REPORT

Longue Hougue South

Environmental Statement

Client: States of Guernsey

Reference: PB5312-RHD-ZZ-XX-RP-Z-0001

Status: Final/01

Date: 18 November 2019

Royal HaskoningDHV
Enhancing Society Together

Open

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Classification
Open

MANAGEMENT SYSTEM CERTIFICATION
DNV·GL
ISO 9001 = ISO 14001
ISO 45001

Table of Contents

Table of Tables

Table of Figures

Appendices

1 Introduction

1.1 The Purpose of this Document

1.1.1 This document is the Environmental Statement (ES) for the Longue Hougue South inert waste facility ("the Project") (**Figure 1-1**). A full project description is given in **Chapter 4 Project Description**.

1.1.2 The purpose of this ES is to provide impact assessments as required by The Land Planning and Development (Environmental Impact Assessment) Ordinance 2007, and to provide the information required within Schedule 5 of this Ordinance (see **Chapter 2 Planning, Policy and Legislative Context**). Consequently, this ES describes the environmental impacts associated with an inert waste facility, including the associated infrastructure both onshore and offshore, which may arise from construction and operation including maintenance activities.

1.1.3 This ES has been informed by an informal Environmental Impact Assessment (EIA) Scoping Opinion, which was used to support consultation and to inform the scope of the EIA. Feedback from this consultation has been used to inform the concept design of the Project, as well as feed into the impact assessment process.

1.1.4 This ES will be submitted with an application for planning permission under The Land Planning and Development (General Provisions) Ordinance, 2007. Further information on the legislative context is provided in **Chapter 2 Planning, Policy and Legislative Context**.

1.1.5 The overall objectives of the EIA for the project are to:

- avoid or minimise potential negative impacts;
- identify opportunities for positive impacts; and
- to meet the requirements of Schedule 3 and Schedule 5 of the Land Planning and Development (EIA) Ordinance 2007.

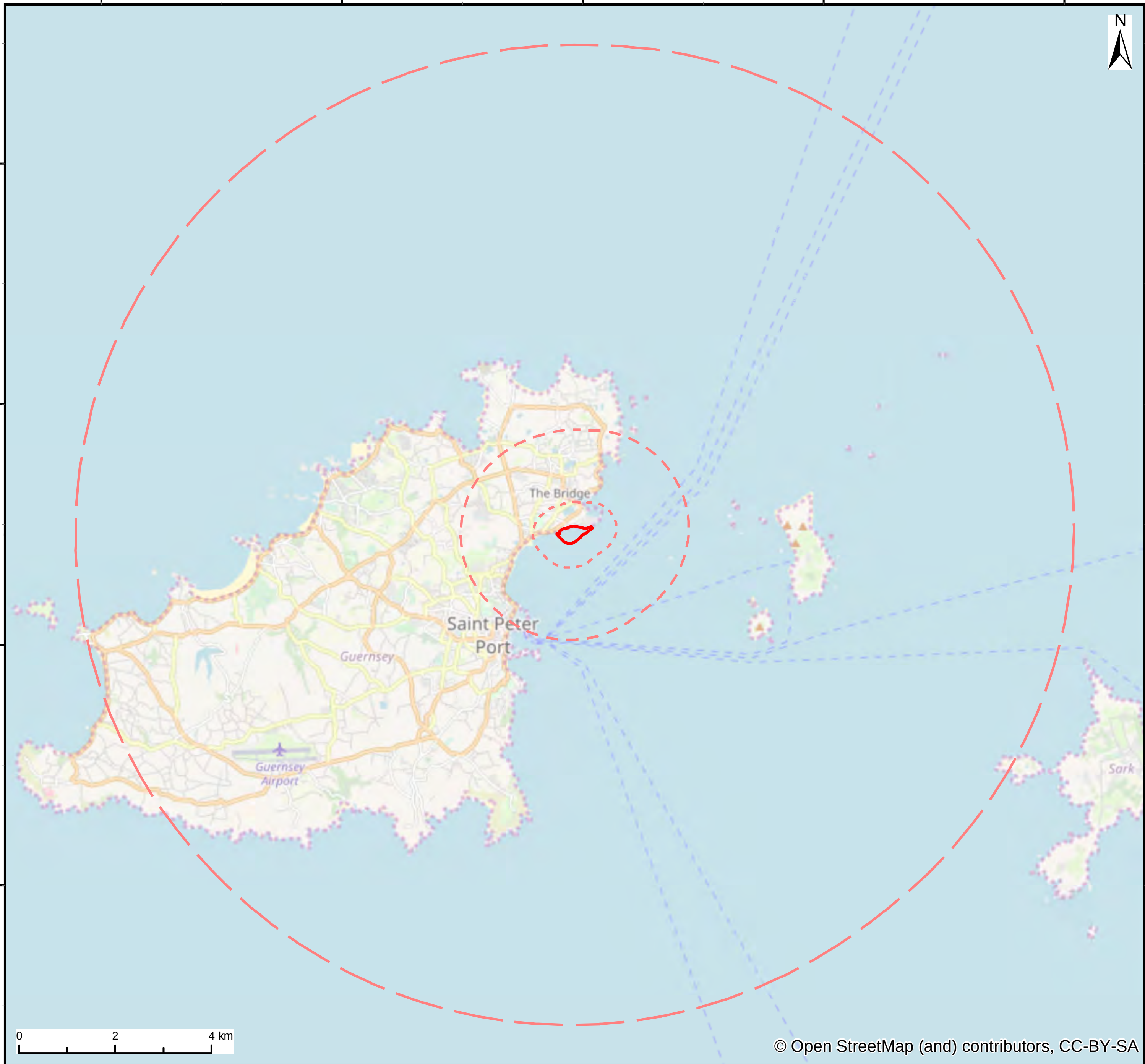
1.2 Need for the Project

1.2.1 The definition of waste is provided in Environmental Pollution (Guernsey) Law 2004 (the Law) as:

"waste" includes –

(a) scrap material, effluent or other unwanted surplus arising from any process, and

(b) anything which requires to be disposed of as being broken, worn out, contaminated, spoiled or redundant.



Legend:

Outline of Proposed Development

Proposed Development Buffers

0.5km

2km

10km

Client:	Project:
States of Guernsey	Longue Hougue South EIA

Title:

Site Location and Study Area

Figure:	1.1	Drawing No:	PB5312-300-019

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	17/04/2019	FC	PT	A4	1:120,000

Co-ordinate system: Guernsey Grid

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1.2.2 The Law does not define inert waste.

1.2.3 The Waste Disposal and Recovery Charges Regulations, 2018 defines Inert Waste as: '*waste:*

(a) which does not undergo any significant physical, chemical or biological transformations,

(b) which does not dissolve, burn or otherwise physically or chemically react, biodegrade or adversely affect other matter with which it comes into contact in a way likely to give rise to environmental pollution, and

(c) which has insignificant total leachability and pollutant content and the leachate of which has insignificant ecotoxicity (in particular, not such as to endanger the quality of any water).'

1.2.4 This definition aligns with the definition of Inert waste provided in the European Commission (EC) Landfill Directive (1999/31/EC).

1.2.5 In recent years the States of Guernsey (the States) has relied on coastal land reclamation to manage inert waste from the construction and demolition industry. The Longue Hougue Reclamation Facility on the east coast of Guernsey has received the Island's inert waste since 1995. Recent surveys of the current site at Longue Hougue have indicated that the site is nearing the end of its life, with estimates suggesting less than three to five years of void space remaining. A longer-term solution is therefore now required to ensure the sustainable management of these materials. For that purpose, a strategy for inert waste has been drawn up that will provide a framework against which sound investment decisions can be made. The Strategy identifies short, medium-term and long-term options for managing inert waste in Guernsey in line with the Waste Hierarchy. Alongside the strategy an Options assessment was undertaken to derive a short list of options for inert waste management, including inert waste disposal sites. The site recommended as the 'preferred way forward' from the short list, was the site south of the existing Longue Hougue facility, 'Longue Hougue South'. This option provides a medium-term solution and would be a relatively easy transition to an inert waste reclamation site. However, the site requires further investigation in terms of potential environmental impacts.

1.2.6 Royal HaskoningDHV was commissioned by the States to undertake an Inert Waste Management Capacity Assessment for the existing Longue Hougue Reclamation Site in 2017. This assessment was commissioned to ensure that an up-to-date and accurate picture of the Island's inert waste stream is provided for the strategic appraisal of options at that time.

1.2.7 The forecast of likely available residual inert waste is presented in Chapter 4 Project Description (**Figure 4-5** and **Table 4-3**). This is in as far as future construction industry activity and the amount of re-use and recycling can be predicted, amongst other factors and is based upon 2018 arisings data made available in July 2019. The worst-case scenario for this assessment would see capacity reached in 2021. A more conservative case would see capacity of the site reached by mid-2022 to 2024 approximately, based on the forecast assumptions at that time.

1.2.8 Considering the remaining capacity issue at the current Longue Hougue Reclamation Site, the States identified the need to develop an inert waste management solution to follow on from the existing land reclamation site at an early stage to ensure continuity of services. The States sought to ensure that any future inert waste management proposals would provide a solution to inert waste management for the next 20 years, in line with the Waste Hierarchy, as identified in the Inert Waste Strategy. The process and conclusions of the strategic appraisal are detailed in **Chapter 3 Site Selection and Consideration of Alternatives**, though the final conclusion is that the Project would provide a suitable solution for the management of the islands residual inert waste.

1.3 Structure of the Environmental Statement

1.3.1 The structure of this Environmental Statement is presented in **Table 1-1**.

1.3.2 A Non-Technical Statement (NTS) has also been prepared as a standalone document, which summarises the content of this ES in a short, easy to read format.

Table 1-1: Environmental Statement (ES) Structure

Section	Description
Section 1 (this Section) – Introduction	This section introduces the purpose of the EIA and the need for the project and sets out the ES structure.
Section 2 – Planning, Policy and Legislative Context	This section sets out the planning and legislative context for the project and the Waste Hierarchy
Section 3 – Site Selection and Consideration of Alternatives	This section provides a history of the Project and Inert Waste Strategy including the previous studies/reports that have been produced in the decision-making process, and the reason for the Project. It also provides a summary of alternative options and why they were not selected during the high-level EIA and options appraisal process.

Section	Description
Section 4 – Project Description	This Section includes a detailed description of the preferred option. It also provides a description of the construction methodology and operational characteristics of the site.
Section 5 – EIA methodology	This section provides a description of the general EIA methodology along with the generic criteria for assessing significance and the terminology used in this ES. If a specific topic uses a different approach for a particular receptor, this is provided in the relevant topic section of the ES.
Section 6 – Consultation	This section provides a summary of the consultation undertaken during the whole EIA process prior to submission of the ES.
Sections 7 – 19 Topic Chapters	These sections provide the assessment of predicted environmental impacts of the proposed Project which have been scoped into this ES for each topic.
Section 20 - Summary	This section provides a summary of the predicted environmental impacts of the proposed Project on the environmental receptors both alone and in combination with other plans, projects or policies.
Appendices	Technical data of relevance that have been used to inform this report.
References	Literature used to inform the development of this ES.
Abbreviations and Acronyms	List of abbreviations and acronyms used in this ES

2 Planning, Policy and Legislative Context

2.1 Introduction

2.1.1 The purpose of this chapter is to:

- describe the legislative and policy context of relevance to this EIA;
- describe the existing international and national (the States', and UK where applicable) legislative environment for land use planning and identify the environmental objectives contained with existing legislation;
- describe the existing States' policy environment for land use planning and identify the environmental objectives contained with existing policy; and
- carry through these legislative and policy objectives against which to assess the potential impacts of the project as part of the EIA process.

2.2 Background to Environmental Impact Assessment

2.2.1 The Land Planning and Development (Environmental Impact Assessment) Ordinance, 2007 sets out the requirements for EIA for developments and policies relating to proposed developments. Development involving the management of inert waste and land reclamation falls under Schedule 1 of the EIA Ordinance, and therefore the proposal is considered to be 'EIA type development'. EIA type development requires an Environmental Statement (ES).

2.2.2 This must (as stated in Schedule 5 of the Ordinance) include:

a. a description of the development comprising information on the development site and the design, size and nature of the development;

b. the data required to identify and assess the main effects which the development is likely to have on the environment;

c. an outline of the main alternatives considered by the applicant or the person minded to carry out the development to the development selected including:

   i. where relevant in relation to certain aspects of the development, the option of not carrying out certain parts of the development; and

   ii. an indication of the main reasons for the choice of the development selected taking into account the environmental effects of those alternatives.

d. an assessment of the likely significant environmental effects of the development including an assessment of any matters, where relevant, which the Scoping Opinion specifies must be addressed in the EIA and such an assessment must:

i. specify the methodology used in carrying out that assessment;

ii. specify the criteria used for assessing environmental effects;

iii. include a suitable and sufficient assessment of the main significant effects which the development is likely to have on the environment including effects on population, fauna, flora, soil, water, air, climatic factors, material assets (including the architectural and archaeological heritage) and landscape;

iv. specify how it is intended to remedy or mitigate and manage the likely significant adverse effects on the environment and to enhance any likely significant beneficial effects on the environment;

v. specify the likely residual effects on the environment after the likely significant adverse effects are mitigated and managed as set out in sub-item (iv); and

vi. specify how the effects on the environment arising from the development are to be monitored when and after the development is carried out.

e. a description of any difficulties encountered by the applicant, or person minded to carry out the development, in compiling the information required to prepare the Environmental Statement and in particular any difficulties arising from technical deficiencies or lack of relevant knowledge;

f. a glossary of terms used in the Environmental Statement;

g. figures illustrating the material set out in the Environmental Statement;

h. the following appendices:

i. any studies carried out to enable the Environmental Statement to be compiled; and

ii. a copy of the relevant Scoping Opinion (not yet included within this ES, to be appended when issued by States of Guernsey).

i. a non-technical summary of the matters set out in this paragraph.

2.2.3 An Environmental Statement must also include such of the following matters as is reasonably required to enable the Department to assess the environmental impact of the development:

a. a summary of any relevant policies in a Plan or Local Planning Brief;

b. a summary of the planning history of the development site insofar as it is relevant to the effects of the development on the environment.

International Standards and Guidance

2.2.4 **Table 2-1** presents the standards and guidance that have specific thresholds which have been used to develop criteria against which to assess the impacts of developments.

Table 2-1: Standards and Guidance used to Develop Assessment Criteria

International legislation	Relevance
EU Directive 2006/7/EC Bathing Water Directive	Bathing water quality standards (for *Escherichia coli* and *Intestinal enterococci*)
EU Directive 2008/105/EC on Environmental Quality Standards	Drinking water quality standards
EU Directive 2008/50/EC on ambient air quality and cleaner air for Europe	Air pollution standards

Habitats Directive

2.2.5 The States does not have specific legislation for the adherence to the European Union's Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (the Habitats Directive) or the Council Directive 2009/147/EC on the conservation of wild birds (the Birds Directive). However, to adhere to best practice and comparable approaches to European and UK EIAs, we propose to apply the European Commission Habitats Directive Approach (Article 6(4)) as implemented in England and Wales (in the Conservation of Habitats and Species Regulations 2017) where relevant.

2.2.6 UK Government policy (ODPM, 2005) states that internationally important wetlands designated under the Ramsar Convention 1971 (Ramsar sites) are afforded the same level of consideration as those sites designated under the Habitats Directive (Special Area of Conservation (SAC)) and the Birds Directive (Special Protection Area (SPA)) for the purpose of considering development proposals that may affect them. A similar approach to Ramsar sites has therefore been taken in this EIA.

2.2.7 The proposed development site is located approximately 1.8km from the Herm, Jethou and The Humps Ramsar Site. Given the location of the proposed inert waste reclamation facility relatively near to the Ramsar site, there is the potential for change to coastal processes, and therefore impacts to the habitats and species it is designated for. Furthermore, the proposed development is not connected with the management of the Ramsar site therefore, the project will be considered in line with the assessment approach presented in the Habitats Directive (Article 6(4)). Consequently, a 'shadow' Habitats Regulations Assessment (HRA) Screening exercise has been carried out as part of the EIA process and is presented within this ES.

2.3 Relevant Guernsey Legislation

2.3.1 The following sub-sections summarise the relevant States' legislative requirements related to the environment and protection of human health.

Land Planning and Development (Guernsey) Law 2005

2.3.2 The Land Planning and Development (Guernsey) Law 2005 sets the legal context for the land use planning in Guernsey. Section 1 of the Law states the purposes of the Law is to protect and enhance, and to facilitate the sustainable development of, the physical environment of Guernsey. In this regard, the Law seeks to:

- "protect and enhance the natural beauty and amenity of Guernsey's coasts, cliffs, countryside and other open spaces;
- protect and enhance Guernsey's heritage of buildings, monuments and sites of historic, architectural or archaeological importance;
- preserve and promote biological diversity;
- achieve quality in the design and implementation of development so as to respect Guernsey's historic, architectural and archaeological heritage and make a positive contribution to the built environment;
- maintain a balance between the competing demands of the community for the use of land; and
- ensure that all development is carried out in a sustainable manner and in such a way as to achieve a safe and healthy living and working environment.

Land Planning and Development (General Provisions) Ordinance, 2007

2.3.3 The Land Planning and Development (General Provisions) Ordinance, 2007 sets out more detailed material considerations required during land use planning in Guernsey. Specifically, the Ordinance sets out the following material consideration during land use planning:

"*13. (1) Subject to section 12, in addition to the matters to which the (Development and Planning) Authority is required to have regard under the Law and this Ordinance, in determining an application for planning permission, the Authority must have regard to -*

- *the likely effect of the development on the natural beauty and landscape quality of the locality in question;*
- *the character and quality of the natural and built environment which is likely to be created by the development;*
- *the appropriateness of the development in relation to its surroundings in terms of its design, layout, scale, siting and the materials to be used;*
- *the likely effect of the development on the character and amenity of the locality in question;*
- *the likely effect of the development on roads and other infrastructure, traffic and essential services;*
- *the likely effect of the proposed use to which the application site is to be put and the likely effect of any other use to which it could be put without obtaining a further planning permission;*
- *any proposed planning covenant which can be entered into in accordance with section 23 of the Law – (i) which provides a benefit having regard to the purposes of the Law or any other purpose for which a planning covenant may be entered into, and (ii) which would have a material connection with the development;*
- *the likely effect of the development on parks, playing fields and other open spaces; and*
- *the likely effect of the development on the reasonable enjoyment of neighbouring properties*".

Environmental Pollution (Guernsey) (Amendment) Law, 2015 ('the Amendment Law')

2.3.4 The Environmental Pollution (Guernsey) (Amendment) Law, 2015 ('the Amendment Law') revised the Law to expand coverage from 'Disposal' to 'the disposal and recovery' of waste; and makes reference to the revised Waste Framework Directive ('rWFD' – 2008/98/EC) for the definitions of the terms 'disposal' and 'recovery'. The Amendment Law implements the waste hierarchy. The States' Solid Waste Strategy and following on from that, the Inert Waste Strategy, was formulated with the principle of the Waste Hierarchy at its core. The Waste Hierarchy promotes the management of waste in order of priority: Prevention – Re-use – Recycling – Recovery – Disposal.

2.3.5 In addition to these key pieces of legislation, the wider States' legislative context has been reviewed to inform this EIA. As part of this process, **Table 2-2** presents the legislation that has been considered.

Table 2-2: States' Environmental Legislation Relevant to the EIA

Legislation relevant to the EIA
Planning[1]
The Land Planning and Development (Guernsey) Law, 2005
The Land Planning and Development (Environmental Impact Assessment) Ordinance, 2007
The Land Planning and Development (General Provisions) Ordinance, 2007
The Land Planning and Development (Special Controls) Ordinance, 2007
The Building (Guernsey) Regulations, 2012 (and Guernsey Technical Standards issued under those Regulations)
Waste
Refuse Disposal Ordinance, 1959
The Transfrontier Shipment of Waste (Guernsey) Ordinance, 2018
The Environmental Pollution (Guernsey) (Amendment) Law, 2015
The Environmental Pollution (Guernsey) Law, 2004[2]
The Environmental Pollution (Waste Control and Disposal) Ordinance, 2010
The Environmental Pollution (Waste Control and Disposal) (Fees) Regulations, 2010
The Waste Control and Disposal (Duty of Care) Regulations, 2010
The Waste Control and Disposal (Exemptions) Regulations, 2010
The Waste Control and Disposal (Specially Controlled Waste) Regulations, 2010
The Parochial Collection of Waste (Guernsey) Law, 2015
Waste Management Services (Charging) Ordinance, 2018
Waste Disposal and Recovery Charges Regulations, 2018 (as amended)
Water / Sea
The States Water Supply (Guernsey) Laws, 1927 to 1997
Loi Relatif aux Douits, 1936
The Watercourses Ordinance, 1957 (as amended)

[1] This list only includes planning and building control legislation most relevant to the assessment of the environmental effects of development.
[2] The parts relating to water and air pollution and pollution by sound and light are not yet in force but there is approved policy to bring into force the water pollution part and enact legislation under it to replace some of the current water pollution legislation.

Legislation relevant to the EIA
States Water Supply (Prevention of Pollution) Ordinance, 1966 (as amended)
Sewerage (Guernsey) Law, 1974 (as amended)
Part III of the Food and Environment Protection Act 1985 as extended to Guernsey with modifications
The Water Byelaws (Guernsey) Ordinance, 2003
Public Health / Nuisances
Loi relative à la Santé Publique, 1934
The Public Health Ordinance, 1936 (as amended)
Other legislation: Health and Safety[3]
Loi Relative aux Explosifs, 1905
Loi Relative aux Huiles ou Essences Minerales ou Autre Substances de la Meme Nature, 1924
Health and Safety at Work (General)(Guernsey) Ordinance, 1987 (as amended)
The Health and Safety (Gas)(Guernsey) Ordinance, 2006
The Control of Poisonous Substances (Guernsey) Regulations, 2014 (as amended)
Other legislation: Energy
The Renewable Energy (Guernsey) Law, 2010
The Renewable Energy (Guernsey) Ordinance, 2015
Other legislation: Shipping, Harbours and Maritime
Harbours Ordinance, 1988 (as amended)
Merchant Shipping (Bailiwick of Guernsey) Law, 2002
Merchant Shipping (Bailiwick of Guernsey) Law 2002 (Commencement) Ordinance, 2013
Security of Ships and Port Facilities (Guernsey) Ordinance, 2004
Prevention of Pollution (Guernsey) Law, 1989

[3] *In enforcing the above Health and Safety legislation, regard is had by the Guernsey Health and Safety Executive to the following UK Health and Safety Executive guidance insofar as consistent with Guernsey legislation:*
- *PADHI – Planning Advice for Developments near Hazardous Installations;*
- *Land use planning advice around large scale petrol storage sites (SPC/TECH/GENERAL/43).*

Legislation relevant to the EIA
Other legislation: Animals and Animal Health
The Animal Welfare (Guernsey) Ordinance, 2012

2.4 Policy Context

2.4.1 The following sub-sections summarise the relevant States' land use policies and how they recommend that the environment is considered during the land use planning process. The following sub-sections also identify those environmental objectives identified within the policy documents described.

Future Guernsey Plan 2017 to 2021

2.4.2 This is the overarching policy document that prioritises spending and policy within Guernsey.

2.4.3 The Future Guernsey Plan (previously known as the Policy & Resources Plan) is centred on the 20-year vision for Guernsey, which is:

> *'We will be among the happiest and healthiest places in the world, where everyone has equal opportunity to achieve their potential. We will be a safe and inclusive community, which nurtures its unique heritage and environment and is underpinned by a diverse and successful economy.'*

2.4.4 In November 2017, the States agreed its policy priorities for 2017 - 2021. The States updates these policy priorities annually, and there were last updated in June 2019.

2.4.5 The plan focuses on the following areas:

- Our community (Inclusivity and committal to social justice, Improving standards of living: tackling poverty, lifelong learning).
- Our quality of life (Better life indicators, healthy community, safe and secure place to live, fighting climate change).
- Our place in the world (Centre of excellence and innovation, mature international identity).
- Our economy (Strong sustainable and growing economy, sustainable public finances).

Strategic Land Use Plan 2011

2.4.6 The Strategic Land Use Plan (SLUP) is a statutory document prepared by the Strategic Land Planning Group under the 2005 Planning Law. It sets out a 20-year agenda for land use planning in Guernsey and guides and directs the DPA in the preparation of detailed land use policies set out within the Development Plans. The SLUP concentrates on the action that needs to be taken to use and manage land as a strategic resource, rather than only looking narrowly at individual topics and land supply targets.

2.4.7 The SLUP includes ten core objectives "to improve the quality of life of Islanders and to support a successful economy while protecting the Island's environment, unique cultural identity and rich heritage through spatial planning policies" (States of Guernsey, 2011b). These objectives include the following environmental objectives, through ensuring that planning polices enable:

- "*the maintenance of a healthy society…that provides for a wide range of leisure opportunities;*
- *the wise management of Island resources such as land, air quality, energy and water;*
- *support to be given to corporate objectives and associated policies relating to the conservation of energy, reduction of our carbon footprint, development of renewable energy and adaptation to climate change;*
- *the protection of local biodiversity and the countryside;*
- *the enhancement of the culture and identity of Guernsey by protecting local heritage and promoting high standards of new development;*
- *the management of solid and liquid waste*" (States of Guernsey, 2011b).

Island Development Plan 2016

2.4.8 The Island Development Plan (IDP) was adopted by the States on 2nd November 2016. It sets out the land use policies for the whole of Guernsey. The plan replaced the Urban Area Plan (UAP) and Rural Area Plan (RAP).

2.4.9 The IDP contains a series of overarching objectives to help deliver the IDP's principal aim of helping to maintain and create a socially inclusive, healthy and economically strong Island, while balancing these objectives with the protection and enhancement of Guernsey's built and natural environment and the need to use land wisely. These high-level statements of intent set out the States' aspirations and expectations for development. They include the following (relevant) environmental objectives:

- **The most effective and efficient use of land and natural resources:** "Good land use planning is essential in delivering sustainable development, which is about meeting the needs of the present while safeguarding the interests of future generations…realised through:

  (i) achieving the prudent use of natural resources, including those that may enable the supply of renewable energy;

  (ii) ensuring the physical and natural environment of the Island is conserved and enhanced;

  (iii) reducing, where practicable, the Island's contribution to greenhouse gases".
- "*The IDP policies have an emphasis towards encouraging brownfield development in the interests of the most effective and efficient use of land and protection of the environment*."
- **Manage the built and natural environment:** "*the IDP policies must ensure protection of the historic environment, but as part of the wider task of balancing economic, social and environmental objectives.*
- *The IDP policies must ensure protection of important landscapes and open spaces…Those areas identified as being of particular importance, in environmental terms, include Sites of Special Significance and Areas of Biodiversity Importance*."
- **Supporting a healthy and inclusive society:** "*The IDP seeks to enable a balance to be achieved between conservation and the needs of disabled people, specifically in relation to Protected Buildings.*
- *The IDP will support the maintenance and enhancement of access to indoor and outdoor recreation, including informal outdoor recreation, access to the countryside, coastal areas and visual access to open areas*" (States of Guernsey, 2016c).

2.4.10 In addition to these environmental objectives, the IDP contains specific polices relating to different environmental receptors and how they must be considered during land use planning. These policies (the 'general policies') will help direct the identification of environmental objectives against which to assess the inert waste management options.

Landscape Character and Open Land

2.4.11 Policy GP1 states that "Proposals will not be supported if they would result in the unnecessary loss of open and undeveloped land which would have an unacceptable impact on the open landscape character of an area" (States of Guernsey, 2016c). Consideration of the landscape character type in which a development sits, distinctive landscape features and local distinctiveness, and visual and physical access provision are all required for a development to have adequately taken into landscape character into account.

Sites of Special Significance (SSS)

2.4.12 Policy GP2 requires that proposed developments follow the mitigation hierarchy when considering impacts to SSSs, and that development proposals demonstrate that they will not have a negative impact upon SSSs, or that where an negative impact will occur that sufficient mitigation can be provided to ensure no net loss of the SSS special interest features, or where mitigation is not possible that any negative impact can be offset, either on or offsite.

Areas of Biodiversity Importance (ABI)

2.4.13 Policy GP3 requires that proposed developments demonstrate that the biodiversity interest of ABIs have been considered as part of the design and development process, with biodiversity interest being protected or enhanced, any negative effects mitigated.

Conservation Areas

2.4.14 Policy GP4 requires that development proposals within a Conservation Area conserves and, where possible, enhances the special character, architectural or historic interest and appearance of the particular Conservation Area.

Protected Buildings

2.4.15 Policy GP5 requires development proposals to extend or alter a Protected Building demonstrate no negative effect upon the special interest of the building or its setting. There is presumption against demolition of a Protected Building unless it is demonstrated that the Protected Building is structurally unsound, or it can be demonstrated that there are overriding benefits to the population centre in which it is situated.

Protected Monuments

2.4.16 Policy GP6 requires development proposals which directly affect a Protected Monument, or the site on which it is located to demonstrate that there will be no negative effect on the special interest of the Protected Monument. There is presumption against demolition of a Protected Monument unless it is demonstrated that the Protected Monument is structurally unsound, is technically incapable of repair and represents a danger to the public.

Archaeological Remains

2.4.17 Policy GP7 requires development proposals which directly affect sites or areas of archaeological importance require an archaeological assessment scheme to be agreed with the States. This scheme will include an archaeological investigation or provision of an archaeological watching brief, the details of which are to be agreed with the States. Depending on the nature of the findings, the States may require that any remains found are preserved in situ.

Sustainable Development

2.4.18 Policy GP9 requires developments to consider the use of energy and resources and any negative impact on the environment through paying particular regard to the location, orientation and appearance of the building, the form of construction, the materials used and its resilience to climate change and flooding; and to acceptable impacts on the amenities of neighbouring properties.

2.4.19 These obligations set out in these policies apply if they are in accordance with other IDP policies. Where there is a conflict, there is a presumption in favour of sustainable development.

Guernsey Biodiversity Strategy

2.4.20 Guernsey's Biodiversity Strategy (States of Guernsey Environment Department, 2015) appraises the current state of Guernsey's ecosystems and identifies the principal threats to its native flora and fauna before outlining a framework for the conservation and enhancement of the island's biodiversity. The strategy includes the following objectives for ensuring the Strategy's overarching aim of conserving and enhancing biological diversity in Guernsey:

- "*To conserve and enhance key local, regional and internationally important species, habitats and sites;*
- *To ensure that biodiversity objectives and considerations are integral to all States' policy, programmes and action;*
- *To increase public awareness and encourage communities and individuals to be involved in the conservation of local biodiversity; and*
- *To monitor and review biodiversity in Guernsey*" (States of Guernsey Environment Department, 2015).

2.5 Planning History of the Site

2.5.1 The Project area comprises intertidal and subtidal habitat and has had no previous planning applications for it or human developments on it. The majority of the adjacent land is reclaimed, but due to the historic nature of the reclamation there were no planning requirements; in particular the current Longue Hougue facility has been since operating since 1995. Whilst no planning requirements were necessary for this, any permanent developments on top of the reclaimed area have gone through the planning process. The north-western end of the landward boundary of the Project borders a residential property, 'Gorselea'. No recent planning applications are noted for the area immediately adjacent to the Project boundary.

2.6 Project Effect on Plans and Policies

2.6.1 **Table 2-3** presents the list of key relevant plans and policies and describes how the Project is compliant or non-compliant with them.

Table 2-3: Project's Compliance or Non-compliance with Plans and Policies

Plan	Policy	Project Compliance / Non-compliance
Future Guernsey Plan 2019 update	Our Quality of life – Healthy Community Encourage active lifestyles for the benefit of the community's health and mental wellbeing	Health and well-being is considered in **Chapter 14 Population and Human Health**. During construction the existing footpath at Longue Hougue South will be kept open to provide ongoing access to walking. Once the breakwater is completed, an additional path will be provided to link into the wider coast path network. Access to these paths provide a means for the residents of Guernsey to pursue a healthy lifestyle.
	Our Quality of life – Safe and Secure Place to Live Ensure we have fit-for-purpose infrastructure to enable us to deliver services appropriately Ensure the built environment is of a high quality, reflecting our local distinctiveness and meeting the needs of businesses based in Guernsey Consider the importance of our marine environment as well as its potential for supporting economic growth	The Project will allow the States of Guernsey to manage waste resources effectively. The breakwater has been designed to meet the need of the facility whilst being of good high-quality design. The appearance of the breakwater is considered in **Chapter 16 Landscape and Visual Character**. The value of the marine Environment is considered in **Chapter 18 Marine Ecology**.

Plan	Policy	Project Compliance / Non-compliance
Strategic Land Use Plan 2011	POLICY LP1: SUSTAINABLE DEVELOPMENT. Achieving social wellbeing and maintaining economic development with high levels of employment are sustainable development priorities for Guernsey. These will be realised through: i. achieving the prudent use of natural resources, including those that may enable the supply of renewable energy ii. ensuring the physical and natural environment of the Island is conserved and enhanced iii. reducing, where practicable, the Island's contribution to greenhouse gases	The principles of sustainable development underpin the design of the inert waste facility. This EIA considers the impact to the physical and natural environment and identifies mitigation where required. The construction and operation of Longue Hougue South will not result in the emission of any greenhouse gases.
	POLICY LP2: CLIMATE CHANGE MITIGATION. Mitigation, through reducing greenhouse gas emissions will primarily be addressed through greater resource efficiency including: i. improving the energy efficiency and carbon performance of new buildings and encouraging existing building occupants to improve efficiency where reasonable ii. reducing the need to travel and ensuring good accessibility to public and other sustainable modes of transport iii. enabling the development and use of renewable energy iv. putting policies in place that facilitate the development of an appropriate waste strategy	The construction and operation of Longue Hougue South will not result in the emission of any greenhouse gases. New buildings have not yet been designed but they will follow energy efficiency principles. The nature of the development is such that people will need to drive, however the location of the inert waste facility next to the other waster services in Guernsey reduces travel between these locations.

Plan	Policy	Project Compliance / Non-compliance
Strategic Land Use Plan 2011	POLICY LP4: SUSTAINABLE DESIGN AND CONSTRUCTION The design and construction of new development and the redevelopment and refurbishment of existing building stock will be expected to incorporate appropriate sustainable construction techniques. This will include: i. giving consideration to how the development can meet higher standards of sustainable development ii. making the best use of natural resources iii. balancing the need to protect the integrity of historic and otherwise important structures with sustainability and resource use priorities iv. seeking flexibility of design to enable buildings to adapt and change over time whist enabling the demolition and rebuilding of structures where greater long term efficiencies can be achieved	The principles of sustainable development underpin the design of the inert waste facility. The re-use of inert waste to reclaim land avoids the need to import fill material. The breakwater is constructed from rock armour that can be dismantled and reused in future if required.
	POLICY LP11: INFRASTRUCTURE AND IMPLEMENTATION. The Development Plan will make provision for the development of Guernsey's infrastructure to meet the social, economic and environmental objectives of the States	This EIA considers the impact to the physical and natural environment and identifies mitigation where required. This is in line with the social, economic and environmental objectives of the States.

Plan	Policy	Project Compliance / Non-compliance
Strategic Land Use Plan 2011	POLICY SLP19: The Development Plans will include measures to prevent the pollution of potable water supplies and sea water as a consequence of development.	The impacts to sea water quality are considered in **Chapter 8 Marine Sediment and Water Quality**.
	POLICY SLP22: The risk of flooding should be carefully evaluated and taken into account when planning for development.	Flooding is considered in **Chapter 9 Surface Water**.
	POLICY SLP31: Particular regard will be given to maintaining the coastline as an environmental, economic and recreational resource while responding to climate change pressures including rising sea levels and to the possible future need for infrastructure development	Change in character of the coastline is considered in **Chapter 16 Landscape and Visual**. Impacts to recreation are considered in **Chapter 14 Population and Human Health**.
Island Development Plan 2016	The Island Development Plan is a Development Plan, prepared by the Development & Planning Authority (hereafter referred to as the Authority) under section 8 of the Land Planning and Development (Guernsey) Law, 2005, which sets out the land planning policies for the whole of Guernsey in a single document. The Principal Aim of the IDP is to ensure land planning policies are in place that are consistent with the Strategic Land Use Plan and which help maintain and create a socially inclusive, healthy and economically strong Island, while balancing these objectives with the protection and	This EIA considers the impact to the physical and natural environment and identifies mitigation where required. This is in line with the social, economic and environmental objectives of the States.

Plan	Policy	Project Compliance / Non-compliance
	enhancement of Guernsey's built and natural environment and the need to use land wisely. To deliver its Principal Aim, the Island Development Plan has six overarching Plan Objectives. These high-level statements of intent set out the Authority's aspirations and expectations for development. All development that is acceptable under the policies of the Island Development Plan will be expected to be consistent with the Plan Objective or Objectives relevant to the specific proposals so that, through reasonable application and in consistency with the provisions of the Strategic Land Use Plan, they can facilitate the achievement of the economic, social and environmental objectives of the States of Guernsey, as set out within the Strategic Land Use Plan. Make the most effective and efficient use of land and natural resources; Manage the built and natural environment; Support a thriving economy; Support a healthy and inclusive society; Ensure access to housing for all; Meet infrastructure requirements.	
Island Development Plan 2016	Policy S1: Spatial Policy. The Spatial Policy is to concentrate the majority of new development in the Main Centres and the Main Centre Outer	Longue Hougue South is located outside of the main centre, however it is located on land that is adjacent to, and surrounded by, the Main Centre. The IDP makes

Plan	Policy	Project Compliance / Non-compliance
	Areas to maintain the vitality of these areas, and to make provision for limited development in the Local Centres to support and enhance them as sustainable settlements and community focal points and to allow for development Outside of the Centres in identified specific circumstances, in accordance with the Strategic Land Use Plan.	provision for certain forms of development outside of local centres where it is of Strategic Importance. The management of inert waste falls within this category. As demonstrated in **Chapter 3 Site Selection and Consideration of Alternatives**, there is no viable long-term alternative location for the proposed Peoject.
Island Development Plan 2016	Policy S4: Outside of the Centres. Outside of the Centres, support will be given for development that meets the requirements of the relevant specific policies of the Island Development Plan.	
Island Development Plan 2016	Policy S5: Development of Strategic Importance. Proposals for development that is of Strategic Importance and which may conflict with the Spatial Policy or other specific policies of the Island Development Plan but which is clearly demonstrated to be in the interest of the health, or well-being, or safety, or security of the community, or otherwise in the public interest may, exceptionally, be allowed where: a. there is no alternative site available that, based on evidence available to the Authority, is more suitable for the proposed development; and, b. the proposals accord with the Principal Aim and relevant Plan Objectives.	

Plan	Policy	Project Compliance / Non-compliance
Island Development Plan 2016	Policy GP1: Landscape Character and Open Land. Proposals will not be supported if they would result in the unnecessary loss of open and undeveloped land which would have an unacceptable impact on the open landscape character of an area. Development will be supported where it: a. respects the relevant landscape character type within which it is set; and, b. does not result in the unacceptable loss of any specific distinctive features that contribute to the wider landscape character and local distinctiveness of the area concerned; and, c. takes advantage, where practicable, of opportunities to improve visual and physical access to open and undeveloped land; and, d. accords with all other relevant policies of the Island Development Plan. Proposals for development that is considered to be significant in terms of scale, setting and appearance will normally be required to include a landscaping scheme.	**Chapter 16 Landscape and Visual** considers the impacts to landscape from the proposed Project. Significant effects to landscape character and visual amenity would occur, but these are not considered to be unacceptable.

Plan	Policy	Project Compliance / Non-compliance
Island Development Plan 2016	Policy GP3: Areas of Biodiversity Importance. Development within an Area of Biodiversity Importance will be supported provided that: a. proposals demonstrate that the biodiversity interest of the site has been considered and taken into account as part of the design and development process; and, b. the biodiversity interest of the area has been protected and, where possible, enhanced; or, c. any negative impacts can be appropriately and proportionately mitigated in accordance with a scheme to be approved by the Authority. The Authority will consider applying planning conditions or entering into a planning covenant to ensure the implementation of mitigation measures. The Biodiversity Strategy for Guernsey, and details emerging from it, will be taken into account when making a decision on a planning application that may affect Areas of Biodiversity Importance. This policy does not apply to householder development within the curtilage of a dwelling.	Impacts to ABIs are considered in **Chapter 18 Marine Ecology** and **Chapter 19 Terrestrial Ecology**. Negative impacts can be mitigated and there are limited residual impacts.

Plan	Policy	Project Compliance / Non-compliance
Island Development Plan 2016	Policy GP6: Protected Monuments. Proposals for development which directly affects a protected monument, or the site on which it is located, will be supported where it is required for a purpose connected with enabling or facilitating access to, or enhancing appreciation of, the protected monument by the public and where there is no adverse effect on the special interest of the protected monument and proposals accord with other relevant policies of the Island Development Plan. There is a presumption against the demolition or partial demolition of a protected monument and this will only be permitted where it is demonstrated that the protected monument is structurally unsound and is technically incapable of repair. and represents a danger to the public so as to outweigh the presumption. Proposals for development outside of the protected monument site but which affect its setting will be supported where the development does not adversely affect the particular protected monument and proposals accord with other relevant policies of the Island Development Plan.	Impacts to protected monuments are considered in **Chapter 15 Material Assets (Archaeology, Built and Cultural Heritage)**. None of the Protected Monuments within the study area will be affected by the Project.

Plan	Policy	Project Compliance / Non-compliance
Island Development Plan 2016	Policy GP7: Archaeological Remains. Proposals that would be likely to adversely affect sites or areas of archaeological importance will be supported where they are in accordance with a scheme, as appropriate and proportionate to the archaeological importance of the site and the development proposed, which is agreed by the Authority, to: a. carry out archaeological investigation and recording prior to the development commencing; or, b. make appropriate and satisfactory provision for an archaeological watching brief and recording during construction and for mitigation measures to avoid damage to the remains and to preserve them in-situ. Where it is not proposed to preserve the remains in situ the Authority will support proposals where it is demonstrated that the benefits of the development outweigh the importance of preserving the remains in-situ and proportionate mitigation is carried out in accordance with a scheme approved by the Authority. In all cases proposals must also accord with all other relevant policies of the Island Development Plan.	Impacts to archaeological remains are considered in **Chapter 15 Material Assets (Archaeology, Built and Cultural Heritage)**. Without mitigation there will be a direct adverse impact to gun emplacement MGU664. Mitigation measures have been identified to retain this asset. These shall be agreed with Guernsey Culture and Heritage curatorial team.

Plan	Policy	Project Compliance / Non-compliance
	The Authority will consider applying planning conditions or entering into a planning covenant to ensure the implementation of mitigation measures. Development which would have an unacceptable negative and damaging impact on remains of international importance will not be supported.	
Island Development Plan 2016	Policy GP8: Design. In order to achieve high standards of design which respects and, where appropriate, enhances the character of the environment, proposals for new development will be expected to: a. achieve a good standard of architectural design, including the design of necessary infrastructure and facilities; and, b. demonstrate the most effective and efficient use of land; and, c. respect the character of the local built environment or the open landscape concerned; and, d. consider the health and well-being of the occupiers and neighbours of the development by means of providing adequate daylight, sunlight and private/ communal open space; and, e. provide soft and hard landscaping where this reinforces local character and distinctiveness and/or mitigates the	The principles of sustainable development underpin the design of the inert waste facility. The re-use of inert waste to reclaim land avoids the need to import fill material. The breakwater is constructed from rock armour that can be dismantled and reused in future if required. Soft landscaping to screen the views locally is identified in **Chapter 16 Landscape and Visual**. ABIs and heritage assets are considered in **Chapter 18 Marine Ecology** and **Chapter 19 Terrestrial Ecology**. Impacts to archaeological remains are considered in **Chapter 15 Material Assets (Archaeology, Built and Cultural Heritage)**.

Plan	Policy	Project Compliance / Non-compliance
	impacts of development and/or contributes to more sustainable construction; and, f. demonstrate accessibility to and within a building for people of all ages and abilities; and, g. with regard to residential development, offers flexible and adaptable accommodation that is able to respond to people's needs over time. Within areas of higher protection, such as Sites of Special Significance, Areas of Biodiversity Importance and Conservation Areas, and where development relates to protected buildings or protected monuments or their settings, development will be expected to conserve the particular special interest of those areas or buildings and the relevant policies relating to those areas shall apply.	
Island Development Plan 2016	Policy GP9: Sustainable Development. Proposals for new development, and the refurbishment, extension and alteration of existing buildings, will be supported where it has been demonstrated that: a. they have been designed to take into account the use of energy and resources and any adverse impact on the environment through paying particular regard to the location, orientation and appearance of the building, the form of	The principles of sustainable development underpin the design of the inert waste facility. The re-use of inert waste to reclaim land avoids the need to import fill material. The breakwater is constructed from rock armour that can be dismantled and reused in future if required.

Plan	Policy	Project Compliance / Non-compliance
	construction, the materials used and its resilience to climate change and flooding; and, b. they will not have unacceptable impacts on the amenities of neighbouring properties or an adverse effect on the special interest of Conservation Areas, protected buildings or protected monuments; and, c. the proposals accord with all other relevant policies of the Island Development Plan. Development of five or more dwellings or any form of development of a minimum of 1,000 square metres of floor area or where development relates to the demolition and redevelopment of a redundant building or a dwelling which has planning permission to be subdivided, or a replacement dwelling on a one for one basis will require a Waste Management Plan to be submitted with a planning application, which shall demonstrate, how waste associated with the development process is to be minimised, how existing materials are to be reused on or off the site and how residual waste will be dealt with.	
Island Development Plan 2016	Policy GP17: Public Safety and Hazardous Development. Proposals for development with the potential to cause, increase or be affected by significant risks to public health or safety will include an assessment of the risk of harm and set	Public Access to the site will be prevented by a security fence. Emissions are considered in **Chapter 12 Air Quality**.

Plan	Policy	Project Compliance / Non-compliance
	out measures to satisfactorily address the risks arising from the proposals. Proposals will not be supported if the level of risk to public health or safety associated with the development is considered to be unacceptable. The Authority may apply additional controls over proposed development within known Public Safety Areas such as those detailed in Annex IX: Public Safety Areas or any other identified Public Safety Area where this is required to ensure public health or safety.	Health and well-being is considered in **Chapter 14 Population and Human Health**.
Island Development Plan 2016	Policy GP18: Public Realm and Public Art. The Authority will expect applicants to consider the relationship of proposed development with the public realm and, where appropriate, will encourage proposals to contribute to the enhancement of the public realm adjoining the development site. This could be achieved through the use of planning conditions or planning covenants. Development proposals within areas of the public realm will be expected to enhance the character and functionality of a locality for the public benefit including through improving accessibility for people of all ages and abilities and appropriate design and use of appropriate materials and	The footpaths through the site will maintain accessibility in the public realm. **Chapter 16 Landscape and Visual** identifies that the gabbro present within the footprint of the Project will be excavated and placed around the site. This will also create a public realm feature.

Plan	Policy	Project Compliance / Non-compliance
	providing suitably located and appropriately designed street furniture. The inclusion of appropriate public art, which takes into account people of all ages and abilities, as an integral part of a proposed new building, development or as a standalone feature within the public realm will be encouraged. In considering proposals for development within areas of the public realm and for the installation of public art, the Authority will take into account the requirements of disabled people to ensure accessibility is retained, improved or enhanced, wherever possible, and the impacts on its setting.	
Island Development Plan 2016	Policy IP2: Solid Waste Management Facilities. Development required to implement the States' Waste Strategy will be supported, providing it accords with all relevant policies of the Island Development Plan. Proposals for development or redevelopment of waste management facilities within the St Sampson's Harbour Action Area, will be supported where they are in accordance with the Principal Aim and relevant Plan Objectives, the Spatial Policy and the relevant Local Planning Brief for the area. Where there is not an approved Local Planning Brief for the St Sampson's Harbour Action Area, or where a proposed	The Project accords with all relevant policies of the IDP.

Plan	Policy	Project Compliance / Non-compliance
	development is of a minor or inconsequential nature, proposals will be supported providing that the development: a. would not prejudice the outcome of the Local Planning Brief process; or, b. would not inhibit the implementation of an approved Local Planning Brief; and, c. would accord with all other relevant policies of the Island Development Plan. Other than within the Longue Hougue Key Industrial Area, proposals for new waste management facilities required as part of the States' Waste Strategy will be regarded as Development of Strategic Importance (see Policy S5: Development of Strategic Importance). Other new waste management facilities will only be permitted where they are located within Key Industrial Areas or Key Industrial Expansion Areas and accord with all other relevant policies of the Island Development Plan. Proposals for alterations or extensions to existing waste management facilities on sites other than Longue Hougue and Mont Cuet will be considered on a case-by-case basis and must be an integral part of the States' Waste Strategy or required to comply with Environmental Health waste licensing or other legal requirements.	

Plan	Policy	Project Compliance / Non-compliance
	In all cases, development must be appropriately located having regard to the Spatial Policy and must accord with all other relevant policies of the Island Development Plan. Facilities that are intended for personal use, such as bring bank sites, should be located in Main Centres, Main Centre Outer Areas or Local Centres. Sites Outside of the Centres will only be acceptable where it can be demonstrated that no suitable sites are available within a Centre. Where possible these should be located in close proximity to other community facilities.	
Island Development Plan 2016	Policy IP3: Main Centre Port Development. Proposals for development or redevelopment within St Peter Port Harbour and St Sampson's Harbour will be supported where they are in accordance with the Principal Aim and Spatial Policy of the Island Development Plan, are consistent with the relevant Plan Objectives of the Island Development Plan and are in accordance with an approved Local Planning Brief for the area. Where there is not an approved Local Planning Brief for a Harbour Action Area or where the proposed development is of a minor or inconsequential nature, proposals for port related development that is essential to the effective, efficient and safe operation of the ports will be supported providing that the	The Project accords with all relevant policies of the IDP.

Plan	Policy	Project Compliance / Non-compliance
	development would not prejudice the outcomes of the Local Planning Brief process and would not inhibit the implementation of an approved Local Planning Brief. Where there is not an approved Local Planning Brief for a Harbour Action Area and where development is not of a minor or inconsequential nature, proposals for operational development required for the functioning of the Ports will be supported providing that the development: a. would not prejudice the outcomes of the Local Planning Brief process; and, b. would not inhibit the implementation of an approved Local Planning Brief; and, c. would not have an adverse effect on the distinctive character and historic setting of the harbours and quayside or on important public views. Proposals which prejudice the effective, deficient and safe operation of the Ports will not be permitted.	
Island Development Plan 2016	Policy IP6: Transport infrastructure and support facilities. Development proposals that encourage a range of travel options to and within the Main Centres and the Main Centre Outer Areas will be supported, where they are compatible with other relevant policies of the Island Development Plan.	The location of the development is accessible by foot as well as public transport.

Plan	Policy	Project Compliance / Non-compliance
	Development proposals within the Main Centres and the Main Centre Outer Areas will be expected to be well integrated with the transport network and make provision for infrastructure and facilities that will assist in people being able to commute to the site using a range of transport options including by bicycle or on foot. Throughout the Island, the Authority will support proposals for public infrastructure that would assist in providing greater transport choice where these accord with all other relevant policies of the Island Development Plan. New large scale public infrastructure will be considered under Policy S5: Development of Strategic Importance. In all cases, when considering proposals for development, the Authority will take into account the provision of appropriate levels of bicycle and motorcycle parking in accordance with the guidance set out in Supplementary Planning Guidance: Parking Standards and Traffic Impact Assessment.	
Island Development Plan 2016	Policy IP9: Highway Safety, Accessibility and Capacity. In considering proposals for development the Authority will take into account: a. the existing public road network's ability to cope with any increased demand as a result of the development and may require physical alterations to the highway or the	**Chapter 11 Traffic and Transport** considers the future traffic demand as a result of the Project.

Plan	Policy	Project Compliance / Non-compliance
	implementation of an operational scheme to manage the impact of the development on the road network (a Traffic Impact Assessment may be required); and, b. the access requirements of people of all levels of mobility and health. In considering proposals for enhancement to access of developments or to improvements to the local highway network the Authority will seek to ensure, wherever possible, that they do not result in adverse impacts on the special interest or character or appearance of a Conservation Area, protected building or protected monument, or elsewhere, wherever possible, on the landscape character or distinctive natural or built features that contribute positively to the character of the wider area.	
Island Development Plan 2016	Policy IP10: Coastal Defences. Proposals for new or replacement coastal defences will be considered against Policy S5: Development of Strategic Importance.	Longue Hougue South is located outside of the main centre, however it is located on land that is adjacent to, and surrounded by, the Main Centre. The IDP makes provision for certain forms of development outside of local centres where it is of Strategic Importance. The management of inert waste falls within this category. As demonstrated in **Chapter 3 Site Selection and Consideration of Alternatives**, there is no viable long-term alternative location for the proposed Project.

Plan	Policy	Project Compliance / Non-compliance
Guernsey Biodiversity Strategy	The Biodiversity Strategy for Guernsey will identify priority species and habitats using criteria drawn up locally and informed by several other sources including International Conventions, global and national conservation status, changes in population and distribution, and the risk of specific threats.	The Guernsey Biodiversity Strategy does not yet have Action Plans for individual Species. **Chapter 18 Marine Ecology** and **Chapter 19 Terrestrial Ecology** consider the impacts to protected species based on the known environment.
Guernsey Coastal Defence Strategy	The purpose of the strategy is to establish a sustainable policy for the management of coastal defences for the island. The principal objectives of the strategy are: • To provide appropriate coastal defences which are technically sound, economically justified and environmentally acceptable; • To manage the frontage in sympathy with natural and coastal processes; • To provide best value for money considering capital, maintenance and emergency expenditure in achieving a sustainable coastal defence and beach management; • To provide a framework which can ensure consistency of approach to the management of defences within the study area; • To formulate a comprehensive management plan. The strategic objectives are used in the appraisal of options and hence the development of particular strategies within	The proposed Project will not preclude the objectives or policy options of the Guernsey Coastal Defence Strategy.

Plan	Policy	Project Compliance / Non-compliance
	each coastal unit. They are necessarily wide ranging so that they are relevant to the entire island coastlines. More specific interests are identified for each coastal unit as part of the appraisal process.	
Guernsey Coastal Defence Strategy	Coastal Unit 18: Longue Hougue South Inert Waste Landfill Site will be located within Coastal Unit 18 of the Guernsey Coastal Defence Strategy. This unit extends between Vale Castle and Spur Point, including the whole of St Sampson Harbour, and is approximately 1,800m in length. The recommended method that was proposed to hold the line within this unit was Continuing Existing Practice (Sustain), consisting of regular re-pointing of the masonry structures and annual inspections of defences. This method ensures the integrity of the man-made defences for the life of the strategy and hence the assets they protect.	The proposed Project will not preclude the objectives or policy options of the Guernsey Coastal Defence Strategy.
	Coastal Unit 19. The proposed development will be adjacent to Coastal Unit 19 of the Guernsey Coastal Defence Strategy. Coastal Unit 19 extends between Spur Point and La Salerie, forming Belle Grève Bay. It measures approximately 2,400m in length. The preferred strategic policy for this frontage is Option 2, to Raise the Seawall.	

3 Site Selection and Consideration of Alternatives

3.1 Introduction

3.1.1 The purpose of this chapter is to meet the legislative requirements of the Land Planning and Development (Environmental Impact Assessment) Ordinance, 2007 and Environmental Pollution (Guernsey) Law, 2004.

3.1.2 The Land Planning and Development (Environmental Impact Assessment) Ordinance, 2007 sets out the requirements for EIA for developments and policies relating to proposed developments. This must (as stated in Schedule 5 of the Ordinance) include:

a. an outline of the main alternatives considered by the applicant or the person minded to carry out the development to the development selected including:

   i. where relevant in relation to certain aspects of the development, the option of not carrying out certain parts of the development; and

   ii. an indication of the main reasons for the choice of the development selected taking into account the environmental effects of those alternatives.

3.1.3 In developing an inert waste management solution, under the Environmental Pollution (Guernsey) Law, 2004, the Guernsey Waste section of the States of Guernsey Trading Assets is required to identify the 'Best Practical Environmental Options' (BPEO) for the disposal of waste. BPEO is one of the key principles to guide progress towards sustainable waste management practices. It entails a systematic and balanced assessment of options against a variety of criteria, in order to identify which option(s) provide the maximum environmental, economic and social benefits, as well as meeting technical and legislative constraints.

3.1.4 This chapter describes the 'do nothing' scenario, whereby no scheme would be built. This is necessary as a benchmark to consider the Proposal and alternative options against. It also sets out the alternatives considered and the decision-making process behind the reason for rejection of these and the selection of the preferred option.

3.2 Do Nothing Scenario

3.2.1 The Longue Hougue reclamation facility provides the current strategic option for the management of inert waste. It accepts 'Household Waste or Commercial Waste, or a mixture of such waste, which is Inert Waste', as defined in the Waste Disposal and Recovery Charges Regulations, 2019. Inert Waste generally covers wastes such as: soil, stone, hardcore, gravel, sand, non-recyclable glass, concrete and ceramics.

3.2.2 In recent years the States has relied on coastal land reclamation for the management of inert waste from the construction and demolition industry. The Longue Hougue Reclamation Facility on the east coast of Guernsey has received the Island's inert waste since 1995. Recent surveys of the current site at Longue Hougue have indicated that the site is nearing the end of its life, with estimates suggesting less than three to five years of void space remaining.

3.2.3 Despite a modern policy context where the minimisation or prevention of inert waste is encouraged by efficient design; and inert waste is recovered locally for re-use in construction; both because of focussed policy drivers, there will still be residual inert waste that requires managing. In a 'do-nothing' scenario there would be no suitable long-term solution to manage inert waste on the Island that cannot otherwise be prevented or recovered. This would result in a breach of the obligations of Guernsey's Waste Disposal Authority to ensure the operation of Guernsey's public waste management system and comply with the requirements of the current Inert Waste Management Strategy; and to ensure the provision of places for the recovery or disposal of waste in accordance with the Environmental Pollution (Guernsey) Law, 2004 and Environmental Pollution (Guernsey) (Amendment) Law, 2015 ('the Amendment Law'). Therefore, 'do nothing' is not an acceptable option.

3.3 Selection of the 'Preferred Way Forward' Option

Overview

3.3.1 The options appraisal process has been undertaken over several years and comprises the following stages:

- Identification of a long-list of potentially suitable options for inert waste management;
- Identification of environmental, social, and economic objectives and criteria against which to screen long-list of options to determine BPEO;
- Conducted High Level EIA against the BPEO short-listed options;
- Selection of the preferred solution(s); and
- Conduct detailed EIA against the solution which has currently been identified as 'the preferred way forward' (this report).

Long List of Options

3.3.2 A cross-departmental team of officers from the States conducted an initial review of options for an inert waste management solution in 2014. This review identified a long-list of 51 options (15 main options and several sub-options) for future inert waste management in Guernsey. This long list included a combination of alternative locations for receiving inert waste, as well as opportunities for reducing, reusing and recycling inert waste as per the Waste Hierarchy.

3.3.3 This long list was assessed according to a BPEO process.

3.3.4 A review of these options was undertaken during the strategic options appraisal process (as reported in the Inert Waste Management Strategy Options Report (Royal HaskoningDHV, 2017b)) and the 'long-list' of options identified by the States was reduced to a 'second-pass' list of 20 options (comprised of sub-options identified within the long-list) on the basis of:

- Capacity – any option with a capacity of less than one year was ruled out due to cost associated with implementation;
- Safeguarded / protected sites – if a site has been allocated by planning or another States department for a specific purpose, which did not involve the management of inert waste, it was ruled out;
- Policy or regulatory constraints - where Guernsey Law, the Guernsey planning system; or European Law places a policy or regulatory restriction on the option to the extent that it is unlikely to be viable, it was ruled out.

Short List of Options

3.3.5 The resulting 'second-pass' options (listed in **Table 3-1**) were assessed in accordance with a High Level EIA process. In the absence of any published guidelines on undertaking High Level EIA, the approach followed best practice regarding strategic assessment – specifically following the methodology set out in the European Council's Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment (the Strategic Environmental Assessment (SEA) Directive), and the guidelines on SEA set out in the UK's Office for the Deputy Prime Minister SEA guidelines (ODPM, 2005).

Table 3-1: 'Second-pass' Options for an Inert Waste Management Solution (Options Subject to High Level EIA)

Option No. (derived from original long list)	Site / Option Name
1	Airport Runway Extension (eastern end) (potential use of inert material)
3.1	Beach-raising on West Coast
4.1	Cotes des Amarreurs

Option No. (derived from original long list)	Site / Option Name
4.15	Guillotine Quarry
4.18	L'Epine Quarry
4.19	Paradis Quarry
4.24	Barker's Quarry
5	Les Vardes Quarry
8.1	Longue Hougue South
8.2	Black Rock Option 1 (Harbour)
8.3	Black Rock Option 2
8.4	Baie De Pecqueries
8.5	North of Mont Cuet/Creve Coeur
8.6	Albecq
8.7	East of QEII Marina (St Peter Port)
8.8	Havelet Bay
11	Raising level of existing Land Reclamation at Longue Hougue
13	Increase in re-use / recycling of inert waste. Proposal: procurement of services to process inert waste received at Longue Hougue and recycle stone from this waste material using mobile plant - operations may be relocated to any follow-on reclamation site as land becomes available once the current site is completed.
14	Temporary Stockpile at Longue Hougue
15	Longue Hougue Reservoir

3.3.6 This BPEO assessment process included consultation with relevant stakeholders as part of workshops held in Guernsey in July 2017 to agree the assessment criteria. Subsequently, options were scored for given objectives and an overall score determined, which provides the optimum balance in terms of economic, social, environmental, practicable and policy considerations (including transport) that were relevant to Guernsey.

3.3.7 The Inert Waste Management Strategy Options Report identified 12 leading sites and options from the above 20 options, based on their environmental and cost and affordability criteria. A total of eight options were scoped out due to environmental, infrastructure and recreational constraints (**Table 3-2**).

Table 3-2: Summary Table of the Short List Options and any identified constraints

Option No. (derived from original long list)	Site / Option Name	Major Environmental Constraint Present?
1	Airport Runway Extension (eastern end)	No
3.1	Beach-raising on West Coast	Yes – major constraint posed by SSS, tourist sites, archaeological sites and coastal erosion
4.1	Cotes des Amarreurs	No
4.15	Guillotine Quarry	No
4.18	L'Epine Quarry	No
4.19	Paradis Quarry	No
4.24	Barker's Quarry	No
5	Les Vardes Quarry	Yes - major constraint posed by water supply
8.1	Longue Hougue South	No
8.2	Black Rock Option 1 (Harbour)	Yes – major constraint posed by sensitive ecological receptors (maerl) and *Maintenance and enhancement of modern key strategic infrastructure* due to being located adjacent to St Sampson's Harbour major Island gateway

Option No. (derived from original long list)	Site / Option Name	Major Environmental Constraint Present?
8.3	Black Rock Option 2	Yes – major constraint posed by sensitive ecological receptors (maerl) and *Maintenance and enhancement of modern key strategic infrastructure* due to being located adjacent to St Sampson's Harbour major Island gateway
8.4	Baie De Pecqueries	Yes – major constraint posed by recreational resources and SSS
8.5	North of Mont Cuet/Creve Coeur	No
8.6	Albecq	No
8.7	East of QEII Marina (St Peter Port)	Yes – major constraint posed by critical infrastructure
8.8	Havelet Bay	Yes – major constraint posed by recreational resources and critical infrastructure
11	Raising level of existing Land Reclamation at Longue Hougue	No
13	Increase in re-use / recycling of inert waste. Proposal: procurement of services to process inert waste received at Longue Hougue and recycle stone from this waste material using mobile plant - operations may be relocated to any follow-on reclamation site as land becomes available once the current site is completed.	No

Option No. (derived from original long list)	Site / Option Name	Major Environmental Constraint Present?
14	Temporary Stockpile at Longue Hougue	No
15	Longue Hougue Reservoir	Yes – major constraint posed by critical infrastructure and water supplies

3.3.8 The 12 leading options are listed in **Table 3-3** in order of decreasing weighting as identified during the High Level EIA. The leading list of sites and options in **Table 3-3** were then subject to the next phase of the BPEO assessment process.

Table 3-3: Leading Sites and Options Identified in the Inert Waste Management Strategy Options Report

Option	Site / Option
1	Airport Runway Extension (eastern end)
4.15	Guillotine Quarry
11	Raising level of existing Land Reclamation at Longue Hougue
5	Les Vardes Quarry
13	Increase in re-use / recycling of inert waste
14	Temporary Stockpile at Longue Hougue
4.19	Paradis Quarry
4.18	L'Epine Quarry
8.1	Longue Hougue South
8.7	East of QEII Marina (St Peter Port)
8.5	North of Mont Cuet/Creve Coeur
4.1	Cotes des Amarreurs

Identification of Lead Sites

3.3.9 A 'leading list' of sites (noting that Paradis Quarry and L'Epine Quarry represent one option of combined sites) was selected for further assessment to create the final shortlist. This leading list sought to capture only those sites which could provide a single viable long-term solution for management of *residual inert waste that cannot be managed using options further up the waste hierarchy* i.e. through prevention or recycling options (**Table 3-4**).

3.3.10 Several sites were not taken further at this stage as they did not present a single viable option. These include:

3.3.11 **Option 1 Airport runway -** identification of BPEO needs to be able to select a viable option i.e. one that can be developed. At the time of assessment, it was uncertain whether this option would proceed. This option would only be able to utilise part of the inert material, where this was proven to meet strict engineering standards and could not operate as a residual inert waste facility therefore it is not a viable long-term option.

3.3.12 **Option 11 Raising levels at Longue Hougue** – this option offers a short-term solution which does not therefore fill the objective of providing a single viable long-term solution. This option may be considered in combination, but it not considered further as the leading option.

3.3.13 **Option 14 Temporary stockpiling** – as with Option 11, this option offers a short-term solution which does not therefore fill the objective of providing a single viable long-term solution. This option may be considered in combination, but it not considered further as the leading option.

3.3.14 **Option 13 Increase in reuse** – reuse is not an option which can manage all inert waste, because residual waste that is not suitable for reuse or recycling will remain and will need to be managed. As with Option 11 and Option 14, this option may be considered in combination, but it not considered further as a sole leading option.

3.3.15 **Option 8.3 Black Rock Option 2** does present a long-term solution. However, it was not selected for further assessment because of major environmental constraints for this option identified during the BPEO process posed by: coastal ecological resources (maerl beds (see below)), active coastal processes, dust sensitive receptors, the proximity to the entrance to the active St Sampson's port, and the potential effect on views and the setting of Vale Castle.

3.3.16 The Black Rock options sit over a maerl location, as identified in the 2015 Longue Hougue Intertidal habitat biotope survey. This is a habitat type Listed in Annex I of the Habitats Directive (for reference, also a UK Habitat of Principal Importance, under the post-2010 Biodiversity Framework), so is a habitat of European importance. The direct and permanent loss of an ecological feature of this scale of importance (i.e. international) meant that this was classified as a significant environmental constraint following the approach to environmental screening adopted in the BPEO process.

3.3.17 The **East of QEII Marina** site has large available capacity, however, there are significant impacts associated with the town centre location, particularly traffic, views from and into St Peter Port, proximity to population and potential high initial capital costs, which would affect the fee for depositing material at the site, thereby affecting value for money concerns as an inert waste solution.

3.3.18 Delegates identified there were potential drawbacks, notably conflict between the requirements of an inert waste site (i.e. longevity) and the likely greater urgency in development of strategically important new infrastructure – particularly given the location.

3.3.19 It was also noted that harbour development was being considered as part of the wider seafront enhancement project, and it was concluded that separate initiative would identify the requirements for any such development. That was therefore the appropriate vehicle for this to be considered. This option would be unlikely to be available for use by 2023 due to the need to complete a Local Planning Brief for the St Peter Port Harbour Action Area (HAA) and the completion of statutory processes associated with this.

3.3.20 As such, the option was rejected as a preferred solution for inert waste management. This option could still be reconsidered in the future as an option for the longer-term, if it is identified as a strategic benefit within the HAA.

Assessment of Lead Sites

3.3.21 The constraints associated with the remaining lead sites (below) were outlined in a value engineering workshop, and as part of the BPEO process described above:

- Guillotine Quarry;
- Paradis/L’Epine Quarries;
- Longue Hougue South Land Reclamation;
- North of Mont Cuet/Creve Coeur Land Reclamation; and
- Les Vardes Quarry.

3.3.22 The observations associated with these sites are outlined in **Table 3-4**. In this step, the leading list of sites were assessed in terms of other 'non-environmental' Decision Criteria such as engineering feasibility, indicative cost, life expectancy, ownership, advantages and disadvantages and risk items associated with the proposed site. This process was informed by:

- the High Level EIA for the Inert Waste Strategy and the mitigation measures identified during this process;
- an engineering review;
- stakeholder consultation;
- waste hierarchy assessment; and
- cost benefit analysis.

Table 3-4: Consideration of Lead Sites and Reason for Rejection / Selection

Site	Summary of discussion	Decision
Guillotine Quarry	The workshop delegates identified this option could deliver short term potential but only if it can be brought on line quickly. However, it only has a limited lifespan of less than two years. In this respect, it does not represent a strategic long-term option and would only work in combination with other sites. It was also identified that this site poses uncertainties regarding the proximity of the site to Bordeaux landfill and hydraulic connectivity of leachate to that site; the loss of void space at an already small site that would be required for ancillary developments (access ramp, weighbridge etc.); concerns about pollution impacts on water supplies from local wells; and the loss of established ecosystems. The workshop identified this as 'Possible', where a short-term need was required. Short-term options were initially considered but the summary in the Inert Waste Policy Letter (2017) was that Guillotine Quarry, Paradis and L'Epine quarries whilst having a number of advantages are disadvantaged by having a very small capacity and a number of logistical and other challenges. Therefore, although the workshop identified this as a possible site, it is ultimately rejected as a preferred solution based on the above reasons.	Initially identified as Possible. However, subsequently Rejected

Site	Summary of discussion	Decision
Les Vardes Quarry	The site is not an immediate strategic solution because it is an active quarry that would not be available until 2026 at the earliest. It has also been safeguarded for future water storage. However, if it did become available, it would provide huge capacity beyond a 35-year horizon. So, there may be is potential to bring it into line after 2026 to add to the capacity of the facility that will be operating then. However, the logistics of this option require further investigation. Therefore, this option was identified in the workshop sessions as 'Possible' as a long-term option only; and will not be available in the timescale as an option to carry on from the current Longue Hougue facility. It was also identified that given that it is safeguarded, any change of use would need to demonstrate that the need for inert waste management was greater than the need for the site to be retained as a strategic water reserve; and a change to the Strategic Land Use Plan would be required. Given it is not available by 2023, it was rejected as the preferred way forward.	Rejected (as an immediate option)

Site	Summary of discussion	Decision
Combined Paradis Quarry and L'Epine Quarry	The workshop delegates identified this option could deliver short term potential but only if it can be brought on line quickly. However, it only has a limited lifespan of just over three years (and only if both can be delivered). In this respect, it does not represent a strategic long-term option and would only work in combination with other sites. Furthermore, the capacity of the combined site is unlikely to represent the available void once space for ancillary developments such as access ramps, weighbridge and welfare facilities have been accommodated. There are two property owners with an interest in Paradis Quarry, if one or both parties were unwilling to sell this would add further complexities to the development of the site. This could cause time delays in terms of resolution. The workshop initially identified this as 'Possible', where a short-term need was required, but later concluded that ownership issues could result in availability being unlikely. Short-term options were initially considered but the summary in the Inert Waste Policy Letter (2017) was that Guillotine Quarry, Paradis and L'Epine quarries whilst having a number of advantages are disadvantaged by having a very small capacity and a number of logistical and other challenges. Therefore, it is ultimately rejected as a preferred solution based on the above reasons.	Rejected

Site	Summary of discussion	Decision
Longue Hougue South	The workshop delegates identified that this site has potential to design in functionality for future use, based on the IDP designation/location (although this may have cost implications). The site is located next to an industrial area so current site users have familiarity and associate the area with the proposed reclamation activity. The area would be used for the same purpose as the existing facility, so the existing infrastructure could be moved a relatively short distance, which would represent minor cost benefits. The site is technically feasible, although will require substantial investment (more than the existing Longue Hougue facility, due to greater water depths). However, all land reclamation options require a substantial investment to ensure technical feasibility, and this factor must be weighed against the other benefits of land reclamation sites. Therefore, it was concluded that this site is a ‘Probable’ option for the management of residual inert waste that cannot be managed by options further up the waste hierarchy. It was also suggested that this option could partner well with the Les Vardes option in providing a strategic option that could last almost 50 years, but only if Les Vardes could be justified as available for this use once it becomes available.	Selected as the preferred way forward

Site	Summary of discussion	Decision
North of Mont Cuet/Creve Coeur	This potential site is located next to existing landfill facilities, which already have appropriate weighbridge and ancillary infrastructure, thereby removing the need for provision of infrastructure leading to reduced costs. It has good access and reasonable capacity, although less than Longue Hougue South and was demonstrated to be less cost-effective compared to the proposed Longue Hougue South site. However, there are ownership issues and questions about the potential use of the land following reclamation; plus environmental constraints being close to L'Ancresse Common SSS/Foreshore ABI. An extension would be required to the leachate outfall from Mont Cuet landfill. Furthermore, although technically feasible the location would be subject to significant coastal marine effects, so the level of breakwater protection would require significant investment. Therefore, the site is considered as a 'Possible' option for the management of inert waste when used in combination with another option, to enable a 20 year residual inert waste solution.	Possible option

Conclusions of the Site Selection Process

3.3.23 The stakeholder workshop, BPEO process and cost benefit assessment identified the Longue Hougue South site option as the 'preferred way forward' at this stage because it offered the best fit in terms of meeting the critical success factors and investment objectives. It could be constructed to be available for operation by the end of 2022 and has the largest capacity of all options that are available in the necessary timeframe.

3.3.24 It could also have beneficial after use once it has reached capacity and can therefore be classed as recovery under the terms set out in the Inert Waste Strategy which is consistent to the priority given to recovery over disposal in the Waste Hierarchy. Future uses will be subject to independent planning decisions and are not assessed in this EIA process.

3.4 Project Design Criteria and Alternative Designs

3.4.1 The current development concept is based on a 100-year return storm period design standard (i.e. the event we are designing against) and a 50-year design life (incorporating sea level rise) assuming deposit of inert material to a level of +7.5 metres above Guernsey datum (mAGD). Sensitivity (in terms of quantities, reclamation area and cost) to different design standards and design life is being examined. Different storm events will result in changes to the required crest height, seaward slope and rock armour specification. **Appendix 3.1** presents the Project's design aspects that were considered during development of the high-level design.

3.4.2 To inform the current design, available bathymetry was taken from the October 1988 survey of Belle Grève Bay, recorded to Chart Datum St Peter Port (-5.06mAGD). This was combined with basic topographic data for the island to metres above Guernsey datum (mAGD) and checked against the 2018 Lidar survey undertaken at the site.

3.4.3 The neighbouring inert waste facility at existing Longue Hougue Reclamation Site has a ground level of approximately +7.5mAGD. To tie-in to the existing site it was assumed that the finished ground level at Longue Hougue South will be set at +7.5mAGD once the site has been filled.

3.4.4 During the process of design, the standards assessed include the following:

- a 1 year, 50 year and 100 year storm event with sea level rise over the 50 year design life;
- the 1 year, 50 year and 100 year storm event without sea level rise; and
- the 1 year, 50 year and 100 year storm event increasing sea level rise to impact over an increased design life of 100 years.

3.4.5 The current design has a breakwater height of +9.5mAGD. This level will allow operations to continue without disruption, with an overtopping discharge level of less than 1l/s per m for a 1:1 year storm event. During a 1:100 year storm event there will be no damage to the rear of the breakwater with a maximum level of overtopping discharge of 50l/s/m for an extreme 1:100 year storm event. To enable future development behind the breakwater the maximum overtopping allowed is 10 l/s/m during a 1:100 year storm event. The current design complies with these standards.

3.4.6 An infilling level of +7.5mAGD is proposed because it is the same level as the current Longue Hogue site. Infilling could occur up to a maximum level of +8.5mAGD though variable across the site subject to landscaping proposals and the future after use proposals. Raising the level behind the breakwater will not affect the compliance of the structure with the standards described above.

3.4.7 Optimisation of the breakwater design is expected to be undertaken as the project progresses through to detailed design as further information is made available.

3.4.8 A range of alternative options for the 'structure' to enclose the embayment and thus allow inert waste to be infilled have been considered. An initial concept option of a rock armour breakwater was developed and has been considered in this ES as it is likely to represent all the potential impacts associated with other forms of 'breakwater'. The options that were considered for the breakwater are:

- Steel sheet pile;
- Concrete caisson;
- 'Engineered' concrete blockwork / revetment; and
- Rock armour.

3.4.9 The consideration of design alternatives is summarised in **Table 3-5** with the rock armour breakwater the preferred solution. There are several different environmental impacts associated with the various options (landscape impacts associated with caissons, piling noise and wave reflection associated with piled breakwater, and greater footprint for the blockwork breakwater). However, the rock breakwater option was selected due to technical feasibility and to a lesser degree, cost.

Table 3-5: Consideration of Alternative Design Solutions

Option Description	Viability for Flood Protection	Other issues	Cost	Conclusion
Steel sheet piles: Tied steel sheet piles filled with processed demolition materials.	It is uncertain whether freestanding sheet piles (prior to filling with demolition materials) will be able to withstand the wave forces they will be subjected to during a storm event. In some places, the sheet piles will be required to free stand at 19m above bed level prior to filling. Stability of the sheet piles will be a concern under wave attack and it is likely a trapezoidal earth bank will be required to be constructed on the landward side.	The effectiveness of a sheet piled solution is highly dependent upon the underlying ground in which they are piled into. Offshore geotechnical investigations will be required to determine if sufficient depth of granular or cohesive soil is present to facilitate a sheet piled solution. This is unlikely due to the visual presence of bedrock in the footprint of the required sheet piles.	The material cost of steel sheet piles is likely to be cheaper than the material costs of the other options considered. The solution will likely require a trapezoidal earth bank on the landward side to provide the required stability against wave attack.	A steel sheet piled solution is not viable at Longue Hougue South due to concerns over structural stability during wave attack and the location of bed rock limiting the depth of cohesive or granular material to pile into.

Option Description	Viability for Flood Protection	Other issues	Cost	Conclusion
Concrete Caisson: Gravity solution constructed using vertical-walled precast concrete units filled with processed demolition materials or the like.	A suitable concrete caisson construction would provide the necessary protection against storm events at Longue Hougue South.	A vertical concrete structure may look out of place next to natural rocky headlands.	A caisson solution is likely to be the most expensive solution due to the complexity in construction and quantity of concrete required. In Royal HaskoningDHV's experience, caisson solutions can be as much four times more expensive than rock breakwater solutions.	A caisson solution is not viable at Longue Hougue South due to the extremely high cost of the solution.

Option Description	Viability for Flood Protection	Other issues	Cost	Conclusion
Blockwork Breakwater (Hillblock Units): Hillblock units or 'Dutch Style' block revetments are the default solution in the Netherlands for protecting sea banks against waves. The concrete blocks are used to line slopes and significantly reduces the impact of waves and wave run-up compared to existing types of shore protection.	A concrete blockwork breakwater would provide the necessary protection against storm events at Longue Hougue South. The blockwork units can defend against maximum wave heights of up to 2.5m and placed at a minimum slope angle of 1:3 to 1:4.	Concrete blockwork is an innovative solution that have been rarely used outside the Netherlands. They will require specialist contractors for installation and the typical blockwork revetment solution will require modification to act as a breakwater.	Blockwork solutions are usually a more cost-effective solution than traditional rock revetments, for sites with a relatively modest wave climate, even when the blocks are produced and transported from the Netherlands. The issue is the slope angle of the seaward face of the trapezoidal bund, on which the blocks would be laid. This is required to be 1:3 at a minimum. This increases the footprint and quantity of core material required in the breakwater structure. In terms of cost the core material is critical at Longue Hougue South and hence a blockwork solution will be more expensive in comparison to a rock solution.	A blockwork revetment solution is not preferred at Longue Hougue due to the high cost of the solution as well as the larger footprint taken up by the slope required.

4 Project Description

4.1 Introduction

4.1.1 This Chapter provides a description of the proposed Project, including the current physical environment at the site, the history of the site, the physical parameters of the Project, the construction methodology and details, the operational details and activities. At this current stage and given the long duration of infilling, a description of the after use when the site infilling is completed cannot be provided. It is expected that any after use would have to relate to the strategic needs of Guernsey and the planning context set out in the relevant Development Plan in force, and any after use would be subject to its own planning application process.

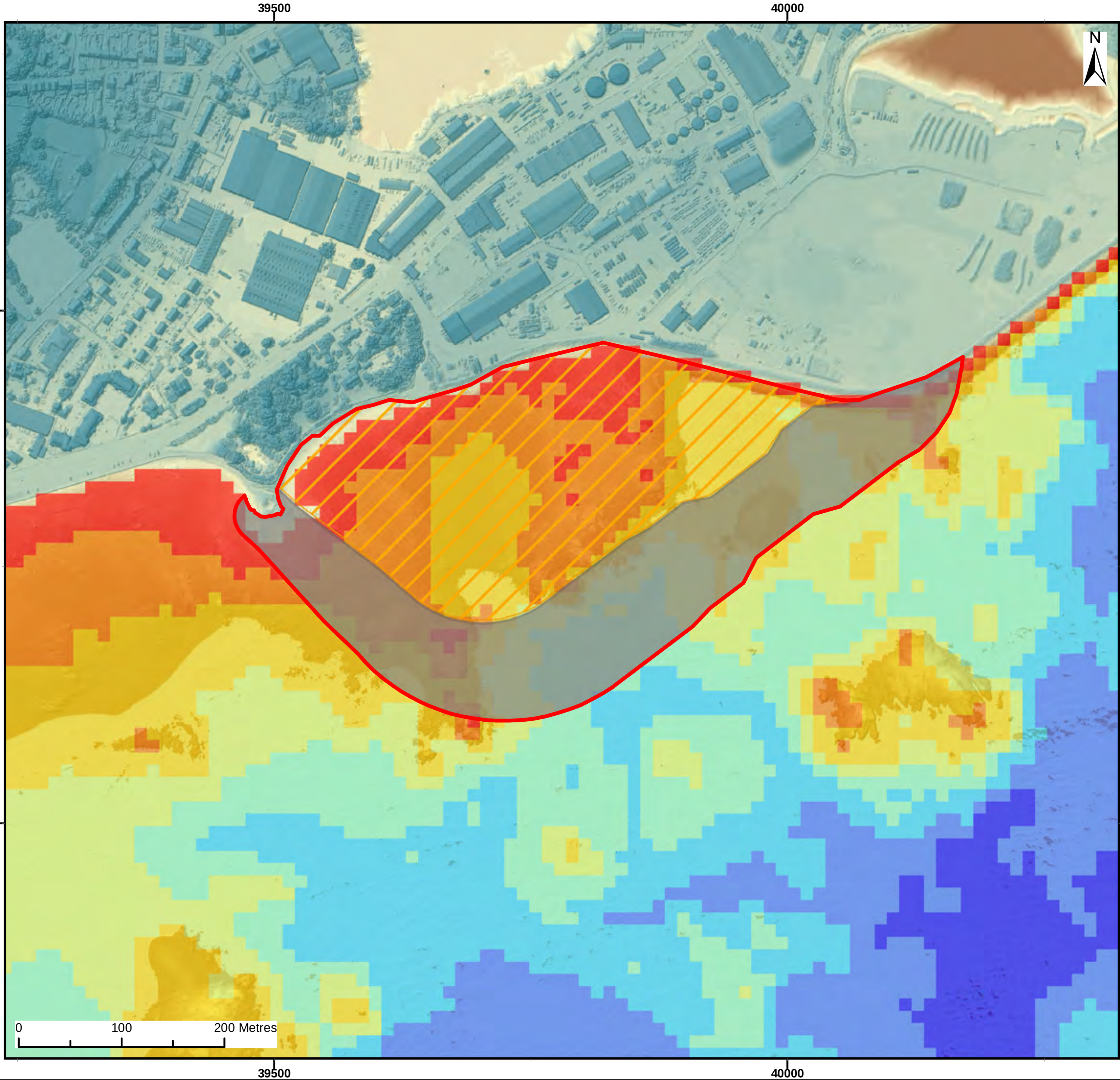
4.2 Site Description

4.2.1 The Project is situated on the east coast of Guernsey adjacent to previously reclaimed land, including the Longue Hougue Reclamation Site which has received inert waste since the mid 1990's. The site covers approximately 11ha, ranging 550m in length at its longest point to 300m at its widest point. The site is accessed via Bulwer Avenue and a States owned (but not public) access road in the industrial area of St Sampson. To the west, the site includes a beach approximately 35m wide, and the headland of Spur Point, and there is a large residential property which has a boundary with the site to the north. The site also includes an intertidal and subtidal area within Belle Grève Bay which comprised cobbles, pebbles and boulders with occasional patches of coarse sand and finer gravel. The elevation at the landward side of the beach is 6mAGD and extends down a maximum seabed depth of -9.5mAGD approximately 210m from the land boundary (**Figure 4-1**).

4.3 Project Scope

4.3.1 The States of Guernsey is seeking to gain planning approval for an inert waste disposal facility at Longue Hougue, on the north-east coast of Guernsey. The need for the project is described in **Section 1.2**. The first stage of the project would consist of the construction of a structure approximately 800m in length and extending between 210m and 300m from the shoreline (**Figure 4-1**) to the crest of the structure. The area (approximately 9ha) within the structure would be used as a deposit site for Guernsey's residual inert waste, with a capacity of approximately 715,000m^3.

4.3.2 Currently, the design for the project is at outline / concept stage and will need to go through a detailed design stage. However, the nature and scale of the design will not change significantly as to alter the potential impacts of the project.



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Legend:

Outline of Proposed Development

Infill Area

Breakwater

Bathymetry (m)

- 3.5 - 0.01
- 0 - -2.49
- -2.5 - -4.99
- -5 - -7.49
- -7.5 - -9.99
- -10 - -12.49
- -12.5 - -14.99
- < -15

LiDAR (mAD)

- 76.76 - 20.01
- 20 - 15.01
- 15 - 10.01
- 10 - 9.51
- 9.5 - 9.01
- 9 - 8.51
- 8.5 - 8.01
- 8 - 7.51
- 7.5 - 7.01
- 7 - 6.51
- 6.5 - 6.01
- 6 - 5.51
- 5.5 - 5.01
- 5 - 4.51
- 4.5 - 4.01
- 4 - 3.51
- 3.5 - 3.01
- 3 - 2.51
- 2.5 - 2.01
- 2 - 1.51
- 1.5 - 1.01
- 1 - 0.51
- 0.5 - 0.01
- 0 - -0.49
- -0.5 - -0.99
- -1 - -1.49
- -1.5 - -1.99
- -2 - -2.49
- -2.5 - -2.99
- -3 - -5.05

Client:	Project:
States of Guernsey	Longue Houge South EIA

Title: Longue Houge South Site Layout

Figure:	4.1	Drawing No:	PB5312-300-011

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	15/04/2019	FC	PT	A4	1:5,500

Co-ordinate system: Guernsey Grid

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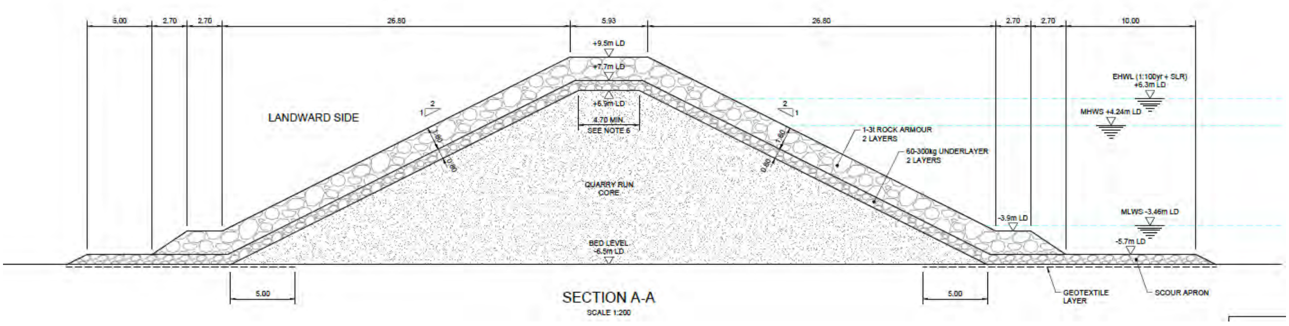
4.3.3 The predicted operational life is a minimum of 12 years. This estimate has been calculated based on predicted arisings of 1,213,000 tonnes in the 11 years between 2022 and 2032 inclusive and a volume of $1m^3$ for every 1.75 tonnes of inert waste. Improvements in the reuse and recycling of inert waste were introduced at Longue Hougue Reclamation Site early in 2019. The full impact of this new initiative has yet to be fully understood but has the potential to extend the life of the existing reclamation site by several years, and to extend the duration of infilling activities at Longue Hougue South, such that it could operate for a longer period.

4.3.4 The construction phase will involve building a rock breakwater that will form a perimeter wall inside which, will be the location for infilling of residual inert waste for the Longue Hougue South Facility. The top of the rock breakwater will be +9.5mAGD to take account of sea level rise and potential future after uses, as well as provide a greater capacity. The ground level behind the breakwater will be up to +8.5mAGD. The width of the crest of the breakwater will be approximately 4.7m. The design of the breakwater would allow the site to be operational throughout the year and would protect against a 1:100 year storm event including for sea level rise for a design life of 50 years.

4.3.5 The breakwater is likely to consist of three layers: an armour layer, an underlayer, and core (**Figure 4-2**).

Figure 4-2 Indicative Breakwater Cross Section



4.4 Construction Methodology

4.4.1 Construction of the breakwater will be undertaken using predominantly land-based equipment and techniques. For deeper sections, if the reach of land-based equipment is not sufficient, floating equipment may be required. The crest of the breakwater's core will be used as a temporary construction road during the construction process; notably when the breakwater height is lower (and the access wider) vehicles will be able to pass each other. However, when the breakwater is higher (and narrower) only single lane access will be possible.

4.4.2 Prior to construction starting a compound will be erected (see **Figure 4-3**) within the existing landscaped area of the waste facilities. Access would be through the gates of the current Inert Waste Management Facility, across to the seaward perimeter and then down alongside the Waste Transfer Station (WTS) and through the perimeter bund of the current site (**Figure 4-3**).

4.4.3 The compound will comprise temporary cabins and facilities enclosed by fencing. It will be necessary to provide foul water storage onsite if mains drainage is not available; a temporary tank will be buried for this purpose. The compound will also have marked areas for parking, plant, material laydown and other storage areas. Security fencing that matches the WTS (approximately 2.4m high) will be placed around the perimeter of the site and will include two sets of double gates (see **Figure 4-3**).

4.4.4 The volumes required for each element of the breakwater are outlined in **Table 4-1**.

4.4.5 It is very unlikely that the quantity of rock (800,000 tonnes) required to construct the outer layers breakwater will be available on the Island. It is assumed that the rock will be delivered from another country (most likely Norway or France) by boat, arriving on a large vessel (i.e. 20,000 tonne barge) and then transferred to shore using smaller 1,500 tonne barges in one of two ways:

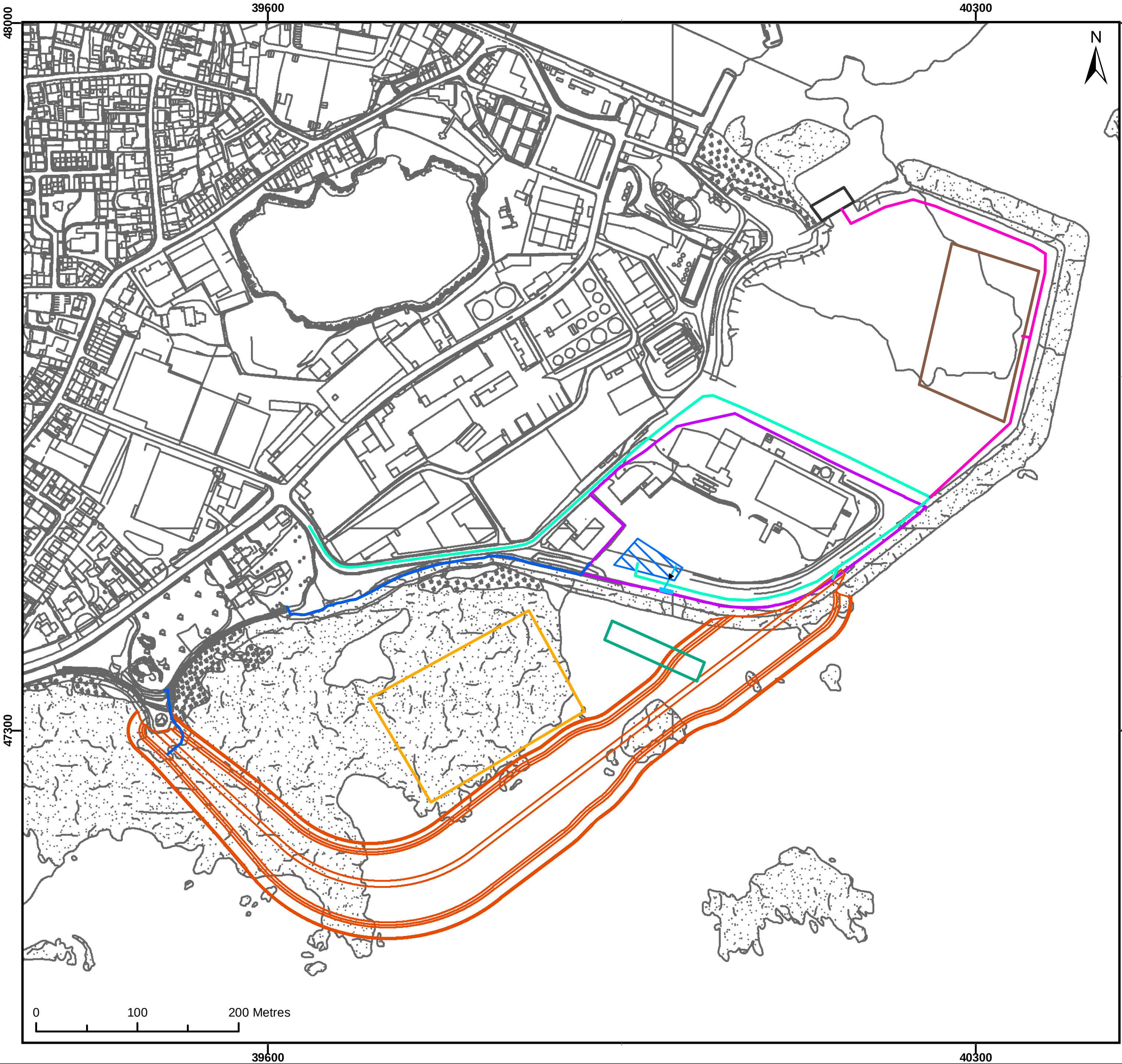
- **Option 1: Shoreline deposition** - the smaller barge would arrive at the site at high tide to deliver the rock onto the shoreline within the Longue Hougue South site (see **Figure 4-3**). The barge will either comprise a hopper barge whereby the hopper would open, and the rock would be deposited underwater but in an area which will become exposed at low tide, or be deposited from the barge using an excavator. Once on the shore the rock will be transported to the storage area by excavators.
- **Option 2: Berth based deposition** – essentially the smaller barge would berth at the north end of Longue Hougue (where barges berthed for the Longue Hougue Construction and trucks would transfer the rock to a stockpile in the existing Longue Hougue site (see **Figure 4-3**) before being transported to Longue Hougue South for placement.

4.4.6 It is anticipated that up to two deliveries will occur per day for either option, based on one delivery per tidal cycle, and it will take one week to unload a large vessel. Based on the worst-case source of Norway, it will take one week to travel back to Norway, re-load and travel back to Guernsey. In total 40 trips by large vessel between Norway and Guernsey will be required. To deliver all of the rock from the large vessels, 14 smaller barge trips will be required per week, with 560 trips in total, or less if local quarry run or other material sources are identified.

Table 4-1: Volumes of Material and Movements of Vehicles and Vessels Associated with Breakwater Construction

Element	Whole Breakwater	Local Quarry Run Material
Amount of material required	800,000T (comprising: 250,000T Rock Armour 550,000T Quarry Run Core)	78,000T (15% of total quarry run core material)
Delivery method	20,000T barge (large barge) and 1,500T barge (small barge)	5 x 10T wagons
Number of movements per day	One large barge to remain anchored offshore in transhipment area Two small barge movements to shore per day (one per tidal cycle)	Three deliveries per wagon per day Total 15 deliveries per day
	Number of movements (on land) for Berthed Barge option: 150 x 10T wagons 30 trips for five wagons over 12 hours	
Movements per week	One shipment by large barge per week 14 deliveries by small barge per large barge (one a week)	180 movements per week (assuming a six-day work week)
Total	40 large barge deliveries 560 small barge movements over whole project	15,600 movements over whole project

4.4.7 The inner core of the breakwater will be constructed using a combination of imported rock, existing stockpiled inert waste and quarry run material from elsewhere on the island (**Table 4-1**). The use of stockpiled inert waste will be confirmed by material property testing of the inert waste material prior to construction. The quarry run material from elsewhere on the island will be transported to site using 10t payload dump trucks (referred to as Heavy Goods Vehicle (HGV) deliveries). Based on a working day of 10 hours, it is expected that there will be 15 deliveries per day, equating to 30 daily HGV movements.



Legend:

- Site Compound
- Stockpile Shore Based Material Delivery
- Current Waste Transfer Station
- Material Stockpile Area
- Barge Berthing Area
- Hopper Barge Indicative Discharge Location
- Household Recycling Plant Surface Water Outfall
- Transport Route
- Rock Transport Route
- Temporary Security Fencing
- Breakwater Structure

Client:	Project:
States of Guernsey	Longue Hougue South EIA

Title:

Construction Site Plan

Figure:	4.3	Drawing No:	PB5312-300-012

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
06	07/11/2019	FC	PT	A4	1:5,500
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Co-ordinate system: Guernsey Grid

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4.4.8 It is anticipated that delivery of material will take between 12 and 18 months, depending on the availability of barges and the proportion of material imported from local quarries. Under the shoreline deposition material delivery option, the rock would be stockpiled within the area to be infilled during operation as close to the working area as possible (see **Figure 4-3**), whilst allowing barges to safely access at high tide to deposit rock armour. Under the barge berth material delivery option, material will be stockpiled at the north-east end of Longue Hougue (see **Figure 4-3**) and would be transported to site for placement as necessary, being transported around the landward edge of Longue Hougue.

4.4.9 A total of 9 vehicles would be used on site during the construction phase. This assumes that construction would only take place at one end of the breakwater. If construction were to take place at both ends simultaneously 18 vehicles could be required.

4.4.10 The land-based equipment used in construction will include:

- Two (long reach) excavators for transporting and dumping core material and rock underlayer;
- Two (long reach) excavators / cranes for:
  - Material handling at the stockpile;
  - Shaping of the (sides of the) core;
  - Placement of the underlayer over the core;
  - Placement of the geotextile by means of a frame (if required in detailed design);
  - Placement of the armour rock; and
  - Placement of the toe construction rock;
- Two bulldozers for levelling and shaping of the crest of the core after it is dumped by the trucks; and
- Three dump trucks for transport of the primary armour rock from the stockpile to the site.

4.4.11 The anticipated breakwater construction sequence is outlined below

- Temporary haul roads constructed to site (see **Figure 4-3**).
- Delivery and stockpile of primary armour layer and underlayer (on foreshore at Longue Hougue South for beach delivery option or to stockpile on Longue Hougue for berth delivery option).
- Delivery of quarry run material to site via road. Delivery of the quarry run

core via road and quarry run core via barge undertaken concurrently.

- Placement of geotextile along scour apron of breakwater footprint. To do this, an excavator will be situated on the breakwater arm and will be fitted with apparatus to attach a roll of geotextile. The geotextile will be placed at low tide and secured with rock for the scour apron. This may require marine-based techniques in deep water. The requirement for a geotextile will be confirmed following geotechnical investigation. The geotextile will be placed in sections as construction progresses along the breakwater and hence will take place throughout the duration of the project.
- End tipping of quarry run or existing inert material to form core of the breakwater. For the lower and intermediate levels the road running along the crest of the breakwater would be on a two lane system to allow multiple vehicles to work simultaneously. For the upper layers, when the width becomes too narrow for multiple vehicles, a single lane would be used. End tipping of core material will be undertaken in sections as construction progresses along the breakwater.
- Placement of underlayer and primary armour layer from breakwater crest (land-based techniques). Following placement of the core of the breakwater, the underlayer and primary armour layer will be placed in sections. Overall, placing rock armour in sections will protect the exposed core (reducing washout) but such placement activities will take place for the duration of the construction works.

4.4.12 Construction is anticipated to take up to 20 months (best case scenario), though this is highly dependent on contractor engagement and rock sourcing, as well as timings and seasonality. If the availability of rock and transhipment barges proves troublesome then construction programme may increase up to 36 months (worst-case scenario). The best-case and worst-case programme is provided in **Table 4- 2**.

4.4.13 It is envisaged construction workers will predominantly work during the hours of 0700 to 1900. However, construction of the breakwater is likely to be carried out at any point during 24 hours per day due to the tidal nature of the site, thus resulting in personnel on site day and night for some durations.

4.4.14 The average number of workers present on site will be 25 each day, with a maximum of 50 at peak times (including office-based staff).

Table 4-2: Worst Case and Best Case Programme for Construction

Activity	Month							
	1	2 to 3	4 to 5	6 to 12	13 to 18	19 to 20	21 to 30	31 to 36
Temporary haul roads constructed to site								
Delivery and stockpile of primary armour layer and underlayer								
Delivery of quarry run material to site								
Placement of geotextile along scour apron of breakwater footprint								
End tipping of quarry run or existing inert material to form core of the breakwater								
Placement of scour apron and rock toe								
Placement of underlayer and primary armour layer from breakwater crest (land-based techniques)								

Best Case

Worst Case

4.5 Inert Waste Site Operation

4.5.1 The operational facility will be located on existing reclaimed land at Longue Hougue (**Figure 4-4**). Over time as infilling works progress, operational activities (such as recycling) will move onto the reclaimed area at the north-east corner of Longue Hougue South, which may include the site office and welfare facilities.

4.5.2 The site will be operational from year 2023 at the earliest and will be receiving and processing waste between 08:00 to 16:00 Monday to Friday. The site is not operational on weekends or Bank Holidays.

4.5.3 The operational activities at the site are limited and therefore the number of personnel present is small, ranging up to four at any one time (who would essentially be transferred from the operation at the Longue Hougue site), including the existing recycling contractor.

4.5.4 The equipment used for reclamation purposes during the operation of the site will be comprised of the following:

- Volvo 21 Tonne Tracked Excavator;
- Cat 953D Tracked Loader;
- Cat 953C Tracked Loader; and
- 4x4 pick up.

4.5.5 The equipment listed excludes contractor supplied plant and machinery used under the aggregate recycling contract, which includes a tracked loader, and mobile screening and crushing equipment which would be transferred to the new operational site from the existing.

4.5.6 The operational phase will follow a Site Working Plan which will be developed before completion of construction. The Plan and operational activities will follow those of the current Longue Hougue facility. The following presents the operational steps for the gradual infilling of the area between the breakwater and the shoreline:

- Material arrives at the Waste Transfer Station gatehouse and is weighed and checked by the site operative, and payment taken;
- At the same time the material is checked any material in the load that can be recycled will be extracted and stockpiled / recycled on site;
- Vehicles will be marshalled on site and shall be offloaded at appropriate location on site (see **Figure 4-4**). The tipped load will be inspected. Topsoil received will be stockpiled for alternative use, and any vegetation shall be composted off-site. Any non-compliant (e.g. putrescible or hazardous)

material will be reloaded onto the vehicle for the customer to dispose of appropriately;

- Waste stockpiles will be consolidated and moved into the land reclamation area to a line and level in accordance with the Site Working Plan.

Infill Volumes during Operation

4.5.7 **Figure 4-5** and **Table 4-3** present the current predictions relating to inert waste generated in Guernsey. It is noted that historical analysis indicates high variability, however, a fairly conservative prediction of residual inert waste has been used in the description of the operational quantities at Longue Hougue South.

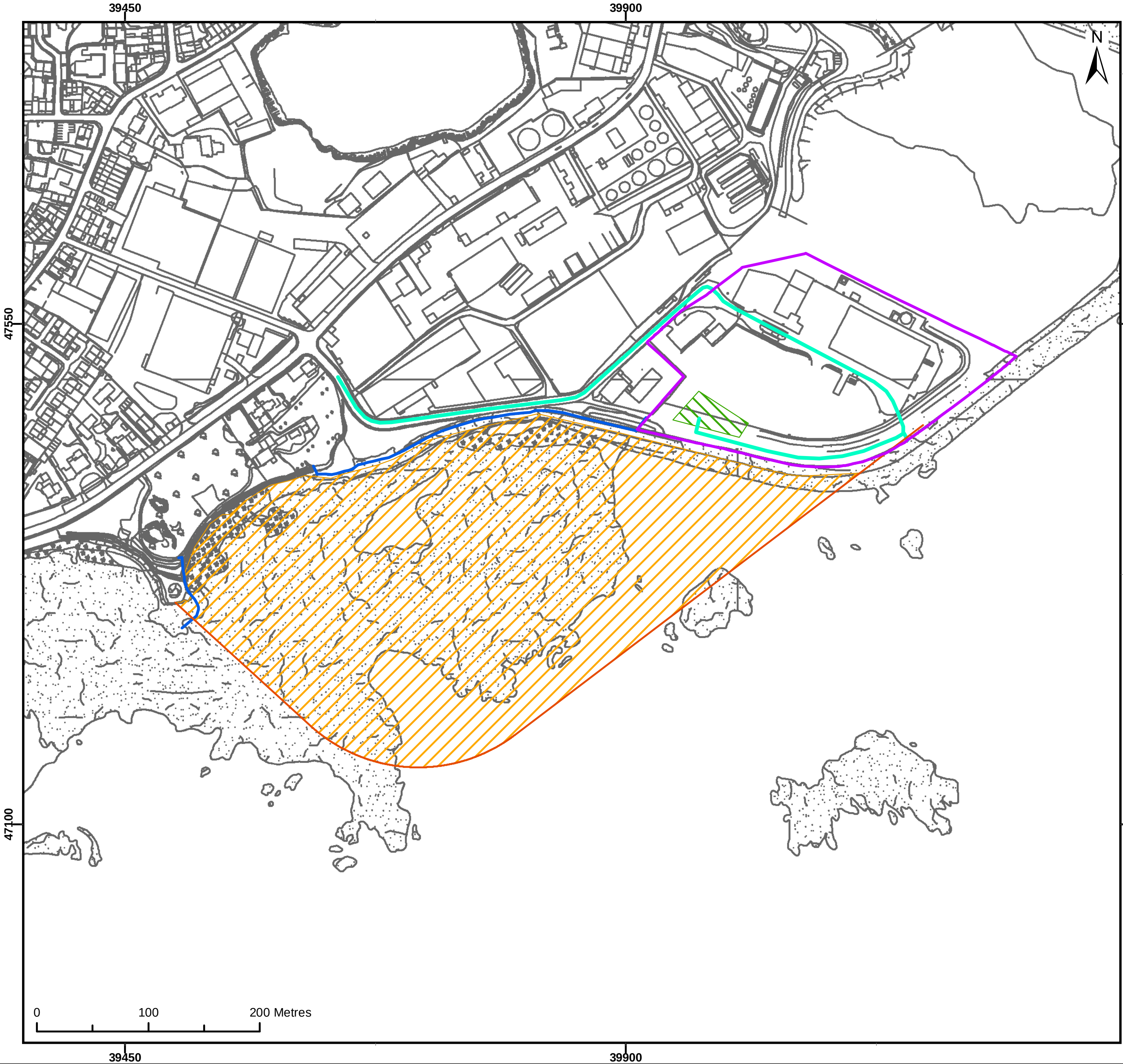
Traffic Movements during Operation

4.5.8 Vehicle movements to and from Longue Hougue and the other associated waste facilities are counted on a regular basis. Consequently, utilising historic data and future predictions the predicted traffic volumes both without and with an inert waste facility being constructed are presented in **Table 4-4** and **Table 4-5** respectively. The vehicle numbers specifically moving into and out of the Longue Hougue South site during the operation phase are presented in **Table 4-6**.

4.5.9 Maintenance activities on the site would include maintaining the operational infrastructure such as ensuring the fencing is secure, maintenance of related buildings in the operational footprint of the site, and monitoring and maintenance of rock armour. These activities would be limited in scale and likely duration of work or volumes of personnel / equipment / materials required and would be negligible when compared to the daily operational vehicle movements associated with site use.

4.6 Key Design Mitigation

4.6.1 It was identified during the detailed assessment that a potentially significant impact could be reduced by a change in the project design. Specifically, the landscape character and visual assessment identified that the breakwater should tie-in behind Spur Point (when viewed from the west and south-west to avoid overwhelming the natural feature of Spur Point. **Figure 4-6** presents this proposed mitigation for consideration in other chapters. The review of the change indicates that there would a very slight reduction in overall capacity of the infill volume for the site (less than 0.5%) and either a neutral or slightly reduced (albeit very small) cost implication for the construction phase.



Legend:
- Infill Area
- Site Infrastructure
- Current Waste Transfer Station
- Transport Route
- Security Fencing
- Breakwater Crest

Client:	Project:
States of Guernsey	Longue Houge South EIA

Title:

Operation Site Plan

Figure: 4.4 | Drawing No: PB5312-300-013

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Figure 4-5 Guernsey Residual Inert Waste Actual Volumes and Forecast

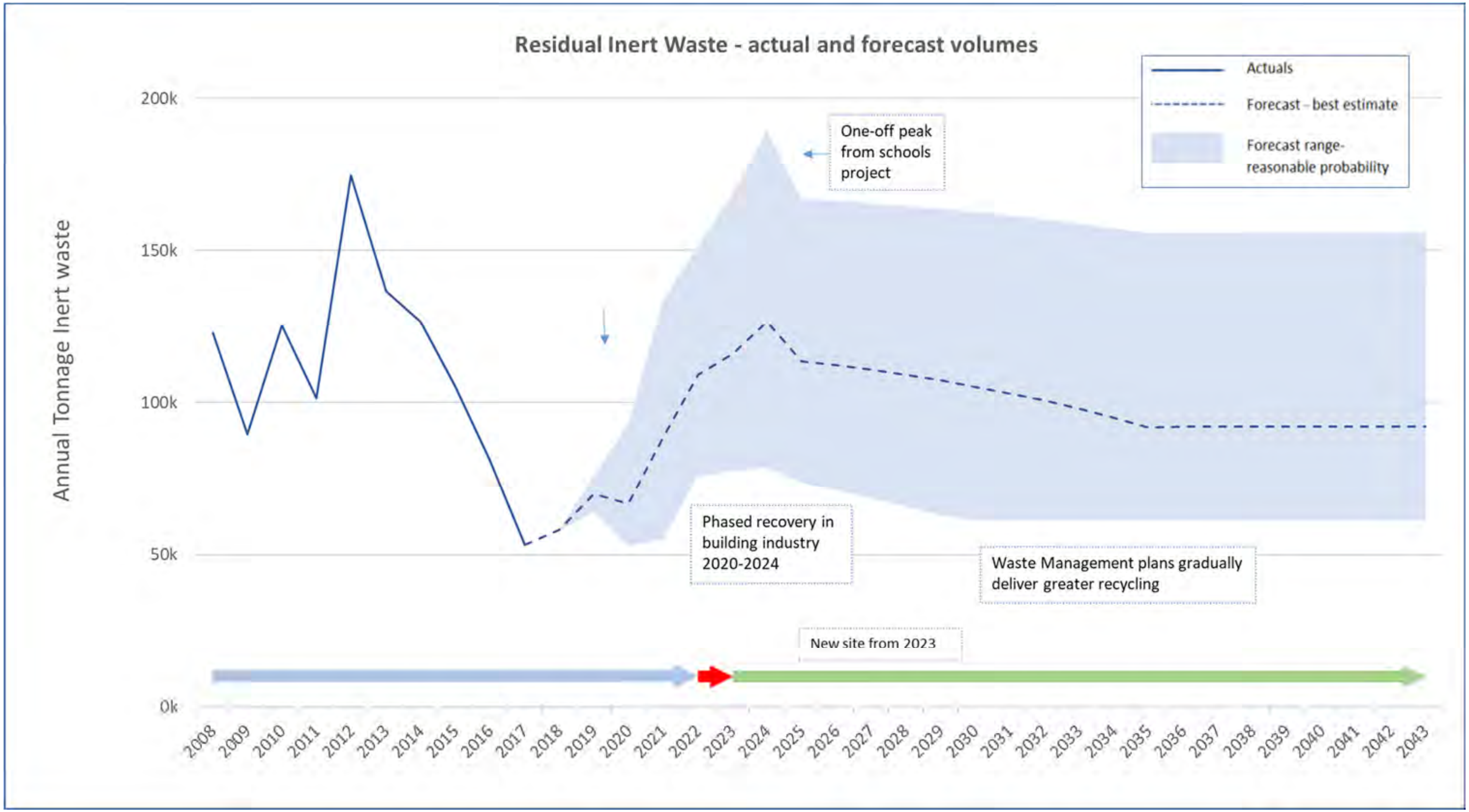


Table 4-3: Guernsey Residual Inert Waste Actual (in bold) and Forecast Volumes

Year	Annual tonnages of residual inert waste for land reclaim			Annual tonnages of residual inert waste for land reclaim following recycling
	Mid-case	Upper case	Lower case	Mid-case
2018	57,083	--	--	--
2019	70,000	--	--	21,000
2020	66,715	93,173	52,741	20,015
2021	88,459	134,178	54,950	44,229
2022	109,119	151,256	75,664	54,560
2023	115,970	168,188	77,380	57,985
2024	126,462	189,297	78,804	63,231
2025	113,599	166,940	73,457	56,799
2026	112,232	166,221	71,197	56,116
2027	110,729	165,430	68,710	55,364
2028	109,075	164,560	65,975	54,538
2029	107,257	163,603	62,966	53,628
2030	105,256	162,550	61,262	52,628
2031	103,055	161,392	61,262	51,527
2032	100,634	160,118	61,262	50,317
2033	97,971	158,717	61,262	48,986
2034	95,042	157,176	61,262	47,521
2035	91,820	155,681	61,262	45,910
2036	92,202	155,681	61,262	46,101
2037	92,202	155,681	61,262	46,101
2038	92,202	155,681	61,262	46,101
2039	92,202	155,681	61,262	46,101
2040	92,202	155,681	61,262	46,101
2041	92,202	155,681	61,262	46,101
2042	92,202	155,681	61,262	46,101
2043	92,202	155,681	61,262	46,101

*Table 4-4: Traffic Movements (each way) into and out of the Longue Hougue Waste Sites **without** Longue Hougue South in Operation*

Year	Annual movements			Monthly movements			Weekly movements			Daily movements			Hourly movements		
	HGV	Van	Car	HGV	Van	Car	HGV	Van	Car	HGV	Van	Car	HGV	Van	Car
2019	51,080	18,767	20,000	4,257	1,564	1,667	1,011	370	392	131	74	79	25	9	10
2020	49,498	17,886	20,000	4,125	1,491	1,667	979	353	392	202	71	79	24	9	10
2021	48,157	23,716	20,000	4,013	1,976	1,667	953	468	392	196	94	79	24	12	10
2022	56,708	29,255	20,000	4,726	2,438	1,667	1,122	577	392	191	115	79	28	14	10
2023	59,393	31,092	20,000	4,949	2,591	1,667	1,175	613	392	224	123	79	29	15	10
2024	63,718	33,905	20,000	5,310	2,825	1,667	1,260	669	392	235	134	79	32	17	10
2025	57,990	30,456	20,000	4,833	2,538	1,667	1,147	601	392	252	120	79	29	15	10
2026	9,524	0	20,000	794	0	1,667	189	0	392	229	0	79	5	0	10
2027	9,481	0	20,000	790	0	1,667	188	0	392	38	0	79	5	0	10
2028	9,438	0	20,000	787	0	1,667	187	0	392	38	0	79	5	0	10
2029	9,396	0	20,000	783	0	1,667	186	0	392	37	0	79	5	0	10
2030	9,396	0	20,000	783	0	1,667	186	0	392	37	0	79	5	0	10
2031	9,396	0	20,000	783	0	1,667	186	0	392	37	0	79	5	0	10
2032	9,396	0	20,000	783	0	1,667	186	0	392	37	0	79	5	0	10
2033	9,396	0	20,000	783	0	1,667	186	0	392	37	0	79	5	0	10

Year	Annual movements			Monthly movements			Weekly movements			Daily movements			Hourly movements		
	HGV	Van	Car	HGV	Van	Car	HGV	Van	Car	HGV	Van	Car	HGV	Van	Car
2034	9,396	0	20,000	783	0	1,667	186	0	392	37	0	79	5	0	10
2035	9,396	0	20,000	783	0	1,667	186	0	392	37	0	79	5	0	10
2036	9,396	0	20,000	783	0	1,667	186	0	392	37	0	79	5	0	10
2037	9,396	0	20,000	783	0	1,667	186	0	392	37	0	79	5	0	10
2038	9,396	0	20,000	783	0	1,667	186	0	392	37	0	79	5	0	10
2039	9,396	0	20,000	783	0	1,667	186	0	392	37	0	79	5	0	10
2040	9,396	0	20,000	783	0	1,667	186	0	392	37	0	79	5	0	10
2041	9,396	0	20,000	783	0	1,667	186	0	392	37	0	79	5	0	10
2042	9,396	0	20,000	783	0	1,667	186	0	392	37	0	79	5	0	10
2043	9,396	0	20,000	783	0	1,667	186	0	392	37	0	79	5	0	10

*Table 4-5: Traffic Movements (each way) into and out of the Longue Hougue Waste Sites **with** Longue Hougue South in Operation*

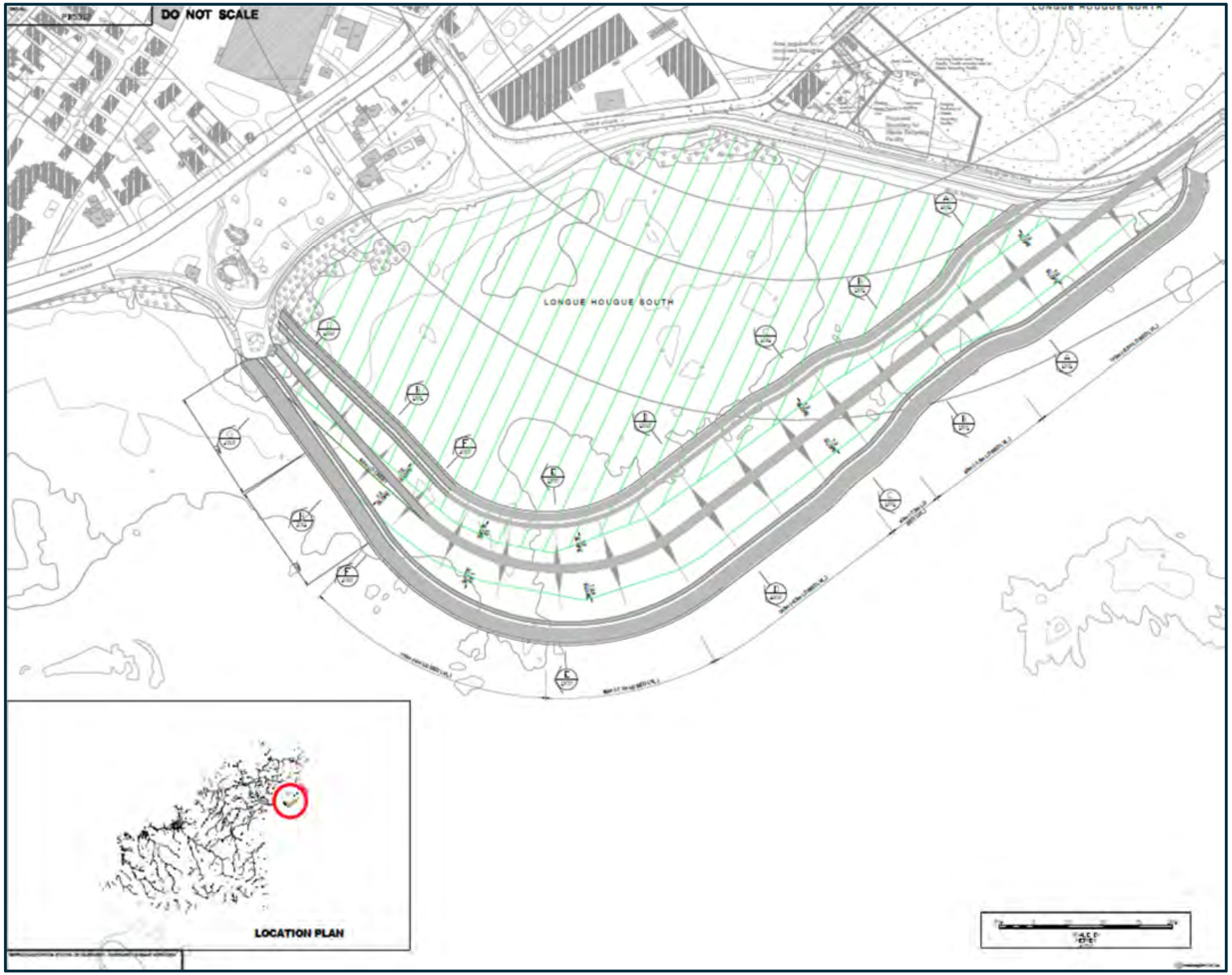
Year	Annual movements			Monthly movements			Weekly movements			Daily movements			Hourly movements		
	HGV	Van	Car	HGV	Van	Car	HGV	Van	Car	HGV	Van	Car	HGV	Van	Car
2019	33,041	18,767	20,000	2,753	1,564	1,667	653	370	392	131	74	79	16	9	10
2020	51,080	17,886	20,000	4,257	1,491	1,667	1,011	353	392	202	71	79	25	9	10
2021	49,544	23,716	20,000	4,129	1,976	1,667	980	468	392	196	94	79	25	12	10
2022	48,249	29,255	20,000	4,021	2,438	1,667	955	577	392	191	115	79	24	14	10
2023	57,209	31,092	20,000	4,767	2,591	1,667	1,132	613	392	226	123	79	28	15	10
2024	60,122	33,905	20,000	5,010	2,825	1,667	1,189	669	392	238	134	79	30	17	10
2025	64,582	30,456	20,000	5,382	2,538	1,667	1,278	601	392	256	120	79	32	15	10
2026	58,944	30,090	20,000	4,912	2,507	1,667	1,166	593	392	233	119	79	29	15	10
2027	58,363	29,687	20,000	4,864	2,474	1,667	1,155	586	392	231	117	79	29	15	10
2028	57,724	29,243	20,000	4,810	2,437	1,667	1,142	577	392	228	115	79	29	14	10
2029	57,021	28,756	20,000	4,752	2,396	1,667	1,128	567	392	226	113	79	28	14	10
2030	56,248	28,219	20,000	4,687	2,352	1,667	1,113	557	392	223	111	79	28	14	10
2031	55,397	27,629	20,000	4,616	2,302	1,667	1,096	545	392	219	109	79	27	14	10
2032	54,462	26,980	20,000	4,538	2,248	1,667	1,077	532	392	216	106	79	27	13	10
2033	53,432	26,266	20,000	4,453	2,189	1,667	1,057	518	392	211	104	79	26	13	10
2034	52,300	25,481	20,000	4,358	2,123	1,667	1,035	503	392	207	101	79	26	13	10

Year	Annual movements			Monthly movements			Weekly movements			Daily movements			Hourly movements		
	HGV	Van	Car	HGV	Van	Car	HGV	Van	Car	HGV	Van	Car	HGV	Van	Car
2035	51,055	24,617	20,000	4,255	2,051	1,667	1,010	486	392	202	97	79	25	12	10
2036	49,685	24,719	20,000	4,140	2,060	1,667	983	488	392	197	98	79	25	12	10
2037	49,848	24,719	20,000	4,154	2,060	1,667	986	488	392	197	98	79	25	12	10
2038	49,848	24,719	20,000	4,154	2,060	1,667	986	488	392	197	98	79	25	12	10
2039	49,848	24,719	20,000	4,154	2,060	1,667	986	488	392	197	98	79	25	12	10
2040	49,848	24,719	20,000	4,154	2,060	1,667	986	488	392	197	98	79	25	12	10
2041	49,848	24,719	20,000	4,154	2,060	1,667	986	488	392	197	98	79	25	12	10
2042	49,848	24,719	20,000	4,154	2,060	1,667	986	488	392	197	98	79	25	12	10
2043	49,848	24,719	20,000	4,154	2,060	1,667	986	488	392	197	98	79	25	12	10

Table 4-6: Forecast Vehicle Movements Entering and Leaving Longue Hougue South during the Operation Phase

Year	HGVs					Vans				
	Annual	Monthly	Weekly	Daily	Hourly	Annual	Monthly	Weekly	Daily	Hourly
2023	31,092	2,591	613	123	15	31,092	2,591	613	123	15
2024	33,905	2,825	669	134	17	33,905	2,825	669	134	17
2025	30,456	2,538	601	120	15	30,456	2,538	601	120	15
2026	30,090	2,507	593	119	15	30,090	2,507	593	119	15
2027	29,687	2,474	586	117	15	29,687	2,474	586	117	15
2028	29,243	2,437	577	115	14	29,243	2,437	577	115	14
2029	28,756	2,396	567	113	14	28,756	2,396	567	113	14
2030	28,219	2,352	557	111	14	28,219	2,352	557	111	14
2031	27,629	2,302	545	109	14	27,629	2,302	545	109	14
2032	26,980	2,248	532	106	13	26,980	2,248	532	106	13
2033	26,266	2,189	518	104	13	26,266	2,189	518	104	13

Figure 4-6 Recommended Design Change for Tie-in at Spur Point



4.7 Decommissioning / After Use

4.7.1 The States of Guernsey will find an alternative use for the site, once its function as an inert waste facility is complete. This has not yet been determined and will depend on the future requirements of the States of Guernsey. This report does not therefore consider the future use of the site, as this would be dependent on future requirements and subject to planning. On that basis, there would also be no decommissioning phase envisaged in any scenario for Longue Hougue South.

Royal HaskoningDHV

5 EIA Methodology

5.1 Introduction

5.1.1 This EIA considers all relevant topics covered under the three general areas of physical environment, biological environment, and human environment.

5.1.2 This EIA has been carried out in accordance with the Schedule 3 of the Land Planning and Development (EIA) Ordinance 2007 (see **paragraph 1.8.2**). Furthermore, the approach to the EIA and the production of this ES has closely followed relevant legislation, policy and guidance including:

- European Community, 2017: Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report;
- Land Planning and Development (Guernsey) Law 2005;
- Land Planning and Development (General Provisions) Ordinance 2007;
- States' policies such as the Strategic Land Use Plan 2011 and the Island Development Plan 2016;
- Institute of Environmental Management and Assessment, 2004: Guidelines for Environmental Impact Assessment;
- Institute of Environmental Management and Assessment, 2016: Environmental Impact Assessment Guide to: Delivering Quality Development;
- Institute of Environmental Management and Assessment, 2017: Health in Environmental Assessment;
- Relevant UK and EU Directives for environmental quality standards (such as 2006/7/EC, 2008/105/EC and 2008/50/EC), and
- States of Guernsey Environment Department: A brief guide to development requiring Environmental Impact Assessment.

5.1.3 It has also given due regard to the requirements of the UK's Conservation of Habitat and Species Regulations 2017, and the UK's Marine and Coastal Access Act 2009 as best practice in relation to the implementation of European Community Directives.

5.2 Characterisation of the Existing Environment

5.2.1 The characterisation (description) of the existing environment has been undertaken to determine the baseline conditions in the area covered by Longue Hougue South and relevant surrounding study areas. This entailed the following steps:

- Study areas were defined for each receptor based on the relevant characteristics of the receptor (e.g. mobility/range);
- Review of the available information;
- Review of the likely or potential impacts that might be expected to arise from the development;
- Determination if data is sufficient to make the EIA judgements with sufficient confidence;
- If further data required, ensure that data gathered are targeted and directed at answering the key question and filling key data gaps; and
- Review the information gathered to ensure the environment can be characterised in sufficient detail.

5.2.2 A significant amount of existing data has been collated from a number of sources including:

- High Level EIA (Royal HaskoningDHV, 2017a);
- High Level EIA Scoping Report (Royal HaskoningDHV, 2017c); and
- Previous reports and environmental assessments in the States of Guernsey.

5.2.3 Consideration has also been given to the evolution of the baseline in the absence of the development (described as the 'do nothing' scenario), this has taken into account of current trends such as climate change and biodiversity loss.

5.2.4 The specific approach to establishing a robust baseline (upon which impacts can be assessed) is set out under each parameter within the EIA draft Scoping Opinion (**Section 2**). This approach has evolved over time with the collection of new data (including surveys) from the study area and as the design of the project has advanced. It is however noted that in Guernsey, a Scoping Opinion for the proposal will only be issued by the Development & Planning Authority following the receipt of a planning application for the proposal.

5.3 Assessment of the Project Impacts

5.3.1 The approach to making balanced assessments has been guided by both EIA specialists and technical specialists using available data, new data, experience, expert judgement, and consultation with statutory consultees and other key stakeholders. In order to provide a consistent framework and system of common tools and terms, where appropriate, a matrix approach has been used to frame and present the judgements made. However, it should be noted that for each topic of the EIA, the latest guidance or best practice has been used, therefore definitions of sensitivity and magnitude of impact have been tailored to each receptor. The impact assessment has considered the potential for impacts during the construction and operation of Longue Hougue South.

Determining Receptor Sensitivity and Value

5.3.2 The characterisation of the existing environment has helped to determine the receptor sensitivity in order to assess the potential impacts upon it.

5.3.3 Receptor value considers whether, for example, the receptor is rare; has protected or threatened status; its importance at local, regional, national or international scale; and, in the case of biological receptors, whether the receptor has a key role in the ecosystem function. These considerations are balanced against the properties of the receptor under consideration.

5.3.4 The ability of a receptor to adapt to change, tolerate, and/or recover from potential impacts is key in assessing its sensitivity to the impact under consideration. For ecological receptors tolerance could relate to short-term changes in the physical environment. For human environment receptors tolerance could relate to displacement effects and therefore impacts upon economics or safety. It also follows that the time required for recovery is a key consideration in determining receptor sensitivity.

5.3.5 The overall receptor sensitivity is determined by considering a combination of value, adaptability, tolerance and recoverability, and applying professional judgement and/or past experience.

5.3.6 Note that expert judgement is particularly important when determining the sensitivity of receptors. For instance, an Annex II species (under the Habitats Directive) would have a high value, but if it was highly tolerant of an impact or had high recoverability it would follow that the sensitivity should reflect the ecology rather than default to protected status taking precedence.

Predicting the Magnitude of Project Impacts

5.3.7 To predict the significance of an impact it is fundamental to establish the magnitude and probability of an effect occurring by considering:

- Scale or spatial extent (small scale to large scale; most of the population or a few individuals);
- Duration (short-term to long-term);
- Frequency; and
- Nature of change relative to the baseline.

Evaluation of Significance

5.3.8 Subsequent to establishing the sensitivity and magnitude of an effect, the impact significance has been predicted using quantitative or qualitative criteria, as appropriate to ensure a robust assessment. Where possible a matrix such as the one presented in **Table 5-1** was used to aid assessment of impact significance based on expert judgement. For each section of the ES, the appropriate methodology (based on the latest available guidance) has been followed and, when more appropriate, another approach than the matrix may have been used. For example, noise thresholds for significance are derived from World the Health Organisation. Any thresholds or criteria relevant to any topic will be described in the topic chapter.

Table 5-1: Impact Significance Matrix

		Magnitude			
		High	**Medium**	**Low**	**Negligible**
Sensitivity	**High**	Major	Major	Moderate	Minor
	Medium	Major	Moderate	Minor	Minor
	Low	Moderate	Minor	Minor	Negligible
	Negligible	Minor	Negligible	Negligible	Negligible

5.3.9 **Table 5-2** provides an indication of the significance definitions used in the assessment process for the majority of parameters.

Table 5-2: Impact Significance Definitions

Impact Significance	Definition
Major negative	Very large or large negative changes in receptor condition, which are likely to be important considerations at a regional or local level because they contribute to achieving national, regional or local objectives, or, could result in exceedance of statutory objectives and/or breaches of legislation.
Moderate negative	Intermediate negative changes in receptor condition, which are likely to be important considerations at a local level.
Minor negative	Small negative changes in receptor condition, which may be raised as local issues but are unlikely to be important in the decision-making process.
Negligible	No discernible changes in receptor condition.
Minor positive	The impact is of minor significance but has been assessed as having some environmental benefit.
Moderate positive	The impact is assessed as providing a moderate gain to the environment.
Major positive	The impact is assessed as providing a significant positive gain to the environment.

5.3.10 A description of the approach to impact assessment and the interpretation of significance levels is provided within each section of the EIA. This approach ensures the definition of impacts is transparent and relevant to each topic under consideration.

Confidence

5.3.11 Once an assessment of a potential impact has been made, it is necessary to assign a confidence value to assist in the understanding of the judgment. This is undertaken on a simple scale of high-medium-low, where high confidence assessments are made on the basis of robust evidence, with lower confidence assessments being based, for example, on extrapolation and/or use of proxies.

Mitigation Measures

5.3.12 Where the impact assessment identifies that an aspect of the development is likely to give rise to significant or potentially significant negative environmental impacts, mitigation measures have been proposed and discussed with the relevant authorities to prevent, avoid, or minimise the impact(s) to acceptable levels. We have also identified and used mitigation measures to enhance the environment where possible and relevant. Where mitigation measures are identified, we have provided an understanding of the likely success of the measure(s) and the magnitude of reduction they are predicted to result in.

5.3.13 For the purposes of the EIA, two types of mitigation have been defined:

- Embedded mitigation - measures that are identified and adopted as part of the evolution of the project design; and
- Additional mitigation - measures that are identified during the EIA process to reduce or eliminate any predicted impacts, which are subsequently adopted by the Applicant as project commitments.

Assessing Residual Impacts

5.3.14 The impact assessment considers the presence of embedded mitigation. However, following the identification of 'additional' mitigation measures, impacts have been re-assessed and the residual effects are described and evaluated. Where no mitigation measure is proposed, a statement is made to explain why the impact cannot be reduced.

Cumulative Impacts

5.3.15 Cumulative assessment forms an essential part of the EIA process. Schedule 2 of The Land Planning and Development (Environmental Impact Assessment) Ordinance 2007 sets out the requirement to assess the impact of the development in combination with any other activity having an effect in the same area.

5.3.16 Only projects which are reasonably well described and sufficiently advanced to provide information on which to base a meaningful and robust assessment have been included in the cumulative assessment. All key developments currently within the planning system have been screened to determine whether they are likely to result in cumulative effects. This will include:

- developments highlighted in policies such as the Island Development Plan;
- developments consented and built but not yet operating;
- developments consented but not yet constructed (or completed);

- developments in the consenting process but no decision made; and
- developments known to be likely applications (consultation underway) in the near future.

5.3.17 Our approach to the cumulative assessment took place in four stages. First, the list of developments within the planning process was reviewed to remove any small-scale developments such as works to a house, driveway, garage, change of use etc., anything that was local to any existing premises (replacement or tweaking) or just small scale (like 2 or 3 houses replacing one house). There will be no or negligible interaction with these types of development because of the scale, as well as the spatial distribution and differing timescales for work or post-operation. The full list of projects taken forward to stage two of the cumulative impact assessment is provided in **Appendix 5.1.**

5.3.18 Second, all listed projects identified during stage one and their spatial location were presented in relation to the zones of influence identified for each of the receptor groups (identified in **Table 5-3**). Similar zones of influence were then overlaid from the other developments, and a list of possible receptors that could potentially be affected was extracted. This list is provided in **Appendix 5.2** and the applications are presented on **Figure 5-1**.

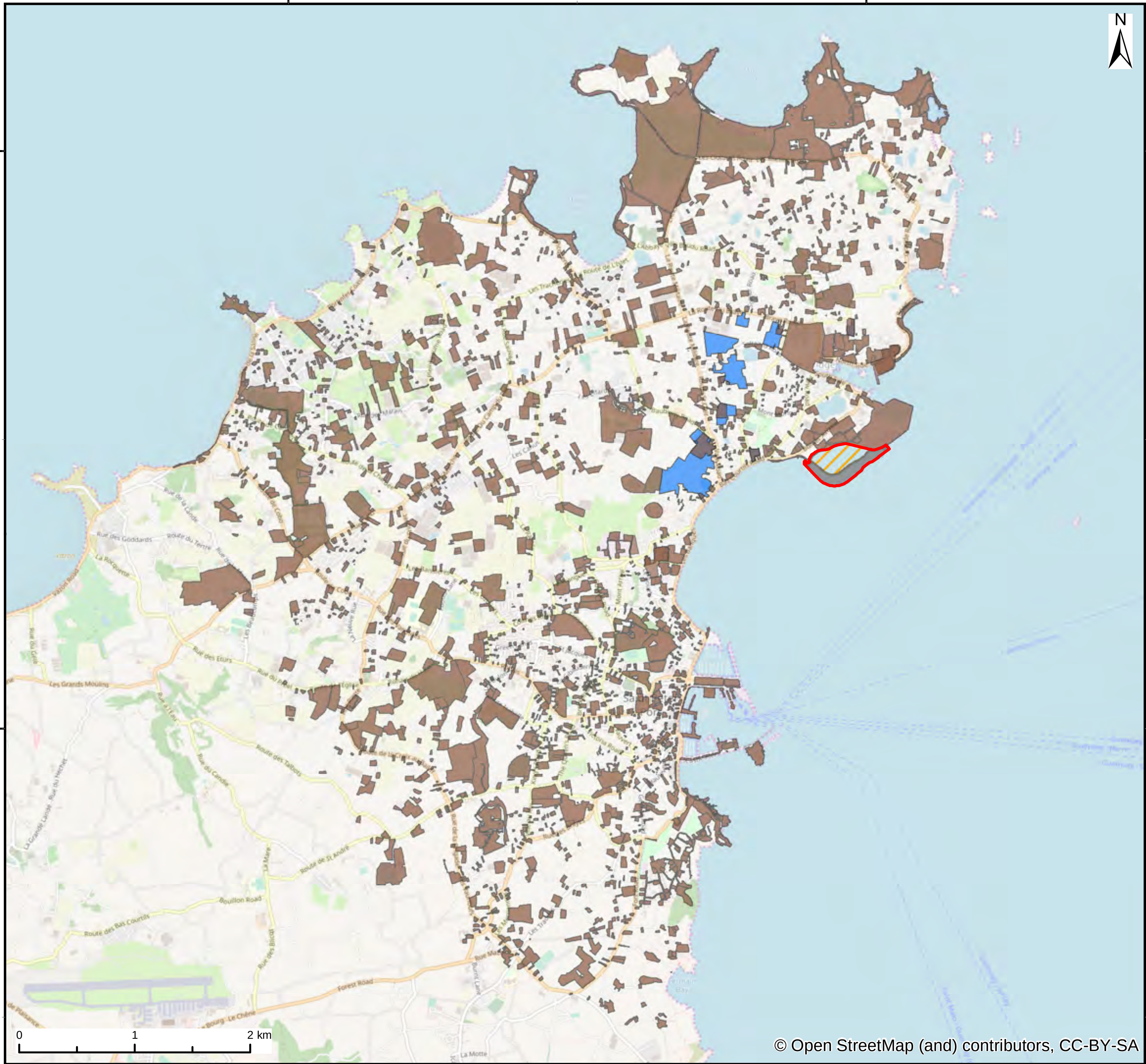
5.3.19 Third, following this initial screening each project and the potential impacts were considered by each of the topic chapter experts to determine the likelihood of an impact occurring (such as if a development was already built or nearly completed (in relation to some potential impacts) before work would commence at Longue Hougue South), or whether the zones of influence had been overly conservative (whereby it is clear from intervening landforms or intervening infrastructure that the pathway would not be present or the scale insufficient to extend to the overlapping zone (for example if there were high trees or properties which screened developments from the relevant receptors)), to further scope out any potential developments / cumulative impacts. This was the cumulative impact scoping stage.

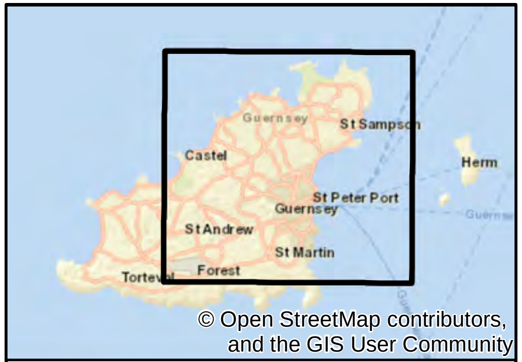
5.3.20 Finally, the remaining potential cumulative impacts were assessed with findings presented at the end of each technical topic chapter.

5.3.21 The projects scoped in to the cumulative impact assessment are provided in **Table 5-4** and their locations shown on **Figure 5-2**.

Table 5-3: Zones of Influence used in to Screen Projects for Potential Cumulative Impacts

<table>
<tr><th>Receptor</th><th>Zone of Influence</th></tr>
<tr><td>Terrestrial Ecology</td><td>5km for Ramsar Site, 2km for all other receptors</td></tr>
<tr><td>Surface Water and Flooding</td><td>2km</td></tr>
<tr><td>Air quality</td><td rowspan="4">1km</td></tr>
<tr><td>Noise and vibration</td></tr>
<tr><td>Population and Human Health</td></tr>
<tr><td>Material Assets (Archaeology)</td></tr>
<tr><td>Land Use, Land Quality, Soil Quality, Geology and Hydrogeology</td><td>250m</td></tr>
<tr><td>Landscape</td><td>Vales Castle to the North, La Vallette Bathing Pools to the south, 1km inland and 5km to the sea</td></tr>
<tr><td>Traffic and Transport</td><td>1.2km south and 1.8km north – 1km inland</td></tr>
<tr><td>Coastal Processes</td><td rowspan="3">Between Bordeaux harbour and St Peter Port Southern Breakwater extending to 5km offshore</td></tr>
<tr><td>Marine Sediment and Water Quality</td></tr>
<tr><td>Marine Ecology</td></tr>
</table>





Legend:

- Outline of Proposed Development
- Breakwater
- Infill Area
- All Planning Applications within 5km[1]
- Relevant Housing Allocations

[1] States of Guernsey, 2019.

Client:	Project:
States of Guernsey	Longue Hougue South EIA

Title:

Projects Considered in Cumulative Impact Assessment

Figure:	5.1	Drawing No:	PB5312-300-020		
Revision:	**Date:**	**Drawn:**	**Checked:**	**Size:**	**Scale:**
03	13/09/2019	FC	PT	A4	1:50,000
02	05/08/2019	FC	PT	A4	1:50,000

Co-ordinate system: Guernsey Grid

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Table 5-4: Projects Scoped in to the Cumulative Impact Assessment

Project Name	Description	Distance from Longue Hougue South (m)
Mont Crevelt Breakwater Longue Hougue, St. Sampson.	Infill existing temporary opening formed in existing breakwater as part of works for St. Sampsons marina project	0
Pont Colliche (Formerly "Bickleigh") Salt Pans Road, St. Sampson.	Variations to plans previously approved to demolish existing dwelling and erect 18 residential units (Revised Scheme) - alterations to roadside windows and replace external granite to facade with smooth rendered finish (units 1 - 4).	1,129
1 Doyle Road, St. Peter Port.	Re-development of site to create 8 houses and 1 flat with associated parking areas.	2,662
Vauvert Primary School Vauvert Road, St. Peter Port.	Install underground surface water attenuation tank with associated hard surfacing and fencing.	2,698
Warma Le Pre De La Cotte Route De Carteret, Castel.	Erect 13 new dwellings with associated car parking, amenity areas and landscaping and create new vehicular access.	4,558
Pont Colliche Salt Pans Road, St. Sampson.	Variation to plans previously approved for Residential Development - Demolish existing dwelling and erect 18 residential units - reposition solar panels to front roof slope.	1,130

Project Name	Description	Distance from Longue Hougue South (m)
Land Adjacent to Westwood Sohier Road, Vale.	Variations to plans previously approved for Residential development to retain existing dwelling and erect 7 new dwellings and alterations to vehicular access - Raise ridge height of units 1,2 and 3 by 600mm, and alterations to fenestration.	1,485
Le Murier School Baubigny Farm Lane, St. Sampson.	Install 4 cabins and 'stores' building to provide units of independent living (revised).	1,436
Hotel Dunchoille Guelles Road, St. Peter Port	Redevelopment of site to create 14 apartments with parking and landscaping (revised).	2,039
Guernsey Dairy La Brigade, St. Andrew.	Install new chiller plant and external steel platform/plant deck on east elevation	4,148
Duval Lodge Le Murier, St. Sampson.	Erect 7ft retaining wall (retrospective), install 6ft timber fence above retaining wall (east boundary) and install entrance gates (west boundary).	900
Le Vieux Jardin off Courtil Le Clement, Vale.	Erect 20 one bedroom flats comprising Supported Housing and 8 one bedroom dwellings within an Autism Unit, construct associated access road and 29 parking spaces - Variations to design of staff accommodation and communal areas to Autism Unit previously a	1,724
Longue Hougue South Industrial & Reclamation Area Bulwer Avenue, St. Sampson.	Temporary re-location (for a period of 24 months) of the household waste recycling facility and development of a construction lay down area associated with the development of the Longue Hougue waste facility.	0

Project Name	Description	Distance from Longue Hougue South (m)
Warrys Bakery Le Grand Bouet, St. Peter Port.	Variations to plans previously approved to erect 20 residential units with parking and landscaping - revised design to Block E, alterations to parking, entrance and roadside walls to Ivy Castle lane and Grand Bouet.	1,600
Millbrook & Niardua Guelles Road, St. Peter Port.	Variations to plans previously approved to provide 20 flats - Demolish "Millbrook" and erect 4 flats, reposition units 13-20 with alterations to fenestration and demolish and reconstruction of communal store.	2,384
Land Adjacent to Westwood Sohier Road, Vale.	Residential development - Retain existing dwelling and erect 7 new dwellings and alterations to vehicular access.	1,493
Duke Of Normandie Hotel Berthelot Street/Lefebvre Street, St. Peter Port.	Variations to plans previously approved to demolish cottage and outbuildings and erect a block of 15 en suite bedrooms in courtyard - Construct roof terrace/cafe.	2,431
Pont Colliche (Formerly "Bickleigh") Salt Pans Road, St. Sampson.	Residential Development - Demolish existing dwelling and erect 20 residential units. (Revised Scheme).	1,123
Leale's Yard Bridge Avenue, Vale.	Outline planning application for the mixed-use re-development of part of the Leale's Yard site involving the creation of 303 new residential units and 1,074m^2 of commercial/retail/community space; together with creation of associated parking and ancillary/public realm areas	778

Project Name	Description	Distance from Longue Hougue South (m)
Admiral Park, St. Peter Port.	Erection of residential, office, retail, leisure and day nursery facilities at various sites.	1,422
Le Friquet Country Hotel Rue De Friquet, Castel.	Extend curtilage of Hotel, erect 11 self-catering lodges and alter vehicular access.	3,562
Le Vieux Jardin off Courtil Le Clement, Vale.	Erect 20 one bedroom flats comprising Supported Housing and 8 one bedroom dwellings within an Autism Unit, construct associated access road and 29 parking spaces.	1,747
Warrys Bakery Le Grand Bouet, St. Peter Port.	Demolish former bakery and erect 20 residential units with associated parking and landscaping (Reserved Matters)	1,319
Guernsey Prison Baubigny Road Les Nicolles, St. Sampson.	Erect a timber outbuilding for use as a retail shop.	1,346
Former Priaulx Garage & Late Shopper Site Les Oberlands, St. Peter Port.	Demolish existing buildings, erect 8 new dwellings and 14 apartments with associated car parking, create new access road and pedestrian/cycle access and carry out landscaping.	3,969
Upham's Yard Les Amballes, St. Peter Port.	Erect 14 flats and 3 dwellings with associated parking (revised).	1,811
Duke Of Normandie Hotel Berthelot Street, St. Peter Port.	Demolish cottage and outbuildings and erect a block of 15 en suite bedrooms in courtyard.	2,411

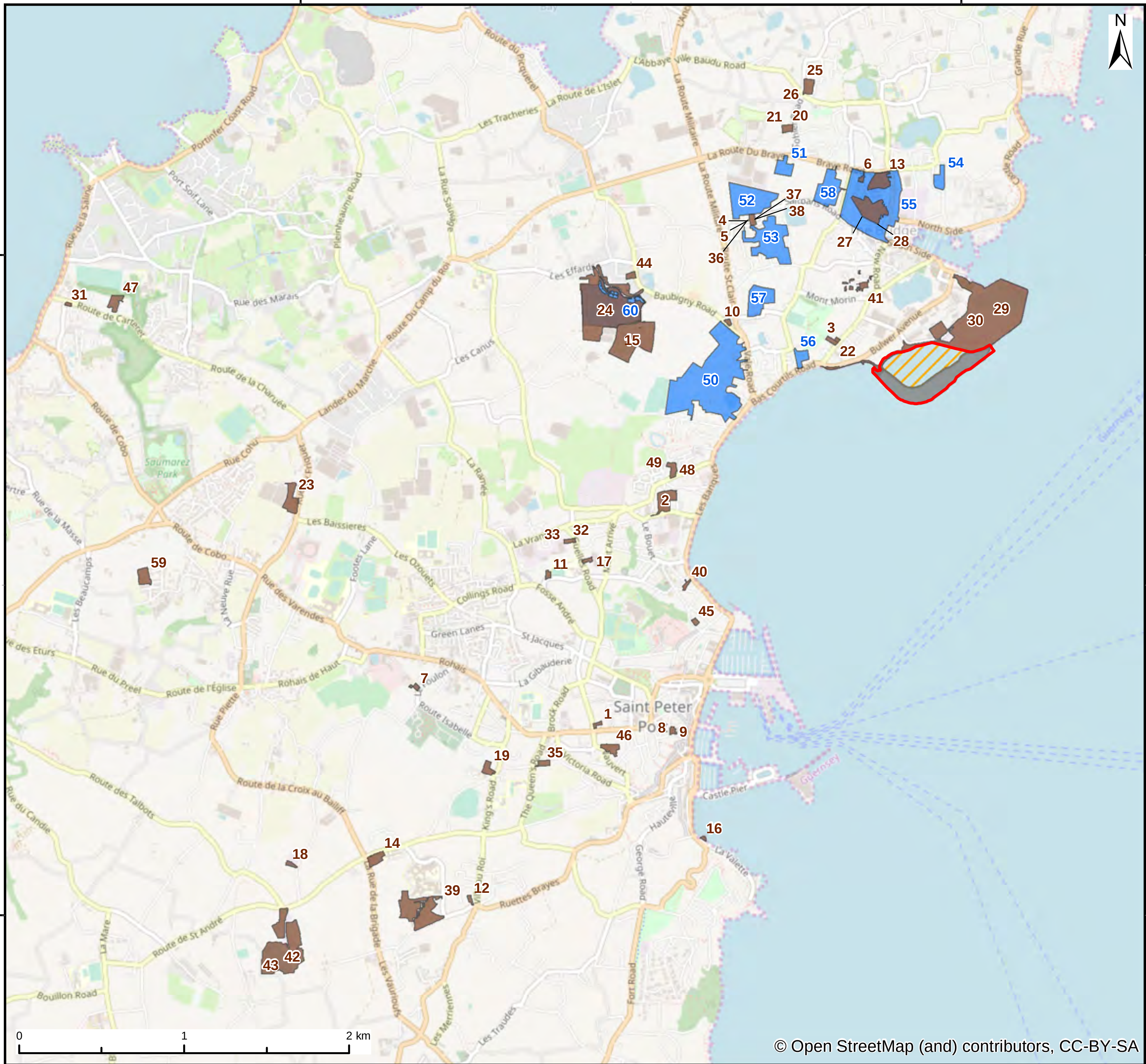
Project Name	Description	Distance from Longue Hougue South (m)
Petite Fontaine Les Petites Fontaines, Queens Road, St. Peter Port.	Erect terrace of 10 dwellings with associated parking.	3,040
Half Moon Cafe La Vallette, St. Peter Port.	Create terrace and install railway sleepers (north-west of site).	2,903
Island Waste Limited Rue Des Pointes, St. Andrew.	Erect industrial building.	4,606
Land to front of St Damians Les Grandes Maisons Road, St. Sampson.	Erect 2.5 storey dwelling, create vehicular access (Revised).	267
Bickleigh Salt Pans Road, St. Sampson.	Residential development - Erect extension and sub-divide existing dwelling to create 6 units of accommodation and erect additional 14 units of accommodation.	1,122
Leale's Yard Bridge Avenue, Vale.	Demolition of existing buildings on the Bridge/derelict buildings within the site; and the development of two buildings together comprising 109 new residential units and 1,049m2 of ground floor commercial/retail space, together with associated car parkin	778

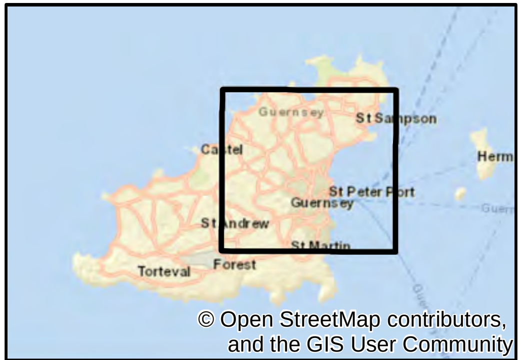
Project Name	Description	Distance from Longue Hougue South (m)
Co-op Homemaker Lowlands Industrial Estate Braye Road, Vale.	Demolition of the existing Co-op Homemaker Store at Lowlands Industrial Estate and the construction of two retail blocks (four individual units) comprising a total of 2,600 m2 of retail space, together with 72 car parking spaces and associated external w	1,046
Le Petit Villocq Chemin Des Monts, Castel.	Residential development - 22 units of accommodation (Social Housing).	4,628
The Oaks Baubigny Road, St. Sampson.	Erect 10 dwellings and construct associated access and car parking.	1,543
Site to rear of Le Bouillon House St. George's Esplanade, St. Peter Port.	Erect 3 dwellings with associated car parking and create new vehicular access onto St Clements Road (Revised).	1,669
Site within Rodley Park Estate Mont Morin, St. Sampson.	Erect terrace of three dwellings and additional parking area (revised) - install additional roof light (east elevation).	424
Longue Hougue Reclamation Site Bulwer Avenue, St. Sampson.	Erect a waste transfer station building, with associated hardstanding for up to 180 shipping containers and ancillary plant including a 20 metre high chimney, two weighbridges, fire water tank and pump house, electricity sub-station and fuel storage area	0

Project Name	Description	Distance from Longue Hougue South (m)
Millbrook & Niardua Guelles Road, St. Peter Port.	Redevelop site - Demolish 'Niardua' and erect 16 apartments and convert and extend 'Millbrook' to provide 4 apartments with associated parking and landscaping.	2,066
Kings Tennis Courts Kings Road, St. Peter Port.	Erect 13 new apartments with underground car parking, construct new roadway and junction and remove Leylandii hedge and tennis courts.	3,308
St. Andrews Reservoir St Andrews Road, St. Andrew.	Erect 9 industrial units.	4,813
Freelance Motors Vale Garage Complex Braye Road, Vale.	Erect car washing facility.	975
St. Andrews Reservoir St Andrews Road, St. Andrew.	Erect switching station building, security fence with gates and gabion wall.	4,813
Princess Elizabeth Hospital La Rue De La Corbinerie/Oberland St. Martin.	Extend car park to create 81 new car parking spaces and carry out landscaping	4,093

Project Name	Description	Distance from Longue Hougue South (m)
Belstone Les Grandes Maisons Road, St. Sampson.	Erect four two and a half storey semi-detached dwellings, remove section of side boundary wall to create vehicular access and remove sections of front boundary wall to form pedestrian gateways. (Revised Scheme).	268
Maison De Carteret Route Des Carteret, Castel.	Demolish store and two existing garages. Erect a 2.5 storey extension (east elevation) comprising retail at ground floor level with two 1 bedroom apartments above. Extend above existing flat roof (west elevation) to create a two bedroom apartment.	4,869
Field at Longfield Maurepas Road, St. Peter Port.	Erect 6 new dwellings with associated parking and landscaping, remove roadside hedge and erect new wall on south boundary	2,294
Crewkerne Le Foulon, St. Peter Port.	Demolish existing dwelling and erect four dwellings with associated parking and landscaping.	3,350
Bickleigh Salt Pans Road, St. Sampson.	Residential Development - Demolish existing dwelling and erect 18 residential units (Revised Scheme).	1,122
Belgrave Vinery	15ha housing allocation, EY: 158-285. Sites b and c assessed as being of high sensitivity to change with regard to flood risk.	765
Cleveley's Vinery	0.89ha allocated housing development site, EY: 19-29. A redundant vinery occupies the western half of the site, the rest is greenfield.	1,272

Project Name	Description	Distance from Longue Hougue South (m)
Franc Fief	4.53ha housing allocation, EY: 133-263. All of site is considered available and deliverable.	811
Les Bas Courtils	0.63ha housing allocation, EY: 6-12. Comprises a former orchard and vinery.	395
Pointues Rocques	2.15ha housing allocation, EY: 75-125. Comprises of a part disused and part working vinery.	721
Saltpans	2.4ha housing allocation, EY: 84-154. All of site considered to be available and deliverable. Northern 70% is in a flood zone.	1,022
Le Maresquet	0.68ha approved DF, estimates 21-38 dwellings. See gov.gg/lemaresquet for map.	1,164
Leales Yard Regeneration Area	11.9 ha housing allocation, EY:135-352 permission has now lapsed. High density option: 400 units and 2000m^2 of commercial/retail/community space. Low density option: 200 units and 1000m^2.	780
Data Park	4.1ha approved housing development, mapped.	1,174
St Sampson's	Extension to school; TIA has been ordered.	1,141





Legend:

- Outline of Proposed Development
- Breakwater
- Infill Area
- Planning Applications Scoped in within 5km[1]
- Relevant Housing Allocations

[1] © States of Guernsey, 2019.
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Client:	Project:
States of Guernsey	Longue Hougue South EIA

Title:

Projects Screened into Cumulative Impact Assessment

Figure: 5.2 | Drawing No: PB5312-300-021

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
03	13/09/2019	FC	PT	A4	1:35,000
02	05/08/2019	FC	PT	A4	1:35,000

Co-ordinate system: Guernsey Grid

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6 Consultation

6.1 Previous Consultation

6.1.1 Stakeholders were consulted at various stages in the process to identify the preferred way forward for a new inert waste facility. For example, in the initial high level options review, and providing input on the environmental, social and economic factors to be considered in the high level BPEO assessment, and their relative weightings. This was iterative, with output from workshops fed back to consultees and shared with other stakeholders for further comment. A public drop-in was also held in November 2017 where the results of the BPEO process were available.

6.1.2 Details of the consultation for the initial options evaluation and BPEO assessment can be found in the Initial Options Report (Royal HaskoningDHV, 2017).

6.2 Approach to EIA Consultation

6.2.1 Key stakeholders are identified in **Table 6-1**. They are allocated to specific groups, broadly to reflect the type of engagement activity that has been most appropriate, as detailed in **Table 6-2**.

Table 6-1: Stakeholder List

Group 1 – Expert / Technical
States bodies
The Development & Planning Authority
Committee for Economic Development: • Sea Fisheries
The Director of Environmental Health & Pollution Regulation
States Trading Assets: • Guernsey Harbours • Guernsey Water • Property Services
Committee for Education, Sport & Culture: • Heritage Services
Committee for the Environment & Infrastructure: • Traffic & Highway Services • Energy Strategy / Hydrocarbons Project • Agriculture, Countryside & Land Management Services

Group 1 – Expert / Technical
Ecology / Environment NGOs
La Société Guernesiaise - Specific sections: • Archaeology • Geology & Geography • Marine Biology • Nature Conservation
National Trust of Guernsey
Guernsey Conservation Volunteers
Environment Guernsey
RSPB Guernsey
Other
Coastal Pilots (*added following technical workshops*)
Group 2 - Users
2A: Construction industry / Waste producers
Bob Froome
Construction Industry Forum
Garenne Group
Guernsey Building Trades Employers Association
Guernsey Housing Association
J W Rihoy
Paul Rouget Plant Hire
Ronez
2B: Operators
States Works
Guernsey Recycling Group

Group 3 - Business General
Confederation of Guernsey Industry
Chamber of Commerce
Guernsey Marine Traders Association
Group 4 - Community
4A: Parish Representatives
Vale Douzaine
St. Sampson's Douzaine
4B: Near Neighbours
Bulwer Avenue residents – immediately adjacent the potential development
4C: Neighbours
Wider neighbours, e.g. • Vicinity – Bulwer Avenue, Grandes Maisons Road, The Bridge etc. • Visibility - Northside, Grandes Maisons Road, Delancey etc. • Haul Route – Bas Courtils Road, Halfway, etc.
4D: General Public
Group 5 - Media

Table 6-2: General Engagement Approach

Group	Description	Approach
1	Expert / Technical	Workshops – technical input for scoping; circulation of draft report for comment.
2	Users	Non-technical; consider for presentation/milestone updates.
3	Business general	
4	Community	
	4A – Parishes	Non-technical; consider for presentation/milestone updates.
	4B - Near neighbours	Liaison. Share draft scoping opinion. Invite expert advisers to workshop / comment on draft scoping.

Group	Description	Approach
	4C – Neighbours	Correspondence. Drop-in invites. Online information, including non-technical summary for scoping opinion. Potential liaison group for construction phase.
	4D - General public	Drop-in publicity. Media relations. Online resources.
5	Media	Technically communications channel(s) rather than engagement stakeholders. Briefings/releases.

6.2.2 The EIA itself is a technical exercise. Therefore, stakeholder engagement in the scoping exercise was primarily to gather input from expert local individuals, groups and organisations. In particular on the likely considerations and expectations for the EIA, potential constraints, baseline requirements, potentially significant impacts to consider, and further detail on mitigation measures and enhancement opportunities.

6.2.3 Wider engagement with other stakeholders is also important in informing debate. Such a major development can be expected to attract interest from neighbours and the wider community, and their input may be relevant on issues such as design. The project team therefore planned engagement with stakeholders at various stages, to keep them appraised of the progress of the project and invite feedback.

6.2.4 Activity has included:

- Contacting key data holders and interested parties to request data associated with the project's study area (initially by phone and email).
- Discussion (including teleconferences and meetings) with technical stakeholders to confirm the scope of the EIA and gain feedback on social, environmental, and technical aspects.
- Circulating the draft EIA Scoping Opinion to technical stakeholders and seeking structured feedback through a workshop.
- A public drop-in in March 2019 where anyone could comment on the impacts associated with the scheme.

6.2.5 Project updates are published online at www.gov.gg/inertwaste, and accompanied by media publicity. This webpage has information on the wider project and timelines, and key documents such as the draft EIA Scoping Opinion and non-technical summary.

6.2.6 Direct engagement has also been undertaken with immediate neighbours, who have considerable interest and naturally may have significant concerns about any development. In particular, expert advisers appointed by the owners of one neighbouring property have been engaged in the technical workshops.

6.2.7 Meaningful engagement has been sought with these neighbours, through correspondence and directly. Air quality experts from Royal HaskoningDHV have also carried out testing on site for one property, at the owners' request.

6.2.8 The wider local community in the Longue Hougue area has been engaged with directly by invitation to the public 'drop-in' event (see below). These invitations included links to www.gov.gg/inertwaste, where they could find out more information without attending the drop-in, as well as contact details for the project team should they have any questions.

6.2.9 Key milestones are provided in **Table 6-3**.

Table 6-3: Overview of Stakeholder Consultation

Activity	Stakeholder groups	Dates
Scoping Stage		
Data collection	Group 1	Ongoing
Circulate draft EIA scoping opinion	SoG Project Team	26 Oct 2018
Comment on draft EIA scoping opinion	N / A	27 Nov 2018
Review comments and include in draft EIA scoping opinion	N / A	11 Dec 2018
Circulate draft EIA scoping opinion	SoG Project Team	29 Jan 2019
Technical stakeholder workshop	Group 1	14 Feb 2019
Draft summary of the EIA scoping opinion published online	All groups	22 Feb 2019
Mailshot invite to public drop-in	Group 4A, 4B & 4C	22 Feb 2019
Briefing for construction industry stakeholders	Group 2	1 Mar 2019
Public drop-in	Groups 4 & 5	1 & 2 Mar 2019
EIA Stage		
Circulation of draft ES chapters	SoG Project Team	May - Sept 2019
Comment on draft ES chapters	N / A	Jul - Aug 2019

Activity	Stakeholder groups	Dates
Engage with technical stakeholders to gather key concerns / discuss issues and mitigation measures	Group 1	August - October 2019
Review comments and include in revised draft ES	N / A	August - October 2019
Online publication of a summary of the draft ES and request for comments	Groups 2, 3, 4 & 5	19 November 2019
Circulate draft ES	SoG Project Team	19 November 2019
Mailshot invitation to drop-in	Groups 4A, 4B & 4C	20 November 2019
Briefing	Group 1	29 November 2019
Public drop-in	Groups 3, 4 & 5	29/30 November 2019
Collate responses to consultation	N / A	1 week
Review & incorporate comments in ES	N / A	3 weeks

6.2.10 The content of the technical workshops and public exhibition are described in the below sections. The comments received during these events can be found in **Appendix 6.2**.

6.3 Stakeholder Technical Workshop

6.3.1 A workshop for expert stakeholders (Group 1) was held on 14 February 2019. The draft scoping opinion was circulated along with the invitations two weeks in advance, to allow time to consider the proposed topics for assessment in the EIA.

6.3.2 The workshop was split into three sessions, each focussing on a different topic area:

- Physical environment – coastal processes.
- Human environment – traffic, noise, and air quality.
- Biodiversity – flora and fauna.

6.3.3 These sessions were between 60 minutes and 90 minutes long, depending on how broad the topic area was. Each began with an introduction to the Longue Hougue South project, before identifying:

- Relevant baseline data, existing and/or proposed surveys.
- Impacts and assessment methodology.
- Potentially significant impacts.

6.3.4 Stakeholders could attend any or all sessions, depending on what was relevant to their area of interest/expertise. Attendees are listed in **Table 6-4**.

Table 6-4: Technical Workshop Attendees

Role / Expert area	Representative	Sessions		
		Physical environment	Human environment	Biodiversity
States of Guernsey				
States Archaeologist	Dr Philip de Jersey	Yes	Yes	No
Guernsey Harbours	Colin Le Ray	Yes	No	No
Property Services	David Parish	Yes	No	No
Guernsey Water	Steve Langlois	Yes	No	No
Environmental Health & Pollution Regulation	Catherine Rirsch	No	Yes	No
Biodiversity Officer	Julia Henney	No	No	Yes
NGOs				
La Société Guernesiaise				
Geology & Geography	Andrew Dorey	Yes	Yes	Yes
Archaeology	Tanya Walls	Yes	Yes	No
Marine Biology	Laura Bampton	No	No	Yes
Nature conservation	Trevor Bourgaize	No	No	Yes
Natural History	Lesley Bourgaize	No	No	Yes
Environment Guernsey	Jamie Hooper	Yes	No	Yes
Festung Guernsey	Paul Bourgaize	Yes	No	No

Role / Expert area	Representative	Sessions		
		Physical environment	Human environment	Biodiversity
Other				
Institute of Estuarine & Coastal Studies	Nick Cutts	By Skype	By Skype	By Skype
	Prof Mike Elliot	No	By Skype	By Skype
Project Team				
Rob Roussel	Project team	Yes	Yes	Yes
Graeme Falla	Project team	Yes	Yes	Yes
Simone Whyte	Planning Service	Yes	Yes	Yes
Denice Carling	Project team	Yes	Yes	Yes

6.3.5 The purpose of the workshop was to identify any other relevant baseline data and establish whether the proposed study areas and surveys were sufficient. It was also an opportunity for stakeholders to discuss potentially significant impacts, whether there were any not identified in the draft scoping document, and suggest how they might be prevented, minimised or managed to the benefit of the environment. Questions were welcomed at any stage.

Feedback

6.3.6 All feedback was recorded and collated and is detailed in the workshop report (see *Appendix A1* in **Appendix 6.1**). New baseline information sources have been reviewed, and where appropriate the EIA methodology has been adapted to take account of issues raised.

6.3.7 Coastal processes:

- Guernsey Water highlighted EIA studies carried out for the wastewater outfall replacement project in Belle Greve, including tidal flow modelling and benthic surveys. The location of this infrastructure also had to be considered in this EIA, including the potential impact on flows/dispersal (in particular the short sea outfall).
- Following a suggestion by Guernsey Harbours, local coastal pilots have also been asked to provide input into the modelling.
- Various technical clarification was provided, including hydrodynamic models used; existence of previous benthic surveys and physical data for the current

Longue Hougue land reclamation; and exclusion of climate change effects in the modelling. It was also confirmed that both wave action and tidal currents are being modelled.

- Potential impacts on Herm from the existing Longue Hougue land reclamation, and the possibility of knock-on effects was discussed. A review of historical aerial photography was suggested. Another baseline survey for that island's outfall was also highlighted.
- Possible sedimentation around St Sampson's Harbour, from the current Longue Hougue land reclamation, was raised, to be discussed with pilots.
- A potential impact of changing the direction of the tide, rather than the speed, was also raised, as was the extent to which sediment suspension and longshore impacts would be considered. It was confirmed that the modelling suggested effects on tide were localised, and in a high energy environment sediment suspension was not considered an issue.
- The location of an oyster hatchery to the north of the site highlighted, for potential inclusion as a receptor.

6.3.8 Human environment:

- Various technical clarification was provided, such as the inclusion of the power station activity in assessing air quality impacts; the possible existence of baseline data for noise and dust from other construction at Longue Hougue; locations for air quality and noise monitors; the dates and duration of surveys; inclusion of flood risk assessment; and the proposed breakwater construction method.
- The treatment of known archaeological and/or heritage assets within the site was raised. The initial draft scoping opinion had proposed these were not included in the assessment. It was suggested there was insufficient information in the draft document on land-based development around Spur Point (which includes a WWII structure) to conclude there would be no impacts.
- It was suggested the gabbro rock formation within the potential development site was unique and of international importance, and therefore required some preservation. Potential mitigation would be considered.

6.3.9 Biodiversity:

- Various technical clarification was provided, including on the extent of survey areas and overall scope of the EIA; whether consideration would be given to breeding seasons in the timing of works; biosecurity measures for imported rock armour; the extent of sampling in the intertidal region; potential

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measurement of underwater noise arising from any development; and it was confirmed that marine mammals would be considered as a ‘receptor’ in relevant chapters.

- There was discussion around the proposed location for benthic surveys, and it was agreed this would be reconsidered in light of the results from the tidal monitoring. Additional intertidal surveys were also commissioned as a result of discussions with stakeholders.
- It was suggested the scaly cricket population around Spur Point was of international significance. RHDHV clarified there was a process for a species to be recognised as globally significant, but the scaly cricket is being given significant weight in the EIA. More details regarding the timings of the survey was provided, potentially in conjunction with La Société.
- The presence of internationally significant habitats (Herm, Jethou and the Humps Ramsar) within 2km of the potential development was noted and would be included in the EIA.
- The potential release of contaminated materials through any new bund was raised, and possible stagnation, both of which would impact water quality. However, there was no evidence of contamination from the existing site, and the high tidal range and tidal speeds in the area made stagnation unlikely.
- Potential impacts on marine ecology from any changes to coastal processes was discussed. This was to be subsequently raised with the relevant technical experts at RHDHV (who were not present at the workshop).
- RHDHV confirmed potential impacts on any special habitat provided by the existing rock armour would be considered, and they had experience in this area.

6.4 “Industry” Briefing Session

6.4.1 Although site users are not technical stakeholders in the EIA sense, they have significant interest in the future operation of any development. Construction industry representatives (Group 2 – **Table 6-1**) were therefore invited to a breakfast briefing on 1 March 2019, following publication on the draft scoping opinion and to coincide with the public drop-in session.

6.4.2 14 people attended, including representatives of the Chamber of Commerce Infrastructure subcommittee, the Confederation of Guernsey Industry, and the Construction Industry Forum. They were given an update on the programme and the EIA process by the project team and Royal HaskoningDHV.

6.5 Public Drop-in Event

6.5.1 Public 'drop-in' sessions were held on 1 March 2019 in the foyer of the Performing Arts Centre, and on 2 March 2019 in the Beau Sejour foyer.

6.5.2 A media release was issued to accompany the publication of the EIA scoping document, to publicise the events and invite islanders to come along and find out more about the scheme and the proposed potential impacts to be investigated in the EIA. Invitations were also sent by post to more than 800 households in the area around Longue Hougue.

6.5.3 At the drop-ins, information about the Longue Hougue South scheme was presented on display boards, and members of the project team and Royal HaskoningDHV were on hand to answer any questions.

6.5.4 A frequently asked questions (FAQ) document was also available for the public to take away. This explained the rationale behind the project, the Inert Waste Strategy, how Longue Hougue South was identified as the preferred way forward, and the proposed environmental impacts to be considered in the EIA. The FAQs document is provided in *Appendix A4* in **Appendix 6.1**.

6.5.5 The public were invited to record any comment through feedback forms, which could be submitted during or after the events.

6.5.6 A total of 31 attendees provided feedback. Of these, 61% rated the event as 'very good' or 'excellent', with another 26% saying it was 'good'. Only one respondent (3%) rated it 'fair', and 10% gave no response. Nearly all respondents said the team were able to answer any questions they had, with only one person disagreeing. One other person said they were awaiting a response to a query.

6.5.7 The feedback form responses are detailed in *Appendix A2* in **Appendix 6.1** and summarised below:

- St Peter's Port harbour extension could be used for inert waste disposal instead of Longue Hougue South;
- The workshop was informative and provided me with the information I required;
- The presentation boards could have been larger and videos could have been used;
- The air quality in St Sampson's is poor;
- Tidal currents and waves need to be investigated in detail;
- There is little political support for this plan;

- Further detail required on how the site would look after development; and
- Impact on scaly cricket needs investigating.

6.6 Other Engagement

6.6.1 Members of the project team met with the Coastal Pilots on the 29 March 2019 on the coastal processes and modelling. Baseline data was subsequently shared and after reworking of the model they agreed that the predictions matched their experience.

6.6.2 A meeting was also held with Agriculture, Countryside & Land Management Services on 19 June 2019, to discuss the marine and land ecology surveys.

6.6.3 Both these meetings arose following feedback from the earlier workshop sessions.

6.7 Ongoing Consultation

6.7.1 Prior to submission of the ES we would seek to pass on findings of some or most of the concerns raised by local residents and other stakeholders in earlier consultation phases. This will be expected to be through engagement at a public information event, and would have a focus on what impacts were resolved and how the initial concerns of stakeholders have been accommodated in the EIA process. This would include appropriate presentation materials, as well as full copies of the key document for review if required. Issues, concerns, suggestions etc. will be captured through feedback forms. This will be held on 29th and 30th November 2019, and provides an opportunity for any final issues to be identified and considered in the final ES.

7 Coastal and Marine Processes

7.1 Introduction

Content

7.1.1 This chapter of the Environmental Statement (ES) describes the existing environment in relation to coastal and marine processes and details the assessment of the potential impacts during the construction and operational phases of the Longue Hougue South Inert Waste Management Facility (the Project). Changes to waves and tidal current velocities may drive changes in sediment transport and patterns of erosion and deposition in the coastal and marine zones. These changes may arise during both construction and operation of the Project. The effects of the Project on both bedload processes (sediment particles transported in contact with the bed) and suspended sediment processes (sediment particles transported in suspension) are considered. Mitigation measures are described and a discussion of the residual impacts provided, where significant impacts were identified.

7.2 Legislation and Policy Context

7.2.1 The States of Guernsey legislative requirements relevant to coastal and marine processes are detailed in **Chapter 2 Planning, Policy and Legislative Context**. The main legislative requirement for coastal and marine processes relates to the Habitats Directive (**Section 2.3**). The Project is about 1.8km from the Herm, Jethou and The Humps Ramsar Site and there is the potential for changes to coastal and marine processes to occur that could impact habitats and species at the designated site.

7.2.2 The main policy requirement is related to Areas of Biodiversity Importance (ABI) where land use policy states that proposed projects demonstrate that the biodiversity interest of ABIs have been considered as part of the design and development process. The Project is located within a foreshore ABI.

7.3 Assessment Methodology

Impact Assessment Methodology

7.3.1 Consideration of the potential effects of the Project on coastal and marine processes is carried out over the following spatial scales:

- near-field: the area within the immediate vicinity (tens or hundreds of metres) of the proposed Project; and
- far-field: the wider area that might also be affected indirectly by the proposed Project (e.g. due to disruption of waves, tidal currents or sediment pathways).

7.3.2 Two phases of development are considered, in conjunction with the present-day baseline. These are:

- construction phase; and
- operational phase.

7.3.3 The assessment of coastal and marine processes covers impacts where several discrete direct receptor groups are identified. These include receptors which possess their own intrinsic morphological value, such as beaches, rock platforms, saltmarsh and intertidal mudflats. The impact assessment incorporates a combination of the sensitivity of the receptor, its value (if applicable) and the magnitude of the change to determine a significance of impact by means of an impact significance matrix. **Chapter 5 EIA Methodology** provides an overview of this approach to the assessment of impacts.

7.3.4 In addition, a second type of assessment is adopted. This covers changes to coastal and marine processes that in themselves are not necessarily impacts to which significance can be ascribed. Rather, these changes (such as a change in the wave climate, a change in the tidal regime or a change in suspended sediment concentrations) represent effects which may manifest themselves as impacts upon other receptors, most notably marine sediment and water quality, marine ecology, and material assets (e.g. in terms of increased suspended sediment concentrations and/or erosion or smothering of habitats on the sea bed). In this case, the magnitude of effect is determined in a similar manner to the first assessment method but the sensitivity of the other receptors and the significance of impacts on them is assessed within the relevant chapters of this ES pertaining to those receptors. These are **Chapter 8 Marine Sediment and Water Quality**, **Chapter 15 Material Assets (Archaeology, Built and Cultural Heritage)**, and **Chapter 17 Marine Ecology**.

Numerical Modelling

7.3.5 To support the assessment of impacts and effects, numerical modelling of tidal currents after construction of the Project has been completed. Simulations were run for the baseline condition and after implementation of the Project. This model represents recognised good practice for informing environmental appraisals and is required as the greatest risk concerns morphological changes to the adjacent beaches and nearshore areas caused by changes to physical processes.

7.3.6 Outputs from the modelling are presented to inform the EIA process, aid interpretation of the potential effects and address any concerns raised by stakeholders and consultees **Chapter 6 Consultation**. The numerical model used to predict changes in tidal currents is the English Channel Regional Model and the details of model set-up, calibration and results are presented in **Appendix 7.1**.

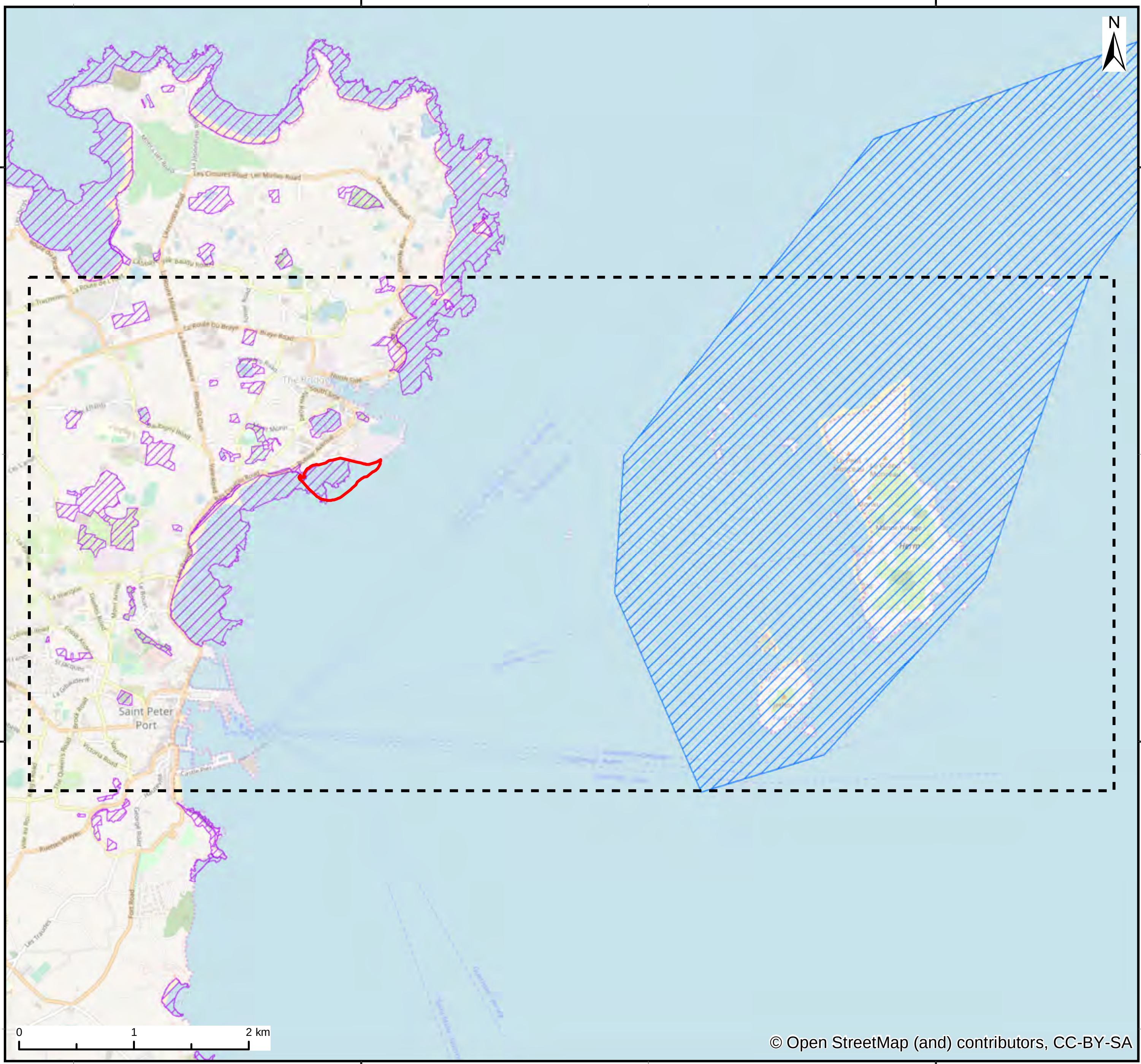
Expert Geomorphological Assessment

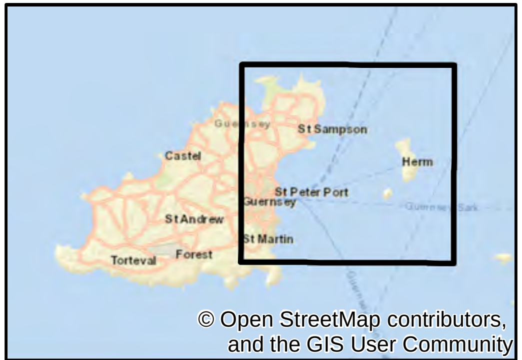
7.3.7 In addition to the numerical model, a range of analytical techniques have been applied, including Expert Geomorphological Assessment (EGA) for the prediction of longer-term morphological change. EGA is a technique which involves interrogating a range of data and applying expert judgement to evaluate how the hydrodynamic and sedimentary regimes function and determine how any changes to these regimes may affect sediment distribution. The main EGA technique used here to assess effects on coastal and marine processes is predicated on a Source-Pathway-Receptor (S-P-R) conceptual model, whereby the source is the initiator event, the pathway is the link between the source and the receptor impacted by the effect, and the receptor is the receiving entity.

Impact Receptor Groups

7.3.8 For impacts on coastal and marine processes, two receptor groups are identified, which contain various features with ascribed inherent value. The location of these is shown in **Figure 7-1**. One group covers the Herm, Jethou and The Humps Ramsar site. The nearest point of the Herm group of receptors is located about 1.8km from the Project across the Little Russel Channel. It is included because of the potential for changes to tidal current flows following construction (operation) of the Project.

7.3.9 The second receptor group is the coastal zone of the east coast of Guernsey. The proposed Project is located on an area of intertidal and subtidal habitat in Belle Grève Bay which includes the foreshore Area of Biodiversity Importance (ABI) (**Figure 7-1**). The foreshore ABI includes all subtidal habitat in the north of the Island, from Pleinmont to St. Peter Port. ABIs are protected because they represent habitat types that are of significance to nature conservation in the island. However, they do not have sufficiently high level of special interest to be designated as Sites of Special Significance. Belle Grève Bay ABI is included as a receptor group because of the potential for local changes to tidal currents and erosion / accretion patterns following completion of the construction phase of the Project.





Legend:

- Outline of Proposed Development
- Coastal and Marine Processes Study Area
- Area of Biological Importance[2]
- Herm, Jethou and the Humps Ramsar Site[1]

[1]JNCC 2016
[2]Guernsey Government, 2013,
© HaskoningDHV UK Ltd.

Client:	Project:
States of Guernsey	Longue Hougue South EIA

Title:
Receptor Groups and Study Area for Assessment of Coastal and Marine Processes

Figure: 7.1 Drawing No: PB5312-300-032

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	30/08/2019	FC	PT	A4	1:50,000

Co-ordinate system: Guernsey Grid

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Cumulative Impact Assessment

7.3.10 Cumulative impacts are assessed through consideration of the extent of influence of changes or effects upon coastal and marine processes arising from the Project alone and those arising from the proposed project cumulatively or in combination with other developments and other nearby activities. There are no projects scoped-in for assessment of cumulative impacts with the Project construction and operation in relation to coastal and marine processes. The current Longue Hougue facility is part of the baseline and is therefore not assessed as part of the cumulative impacts.

Transboundary Impact Assessment

7.3.11 Transboundary impacts are assessed through consideration of the extent of influence of changes or effects and their potential to impact upon coastal and marine processes receptor groups that are located within other EU member states. Given the distance of the Project from international boundaries in the English Channel, it is concluded that transboundary impacts on coastal and marine processes would not occur.

7.4 Baseline

7.4.1 This section provides an overview of the key information from the assessment of the existing coastal and marine processes environment. The approach taken has been to review existing relevant data and reports from Guernsey and formulate an understanding of the baseline physical and sedimentary environments using expert-based assessment and judgement supported by the hydrodynamic modelling.

Study Area

7.4.2 This coastal and marine processes assessment addresses the potential effects on the coastal zone between the southern breakwater at St. Peter Port in the south and Bordeaux Harbour in the north, and the offshore zone extending into the Little Russel Channel between Guernsey and Herm (**Figure 7-1**). The study area was defined after review of the numerical modelling results. Its boundaries were chosen to be outside the predicted area of influence of changes to tidal currents, and bedload and suspended sediment transport.

Data Sources

7.4.3 Data has been collected from a variety of available sources and includes information on geology, topography, bathymetry, waves, water levels, tidal currents, beach and offshore sediment and suspended sediment concentrations. These various data sources have been used to develop a baseline understanding of the study area. The key data sources that have been used to inform the assessment process are listed in **Table 7-1**.

Table 7-1: Data Sources Used to Unform the Assessment Process

Data	Coverage	Source
Bedrock Geology	Guernsey	Topley et al. (1990), Guernsey Renewable Energy (2011), and Hawley (2017) adapted from Roach et al. (1991)
Pleistocene Geology	Guernsey	Keen (1982) and Renouf and James (2011)
Coastal Infrastructure	Guernsey	Guernsey Coastal Defence Strategy (Posford Duvivier, 1999; Royal Haskoning, 2007)
Topography / Bathymetry	Guernsey east coast	Digimap (2017) lidar data flown on 30th March 2017
Bathymetry	Little Russel Channel	Clydeside Surveys multibeam echosounder collected in 2014 and C-map electronic charts
Waves	Longue Hougue South and Belle Grève Bay	Guernsey Coastal Defences Flood Risk Assessment (Royal Haskoning, 2012a, b)
Astronomical Water Levels	St. Peter Port	Admiralty Tide Tables (2019)
Extreme Water Levels	Guernsey east coast	Guernsey Coastal Defences Flood Risk Assessment (Royal Haskoning, 2012a)
Holocene Sea-level Rise	Guernsey	Hawley (2017), adapted from Sebire and Renouf (2010)
Historic Sea-level Rise	Guernsey	Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment of Climate Change (Church et al., 2013)
Future Relative Sea-level Rise	Guernsey	IPCC Fifth Assessment of Climate Change (Church et al., 2013) and land motion (Shennan et al., 2012)
Tidal Currents	Guernsey coastal waters	Regional hydrodynamic model (Bedingham, 2012)
	Longue Hougue South and the Little Russel Channel	English Channel Regional (hydrodynamic) Model (Royal HaskoningDHV, 2019)

Data	Coverage	Source
Regional Sea-bed Sediment Distribution	Guernsey coastal waters	Sea-bed sediment mapping (Hommeril, 1967; Auffret et al., 1979; British Geological Survey, 2000)
Sediment Particle Size	Longue Hougue South and the western Little Russel Channel	Ecological survey between 10th and 12th May 2019 with supporting particle size analyses (**Appendix 17.1**)
Coastal Sediment and Bedload Sediment Transport	Longue Hougue South and adjacent coasts	Site visit on 13th February 2019 and Guernsey Coastal Defence Strategy (Posford Duvivier, 1999; Royal Haskoning, 2007)

7.4.4 This section provides an overview of the key information from the assessment of the existing coastal and marine processes environment. The approach taken has been to review existing relevant data and reports from Guernsey and formulate an understanding of the baseline physical and sedimentary environments using expert-based assessment and judgement supported by the hydrodynamic modelling.

Bedrock Geology

7.4.5 Geologically, Guernsey can be divided into two parts. The southern part, known as the Southern Metamorphic Complex comprises predominantly Precambrian gneisses about 2,000 million years old. The northern part, known as the Northern Igneous Complex (and containing the Project) is largely composed of igneous rocks dating between 550 and 700 million years old (Topley et al., 1990). The Project is located on the northern part of the Precambrian St. Peter Port Gabbro, which outcrops south to St. Peter Port (Guernsey Renewable Energy, 2011; Hawley, 2017, adapted from Roach et al., 1991) (**Figure 7-2** and **Figure 7-3**). To the north of St. Sampson Port, the Bordeaux Diorite Complex is exposed and to the south of St. Peter Port, the Castle Cornet Gneiss and then Icart Gneiss outcrop. Offshore into the Little Russel Channel, the L'Ancresse Granodiorite outcrops.

7.4.6 The St. Peter Port Gabbro outcrops as a shore platform along the east coast of Guernsey between St. Sampson and St. Peter Port, including Longue Hougue South (Topley et al., 1990) (**Figure 7-4** and **Figure 7-5**). Natural exposure of the St. Peter Port Gabbro is limited to the shore platform.

Figure 7-2 Bedrock Geology of Guernsey (Guernsey Renewable Energy, 2011)

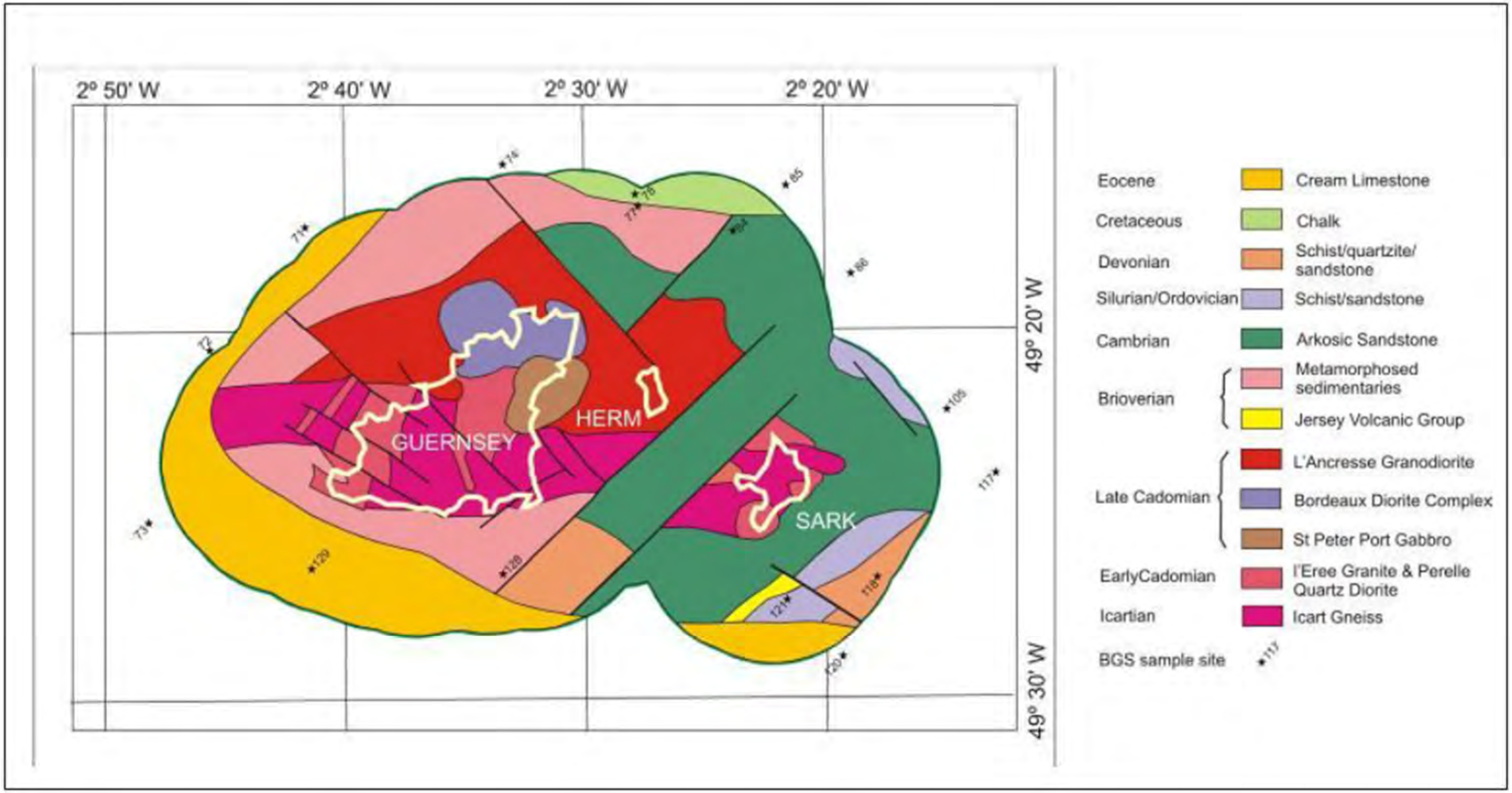


Figure 7-3 Bedrock Geology of Guernsey (Hawley, 2017, adapted from Roach et al., 1991)

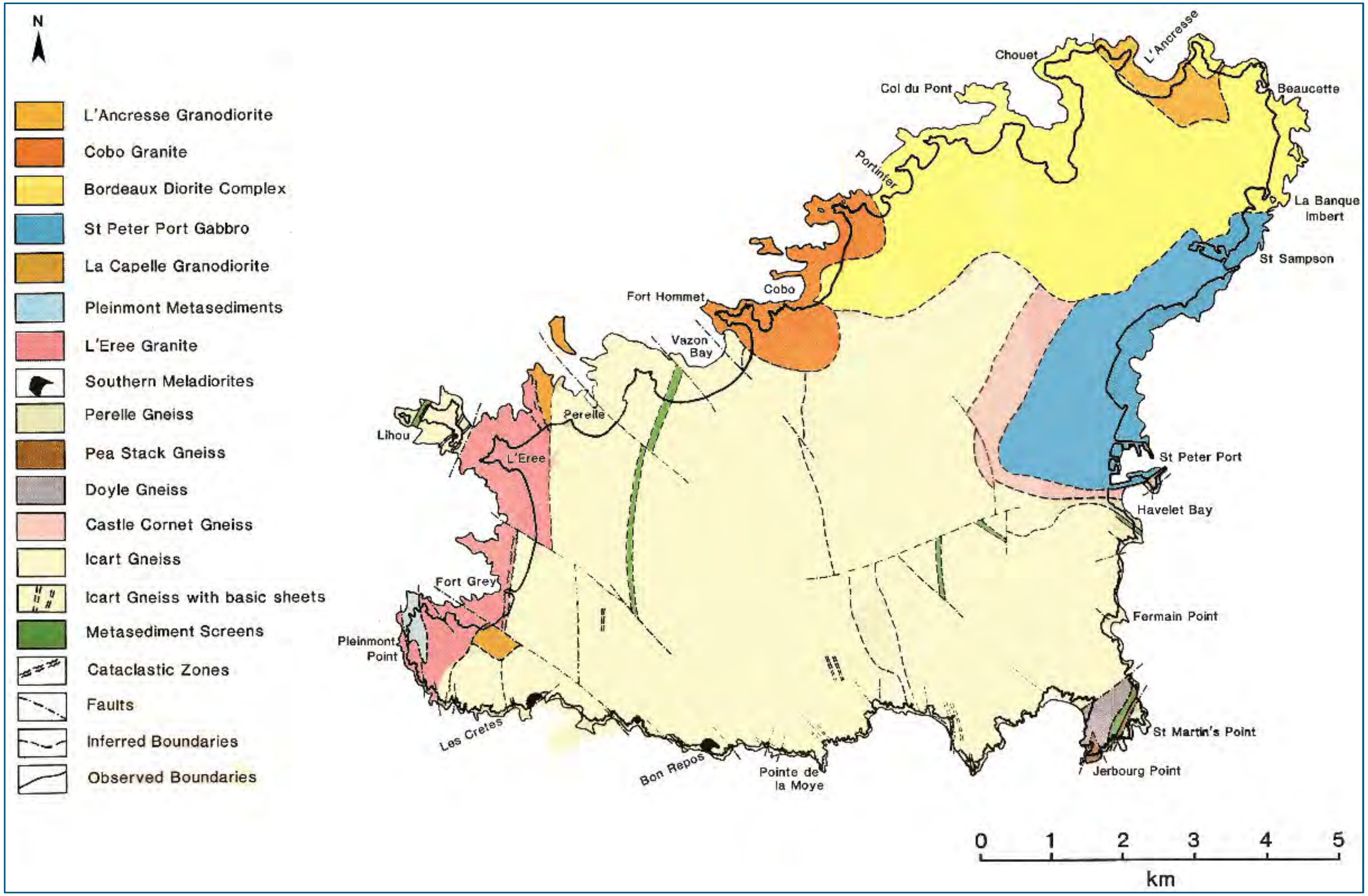


Figure 7-4 Shore Platform Composed of St. Peter Port Gabbro Between St. Sampson and St. Peter Port (Topley et al., 1990)

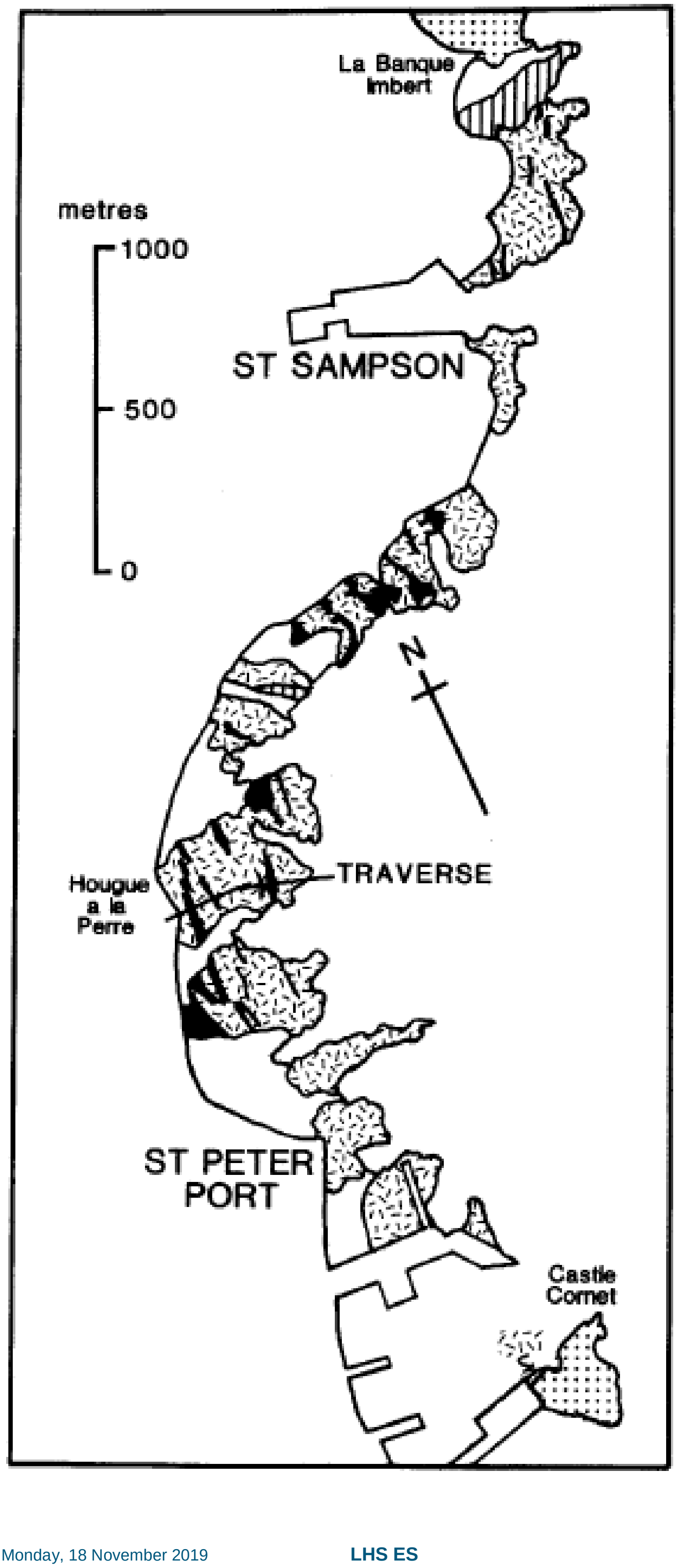


Figure 7-5 Photograph of the Shore Platform at Longue Hougue South (Photograph taken 13th February 2019)

Pleistocene Geology

7.4.7 The Pleistocene deposits of Guernsey are restricted to three main types; periglacial loess, raised beaches, and head deposits. None of these deposits are exposed at or adjacent to Longue Hougue South and so only brief descriptions are provided.

Periglacial Loess

7.4.8 Loess is a wind-blown silt, which is up to 5m thick in the southeast of Guernsey, decreasing in thickness to the north and west.

Raised Beaches

7.4.9 Raised beaches in Guernsey were formed during the elevated sea-levels of past interglacial periods. They comprise sand and gravel accumulations at various locations around the island, at elevations of about 30m (about 395,000 years ago), 18m (about 230,000 years ago) and 8m (about 125,000 years ago) above mean sea level (Keen, 1982; Renouf and James, 2011). Raised beaches closest to Longue Hougue South are at the northern and southern ends of the east coast.

Head Deposits

7.4.10 Head deposits are exposed to the north and west of Guernsey, where they comprise solifluction deposits (the gradual movement of wet soil or other material down a slope) with the larger particles composed of local rock types but with a finer fraction that may contain loess from further afield. The thickest coastal head deposits (20m) generally rest on the 8m raised beach demonstrating that much of the head post-dates this beach.

Coastal Infrastructure

7.4.11 North of St. Sampson, both anthropogenic and natural defences protect Bordeaux Harbour (Posford Duvivier, 1999; Royal Haskoning, 2007). Both natural defences and rock protection exist on the south facing shore and dunes defend a short length of the frontage along the northwest edge. The east-facing frontage is defended by a seawall. Rock protection defends the cliffs to the north of Vale Castle. The headland of Vale Castle is protected by a seawall. In addition, a 20m length of rock revetment protects the southern end of the wall and the soft coastal edge in front of Bordeaux Beach car park. A 20m undefended section then exists, followed by a 30m length of rock revetment which continues to the end of the unit.

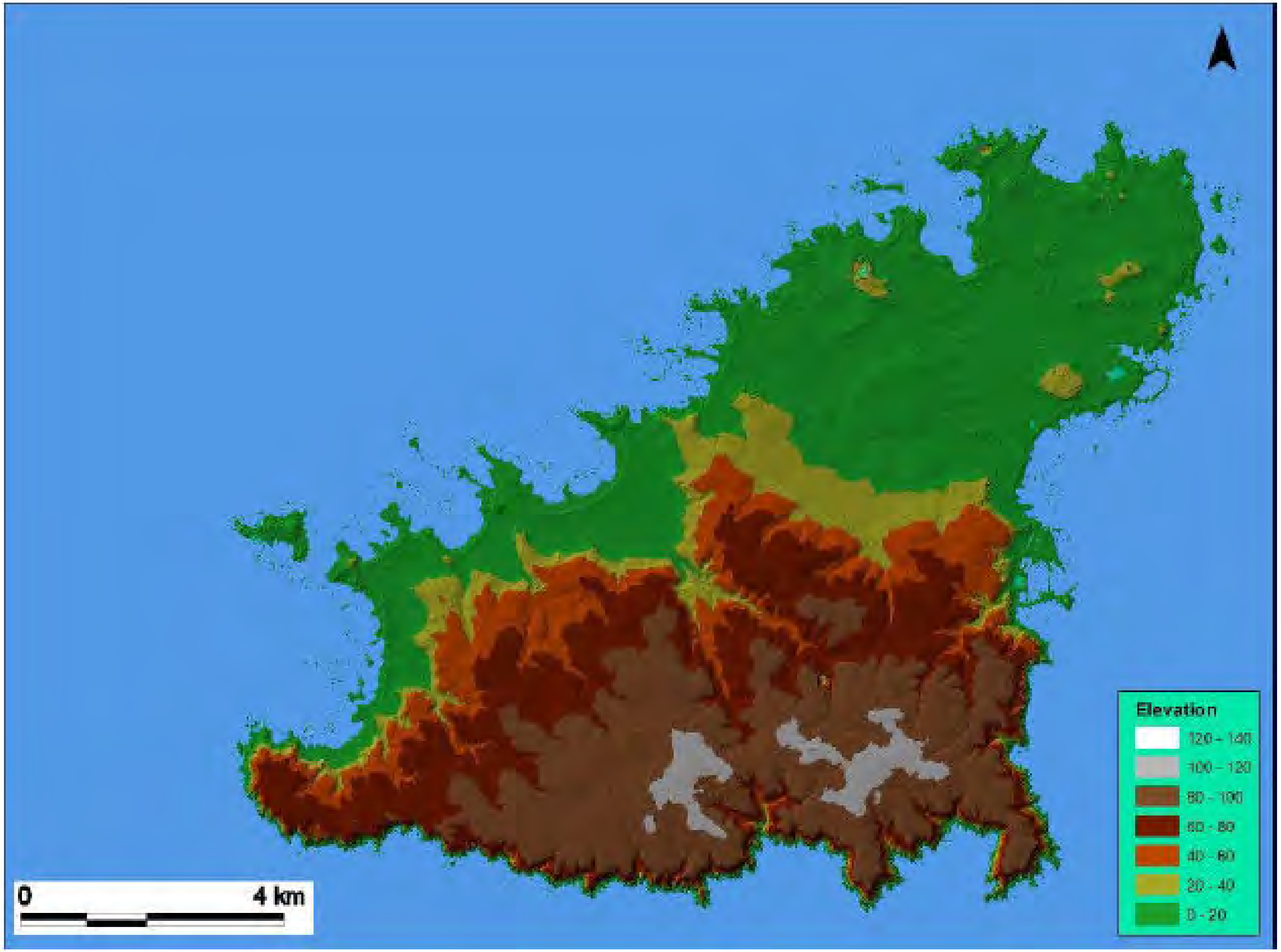
7.4.12 Much of the coast fronting St. Sampson is land-claim built on quarry waste and is protected by a rock revetment (Posford Duvivier, 1999; Royal Haskoning, 2007). The rock platform is still evident at low tide. St. Sampson Harbour is protected by vertical masonry breakwaters. Land-claim of the Longue Hougue site commenced in the early 1990s but the harbour itself has not changed shape since 1880.

7.4.13 The promontory of Spur Point immediately south of Longue Hougue South is defended by a combination of natural defences and rock dumped on the foreshore (Posford Duvivier, 1999; Royal Haskoning, 2007). The northern part of Belle Grève Bay is protected by a seawall to Halfway, whereas south of Halfway to north of Grande Bouet, there are no defences. A shingle ridge occurs at the top of the beach. The coast between Grande Bouet and St. Peter Port is protected by a seawall.

Topography and Bathymetry

7.4.14 The coastal area north of St. Peter Port, including Longue Hougue South, is undulatory but typically below 20m mean sea level (**Figure 7-6**).

Figure 7-6 Topography of Guernsey at Mean Sea-level Derived from 2016 Digimap data (Hawley, 2017)



7.4.15 The bathymetry of the east coast of Guernsey is characterised by contours approximately parallel to the coast. The 10m contour is about 1km offshore. Bedrock outcrops are exposed at low water. The topography and offshore and nearshore bathymetry adjacent to the Project was compiled from several data sources (**Table 7-1**). A combined topography and bathymetry map of Longue Hougue South and adjacent areas (used in the numerical modelling simulations) is shown in **Figure 7-7**. Here, the Little Russel Channel offshore from the Project descends from the edge of the shore platform to a depth of about 30m below CD. The topography local to the site is shown in **Figure 7-8**.

7.4.16 Beach profiles across the site (**Figure 7-9**) have been generated from the Lidar data and these are shown in **Figure 7-10** (west of the headland) and **Figure 7-11** (east of the headland).

7.4.17 Sections 1 to 3 on the west side of the headland show similar cross-shore changes in substrate with the beach increasing in width from 5m in the west to 10m in the east. However, the vertical height between the top and base of the beach diminishes in a west to east direction from 1m at Section 1 to 3m at Section 3. This means that the beach slope varies from 1 in 4 to 1 in 5. The elevation of the top of the beach where it is adjacent to the sea wall is between 4m and 5.5m above Ordannce Datum (OD) Guernsey with the base between 2.5m and 3.5m above OD (**Figure 7-12**). Seaward of the beach is the shore platform with a partial veneer of cobbles and boulders. The beach at Sections 2 and 3 is mainly composed of cobbles (64-256mm) and pebbles (4-64mm) whereas Section 3 contains a large proportion of boulders (256-4096mm). The slope of Section 4 (1 in 6.5) is different to Sections 1 to 3 and is composed of coarse sand and smaller gravel sizes.

7.4.18 The beach to the east of the headland is wider than to the west, ranging from about 15m to 35m with vertical heights from 2m to 5m. The beach slope is shallower than to the west of the headland, between 1 in 6.5 and 1 in 8.5. The top of the beach where it meets a rock revetment against a shallow bank is higher than to the west of the headland, at about 6m above OD (at Section 10 it is slightly lower at 5.5m above OD) with the base between 1m and 4m above OD (mainly 2m above OD) (**Figure 7-13**). Like the west of the headland, seaward of the beach is the shore platform with a partial veneer of cobbles and boulders. The beach at all locations is composed of a mix of pebbles (4-64mm) and cobbles (64-256mm). Patches of coarse sand and finer gravel occur locally across the beach.

Figure 7-7 Topography and Bathymetry of Longue Hougue South and Adjacent Areas Derived from 2014 Multibeam Echosounder Data (Clydeside Surveys) and 2017 Lidar Data (Digimap)

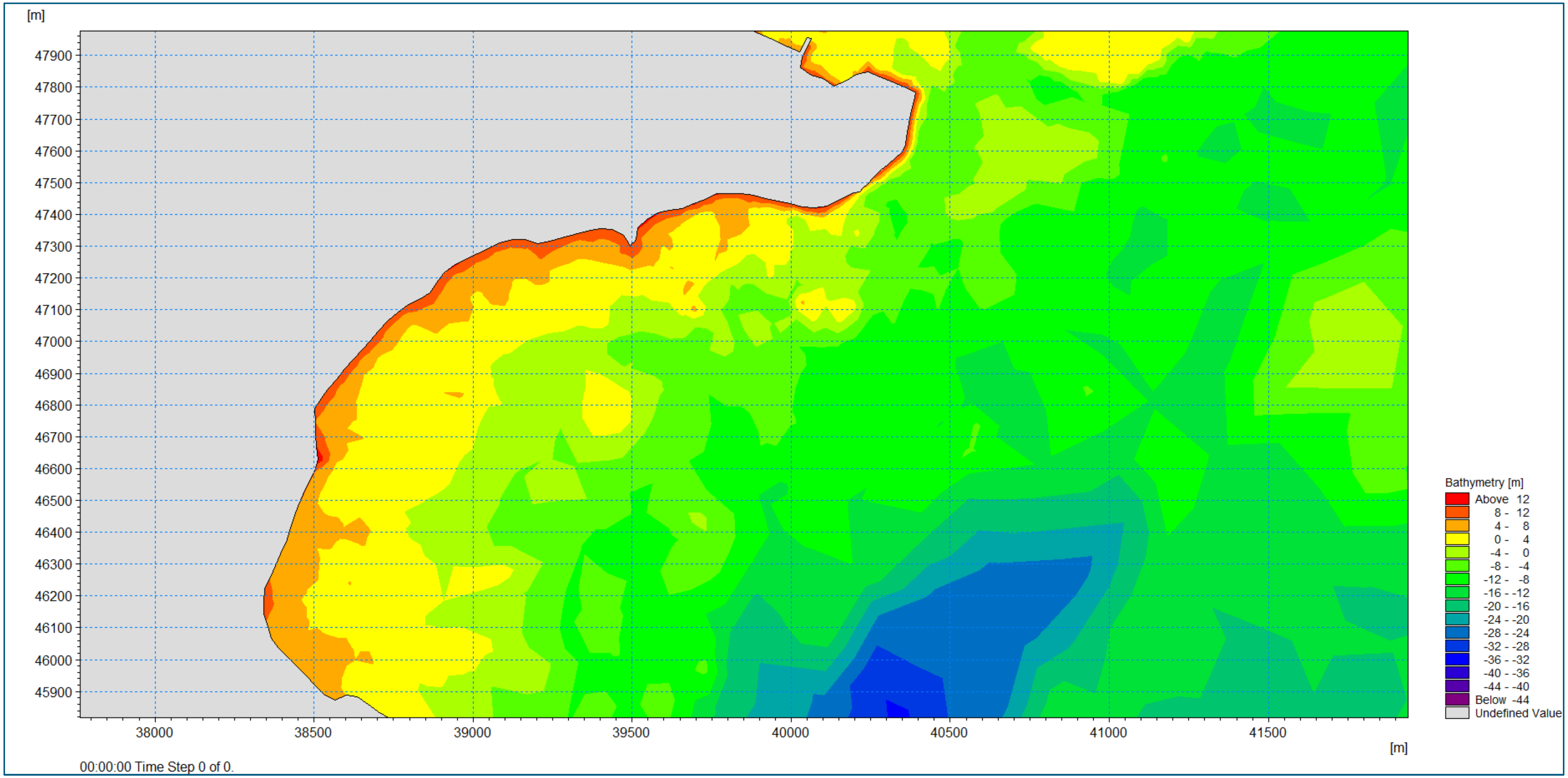


Figure 7-8 Topography of Longue Hougue South Derived from 2017 Lidar Data (Digimap)

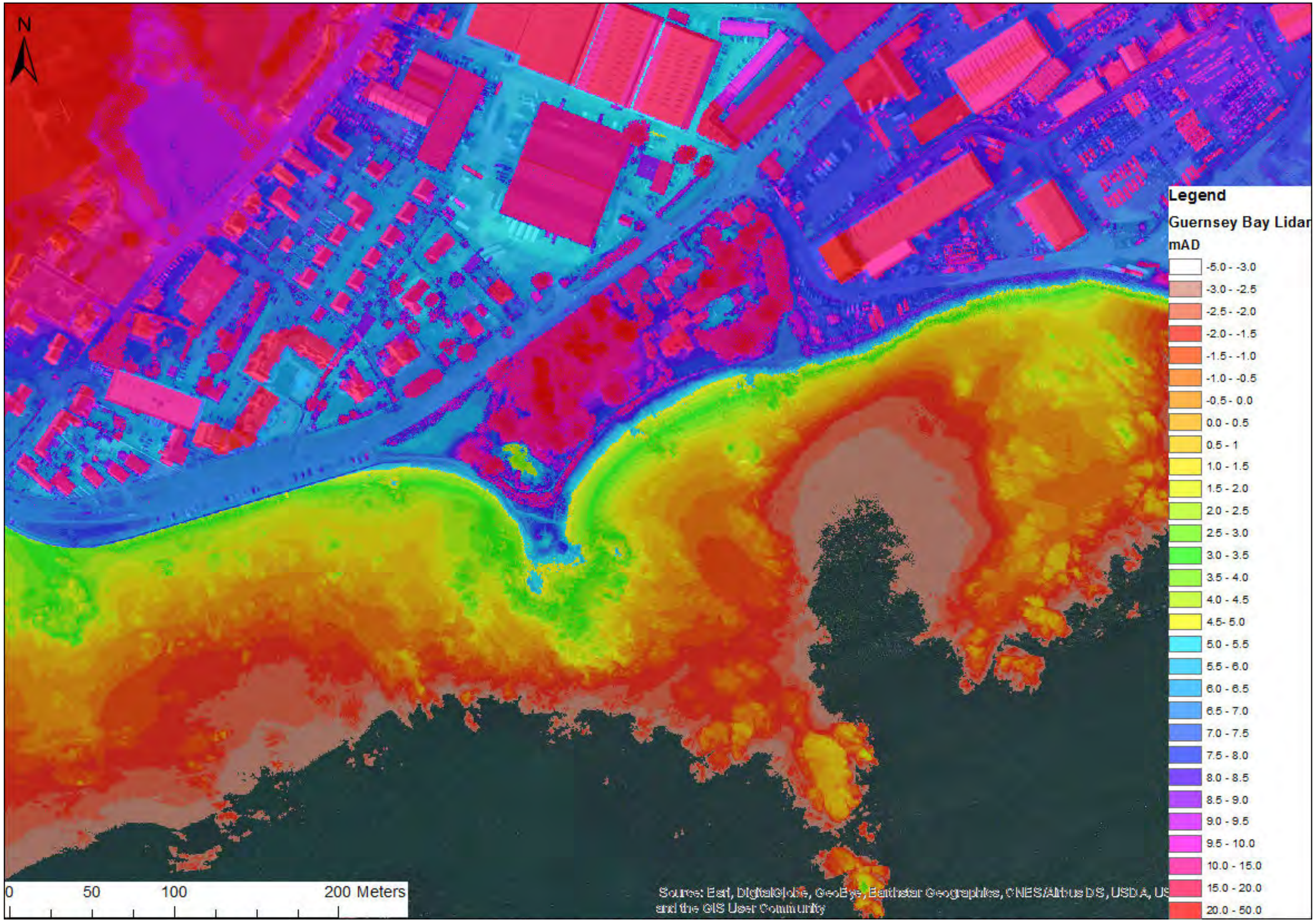


Figure 7-9 Locations of Beach Profiles at Longue Hougue South

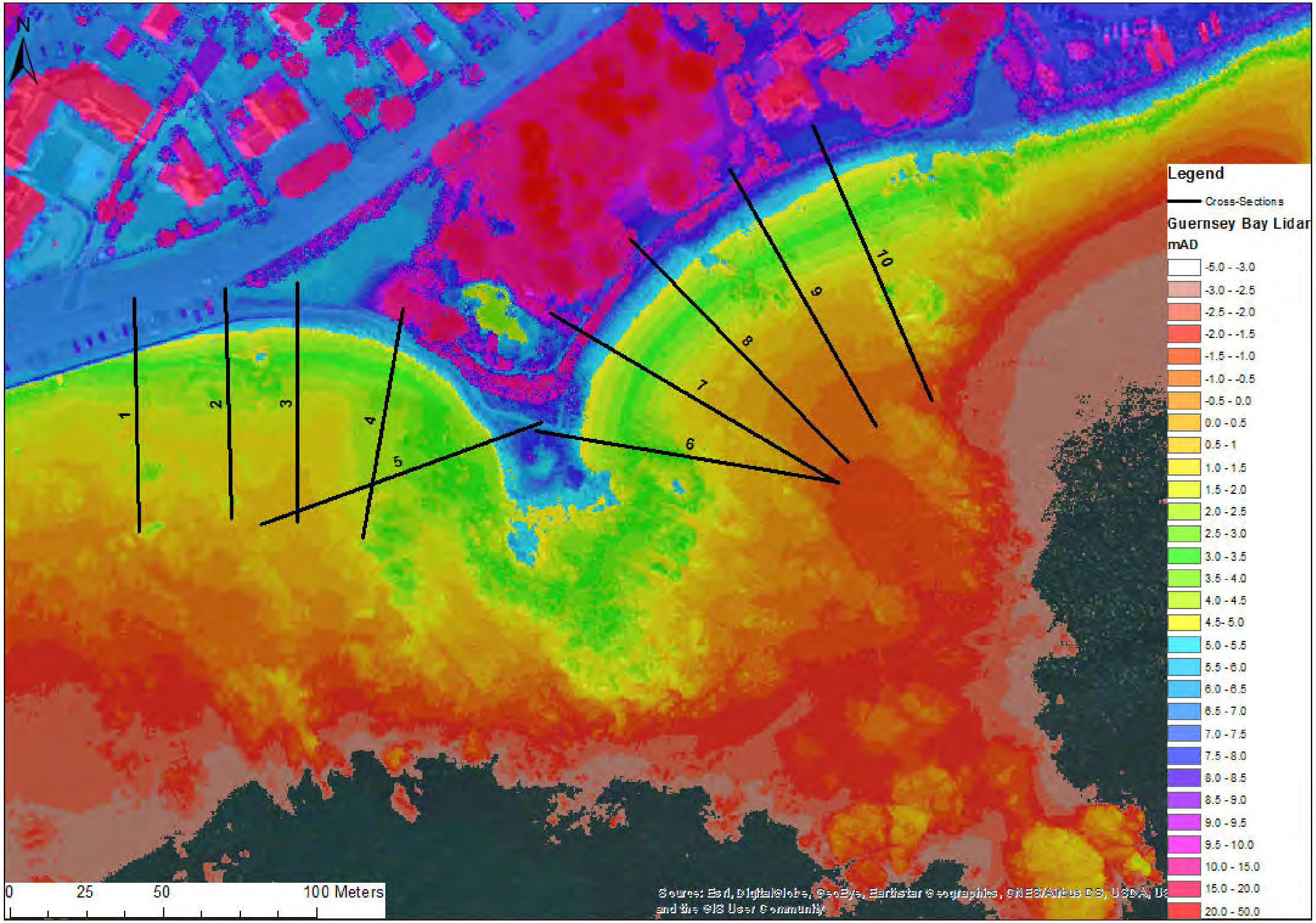
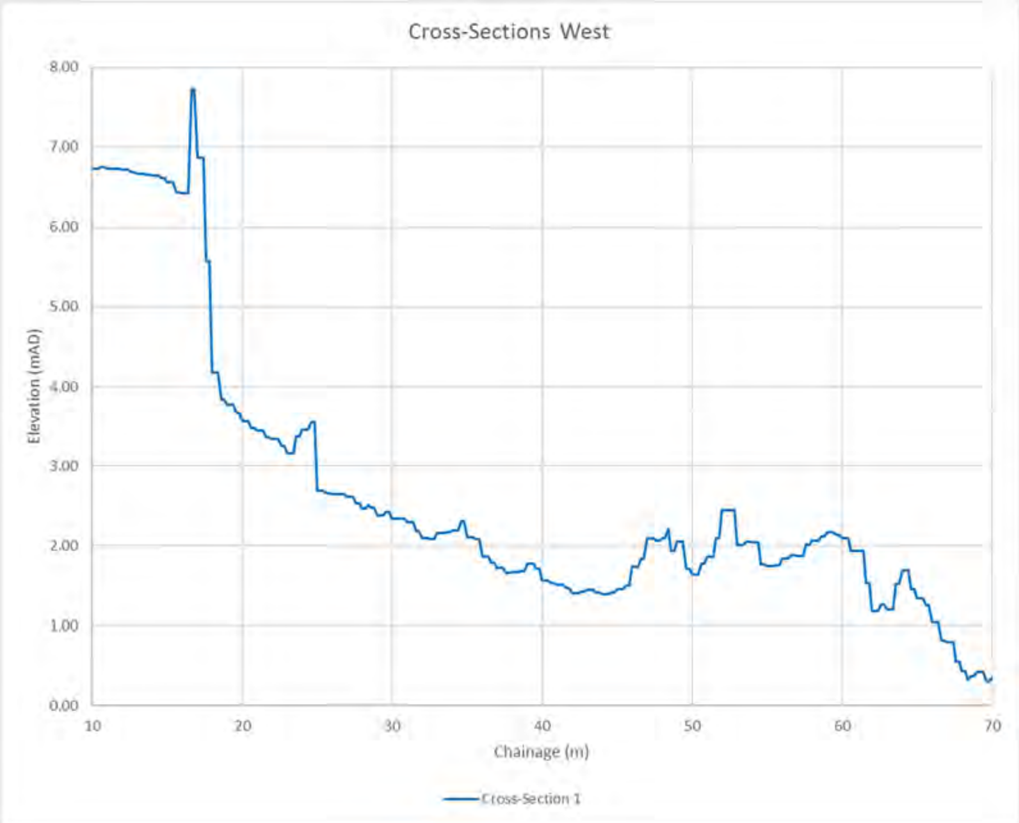
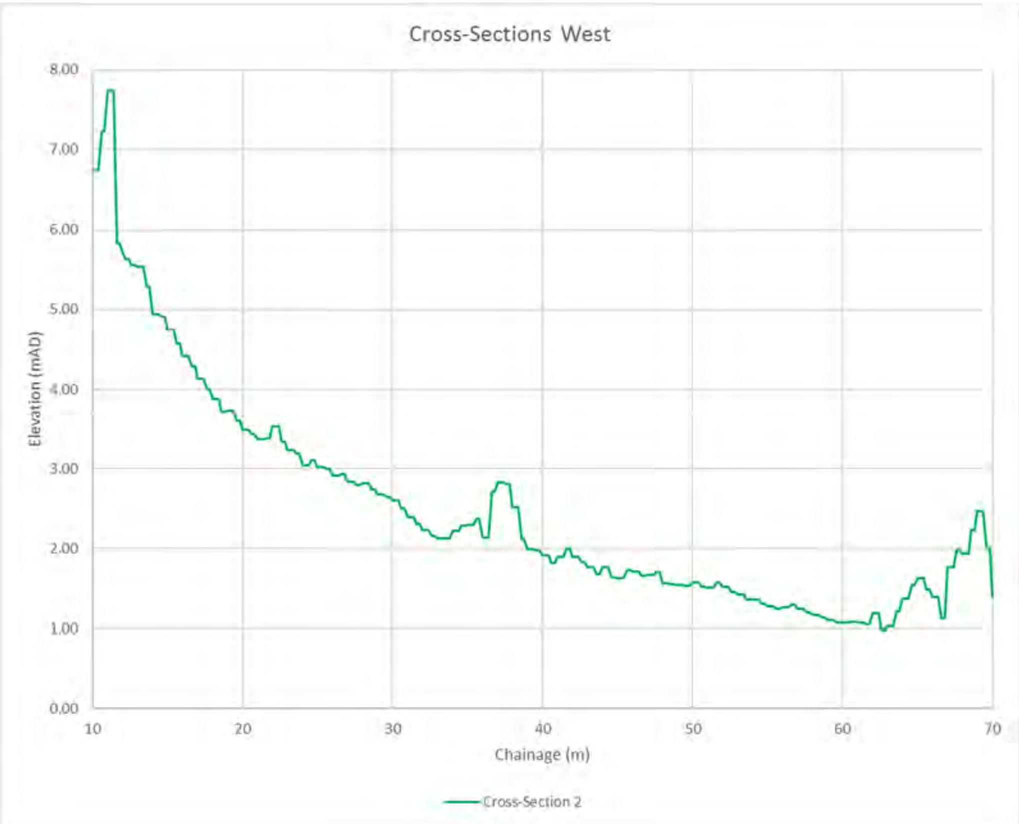
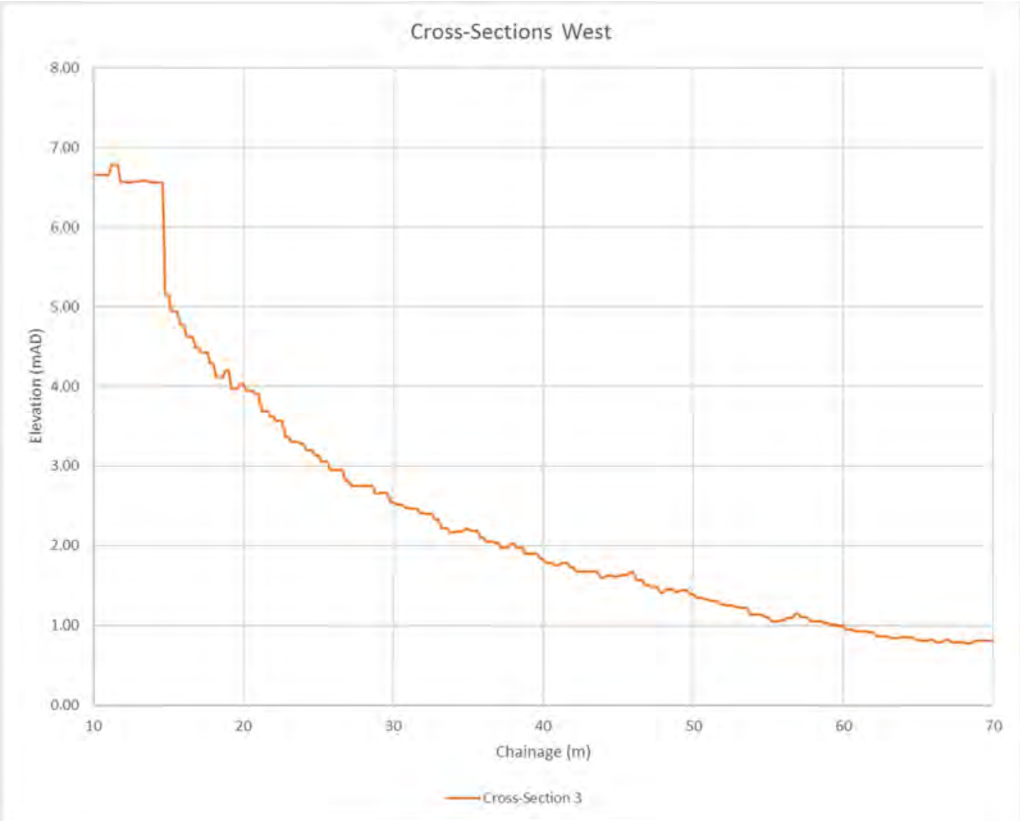
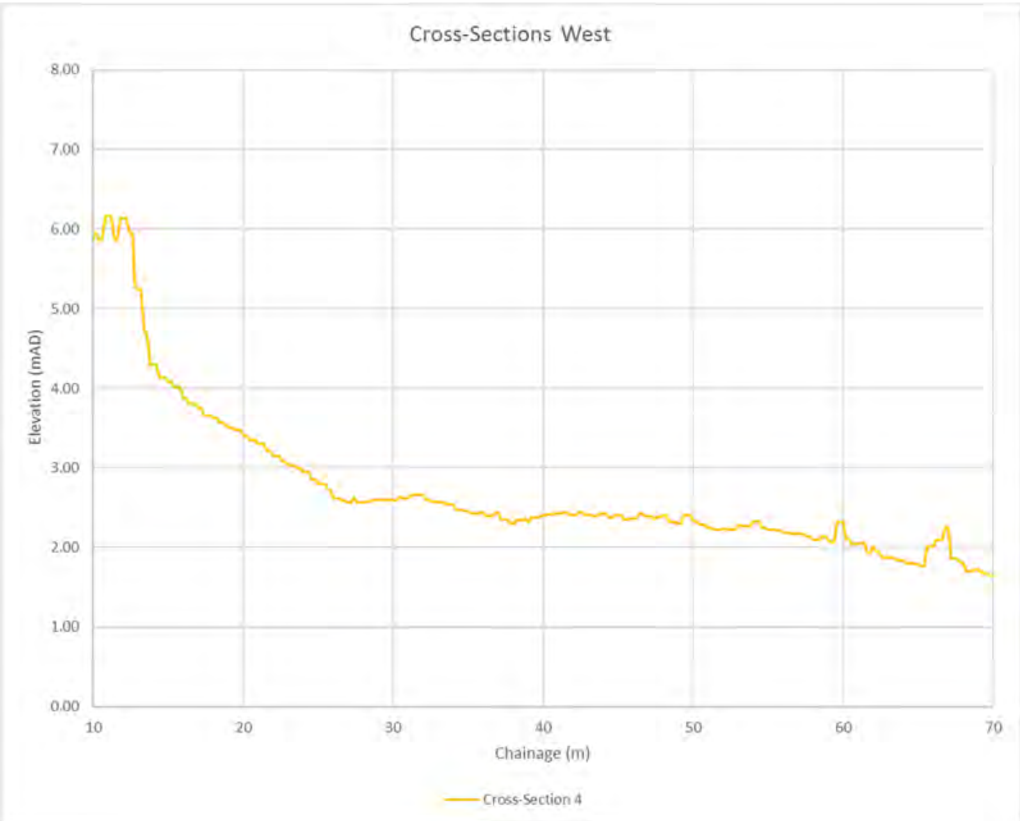


Figure 7-10 *Beach Profiles on the West Side of the Headland (Locations are shown on **Figure 7-9**)*






Cross-Sections West
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
Elevation (mAD)
10
20
30
40
50
60
70
Chainage (m)
Cross-Section 3


Cross-Sections West
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Elevation (mAD)
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20
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70
Chainage (m)
Cross-Section 4

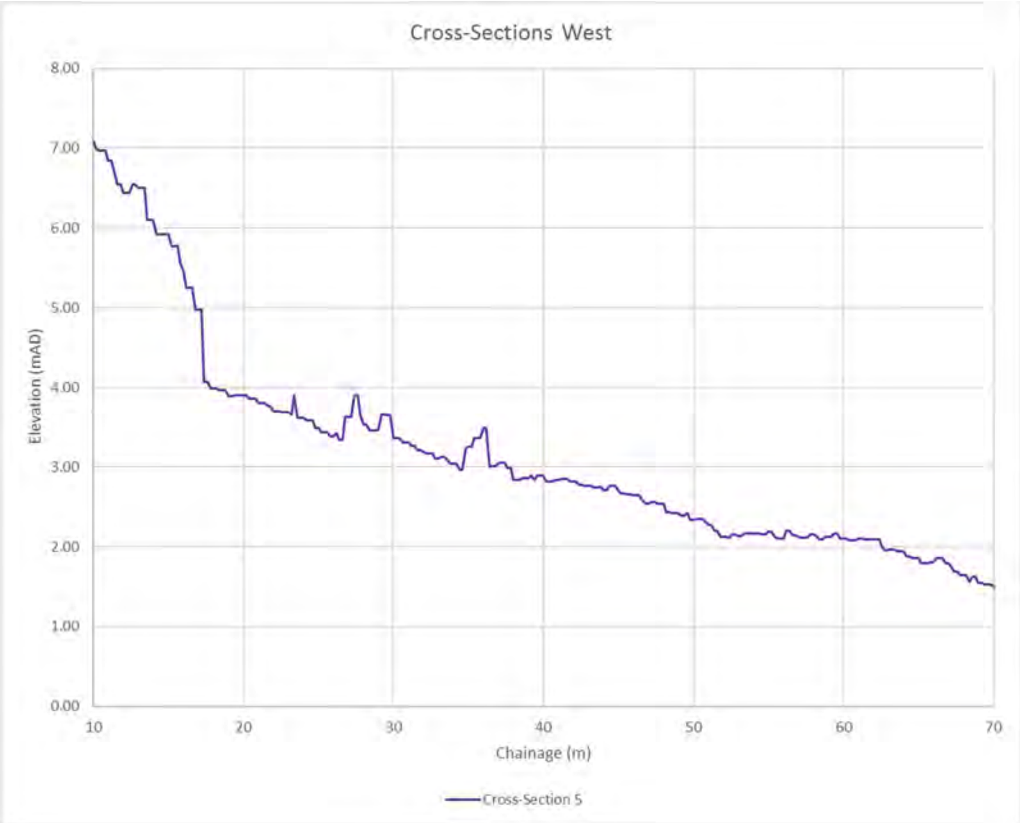
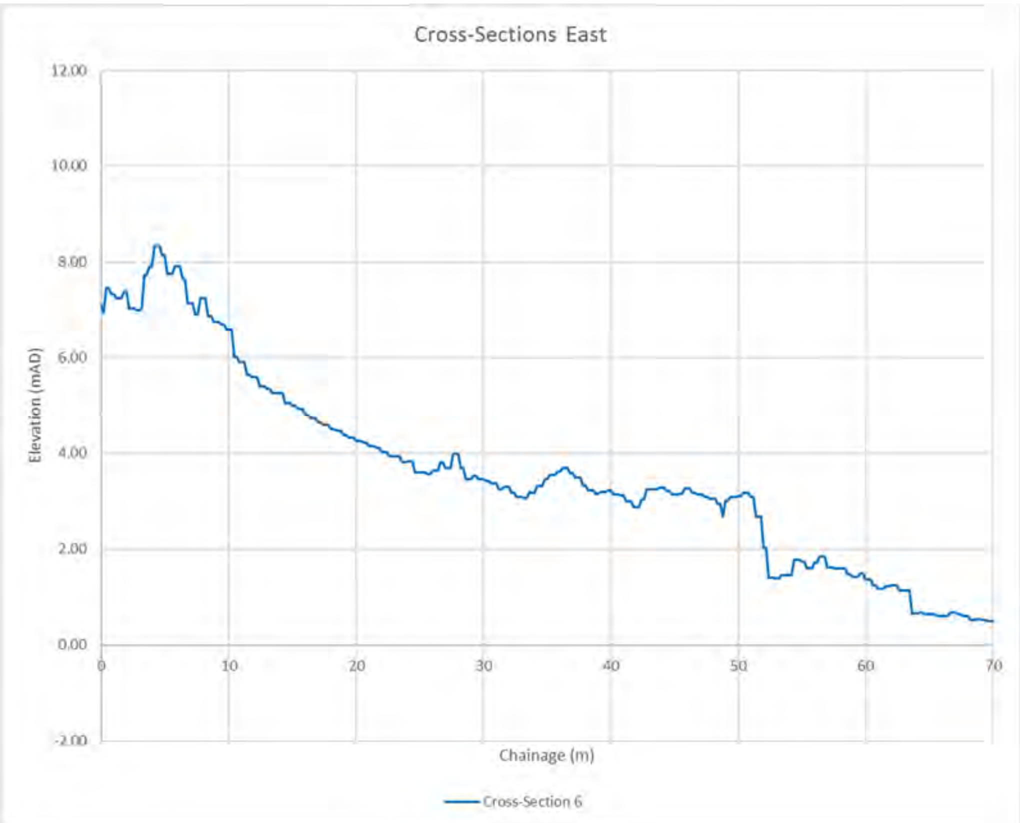
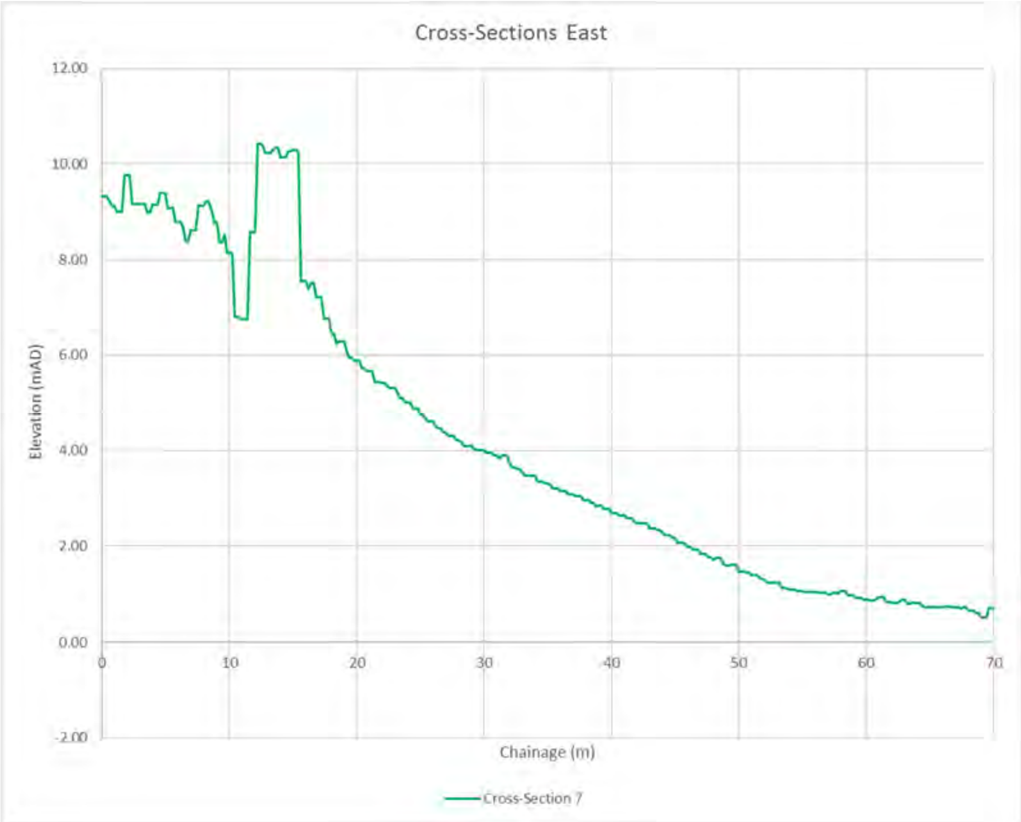


Figure 7-11 *Beach Profiles on the East Side of the Headland (Locations are Shown on **Figure 7-9**)*




Cross-Sections East
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8.00
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Elevation (mAD)
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20
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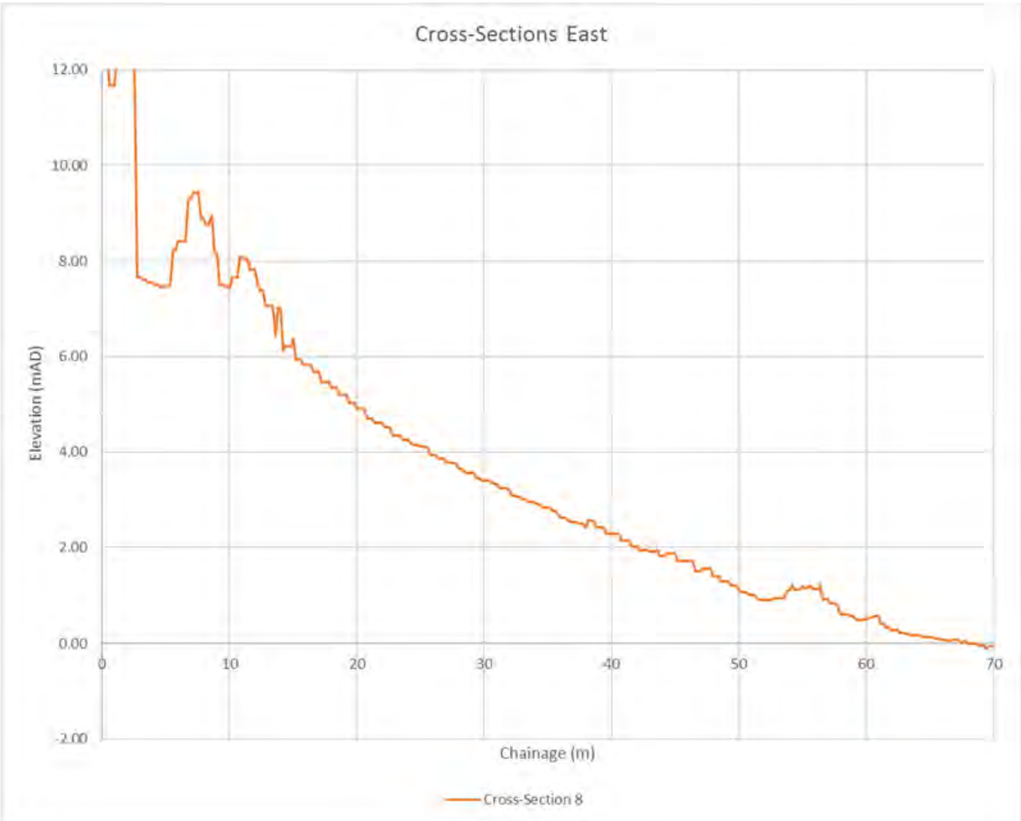
70
Chainage (m)
Cross-Section 7


Cross-Sections East
12.00
10.00
8.00
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4.00
2.00
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-2.00
Elevation (mAD)
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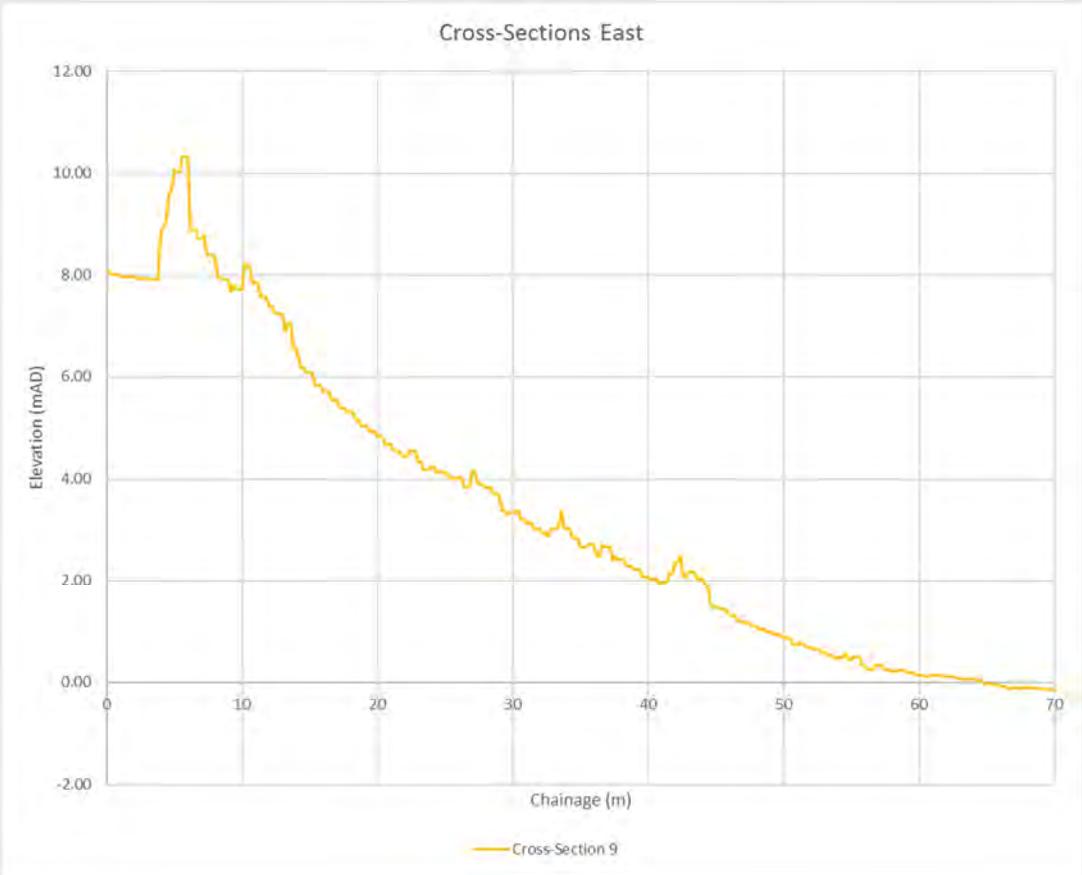
70
Chainage (m)
Cross-Section 8


Cross-Sections East
Elevation (mAD)
12.00
10.00
8.00
6.00
4.00
2.00
0.00
-2.00
0
10
20
30
40
50
60
70
Chainage (m)
Cross-Section 9

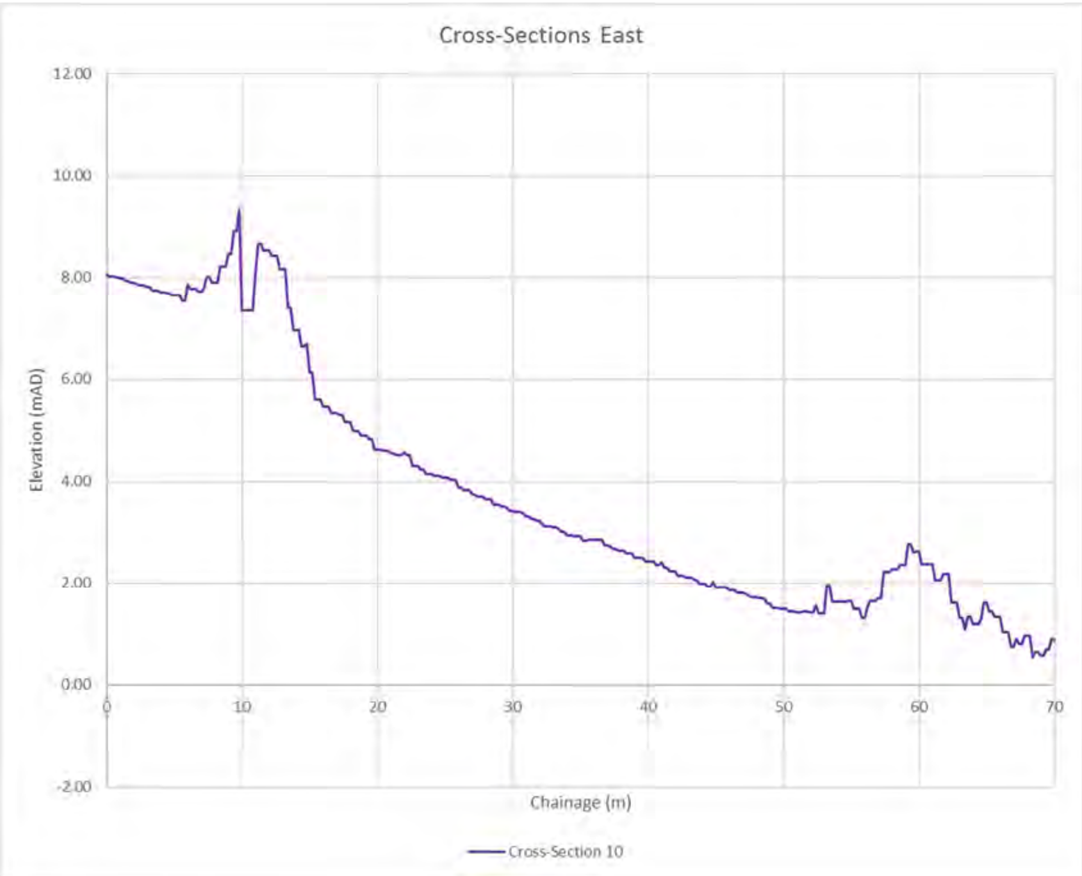

Cross-Sections East
Elevation (mAD)
12.00
10.00
8.00
6.00
4.00
2.00
0.00
-2.00
0
10
20
30
40
50
60
70
Chainage (m)
Cross-Section 10

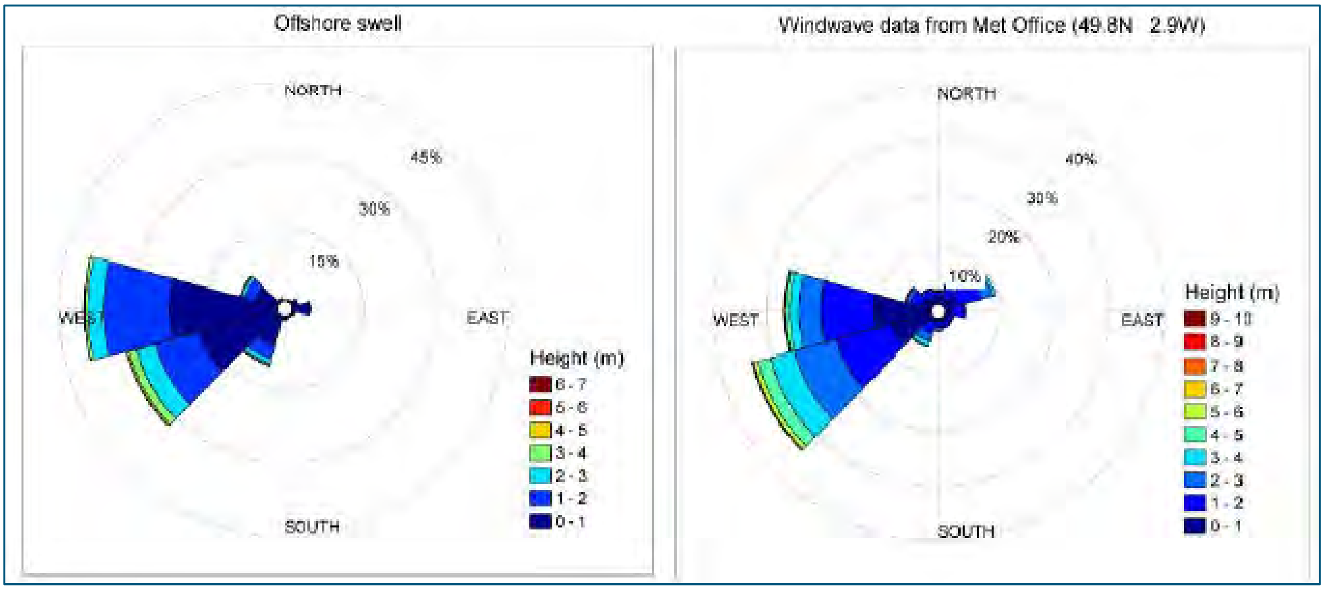
Figure 7-12 Beach to the West of the Headland (photograph taken 13th February 2019)

Figure 7-13 Beach to the East of the Headland (photograph taken 13th February 2019)

Offshore Wave Climate

7.4.19 Guernsey is exposed to waves from all directions. The conditions include wind waves generated locally arriving from the directions of the coasts of France and England, and swell propagating down the English Channel and diffracting around the Cherbourg Peninsula, as well as swell arriving from the north Atlantic. The dominant wave climate and the most severe conditions originates from the west, arriving either as north Atlantic long period swell, or as shorter period wind-waves, generated more locally by south-westerly storms. Typical offshore wave roses for swell and locally generated waves are shown in **Figure 7-14** (Royal Haskoning, 2012a).

Figure 7-14 Typical Offshore Wave Climate of Swell (left) and Wind-wave (right) (Royal Haskoning, 2012a)



Nearshore Wave Climate

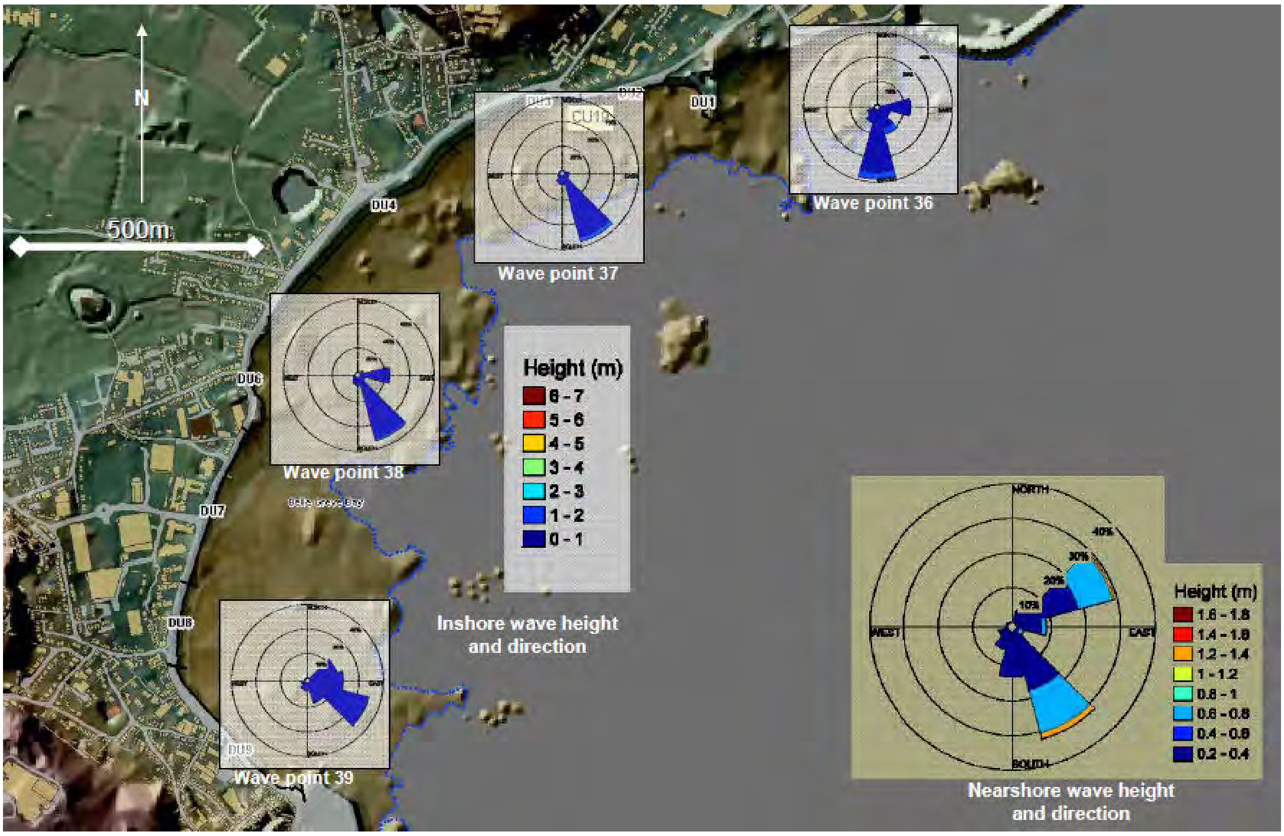
7.4.20 Royal Haskoning (2012b) used a MIKE21 model to transform the offshore waves to the coast at over 50 locations including Longue Hougue South. In Belle Grève Bay, Royal Haskoning (2012b) showed that typical locally generated wave heights reach approximately 1.8m for all return periods (1-year to 250-year), with wave periods of about seven seconds. The dominant wave direction is from the southeast at the shoreline. The bay can be affected by longer period swell but this has a lower wave height, although these waves are of significantly greater wave period. Royal Haskoning (2012b) presented the distribution of typical wave heights and direction as wave roses at four inshore locations around Belle Grève Bay **(Figure 7-15**), together with a wave rose for slightly further offshore (nearshore wave climate determined at St. Peter Port). The bay gains significant shelter because of St. Peter Port to the south and the land-claim to the north. The northern section of the bay is more exposed than the frontage to the south. Predominant waves tend to approach the southern defences (DU9 through to DU5) at a slightly oblique angle to the alignment of the defences. Waves approach DU4 more normal to the shoreline encouraging the development of the shingle bank in this area. A summary of worse case wave heights and wave period at Longue Hougue South are shown in **Figure 7-17**.

Table 7-2: Design Wave Heights and Periods at Longue Hougue South and Immediately to the South

Frequency	Longue Hougue South (DU1 on Figure 7-15)		South of Longue Hougue South (DU3 on Figure 7-15)	
	Wave Height (m)	Period (s)	Wave Height (m)	Period (s)
Locally Generated Waves				
1-year	1.7	7.2	1.7	7.2
10-year	1.8	7.2	1.7	7.2
50-year	1.8	7.2	1.7	7.2
100-year	1.8	7.2	1.7	7.2
250-year	1.8	7.2	1.7	7.2
Swell Waves				
1-year	0.4	11.7	0.4	11.7
10-year	0.5	12.5	0.5	12.5
50-year	0.5	13.0	0.5	13.0
100-year	0.6	13.3	0.6	13.3
250-year	0.6	13.6	0.6	13.6

7.4.21 Joshi (2012) used Delph 3D-WAVE to predict significant wave heights around Guernsey. The results showed that significant wave heights along the east coast are between 0.5m and 1.0m (**Figure 7-16**).

Figure 7-15 Predicted Locally Generated Wave Conditions within Belle Grève Bay (Royal Haskoning, 2012b)



Astronomical Water Levels

7.4.22 Tides in the English Channel are derived from a tidal wave generated in the Atlantic Ocean, which does not exceed 0.5m in range. When this tidal wave passes over the continental slope and reaches the shelf it is amplified, the amplification becoming greater as the wave progresses east in the Channel. The wave is then reflected along the western coast of the Cotentin Peninsula, in such a way that a standing wave is created causing very large tidal ranges in the Brittany-Normandy Gulf (up to 11m, **Figure 7-17**) (Reynaud *et al*. (2003).

7.4.23 As part of this standing wave, the tides at St. Peter Port to the south of the Project are regular and semi-diurnal, with predicted spring and neap tide ranges of 7.9m and 3.4m, respectively (Admiralty Tide Tables, 2018) (**Table 7-3**).

Extreme Water Levels

7.4.24 Royal Haskoning (2012a) calculated extreme water levels along the east coast of Guernsey from a statistical analysis of the highest water levels recorded at St. Peter Port (**Table 7-4**).

Figure 7-16 Predicted Significant Wave Heights Around Guernsey (Joshi, 2012)

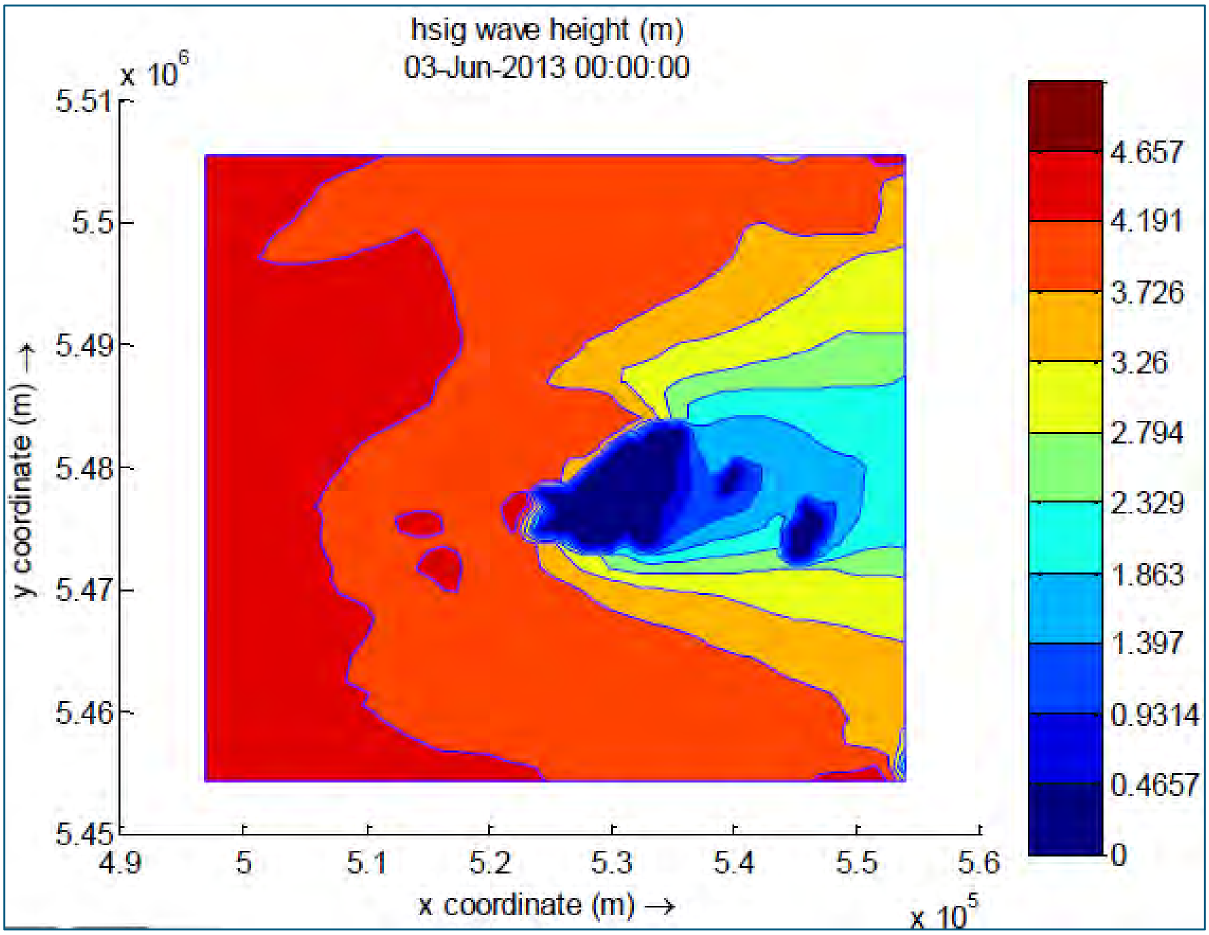
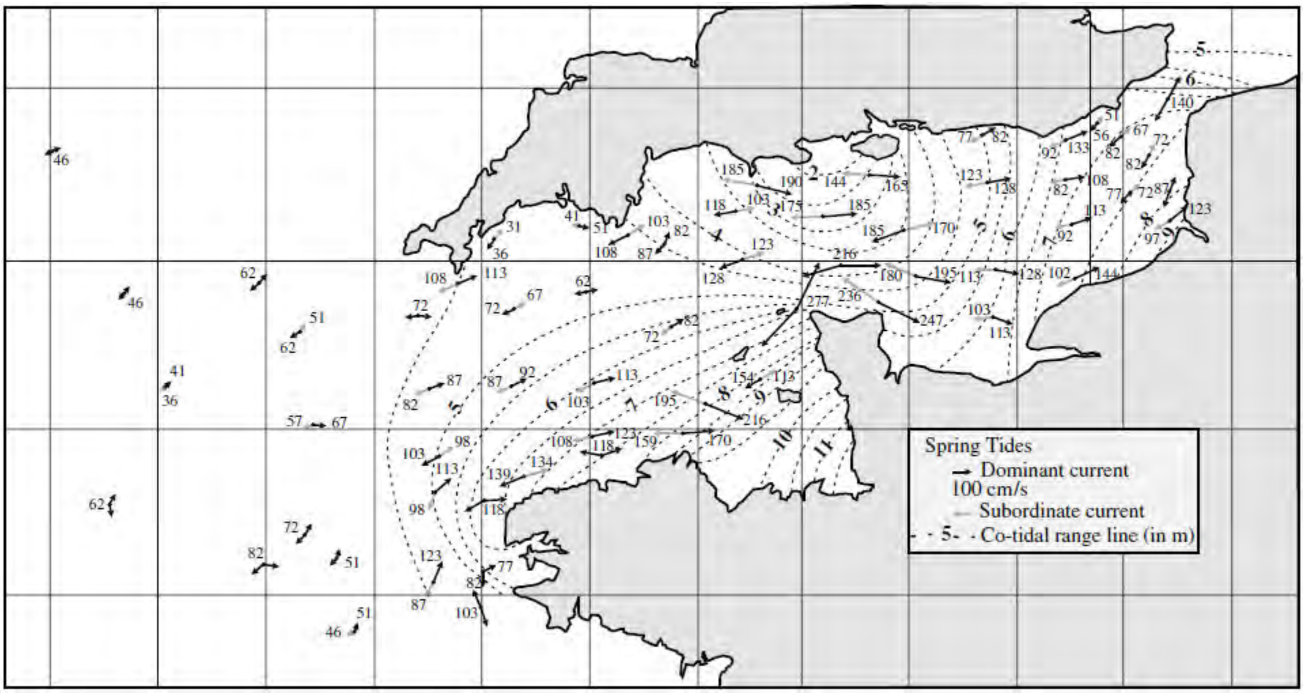


Figure 7-17 Present-day Surface Currents in the English Channel (Reynaud et al., 2003)



Note: Spring maximum current vectors using data of the SHOM (1968).

Table 7-3: Tidal Datums at St. Peter Port (Admiralty Tide Tables, 2018)

Tidal Datum	Elevation at St. Peter Port (m CD)	Elevation at St. Peter Port (m OD)
Highest Astronomical Tide (HAT)	10.3	5.24
Mean High Water Spring Tide (MHWS)	9.3	4.24
Mean High Water Neap Tide (MHWN)	7.0	1.94
Mean Low Water Neap Tide (MLWN)	3.6	-1.46
Mean Low Water Spring Tide (MLWS)	1.4	-3.46
Lowest Astronomical Tide (LAT)	0.0	-5.06

Table 7-4: Extreme Water Levels at Longue Hougue South Relative to Guernsey Local Datum (GD) (Royal Haskoning, 2012a)

Water Level	Elevation (m GD)
Mean Low Water Spring Tide (MLWS)	-3.46
Mean High Water Spring Tide (MHWS)	4.24
1-year return period	5.18
10-year return period	5.45
50-year return period	5.67
100-year return period	5.87

7.4.25 Water levels taken for the analysis are based on St. Peter Port. The numerical tidal modelling of Royal Haskoning (2012a) showed that there is a significant water level gradient to the north of St. Peter Port, along the Little Russel Channel. This variation in water surface changes over the tidal cycle and results in stronger tidal flow through the area around high water. The values taken for the St. Sampson may vary from those at St. Peter Port on surge events. This does, however, depend on specific surge conditions.

Sea-level Rise

7.4.26 Changes in sea level at Longue Hougue South will be due to the interaction of several mechanisms, broadly divided into two types:

- Eustatic changes: these are changes in the absolute water elevation; for example, ice melt causing an increase in the total worldwide volume of seawater. Due to the interconnectivity of the world oceans, eustatic changes are global changes; and
- Local changes: these mechanisms are due to local changes in the elevation of the land surface. These can take the form of isostatic effects (changes in land elevations due to the redistribution of weight on the land surface, e.g. due to loss of glacier ice post-Pleistocene), tectonic effects (changes in land elevations due to tectonic adjustments), and/or sediment supply (the balance between sediment availability and the rate that sea level changes).

7.4.27 Processes that fall into these two groups interact to cause observed sea-level changes at a location. These are known as relative sea-level changes.

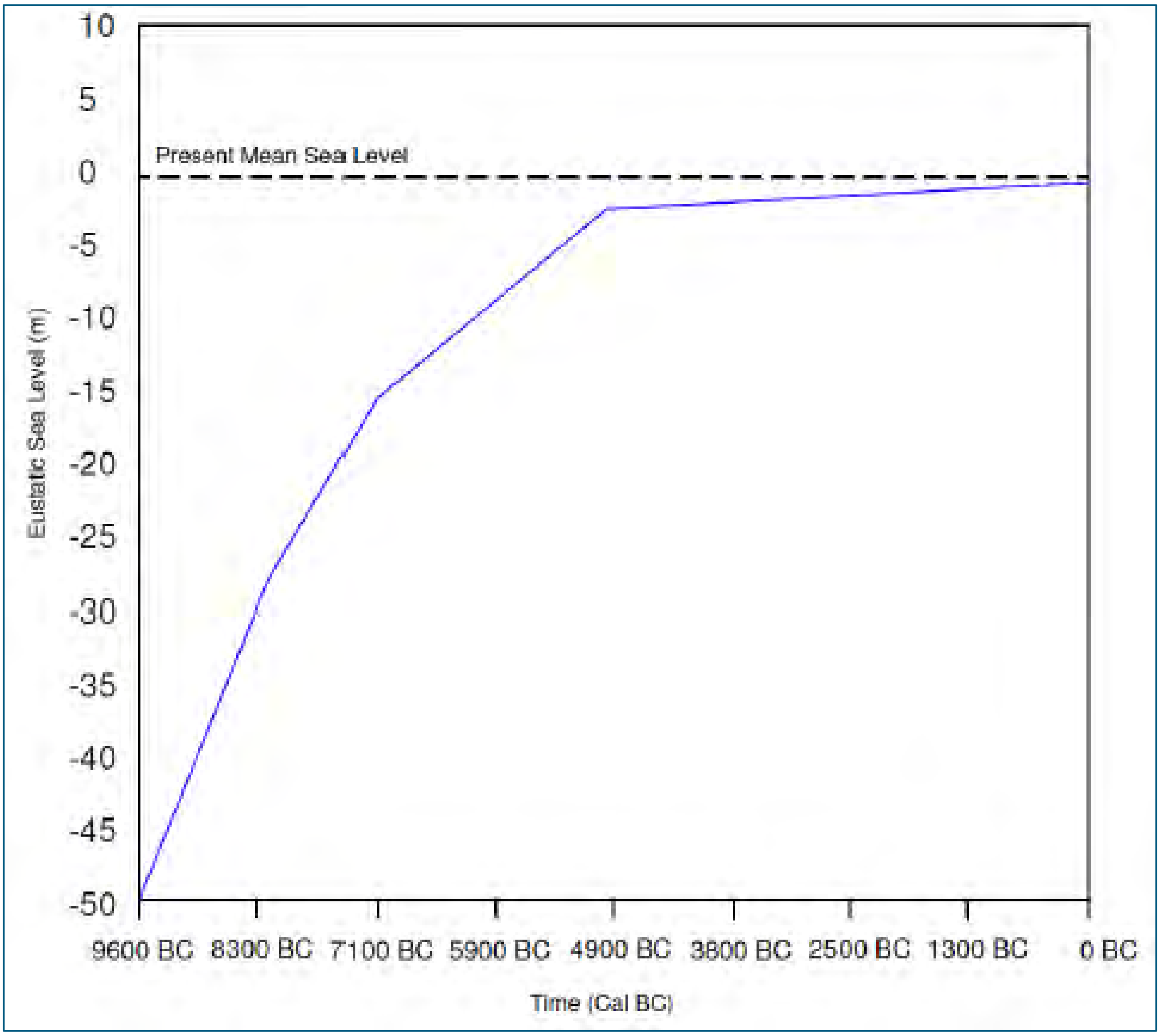
Holocene Sea-level Rise

7.4.28 Sebire and Renouf (2010) presented a Holocene sea-level curve for Guernsey (**Figure 7-18**). During the last glacial maximum and late glacial (about 30,000-12,000 years ago), Guernsey formed part of the adjacent continental mainland. Towards the end of the last glaciation, the climate warmed, the ice melted and was released into the oceans causing a global sea-level rise, ultimately resulting in the formation and separation of Guernsey about 11,000 years ago.

Historic Sea-level Rise

7.4.29 According to the IPCC's Fifth Assessment of Climate Change (Church *et al*., 2013), it is likely (IPCC terminology) that the rate of global sea-level rise has increased since the early 20th century. It is very likely (IPCC terminology) that the global mean rate was 1.7mm/year (1.5 to 1.9mm/year) between 1901 and 2010 for a total sea-level rise of 0.19m (0.17 to 0.21m). Between 1993 and 2010, the rate was very likely (IPCC terminology) higher at 3.2mm/year (2.8 to 3.6mm/year), and this is the historic rate used in this analysis.

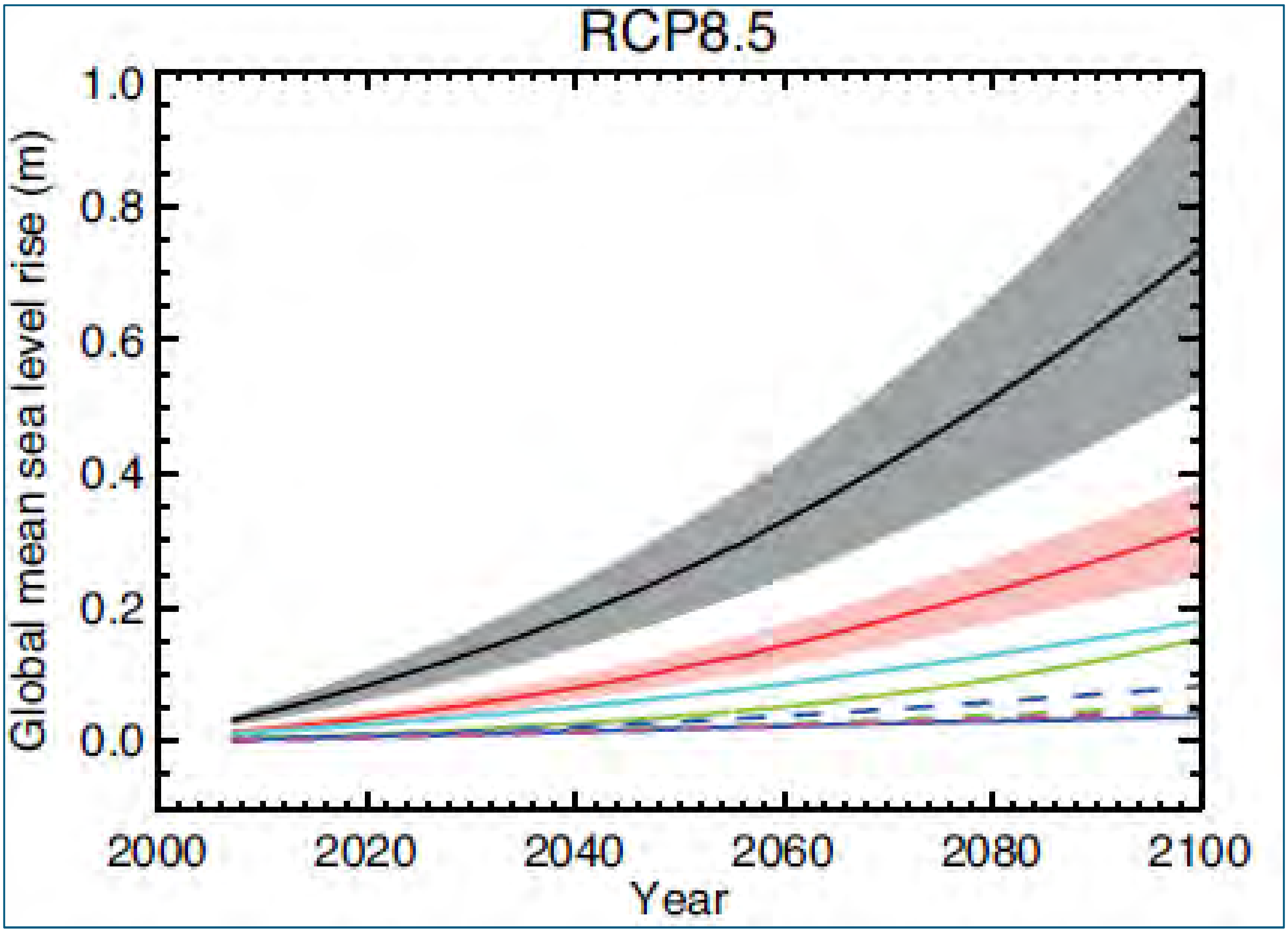
Figure 7-18 Holocene Sea-level Rise on Guernsey (Hawley, 2017, adapted from Sebire and Renouf, 2010)



Predicted Future Relative Sea-level Rise

7.4.30 The rate of global mean sea-level rise during the 21st century is likely to exceed the rate observed between 1993 and 2010. Church *et al*. (2013) developed projections of global sea-level rise for four emissions scenarios of future climate change, called the Representative Concentration Pathways (RCP). In this analysis, the median projection of the worst-case emissions scenario (RCP8.5) is used (**Figure 7-19**). The lines show the median projections providing a conservative estimate. For RCP8.5, the rise by 2100 is 0.74m (range 0.52 to 0.98m) with a predicted sea-level rise rate during 2081–2100 of 8 to 16mm/year. Using the RCP8.5 scenario, and a baseline at 2017, sea-level rise in 2037 (20 years' time) and 2067 (50 years' time), would be about 0.1m and 0.32m, respectively.

Figure 7-19 Projections from Process-based Models of Global Mean Sea-level Rise Relative to 1986-2005 for Emissions Scenario RCP8.5 (Church et al., 2013)

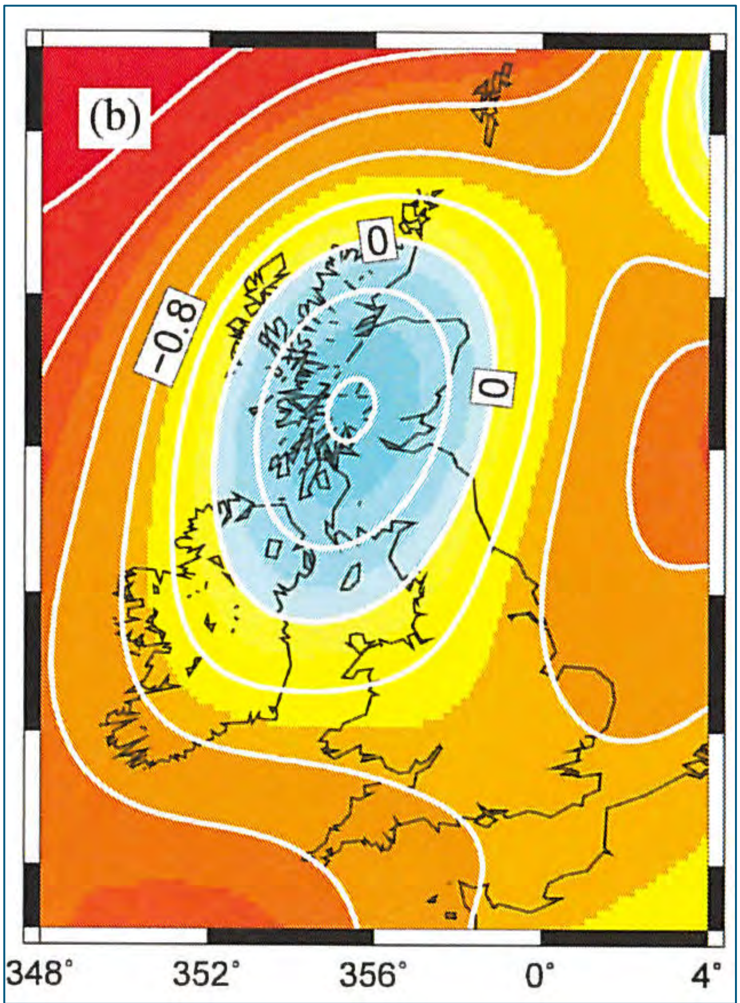


Note: The lines show the median projections. Grey with solid black line = sum, red with solid red line = thermal expansion, light blue solid line = glaciers, green solid line = Greenland ice sheet, dark blue solid line = Antarctic ice sheet, dashed green line = Greenland ice-sheet rapid dynamics, dashed blue line = Antarctic ice-sheet rapid dynamics, dashed pink line = land water storage.

7.4.31 Shennan et al. (2012) presented the most up-to-date estimates of vertical land motion for the United Kingdom and the English Channel. They showed that at Guernsey the land is vertically lowering by approximately 0.8mm/year (**Figure 7-20**).

7.4.32 If this land motion estimate is applied to the estimate of future sea-level rise, then the future estimated relative sea-level change at Longue Hougue South is shown in **Table 7-5**. The estimated rises in relative sea level are 0.06m, 0.12m, 0.19m and 0.26m after five, ten, 15 and 20 years (2018 baseline), respectively. The data shows that projections of sea-level rise are likely to increase in the future due to climate change. An increase in sea-level rise will expose the coast at Longue Hougue South to increased wave attack and increased frequency of storm events.

Figure 7-20 Model Prediction of Present-day Vertical Land Motion Across the UK in Millimetres (Shennan et al., 2012)



Note: Negative values denote lowering of the land surface.

Table 7-5: Climate Change Scenario Changes in Sea Level (in m) Relative to a 2018 Baseline

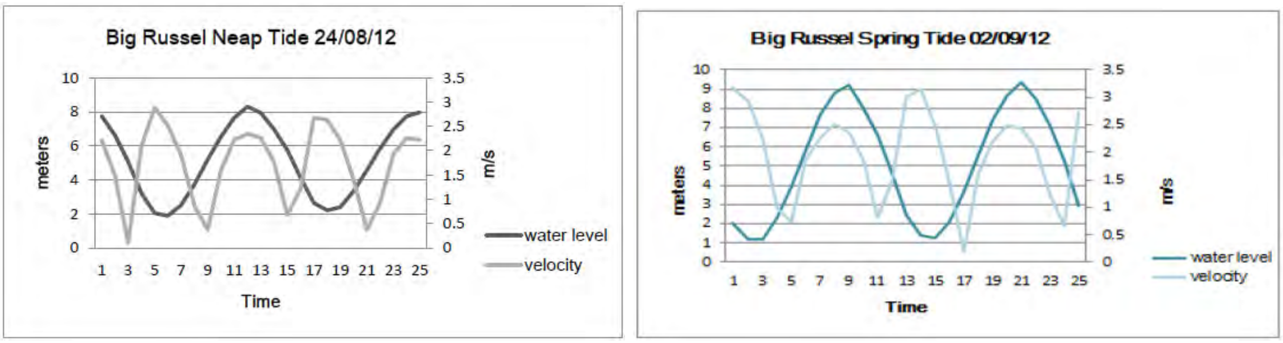
Year	Median Global Sea-level Rise (RCP8.5) (m) (Church et al., 2013)	Vertical Land Motion (m) (Shennan et al., 2012)	Estimated Relative Sea-level Rise (m)
2018	0	0	0
2023	0.02	0.04	0.06
2028	0.04	0.08	0.12
2033	0.07	0.12	0.19
2038	0.10	0.16	0.26

Tidal Currents

7.4.33 The high tidal range in the Brittany–Normandy Gulf including the sea areas around Guernsey results in high regional tidal current velocities (greater than 1m/s) (Reynaud *et al*., 2003). Posford Duvivier (1999) indicated that tidal flows along the Little Russel Channel are complex. During the early stages of the flood tide, current velocities up to 2.6m/s can occur directed southwest. Around mid-tide, flows reverse to a northeast direction and peak at 2.7m/s around high water. Flows reverse again midway through the ebb tide. South of the Little Russel Channel, the flows are more moderate.

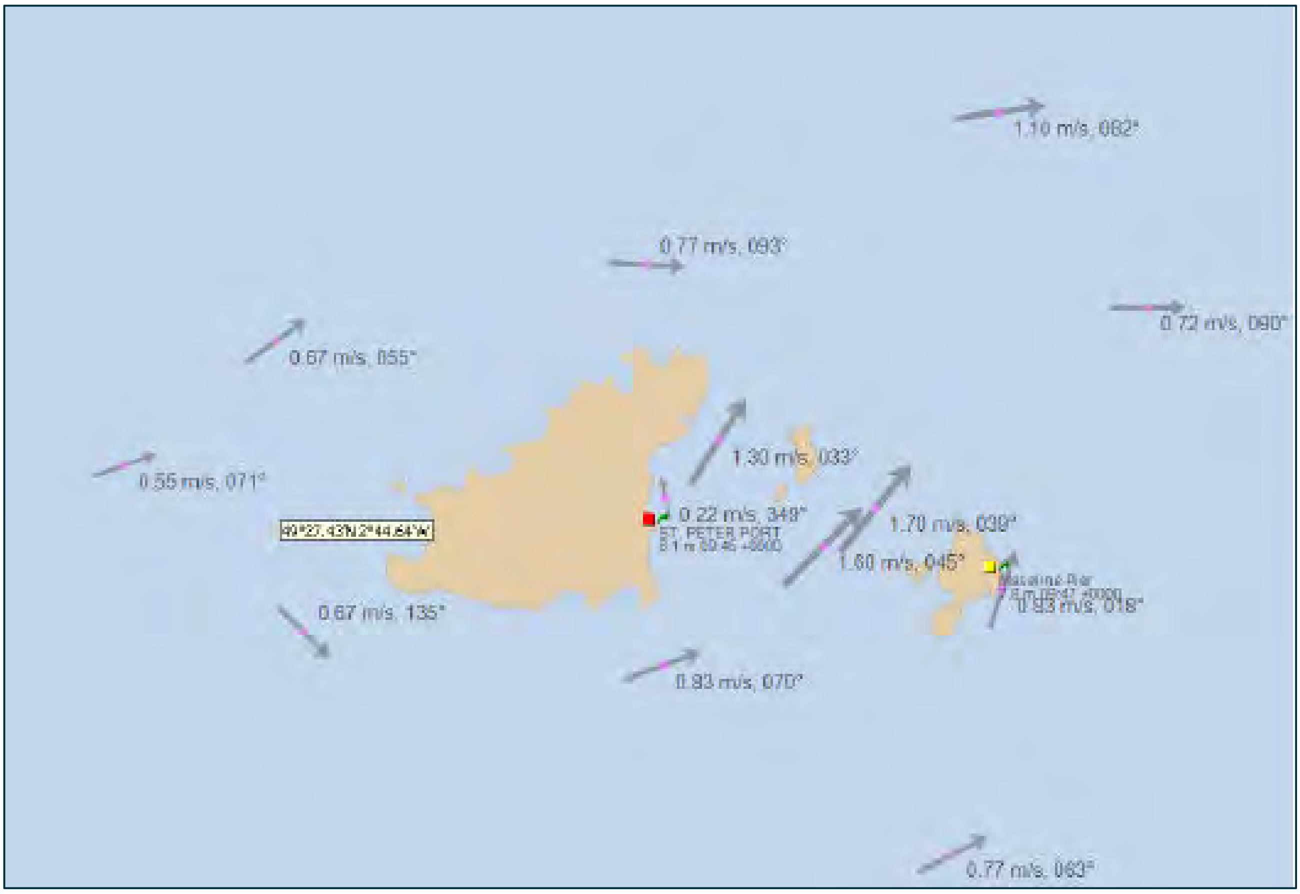
7.4.34 Bedingham (2012) used Delft3d FLOW to predict the tidal flows of Guernsey coastal waters and showed that the velocity and water level relationship through Big Russel (between Sark and Herm) was in phase, with peak velocities occurring at each tidal limit and minimum velocity values occurring at the mid tide (**Figure 7-21**). This phasing supports the conclusions of Posford Duvivier (1999). This is contrary to the expected velocity curve for the diurnal tidal pattern which would be for the velocity to be 90^{o} out of phase with the water level. The flood and ebb tides are asymmetrical with the flood tide longer than the ebb tide with a steeper curve on the ebb tide. This is especially so during the low water period where the period leading up to the maximum velocity exceeds the period leading to the minimum velocity.

Figure 7-21 Water Levels and Current Velocity on a Neap Tide (left) and Spring Tide (right) in Big Russel (Bedingham, 2012)



7.4.35 Owen (2012) showed digital tidal diamond data using the Admiralty's TotalTide® software. **Figure 7-22** shows the tidal diamond in the Little Russel Channel describes a north-northeast current with a velocity of 1.3m/s.

Figure 7-22 Tidal Diamond Data as Extracted from Admiralty TotalTide® Software (Owen, 2012)



Modelled Tidal Currents

7.4.36 Predicted tidal currents at peak flood tide and peak ebb tide near the Project are shown in **Figure 7-23** and regionally in Little Russel Channel in **Figure 7-24** (**Appendix 7.1**). Close to the Project, the predicted peak flood tide velocities are greater than the peak ebb tide velocities. Predicted peak flood currents increase north from up to 0.6m/s across the Project to up to 2m/s towards St. Sampson, directed north-northeast (**Figure 7-23**). On peak ebb tides, velocities are less than 0.2m/s at the Project, increasing to about 1m/s at St. Sampson, directed south-south-west.

7.4.37 In the Little Russel Channel, the highest predicted current velocities on a peak flood tide are greater than about 2.6m/s to the north in the west-central part of the channel between St. Sampson and the northwest part of Herm (**Figure 7-24**). Predicted current velocities decrease towards the coasts of Guernsey and Herm, and to the south in the channel. In the partially sheltered Belle Grève Bay, predicted current velocities are less than 0.3m/s. Similar patterns of predicted current distribution occur on a peak ebb tide but the magnitudes are lower; up to 1.5m/s in the centre of the channel between St. Sampson and the northwest part of Herm.

Figure 7-23 Predicted Tidal Current Velocities and Directions on a Peak Flood Tide (Top) and Peak Ebb Tide (Bottom) Close to the Project (Royal HaskoningDHV, 2019)

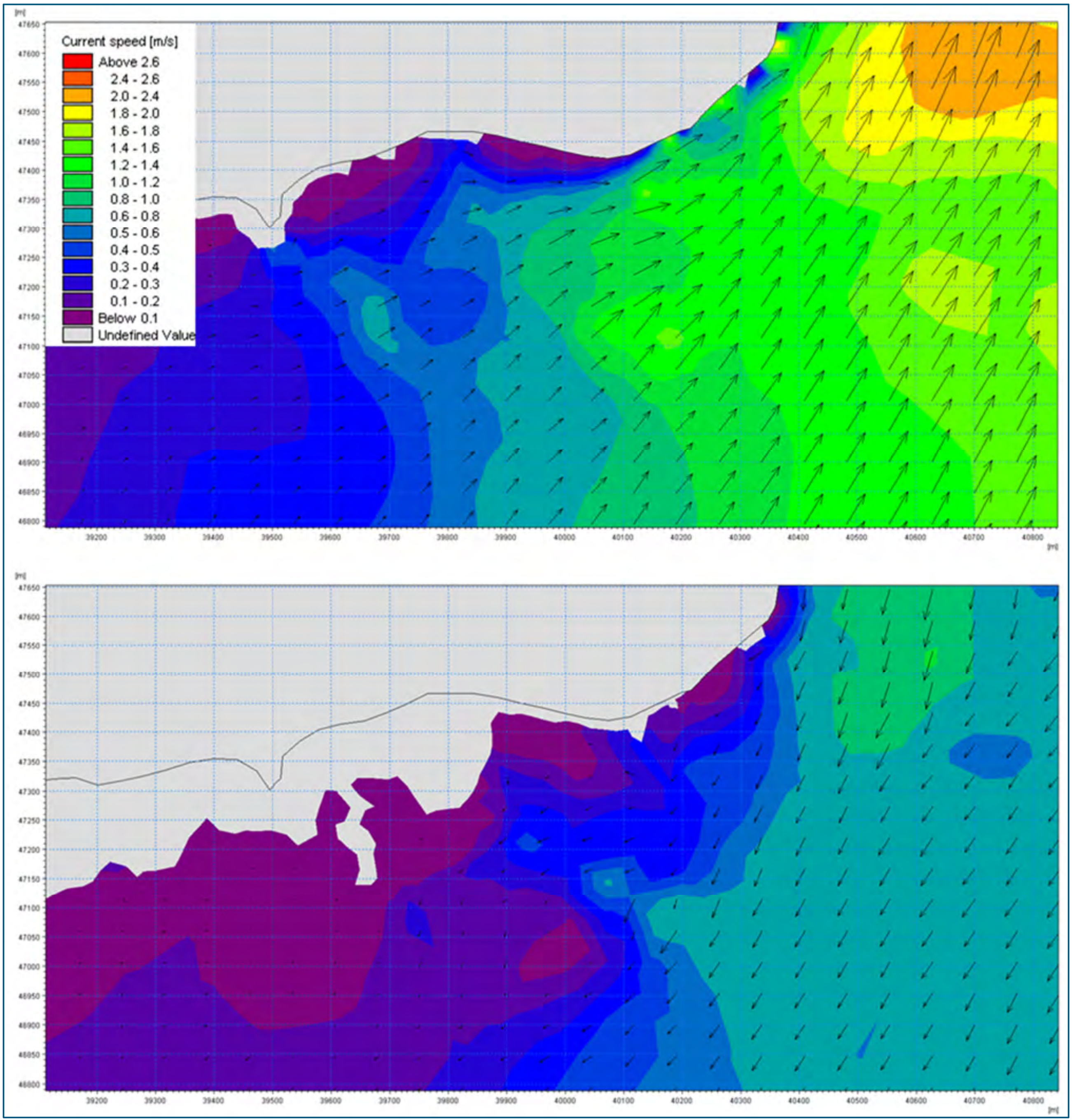
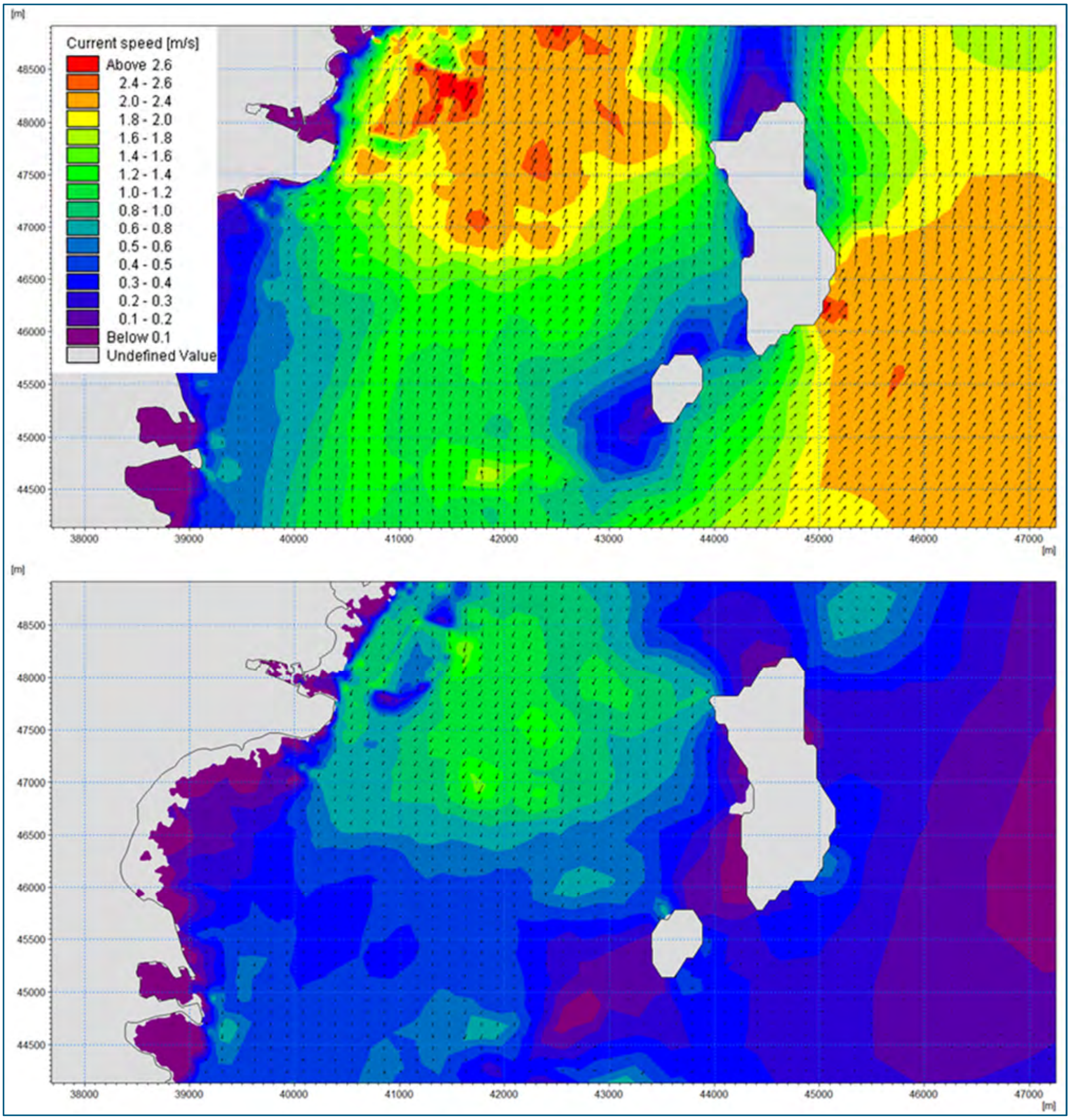


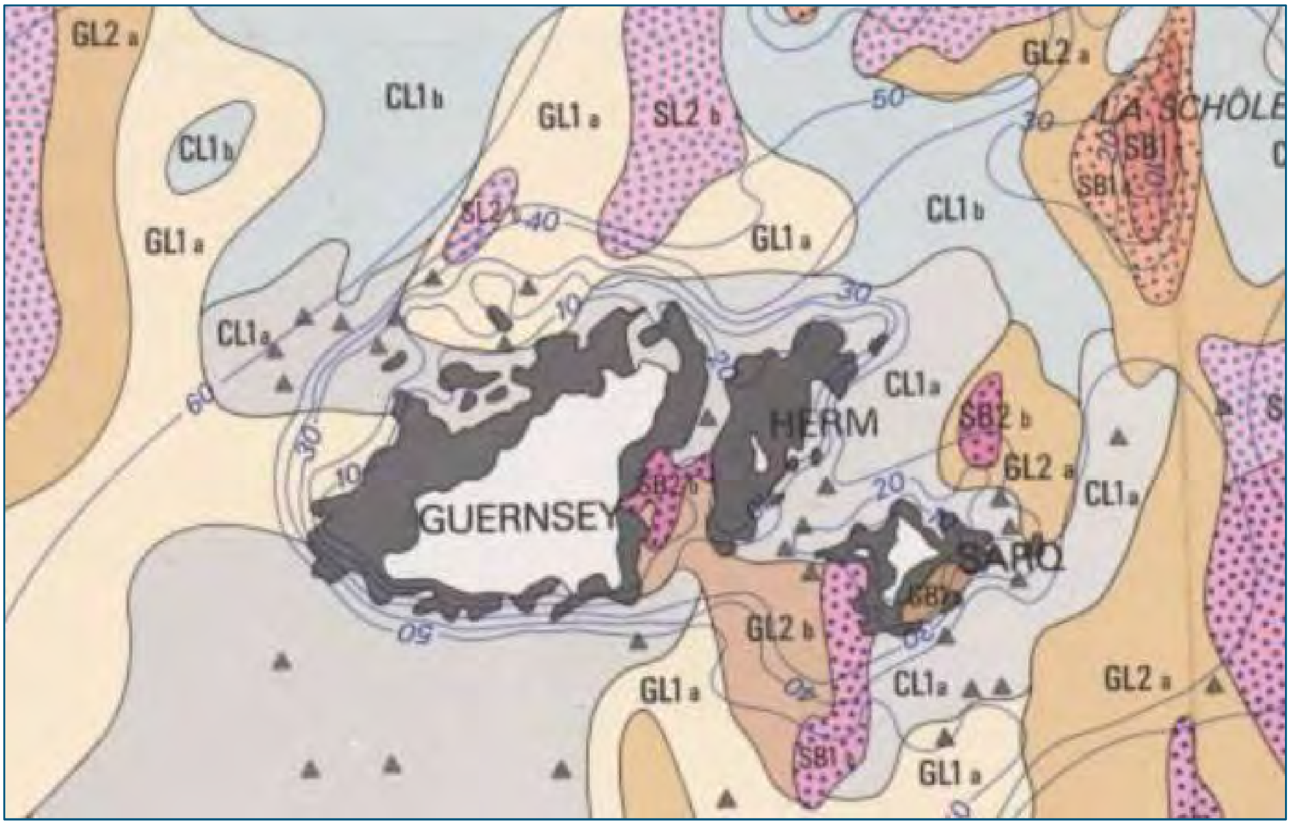
Figure 7-24 Predicted Tidal Current Velocities and Directions on a Peak Flood Tide (Top) and Peak Ebb Tide (Bottom) in the Little Russel Channel (Royal HaskoningDHV, 2019)



Regional Sea-bed Sediment Distribution

7.4.38 Only limited regional sea-bed sediment data is available for the study area (Auffret et al., 1979; British Geological Survey). Auffret *et al*. (1979) described the sea-bed sediments around Guernsey using data acquired up to 1977, based on a sediment type defined from both its particle size and its calcium carbonate content. Adjacent to the study area, the sea bed is dominated by bedrock. Further offshore into the centre of the Little Russel Channel between Guernsey and Herm, the sea-bed sediments are defined as lithoclastic pebbles constituting greater that 70% pebbles and carbonate, less than 30% carbonate and less than 5% clay (CL1a on **Figure 7-25**). Further south in Little Russel Channel, the bed is composed of bioclastic gravelly sand (SB2b on **Figure 7-25**, with greater quantities of gravel than carbonate, greater than 50% sand and clay, less than 5% clay, 15 to 50% at 2mm).

Figure 7-25 Sea-bed Sediment Distribution Around Guernsey According to Auffret et al. (1979) (Guernsey Renewable Energy, 2011)

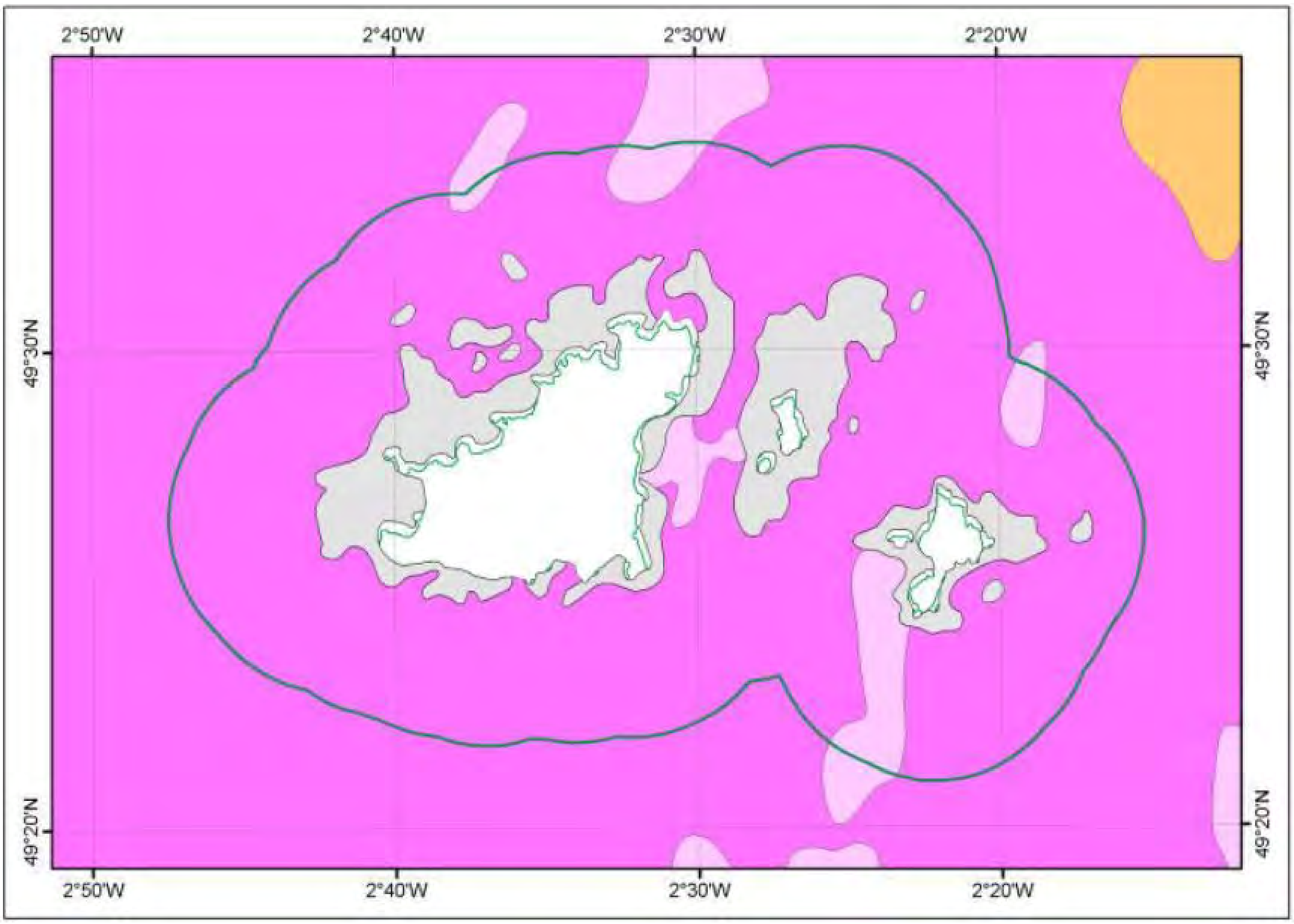


7.4.39 British Geological Survey (2000) reproduced the map of Auffret et al. (1979) but used a different sediment classification (Folk). Adjacent to the study area, the sea bed is dominated by bedrock. Further offshore into the centre of Little Russel Channel between Guernsey and Herm, the sea-bed sediments are defined as gravel, whereas further south in the Little Russel Channel, the bed is sandy gravel (**Figure 7-26**).

7.4.40 Hommeril (1967) described nine main sea-bed sedimentary zones around Guernsey, of which three are represented between Guernsey and Herm. Adjacent to Longue Hougue South, the zone was defined as pebbles, with greater than 70% pebbles (**Figure 7-27**). The dominant lithology of the pebbles is granite. Further south, the Guernsey side of the Little Russel Channel is dominated by homogeneous coarse sand. Sediments contain less than 50% pebbles, less than

25% gravel, with a median particle size greater than 0.65mm, and with the fraction greater than 1.3mm diameter exceeding 10%. The Herm side of the Little Russel Channel was defined as sandy shelly gravel, containing less than 15% pebbles and 5 to 25% gravel.

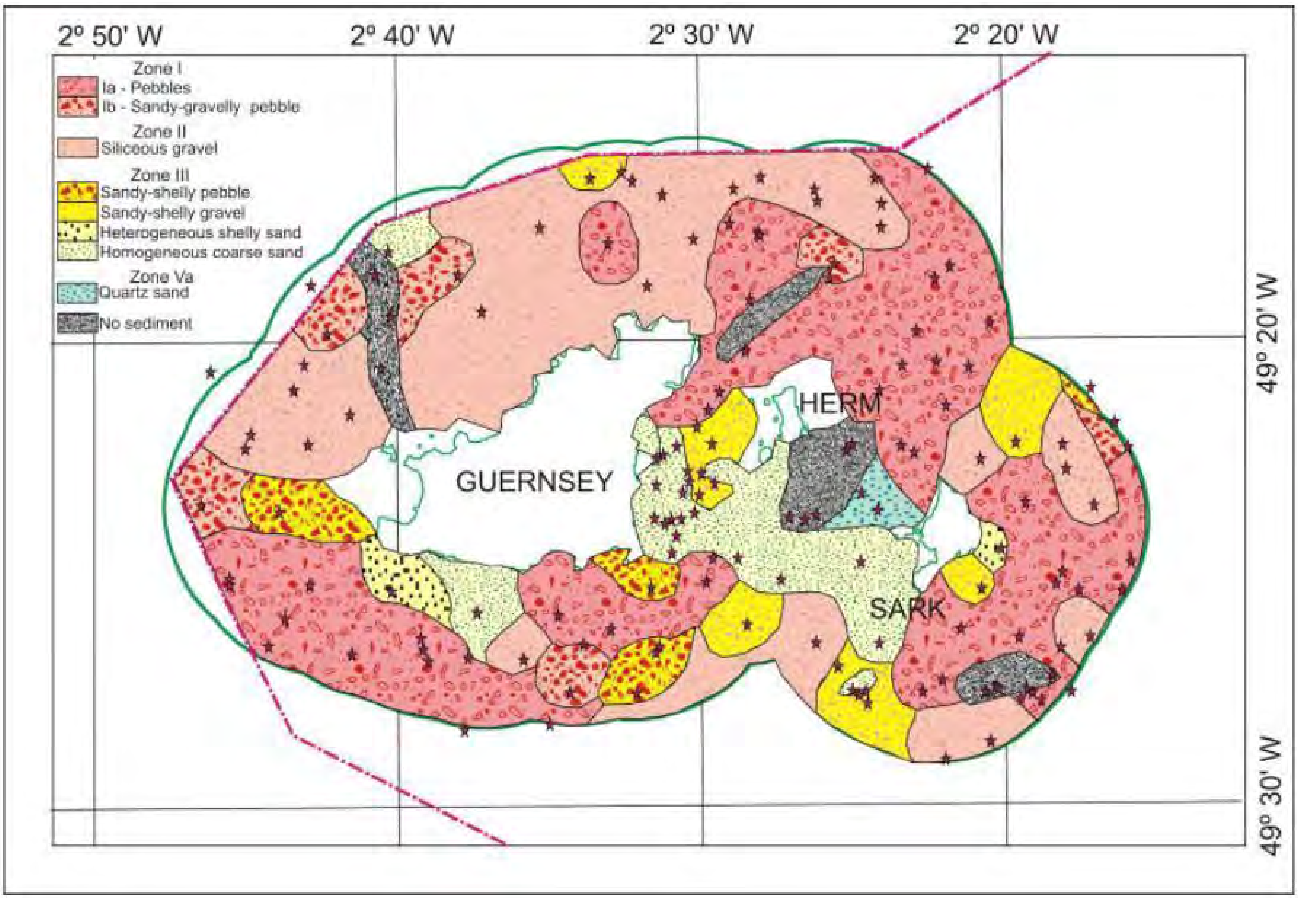
Figure 7-26 Sea-bed Sediment Distribution Around Guernsey According to British Geological Survey (2000) (Guernsey Renewable Energy, 2011)



Notes: Grey is bedrock, dark pink is gravel and pale pink is sandy gravel.

7.4.41 Guernsey Renewable Energy (2011) provided a summary of sea-bed sediment distribution based on the data of Auffret *et al*. (1979), British Geological Survey (2000) and Hommeril (1967) (**Figure 7-28**). The sediment in the Little Russel Channel is dominantly pebbles and gravel becoming coarse sand south of Herm. At the south end of the Little Russel Channel is the Great Bank, the north end of which is 2km - 3km south of Longue Hougue South. It is a 5km-long, 1,200m-wide sand bank, oriented north-northeast to south-south-west. Great Bank is a simple sand bank, containing only a few sand waves which are parallel to its long axis, with a wavelength of 100m - 200m and 1m - 3m high. Between the east coast of Guernsey and the sand bank is a narrow channel 500m wide and 40m deep.

Figure 7-27 Sea-bed Sediment Distribution Around Guernsey According to Hommeril (1967) (Guernsey Renewable Energy, 2011)

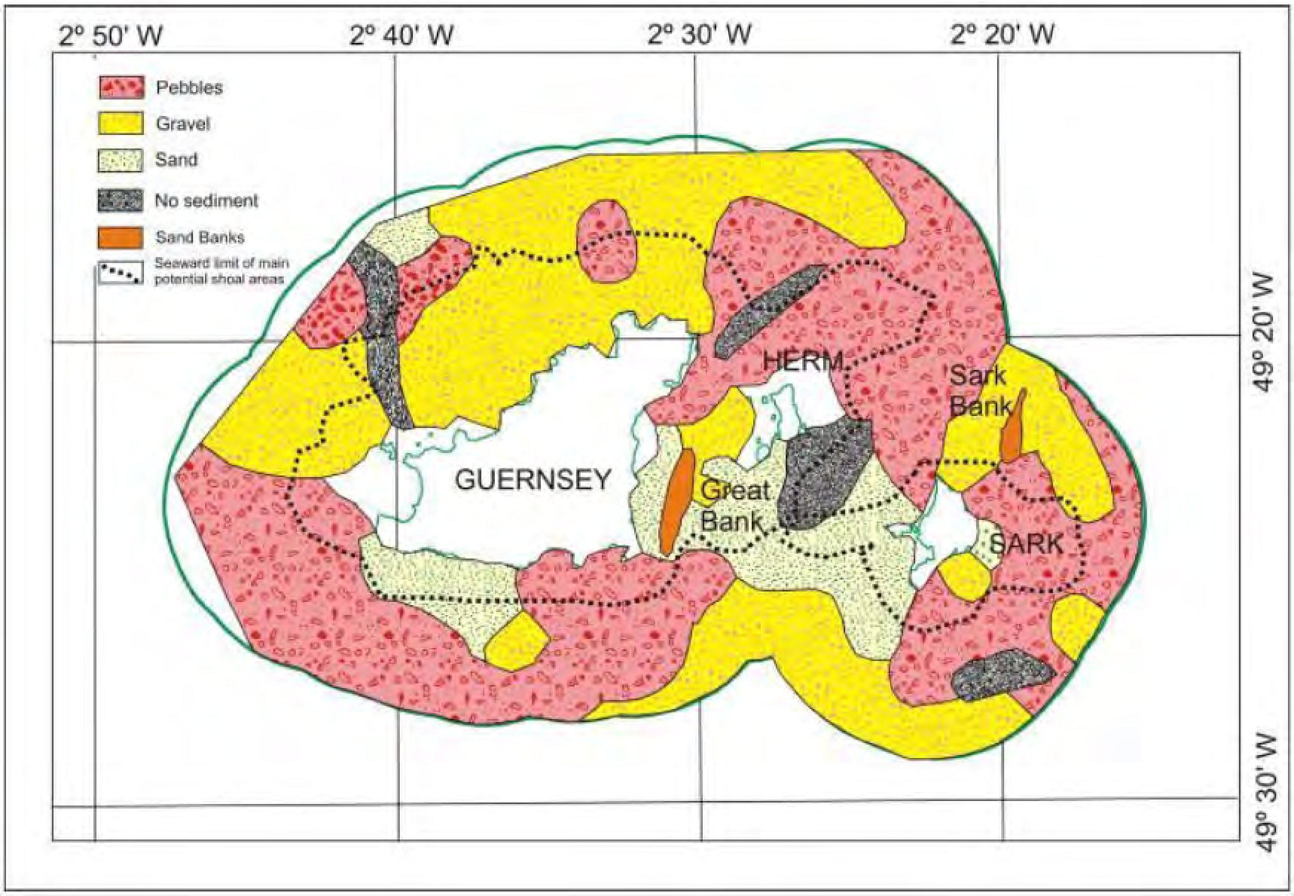


7.4.42 Apart from the Great Bank, the sediment cover is thin (10's of centimetres). Around the island, the coastal zone is predominantly sediment free or with very thin cover comprised of coarse sediments. Areas with no sediment were identified by Hommeril (1967). The present sediment distribution is the result of sea-level rise over the long term. The coarse sediments are lag deposits derived from low sea-level stands and reworked during the Holocene marine transgression. Finer sediments are scarce around Guernsey because the high tidal current velocities (greater than 1m/s) can transport any size of sand. According to Reynaud *et al* (2003), the Great Bank formed during the Holocene rise in sea level by trapping of sediment within tidal eddies generated by headlands or flow convergence.

Coastal Sediment Distribution and Longshore Sediment Transport

7.4.43 A sea bed sediment grab sampling and drop-down video (DDV) campaigns local to the Project were completed between 10th and 12th May 2019 (**Appendix 17.1**). The DDV shows that the predominant sea bed type is rock with no (or very little) mobile sediment. Because of this paucity of sediment, only seven grabs were able to recover sediment (stations 3 to 9 on **Figure 7-29**), and in a landscape-scale contect are not representative of the seabed in this area.

Figure 7-28 Summary Sea-bed Sediment Distribution (Guernsey Renewable Energy, 2011) Combining the Data of Auffret et al. (1979), British Geological Survey (2000) and Hommeril (1967)



7.4.44 Where sediment is present, samples are variable in particle size. In four samples (5, 6, 8 and 9), the sea bed sediments were dominated by very fine to fine sand, with small amounts of mud and gravel (**Table 7-7**). Sample 7 contained almost 50% mud, whereas sample 3 contained over 50% very coarse sand and gravel. Sample 4 comprised an evenly distributed spread of very fine through very coarse sand and gravel components.

Belle Grève Bay (including Longue Hougue South)

7.4.45 The coast of Belle Grève Bay stretches from Salerie Corner in the south to Longue Hougue land-claim in the north. Belle Grève Bay has a narrow shingle beach at the top, with some sand on the foreshore, fronted by a rock shore platform. Most of the frontage at Longue Hougue and north towards St. Sampson is land-claim and consists of a rock shore platform, with local pockets of mobile sediment. Longshore sediment transport is limited and directed to the north driven by the local wave conditions (Posford Duvivier, 1999; Royal Haskoning, 2007).

Figure 7-29 Locations of Sediment Grab Samples and Drop-down Video Area

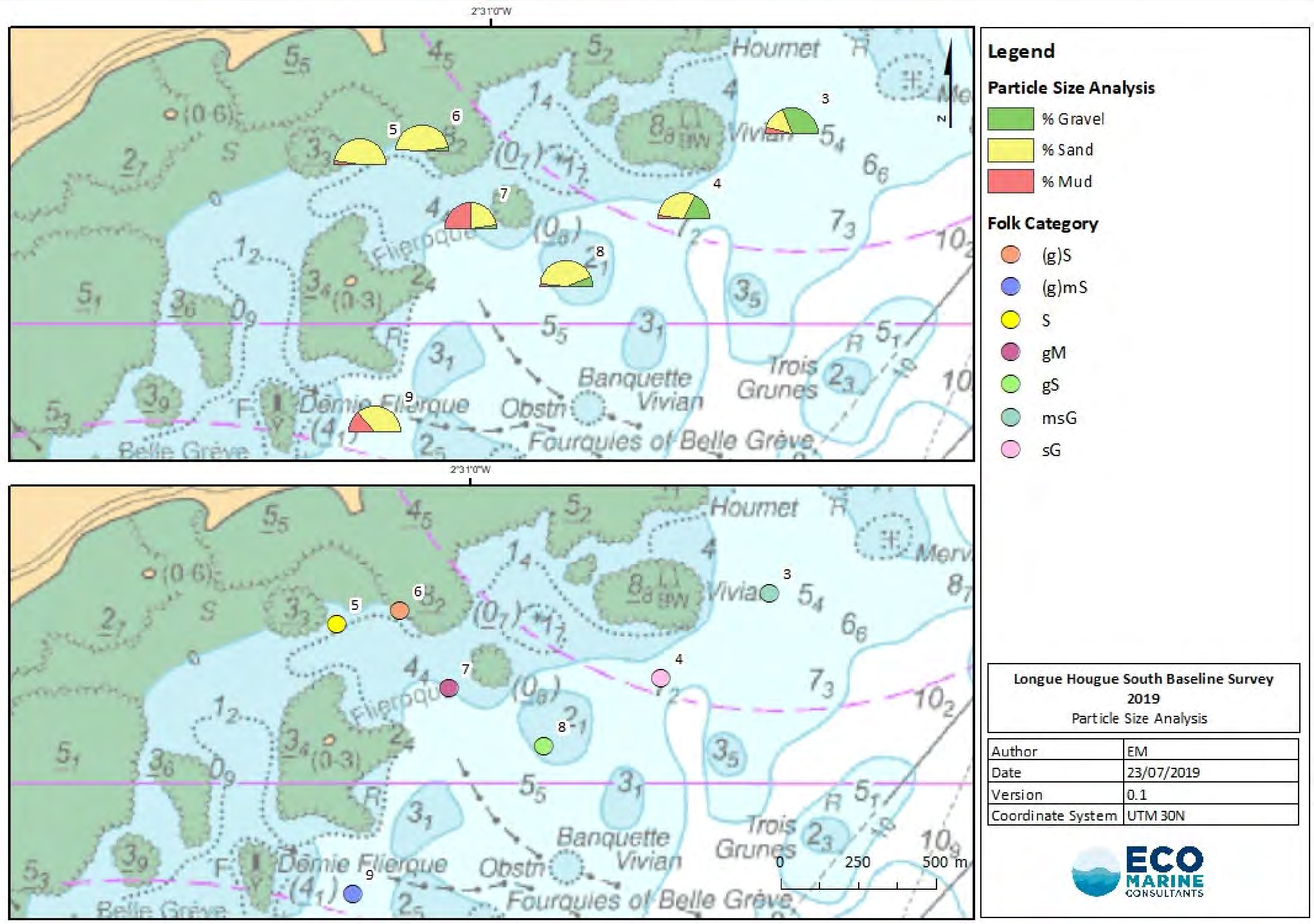


*Table 7-6: Particle Size Summary (Sample Locations are Shown on **Figure 7-29**)*

Station	% gravel (>2mm)	% sand (0.063-2mm)	% mud (<0.063mm)
3	61.65	30.83	7.52
4	36.66	58.88	4.46
5	0.05	95.41	4.54
6	3.79	94.63	1.59
7	5.33	44.94	49.73
8	11.92	84.87	3.22
9	1.10	72.90	26.00
Mean	**17.21**	**68.92**	**13.86**

7.4.46 According to Posford Duvivier (1999) and Royal Haskoning (2007), the beaches are susceptible to cross-shore losses. During storms material is drawn down the beach and deposited on the lower foreshore where it can then be removed by strong tidal currents. This sediment is then effectively removed from the beach system.

St. Sampson to Bordeaux Harbour

7.4.47 Most of the frontage near St. Sampson is land-claim and consists of a rock shore platform, with local pockets of mobile sediment. A rock shore platform is also present further north at Vale Castle. The coast of Bordeaux Harbour is characterised by a sandy foreshore with lengths of shingle at the top of the beach and a rocky lower foreshore. The east facing shore is covered by a thin veneer of sand whereas the south facing foreshore is dominated by a shingle upper beach with a sandy lower foreshore.

7.4.48 Posford Duvivier (1999) found limited evidence for longshore sediment transport along the northern east coast of Guernsey. They suggested that cross-shore movement of sediment during storms is likely to be more significant, and consequently, there is a general lack of sediment accumulation against headlands or other major obstructions across the foreshore.

Suspended Sediment Concentrations

7.4.49 Data for the ambient suspended sediment concentrations at Longue Hougue South or regionally in the Little Russel Channel is not available. This assessment is solely based on expert geomorphological assessment of the likely magnitudes at the coast, based on the perceived energy conditions and potential sources to create turbidity in the water column.

7.4.50 Given the high energy regime, the entrainment and dispersion of fine sediment in suspension is effective in this area, and so suspended sediment concentrations will be very low. This is supported by the sea bed characterisation that showed it is mainly bedrock swept clear of sediment by tidal currents.

7.5 Worst Case Scenarios

Land-claim through Construction of the Breakwater

7.5.1 The proposed Project involves land-claim of Longue Hougue South through construction of a continuous rock armour breakwater, approximately 800m long and up to 210m from the existing coast (**Figure 4-1**). The area inside the structure is about 9ha with a predicted capacity of 850,000m^3 for inert waste, and a lifetime of 12 years or more. The design of the breakwater would allow the site to be operational throughout the year and would protect against a 100-year storm event including sea-level rise for a design life of 50 years (concept design height of 9.5m above OD).

7.5.2 The breakwater will be constructed using land-based equipment and techniques. To enable land-based construction, the crest of the breakwater core must be set at a minimum height above present day mean high water spring plus 1m freeboard to allow it to be used as a temporary construction road. The minimum crest level of the breakwater core to enable land-based construction is 5.24m above OD.

7.5.3 For deeper sections, if the reach of land-based equipment is not enough, floating equipment would be required. For example, the construction of the toe berm, scour apron and placement of part of the armour layers may prove impractical for some sections of the structures using only land-based equipment.

7.5.4 The anticipated breakwater construction sequence (Royal HaskoningDHV, 2018) is anticipated to be:

- Temporary haul roads constructed to site.
- Delivery and stockpile of primary armour layer and underlayer on the foreshore at Longue Hougue South. Delivery of the rock would either be by road or sea, or a combination of both depending on the availability of material in Guernsey.
- Delivery of quarry run material to the site via road or by sea depending on the availability of material in Guernsey.
- End tipping of quarry run material to form the core of the breakwater. The

core should not be left unprotected. A maximum 30m advance of core without protection is recommended.

- Placement of geotextile along the scour apron of the breakwater footprint. This may require marine-based techniques in deeper water.
- Placement of the scour apron and rock toe. This may require marine-based techniques in deeper water.
- Placement of underlayer and primary armour layer from the breakwater crest (land-based techniques).

7.5.5 The construction period will be highly dependent upon the source of material, the availability of transhipment barges and an assumption that the material can be stockpiled on the intertidal foreshore. Assuming there are enough large transhipment barges and the breakwater is built out from both ends, the construction period will be approximately 20 months in the best-case scenario. A maximum construction period of 36 months is anticipated for a worse-case scenario with the availability of transhipment barges an issue.

7.5.6 During the detailed assessment a decision was taken to change the project design, whereby the breakwater would tie-in behind Spur Point to avoid overwhelming this natural feature. **Figure 4-6** shows the proposed design change that is considered in this chapter. The design change would result in a small reduction in capacity of the site (less than 0.5%).

Design Parameters that Potentially Influence Coastal and Marine Processes

7.5.7 In this chapter, only those design parameters with the potential to influence coastal and marine processes are identified. For construction, these are:

- Construction Impact 1: Changes in suspended sediment concentrations due to the construction of the breakwater.
- Construction Impact 2: Changes in sea-bed level due to the construction of the breakwater.

7.5.8 For operation, these are:

- Operational Impact 1: Changes to the wave regime due to the presence of the Project.
- Operational Impact 2: Changes to the tidal current regime due to the presence of the Project.
- Operational Impact 3: Changes to sediment transport and erosion/accretion patterns due to the presence of the Project.

7.5.9 Other design parameters are not considered to have a material bearing on the outcome of this assessment.

7.6 Do Nothing Scenario

7.6.1 In the absence of the Project in the future, the baseline coastal and marine processes would evolve naturally. They would continue to be controlled by waves and tidal currents driving changes in sediment transport and then sea bed morphology. However, the long-term established performance of these drivers may be affected by environmental changes including climate change driven sea-level rise. This will have the greatest impact at the coast where more waves will impinge, potentially increasing rates of coastal erosion. The shingle beach would gradually be lost through coastal squeeze against the seawall.

7.6.2 Climate change will have little effect further offshore where landscape-scale changes in water levels (water depths) far outweigh the effect of minor changes due to sea-level rise. Given the insignificant changes in the coastal and marine processes which drive sedimentary processes, it is anticipated that the sea bed sediment distribution, and bedload and suspended sediment transport regimes would continue at similar magnitudes to historically.

7.7 Potential Effects during Construction

7.7.1 During the construction phase of the Project, there is the potential for construction of the breakwater to alter suspended sediment concentrations and deposition on the sea bed from the resulting plume.

7.7.2 The worst-case scenario for waves and tidal currents is during the operation of the Project and such effects are considered below in **Section 7.8**. This means that effects on waves and tidal currents during construction will be less significant, so these are not considered further.

CONSTRUCTION IMPACT 7.1: Changes in Suspended Sediment Concentrations Due to the Construction of the Breakwater

7.7.3 Release of fine sediment during construction has the potential to enhance the baseline suspended sediment concentrations in the water column, making it more turbid, until the plume becomes dispersed by tidal current and wave action and the sediments settle once again on the sea bed.

7.7.4 At the Project and throughout the area adjacent to the Project, there is a paucity of surface mobile sediment, with tide-swept bedrock prevailing (**Appendix 17.1**). Where sediment does exist in these areas, it is predominantly sand and gravel, which are not particle sizes that can besome of it (the finer particles) would be suspended in the water column and therefore will not form part of a low concentration sediment plume even if disturbed during construction.

7.7.5 The maximum envisaged effect associated with sediment plumes arising from the construction activities will therefore cause only very minor enhancements in suspended sediment concentration (typically less than 1mg/l a short distance from the release point) over only a small geographical area (a few hundred metres). The effects will be temporary, with a return to the very low background concentrations occurring rapidly upon cessation of the installation activity (i.e. the effect is temporary only).

Assessment of Effect Magnitude and/or Impact Significance

7.7.6 The changes in suspended sediment concentrations due to the construction of the breakwater under the worst-case sediment dispersal scenario are likely to have the magnitudes of effect described in **Table 7-7**.

Table 7-7: Magnitude of Effect on Suspended Sediment Concentrations Under the Worst-case Scenario for Sediment Dispersal During the Construction of the Breakwater

Location	Scale	Duration	Frequency	Reversibility	Magnitude of Effect
Near-field*	Negligible	Negligible	Negligible	Negligible	Negligible
Far-field	Negligible	Negligible	Negligible	Negligible	Negligible

*The near-field effects are confined to a small area, likely to be several hundred metres from the breakwater.

7.7.7 The effects on suspended sediment concentrations due to construction of the breakwater do not directly impact upon the identified receptor groups for coastal and marine processes. This is because the designated features of the Herm and Belle Grève Bay receptor groups are related to processes operating on the sea bed and not in the water column. Hence, there is **no impact** on the identified receptor groups associated with the suspended sediment generated by the Project.

CONSTRUCTION IMPACT 7.2: Changes in Sea-bed Level Due to the Construction of the Breakwater

7.7.8 Any sediment that becomes entrained within the plume generated by breakwater construction will have the potential to deposit on the sea bed at some distance from its point of release, as it settles through the water column.

7.7.9 Based upon the realistic worst-case scenario of sediment release from breakwater construction, the sediment deposition on the sea bed local to the Project will be extremely small in thickness (less than a few millimetres). These sediments are then highly likely to become re-entrained by waves and tidal currents and transported away. The deposition of sediments would extend over a similar zone of influence to that of the sediment plume (i.e. within a few hundred metres of each release point), but the thickness of deposits would be even smaller than close to the Project. In such a highly dynamic area, this would be an immeasurably small change.

Assessment of Effect Magnitude and/or Impact Significance

7.7.10 The changes in sea-bed level due to construction of the breakwater under the worst-case sediment dispersal scenario are likely to have the magnitudes of effect described in **Table 7-8**.

Table 7-8: Magnitude of Effect on Sea-bed Level Changes Due to Deposition Under the Worst-case Scenario for Sediment Dispersal During the Construction of the Breakwater

Location	Scale	Duration	Frequency	Reversibility	Magnitude of Effect
Near-field*	Negligible	Negligible	Negligible	Negligible	Negligible
Far-field	Negligible	Negligible	Negligible	Negligible	Negligible

*The near-field effects are confined to a small area, likely to be several hundred metres from the breakwater.

7.7.11 The overall impact of breakwater construction under a worst-case scenario on sea-bed level changes for the identified morphological receptor groups is **no impact**. This is because the predicted thickness of sediment resting on the sea bed initially would only amount to a maximum of less than a few millimetres. After this initial deposition, this sediment will be continually re-suspended to reduce the thickness even further to a point where it will be effectively zero. This will be the longer-term outcome, once the sediment supply from construction activities has ceased.

7.7.12 The effects on sea-bed level have the potential to impact upon other receptors and the assessment of impact significance is addressed within the relevant chapters of this ES.

7.8 Potential Effects during Operation

7.8.1 During the operational phase of the Project, there is potential for its presence to cause changes to the wave and tidal regimes due to physical blockage effects. These changes could potentially affect the sediment regime and/or sea bed morphology. These potential effects are considered as operational impacts 1 to 3 below.

OPERATIONAL IMPACT 7.3: Changes to the Wave Regime Due to the Presence of the Project

7.8.2 The presence of Project has the potential to alter the baseline wave regime, particularly with respect to wave heights and directions. Any changes in the wave regime may have the potential to contribute to changes in the sea bed morphology due to alteration of sediment transport patterns. The impacts on the wave regime would not extend beyond the breaker zone and so there are no effects associated with the Project beyond the immediate nearshore zone (less than about 100m seaward). The effects on waves are therefore restricted to local changes near the Project.

7.8.3 The breakwater fronting the Project will effectively be a continuation of the rock revetment fronting the current Longue Hougue facility reclamation to the north-east. The predominant waves approach from the south at Longue Hougue South and so any modification to the height and/or direction of the waves would be at the Project and to the north of it. Changes to wave height and direction would be minimal to the south of the Project and into Belle Grève Bay. After impinging on the breakwater and progressing to the north, wave heights would eventually return to baseline conditions towards St. Sampson.

7.8.4 The breakwater fronting the Project will advance the position of the shoreline across the shore platform. This would only cause a small modification to the waves as they approach the breakwater because of the wide and shallow nature of the shore at this location. The extension seaward would only lead to a small increase in the slope of the shoreline across which the waves approach and so changes to wave steepness (height divided by wavelength) would be minimal.

Assessment of Effect Magnitude and/or Impact Significance

7.8.5 The worst-case changes to significant wave heights due to the presence of the Project are likely to have the magnitudes of effect described in **Table 7-9**.

Table 7-9: Magnitude of Effect on Significant Wave Heights Under the Worst-case Scenario for the Presence of the Project

Location	Scale	Duration	Frequency	Reversibility	Magnitude of Effect
Near-field	Negligible	High	Medium	Negligible	Negligible

7.8.6 As there is no physical pathway that links the source of the impact to the beaches to the south or to Herm or Jethou (or the Herm, Jethou, and The Humps Ramsar site), before the effect on the wave regime is diminished to baseline, there is **no impact** on the identified geomorphological receptor groups.

OPERATIONAL IMPACT 7.4: Changes to the Tidal Current Regime Due to the Presence of the Project

7.8.7 The presence of the Project has the potential to alter the baseline tidal regime, particularly tidal currents. Any changes in the tidal regime may have the potential to contribute to changes in sea bed morphology due to alteration of sediment transport patterns. The effects on tidal currents can be divided into two types:

- local changes near the Project created by interaction with the currents; and
- regional changes in the Little Russel Channel and beyond (e.g. Herm).

7.8.8 To predict the effect of the Project once constructed, Royal HaskoningDHV (2019) modelled predicted tidal current velocities and compared them to the predicted baseline situation. The results of the hydrodynamic modelling are presented as predicted changes in tidal current velocity due to the Project and in the wider Little Russel Channel at times of peak flood tide and peak ebb tide (**Figure 7-30** and **Figure 7-31**, respectively). The predicted changes are both positive (corresponding to an increase in current velocity) and negative (corresponding to a decrease in current velocity).

7.8.9 The results show that predicted changes to tidal current velocities are local to the Project. On a peak flood tide, the model predicts two areas of tidal current increase, one adjacent to the Project and one adjacent to the current Longue Hougue facility land-claim (**Figure 7-30**). Maximum increases of up to 0.2m/s (20cm/s) are predicted locally adjacent to the Project reducing to 0.05m/s (5cm/s) in the wider nearshore zone. Predicted increases adjacent to the current Longue Hougue facility are locally up to 0.8m/s (80cm/s) but only close to the existing breakwater. Predicted increases reduce rapidly away from the breakwater to around 0.05m/s approximately 300m offshore. There are no predicted increases in tidal current velocity across the approaches to St. Sampson Harbour.

Figure 7-30 Predicted Changes in Local Tidal Current Velocity Vaused by the Presence of the Project at Peak Flood Tide (Top) and Peak Ebb Tide (Bottom) (Royal HaskoningDHV, 2019)

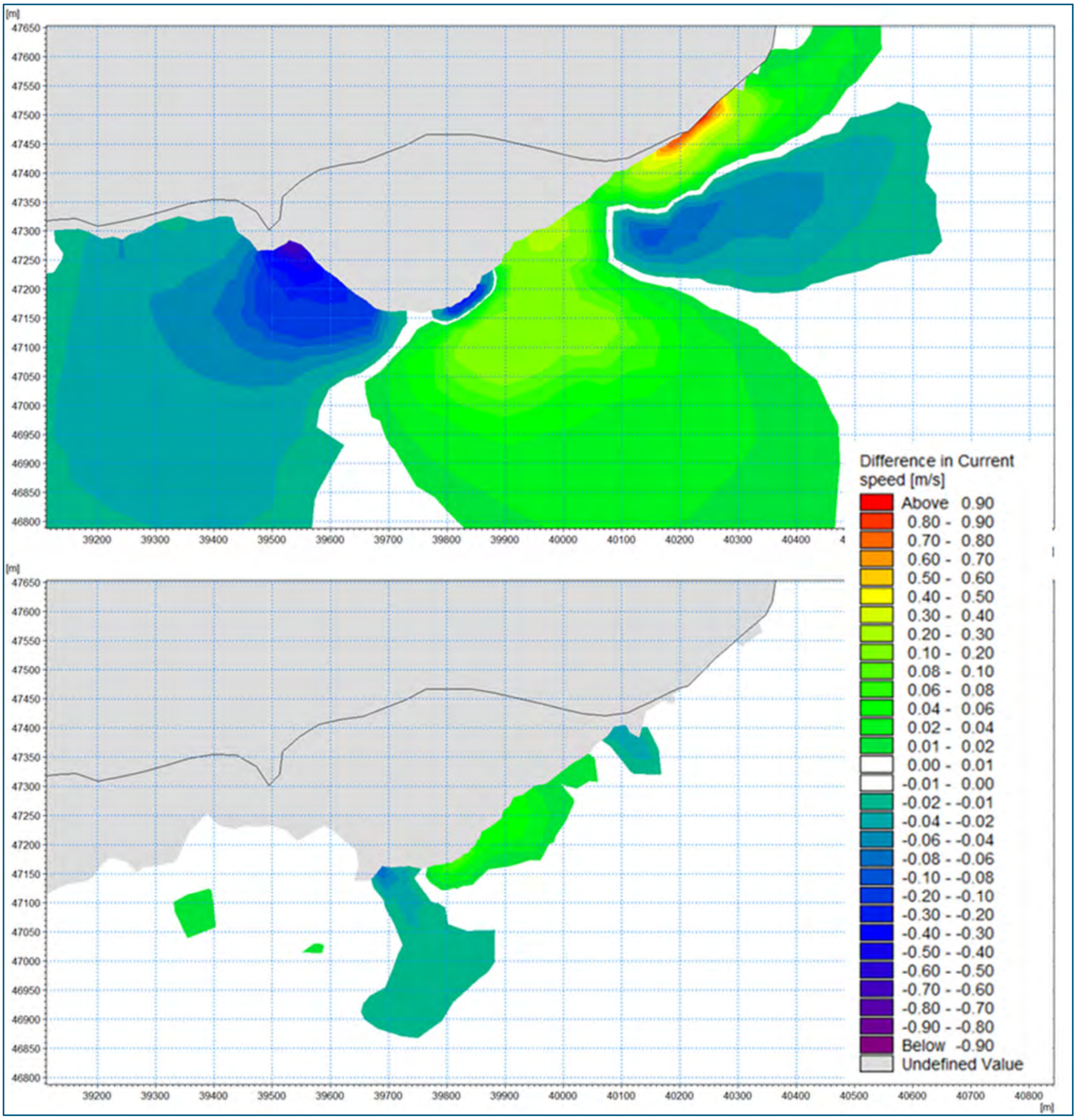
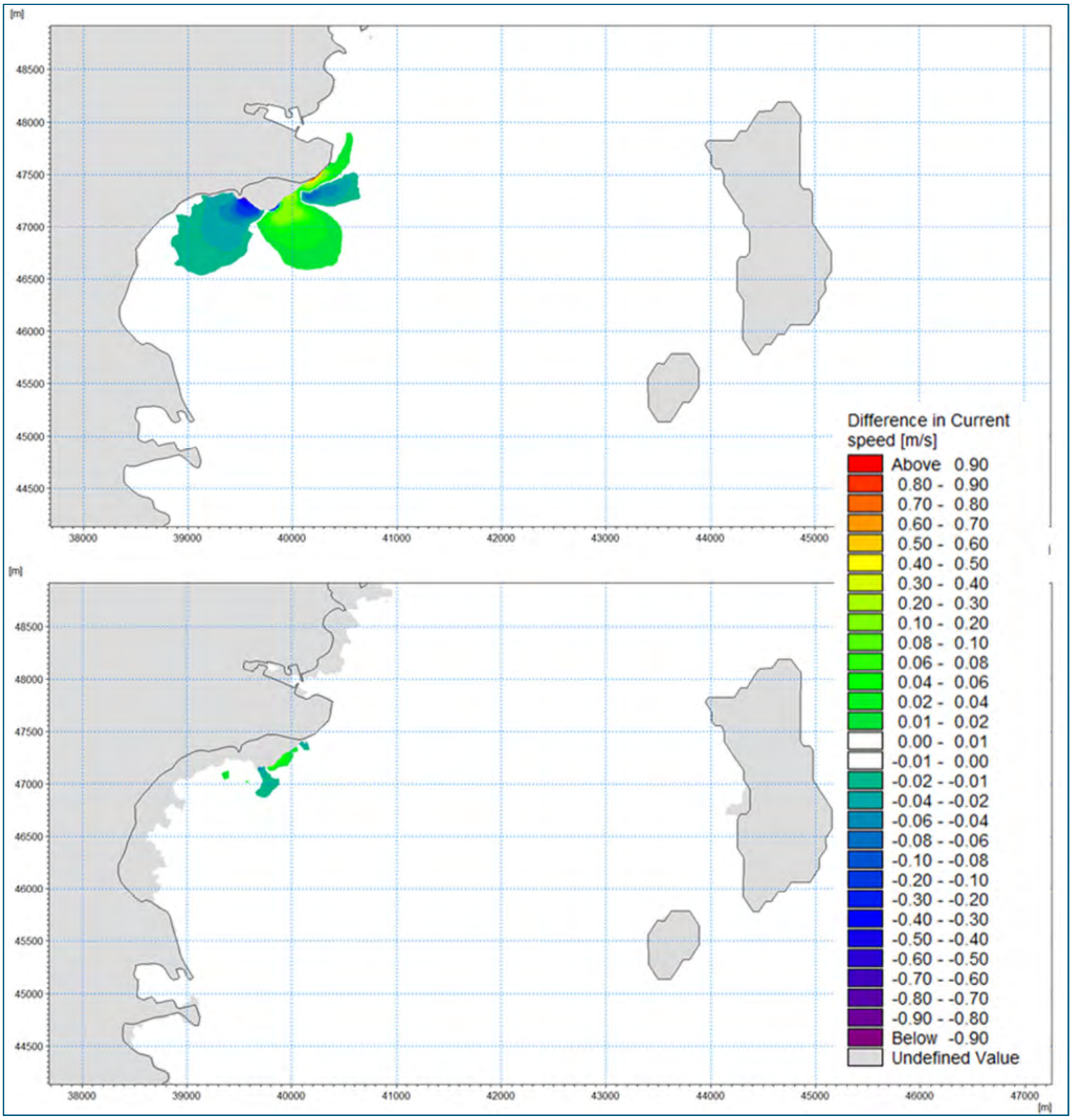


Figure 7-31 *Predicted Changes in Tidal Current Velocity in Little Russel Channel Caused by the Presence of the Project at Peak Flood Tide (Top) and Peak Ebb Tide (Bottom) (Royal HaskoningDHV, 2019)*



7.8.10 Predicted reductions in tidal current velocities (up to 0.6m/s, 60cm/s) are simulated south of the Project, reducing to less than 0.05m/s in Belle Grève Bay. North of the Project, immediately offshore from the predicted velocity increase at the current Longue Hougue Reclamation Site, tidal current velocities reduce by up to 0.2m/s.

7.8.11 On a peak ebb tide predicted changes to tidal current velocities local to the Project are less than on a peak flood tide and have a much smaller geographical effect (**Figure 7-30**). The predicted changes to tidal current velocities are small compared to the baseline velocities.

7.8.12 The northern part of Belle Grève Bay is affected by small reductions in tidal current velocity (mainly up to 0.05m/s with higher changes of up to 0.6m/s in a small area immediately south of the Project). There are no changes to the predicted tidal current velocities across the Little Russel Channel and at Herm (**Figure 7-31**).

7.8.13 The change in the position of the breakwater to a more landward orientation at its connection with Spur Point would only modify the changes to predicted tidal currents (compared to the original design) locally. Also, the differences between the predicted changes due to the original design and predicted changes due to the new design would also be so small that they would not affect the outcomes of the assessment. Most of the breakwater that would have the greatest impact on hydrodynamics (i.e. most of its length which has not changed position) is the same design as the original and so the assessment of effects is still applicable.

Assessment of Effect Magnitude and/or Impact Significance

7.8.14 The worst-case changes to tidal current velocities due to the presence of the Project are likely to have the magnitudes of effect described in **Table 7-10**.

Table 7-10: Magnitude of Effect on Tidal Current Velocities Under the Worst-case Scenario for the Presence of the Project

Location	Scale	Duration	Frequency	Reversibility	Magnitude of Effect
Near-field	Negligible	High	Medium	Negligible	Negligible

7.8.15 Given the changes in nearshore tidal current velocities are small and only occur in the northern part of Belle Grève Bay, and they approach baseline close to the beach, there is only a **negligible impact** on this geomorphological receptor group. The Herm receptor group is remote from the potential influence on the tidal regime. Due to this, no pathway exists between the source and the receptor, and there is **no impact** on this receptor group associated with the Project.

OPERATIONAL IMPACT 7.5: Changes to Sediment Transport and Erosion / Accretion Patterns Due to the Presence of the Project

7.8.16 Modifications to the wave and/or tidal regime due to the presence of the Project during the operational phase may affect the sediment regime. The predicted reductions in wave height (operational impact 1) and tidal flow (operational impact

2) associated with the presence of the Project would result in a reduction in the sediment transport potential across the areas where such changes are observed. Conversely, the areas of increased wave height and tidal flow would result in increased sediment transport potential.

7.8.17 Since it is expected that the changes in tidal flow and wave heights during the operational phase would have no significant far-field effects, then the changes in sediment transport would be similar.

7.8.18 Changes in the near-field sediment transport regime may arise as an indirect effect, consequent upon changes in the tidal and/or wave regimes caused by the operation of the Project. However, at the Project there is little mobile sediment available for bedload transport. This is because most of the sea bed has been swept to bedrock (with or without a gravel, cobble, boulder lag) by the high energy physical processes. Given this dominant process, the potential for interruption or disturbance of sediment transport by operation of the Project is limited.

Assessment of Effect Magnitude and/or Impact Significance

7.8.19 The worst-case changes to sediment transport and erosion/accretion patterns due to the presence of the Project are likely to have the magnitudes of effect described in **Table 7-11**.

Table 7-11: Magnitude of Effect on Sediment Transport and Erosion / Accretion Patterns Under the Worst-case Scenario for the Presence of the Project

Location	Scale	Duration	Frequency	Reversibility	Magnitude of Effect
Near-field	Negligible	High	Medium	Negligible	Negligible

7.8.20 Reductions in tidal velocities and wave heights of the order expected are small relative to the high baseline tidal flows and wave energies and would not result in changes to the existing erosion or deposition patterns of coarse sediment since the critical thresholds for deposition would still not be crossed. Hence, there is no physical pathway that links the source of the impact (indirectly caused by changes to the tidal and/or wave regimes) to the Belle Grève Bay beaches to the south and therefore there is **negligible impact** on this shoreline geomorphological receptor group.

7.8.21 Because the Herm receptor group is remote from the potential influence of changes to waves and tidal currents means there would be **no impact** on erosion/accretion patterns.

OPERATIONAL IMPACT 7.6: Changes in Suspended Sediment Concentrations Due to the Presence of the Breakwater

7.8.22 Deposition of sediment to infill the land-claim behind the breakwater has the potential to temporarily increase suspended sediment concentrations in the nearshore by fine sediment passing through interstitial gaps in the breakwater structure.

7.8.23 The worst-case scenario assumes that sediment would pass through the gaps and be suspended in the nearshore water column. This process would cause very localised and short-term increases in suspended sediment concentrations at the points of discharge in the breakwater. The permeability of the breakwater structure would only allow small amounts of sediment through at any one time, and the dispersion of this in the water column would be at extremely low concentrations (likely to be of the order of tenths of a mg/l). The sediment would then be rapidly dispersed by the high energy conditions outside the breakwater. Over time the interstitial spaces would gradually fill with sediment and the process would effectively cease.

7.8.24 The worst-case changes to suspended sediment concentrations due to the operation of the Project are likely to have the magnitudes of effect described in **Table 7.12**.

Table 7.12: Magnitude of Effect on Suspended Sediment Concentrations Under the Worst-case Scenario for the Presence of the Project

Location	Scale	Duration	Frequency	Reversibility	Magnitude of Effect
Near-field	Negligible	High	Medium	Negligible	Negligible

7.8.25 The rapid dispersion of a very low concentration and spatially limited plume means that there is no physical pathway that links the source of the impact (the breakwater) to the Belle Grève Bay beaches to the south. Therefore, there is **negligible impact** on this shoreline geomorphological receptor group.

7.8.26 Because the Herm receptor group is remote from the potential influence of changes to suspended sediment concentration means there would be **no impact**.

7.9 Cumulative Impacts

7.9.1 There are no projects scoped-in for assessment of cumulative impacts with the Project construction and operation in relation to coastal and marine processes. The current Longue Hougue Reclamation Site is part of the baseline and is therefore not assessed as part of the cumulative impacts.

7.10 Inter-Relationships with Other Topics

7.10.1 The range of effects on coastal and marine processes of the Project not only have the potential to directly affect the identified receptor but may also manifest as impacts upon receptors other than those considered within the context of coastal and marine processes. The assessments of significance of these impacts on other receptors are provided in the chapters listed in **Table 7-13**. This chapter has inter-relationships with **Chapter 8 Marine Sediment and Water Quality**, **Chapter 15 Material Assets (Archaeology, Built and Cultural Heritage)** and **Chapter 17 Marine Ecology**.

Table 7-13: Chapter Topic Inter-relationships

Topic and description	Related Chapter	Where addressed in this Chapter
Effects on water column (suspended sediment concentrations)	Chapter 8 - Marine Sediment and Water Quality	**Section 7.7**
Effects on sea bed (morphology/sediment erosion and deposition)	Chapter 15 – Material Assets (Archaeology, Built and Cultural Heritage) Chapter 17 – Marine Ecology	**Section 7.7** and **Section 7.8**

7.10.2 These inter-relationships are included for the following reasons:

- The receptors of changes in suspended sediment are marine sediment and water quality and therefore these are assessed in **Chapter 8 Marine Sediment and Water Quality**.
- Changes to sea bed morphology/sediment erosion and deposition could affect the habitat of benthic receptors (**Chapter 17 Marine Ecology**).
- Changes to sediment erosion and deposition could affect the exposure of, and therefore impact on, archaeological features assessed in **Chapter 15 Material Assets (Archaeology, Built and Cultural Heritage)**.

7.11 Interactions

7.11.1 The impacts identified and assessed in this chapter have the potential to interact with each other, which could give rise to synergistic impacts because of that interaction. The worst-case impacts assessed within the chapter take these interactions into account and for the impact assessments are considered conservative and robust. For clarity, the areas of interaction between construction and operational impacts are presented in **Table 7-14** and **Table 7-15**, respectively, along with an indication as to whether the interaction may give rise to synergistic impacts.

Table 7-14: Interaction Between Construction Impacts

Impacts	1: Changes in suspended sediment concentrations due to the construction of the breakwater	2: Changes in sea-bed level due to the construction of the breakwater
1: Changes in suspended sediment concentrations due to the construction of the breakwater	-	Yes
2: Changes in sea-bed level due to the construction of the breakwater	Yes	-

7.12 Summary

7.12.1 The assessment of the construction and operational phases of the proposed Project could cause a range of effects on coastal and marine processes. The magnitude of these effects has been assessed using hydrodynamic numerical modelling and expert geomorphological assessment. The receptors that have been specifically identified in relation to coastal and marine processes are the Herm Ramsar and Belle Grève Bay Area of Biodiversity Importance. In both cases, the effects that have been assessed resulted in no impact or negligible impact to these receptors. A summary of impacts to these receptors are listed in **Table 7-16**.

Table 7-15: Interaction Between Operational Impacts

Interactions	1: Changes to the wave regime due to the presence of the Project	2: Changes to the tidal current regime due to the presence of the Project	3: Changes to sediment transport and erosion/accretion patterns due to the presence of the Project	4: Changes in suspended sediment concentrations due to the operation of the breakwater
1: Changes to the wave regime due to the presence of the Project	-	No	Yes	No
2: Changes to the tidal current regime due to the presence of the Project	No	-	Yes	No
3: Changes to sediment transport and erosion/accretion patterns due to the presence of the Project	Yes	Yes	-	No
4: Changes in suspended sediment concentrations due to the operation of the breakwater	No	No	No	-

Table 7-16: Coastal and Marine Processes Impact Summary

Potential Impact	Receptor Group	Significance	Mitigation	Residual Impact
Construction				
Impact 7.1: Changes in suspended sediment concentrations due to the construction of the breakwater	Herm	No impact	N/A	No impact
	Belle Grève Bay	No impact	N/A	No impact
Impact 7.2: Changes in sea-bed level due to the construction of the breakwater	Herm	No impact	N/A	No impact
	Belle Grève Bay	No impact	N/A	No impact
Operation				
Impact 7.3: Changes to the wave regime due to the presence of the Project	Herm	No impact	N/A	No impact
	Belle Grève Bay	No impact	N/A	No impact
Impact 7.4: Changes to the tidal current regime due to the presence of the Project	Herm	No impact	N/A	No impact
	Belle Grève Bay	Negligible	None proposed	Negligible
Impact 7.5: Changes to sediment transport and erosion/accretion patterns due to the presence of the Project	Herm	No impact	N/A	No impact
	Belle Grève Bay	Negligible	None proposed	Negligible
Impact 7.6: Changes in suspended sediment concentrations due to the operation of the breakwater	Herm	No impact	N/A	No impact
	Belle Grève Bay	Negligible	None proposed	Negligible

8 Marine Sediment and Water Quality

8.1 Content and Data

Content

8.1.1 This chapter of the Environmental Statement (ES) describes the existing environment in relation to marine sediment and water quality and details the assessment of the potential impacts during the construction and operational phases of the Longue Hougue South Inert Waste proposed facility (the proposed Project). **Table 8-1** presents the impacts scoped in during the Scoping opinion. Mitigation measures are detailed below, and a discussion of the residual impacts provided where significant impacts are identified.

Table 8-1: Summary of Impacts Relating to Marine Sediment and Water Quality

Potential impacts	Scoped in?	
	Construction	Operation
Deterioration in water quality due to increased suspended sediment concentrations	Yes – in relation to disturbance to seabed during construction	Yes – tipped material is released through the breakwater
Release of contaminated sediments	Yes – in relation to disturbance to seabed during construction	Yes – tipped material is released through the breakwater
Accidental release of contaminants	Yes – this relates to accidental pollution during construction	Yes – tipped material is released through the breakwater
Deterioration in water quality due to changes in hydrodynamic regime	Yes – potential effects on tidal flows could impact dispersion from outfall. Permanent effects will be felt in the operation phase so the construction phase is not considered further.	Yes – potential effects on tidal flows could impact dispersion from outfall

Study Area

8.1.2 Consideration of the potential effects of the proposed Project on marine sediment and water quality is carried out over the spatial scales indicated by the work undertaken to inform **Chapter 7 Coastal and Marine Processes**. This is because the extent of effects on physical processes could have implications for water quality where sediment is resuspended as a result of construction or during operation of the proposed Project.

8.1.3 The study area therefore covers the area between the southern breakwater at St. Peter Port in the south and Bordeaux Harbour in the north, and the offshore zone extending into the Little Russel Channel between Guernsey and Herm. The study area is identical to that considered for Coastal and Marine Processes displayed in **Figure 7-1**. The study area was confirmed after review of the numerical modelling results. Its boundaries were chosen to be outside the area of influence of changes to tidal currents, and bedload and suspended sediment transport as indicated in the numerical model results.

8.1.4 Note that the potential effects associated with decommissioning are not considered further given that the proposals for this phase have not been identified at this stage.

Data Sources

8.1.5 Data sources are summarised in **Table 8-2**.

Table 8-2: Summary of Data Uses Within the Study Area

Data	Coverage	Source
Regional Sea-bed Sediment Distribution	Guernsey coastal waters	Sea-bed sediment mapping (Hommeril, 1967; Auffret et al., 1979; British Geological Survey, 2000).
Sediment Particle Size and Contaminant Concentrations	Longue Hougue South and western Little Russel Channel	Benthic ecological survey (**Appendix 17.1**) with supporting particle size and contaminant analyses.
Bacteriological data from Bathing Waters Monitoring	Designated Bathing Waters	States of Guernsey (2019). Bathing Water Quality. Available online at https://www.gov.gg/bwq. Accessed on 16/10/2019.
Modelling output	Study Area	From **Chapter 7 Coastal and Marine Processes**.

Legislation and Policy Context

8.1.6 The States of Guernsey legislation and ordinances relevant to Marine Water and Sediment Quality are referenced below:

- The Environmental Pollution (Guernsey) (Amendment) Law, 2015.
- The Environmental Pollution (Guernsey) Law, 2004.

- The States Water Supply (Guernsey) Laws, 1927 to 1997.
- The Water Courses Ordinance, 1957 (as amended).
- States Water Supply (Prevention of Pollution) Ordinance, 1966 (as amended).
- Food and Environment Protection Act 1985 (Guernsey) Order 1987 (as amended) and the Deposits in the Sea (Exemptions) Order, 1992.

8.1.7 The Environmental Pollution Law (Guernsey) 2004 and Environmental Pollution (Guernsey) (Amendment) 2015 allows the States of Guernsey to enforce measures which prevent any new or existing development or any activities which may be detrimental to the preservation and enhancement of the environment due to the introduction of pollutants. This is carried out by monitoring and enforcing the best available techniques to eliminate or reduce risks to a minimum. The law states "*the States of Guernsey may prohibit, restrict, or limit, the introduction of any substance capable of causing serious water pollution to water on or below the surface of the ground, or into the sea*".

8.1.8 The States Water Supply (Prevention of Pollution) Ordinance 1966 (as amended) is centred around the prevention of pollution in the States water supply. This details prohibitions for allowing run-off or infiltration of waters from polluted surfaces including oils and waste to waters controlled by Guernsey Water. It requires mitigation measures complying with British Standard Code of Practice such as drainage to treatment areas and sealed or bunded areas for contaminants.

8.1.9 Part VI Water Pollution of the Environmental Pollution (Guernsey) Law, 2004 is likely to be provided during legal drafting time early next year. A Water Pollution Ordinance will implement a licencing regime which will require certain activities which present a risk of environmental pollution to hold a licence.

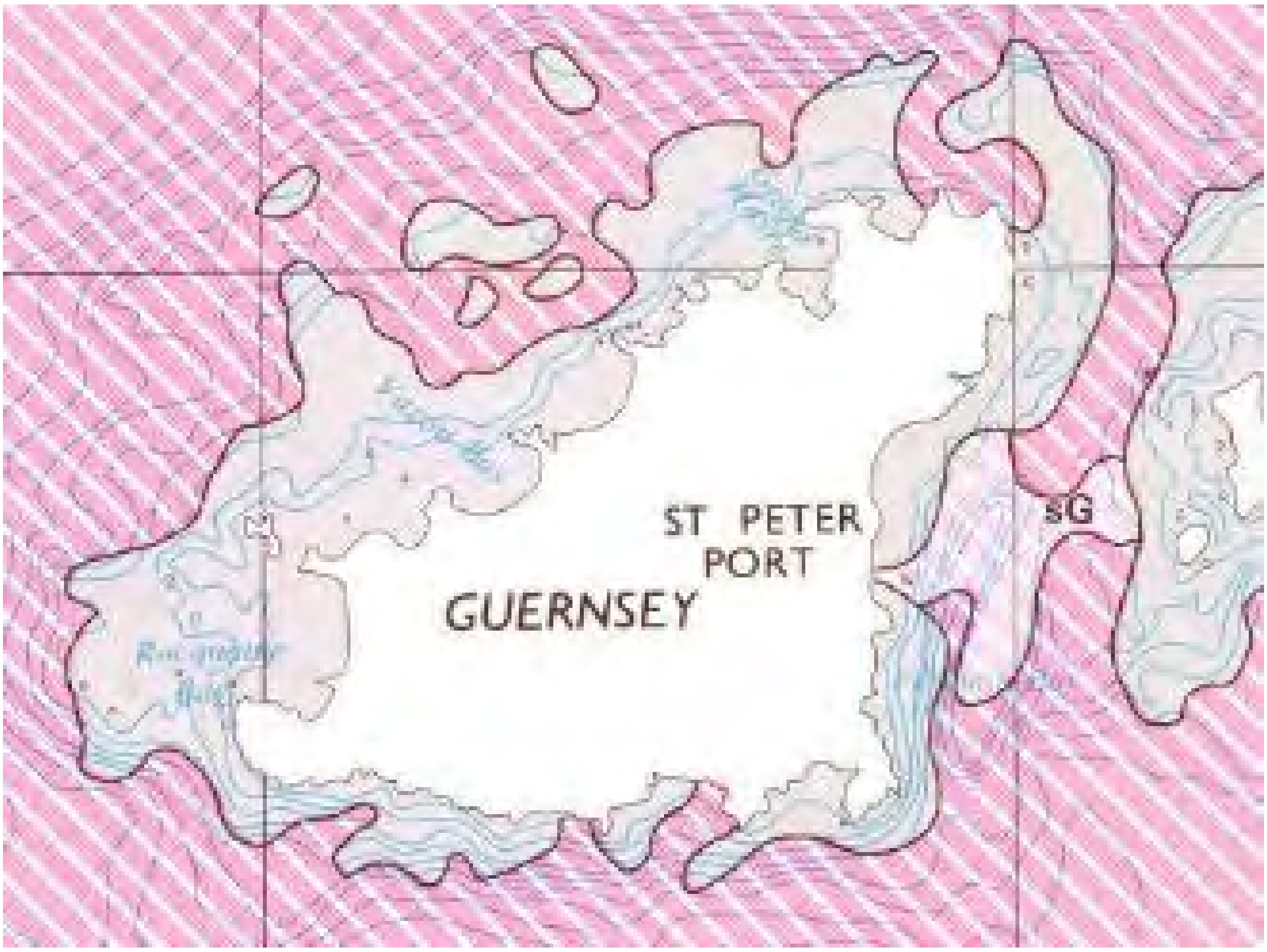
8.2 Baseline

Sediment Quality

8.2.1 Geophysical information is important for **Chapter 7 Coastal and Marine Processes** when assessing the potential increases in suspended solids concentrations associated with seabed disturbance. This information can also be used within this topic to assess the risk of contamination due to finer grained materials (silts and clays) functioning as a sink for contaminants and therefore having a greater potential to retain contaminants than larger grained materials (Horowitz, 1987).

8.2.2 At the proposed Project and throughout the area adjacent to the proposed Project, there is a scarcity of mobile surface sediment, with tide-swept bedrock prevailing. The sediment which exists in these areas is predominantly gravel, cobbles and rock boulders. The British geological Survey (BGS, 1989) has shown that the majority of sediment at St. Peter Port and the surrounding area including the proposed Project is composed of sandy gravel (sG) while the majority of the island is surrounded by gravel as shown by **Figure 8-1**. The coastline between Spur Point and Richmond Corner (adjacent to the proposed site) is predominantly rocky, with pockets of shingle and sand on the foreshore (Royal Haskoning DHV, 2007).

Figure 8-1 BGS (1989) Map Showing the Dominant Sediment Layers around Guernsey



Notes: sG represents sand gravel sediment whereas the striped pink layer represents gravel.

8.2.3 Finer sediments are scarce around Guernsey because the high tidal current velocities (greater than 1m/s) can transport any size of sand. According to Reynaud *et al*. (2003), the Great Bank formed during the Holocene rise in sea level by the trapping of sediment within tidal eddies generated by headlands or flow convergence.

8.2.4 A benthic survey was carried out in May 2019 (**Appendix 17.1**) which took sediment samples at nine stations using a $0.1m^2$ Hamon grab. Of the nine stations sampled, seven were sent for particle size analysis (PSA) and six were analysed for contaminants (**Figure 8-2**).

PSA

8.2.5 The sediments were sieved at ½ phi intervals over a particle size range of 64mm-0.063mm on the Wentworth Scale (EcoMarine, 2019). In order to further describe the substrate types recorded across the study area, sediment samples have been classified according to the Folk classification system (Folk, 1954). Grab samples could not be collected from a number of sampling stations due to a lack of sediment above the exposed bedrock. Of the sites where sediment was present, the average composition was dominated by sand (68.9%), gravel (17.2%) and mud (13.9%) (EcoMarine, 2019). Each station that was sampled was a different Folk category. The categories found are shown in **Figure 8-3**.

Contaminants Analysis

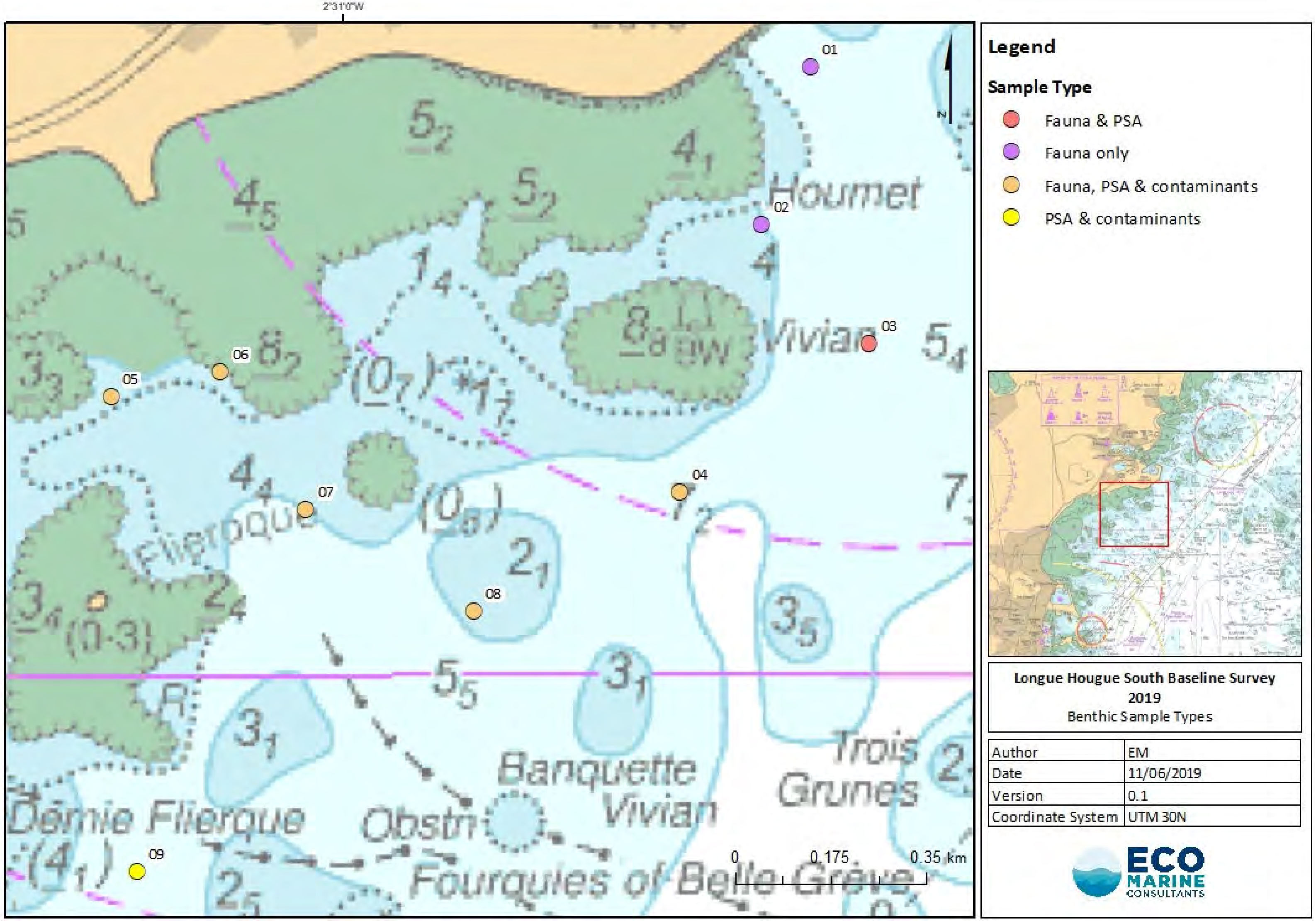
8.2.6 Samples were collected for chemical contaminant analysis (**Table 8-3**) from all benthic stations where sufficient sediment could be collected using the Hamon grab. The sediment samples were subject to Marine Management Organisation (MMO) specification analyses (lower limits of detection and a wide spectrum of contaminant testing e.g. Dibutyltin (DBT)/Tributyltin (TBT)and additional Polycyclic aromatic hydrocarbons (PAHs). This ensured that analyses of the sediments collected at Longue Hougue South and the surrounding area covered a broad range of contaminants to fully determine the environmental status of the surface sediments at the site (EcoMarine, 2019). The results of the analysis are presented in **Table 8-4**.

Water Quality

8.2.7 Weekly monitoring is undertaken by the States of Guernsey's Office of Environmental Health & Pollution Regulation department at 13 locations around the coast. Water quality is tested in accordance with the EU Bathing Water Quality Directive standards and reported for the period between April and September (although monitoring occurs throughout the year). The closest monitoring location to the project site is Bordeaux, approximately 1km to the north.

Royal HaskoningDHV

Figure 8-2 Types of Samples Taken in the May 2019 Benthic Survey



Longue Hougue South Baseline Survey 2019
Benthic Sample Types

Author	EM
Date	11/06/2019
Version	0.1
Coordinate System	UTM 30N

ECO MARINE CONSULTANTS

Figure 8-3 Proportion of Sediment and Folk Categories Observed During the Survey

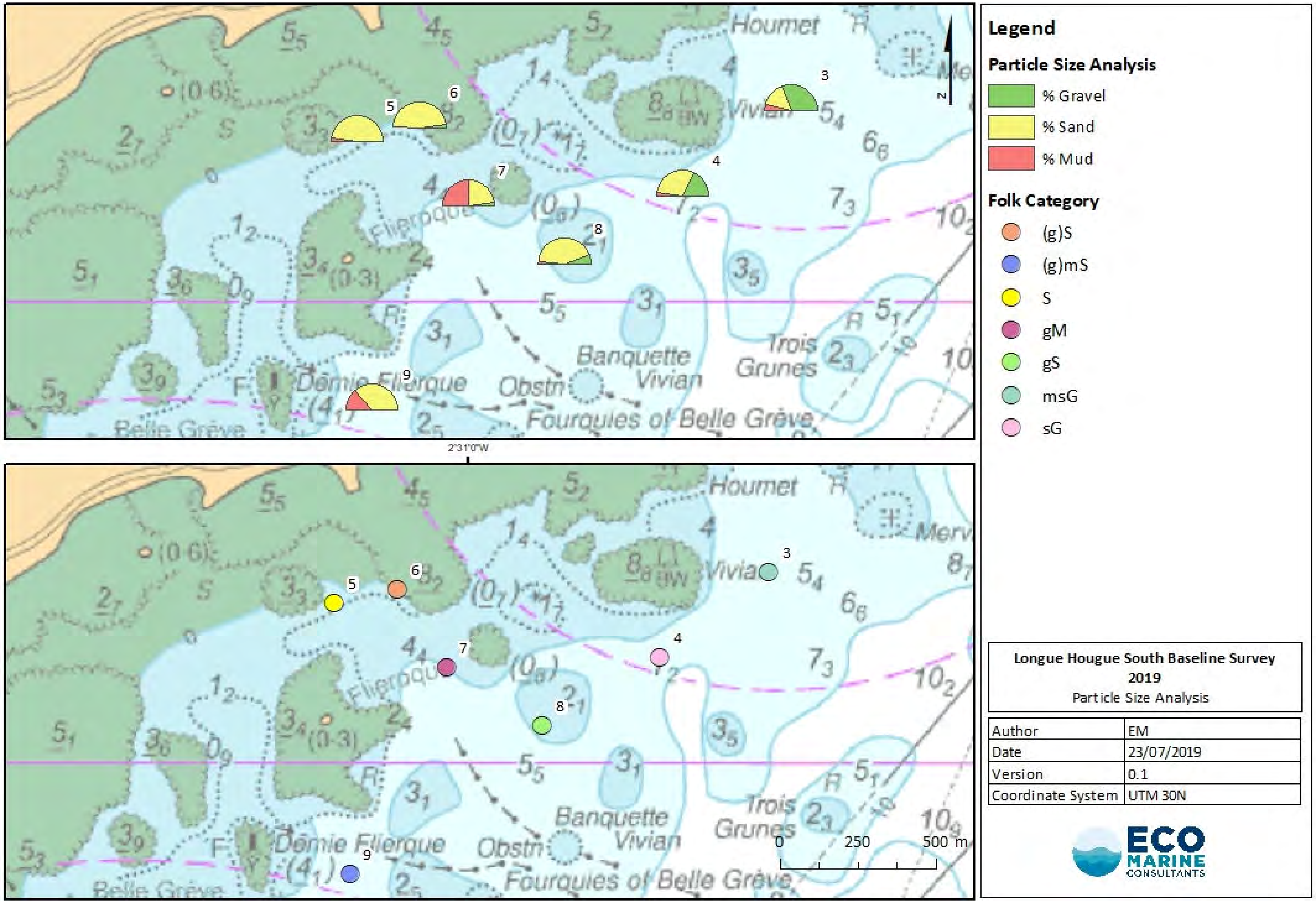


Table 8-3: *Chemical Contaminants and Test Methods for Sediment Samples Collected in the Survey*

Determinand	Limits of Detection	Method	Quality Management System
Metals suite (Arsenic, Cadmium, Chromium, Copper, Mercury, Nickel, Lead, Zinc)	0.015 - 2mg/kg	Aqua-regia extraction & Inductively coupled plasma mass spectrometry (ICP-MS)	United Kingdom Accreditation Service (UKAS) 17025 & MMO
Organotins (DBT, TBT)	0.001 mg/kg	Acid digest and solvent extraction GC-MS	MMO
PAHs (Department of Trade and Industry (UK) (DTI) 2-6 ring aromatics + Environmental Protection Agency (EPA) 16)	1µg/kg	Solvent extraction & GC-MS	UKAS 17025 & MMO
Total hydrocarbon content	1mg/kg	Ultraviolet (UV) fluorescence spectroscopy	MMO

8.2.8 The water collected during monitoring is tested for Escherichia Coli and Intestinal Enterococci. The 2018 sampling data for Bordeaux is the latest dataset available on the official website for the States of Guernsey and is provided in **Table 8-5**. The 2017 classification between was 'Excellent' and all samples taken in 2018 have been 'Excellent' (States of Guernsey, 2019). The four-year classification between 2014 and 2017 was 'Good' (States of Guernsey, 2018b). Reasons for the poor result could relate to heavy rainfall which can cause surface water run-off from fields and roads on higher ground enters streams and storm drains which run on to beaches. This run off may be affected by faecal bacteria from grazing animals, dogs and birds.

Table 8-4: Concentrations of Contaminants at Each Sampling Station and Cefas Action Levels

Contaminant	Sampling station						Cefas Action Level 1	Cefas Action Level 2
	4	5	6	7	8	9		
Arsenic (mg/Kg)	5.5	3.7	4.1	2.5	2.7	2.1	20	100
Cadmium (mg/Kg)	0.08	0.09	0.1	0.08	0.08	0.08	0.4	5
Chromium (mg/Kg)	33.7	43.5	39	24.1	13.1	9.8	40	400
Copper (mg/Kg)	6.5	7.8	9.8	5.9	5.6	4.6	40	400
Lead (mg/Kg)	8.5	8.8	8.1	3.8	6.3	6.3	50	500
Mercury (mg/Kg)	<0.015	0.04	<0.015	<0.015	0.03	<0.015	0.3	3
Nickel (mg/Kg)	11	10.9	10.7	8.3	6.3	4.7	20	200
Zinc (mg/Kg)	27.6	27.5	29.8	14.6	18.9	17.2	130	800
Dibutyltin (mg/Kg)	<0.001	0.0015	<0.001	<0.001	<0.001	<0.001	0.1	1
Tributyltin (mg/Kg)	<0.001	0.0163	<0.001	<0.001	<0.001	<0.001	0.1	1

Notes: Contaminants Highlighted in Orange Exceed Cefas Action Level 1; No Samples exceed Cefas Action Level 2.

Table 8-5: *Bathing Water Data for 2017 at Bordeaux*

Sampling Date	Escherichia coli (no. per 100ml)	Intestinal enterococci (no. per 100ml)	Standard
15/05/2018	28	37	Excellent
22/05/2018	3	3	Excellent
30/05/2018	52	33	Excellent
05/06/2018	31	8	Excellent
12/06/2018	36	24	Excellent
19/06/2018	25	8	Excellent
26/06/2018	7	4	Excellent
03/07/2018	25	28	Excellent
10/07/2018	21	55	Excellent
17/07/2018	42	46	Excellent
24/07/2018	28	34	Excellent
31/07/2018	5	4	Excellent
07/08/2018	88	23	Excellent
14/08/2018	34	9	Excellent
21/08/2018	32	11	Excellent
28/08/2018	32	20	Excellent
04/09/2018	66	54	Excellent
11/09/2018	27	5	Excellent
17/09/2018	120	88	Excellent
25/09/2018	34	16	Excellent

8.2.9 Sampling of the water quality within shellfish waters is routinely undertaken by the Office of Environmental Health and Pollution Regulation (OEHPR), according to the UK Food Standards Agency classification system. The most recent sampling undertaken of the water quality in shellfish waters has classified two bivalve mollusc production areas in Guernsey (effective from 20th September 2018) (OEHPR, 2018). Both areas are for pacific oyster beds; one at Herm (Fisherman's Beach; 4km from Longue Hougue South) and one at Rocquaine North (17km from Longue Hougue South along the coastline), and have been given a classification of B; oysters can go for human consumption, only after they have been re-laid in an approved Class A area, have been purified in an approved plant or after a European Commission approved heat treatment process. Note that Rocquaine North was previously classified as a Class A site, but the most recent water quality analysis of the site undertaken in July 2018 indicates a reduction in water quality, and therefore a change in classification. Other bivalve sites, as noted above, have not been classified, either as the site is currently not in use (as is the case for Torquetil, Rocquaine South and Grand Havre) or is still awaiting further sampling (as is the case for Chouet) (OEHPR, 2018). Oyster classification of two oyster beds, one on Guernsey (Rocquaine II) and another on Herm (Herm Oysters) (The Office of Environmental Health and Pollution Regulation (OHES), 2018). The data is presented in **Table 8-6**.

Table 8-6: Summary of Shellfish Data (OEHPR, 2018)

Bed Name	Species	Class
Herm Oysters	*C. gigas*	B
Rocquaine II	*C. gigas*	B

8.2.10 In terms of suspended sediment data, baseline concentrations at Longue Hougue South or regionally in the Little Russel Channel is not available. As a consequence, **Chapter 7 Coastal and Marine Processes** makes an assessment based on the perceived energy conditions and potential sources to create turbidity in the water column.

8.2.11 To summarise, given the high energy regime, the entrainment and dispersion of fine sediment in suspension is effective in this area, and so suspended sediment concentrations will be very low. This is supported by the sea bed sediment samples collected during the Marine Ecology survey (**Appendix 17.**1). This survey found that as a whole, the sediments contained 17.2% gravel, 68.9% sand and 13.9% mud, giving a sediment type of gravelly muddy Sand (gmS), highlighting the mixed nature of sediments at the site. In addition, the survey area is subject to very high tidal flow, which is exacerbated in some places by complex channel systems while in other areas pockets of calmer waters may be found. This has resulted in the aggregation of varying proportions of fine and coarse sediments across the survey area, with the sandiest sediments present closest to shore. This means that fine sediment on the sea bed that is available for re-suspension is absent, and therefore there is unlikely to be any sediment suspended within the water column during calm conditions. However, in stormy conditions, sediment material is drawn down the beach and deposited on the lower foreshore where it can be removed by strong tidal currents, effectively removing sediments from the beach system.

8.3 Do Nothing Scenario

8.3.1 Should the proposed Project not be built, it is expected that the water quality would remain as per the existing situation.

8.4 Methodology for EIA

8.4.1 The impact assessment methodology in this chapter generally follows that outlined in **Chapter 5 EIA Methodology** with topic specific definitions for sensitivity and magnitude provided below.

Sensitivity

8.4.2 The sensitivity of a receptor, in this case marine water quality, is dependent upon its:

- Tolerance to an effect (i.e. the extent to which the receptor is adversely affected by a particular effect);
- Adaptability (i.e. the ability of the receptor to avoid adverse impacts that would otherwise arise from a particular effect); and
- Recoverability (i.e. a measure of a receptor's ability to return to a state at, or close to, that which existed before the effect caused a change).

8.4.3 The sensitivity is assessed using expert judgement and described with a standard semantic scale. Definitions for each term are provided in **Magnitude**

8.4.4 **Prediction** of the magnitude of potential effects has been based on the consequences that the proposed project might have upon the marine water quality status.

8.4.5 Table 8-7.

8.4.6 Water quality in the study area is considered to be of medium sensitivity because although it is not within a confined area (and therefore has a high capacity to accommodate change due to its size and ability to dilute/flush any contamination) it supports a number of designations which require good water quality to support their function either as a bathing water or a conservation designated site.

Magnitude

8.4.7 Prediction of the magnitude of potential effects has been based on the consequences that the proposed project might have upon the marine water quality status.

Table 8-7: Definitions of Sensitivity Levels for Marine Water and Sediment Quality

Sensitivity	Definition
High	The water quality of the receptor supports or contributes towards the designation of an internationally or nationally important feature and/or has a very low capacity to accommodate any change to current water quality status, compared to baseline conditions.
Medium	The water quality of the receptor supports high biodiversity and/or has low capacity to accommodate change to water quality status.
Low	The water quality of the receptor has a high capacity to accommodate change to water quality status due, for example, to large relative size of the receiving water and capacity for dilution and flushing. Background concentrations of certain parameters already exist.
Negligible	Specific water quality conditions of the receptor are likely to be able to tolerate proposed change with very little or no impact upon the baseline conditions detectable.

8.4.8 These descriptions of magnitude are specific to the assessment of marine water quality impacts and are considered in addition to the generic descriptors of impact magnitude that will be presented in the EIA. Potential impacts have been considered in terms of permanent or temporary, and adverse or beneficial effects. The magnitude of an effect is dependent upon its:

- Scale (i.e. size, extent or intensity);
- Duration;
- Frequency of occurrence; and
- Reversibility (i.e. the capability of the environment to return to a condition equivalent to the baseline after the effect ceases).

8.4.9 The magnitude of effect is assessed using expert judgement and described with a standard semantic scale. Definitions for each term are provided in **Table 8-8**.

Table 8-8: Definitions of Magnitude Levels for Assessing Effects

Sensitivity	Definition
High	Large scale change to key characteristics of the water quality status of the receiving water feature. Water quality status degraded to the extent that a permanent or long-term change occurs. Inability to meet (for example) Environmental Quality Standard (EQS) is likely.
Medium	Medium scale changes to key characteristics of the water quality status taking account of the receptor volume, mixing capacity, flow rate, etc. Water quality status likely to take considerable time to recover to baseline conditions.
Low	Noticeable but not considered to be substantial changes to the water quality status taking account of the receiving water features. Activity not likely to alter local status to the extent that water quality characteristics change considerably or EQSs are compromised.
Negligible	Although there may be some impact upon water quality status, activities predicted to occur over a short period. Any change to water quality status would be quickly reversed once activity ceases.

Impact Significance

8.4.10 Once the sensitivity and magnitude of an effect has been assessed (**Table 8-9**), the impact significance is determined using the matrix as presented in **Table 5-1**.

Table 8-9: Value / Sensitivity of Receptors

Receptor	Value / Sensitivity	Justification
Marine Water Quality	Medium	The marine water environment has been classified as medium sensitivity. Whilst there are designations within the study (bathing water and due to the Herm, Jethou & The Humps Ramsar site) the area is not within an area of restricted flow.

8.5 Impacts During Construction

CONSTRUCTION IMPACT 8.1: Deterioration in Water Quality Due to Increased Suspended Sediment Concentrations

8.5.1 There is the possibility during construction to potentially impact on suspended sediment concentrations due to disturbance associated with working on the seabed (including any excavation required) and due to any water discharged from the reclaimed area once the rock revetment has been constructed. The impact assessment has been carried out in **Table 8-10**.

Table 8-10: Summary of Impact of Deterioration in Water Quality Due to Increased Suspended Sediment Concentrations

Impact Assessment: Impact on water quality due to increased suspended sediment concentrations					
Impact Nature	Positive		Negative		
	The impact on water quality is negative because any increases in suspended sediment concentrations is an alteration from the baseline.				
Impact Type	Direct	Indirect	Reversible	Irreversible	
	The impact is direct and reversible.				
Impact Duration	Temporary	Short-term	Medium-term	Long-term	Permanent
	The impact is short-term because it will only occur during the placement of the first layers of rock in the revetment and during any pumping of water once the construction of the revetment is completed.				
Impact Extent	Local	County	Regional	National	International
	The impact extent is local.				
Impact Magnitude	Negligible	Low	Medium	High	
	The impact magnitude is low given the lack of fine sediment available to be disturbed.				
Receptor Value / Sensitivity	Negligible	Low	Medium	High	
	The receptor value is medium (see Table 8-9).				
Impact Significance	Negligible	Minor	Moderate	Major	
	The impact significance is minor.				

8.5.2 Given the lack of fine sediment in and around the study area, and the temporary nature of the disturbance (i.e. only during the construction of the first rock layer and/or water removal) the magnitude of this effect is anticipated to be low. Overall therefore an impact significance of **minor adverse** is predicted. There are no potential mitigation measures available to reduce this effect therefore the residual impact remains at **minor adverse**.

CONSTRUCTION IMPACT 8.2: Release of Contaminated Sediments

8.5.3 Placement of rocks on the seabed during construction may cause disturbance of the seabed. If sediments are present and disturbed, contaminants present within the sediments may be released into the water column, causing a deterioration in water quality.

8.5.4 During the ecological survey it was noted that the project area was comprised of mostly bedrock with a few small areas of sandy sediment. Sediment size and contaminant analysis was not possible for three samples due to a lack of sediment in the grab samples (**Figure 8-2**). Therefore, the sediment samples analysed do not wholly represent the seabed type present within the footprint of the site, which is mostly rocky and cannot be disturbed during construction.

8.5.5 As stated in **Section 8.2**, no contaminants were found to be in excess of the relevant action levels in the samples analysed, except for chromium, which was found to exceed Cefas Action 1 in one location (sampling station 5; chromium level of 43.5 mg/Kg found, 3.5mg/Kg above the Cefas Action Level 1 of 40mg/Kg). It should be noted that these Action Levels are specifically for the disposal of dredged materials at sea and are not specifically relevant to the effects expected as a result of construction activities at Longue Hougue South. This exceedance is considered to be marginal given the large difference between the measured value of 43.5mg/Kg and Cefas Action Level 2 of 400 mg/Kg. Cefas Action Level 2 is where seabed sediments are considered hazardous and disposal or disturbance should be restricted (PLA, 2018).

8.5.6 Sampling station 5 is not located within the Project site (i.e. it is not within the area to be infilled or the breakwater area), it is located approximately 300m from the closest point of any project infrastructure. The maximum area of impact for sedimentation during the construction phase is within less than 300 metres of the breakwater and will cause a very minor increase in suspended sediment concentrations for a very short period after the construction activity has been undertaken. It is therefore considered that the site with elevated levels of chromium is at a distance from the Project site that means it would not be affected by the construction of the breakwater and subsequent infilling.

Table 8-11: Summary of Impact of Release of Contaminated Sediments

Impact Assessment: Impact on water quality due to release of contamination within the sediments					
Impact Nature	Positive		Negative		
	The impact on water quality is negative.				
Impact Type	Direct	Indirect	Reversible	Irreversible	
	The impact is direct.				
Impact Duration	Temporary	Short-term	Medium-term	Long-term	Permanent
	The impact is temporary as rapid dilution and dispersal of any sediment and associated contaminants would occur, and it is short-term because it will only occur during the placement of the first layers of rock in the revetment.				
Impact Extent	Local	County	Regional	National	International
	The impact extent is local.				
Impact Magnitude	Negligible	Low	Medium	High	
	The impact magnitude is low given the lack of fine sediment available to accumulate contamination in the area of the breakwater works or intertidal area.				
Receptor Value / Sensitivity	Negligible	Low	Medium	High	
	The receptor value is medium (see Table 8-9).				
Impact Significance	Negligible	Minor	Moderate	Major	
	The impact significance is minor.				

8.5.7 Information available on grain sizes of material in the study area indicates that the risk of disturbing fine sediments with high organic matter is very low because they are not present within the study area due to the high energy system. As a result, the risk of contamination accumulating or being adsorbed to sediment is very low. The magnitude of effect is therefore predicted to be negligible and the overall effect is deemed to be of potential short-term and temporary **minor adverse** significance. Given the low risk of contamination there is no requirement for any mitigation measures. As a result, the residual effect remains of potential short-term and temporary **minor adverse** significance.

CONSTRUCTION IMPACT 8.3: Accidental Release of Contaminants

8.5.8 The breakwater would be constructed using land-based equipment and techniques. For deeper sections, if the reach of land-based equipment is not sufficient, floating equipment would be required. For example, the construction of the toe berm, scour apron and placement of part of the armour layers may prove impractical for some sections of the structures using only land-based equipment.

8.5.9 Given that these are not planned impacts the focus of the assessment is on reducing the risk that they are released to the environment. The assessment is risk based. As a consequence, the impact tables have not been completed.

8.5.10 The accidental release of contaminants includes the accidental spill of pollutants and releases of ballast water from marine construction vessels. However, fuel and lubricant quantities carried aboard are likely to be in very small quantities and therefore should a spillage occur, it is likely to be small scale. Additionally, all ships will respect international regulations on bilge water treatment, storage and discharge. In line with the Guernsey Anchorages Regulations, all grey water and black water will be stored on board or transferred to a barge for treatment.

8.5.11 On land, good construction management measures will be implemented to ensure fuel, equipment and construction materials will be stored on an impervious base away from the marine environment in addition to being properly bunded and locked when not in use. Emergency response procedures and equipment such as oil booms and silt traps will be kept on site and all contractor staff will be required to be trained in all procedures.

8.5.12 To ensure all the above measures are implemented, a Construction Environmental Management Plan (CEMP) will be drafted in discussion with the contractor and regulators and monitoring of its implementation will be undertaken throughout construction. Thus, no planned direct discharges are expected during construction. However, the risk of accidental pollution impacting on the marine environment is deemed to be **low**.

CONSTRUCTION IMPACT 8.4: Deterioration in Water Quality due to Changes in Hydrodynamic Regime

8.5.13 Given that the more permanent changes would occur during the operational phase, this impact is considered in detail in **Section 8.6**.

8.6 Impacts During Operation

OPERATIONAL IMPACT 8.5: Release of Contaminated Sediments

8.6.1 Waste material deposited at the site will consist of inert waste and therefore by definition, there would be no risk of contamination to marine water quality due to materials being placed within the site, therefore **no impact** is predicted.

OPERATIONAL IMPACT 8.6: Increase in Suspended Sediment Concentrations

8.6.2 Waste material deposited at the site will consist of inert waste and therefore by definition, material placed at the site should not risk the water environment by releasing contamination. However, there is the potential for some seepage of inert fines through the breakwater into the marine environment, increasing the suspended sediment concentrations in the nearby area.

8.6.3 Depending on the graduation of the breakwater core material, it is likely that internal erosion will occur (i.e. fine materials may be washed out), however, this can be controlled through the addition of a filter or geotextile layer.

8.6.4 If no filter or geotextile layer is added to the reclamation site prior to operation, the rate of seepage of the water (or flow velocity through the breakwater) would depend on the location in relation to water depth, and tidal flow. As discussed in **paragraph 7.8.21**, any increase in suspended sediment concentrations are anticipated to be of low concentrations (in the order of tenths of a mg/l). The rapid energy conditions outside of the breakwater will rapidly disperse the sediment. Over time the spaces between the rocks will fill with sediment, reducing the space for fine sediment to pass through.

8.6.5 Overall, given the wide range of uncertainty over whether such fines would be re-suspended, the potential effect would be intermittent and highly dependent on infilling methods and material. Any effect would be temporary due to the dilution and dispersal of the inshore marine environment and given the uncertainties of the source the magnitude would be negligible, and as such a **long-term intermittent temporary minor adverse** impact could potentially arise.

Table 8-12: Summary of Impact of Increase in Suspended Sediment Concentrations

<table>
<tr><th colspan="6">Impact Assessment: Increase in Suspended Sediment Concentrations</th></tr>
<tr><td rowspan="2">Impact Nature</td><td colspan="2">Positive</td><td colspan="3">Negative</td></tr>
<tr><td colspan="5">The impact on water quality is negative.</td></tr>
<tr><td rowspan="2">Impact Type</td><td>Direct</td><td>Indirect</td><td colspan="2">Reversible</td><td>Irreversible</td></tr>
<tr><td colspan="5">The impact is direct.</td></tr>
<tr><td rowspan="2">Impact Duration</td><td>Temporary</td><td>Short-term</td><td>Medium-term</td><td>Long-term</td><td>Permanent</td></tr>
<tr><td colspan="5">The impact is temporary because it will only occur if fine sediment is present and on an outgoing tide.</td></tr>
<tr><td rowspan="2">Impact Extent</td><td>Local</td><td>County</td><td>Regional</td><td>National</td><td>International</td></tr>
<tr><td colspan="5">The impact extent is local as any suspended sediments will be carried away rapidly by tidal currents.</td></tr>
</table>

Impact Assessment: Increase in Suspended Sediment Concentrations				
Impact Magnitude	Negligible	Low	Medium	High
	The impact magnitude is low given the temporary and local scale of the impact.			
Receptor Value / Sensitivity	Negligible	Low	Medium	High
	The receptor value is medium (see Table 8-9).			
Impact Significance	Negligible	Minor	Moderate	Major
	The impact significance is minor.			

Mitigation

8.6.6 There are a number of ways the operations team could reduce the possibility of fine material travelling through the breakwater. As discussed above, use of a geotextile would prevent movement of fine material through the structure. If use of a geotextile is not possible, selective placement of larger material adjacent to the breakwater and placement of fines further up the shore could prevent fines from being washed out to sea. Placement of matting over fine material could also provide containment and prevent sediment from moving around as water moves in and out of the structure.

Residual Impact

8.6.7 Implementation of geotextile or site operational procedures would further reduce the magnitude of any potential temporary and intermittent increase in suspended sediments resulting from the mobilisation of fines from the site, such that a residual **negligible impact** is predicted to remain in the long-term.

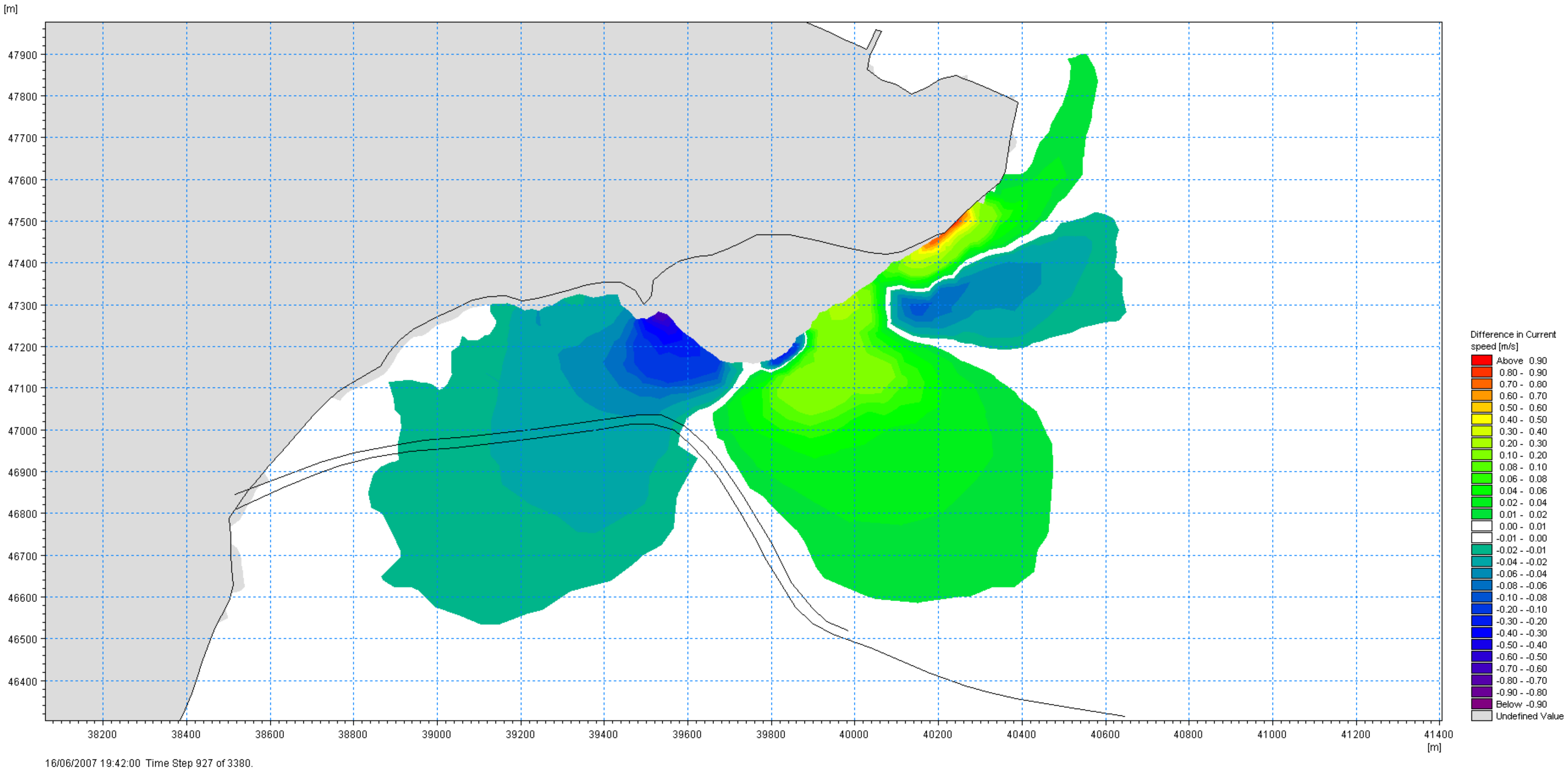
Monitoring

8.6.8 On working days, visual inspections of the water adjacent to the breakwater should be undertaken.

OPERATIONAL IMPACT 8.7: Deterioration in Water Quality due to Long-term Changes in the Hydrodynamic Regime

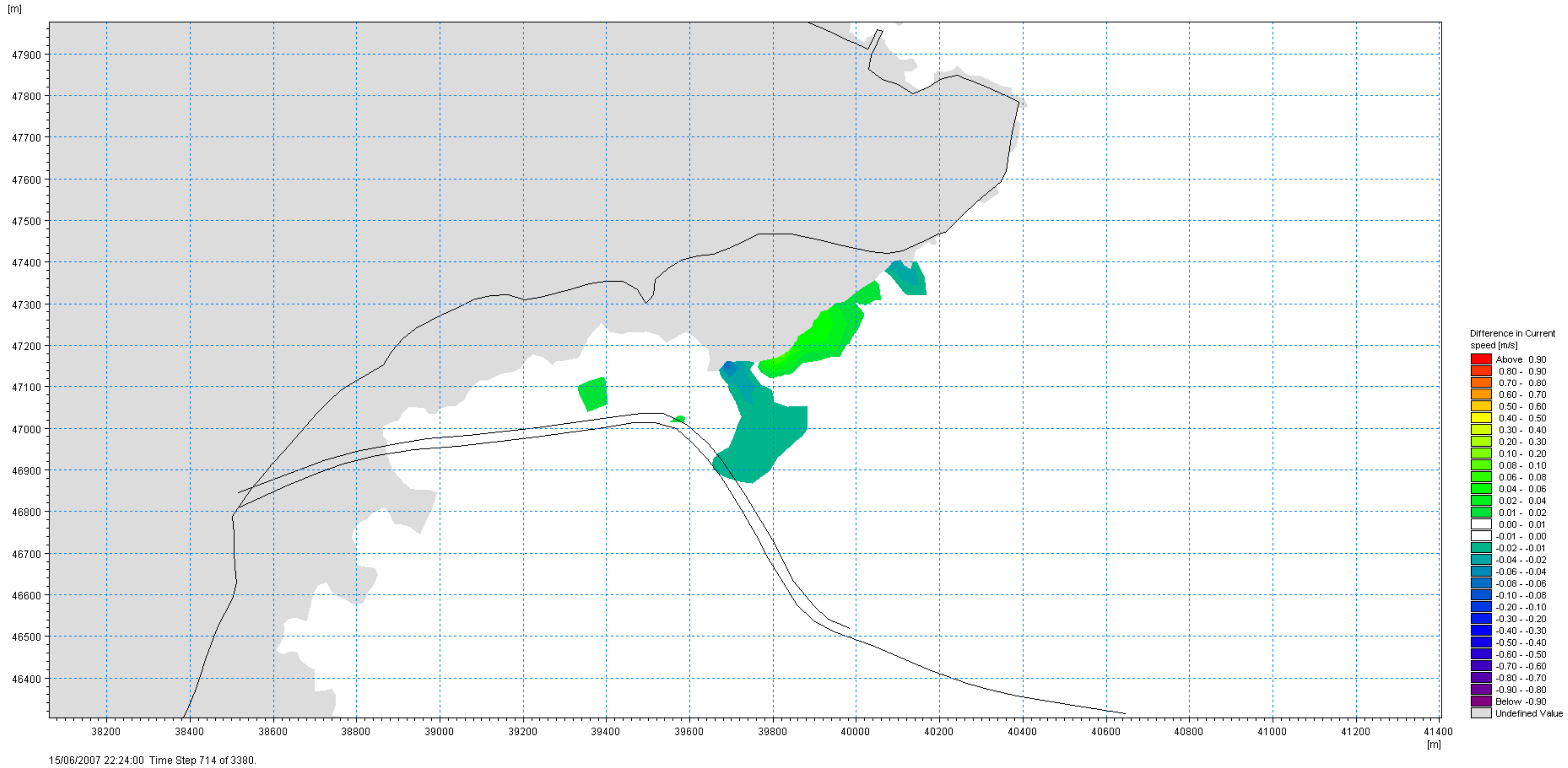
8.6.9 The presence of the proposed Project has the potential to alter the baseline tidal regime thus could potentially affect the dilution afforded by the current position of the Belle Grève Bay long and short sea outfall. To consider this potential effect, modelling has been undertaken (see **Chapter 7 Coastal and Marine Processes** for more detail). The output of the model runs in relation to the long and short sea outfalls are shown in **Figure 8-4** (peak flood tide) and **Figure 8-5** (peak ebb tide).

Figure 8-4 Predicted Changes in Local Tidal Current Velocity Caused by the Presence of the Proposed Project at Peak Flood Tide



Notes: The black lines represent the Belle Grève Bay long and short sea outfalls.

Figure 8-5 Predicted Changes in Local Tidal Current Velocity Caused by the Presence of the Proposed Project at Peak Ebb Tide



Notes: The black lines represent the Belle Grève Bay long and short sea outfalls.

8.6.10 The results show that predicted changes to tidal current velocities are local to the proposed Project. On a peak flood tide, the model predicts two areas of tidal current increase, one adjacent to the proposed Project and one adjacent to the existing inert waste land-claim (**Figure 8-4**). Maximum increases of up to only 0.09m/s (9cm/s) are predicted. Predicted reductions in tidal currents (up to 0.08m/s, 8cm/s) are simulated south of the proposed Project and north of the proposed Project immediately offshore from the predicted tidal current increase at the existing inert waste land-claim.

8.6.11 On a peak ebb tide predicted changes to tidal current velocities local to the proposed Project are less than on a peak flood tide and have a smaller geographical effect (**Figure 8-5**). The predicted changes to tidal current velocities are small compared to the baseline velocities.

8.6.12 The northern part of the Belle Grève Bay is affected by small reductions in tidal current velocity (mainly up to 0.04m/s with higher changes of up to 0.08m/s in a small area immediately south of the proposed Project). There are no changes to predicted tidal current velocities across the Little Russel Channel and at Herm.

8.6.13 Consequently, it is concluded that no change would occur to the dilution currently experienced at the outfall location due to the presence of the proposed Project, and **no impact** is therefore predicted.

OPERATIONAL IMPACT 8.8: Accidental Release of Contaminants

8.6.14 Given that there are no planned solid or liquid contaminant discharges due to the operation of the Project the focus of the assessment is on reducing the risk that such may be released to the environment. The assessment is therefore risk based.

8.6.15 The accidental release of contaminants includes the accidental spill of pollutants or contaminants present in the inert waste material brought to site. However, fuel and lubricant quantities carried in vehicles will be in very small quantities and therefore should a spillage occur, it is likely to be small scale.

8.6.16 Within the inert waste management facility, operational procedures entail inspection of all loads to prevent non-inert waste entering the site. Any non-inert waste entering the site would therefore be of a very small scale to avoid inspection, and carriers of such waste would be aware of the heavy fines for bringing in such material. Consequently, any likely discharges would be highly unlikely and of a very low probability.

8.6.17 However, in both scenarios, emergency response procedures and appropriate equipment such as spill kits will be developed and kept on site respectively as part of the operational procedures. Overall, the risk of accidental pollution impacting on the marine environment is deemed to be **very low**.

8.7 Cumulative Impacts

8.7.1 The marine sediment and water quality impacts that have been assessed for the proposed Project alone are anticipated to result in impacts of minor significance impact. However, there may be potential cumulative effects from interaction of impacts generated by other plans, projects and activities.

8.7.2 The Screening of projects for the potential for cumulative effects is described in **Chapter 5 EIA Methodology** and presented in **Table 5-4** and **Figure 5-2**. Of the developments identified, one has the potential to interact with this development:

- Mont Crevelt Breakwater, Longue Hougue, St. Sampson. Infill of existing temporary opening formed in existing breakwater as part of works for St. Sampson's marina project.

8.7.3 Although the outer boundary of the Mont Crevelt works is 87m from the project boundary, the distance by sea to the gap in the breakwater to be infilled is approximately 800m. Based on the small scale of the works, assuming the filling process will cause similar impacts to those discussed in the above sections, and the pathway of effect (distance at sea) between the two sites there is no possibility for cumulative effects as a result of the two projects.

8.8 Summary

Table 8-13: Summary of Marine Sediment and Water Quality Impacts

Impact	Significance	Mitigation	Residual Impact	Monitoring
Construction				
Deterioration in Water Quality due to Increased Suspended Sediment Concentrations	Minor adverse	None	Minor adverse	None required
Release of Contaminated sediments	Minor adverse	None	Minor adverse	None required

Impact	Significance	Mitigation	Residual Impact	Monitoring
Accidental Release of Contaminants	Low Risk	CEMP required to ensure accidental spills and leaks are reduced as far as possible	Low Risk	Monitoring of adherence to the CEMP will be required
Deterioration in Water Quality due to Changes in Hydrodynamic Regime	See operational phase			
Operation				
Release of Contaminated Sediments	No impact	Not required	No impact	None required
Increase in Suspended Sediment Concentrations	Minor adverse	Use of geotextile, placement of fines away from breakwater	Negligible	Daily visual inspections
Deterioration in Water Quality due to Long-term Changes in the Hydrodynamic Regime	No impact	None	No impact	None required
Accidental Release of Contaminants	Very Low Risk	Site operational procedures and spill kits	Very Low Risk	None required

9 Surface Water and Flooding

9.1 Content and Data

Content

9.1.1 This Environmental Statement (ES) chapter considers the potential impacts of the proposed project on surface water and flood risk. The chapter provides an overview of the existing baseline for the onshore development area, followed by an assessment of the potential impacts and associated mitigation for the construction and operation the proposed project.

Study Area

9.1.2 The study area for consideration of potential surface water and flooding impacts is the risk to the proposed development within the Red Line Boundary (RLB) for the project and any off-site impacts as a result of the project.

Data Sources

9.1.3 The assessment has been informed by a desk-based assessment and review of available data from the States of Guernsey and Guernsey Water, site visits, and consultation with relevant statutory consultees.

9.2 Legislation and Policy Context

9.2.1 The States' legislation relevant to Surface Water and Flooding is provided below:

- The Environmental Pollution (Guernsey) (Amendment) Law, 2015.
- The Environmental Pollution (Guernsey) Law, 2004.
- The Watercourses Ordinance, 1957.
- States Water Supply (Prevention of Pollution) Ordinance, 1966.
- Sewerage (Guernsey) Law, 1974.
- Part III of the Food and Environment Protection Act 1985 as extended to Guernsey with modifications.
- The Water Byelaws (Guernsey) Ordinance, 2003.

9.2.2 A summary of policy relevant to Surface Water and Flooding is provided below:

- **The Island Development Plan** highlights that the possibility of flooding should be considered on a case by case basis for new developments. Resilience to climate change and flooding should be included in the design and development process. Regard should be paid to the recommendations of the Guernsey Coastal Defence Flood studies and approved strategy, 2013 (Billet d'Etat XV, July 2013).
- IP10: Coastal Defences states "*Proposals for new or replacement coastal defences will be considered against Policy S5: Development of Strategic Importance.*"
- Policy S5 allows developments to occur in areas that conflict with the Spatial Policy or "*other specific policies of the Island Development Plan where developments clearly demonstrate to be in the interest of health, wellbeing, safety or security of the community or otherwise in the public interest*."
- **The Island Development Plan Environmental Statement** lists climate change, including coastal flooding as a threat. It also lists 'Located in a 1:100 flood risk area?' as a site-specific assessment criteria for developments.
- **Coastal Defence and Beach Management Strategy** was produced in in 2007 by the States' and highlighted the key issues for coastal management around Guernsey.
- **Coastal Defence Flood Risk Assessment Studies** reviews the areas that may be vulnerable to flood risk due to predicted sea level rise associated with climate change.

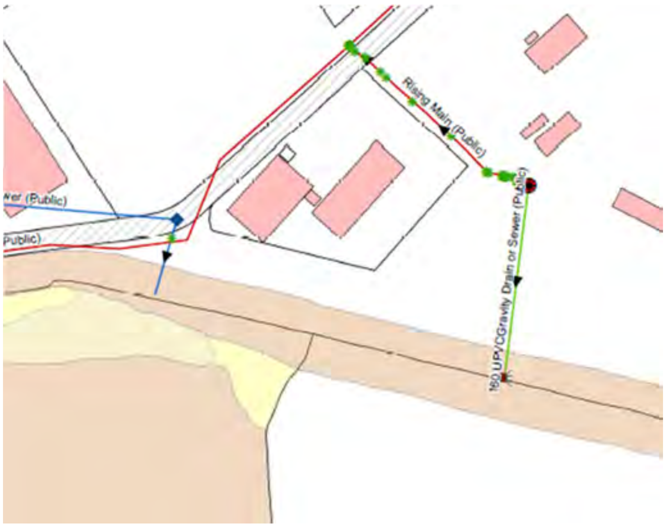
9.2.3 The following guidelines were used to direct this assessment. Although these are UK guidance documents, the relevant principles from them as stated are also considered in this assessment as part of good practice:

- National Policy: National Planning Policy Framework (2018) and National Planning Practice Guidance.
- The National Planning Practice Guidance (NPPG) on Flood Risk and Coastal Change.
- Flood and Water Management Act 2010 (FWMA).
- The Water Framework Directive (WFD).
- The Priority Substances Directive.
- Urban Waste Water Treatment Directive.

9.3 Baseline

9.3.1 There are no named rivers on Guernsey, although there are a series of land drains / ditches / streams that collect water from small catchments across the island. As the development site is located within an urban area there are no watercourses near the site. There are no drains / ditches within 500m of the site, therefore drainage is either through infiltration through the surface to underlying substrates or through run-off to highway drains.

9.3.2 Guernsey Water have identified that a gravity fed public sewer overlow discharges close to that from the Household Waste Recycling Plant, and a surface water drain from a catchment around the Longue Hougue Lane area also discharges to the west of the Waste Transfer Station via an outfall.

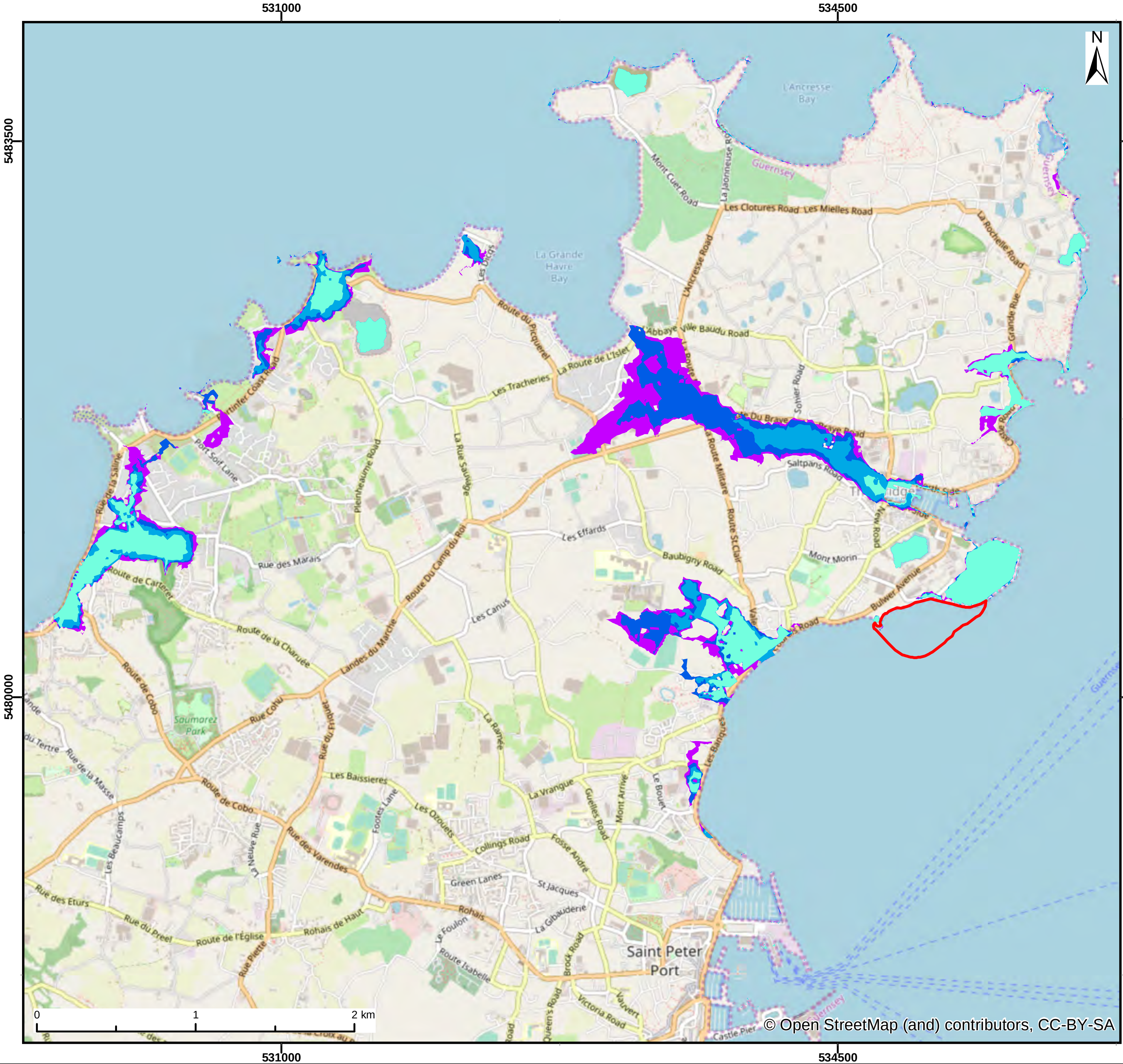


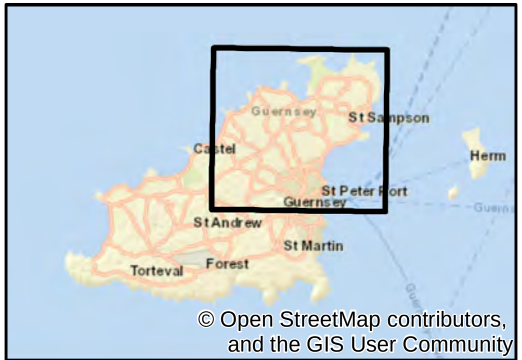
9.3.3 The hardstanding of the new Waste Treatment Facility Plant at Longue Hougue drains to a soakaway, which if its capacity is exceeded, then discharges via an outfall into the Longue Hougue South area.

9.3.4 Information from site investigations for the adjacent reclaimed Longue Hougue site indicates that groundwater is found adjacent to the site, as it ingresses from the sea and flows west to east through the porous St. Peter Port Gabbro bedrock (Amec Foster Wheeler, 2015).

9.3.5 Approximately 300m to the north-west of the site lies Longue Hougue Reservoir, which was flooded by Guernsey Water, after previously being mined as a quarry for St. Peter Port Gabbro bedrock (Amec Foster Wheeler, 2015). The quarry is currently being used as a potable drinking water source and has a maximum depth of 67m (Amec Foster Wheeler, 2015). The Longue Hougue Reservoir is the largest water resource on Guernsey and has a capacity of 1,159 million litres.

9.3.6 Guernsey was recorded as subject to the risk of coastal flooding during flood events with return periods of 1 in 10 years and above (Royal HaskoningDHV, 2012). The seven identified areas at risk during a 1 in 10 year coastal flooding event are shown in **Figure 9-1**. The order of priority for capital works (as agreed by the States of Guernsey in 2013) are St. Sampson’s Harbour area, Belle Grève Bay area, Cobo and Saline Bay, Baie de Port Grat and Pequeries area, Bordeaux Harbour area, Rocquaine and L’Eree area, and Pembroke Bay area.





Legend:

Outline of Proposed Development

Flood Extent

- 1 in 10 year event
- 1 in 50 year event
- 1 in 100 year event
- 1 in 250 year event

Client:	Project:
States of Guernsey	Longue Hougue South EIA

Title: Flood Risk Areas

Figure: 9.1 | Drawing No: PB5312-300-028

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	17/07/2019	FC	PT	A4	1:35,000

Co-ordinate system: WGS 1984 UTM Zone 30N

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9.3.7 The potential effects of flooding events with different return periods at each of these flood risk areas are summarised in **Table 9-1**.

Table 9-1: Coastal Flood Risk Within Guernsey (Royal HaskoningDHV, 2012)

Flood risk area	No. of properties at risk by return period				Additional assets at risk
	1 in 10	1 in 50	1 in 100	1 in 250	
St. Sampson's Harbour area	2	124	246	355	Risk of flooding of the Harbour area and local road network
Belle Grève Bay area	235	378	461	513	Risk to main coastal road
Cobo and Saline Bay	124	154	181	265	Risk to main coastal road
Baie de Port Grat and Pequeries area	10	48	75	110	Risk to life from sudden failure of flood defence
Bordeaux Harbour area	27	44	50	66	Risk of flooding of the local road network
Rocquaine and L'Eree area	9	17	20	24	Risk to main coastal road
Pembroke Bay area	A single commercial building is at risk at this location				

9.3.8 Longue Hougue South sits in between the St Sampson's Harbour and Belle Grève Bay areas. The site boundary is not predicted to be at risk from 1:10, 1:50, 1:100 or 1:250 year flood events. Two future flood risk scenarios were considered in the Guernsey Flood Risk Assessment (Royal Haskoning, 2012). These scenarios predict the areas that may be affected by a 1:250 flood event with predicted future sea level rise for different epochs. Epoch 1 covers the next 12 years (to year 2031), epoch 2 over the following 30 years (to year 2061), and epoch 3 covers the following 50 years (to year 2111). The first scenario considered 'Scenario 3' was described as the worst case for the East Coast with both extreme water levels and waves coming in from the east. The second scenario considered in the study 'Scenario 2' was the worst case for the west coast, with flooding occurring due to wave overtopping and direct water level flooding. Both scenarios assumed no improvements to current flood defences.

9.3.9 In Scenario 3, the current Longue Hougue Site is shown as susceptible to flooding from a 1:250 year flood event in in the next 12 years, and the land situated behind the proposed development is at risk from a 1:250 year flooding event between 2021 and 2061. In Scenario 2, the land surrounding the proposed development is only at risk from a 1:250 year flooding event between 2061 and 2111 (**Figure 9-2** and **Figure 9-3**).

9.4 Methodology for EIA

9.4.1 **Chapter 5 EIA Methodology** provides a summary of the general impact assessment method, and the following sections describe the methodology used to assess the potential impacts of the proposed project on water resources and flood risk in more detail.

9.4.2 Two key groups of impacts have been identified for defining impact significance:

- Water resources: these are potential effects on the physical (including hydrology and geomorphology), biological or chemical character of surface waters or groundwater, potentially impacting on secondary receptors such as wetlands or abstractions, and water body quality; and
- Flood risk: these are the potential impacts to the proposed project from flooding and as a result of the proposed project on site drainage, conveyance and surface water flooding.

9.4.3 Whilst there are clear links between the two impact groups, the assessment of receptor sensitivity and the magnitude of effect may differ.

Sensitivity

9.4.4 Receptor sensitivity has been defined with reference to the adaptability, tolerance, recoverability and value of individual receptors. **Table 9-2** provides the criteria for appraisal of the value and sensitivity for identified water resources and flood risk receptors based on professional judgement and best practice UK guidance.

Figure 9-2 Future Flood Risk Predicted in Scenario 3 of the Guernsey Flood Risk Assessment (Royal Haskoning, 2012)

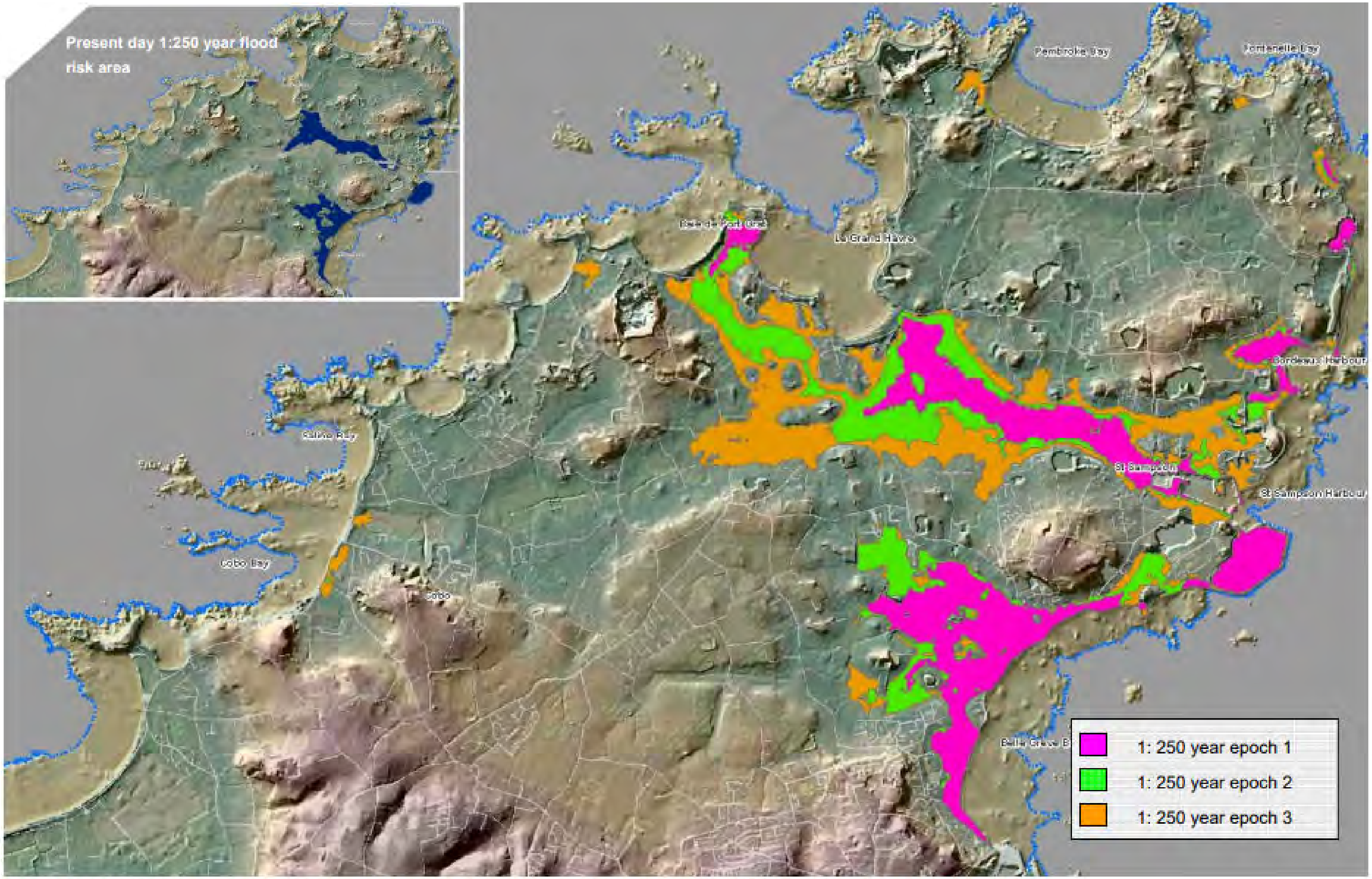


Figure 4.7. Flood Risk Areas Scenario 3 – 1:250 year return period by Epoch (epoch 1 - 2031, epoch 2 – 2061, epoch 3 – 2111)

Figure 9-3 Future Flood Risk Predicted in Scenario 2 of the Guernsey Flood Risk Assessment (Royal Haskoning, 2012)

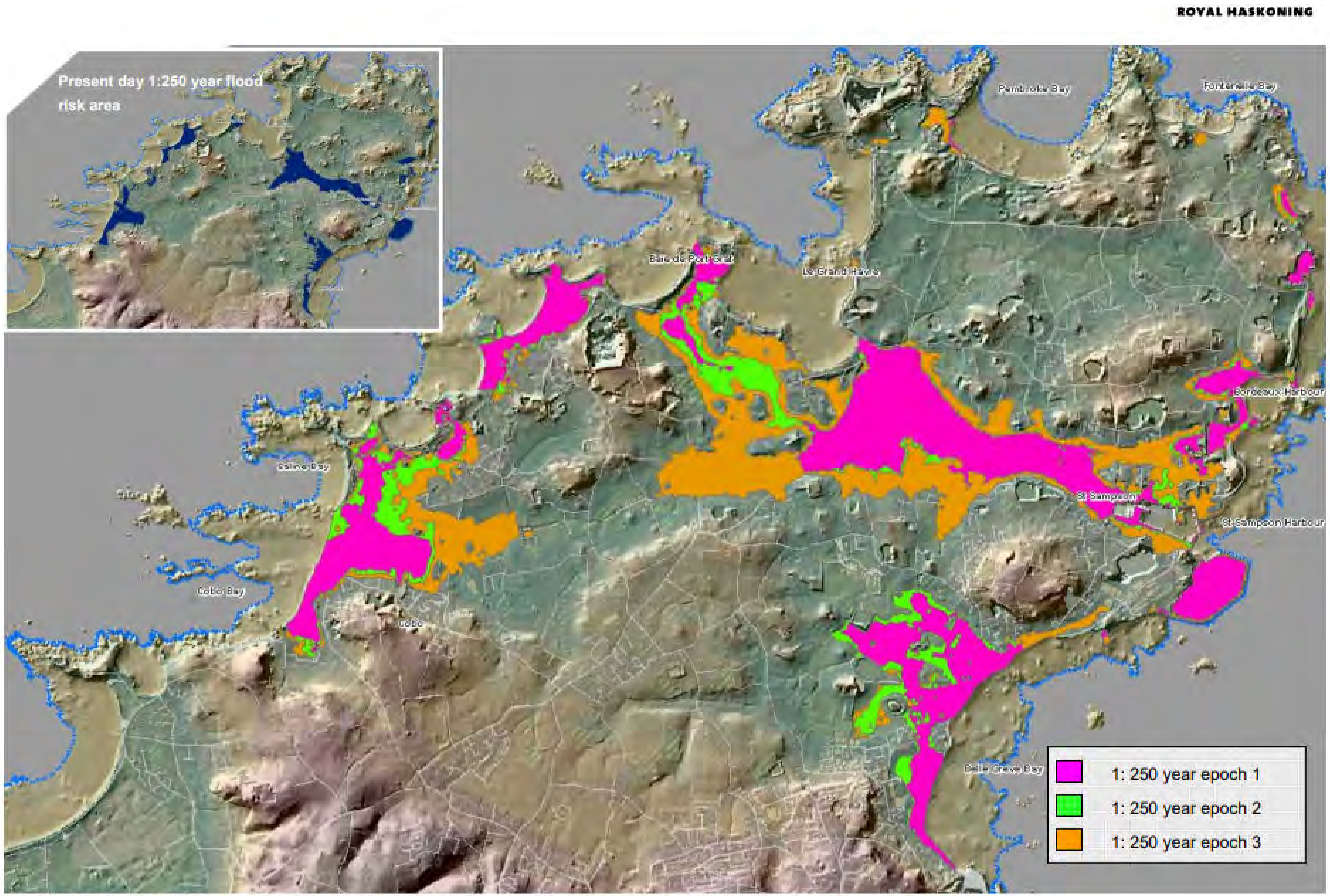


Figure 4.8. Flood Risk Areas Scenario 2 – 1:250 year return period by Epoch (epoch 1 - 2031, epoch 2 – 2061, epoch 3 – 2111)

Table 9-2: Definitions of the Different Sensitivity Levels for Water Resources and Flood Risk Receptors

Sensitivity	Definition
High	Receptor has very limited capacity to tolerate changes to hydrology, geomorphology, and water quality or flood risk. **Water resources** Controlled waters with an unmodified, naturally diverse hydrological regime, a naturally diverse geomorphology with no barriers to the operation of natural processes, and good water quality. Supports habitats or species that are highly sensitive to changes in surface hydrology, geomorphology or water quality. Supports Aquifer with public water supply abstractions by provision of recharge. **Flood risk** Highly Vulnerable Land Use and More Vulnerable Land Use, as defined by NPPF PPG (Department for Communities and Local Government (DCLG) 2015). Land with more than 100 residential properties (after Design Manual for Roads and Bridges (DMRB) 2009).
Medium	Receptor has limited capacity to tolerate changes to hydrology, geomorphology, and water quality or flood risk. **Water resources** Controlled waters with hydrology that sustains natural variations, geomorphology that sustains natural processes, and water quality that is not contaminated to the extent that habitat quality is constrained. Supports or contributes to habitats or species that are sensitive to changes in surface hydrology, geomorphology and/or water quality. Public water supply abstractions. **Flood risk** Less Vulnerable Land Use, as defined by NPPF PPG (DCLG 2015). Land with between 1 and 100 residential properties or more than 10 industrial premises (after DMRB 2009).

Sensitivity	Definition
Low	Receptor has moderate capacity to tolerate changes to hydrology, geomorphology, and water quality or flood risk. **Water resources** Controlled waters with hydrology that supports limited natural variations, geomorphology that supports limited natural processes and water quality that may constrain some ecological communities. Supports or contributes to habitats that are not sensitive to changes in surface hydrology, geomorphology or water quality. **Flood risk** Water Compatible Land Use (including a built element), as defined by NPPF PPG (DCLG 2015). Land with 10 or fewer industrial properties (after DMRB 2009).
Negligible	Receptor is generally tolerant of changes to hydrology, geomorphology, and water quality or flood risk. **Water resources** Controlled waters with hydrology that does not support natural variations, geomorphology that does not support natural processes and water quality that constrains ecological communities. Aquatic or water-dependent habitats and/or species are tolerant to changes in hydrology, geomorphology or water quality. Non-productive strata that does not support groundwater resources. **Flood risk** Water Compatible Land Use (not including any built element), as defined by NPPF PPG (DCLG 2015). Land with limited constraints and a low probability of flooding of residential and industrial properties (after DMRB 2009).

Value

9.4.5 It should be noted that high value and high sensitivity are not necessarily linked with respect to a particular impact. A receptor could be of high value but have a low sensitivity to an effect. It is therefore important not to inflate the significance of an impact due to the value of the receptor. Instead, the value can be used as a modifier for the sensitivity assigned to the receptor. Definitions for the value of water resources and flood risk receptors are provided in **Table 9-3**.

Table 9-3: Definitions of the Value Levels for Water Resources and Flood Risk Receptors

Value	Definition
High	Receptor is an internationally important resource with limited potential for offsetting / compensation. **Water resources** Supports or contributes to designated habitats or species of international or national importance. Licensed and unlicensed potable abstractions (surface water and groundwater). **Flood risk** Nationally significant infrastructure. Internationally or nationally designated planning policy areas.
Medium	Receptor is a nationally important resource with limited potential for offsetting / compensation. **Water resources** Supports or contributes to habitats or species of national value such as Site of Special Significance (SSS), Areas of Biodiversity Importance (ABI), known Geological Sites. Licensed non-potable abstractions (surface water and groundwater). **Flood risk** “Locally significant infrastructure”. Local planning policy designated sites.
Low	Receptor is a locally important resource. **Water resources** Supports or contributes to habitats or species of local value (e.g. La Société Guernesiaise Nature Reserve). Unlicensed non-potable abstractions (surface water and groundwater). **Flood risk** Drainage that does not discharge to areas with known drainage problems.
Negligible	Receptor is not considered to be an important resource. **Water resources** Does not support or contribute to habitats or species of particular importance. No abstractions (surface water and groundwater). **Flood risk** No significant infrastructure.

Magnitude

9.4.6 Receptor magnitude has been defined with reference to the spatial extent, duration, frequency and severity of the effect. The impact magnitude is defined in **Table 9-4**.

Table 9-4: Definitions of the Magnitude Levels for Water Resources and Flood Risk Receptors

Magnitude	Definition
High	Fundamental, permanent / irreversible changes, over the whole receptor, and / or fundamental alteration to key characteristics or features of the particular receptors character or distinctiveness. **Water resources** Permanent changes to geomorphology and/or hydrology that prevent natural processes operating. Permanent and/or wide scale effects on water quality or availability. Permanent loss or long-term (>5 years) degradation of a water supply source resulting in prosecution. Permanent or wide scale degradation of habitat quality. **Flood risk** Permanent or major change to existing flood risk. Reduction in on-site flood risk by raising ground level in conjunction with provision of compensation storage. Increase in off-site flood risk due to raising ground levels without provision of compensation storage. Failure to meet either sequential or exception test (if applicable).
Medium	Considerable, permanent / irreversible changes, over the majority of the receptor, and / or discernible alteration to key characteristics or features of the particular receptors character or distinctiveness. **Water resources** Medium-term (1-5 years) effects on water quality or availability. Medium-term (1-5 years) degradation of a water supply source, possibly resulting in prosecution. Habitat change over the medium-term (1-5 years). **Flood risk** Medium-term (1-5 years) or moderate change to existing flood risk. Possible failure of sequential or exception test (if applicable). Reduction in off-site flood risk within the local area due to the provision of a managed drainage system.

Magnitude	Definition
Low	Discernible, temporary (throughout project duration) change, over a minority of the receptor, and / or limited but discernible alteration to key characteristics or features of the particular receptors character or distinctiveness. **Water resources** Short-term (<1 year) or local effects on water quality or availability. Short-term (<1 year) degradation of a water supply source. Habitat change over the short-term. **Flood risk** Short-term (<1 year), temporary or minor change to existing flood risk. Localised increase in on-site or off-site flood risk due to increase in impermeable area. Passing of sequential and exception test.
Negligible	Discernible, temporary (for part of the proposed project duration) change, or barely discernible change for any length of time, over a small area of the receptor, and/or slight alteration to key characteristics or features of the particular receptors character or distinctiveness. **Water resources** Intermittent (short-term) impact on local water quality or availability. Intermittent (short-term) or no degradation of a water supply source. Very slight local changes to habitat that have no observable impact on dependent receptors. **Flood risk** Intermittent or very minor change (short-term) to existing flood risk. Highly localised increase in on-site or off-site flood risk due to increase in impermeable area.

Impact Significance

9.4.7 The potential significance of an impact is a function of the sensitivity and value of the receptor and the magnitude of the effect (noting that value and sensitivity are not necessarily linked).

9.4.8 The significance is derived using an impact significance matrix, as shown in **Table 9-5**. Definitions of each level of significance are provided in **Table 9-6**.

9.4.9 Assessment of impact significance is qualitative and reliant on professional experience, interpretation and judgement. The matrix should therefore be viewed as a framework to aid understanding of how a judgement has been reached, rather than as a prescriptive, formulaic tool. Note, impacts may be adverse or beneficial.

Table 9-5: Impact Significance Matrix

		Magnitude			
		High	**Medium**	**Low**	**Negligible**
Value / Sensitivity	**High**	Major	Major	Moderate	Minor
	Medium	Major	Moderate	Minor	Minor
	Low	Moderate	Minor	Minor	Negligible
	Negligible	Minor	Negligible	Negligible	Negligible

Table 9-6: Impact Significance Definitions

Significance	Definition
Major	Very large or large change in receptor condition, both adverse or beneficial, which are likely to be important considerations at a regional or district level because they contribute to achieving national, regional or local objectives, or, could result in exceedance of statutory objectives and / or breaches of legislation.
Moderate	Intermediate change in receptor condition, which are likely to be important considerations at a local level.
Minor	Small change in receptor condition, which may be raised as local issues but are unlikely to be important in the decision-making process.
Negligible	No discernible change in receptor condition.
No change	No impact, therefore no change in receptor condition.

9.4.10 Effects that result in major or moderate impacts are considered to be ‘significant’ in EIA terms. Adverse significant impacts may require mitigation; beneficial significant impacts could contribute to the case in favour of the proposed project.

9.4.11 Following initial assessment, if the impact does not require additional mitigation (or none is possible) the residual impact will remain the same. If, however, additional mitigation is proposed there will be an assessment of the post-mitigation residual impact.

Receptors

9.4.12 The sensitivity of each surface water receptor has been defined based on the geomorphological (i.e. physical habitat), hydrological and water quality characteristics. The value has been defined with reference to the ecological value of the receptors and any connected habitats, including the presence of designated sites. The value of this receptor is defined in **Table 9-7**.

Table 9-7: Value / Sensitivity of Receptors

Receptor	Value / Sensitivity	Justification
Marine water	High Sensitivity High Value	Receptor is an internationally or nationally important resource with limited potential for offsetting / compensation. Supports or contributes to designated habitats or species of international or national importance.
Surface waterbody	Low Sensitivity Low Value	Non-productive strata that does not support groundwater resources. Land with 10 or fewer industrial properties (after DMRB 2009). Unlicensed non-potable abstractions (surface water and groundwater). Drainage that does not discharge to areas known for drainage issues.
Infrastructure and property within the site	Low Sensitivity Medium Value	Water Compatible Land Use (including a built element), as defined by NPPF PPG (DCLG 2015). Land with 10 or fewer industrial properties (after DMRB 2009).
Infrastructure and properties adjacent to the site	Medium Sensitivity Medium Value	Less Vulnerable Land Use, as defined by NPPF PPG (DCLG 2015). Land with between 1 and 100 residential properties or more than 10 industrial premises (after DMRB 2009).

9.5 Impacts During Construction

CONSTRUCTION IMPACT 9.1: Pollution of Marine Waterbody due to Accidental Release of Fuels, Oils, Lubricants and Construction Materials

9.5.1 As with all construction projects, there is a risk of accidental pollution events resulting in a degradation of water quality. This could be a direct impact if pollutants are released straight into the marine environment, or indirect if a spill occurs and pollutants reach the marine environment following precipitation. The magnitude of this impact will be reduced through the use of good practice techniques and procedures by the appointed contractor throughout all construction activities. These will be secured through commitment to a Marine Contingency Pollution Plan, to be developed by the Contractor prior to the commencement of construction, and which will be approved by States of Guernsey Planning Department. This commitment ensures the use of appropriate preventative measures and serves as mitigation against all types of pollution incidents. The impact of pollution of marine water quality has been assessed in **Chapter 8 Marine Sediment and Water Quality**.

9.6 Impacts During Operation

CONSTRUCTION IMPACT 9.2: Increased Surface (Pluvial) Water Run-off and Risk of Flooding

9.6.1 The operational site has the potential to alter surface water flows and drainage patterns by altering existing flow paths and changing the distribution of surface drainage through changes to the ground surface.

9.6.2 Any changes in surface flows could increase flood risk to the project as well as within the onshore development area, particularly to third party land and property in areas within flood risk areas. Changes in surface water flows could also increase flood risk in areas not predicted to be at risk in **Figure 9-1**, such as Bulwer Avenue and residential and industrial properties surrounding the proposed development.

9.6.3 The operational phase of site will comprise the gradual infilling of loosely packed inert material. During infilling the site will be highly porous (with areas of open water connected to the sea by percolation through the breakwater) and the proposed development will provide little or no obstruction to surface water run-off.

9.6.4 There is only a limited potential for localised and short-term pooling of rain water on the site and water will infiltrate the surface layers and into the open water where it would then discharge through the permeable breakwater to the sea (impacts on marine water quality are assessed in **Chapter 8 Marine Sediment and Water Quality**).

9.6.5 The construction of the breakwater would enclose an area of sea into which the surface water drainage discharge outfall from the new Waste Transfer Station discharges. Initially there would be no change as the discharge would still occur unobstructed, however, over time, infinfilling works could cause the obstruction or damage to these outfalls and subsequent backing up of surface water drains in and around the Household Waste Recycling Plant and/or around the Longue Hougue Lane area, and even overflow sewerage discharges in the Longue Hougue area. This could result in flooding and disacharge of combined sewerage.

9.6.6 On the Longue Hougue South site itself there is no intention for hard standing to be installed across any areas under the current proposal. Therefore, any surface water would infiltrate through the surface layers or run-off into the open water and out to sea through the permeable breakwater.

9.6.7 Overall, during operation the site does not present an impact to the surface water body or increased flood risk to infrastructure and property within the site and infrastructure and properties adjacent to the site, with the exception of that posed by the damage and blockage to the surface water outfall for the Waste Transfer Station and associated facilities. The subsequent flooding could result in an intermittent **major adverse impact** (**Table 9-8**).

Table 9-8: Assessment of Potential for Increased Surface Run-off

Receptor	Value/ Sensitivity	Magnitude	Significance
Surface waterbody	Low Sensitivity Low Value	None	No impact
Infrastructure and property within the site	Low Sensitivity Medium Value	None	No impact
Infrastructure and properties adjacent to the site	Medium Sensitivity Medium Value	High	Major adverse

9.6.8 If surface water run-off were to enter the marine environment there is potential for debris, suspended solids or chemicals from the site to be washed into the sea. This debris could cause an adverse effect on marine organisms or humans if high enough concentrations. This is assessed in **Chapter 8 Marine Sediment and Water Quality**.

Mitigation Measures

9.6.9 The site Operational Plan will need to develop an approach to ensuring the protection to the outfall from the new Waste Transfer Station to ensure it remains unblocked. This may entail a fenced / exclusion area for a period of time alongside management of infilling stages. At some point the outfall will either need to be extended or re-routed, either during the construction phase to discharge out through the new breakwater, or after a period of a few years of infilling (to be determined by the Operational approaches and rate of infill).

Residual Impact

9.6.10 The successful protection to and/or diversion / extension to the outfall will result in no potential for blockage and flooding of the areas drained by the outfall and therefore **no residual impact** would arise.

CONSTRUCTION IMPACT 9.3: Reduced Flood Risk

9.6.11 The proposed development will build upon the existing defences along the frontage. This will provide a positive impact through the raising of the current coastal defences. Both infrastructure and property within the site as well as infrastructure and properties adjacent to the site which are shown to be at risk in **Figure 9-2**. The breakwater itself is an embedded mitigation measure that will reduce flood risk to these receptors therefore the magnitude of the impact is considered to be **low beneficial**. The significance of the impact for each receptor is provided in **Table 9-9**.

Table 9-9: Assessment of Reduced Flood Risk

Receptor	Value/ Sensitivity	Magnitude	Significance
Surface waterbody	Low Sensitivity Low Value	Beneficial Low	Beneficial Minor
Infrastructure and property within the site	Low Sensitivity Medium Value	Beneficial Low	Beneficial Minor
Infrastructure and properties adjacent to the site	Medium Sensitivity Medium Value	Beneficial Low	Beneficial Minor

9.7 Summary

Table 9-10: Summary of Impacts of Surface Water and Flooding

Impact	Receptor	Significance	Mitigation	Residual Impact	Monitoring
Pollution of Surface Waterbody due to Accidental Release of Fuels, Oils, Lubricants and Construction Materials	See **Chapter 8 Marine Sediment and Water Quality**.				
Increased surface run-off and risk of flooding	Surface waterbody	No impact	None required	No impact	None required
	Infrastructure and property within the site	No impact	None required	No impact	None required
	Infrastructure and properties adjacent to the site	Major adverse	Diversion or protection to WTS outfall	No impact	None required
Reduced Flood Risk	Surface waterbody	Minor positive impact	None required	None	None required
	Infrastructure and property within the site				
	Infrastructure and properties adjacent to the site				

10 Land Use, Land Quality, Soil Quality, Geology and Hydrogeology

10.1 Introduction

10.1.1 This Chapter of the Environmental Statement (ES) describes the anticipated existing environment in relation to land use, land quality, soil quality, geology, hydrology and hydrogeology, and then considers how alterations to the baseline environment as result of the construction and operation of the Project will impact sensitive receptors. Mitigation measures are described, and a discussion of the residual impacts provided where significant impacts are identified.

Study Area

10.1.2 The study area for land use, land quality, and hydrogeology will include the Longue Hougue South site plus an onshore buffer of 250m. This is in line with guidance on setting the appropriate distance to consider off-site features during the hazard identification stage, of contaminated land assessment (National House Builders Council, 2008). The rationale for the study area is therefore based on professional judgement and takes into consideration the spatial extent across which potential hazards could have unacceptable risks from and cause to the Proposed Development.

10.1.3 The study area for geology (as a designation) only includes the land being considered for the proposed development. This is based on the rationale that these receptors will only be potentially affected by activities taking place within the footprint of the receptor.

Data Sources

10.1.4 The data sources outlined in **Table 10-1** were utilised to complete this assessment.

Table 10-1: Data Sources Used to Compile Baseline Environment

Name	Author / Year
Island Development Plan	State of Guernsey [Accessed 2019a]
Digimap Guernsey – Environmental, water, historical mapping	State of Guernsey [Accessed: 2019b]
The Soil and Land Evaluation of Guernsey Report	Commerce and Employment Department, State of Guernsey (2010)

Name	Author / Year
Guernsey Energy from Waste Plant, Ground Investigation Interpretative Report	Mott McDonald (2004)

Assumptions and Limitations of Data

10.1.5 The assessment was informed by a desk-based review of available data from States of Guernsey and consultation with relevant statutory consultees only; though some desk-based sources were from investigative surveys previously carried out in the study area.

10.1.6 The direct assessments and judgements given in this report are limited by both the finite data on which they are based and the proposed works to which they are addressed. The report has utilised a variety of publicly available data sources therefore the study is limited by the age and limitations inherent in the data. The acquisition of data is also constrained by both physical and economic factors and by definition is subject to the limitations imposed by the methods of investigations employed.

10.1.7 Conditions at the site will change over time due to natural variations and may be affected by human activities. In particular, groundwater, surface water and soil gas conditions should be anticipated to change with diurnal, seasonal and meteorological variations. Soil and water chemistry may change due to the actions of, for example, groundwater flows and microbiological activity. The likely variations in the data with time can be assessed following extended periods of measurement and statistical analyses. Unless specifically discussed in the text such extended measurement and analysis have not been carried out and the data collected are taken to be representative.

10.1.8 The opinions included herein are based on the information obtained from the published information, investigations undertaken at the site and professional experience.

10.2 Legislation and Policy Context

10.2.1 This section summarises the relevant States of Guernsey legislative requirements relevant to Land Quality, Soil Quality, Geology and Hydrogeology. More details on legislative and policy context of the Proposed Development can be found in **Chapter 2 Planning, Policy and Legislative Context**.

Legislation

10.2.2 This section summarises the relevant States of Guernsey policies and how they recommend Laud Use, Land Quality, Soil Quality, Geology and Hydrogeology are considered during the land use planning process. More details on the EIA legislation can be found in **Chapter 2 Planning, Policy and Legislative Context**.

10.2.3 The State of Guernsey has no direct legislation relating to Land Quality and the assessment of contaminated land or on the protection of geological sites. However, the relevant legislative context for Land Use, Soil Quality, Geology, and Hydrogeology are:

- The Environmental Pollution (waste control and disposal) ordinance – 2010;
- The Environmental Pollution (Guernsey) – 2004;
- The (Guernsey) building regulations – 2012;
- The Land Planning and Development (Guernsey) Law – 2005; and
- The Island Development Plan - Policy GP17 Public Safety and Hazardous Development.

10.2.4 The Environmental Pollution (waste control and disposal) ordinance, 2010 controls the management and disposal of wastes. The relevant requirement of the ordinance is the outlined Duty of Care and licencing regime for the disposal of waste materials. The key requirements of the legislation are that persons shall not:

- deposit any waste, or knowingly cause or permit any waste to be deposited in or on any land unless that land is part of a licensed waste site, and the deposit is in accordance with the licence granted by the Director under Part III of the Law in respect of that site;
- treat, keep or dispose of any waste, or knowingly cause or permit any waste to be treated, kept or disposed of in or on any land, or by means of any mobile plant, except under and in accordance with a licence granted by the Director under Part III of the Law, or
- treat, keep or dispose of any waste in a manner likely to cause environmental pollution.

10.2.5 The Environmental Pollution (Guernsey) Law outlined the requirement to protect and enhance the environment by preventing and controlling pollution. This law aims to ensure activities which may give risk to pollution are only carried out in the interest of the community and are carried out using best available techniques for eliminating or reducing any risks identified. The law outlined in different sections the environmental factors (waste, air pollution, water pollution, sound pollution) that need to be considered. No specific contaminated land assessment is required; however, the legal requirement for the management of waste material and protection of water are considered to be the provision for this assessment under the law, so adequate assessment of potentially contaminated land will be required.

10.2.6 The Building (Guernsey) Regulations require the consideration of preparation of the site against pollution and contamination. The requirements for this assessment are considered in relation to the relevant guidance outlined below.

Policy and Guidance

10.2.7 This section summarises the relevant States of Guernsey policies and how they recommend Land Use, Land Quality, Soil Quality, Geology, and Hydrogeology are considered during the land use planning process. More details on each of these policies can be found in **Chapter 2 Planning, Policy and Legislative Context**.

Guernsey Technical Standards

10.2.8 The Development & Planning Authority (DPA) of the State of Guernsey has provided technical guidance to support developers in the compliance with The Building (Guernsey) Regulations (2012). The guidance of most relevance to this chapter is Guernsey Technical Standard C (C1 and C2) “Site preparation and resistance to contaminants and moisture” (DPA, 2016). This section addresses the compliance requirement of regulation 11 of the Building (Guernsey) Regulations.

Contaminated Land Guidance

10.2.9 The Office of Environment Health and Pollution Regulation (OEHPR) have set out guidelines on the assessment of contaminated land during planning applications (OEHPR, 2017). This guidance sets out the key questions a developer should consider identifying the need to further assessment. This assessment of potentially contaminated sites includes an assessment of, the known history of the site, the site past historical use, and the proposed future end-use of the site. The guidance sets out a phased approach to the assessment of potentially contaminated land, including a desktop study, site walkover and initial risk assessment be undertaken in order to identify the possibility of significant risk from potentially contaminated land. This document signposts to UK Government Technical Guidance on Land Contamination (Environment Agency, 2016) as a basis of further guidance on the assessment of potentially contaminated land.

10.2.10 The following UK best practice is relevant for consideration:

- UK Department of Environment (DoE) Industrial Profiles;
- BS 10175:2011+A2:2017–Investigation of potentially contaminated sites.

Code of practice; and

- Environment Agency (2019) Contaminated Land: Risk Management Guidance – This guidance is based on Environment Agency (2004) Model Procedures for the Management of Land Contamination, Contaminated Land Report 11 (CLR11). These guidance documents represent the current UK best practice guidance for the management of contaminated sites.

Control of Asbestos

10.2.11 The State of Guernsey Health and Safety Executive sets out guidance on the management and control of asbestos for workplaces, building and structures (State of Guernsey, 2013). The control of asbestos guidance is aimed at providing a code of practice for employees to comply with Health and Safety at Work (General) (Guernsey) Ordinance, 1987.

Organisation and Management of Health and Safety in Construction

10.2.12 The State of Guernsey building control guidance outlines the appropriate consideration which should be made during construction projects to ensure health and Safety.

10.3 Baseline

Site Setting

10.3.1 The Project Site is located in an area of intertidal and subtidal (marine) habitat that is located seaward of the frontage running from Spur Point to the existing Longue Hougue Facility in Belle Grève Bay. Inland of the site are residential and amenity land uses along half of the landward frontage, whilst the remainder comprises industrial land uses comprising a rendering plant, boat yards petroleum and chemical storage facilities. This area of the coastline has historically been reclaimed since the 1800s (see 1746 Admiralty Map (National Maritime Museum, Greenwich, London) and the Ordnance Survey 1933 map), with the current reclamation starting in the 1980's. The frontage along the access road and industrial areas have all been historically reclaimed / infilled, with the exception of the area of residential. However, earlier reclamation may also have been undertaken but is not evidenced in the limited historic mapping of the area. The existing Longue Hougue Waste Management Facilities (Waste Transfer Station and Household Waste and Recycling Centre) are located adjacent to the north-east of the site. The Longue Hougue Waste Management Facilities are located on an area of reclaimed land (Longue Hougue Reclamation Area).

Land Use

10.3.2 The Project is located offshore and, in an area designated as foreshore (see **Figure 10-1**). A search of the Island Development Plan for the State of Guernsey (States of Guernsey, 2018) and satellite imagery on google earth shows that the study area (a buffer zone of 250m beyond the boundary of the site) is an urban area and is predominantly classified as: a key industrial area (including the existing waste facility), a key industrial expansion area, harbour action area and an area of biodiversity importance at Spur Point. Approximately 80 residential properties were identified in the study area, with 6 properties within 100m and the nearest property is 16m from the site boundary. Historic land use and activity adjacent to the site has included military buildings and associated activity, such as the Spur Point Battery, resistance nests, and gun emplacements and associated buildings. Future proposals for land use are also shown on **Figure 10-1**.

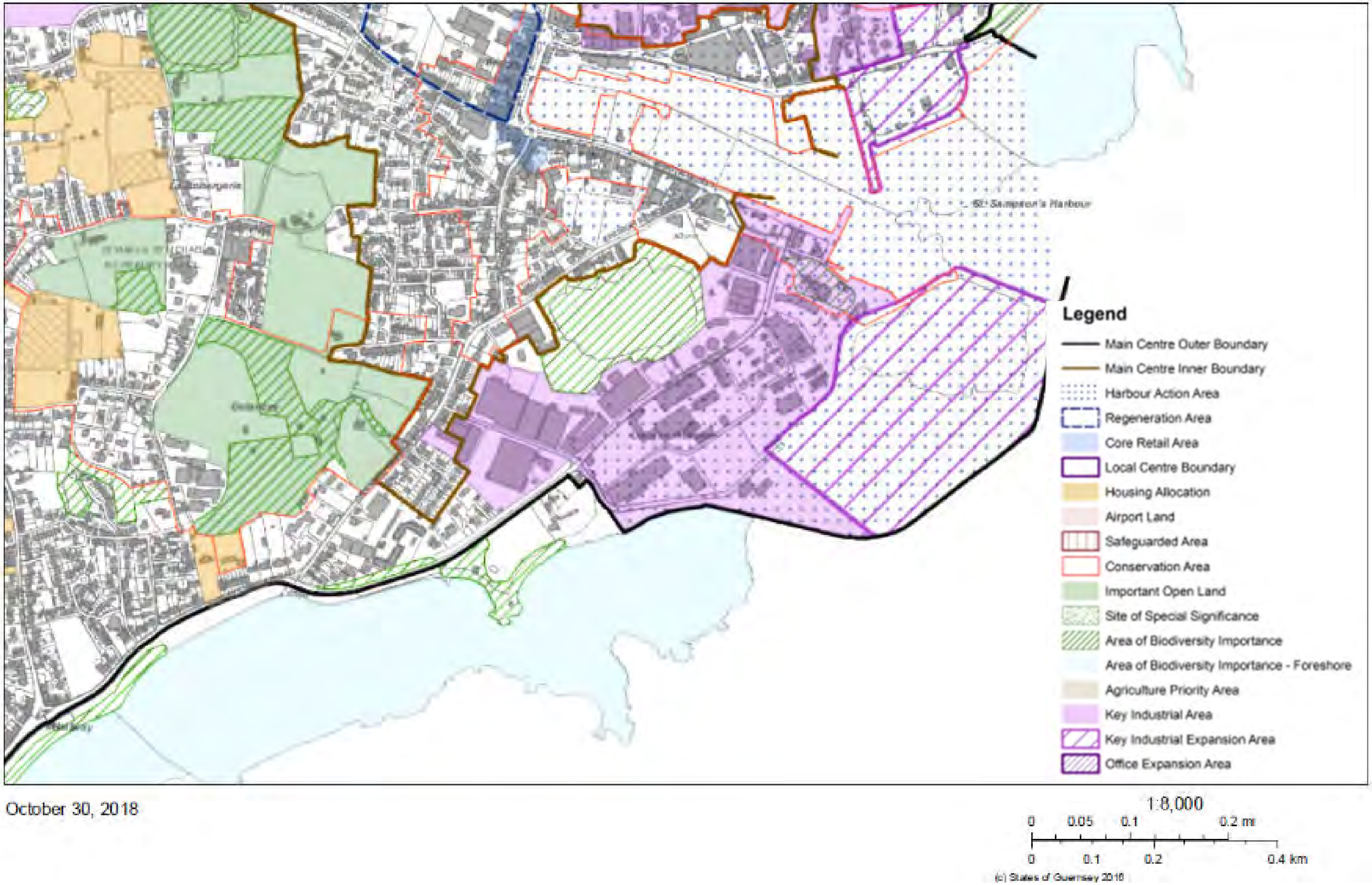
Land Quality

10.3.3 Longue Hougue South is located seaward of the existing land and sea boundary. The site is currently natural habitat but surrounding areas have experienced a range of activities that influence the land quality and potential for contaminant sources. The WWII activities in the adjacent areas may have left some potential waste or contaminants, whereas on the land to the north-east this has all been reclaimed or infilled in at least the previous century. The current Longue Hougue Reclamation Site has been infilled in recent decades (commencing in the 1995). Contaminants within the Longue Hougue Reclamation Site have been recorded at low levels; including trace amounts of bonded asbestos (Mott McDonald, 2004). However, it is noted that the licence allows for non-hazardous asbestos waste containing material' which poses no significant risk to human health.

10.3.4 Landward of the Inert Waste Facility and reclaimed land, earlier reclamations are likely to have included putrescible waste (albeit encased in concrete). Landward of these reclaimed areas, historic uses included fuel storage, chemical storage, boat yards, and other industrial buildings. Land to the north-west of the site was used for fuel storage prior to WWII.

10.3.5 On the existing Longue Hougue Facility more recent (and new) operations are occurring which include the household waste recycling facility as well as the slaughter house and incinerator.

Figure 10-1 Land Uses and Proposals Surrounding the Development Site (Island Development Plan Propsals Map, 2016)



10.3.6 There are 75 known historic landfill sites located on the Island, including five sites of land reclamation (inert), one horticultural-only site, 35 private landfill sites and 30 States' landfill sites, of which four are inert waste only, and the waste streams of the remaining 26 are not confirmed. However, other than the existing inert waste facility at Longue Hougue, no other landfill sites are located immediately adjacent to Longue Hougue South.

Soil Quality

10.3.7 Longue Hougue South is located offshore and therefore no soils are located within the site. A review of soil classification maps contained within The Soil and Land Evaluation of Guernsey Report (State of Guernsey Commerce and Employment Department, 2010) identifies the soils within the study area as non-agricultural or urban soils and not prone to nitrate leaching risk. There are no 'soils' present in the Project site area itself, and as such the assessment of soils quality has been scoped out at the scoping stages of this assessment and therefore soil quality has not been considered further.

Geology

Bedrock Geology

10.3.8 Geologically, Guernsey can be divided into two parts. The southern part, known as the Southern Metamorphic Complex comprises predominantly Precambrian gneisses about 2,000 million years old. The northern part, known as the Northern Igneous Complex (and containing the proposed Project) is largely composed of igneous rocks dating between 550 and 700 million years old (Topley *et al*., 1990). The Facility is located on the northern part of the Precambrian St. Peter Port Gabbro, which outcrops south to St. Peter Port (Guernsey Renewable Energy, 2011; Hawley, 2017, adapted from Roach et al., 1991) (**Figure 10-2** and **Figure 10-3**). To the north of St. Sampson's Harbour, the Bordeaux Diorite Complex is exposed and to the south of St. Peter Port, the Castle Cornet Gneiss and then Icart Gneiss outcrop. Offshore in the Little Russel Channel, the L'Ancresse Granodiorite outcrops.

10.3.9 The St. Peter Port Gabbro outcrops as a shore platform along the east coast of Guernsey between St. Sampson and St. Peter Port, including Longue Hougue South (Topley et al., 1990) (**Figure 10-3** and **Figure 10-4**). Natural exposure of the St. Peter Port Gabbro is limited to the shore platform.

Figure 10-2 Bedrock Geology of Guernsey (Guernsey Renewable Energy, 2011)

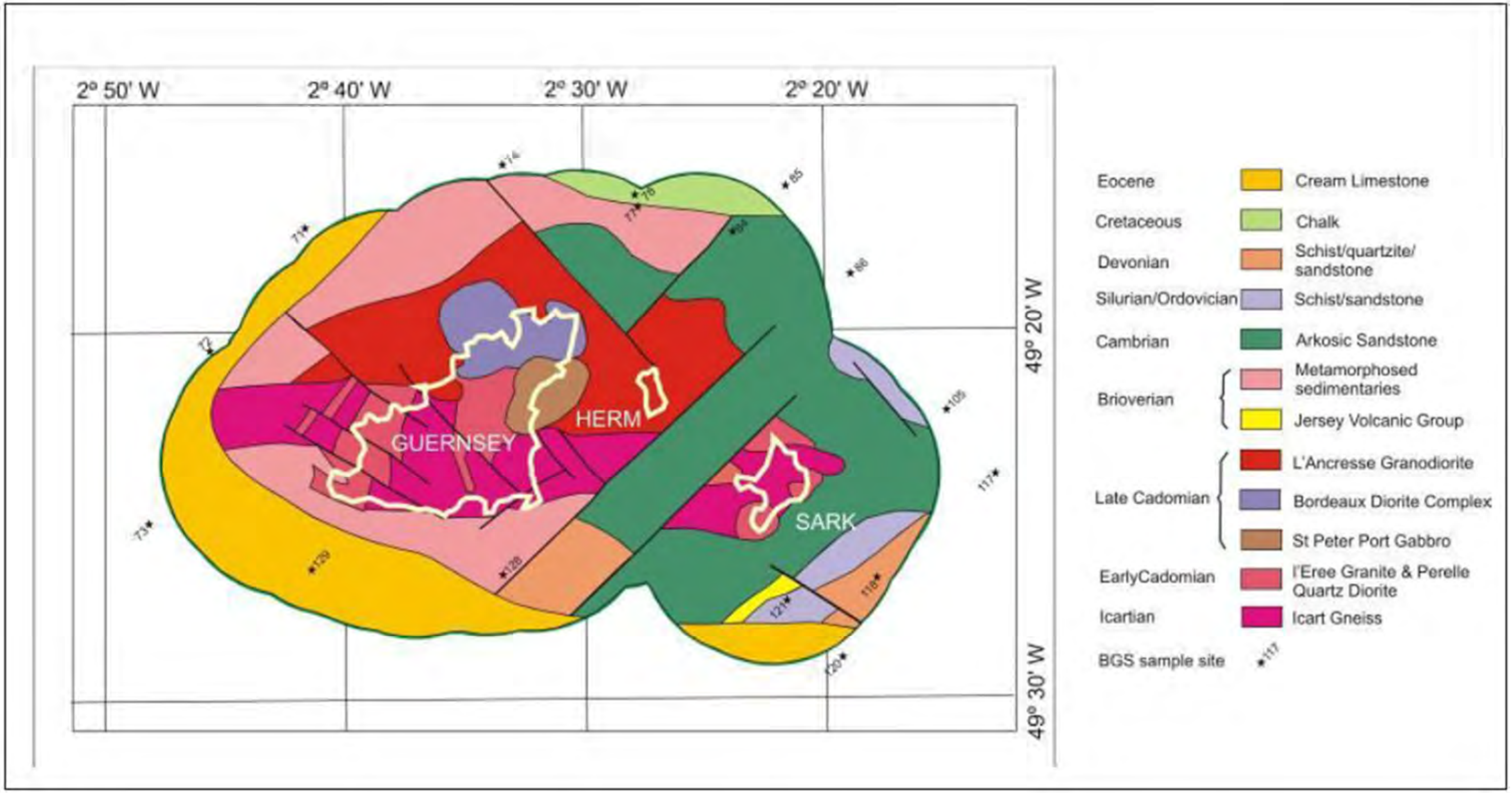


Figure 10-3 Bedrock Geology of Guernsey (Hawley, 2017, Adapted from Roach et al., 1991)

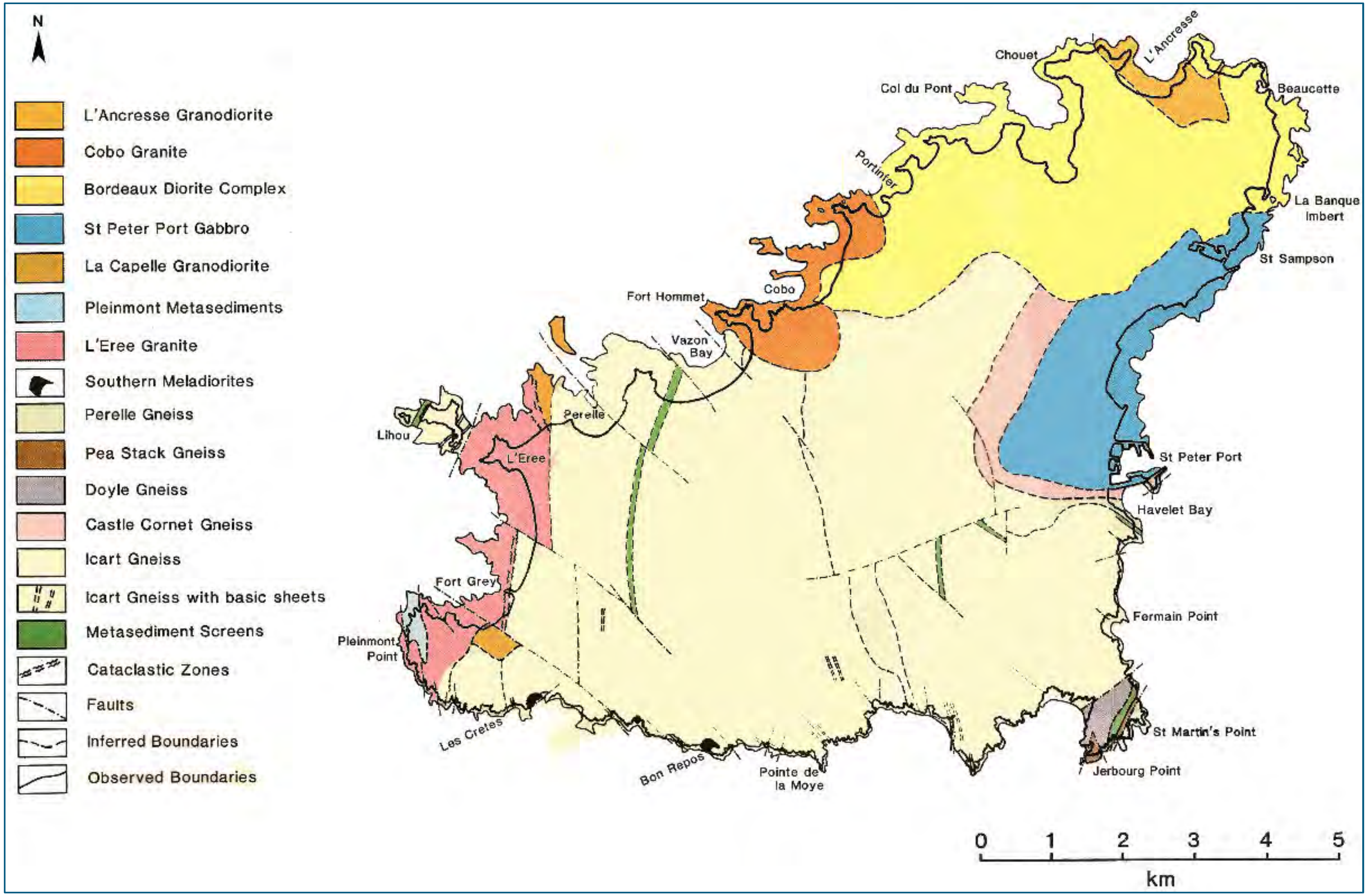
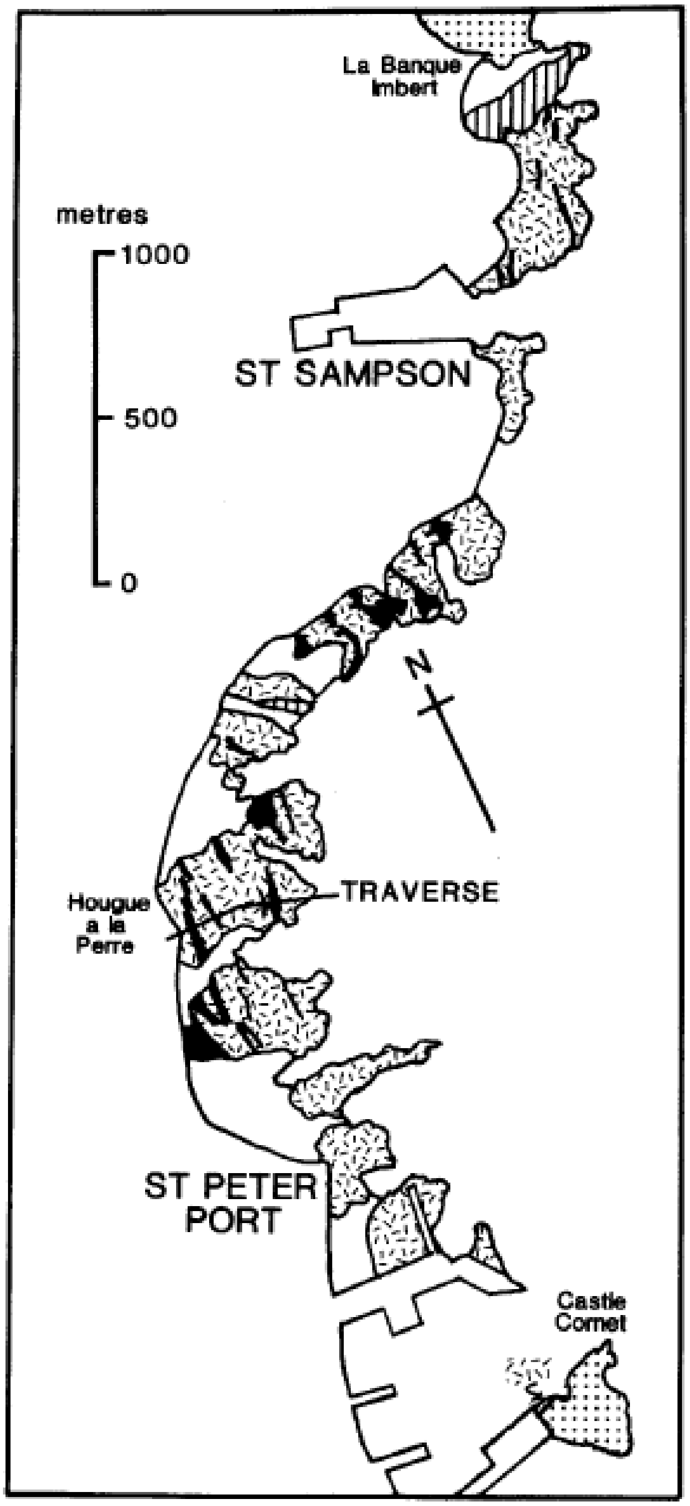


Figure 10-4 Shore Platform Composed of St. Peter Port Gabbro Between St. Sampson and St. Peter Port



Source: Topley et al., 1990.

Key: pecking - hornblende gabbro; black - bojite layers; vertical ruling - agmatite zones; dotted - Bordeaux Diorite Complex (north) and Castle Cornet Gneiss (south); unornamented - no exposure. Dykes and faults omitted.

Superficial Geology

10.3.10 The Pleistocene deposits of Guernsey are restricted to three main types; periglacial loess, raised beaches, and head deposits. None of these deposits are exposed at or adjacent to Longue Hougue South, therefore only a brief description is provided.

10.3.11 Periglacial Loess, Loess is a wind-blown silt, which is up to 5m thick in the southeast of Guernsey, decreasing in thickness to the north and west.

10.3.12 Raised beaches on Guernsey were formed during the elevated sea-levels of past interglacial periods. They comprise sand and gravel accumulations at various locations around the island, at elevations of about 30m (about 395,000 years ago), 18m (about 230,000 years ago) and 8m (about 125,000 years ago) above mean sea level (Keen, 1982; Renouf and James, 2011). Raised beaches closest to Longue Hougue South are at the northern and southern ends of the east coast.

10.3.13 Heads are exposed to the north and west of Guernsey, where they comprise solifluction deposits with the larger particles composed of local rock types but with a finer fraction that may contain loess from further afield. The thickest coastal heads (20m) generally rest on the 8m raised beach demonstrating that much of the head post-dates this beach.

Geology – Summary

10.3.14 No superficial deposits were identified within the Longue Hougue South site. The bedrock geology of the study area is underlain by the St. Peter Port Gabbro. Gabbro is a rare formation that attracts geological university students and visitors to the island. Other layered gabbros exist however St. Peter Port Gabbro has unique physical and mineralogical characteristics (Medland *et al.,* 1996). This feature outcrops along the coastline in this area (see **Figure 10-4**). The Longue Hougue South site's north-eastern and (part of the) northern boundary is an area of reclaimed land, with no natural exposures visible within the reclaimed areas.

Hydrology

10.3.15 A detailed environmental baseline of the study area's hydrology is provided in **Chapter 9 Surface Water and Flooding**. Longue Hougue South is located within the English Channel. There are no surface water stream culverts and surface water features within 200m of the site, with the exception of the two surface water outfalls that discharge into the area of Longue Hougue South (these are considered in **Chapter 9 Surface Water Quality**. The water catchment is located to the north of Bulwer Avenue, 200m north of Longue Hougue South.

10.3.16 Approximately 300m to the north-west of the site is Longue Hougue Reservoir, which has been flooded by Guernsey Water after previously being mined as a quarry for St. Peter Port Gabbro bedrock (Amec Foster Wheeler, 2015). The quarry is currently being used as a potable drinking water source and has a maximum depth of 67m (Amec Foster Wheeler, 2015). The Longue Hougue Reservoir is the largest water resource on Guernsey and has a capacity in the region of 1,300 million litres (Amec Foster Wheeler, 2015).

Hydrogeology

10.3.17 Longue Hougue South is situated on the coast and open water and is therefore not part of an existing groundwater body, within the study area groundwater bodies could be located within the coastal zone. Due to the bedrock conditions (essentially metamorphic and igneous rocks) of the study area no significant groundwater bodies are however anticipated. Guernsey Water obtain most of their water supply through the capture of surface run-off and rainfall (Guernsey water, 2019). However, groundwater is found below the Longue Hougue site (to the north-east of Longue Hougue South), flowing west to east, as it ingresses from the sea through the porous fissures within the rocks (Amec Foster Wheeler, 2015). No significant groundwater migration pathways and hydraulic conductivity between the Project site and the Longue Hougue Reservoir is anticipated (State of Guernsey Water, 2019) due to the geology of the area as described above.

10.4 Do Nothing Scenario

10.4.1 A do-nothing scenario would see no changes to the existing land use, land quality and geology of the study area. As such, the existing land use will remain the same. Land use changes within the surrounding area would occur over time in accordance with the Islands Development Plan (State of Guernsey, 2019).

10.5 Methodology for EIA

10.5.1 The overall approach of assessment has considered impacts to Land Use, Land Quality (Human Health and Controlled Waters) and Geology. The overall approach to the assessment is outlined below.

Receptor Sensitivity

10.5.2 The generic receptor sensitivity examples based on the above criteria are given in **Table 10-2**. It should be noted that receptors may be assessed differently in the EIA due to site-specific considerations.

Magnitude

10.5.3 Potential effects may be adverse, beneficial or neutral. The magnitude of an effect is assessed qualitatively, according to the criteria set out in **Table 10-3**. The following definitions apply to time periods used in the magnitude assessment:

- Long-term: >5 years;
- Medium-term: 1 to 5 years; and
- Short-term: <1 year.

10.5.4 The magnitude for land quality impacts will be considered as follows. For human health, magnitude reflects the likely increase or decrease in exposure risk for a particular receptor (for example construction workers). For controlled waters (hydrogeology), magnitude represents the likely effect that an activity would have on resource usability or value, at the receptor. Magnitude is therefore affected by the distance and connectivity between an impact source and the receptor.

Evaluation of Impact Significance

10.5.5 The impact significance assessment combines receptor sensitivity with effect magnitude, as shown in **Table 10-4**. Assessment of impact significance is qualitative and reliant on professional experience, interpretation and judgement. The matrix should therefore be viewed as a framework to aid understanding of how a judgement has been reached, rather than as a prescriptive, formulaic tool.

10.5.6 Effects that result in Major or Moderate impacts are considered to be ‘significant’ in EIA terms. Significant impacts are those which are likely to influence the outcome of the application for consent. Adverse significant impacts may require mitigation that is difficult or expensive to achieve whereas, beneficial significant impacts contribute to the case in favour of the proposed development. The definitions of significant impacts are presented in **Table 10-5**.

10.6 Potential Impacts during Construction

10.6.1 A summary of the identified potential impact on sensitive receptors from interaction of the Project with contaminated land, geology and hydrogeology can be divided into the following aspects:

- Temporary site compounds and construction of onshore site infrastructure;
- General earthworks; and
- Development of a breakwater.

Table 10-2: Receptor Sensitivity Criteria and Examples

Criteria	Examples
High Has very limited or no capacity to accommodate physical or chemical changes; or, is an international or nationally important resource.	**Human Health** • Construction Workers. • Site Operatives. • General Public (Off-site).
	Controlled waters • Groundwater abstraction zones. • Surface Waters with Water Framework Directive 'High' status objective. • Surface water or groundwater supporting internationally designated or nationally important conservation site (e.g. SSS, Ramsar site, ABI) or fishery.
	Geology • Deposit rare. • Deposit / strata value high (national importance / designation).
	Land Use • Receptor has no or very limited capacity to accommodate changes to the land use such as loss of land areas, soil degradation etc. • Future planning applications for large scale planning uses. • Internationally and nationally designated planning policy areas. • Land uses that are not possible elsewhere or regionally scarce and cannot be adapted or replaced e.g. the ecosystem services.

Criteria	Examples
Medium Has limited capacity to accommodate physical or chemical changes or influences. Is a regionally import resource.	**Controlled Waters** • Principal Aquifer (resource potential). • Groundwater Source Protection Zone Total Catchment. • Licenced groundwater / surface water abstractions. • Surface waters with Water Framework Directive Status / Potential objective 'Good'. • Surface water or groundwater supporting regionally important wildlife sites (ABI) or commercial aquaculture.
	Geology • Deposit localised. • Deposit/strata value medium (regional importance / designations).
	Land Use • Receptor has limited capacity to accommodate changes to the land use such as loss of land areas etc. • Local designated planning policy areas.

Criteria	Examples
Low Has moderate capacity to accommodate physical or chemical changes. Is a locally important resource.	**Controlled Waters** • Unlicensed water supplies. • Surface waters with Water Framework Directive Status / Potential objective 'Moderate' / 'Poor'. • Surface water or groundwater supporting locally important wildlife or amenity site.
	Geology • Deposit moderately widespread deposit / strata value low (local importance / designation) or no value.
	Land Use • Receptor has moderate capacity to accommodate changes to the land use such as loss of land areas, soil degradation etc. • No designated planning policy areas.
Negligible Is generally tolerant of physical or chemical changes. Is of no significant resource value.	**Controlled Waters** • Unproductive Strata with no resource potential. • Surface waters with Water Framework Directive Status / Potential objective 'Bad'.
	Geology • Deposit widespread, with no deposit / strata value (no designation).
	Land Use • Receptor generally tolerant of changes to the land use such as loss of land areas, etc. • No designated planning policy areas.

Table 10-3: Magnitude of Effect Criteria and Examples

Criteria	Examples
High Permanent or large-scale change affecting usability, risk or, value over a wide area, or certain to affect regulatory compliance.	**Human Health** • Permanent or major change to existing risk of exposure (Adverse / Beneficial). • Unacceptable risks to one or more receptors over the long-term or permanently (Adverse). • Prosecution e.g. under health and safety legislation (Adverse). • Remediation and complete source removal (Beneficial). • Construction workers at risk due to lack of appropriate personal protective equipment (Adverse). **Hydrogeology** • Permanent, long-term or wide scale effects on water quality or availability (Adverse / Beneficial). • Permanent loss or long-term derogation of a water supply source of a water supply source resulting in prosecution (Adverse). • Change in water body status (Adverse / Beneficial). **Geology** • Disturbance or loss to protected geological attributes of a designated conservation site. **Land Use** • Permanent (>10 years) / irreversible changes, over the whole receptor, affecting usability, risk, value over a wide area, or certain to affect regulatory compliance.

Criteria	Examples
Medium Moderate permanent or long-term reversible change affecting usability, value, or risk, over the medium-term or local area; possibly affecting regulatory compliance.	**Human Health** • Medium-term or moderate change to existing risk of exposure (Adverse / Beneficial). • Unacceptable risks to one or more receptors over the medium-term (Adverse). • Serious concerns or opposition from statutory consultees (Adverse). **Hydrogeology** • Permanent, long-term or wide scale effects on water quality or availability (Adverse / Beneficial). • Permanent loss or long-term derogation of a water supply source of a water supply source resulting in prosecution (Adverse). • Change in water body status (Adverse / Beneficial). **Geology** • Minor disturbance or loss to protected geological attributes of a designated conservation site. **Land Use** • Moderate permanent or long-term (5-10 years) reversible changes, over the majority of the receptor, affecting usability, risk, value over the local area, possibly affecting regulatory compliance. • Existing land use would not be able to continue on less than 5ha of land. • Noticeable changes to the existing land use although it may continue.

Criteria	Examples
Low Temporary change affecting usability, risk or value over the short-term or within the site boundary; measurable permanent change with minimal effect usability, risk or value; no effect on regulatory compliance.	**Human Health** • Medium-term or moderate change to existing risk of exposure (Adverse / Beneficial). • Unacceptable risks to one or more receptors over the medium-term (Adverse). • Serious concerns or opposition from statutory consultees (Adverse). **Hydrogeology** • Medium-term or local scale effects on water quality or availability (Adverse / Beneficial). • Medium-term derogation of a water supply source, possibly resulting in prosecution (Adverse). • Observable habitat change that is sustainable / recoverable over the medium-term (Adverse / Beneficial). **Geology** • No changes to protected geological attributes of a designated conservation site. **Land use** • Temporary change affecting usability, risk or value over the medium-term (<5 years). • Temporary change affecting usability within the site boundary; measurable permanent change with minimal effect usability, risk or value; no effect on regulatory compliance.

Criteria	Examples
Negligible Minor permanent or temporary change, indiscernible over the medium- to long-term short-term, with no effect on usability, risk or value.	**Human Health** • Short-term temporary or minor change to existing risk of exposure (Adverse / Beneficial). • Unacceptable risks to one or more receptors over the short-term (Adverse). **Hydrogeology** • Short-term or very localised effects on water quality or availability. (Adverse / Beneficial). • Short-term derogation of a water supply source (Adverse). • Measurable permanent effects on a water supply source that do not impact on its operation (Adverse). **Geology** • No significant changes or large-scale loss of geology. **Land use** • Minor permanent or temporary change, undiscernible over the medium to short-term, with no effect on usability, risk or value.

Table 10-4: Impact Significance Matrix

Magnitude	Sensitivity			
	High	**Medium**	**Low**	**Negligible**
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Minor
Low	Moderate	Minor	Minor	Negligible
Negligible	Minor	Minor	Negligible	Negligible

Table 10-5: Impact Significance Definitions

Impact Significance	Definition
Major	Very large or large change in receptor condition (adverse or beneficial), which are likely to be key factors in the decision-making process because they contribute to achieving international, national or regional objectives, or could result in exceedance of statutory objectives and / or breaches of legislation.
Moderate	Intermediate change in receptor condition (adverse or beneficial), which are likely to be important considerations in the decision-making process because they contribute to achieving local objectives or could result in exceedance of statutory objectives and / or breaches of legislation.
Minor	Small change in receptor condition (adverse or beneficial), which may be important but are unlikely to be important considerations in the decision-making process.
Negligible	Very small changes in receptor condition (adverse or beneficial), which may be raised as local issues but are unlikely to be important in the decision-making process.
No change	No or imperceptible effects, within normal variations or within the margins of forecasting error.

CONSTRUCTION IMPACT 10.1: Disturbance to Potentially Contaminated Sites

10.6.2 The Proposed Site is located in an area of intertidal and subtidal (marine) habitat, however inland of the Proposed Site are a number of land uses including a rendering plant, boat yards, petroleum and chemical storage facilities, and parts of the coastline in this area have historically been reclaimed. The existing Longue Hougue Waste Management Facility is located adjacent to the north-east of the Proposed Site and are located on an area of reclaimed land. As such there is the potential for contamination to be present in the vicinity of the Proposed Site that could impact human health and controlled waters during construction.

10.6.3 To facilitate filling of the Proposed Site with inert waste, construction lorries will access the existing Longue Hougue Waste Management Facility through the Waste Transfer Station access road. It is anticipated that vehicles will be weighed at the Waste Transfer Station weighbridge prior to inspection and tipping. The site offices and welfare facilities will either be shared with those of the Waste Transfer Station or located in the south-west of the Waste Transfer Station site (see **Figure 4-4**), and then as infilling progresses will be moved to the north-east corner of Longue Hougue South. When weighbridges, site offices and associated utilities will be constructed either prior to operation or during operation, they will require excavation of shallow deposits. Whilst previous intrusive ground investigation identified the presence of trace amounts of asbestos (Mott McDonald, 2004) at a few sample locations, this indicates that the earthworks have the potential to disturb low levels of contamination, which has a (albeit limited) potential to impact on human health.

10.6.4 There are no surface water features within 200m of the Proposed Site, with the exception of two highway drainage outfalls that discharge into the area of the Proposed Site. Longue Hougue Reservoir is located approximately 300m to the north-west of the Proposed Site, however no significant groundwater migration pathways between the Proposed Site and the Longue Hougue Reservoir are anticipated due to the low permeability geology of the area. Groundwater is likely to be present beneath Longue Hougue Waste Management Facility as a result of sea water ingress, and will be, therefore be saline. Given the site setting and the shallow nature of the excavation works, impacts to groundwater/surface water are considered unlikely. The sensitivity of human health (construction workers and off-site human receptors), is considered to be **high**.

10.6.5 The potential impacts from the proposed earthworks are predicted to be of local spatial extent (localised to the work areas), of short-term duration, and of intermittent occurrence. Exposure to contamination will vary depending on the exposure scenario, e.g. duration of exposure and proximity to contamination. The excavation of potential contaminated land and stockpiling of potentially contaminated materials (e.g. soils) during the construction process will not be extensive.

10.6.6 Construction workers are considered to experience the highest magnitude of effect, due to their longer and more direct exposure routes, resulting from the activities they would be engaged in, in comparison to off-site human receptors. Potential impacts to construction workers can, however, be managed directly via appropriate controls and construction management practices which are in line with current legislation and best practice and will be embedded into the project.

10.6.7 The magnitude of effect was therefore assessed as **low** for construction workers (driven by the limited potential for trace levels of bonded asbestos to be present) and **negligible** for off-site human receptors. Therefore, the overall impact during construction is considered to be of **moderate adverse significance** for construction workers and **minor adverse significance** for off-site human receptors which is driven by the limited potential for trace levels of asbestos to be present, and only if excavation is required.

Mitigation

10.6.8 Given the known presence in trace levels in a number of samples across the Longue Hougue Reclamation Site, it is recommended that an Asbestos Management Strategy is prepared and implemented in the event that there is a need for excavation within the Longue Hougue Reclamation Site. In addition, the adoption of cover layers to break pollutant pathways will minimise the risk of pollutant dispersal.

Residual Impact

10.6.9 The implementation of the Strategy and adoption of cover layers to break pollutant pathways will minimise the risk and scale of any potential impacts, such that the magnitude of effect will be **negligible** for all human health receptors. Therefore, the residual impact during construction will be of **minor adverse significance**.

CONSTRUCTION IMPACT 10.2: Disturbance to Geological Sites

10.6.10 There are no designated sites of international, national or local geological significance that have been identified within the study area. The Project will result in the direct loss of the St. Peter Port Gabbro exposures at Spur Point.

10.6.11 The St. Peter Port Gabbro is considered to be a deposit that is moderately widespread across the eastern coast of Guernsey and outcrops where present along the coastline (St. Sampson and St. Peter Port). Longue Hougue South however, has been identified for important geological features identified within the Gabbro outcropping in this area. Research commissioned by the States to inform the preparation of the Island Development Plan identifies that the St. Peter Port Gabbro exposures at Spur Point and surrounding area including Longue Hougue South are important: showing layering of “Birdseye” Gabbro and pale, finer-grained Feldspar-rich Gabbro (Environment Guernsey, 2014). The gabbro is present throughout Belle Grève Bay, though elements of the gabbro within the site footprint comprise a range of characteristics and as such the obstruction to the geological layers results in a High sensitivity.

10.6.12 Longue Hougue South is located on an area of Gabbro exposure on the coastline of Belle Grève Bay which extends over more than 99ha. Approximately 9ha of the Project’s footprint will see the permanent loss of these geological features within the intertidal (accessible) zone. As such the magnitude is therefore considered to be **Medium**. Consequently, a **major adverse impact** due to the permanent loss of this geological resource is predicted.

Mitigation

10.6.13 Disturbance to geology can be minimised during construction by building out along the breakwater structure from the existing Longue Hougue Reclamation Site and using this as an access road. The temporary site compound should be located where geological outcrops are not present or is not currently covered.

10.6.14 The site will interact with important localised geological deposits, and opportunities should be sought to enhance access to local geology. Excavations of the gabbro during the construction works and placement of large sections of this geological feature along the boundary of the site should be undertaken. Agreement with States landscape team should be undertaken to select appropriate location and scale, but it is indicated that the rock sections should be placed (as standing stones) near the north-western end of the site, with smaller rocks used to delineate the path on the landward side of the site boundary. This will allow the geological feature to be examined in the future and serves as an opportunity to mitigate against the loss of exposures in the area.

Residual Impact

10.6.15 The retention of accessibility to various examples of the gabbro would reduce the sensitivity through providing a visible and accessible resource and the sensitivity of the receptors would reduce to medium. Consequently, a **moderate adverse residual impact** would remain for geological receptors due to the permanent obstruction to a range of gabbro characteristics; albeit some elements are retained in the wider Belle Grève Bay exposures.

CONSTRUCTION IMPACT 10.3: Disruption to Land Use

10.6.16 Belle Grève Bay is used for recreation, and this use will be affected by the construction of the proposed Project, specifically the breakwater around the seaward boundary of the site. During construction, there will be no direct disturbance to adjoining land uses. Disturbance to landscape character and views are assessed in **Chapter 16 Landscape and Visual Character**, whilst disturbance to recreational, residential and commercial receptors are assessed in **Chapter 14 Population and Human Health**.

10.6.17 A review of the Island Development Plan (State of Guernsey, 2016) shows the Project and its footprint will interact with areas identified within the land use plan for Guernsey, essentially the Areas of Biodiversity Importance (ABI); adjacent land uses designations include the Key Industrial Area and Key Industrial Expansion Area, as well as nearby residential land uses.

10.6.18 The majority of the Project site will not interact with any land use receptors and is located within the intertidal and subtidal environment. Therefore, the existing land uses will be unaffected (directly) with the exception of the ABI (the impacts of which are considered in **Chapter 17 Terrestrial Ecology and Ornithology** and **Chapter 18 Marine Ecology**. There is a potential for indirect disturbance to adjacent land uses, however these are already assessed in a number of chapters including **Chapter 12 Air Quality**, **Chapter 13 Noise and Vibration**, and **Chapter 16 Landscape and Visual**. Given that there are no direct obstructions to or loss of existing land uses (aside from the ABI designations which are considered in other chapters) **no impact** is therefore expected on land use during construction.

10.7 Impacts During Operation

10.7.1 The operational impacts to land quality, geology and hydrogeology will be the same as the impacts assessed during the construction phase and assessment has been scoped out

OPERATIONAL IMPACT 10.4: Alteration to Land Use

10.7.2 Once operational there will be a change in land use from coastal habitat used for recreation to open land with potential for other uses, most likely industrial, appropriate to its location if required and subject to relevant planning requirements. Given the island has a finite land resource, the creation of additional capacity is a positive outcome, and scale wise is considered to be medium. As such a **moderate beneficial impact** is predicted.

10.8 Cumulative Impacts

10.8.1 The cumulative impact assessment (CIA) for land quality, soil quality, land-use and hydrogeology was undertaken in two stages. The first stage was to consider the potential for the impacts assessed as part of the projects to lead to cumulative impacts in conjunction with other projects. The first stage of the assessment is detailed in **Table 12-36**.

10.8.2 The impacts associated with land quality, geology and land-use are considered to be restricted to the footprint of the Project boundary and no direct impacts extend outwith this extent. The receptors outside the boundary and any relevant indirect (disturbance) effects are considered for specific topics (such as air quality, noise and vibration, landscape and visual) and are considered and assessed in the other relevant chapters. Impacts to human health (as a result of disturbance to contaminants) are likely to be highly localised for this nature of project and activity and are not considered a source of cumulative impact.

Table 10-6: Potential Cumulative Impacts

Impact		Potential for cumulative impact	Rationale
Construction			
1	Construction footprint, loss of geological sites	Yes	There is potential for cumulative construction dust impacts where projects are located on significant geological features.
2	Construction footprint, alteration to land-use	Yes	Where the construction phase of the project overlaps with other projects, there is the potential for cumulative impacts associated with alteration of land-use.
Operation			
3	Operational phase alteration of land use	Yes	Where the operational phase of the project overlaps with other projects, there is the potential for cumulative impacts associated with project-generated traffic emissions on the local road networks.

10.8.3 The second stage of the CIA is to evaluate the projects considered for the CIA to determine whether a cumulative impact is likely to arise. The full list of considered projects and their anticipated potential for cumulative impacts are detailed in **Table 5-4**.

10.8.4 Projects which may give rise to cumulative construction and operational phase impacts were therefore considered. Of all the projects considered in the CIA, only two were located within 250m of the Project, as detailed in **Table 10-7**.

CUMULATIVE IMPACT 10.5: Disturbance to Geological Sites

10.8.5 Although geographically close to the Project site the identified projects do no occur on and thus disturb or obstruct the same geological receptors (exposures) and therefore **no cumulative impact** is expected.

Table 10-7: Cumulative impacts on land use, land quality, soil quality, geology and hydrogeology

Project	Description	Planning code (ID)	Distance from the Project (m)	Included in CIA
Mont Crevelt Breakwater Longue Hougue, St. Sampson.	Infill existing temporary opening formed in existing breakwater as part of works for St. Sampsons marina project.	FULL/2018/0218 (B003540000)	87	No

CUMULATIVE IMPACT 10.6: Disruption to Land Use

10.8.6 The majority of the Project will not interact with any land use receptors and is located within the intertidal and subtidal environment. The indirect (disturbance impacts) are considered on a topic by topic basis on surrounding receptors that fall under the existing land uses, and we refer to those other chapters for cumulative impacts. The only direct land use impacted by the project would be the ABIs, though the cumulative impact on them is also assessed in **Chapter 17 Terrestrial Ecology and Ornithology** and **Chapter 18 Marine Ecology**. However, the project will result in additional land uses opportunities (commercial, industrial, infrastructure, etc) once the site is completely infilled. However, no other reclamation or infill projects (over and above the existing planned infill at Longue Hougue) are expected and therefore **no cumulative impact** would arise from an additive effect with other projects.

10.9 Summary

Table 10-8: Summary of Impacts for Land Use, Land Quality and Geology

Impact	Significance	Mitigation	Residual Impact	Monitoring
Construction Phase				
Disturbance to Potentially Contaminated Sites	Major Adverse	Implementation of Asbestos Management Strategy and use of cover layers.	Minor Adverse	Not required
IMPACT: Disturbance to Geological Sites	Major Adverse	Removal of in situ boulders and exposures and placement around the site perimeter	Moderate Adverse	Not required
IMPACT: Disruption to Land Use	No impact	None required	n/a	Not required
Operation Phase				
IMPACT: Alteration to Land Use	Moderate beneficial	None required	n/a	Not required

11 Traffic and Transport

11.1 Introduction

11.1.1 This chapter considers the existing highways environment with regards to traffic and transport including impacts during the construction and operational phases of the Longue Hougue South inert waste facility hereafter, (‘the Project’). Mitigation measures are detailed where required, and a discussion of the residual impacts provided where significant impacts were identified.

11.1.2 This section provides an overview of the existing baseline and where the proposed project is located, followed by an assessment of the potential impacts and associated mitigation for the construction phase of the project.

11.1.3 This section is supported by the following appendices:

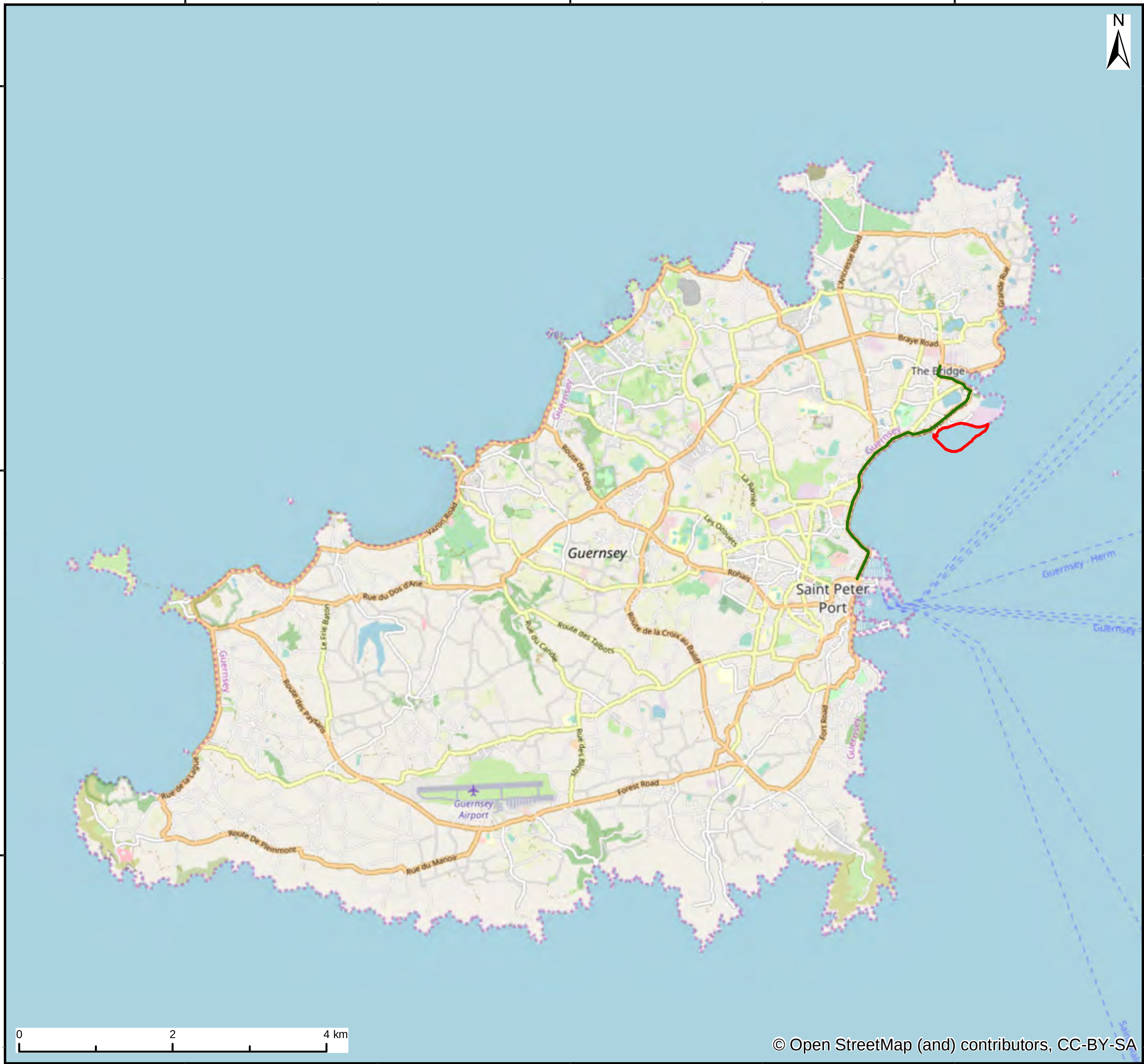
- **Appendix 11.1** – Guernsey Road Hierarchy.
- **Appendix 11.2** – Outline Construction Traffic Management Plan
- **Appendix 11.3 -** Personal Injury Collision Data.
- **Appendix 11.4** – Housing Allocation Growth Factor Results (2021, 2024)
- **Appendix 11.5** – Construction Worker Distribution and Assignment.
- **Appendix 11.6** – Operational HGV distribution and Assignment.

11.2 Study Area

11.2.1 The study area for traffic and transport has been informed by the most probable routes for traffic, for both the movement of materials and personnel, during the construction and operational phase of the Project. The wider highway network is shown in **Figure 11-1**.

11.2.2 The traffic and transport study area is divided into seven separate highway sections, referred to as links, defined as sections of the road with similar characteristics and traffic flows. The study area links are outlined in **Section 11.5** and shown graphically in **Figure 11-2**.

11.2.3 Impacts will be considered on all transport links identified that serve the Project.



Legend:

Outline of Proposed Development

Inter Harbour Route

Note: For road hierarchy classifications please refer to the States of Guernsey Road Hierarchy Plan (2011) at: https://www.gov.gg/CHttpHandler.ashx?id=1863&p=0

Client: States of Guernsey

Project: Longue Hougue South EIA

Title: Wider Highway Network

Figure: 11.1

Drawing No: PB5312-300-014

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	14/08/2019	FC	PT	A4	1:75,000
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Co-ordinate system: WGS 1984 UTM Zone 30N

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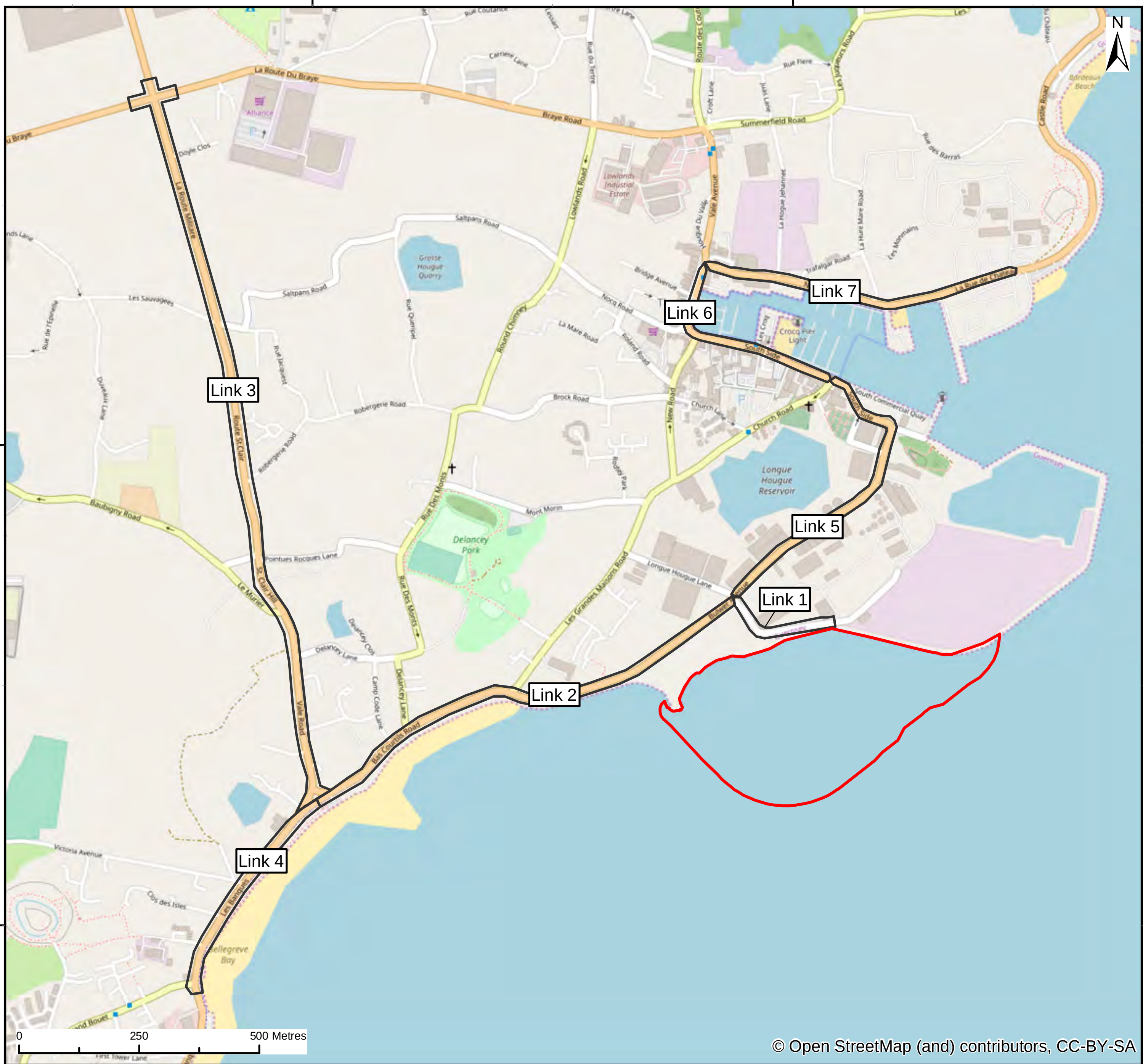

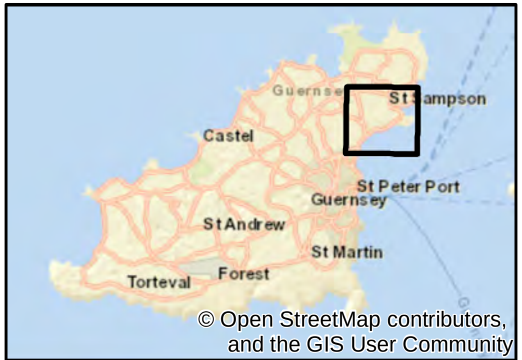

Legend:

- Outline of Proposed Development
- Traffic and Transport Study Area

Client:	Project:
States of Guernsey	Longue Hougue South EIA

Title:

Traffic and Transport Study Area

Figure: 11.2 Drawing No: PB5312-300-015

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Data Sources

Desk Study

11.2.4 This assessment has been undertaken with reference to information from a number of sources, as detailed in **Table 11-1**.

Table 11-1: Key Information Sources

Date Source	Reference
States of Guernsey Government (Amec Foster Wheeler)	SoG (2015): Waste Development at Longue Hougue Environment Statement
States of Guernsey Government	SoG (2013): Guernsey Employment Land Study

Surveys Undertaken

11.2.5 Baseline traffic surveys utilising Automatic Traffic Counters (ATCs) were commissioned by the States of Guernsey (SoG) and undertaken in April 2019. The ATCs record vehicle composition, volume and speeds, 24 hours per day over the course of seven days. Seven ATCs were installed for each of the seven links identified in the traffic and transport study area.

11.2.6 The locations of each of the seven ATC sites is shown in **Figure 11-3**.

Personal Injury Collision Data

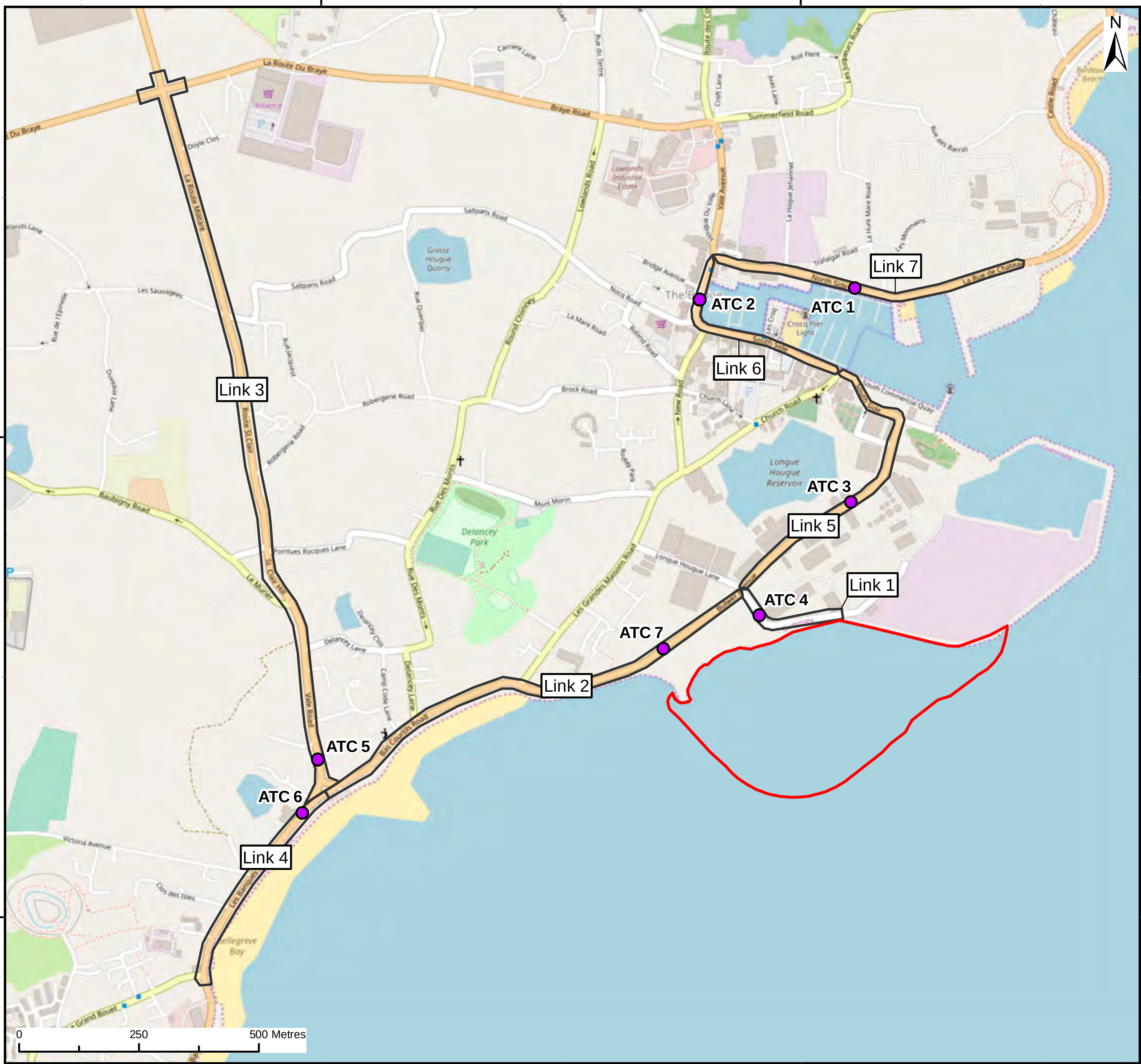
11.2.7 The PIC data includes all collisions reported to the Guernsey Police and includes non-injury/damage only collisions alongside collisions that have resulted in injury. The data has been obtained from SoG for the most recent five-year period (2013 – 2017 inclusive) for the seven highway links. The PIC search area is shown in **Figure 11-4**. The data collected for the project is summarised in **Table 11-2**.

Assumptions and Limitations of Data

11.2.8 The PIC data compiled and provided by SoG and is informed by Guernsey Police records. The data provided has limited information, lacking key details such as accurate PIC location data and the likely cause of collisions.

11.3 Legislation and Policy Context

11.3.1 **Table 11-3** provides detail on key legislation and policy which are relevant to this chapter.



Legend:

- Outline of Proposed Development
- Traffic and Transport Study Area
- Survey Location

Client:	Project:
States of Guernsey	Longue Hougue South EIA

Title:

Survey Locations

Figure: 11.3 | Drawing No: PB5312-300-016

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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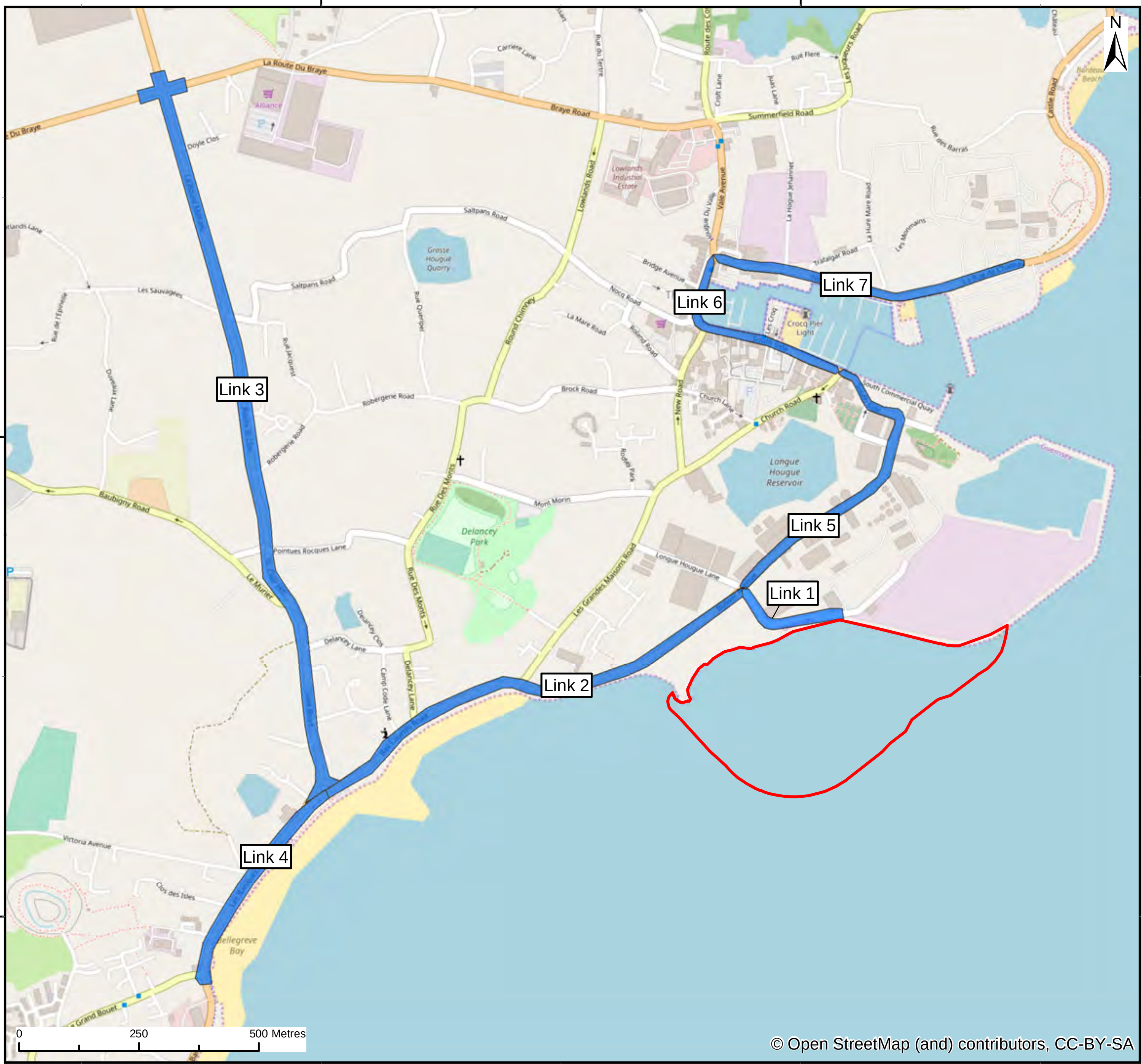

Legend:

Outline of Proposed Development

Collision Data Search Area

Client: States of Guernsey

Project: Longue Hougue South EIA

Title: Road Safety Data Assessment Area

Figure: 11.4

Drawing No: PB5312-300-018

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Table 11-2: Key Sources of Data

Date Source	Date	Coverage	Confidence	Notes
Classified* Automatic Traffic Counts	April 2019	All links within the highway study area	High	Traffic counts commissioned by the States which provide classified hourly and daily count and speed data.
Personal Injury Collision Data	February 2019	All links within the highway study area	Medium	Details of all recorded personal injury collisions within the highway study area obtained from the States.
*	Classified counts include classification of vehicle type (e.g. cars, motorcycles, buses, HGVs).			

Table 11-3: Legislation and Policy

Policy	Section / Policy Reference	Response
Strategic Land Use Plan 2011 **(Strategic Land Planning Group, 2011)**	The Strategic Land Use Plan (SLUP) is a statutory document prepared by the Strategic Land Planning Group in November 2011, under Section 5 of the Land Planning and Development (Guernsey) Law, 2005. The SLUP sets out the land-use planning agenda for Guernsey over a 20-year period. The following salient policies are considered to be of particular relevance to the project. Policy SLP36: “In setting policies to control development on or affecting the road network, consideration should be given to the need to: provide safe access and movement for all users support environmental enhancement ensure strategically important routes are maintained to safeguard links to and between strategically important development”	The Traffic and Transport Chapter contains a full assessment of the Development’s impact on the highway and transport network having due regard for all user groups.

Policy	Section / Policy Reference	Response
Island Development Plan 2016 **(States of Guernsey, 2016)**	The Island Development Plan was adopted by the SOG on 2nd November 2016 and sets out the land planning policies for the island of Guernsey. The following salient policy is considered to be of particular relevance to the project. Policy IP6: Transport infrastructure and support facilities: "Development proposals that encourage a range of travel options to and within the Main Centres and the Main Centre Outer Areas will be supported, where they are comparable with other relevant policies of the Island Development Plan. Development proposals within the Main Centres and the Main Centre Outer Areas will be expected to be well integrated with the transport network and make provision for infrastructure and facilities that will assist in people being able to commute to the site using a range of transport options including by bicycle or on foot. Throughout the Island, the Authority will support proposals for public infrastructure that would assist in providing greater transport choice where these accord with all other relevant policies of the Island Development Plan.	The Project site maximises the potential for access by all modes of transport as evidenced in **Section 11.5** of the Traffic and Transport Chapter.

11.4 Consultation

11.4.1 Consultation undertaken throughout the pre-application phase informed the approach and the information provided in this chapter. A full explanation and details of all consultation undertaken to date is provided in **Chapter 5 Consultation**. A summary of the consultation of particular relevance to traffic and transport is detailed in **Table 11-4**.

Table 11-4: Consultation and Responses

Consultee and Date	Response	Chapter Section where consultation comment is addressed
States of Guernsey, December 2018	The survey area should include The Bridge area, and be included in the most northerly survey site.	**Section 11.5** provides details of the traffic and transport study area.
Phil Ogier (States of Guernsey), March 2019	Construction phase would likely have the greatest impact in terms of traffic, and therefore the inclusion of construction phase scoping in the assessment is supported. The scale of the impact will depend on the chosen method of breakwater / rock-armouring construction and material supply to the site - there are 5 sites listed for collection of background traffic flows, but this does not include Northside. The Bridge, or Southside. It is therefore important during the construction phase to consider whether this data would be important for assessment. The plan includes proposed traffic counter locations (including Northside and Southside), but they do not appear within the scoping document - consideration must be given to traffic data collection to assess impacts during the construction phase. Alternatively, outline for THS why St. Sampson's Harbour imports will not be significant during the project. Mention is made that most lanes in the area have a 25mph speed limit, when in fact most have a 35mph speed limit. Ruette Tranquille have recommended a speed limit of 15mph, not 10mph. There are a few designated cycle lanes, but one runs alongside the Inter Harbour Route. It may be incorrect to say that this development will have an impact on Ruette Tranquilles.	**Sections 11.2** and **Section 11.5** provide details of the traffic and transport study area including data sources used to inform the baseline environment. **Section 11.7** and **Section 0** details the potential impacts during construction and operational phases of the project.

Consultee and Date	Response	Chapter Section where consultation comment is addressed
Public Exhibition, March 2019	Cumulative traffic impact associated with the continuation of traffic for inert waste management and new residential development - the Island Development Plan needs to be considered.	**Section 11.5.52** details the use of Housing Allocation Sites within the Island Development Plan to derive future year growth factors. **Section 11.9** details the cumulative projects which have been scoped in for potential further assessment.

11.5 Baseline

11.5.1 Characterisation of the existing environment has been informed through a number of sources, including:

- Desktop studies and site visits;
- Personal injury collision data sourced from the SoG; and
- Traffic count surveys commissioned by the SoG.

Road Hierarchy

11.5.2 The road hierarchy within Guernsey has been designed to support public transport, parking and development control policies. These routes have been categorised into the following:

- Inter Harbour HGV Route;
- Traffic Priority Routes;
- Local Circulation Routes; and
- Neighbourhood and Country Roads.

11.5.3 **Appendix 11.1** graphically depicts the road hierarchy within Guernsey as defined by the SoG, **Figure 11-1** depicts the highway network in relation to the proposed site location.

Inter Harbour HGV Route

11.5.4 The route links St Sampson's and St Peter Port Harbours. The SoG details that the route is unique in Guernsey terms insomuch as it must accommodate long articulated vehicles and very high traffic flows. This route is of strategic importance for freight deliveries and linking the two main urban areas of the Island. For these reasons the SoG state that the functional emphasis is one of mobility and free traffic flow.

Traffic Priority Routes

11.5.5 Traffic Priority Routes are identified by The States as routes of high traffic flow with the capacity to accept 9T axle loads. The routes comprise of the busiest of the island's main roads and are key routes with a primary function of distributing traffic through the island.

Local Circulation Routes

11.5.6 Local Circulation Routes comprise main roads, which have lower traffic flows than Traffic Priority Routes, often with significant frontage activity. They must accommodate limited through traffic and traffic movements terminating within the surrounding areas.

Neighbourhood and Country Roads

11.5.7 Predominately residential in character with little or no through traffic but may include other areas such as rural lanes. The functional emphasis is primarily one of access to individual properties and provision for vulnerable road users.

Highway Network

11.5.8 The highway network within the study area has been divided up in to discrete lengths (links) reflecting the highway/spatial character.

11.5.9 **Figure 11-2** details the local highway network surrounding the project; a commentary of the characteristics of the links is set out below.

Link 1 – Longue Hougue Access Road

11.5.10 Link 1 is a single carriageway located off Bulwer Avenue by a signalised junction to the northwest. The road is single carriageway in nature with no road markings present, providing access to various industrial units and direct access to the coastline. The road has limited pedestrian provision with intermittent street lighting present.

Link 2 – Les Bas Courtils / Bulwer Avenue (south)

11.5.11 Within Link 2, Les Bas Courtils extends south from Les Grandes Maison Road to the junction with Vale Road. Extending north from Les Grandes Maison Road to Longue Hougue Access Road is Bulwer Avenue. Both Les Bas Courtils and Bulwer Avenue are part of the Inter Harbour HGV Route and is subject to a 35mph speed limit. There are many pedestrian facilities along the route including a footway on the seaward side south from Longue Hougue to Grandes Maisons Road, turning into a pedestrian/ cycle route segregated by lane markings onward to Vale Road. A footpath is also provided on the landward side along the entirety of Les Bas Courtils. A Zebra crossing is provided close to Delancey Lane. Street lighting is present on the landward side.

Link 3 – Vale Road / Route Militaire (south)

11.5.12 Vale Road is a Traffic Priority Route which runs northbound, becoming Route Militaire at the junction with Les Bas Courtils. Route Militaire continues north until it terminates at a signalised junction with Route du Braye. Vale Road is single carriageway in nature and subject to a speed limit of 25mph. Route Militaire (south) is subject to a 35mph speed limit. There are no line markings provided along the majority of the route. A footway is provided along the east side of the road with street lights present.

Link 4 – Les Banques leading to St George's Esplanade

11.5.13 Les Banques continues to be part of the Inter Harbour HGV Route on the island. Running from the Vale Road junction to St Julian's Pier and St Peters Port. The majority of the road is single carriageway subject to a speed limit of 35mph. Street lighting is present along both sides of the road. A pedestrian footway and cycle lane is present on the seaward side of the road. A pedestrian zebra crossing is provided within Link 4.

Link 5 – Bulwer Avenue

11.5.14 Within Link 5, Bulwer Avenue runs southwest along the coastline and is part of the Inter Harbour HGV Route on the island. It begins at the priority junction with Mont Crevelt Lane to the north and becomes Les Bas Courtils at the junction with Les Grandes Maison Road to the southwest. Within Link 5 Bulwer Avenue is a single carriageway road, subject to a speed limit of 35mph. Footways and street lighting is present along the seaward side of the road.

Link 6 – The Bridge / South Quay

11.5.15 South Quay continues as part of the Inter Harbour route which runs northwest from its junction with Church road along the south of St Sampson Harbour providing access to both the harbour and direct frontage to a mix of residential, retail and industrial units. South Quay becomes The Bridge at its junction with Nocq Road. South Quay is a single carriageway road subject to a 25mph speed limit and street lighting. There is a continuous footway lining the landward side and along the seaward side west of La Crocq. On street parking is provided on both sides of the road.

11.5.16 The Bridge (Inter Harbour Route) is a single carriageway road with a 25mph speed limit connecting North Side with South Quay. A service lane runs adjacent to the Bridge providing access to on street-parking and retail properties. The bridge has street lighting present and footways on the eastern and western sides. A zebra crossing is provided to the north of the Nocq junction linking the footways.

Link 7 – North Quay / Castle Road / La Rue du Chateau (North side)

11.5.17 North Quay (part of the Inter Harbour Route) runs eastbound from its roundabout junction with The Bridge along the north of St Sampson Harbour providing access to predominately retail, marine and industrial sites. North Quay becomes a Local Circulation Route at the start of Castle Road (La Rue du Chateau) further eastbound allowing onward travel to the north of the island. North Quay is a single carriageway road subject to a speed limit of 25mph. There is on street parking present on both sides of the road. The road includes street lights and footways are provided on both sides of the road. A zebra crossing facility is provided at the roundabout junction with The Bridge.

Baseline Traffic Flows

11.5.18 Existing traffic flow data for all seven links has been captured from seven day ATC counts commissioned by the SoG and undertaken by a specialist traffic survey company. **Table 11-5** provides a summary of the daily traffic flow for links 1 to 7 within the Traffic and Transport study area.

11.5.19 The assessment uses the term HGV as a proxy for a collective of those vehicle types above 3.5 tonnes (e.g. Other Goods Vehicles, HGVs, buses and coaches) for both baseline data, development generated traffic and the impact assessment.

Table 11-5: Baseline Traffic Data

Link	Description	2019 Background (24hr AADT*)		Data source, type and date
		All vehicles	HGVs	
1	Longue Hougue access road (Project access)	1,285	309	7 day classified ATC (March/April 2019)
2	Bulwer Avenue / Les Bas Courtils (south of Project access)	9,369	872	7 day classified ATC (March/April 2019)
3	Vale Road/Route	11,463	427	7 day classified ATC (March/April 2019)
4	Les Banques	24,377	1,197	7 day classified ATC (March/April 2019)
5	Bulwer Avenue (north of Project access)	8,494	664	7 day classified ATC (March/April 2019)
6	South Side / South Quay	10,386	454	7 day classified ATC (March/April 2019)
7	North Quay / Castle Road / La Rue du Chateau	5,280	500	7 day classified ATC (March/April 2019)
*	24hr AADT – annual Average Daily Traffic (i.e. traffic flows averaged over seven days a week).			

Sustainable Transport

Walking

11.5.20 Walking represents the most sustainable mode of travel. The Chartered Institution of Highways and Transportation (CIHT) document 'Guidelines for Providing for Journeys on Foot', notes that an average walking speed of three miles per hour could be assumed. By this measure, in 15 minutes, a pedestrian could walk approximately 1,200 metres (m) (1.2km) and in 25 minutes, up to 2,000m (2km).

11.5.21 A walking distance of 2km is the maximum desirable commuting distance stated by the CIHT. The 2km walking catchment covers the majority of the areas within The Vale and St Sampson. Other areas such as Maraitaine, Les Monmains, South Side, Richmond, La Robergerie, Saltpans, Braye du Valle, Les Sauvagees, La Tonnelle, Pitronnerie Road Industrial Estate, and Admiral Park can all be reached within the 2km catchment.

11.5.22 Footways (both sides of the road) are provided on the Longue Hougue access road for approximately 140m from the junction with Bulwer Avenue.

11.5.23 The Bulwer Avenue and Longue Hougue access road junction provides a signal-controlled pedestrian facility including associated tactile paving and dropped kerbs.

11.5.24 A footway is provided westbound along the southern verge of Bulwer Avenue for approximately 520m where the road changes to Les Bas Courtils. At this point the footway widens and changes to a footway with a segregated cycle route along much of its length and a shared cycle route/footway for the remainder that allows continuous access to St Peters Port to the south.

11.5.25 A narrow footway is provided along the southern edge of Bulwer Avenue eastbound leading to Southside / South Quay.

11.5.26 No footways are provided along the extent of Longue Hougue Lane directly opposite the Project's access road.

Cycling

11.5.27 Within the traffic and transport study area, the local road network can be split into two distinct categories, roads such as the Inter Harbour Route which is highly trafficked with relatively high average vehicle speeds (circa 29mph) and the minor routes which experience lower traffic volumes and reduced average speeds. Each road type provides a different cycling challenge in terms of cycling safety and pleasantness of journey.

11.5.28 To provide safer travel to cyclists along the highly trafficked Inter Harbour Route, an off-road cycle and pedestrian route is provided along (Les Bas Courtils) that allows continuous access to St Peters Port to the south.

11.5.29 However, there is limited designated cycling infrastructure along the Inter Harbour Route south from the Longue Hougue Access Road to where the off-road cycle route begins on Les Bas Courtils. There are also no dedicated cycling provisions available along the Longue Hougue Access Road. Notwithstanding, traffic flows are relatively low with average vehicle speeds of 18mph, creating an acceptable environment for 'on-road' cycling.

11.5.30 The wider cycle network outside of the traffic and transport study area includes 11 official cycle routes located on the island, with cycle route #11 falling within 700m of the Project site to the northwest via Rue des Monts and cycle route #1 at Vale Castle on Castle Road approximately 2km cycling distance to the north.

11.5.31 Further to the designated cycle routes, Guernsey provides a series of linked minor roads and lanes, known as the Ruette Tranquille Network where cyclists and walkers are signed as having priority and an advisory 15mph speed limit is in place.

11.5.32 Information on the Ruette Tranquille Network can be found online at www.gov.gg/cycling via a SoG leaflet and a specific cycling App for mobile devices.

11.5.33 The CIHT guidance 'Cycle Friendly Infrastructure, Guidelines for Planning and Design[4]' states that three quarters of journeys by all modes are 8km (less than 5 miles) and that this distance could be cycled comfortably by a fit person. This distance corresponds to an approximate 25-minute travel time.

11.5.34 Using 8km as the basis for assessing cycle accessibility of the Project, it is possible to obtain a cycling 'catchment area'. Applying this, and accounting for the topography of Guernsey, the northern half of the island of Guernsey can all be reached by cycling. Travel to the south and west of the island as far as the parishes of St Andrew, St Martin and Castel is also possible.

Public Transport

11.5.35 The 'Guidelines for planning for Public Transport in Developments' published by the Institution of Highways and Transportation recommended a walking distance of less than 400m to the nearest bus stop.

11.5.36 The nearest bus stops to the site are the Grandes Maisons Road (southbound) and the Mont Morin (northbound), both of which are situated on the Grandes Maisons Road. Both bus stops are located approximately 425m away from site compound A and 605m from site compound B. As such, both bus stops fall outside of the recommended maximum distance of 400m (albeit marginally).

11.5.37 The identified bus stops are served by the number 11, 12, 13, 91 and 92 bus services and provide connectivity with key destinations running from the Town Terminus around much of the coast of the island, to L'Ancresse / Pembroke Bays, and to the local centre at L'islet. Further details of these bus services are provided in **Table 11-6** and online at http://buses.gg/routes_and_times.

11.5.38 It is worth noting that as part of the proposals for the recently opened waste facility at Longue Hougue (as detailed within the Chapter 12 of the Waste Development at Longue Hougue Environment Statement (Amec Foster Wheeler, 2015), bus stops were proposed to be provided on Bulwer Avenue (subject to bus operators agreements). At the time of publication of this ES, the waste facility bus stop proposals have not been implemented.

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[4] *Cycle Friendly infrastructure: Guidelines for Planning for Design. The Institute of Highways and Transportation, 10 April 1996.*

Table 11-6: Bus Services

Service No. (Operator)	Route Description	Approximate Daytime Frequency								
		Monday to Friday			Saturday			Sunday		
		First	Frequency	Last	First	Frequency	Last	First	Frequency	Last
11	Town Terminus - L'Ancresse (Mont Morin)	05:00	30 mins	21:00	07:00	30 mins	21:00	07:30	60 mins	19:30
	L'Ancresse - Town Terminus (Grandes Maisons Road)	05:21	30 mins	21:00	07:00	30 mins	21:00	07:30	60 mins	19:30
12	Town Terminus - Pembroke Bay (Mont Morin)	06:15	60 mins	20:15	07:15	60 mins	19:15	10:15	120 mins	18:15
	Pembroke Bay - Town Terminus (Grandes Maisons Road)	06:41	60 mins	20:41	07:15	60 mins	19:15	10:15	120 mins	18:15

Service No. (Operator)	Route Description	Approximate Daytime Frequency								
		Monday to Friday			Saturday			Sunday		
		First	Frequency	Last	First	Frequency	Last	First	Frequency	Last
13	Town Terminus – St Mary's Church (Mont Morin)	06:45	60 mins	18:45	07:45	60 mins	18:45	09:45	120 mins	17:45
	St Mary's Church - Town Terminus (Grandes Maisons Road)	07:10	60 mins	19:10	08:10	60 mins	19:10	10:10	120 mins	18:10
91	Town Terminus – Vazon Bay	09:05	60 mins	19:05	09:05	60 mins	19:05	09:05	120 mins	17:05
92	Town Terminus – Vazon Bay	08:35	60 mins	19:35	06:00	60 mins	19:35	09:35	120 mins	17:35

Summary

11.5.39 The review of the existing sustainable transport options set out above demonstrates that there are good opportunities from the north and south of the Project for personnel and visitors situated on the island to travel by walking within a 2km catchment area. Pedestrian access from the west is limited as Longue Hougue Lane requires pedestrians walking on the road within an industrial area.

11.5.40 Bus provision is adequate with the nearest bus stop falling approximately 25m outside of the recommended 400m maximum walking distance from the site. The existing bus routes serve a large number of residential properties including shops and a medical surgery. Therefore, it is not recommended to introduce a further bus stop closer to the site on Bulwer Avenue reducing the services to the Grandes Maisons Road.

11.5.41 Cycling provision from the south and west is good with dedicated cycling facilities alongside the Inter Harbour Route and off road route such as Delancey Park and dedicated facilities routing past St Sampson's School. However, cycling from the north would require utilising routes such as Vale Avenue and Braye Road with no dedicated cycling provision.

11.5.42 The biggest obstacle to both cycling and walking to the Project site is on the lack of dedicated facilities linking the end of the footway on Longue Hougue access road to the site entrance.

11.5.43 Notwithstanding, proposals were identified in the Waste Facility ES (Amec Foster Wheeler, 2015) to provide a footway/cycle path between Bulwer Avenue junction and the waste facility and a coastal path/cycle path. These proposals should be investigated further as to whether they would further enhance the cycling connectivity to the wider network from the site.

11.5.44 The Outline Traffic Management Plan (OTMP) provided as **Appendix 11.2** examines the validity of sustainable travel in detail and sets out an action plan for reducing single occupancy car travel.

Road Safety

11.5.45 To assess if the project will have an adverse road safety impact, it is necessary to identify any inherent road safety issues within the traffic and transport study area.

11.5.46 The road safety data included in this chapter comprises of collision records reported to the SoG Police Service. Records of collisions include fatal, serious or minor injuries and damage only and have been obtained from the SoG for a five-year period from 2013 to 2017 for the local highway network. The assessment area for the road safety data is graphically depicted in **Figure 11.4**.

11.5.47 **Table 11-7** summarises the number of collisions over the assessment period and **Appendix 11.3** contains the full details provided by the SoG.

11.5.48 A total of 123 collisions occurred within the assessment area, 14.6% of collisions involved vulnerable road users, 5.7% of collisions involved HGVs and 76.4% of collisions caused damage only.

11.5.49 The collision data provided by SoG provides very limited information to accurately assess the causes and exact locations of the collisions. From the information that is available there is evidence of a collision cluster (a concentration of collisions) located at the halfway filter junction between Les Banques and Vale Road.

11.5.50 A total of eight collisions have occurred at the Halfway Filter junction and is therefore considered potentially sensitive to changes in traffic flow and is assessed further in **Section 11.7** and **Section 0**.

11.5.51 For the remainder of the traffic and transport study, there are no particular trends and nothing to suggest any road safety concerns at any of the other junctions or associated links.

Anticipated Trends in Baseline Conditions

11.5.52 To take account of the Island's growth in housing and employment and specifically to the north of the Island within the Parish of St Sampson, vehicle flows within the traffic and transport study area have been factored to provide a forecast future year baseline traffic demand. Growth factors have been derived from a selection of Housing Allocation sites as identified within the SoG Island Development Plan (States of Guernsey, 2016) and agreed with the SoG.

11.5.53 **Table 11-8** provides the five assessed Housing Allocation (HA) sites which would provide the greatest impact in traffic growth in the St Sampson Parish and surrounding area.

11.5.54 To understand how the HA sites would generate traffic, the average dwellings presented in **Table 11-8** have been used for a proportional assessment. **Table 11-9** presents the HA sites with typical build out rates applied to average dwellings over an eight year construction programme as a worst case scenario.

11.5.55 From the programme, a predicted 180 dwellings would have been constructed and occupied during 2021 (the Project peak construction year) and 779 dwellings during the 2024 (the Project peak operational year).

Table 11-7: Summary of Collisions 2013 - 2017

Road	Total	PIC	Minor	Serious	Fatal	Damage Only	Vulnerable	HGVs
La Route Du Braye, Vale	3	3	2	1	0	0	2	0
Northside / North Quay, Vale	11	3	3	0	0	8	1	1
Vale Road, St. Sampson	10	5	4	1	0	5	1	0
The Bridge, Vale	4	0	0	0	0	4	0	0
Braye Du Valle, St. Sampson	2	0	0	0	0	2	0	0
Bulwer Avenue, St. Sampson	21	3	2	1	0	19	0	3
Les Banques, St. Sampson	10	2	1	0	0	8	2	1
Les Bas Courtils, St. Sampson	12	6	6	0	0	6	6	0
Route Militaire, St. Sampson	10	2	2	0	0	8	3	0
Route St. Clair, St. Sampson	3	1	1	0	0	2	0	0
South Side / South Quay, St. Sampson	13	2	2	0	0	11	3	1
The Bridge, St. Sampson	24	4	4	0	0	20	3	0
Totals	123	31	27	3	0	93	21	6

Table 11-8: Housing Allocation Sites

Housing Allocation Sites	Parish	Planning Status / Progress	Units Dwellings		
			Min	Max	Average
Leale's Yard	St Sampson	Permission lapsed moving forward with development framework	200	400	300
Saltpans		Draft development framework published	84	154	119
Pointues Rocques		Development Framework approved	75	125	100
Franc Fief		None	133	263	198
Belgrave Vinery		None	158	285	221.5

11.5.56 The following steps have then been undertaken for each HA site to generate and assign traffic to the highway network:

- Traffic generation for each HA site has been derived by applying the 12hr daily TRICs Trip rates according to the Leale's Yard Transport Assessment (Peter Brett Associates LLP, 2016) to the full build out allocation.
- The resultant daily 12 hour flows has been factored (1.14) to a 24 hour AADT flow.
- The factor was derived from the 12 and 24 hour flows contained within the Project's South Side/ South Quay (Link 6) ATC surveys.
- Each HA site 24 hour AADT flows have been pro-rata by the completed dwellings per assessment year (2021 and 2024).
- Each HA site has been assigned to the highway network via two options
- Existing available assignment information (Leale's Yard, Saltpans); and
- Assumed assignment based on location and expected points of access to the HA sites (Pointues Rocques, Franc Fief, Belgrave Vinery).

11.5.57 A total summation of all five HA site assignments for 2021 and 2024 is presented in **Appendix 11.4**.

11.5.58 The forecast future year flows were compared to the 2019 baseflows and the resultant growth factors are presented in **Table 11-10**.

Table 11-9: *Housing Allocation Assumed Construction Programme*

Housing Allocation Site	Dwelling Build Out Rate Per Year	Construction Programme (Years)	Cumulative Dwellings Yearly Progress							
			2019	2020	2021	2022	2023	2024	2025	2026
Leale's Yard	60	5	0	0	60	120	180	240	300	300
Saltpans	50	2.4	0	0	20	70	119	119	119	119
Pointues Rocques	50	2	0	0	50	100	100	100	100	100
Franc Fief	50	3.96	0	0	50	100	150	198	198	198
Belgrave Vinery	50	4.43	0	0	0	21.5	71.5	121.5	171.5	221.5
Totals			**0**	**0**	**180**	**411.5**	**620.5**	**778.5**	**888.5**	**938.5**
	Longue Hougue South 2021 construction assessment year									
	Longue Hougue South 2024 construction assessment year									
xxxx	Full build out of housing allocation site completed.									

Table 11-10: Future Year Growth Factors

Link	Road	2021 Growth Factors	2024 Growth Factors
1	Longue Hougue access road (Project access)	0.0%	0.0%
2	Bulwer Avenue / Les Bas Courtils (south of Project access)	0.4%	2.6%
3	Vale Road / Route Militaire	1.9%	5.8%
4	Les Banques	0.7%	5.5%
5	Bulwer Avenue (north of Project access)	2.4%	8.9%
6	South Side / South Quay	2.7%	5.4%
7	North Quay / Castle Road / La Rue du Chateau	1.4%	2.7%

11.6 Methodology for EIA

11.6.1 This section describes the methodology and impact assessment criteria used in the traffic and transport assessment.

11.6.2 In the absence of any specific Guernsey traffic and transport environmental assessment guidance, the traffic and transport assessment methodology follows the principles set out in the Guidelines for the Environmental Assessment of Road Traffic' (GEART) (Institute of Environmental Assessment, 1993) and adopts the 'project wide' EIA significance evaluation.

Scale of Assessment

11.6.3 Having identified the study area, GEART suggests application of the following rules to define the extent and scale of the assessment required:

- Rule 1: Include highway links where traffic flows are predicted to increase by more than 30% (or where the number of Heavy Good Vehicles (HGVs) is predicted to increase by more than 30%); and
- Rule 2: Include any other specifically sensitive areas where traffic flows (or HGV component) are predicted to increase by 10% or more.

11.6.4 In justifying these rules GEART examines the science of traffic forecasting and states:

- "*It is generally accepted that accuracies greater than 10% are not achievable. It should also be noted that the day to day variation of traffic on a road is frequently at least some + or -10%. At a basic level, it should therefore be assumed that projected changes in traffic of less than 10% create no discernible environmental impact.*
- *…a 30% change in traffic flow represents a reasonable threshold for including a highway link within the assessment*."

11.6.5 Changes in traffic flows below the GEART rules (thresholds) are assumed to result in no discernible or negligible environmental effects and have therefore not been assessed further as part of this study.

11.6.6 The exception to the GEART rules is the consideration of the effects of driver delay and road safety. These effects can be potentially significant when high baseline traffic flows are evident, and a lower change in traffic flow can be potentially significant. Full details of the methodology adopted for these effects are set out later in this section.

11.6.7 GEART sets out consideration and, in some cases, thresholds in respect of changes in the volume and composition of traffic to facilitate a subjective judgement of traffic impact and significance.

11.6.8 The following environmental effects have been identified as being susceptible to changes in traffic flow and are appropriate to the local area.

Severance

11.6.9 Severance is the perceived division that can occur within a community when it becomes separated by a major traffic artery. The term is used to describe a complex series of factors that separate people from both places and other people. Severance may result from the difficulty of crossing a heavily trafficked road or a physical barrier created by the road itself. It can also relate to relatively minor traffic flows if they impede pedestrian access to essential facilities. Severance effects could equally be applied to residents, motorists, cyclists or pedestrians.

11.6.10 GEART suggests that changes in total traffic flow of 30%, 60% and 90% are considered to be 'slight', 'moderate' and 'substantial' respectively.

Pedestrian and Cycling Amenity

11.6.11 Pedestrian amenity is broadly defined as the relative pleasantness of a journey and is considered to be affected by traffic flow, traffic composition and pavement width and separation from traffic. The definition of amenity also takes into consideration pedestrian fear and intimidation, consideration of the exposure to noise and air pollution, and the overall relationship between pedestrians and traffic.

11.6.12 GEART suggests that a threshold of a doubling of total traffic flow or the HGV component may lead to a negative impact upon pedestrian amenity. This threshold can equally be applied as a proxy for cycling amenity.

Road Safety

11.6.13 The salient GEART guidance on road safety is as follows:

11.6.14 "*Where a development is expected to produce a change in the character of traffic (e.g. HGV movements on rural roads), then data on existing accident levels may not be sufficient. Professional judgement will be needed to assess the implications of local circumstances, or factors which may elevate or lessen the risk of accidents, e.g. junction conflicts*."

Driver Delay

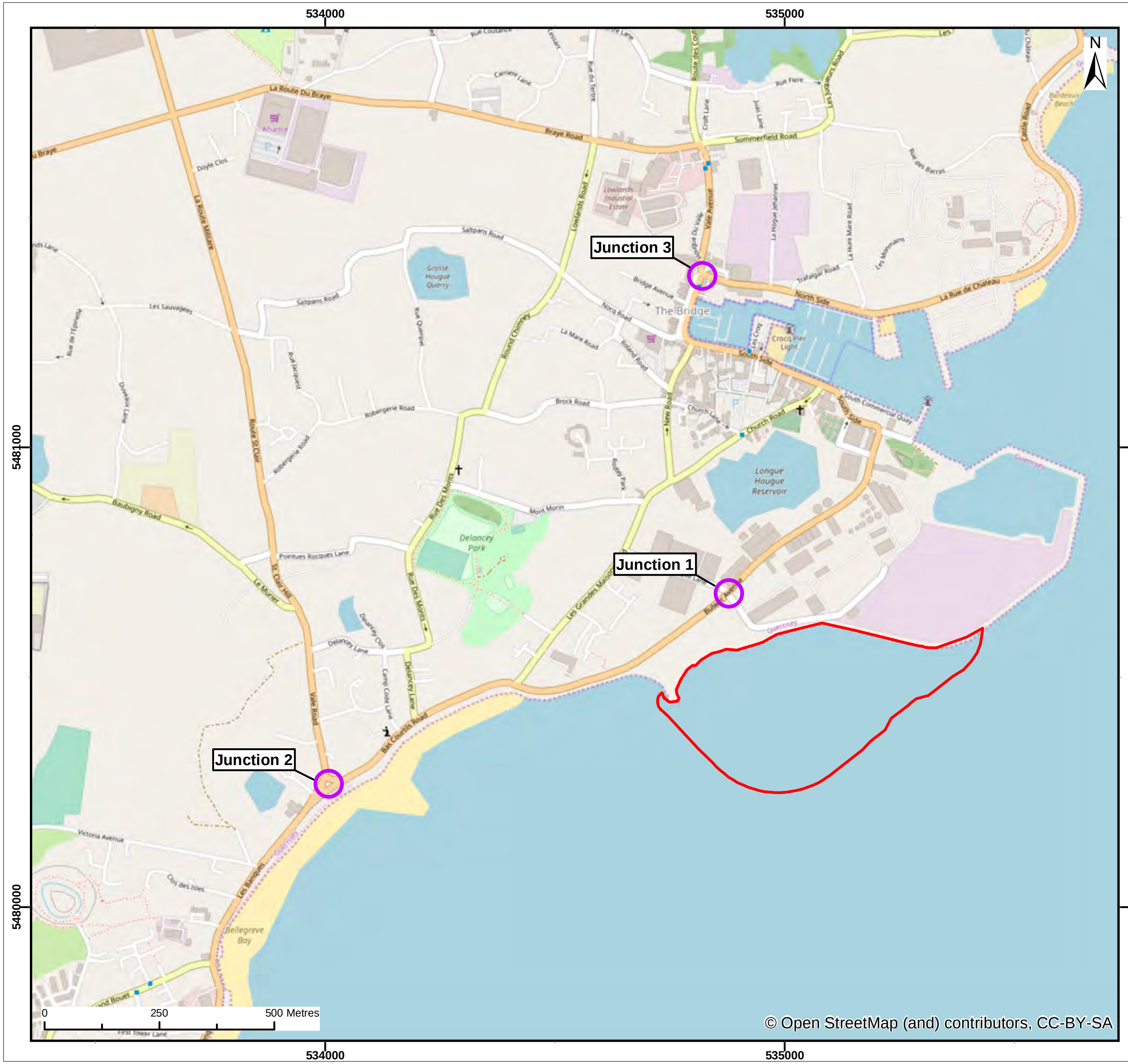
11.6.15 GEART recommends the use of proprietary software packages to model junction delay and hence increased vehicle delays. However, it is noted that vehicle delays are only likely to be significant when the surrounding highway network is at, or close to, capacity.

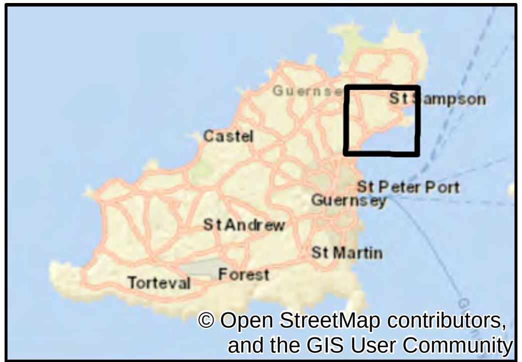
11.6.16 The following three potential sensitive junctions have been identified and require an assessment of potential delays for drivers during peak hours:

- Junction 1: Bulwer Avenue / Longue Hougue South Access Lane / Longue Hougue Lane;
- Junction 2: Les Banques / Les Bas Courtils Road / Vale Road; and
- Junction 3: Vale Avenue / North Side / The Bridge.

11.6.17 **Figure 11-5** details these locations graphically.

11.6.18 The assessment therefore seeks to disaggregate the peak hour traffic movements on to these junctions to facilitate a judgement of the potential significance of the driver delay effects.





Legend:

Outline of Proposed Development

Sensitive Junction Location

Client:	Project:
States of Guernsey	Longue Hougue South EIA

Title:

Sensitive Junction Locations

Figure: 11.5 | Drawing No: PB5312-300-022

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: WGS 1984 UTM Zone 30N

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Other Impacts

11.6.19 Traffic-borne noise and vibration effects and air quality effects will be informed by the traffic data outlined in this chapter. These impacts are assessed in **Chapter 12 Air Quality** and **Chapter 13 Noise and Vibration** respectively.

Receptor Sensitivity

11.6.20 GEART Identifies that it is useful to identify particular groups or locations which may be sensitive to changes in traffic conditions and provides a checklist of sensitive locations and groups: however, the list is not exhaustive and can be added to by the assessor. Sensitive locations include:

- Hospitals;
- Churches;
- Schools;
- Tourist attractions including historical buildings;
- Open spaces and recreational sites;
- Shopping areas; Residential areas; and
- Sites of ecological/nature conservation value.

11.6.21 Sensitive groups include:

- Children;
- The elderly;
- The disabled; and
- People walking and cycling.

Receptor Susceptibility to Changes in Traffic

11.6.22 GEART notes "*the perception of changes in traffic by humans, and the impact of traffic changes on various ecological systems will also vary according to such factors as:*

- *Existing traffic levels;*
- *The location of traffic movements;*
- *The time of day;*
- *Temporal and seasonal variation of traffic;*
- *Design and layout of the road;*

- *Land-use activities adjacent to the route; and*
- *Ambient conditions of adjacent land-uses.*"

11.6.23 A desktop exercise has been undertaken to identify the main sensitive receptors in the traffic and transport study area.

11.6.24 The sensitive receptors within the study area have been assigned to the nearest highway link, and the relationship with the highway environment has been examined to understand the sensitivity of those receptors to change.

11.6.25 **Table 11-11** provides broad definitions of the different sensitivity levels which have been applied to the assessment.

Table 11-11: Link Characteristics

Sensitivity	Definition
High*	High concentrations of sensitive receptors (e.g. local pedestrians, cyclists and residents of Longue Hougue South) and limited separation provided by the highway environment. Defined Collision Clusters Junctions with negative spare capacity.
Medium	A low concentration of sensitive receptors (e.g. residential dwellings, pedestrian desire lines, etc.) and limited separation from traffic provided by the highway environment.
Low	Few sensitive receptors and / or highway environment that can accommodate changes in volumes of traffic.
Negligible	Links that fall below GEART Rule 1 and 2 screening thresholds.

** High sensitivity links are considered to be 'specifically sensitive areas' for the purpose of GEART Rule 2.*

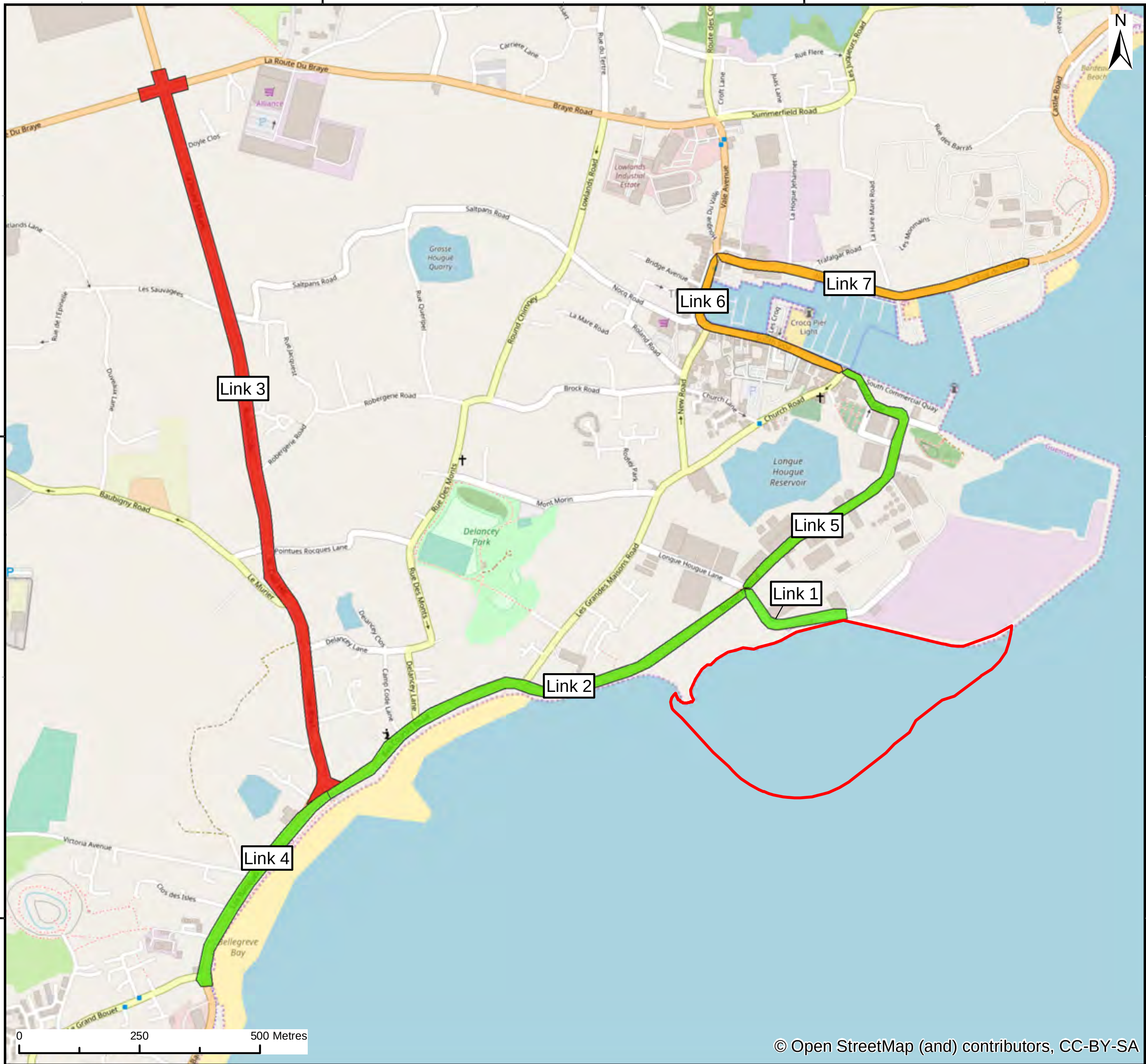
11.6.26 All seven links contained within the traffic and transport study have been assessed and assigned sensitivity. **Table 11-12** summarises the links and the rationale for the applied sensitivity and **Figure 11-6** illustrates this.

Impact Evaluation

11.6.27 **Table 11-13** details the assessment framework used herein adapted from GEART. These thresholds are guidance only and provide a starting point from which additional evidence (for example more detailed traffic analysis and site observations) and professional judgement will inform an analysis of the magnitude of effect.

Table 11-12: Link Sensitivity

Link ID	Link description	Link sensitivity	Rationale
1	Longue Hougue access road (Project access)	Low	Link adjoins to Bulwer Avenue to the southeast. At the north-western end of the link, there are a small number of residential properties, with property that has direct frontage to the link. Footways are provided on both sides of the road to link these properties to Bulwer Avenue. The link curves to the east where there are a number of commercial units with direct frontage development.
2	Bulwer Avenue / Les Bas Courtils (south of Project access)	Low	Part of the Inter Harbour HGV route. Between Bulwer Avenue and Les Bas Courtils, there are a number of residential properties which front onto the footway.
3	Vale Road / Route Militaire	High	There are a large number of residential properties and a public house that front directly on to the road with no footway provision (western verge).
4	Les Banques	Low	Part of the Inter Harbour HGV route. There are residential properties and a public house that front directly on to the road.
5	Bulwer Avenue (north of Project access)	Low	Part of the Inter Harbour HGV route. There are commercial properties that front directly on to the road.
6	South Side / South Quay	Medium	Part of the Inter Harbour HGV route. There are residential properties and commercial units set slightly back from the road with limited segregation of road traffic.
7	North Quay / Castle Road / La Rue du Chateau	Medium	Part of the Inter Harbour HGV route. There are commercial units and a small number of residential properties which front onto the footway.



Legend:

Outline of Proposed Development

Link Sensitivity

High

Medium

Low

Client:	Project:
States of Guernsey	Longue Hougue South EIA

Title:

Link Sensitivity

Figure: 11.6 | Drawing No: PB5312-300-017

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: WGS 1984 UTM Zone 30N

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Table 11-13: Traffic and Transport Assessment Framework

Effect	Magnitude of effect			
	Very low	Low	Medium	High
Severance	Changes in total traffic flows of less than 30%.	Changes in total traffic flows of 30 to 60%.	Changes in total traffic flows of 60 to 90%.	Changes in total traffic flows of over 90%.
Pedestrian and cycling amenity	Change in traffic flows (or HGV component) less than 100%.	Greater than 100% increase in traffic (or HGV component) and a review based upon the quantum of vehicles, vehicle speed and pedestrian footfall.		
Road safety	Informed by a review of existing collision patterns and collision clusters based upon the existing personal injury collision records and the forecast increase in traffic.			
Driver delay (capacity)	Informed by projected traffic increases through sensitive junctions within the study area and further detailed junction modelling analysis as required.			

Impact Significance

11.6.28 **Table 11-14** sets out the assessment matrix adopted for routes that meet the screening criteria (Rule 1 and 2). This combines the assessment of the magnitude of effect, derived from the framework included in **Table 11-13**, with the receptor value presented in **Table 11-12** in order to determine the significance of the predicted impact.

Table 11-14: Impact Significance Matrix

Receptor / link sensitivity	Magnitude of effect			
	High	Medium	Low	Very Low
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Negligible	Negligible

11.6.29 The predicted impact is then further evaluated against the criteria of timescale, frequency and extents to refine the predicted impact determination.

11.6.30 Note for the purposes of the EIA, major and moderate impacts are deemed to be significant. In addition, whilst minor impacts are not strictly considered to be significant in their own right, it is important to distinguish these from other non-significant impacts, as they may contribute to significant impacts cumulatively or through impact interactions.

Cumulative Impact Assessment

11.6.31 **Chapter 5 EIA Methodology** provides a general methodology with regards to the CIA.

11.6.32 The potential for cumulative effects has been considered for the construction and operation of the project cumulatively with other relevant projects.

11.6.33 Cumulative impacts are discussed where the traffic and transport study area has the potential to overlap with similar impacts arising from:

- developments highlighted in policies such as the Island Development Plan;
- developments consented and built but not yet operating;
- developments consented but not yet constructed (or completed);
- developments in the consenting process but no decision made; and
- developments known to be likely applications (consultation underway) in the near future.

11.6.34 The CIA involves consideration of whether impacts on a receptor can occur on a cumulative basis between the project and other activities, projects and plans for which sufficient information regarding location and scale exist.

11.6.35 For further details of the methods used for the CIA for traffic and transport, see **Section 11.9**.

11.7 Impacts During Construction Phase

11.7.1 This section forecasts the traffic generated by the construction of the proposed Project construction works and distributes vehicle trips to the traffic and transport highway study area to establish a basis for assessing the potential transport impacts during the construction phase.

11.7.2 The construction phase will involve building a rock breakwater that will form a perimeter wall inside which, will be the location for infilling of residual inert waste for the Project. Further details can be found within **Section 4.4**.

Construction Programme

11.7.3 Construction is anticipated to take up to 20 months (best case scenario), though this is highly dependent on contractor engagement and rock sourcing, as well as timings and seasonality. If the availability of rock and transhipment barges proves troublesome then construction programme may increase up to 36 months (worst-case scenario). The best and worst case programme is provided in **Section 4.4.**

Traffic Demand (Construction)

11.7.4 The predicted increase in traffic volumes attributable to the construction phase has been derived by ways of a 'first principles' approach whereby vehicle movements are derived from an understanding of the likely requirement for material and resource profiled to an indicative construction programme.

11.7.5 Construction of the breakwater will be undertaken using predominantly land-based equipment and techniques. For deeper sections, if the reach of land-based equipment is not sufficient, floating equipment may be required. The crest of the breakwater's core will be used as a temporary construction road during the construction process; notably when the breakwater height is lower (and the access wider) vehicles will be able to pass each other. However, when the breakwater is higher (and narrower) only single lane access will be possible.

11.7.6 Prior to construction starting, a compound will be erected (see **Figure 4-3**) within the existing landscaped area of waste facilities. Access would be through the gates of the current Inert Waste Reclamation Facility, across to its seaward perimeter and then down alongside the WTS area and through the perimeter bund of the current site (**Figure 4-3**).

11.7.7 The compound will comprise temporary cabins and facilities enclosed by fencing. The compound will also have marked areas for parking, plant, material laydown and other storage areas. Security fencing that matches the WTS (approximately 2.4m high) will be placed around the perimeter of the site and will include two sets of double gates. The perimeter fencing will remain in situ for the duration of the operational phase.

HGV Traffic Demand (Construction)

11.7.8 **Table 4-1** presents the list of key significant volumes of materials predicted to be delivered to site and the indicative maximum HGV generation forecasts (note the schedule uses the term 'wagons' to describe HGVs).

11.7.9 It is very unlikely that the quantity of rock (800,000 tonnes) required to construct the outer layers breakwater will be available on the Island. It is assumed that the rock will be delivered by boat from another country (most likely Norway or France), arriving on a large vessel (i.e. 20,000 tonne barge) and then transferred to shore using smaller 1,500 tonne barges in one of two ways:

- **Option 1: Shoreline deposition -** the smaller barge would arrive at the site at high tide to deliver the rock onto the shoreline within the Longue Hougue South site (see **Figure 4-3**). The barge will either comprise a hopper barge whereby the hopper would open and the rock would be deposited underwater but in an area which will become exposed at low tide, or be deposited from the barge using an excavator. Once on the shore the rock will be transported to the storage area by excavators.
- **Option 2: Berth based deposition** – essentially the smaller barge would berth at the north end of Longue Hougue (where barges berthed for the Longue Hougue Construction and trucks would transfer the rock to a stockpile in the existing Longue Hougue site (see **Figure 4-3**) before being transported to Longue Hougue South for placement.

11.7.10 The inner core of the breakwater will be constructed predominately using quarry run core (550,000 tonnes). Delivery of quarry run material will use a combination of imported rock, existing stockpiled inert waste and quarry run material from elsewhere on the island. It is estimated approximately 15% (78,000 tonnes) (**Table 4-1**) will be supplied by local quarries and delivered via road. This is highly dependent upon the availability of material from local quarries, however, it is included to ensure that the assessment captures the full impact of lorry movements on the island.

11.7.11 The quarry run material from elsewhere on the island will be transported to site using a fleet of 10t payload dump trucks (to be referred to as 'HGVs' for the remainder of this chapter).

11.7.12 Based on a working day of 10 hours (within a 12 hour delivery window, typically 0700 to 1900), it is expected that there will be 15 HGV deliveries per day equating to a total of 30 daily HGV movements.

11.7.13 It is anticipated that delivery of material will take between 12 and 18 months, depending on the availability of barges and the proportion of material imported from local quarries. Under the shoreline deposition material delivery option, the rock would be stockpiled within the area to be infilled during operation as close to the working area as possible, whilst allowing barges to safely access at high tide to deposit rock armour, or it will be stockpiled at the north-east end of Longue Hougue after being taken off by a barge berthed to the north of Longue Hougue. Under the barge berth material delivery option, material will be stockpiled at the north-east end of Longue Hougue (see **Figure 4-3**) and would be transported to site for placement as necessary, being transported around the landward edge of Longue Hougue. Neither options will require any transfer of material by HGV on the public highway.

11.7.14 The land-based equipment used in construction will include:

- Two (long reach) excavators for transporting and dumping core material and rock underlayer;
- Two (long reach) excavators / cranes for:
  - Material handling at the stockpile;
  - Shaping of the (sides of the) core;
  - Placement of the underlayer over the core;
  - Placement of the geotextile by means of a frame (if required);
  - Placement of the armour rock; and
  - Placement of the toe construction rock;
- Two bulldozers for levelling and shaping of the crest of the core after it is dumped by the trucks; and
- Three dump trucks for transport of the primary armour rock from the stockpile to the site.

Employee Traffic Demand (Construction)

11.7.15 The project engineering consultants have provided details of the expected resourcing requirements during the construction programme. Based on this input, it is estimated that a typical workforce of 25 employees (including office-based staff) will be required per day. There may be instances where a maximum of 50 construction workers may be on site at any one time, however this would be an exception and unlikely to occur. Thus, 25 construction workers have been used throughout this assessment as a worst-case scenario.

11.7.16 It is envisaged construction workers will predominately work during the hours of 0700 to 1900. However, as the construction of the Breakwater is likely to be carried out any time during the day and night due to the tidal nature of the site, thus resulting in personnel on site day and night for some durations.

HGV Distribution and Assignment (Construction)

11.7.17 During construction, the majority of inner core breakwater materials will be comprised of imported rock, existing stockpiled inert waste and quarry run material from elsewhere on the island. At this stage, as a definitive source of materials sourced on the island are unknown, it has been assumed that the total peak HGV demand would be assigned to the west (Link 4), the north (Link 3) and the east (Link 7).

Construction Worker Distribution and Assignment (Construction)

11.7.18 The construction worker distribution has been based on the Islands population contained within each Parish. Parish population data has been sourced from Table 6.1.1 of the Guernsey Annual Electronic Census Report (States of Guernsey, 2019). For each parish, one to three population activity centres were identified, and percentages of each parish population was assigned and are shown graphically in **Figure 11-7**. The centres of activity and related percentages form the basis of a gravity model, **Appendix 11.5** details the distribution and final assignment of construction workers to the traffic and transport study area.

Traffic Impact Screening (Construction)

11.7.19 With reference to the GEART (Rule 1 and Rule 2), a screening process has been undertaken for the traffic and transport study area to identity routes that are likely to have an increase in traffic flows that would require further impact assessment.

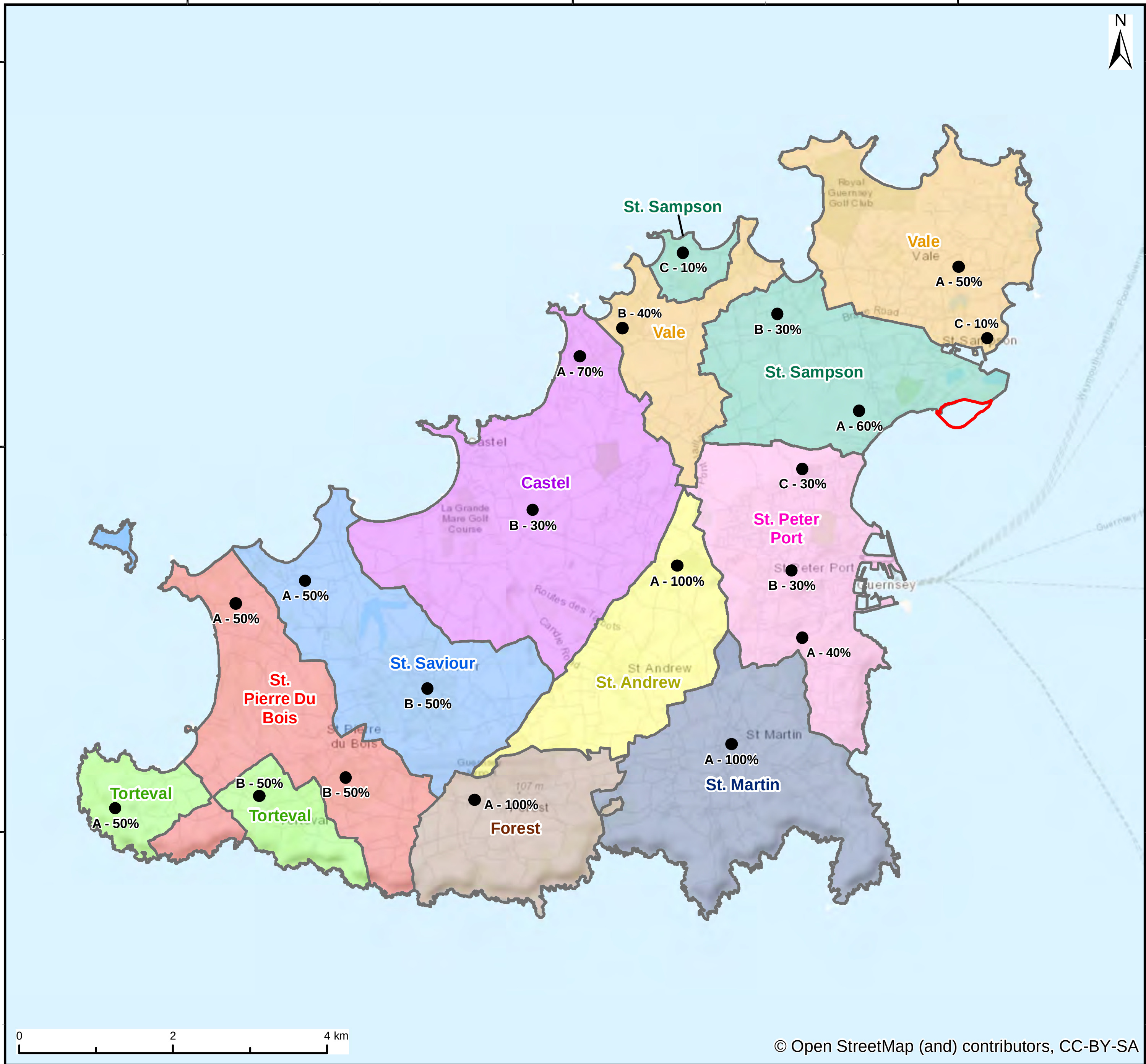
11.7.20 **Table 11-15** summarises the assigned daily peak vehicle movements (i.e. arrivals and departures) of all materials, personnel and plant for peak construction when distributed across the traffic and transport study area.

11.7.21 **Table 11-15** also provides a comparison of the peak daily construction movements with the forecast background daily traffic flows for 2021 (assumed worst cast realistic start of construction) and identifies the screened links.

11.7.22 It is noted from **Table 11-15** that all links (1 to 7) are below the GEART screening thresholds with the greatest increase on the public highway network occurring on link 1 (total vehicles increasing 6.2% over baseline and a HGV increase of 9.7%). These increases are considered negligible and are therefore not considered further within the impact assessment for the assessment of Severance and Pedestrian Amenity.

CONSTRUCTION IMPACT 11.1: Road Safety

11.7.23 As detailed in **paragraph 11.5.50**, only one collision cluster was identified from the available personal Injury Collision data. **Table 11-16** provides a summary of the collision cluster and includes details of the peak increase in daily construction flows in comparison to the forecast background daily traffic flows in 2021.



Legend:

Outline of Proposed Development

Activity Centre

Parish Boundary

- Vale
- St. Sampson
- Castel
- St. Peter Port
- St. Andrew
- St. Saviour
- St. Pierre Du Bois
- St. Martin
- Forest
- Torteval

Client: States of Guernsey

Project: Longue Hougue South EIA

Title: Parishes, Population Centres of Activity

Figure: 11.7

Drawing No: PB5312-300-023

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	14/08/2019	FC	PT	A4	1:75,000

Co-ordinate system: WGS 1984 UTM Zone 30N

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Table 11-15: Link Screening (Construction)

Link	Description	Link Sensitivity	Background 2021 Flows (24hr AADT*)		2021 Peak Daily Construction Vehicle Movements		Percentage Increase	
			All vehicles	HGVs	All vehicles	HGVs	All vehicles	HGVs
1	Longue Hougue access road (Project access)	Low	1,285	309	80	30	6.2%	9.7%
2	Bulwer Avenue/Les Bas Courtils (south of Project access)	Low	9,407	875	75	30	0.8%	3.4%
3	Vale Road/ Route Militaire	High	11,684	435	40	30	0.3%	6.9%
4	Les Banques	Low	25,540	1,205	65	30	0.3%	2.5%
5	Bulwer Avenue (north of Project access)	Low	8,696	680	35	30	0.4%	4.4%
6	South Side/South Quay	Medium	10,664	466	35	30	0.3%	6.4%
7	North Quay/Castle Road/La Rue du Chateau	Medium	5,356	507	31	30	0.6%	5.9%

11.7.24 In accordance with GEART only those links that are showing greater than a 10% increase in total traffic flows (or HGV component) for sensitive links, or greater than 30% increase in total traffic or HGV component for all other links, are considered when assessing the traffic impact upon receptors.

Table 11-16: Collision Cluster Information

Link	Cluster Ref No.	Description	% increase		Summary
			All vehicles	HGVs	
2 / 3 / 4	1	Les Banques / Bas Courtils Road / Vale Road	0.3% - 0.8%	2.5% - 6.9%	It is considered that a peak change in total traffic of 0.8% and HGV traffic of 6.9% represents a very low magnitude of effect on a potentially highly sensitive receptor. Therefore, the impact is assessed as minor adverse.

11.7.25 **Table 11-16** Identifies that the single collision cluster within the traffic and transport study area would experience very low magnitude of effect on a highly sensitive receptor resulting in a **minor adverse** impact.

CONSTRUCTION IMPACT 11.2: Driver Delay

11.7.26 The GEART screening thresholds do not apply to this effect as the potential impact is defined as significant when the traffic system surrounding the proposed project under consideration is at or close to capacity.

11.7.27 To provide a robust assessment the peak construction traffic has been derived based on the following worst-case assumptions:

- The predicted 30 HGV movements are to be divided by 10 based on a working day of 10 hours within a 12-hour delivery window (typically 0700 to 1900). This would result in 3 HGV movements in any one hour.
- The total predicted 25 construction workers have been applied to the morning arrival and evening departure times. This would result in 25 movements in the two identified hourly periods.

11.7.28 The project's AM peak hour traffic demand has been assigned to the identified sensitive junctions to facilitate an assessment of impact significance. **Table 11-17** details the resultant traffic flows at the junctions during the network AM peak hour.

11.7.29 As identified in **Table 11-17,** the worst-case additional traffic associated with the construction of the Project occurs at Junction 1, the signalised junction of Bulwer Avenue and Longue Hougue Access Road. A total of 28 vehicles (three HGVs and

25 light vehicles). Junction 2 and 3 predict total vehicles of 25 and 5.4 vehicles respectively.

Table 11-17: Project Peak Hour Traffic Movements Through Sensitive Junctions

Junction	Junction arm	Arrivals per arm		***% increase over Future 2018 - AM (Total Vehicles)
		Light vehicles**	HGVs	
Junction 1: Signalised junction of the Bulwer Avenue / Longue Hougue Access Road / Longue Hougue Lane	Bulwer Avenue (west)	23	*1.5	
	Longue Hougue Lane	0	0	
	Bulwer Avenue (east)	2	1.5	
	Longue Hougue Access Road	0	*1.5	
Total arrivals		25	3	2.11% (1,326)
Junction 2: Northern Priority junction of the Les Banques / Vale Road / Les Bas Courtils Road	Les Banques	18	*1.5	
	Vale Road	5	*1.5	
	Les Bas Courtils Road	0	1.5	
Total arrivals		23	3	1.3% (1,911)
Junction 3: Roundabout junction of Vale Avenue / North Quay / the Bridge	North Quay	1	1.5	
	The Bridge	0	1.5	
	Vale Avenue	2	0	
Total arrivals		3	3	0.6% (1,007)
*	As a worst case, HGVs have been assigned to all potential origin locations. Total figures for junctions only include for one origin.			
**	Total junction movements taken from Figure 5.5 of the WTS ES chapter (Amec Foster Wheeler, 2015) Future 2018 – AM Scenario for comparison purposes.			

11.7.30 During consultation with the SoG, concern was raised with existing capacity issues in regards to Junction 2, colloquially known as the 'Halfway Filter' junction. The junction is located in a strategically important location linking Les Bas Courtils Road with Vale Road.

11.7.31 The junction is complex in nature and thus the junction has been split into two separate entities and described below.

Northern Junction

11.7.32 The northern junction is a priority junction with three main arms which are as follows:

- Les Bas Courtils Road to the North;
- Les Banques to the south; and
- Vale Road to the west.

11.7.33 The junction allows free flow of traffic north and south, a left turn only movement from Vale Road and a dedicated right turn lane from Les Bas Courtils Road.

Southern Junction

11.7.34 The southern junction is a 'filter' junction with three main arms which are as follows:

- Les Bas Courtils Road to the north;
- Les Banques to the south; and
- Vale Road to the west.

11.7.35 The junction allows north and south movements, a right turn from Vale Road and a unopposed left turn priority lane from Les Banques into Vale Road.

11.7.36 The junction operates a Filter-In-Turn, which is a unique junction operation to Guernsey where all directions at the junction have equal priority as prescribed by No 32 of the Guernsey Highway Code. In addition, guidance from Guernsey Police suggest if vehicles arrive at the filter at the same time then vehicles should give way to traffic from their right, then filter-in-turn when the box junction is clear.

11.7.37 Traffic associated with the Project which would negotiate the junction as shown in **Table 11-18** in the following way

11.7.38 Due to the operational complexities of the junction, the WTS ES chapter (Amec Foster Wheeler, 2015) contained separate junction modelling for each of the northern and southern junctions of the Halfway Filter. The following paragraphs present the results of that modelling and compares to the Project construction traffic to understand the likely impacts that the junction would experience.

Table 11-18: Project Traffic Flows Through Halfway-Filter Junction

Movement	Type	AM Movements		PM Movements	
		Light vehicles	HGVs	Light Vehicles	HGVs
Northern Junction					
Vale Road to Les Bas Courtils	Stop Line	5	**1.5	0	**1.5
Les Bas Coutils to Vale Road	Right turn lane	0	**1.5	5	**1.5
Les Banques to Les Bas Courtils	South to north unopposed	18	*1.5	0	*1.5
Les Bas Courtils to Les Banques	North to south unopposed	0	*1.5	18	*1.5
Total movements		**23**	**3**	**23**	**3**
*if all HGV traffic originated from the south (Les Banques – Link 4) **If all traffic originated from the west (Vale Road – Link 3)					
b					
Les Banques to Vale Road	Priority left turn lane	0	0	0	0
Les Banques to Les Bas Courtils	South to north through filter	18	1.5	0	1.5
Les Bas Courtils to Les Banques	North to south through filter	0	1.5	18	1.5
Vale Road to Les Banques	West to south through filter	0	0	0	0
Total movements		**18**	**3**	**18**	**3**

11.7.39 The WTS ES results for the northern junction found that in isolation, the junction operated well below capacity with a highest RFC on both Vale Road to Les Bas Courtils Road and Les Bas Courtils Road to Vale Road of only 0.060 during the Future 2023+Committed+Development Scenario.

11.7.40 When comparing the Project construction traffic of 26 additional vehicles to the additional traffic forecasts in **Table 11-19**, it can be assumed that the likely results would fall between the 2018 + Development scenario (0.050 RFC) and 2023 + Development + Committed Development Scenario (0.060 RFC) and thus would continue to operate well below capacity.

Table 11-19: Waste Facility ES (2015) Northern Halfway Filter Junction Capacity Results

WTS Assessment Scenario	Total junction movements	AM Results			
		Additional Traffic	RFC	Queue	Delay (mins/Veh)
2015	1487	-	0.040	0	0.11
2018	1504	+17	0.050	0	0.12
2018 + Development	1525	+21	0.050	0	0.12
2023 + Development + Committed Development	1607	+82	0.060	0	0.13

11.7.41 Within the Waste Station ES, the southern part of the junction was modelled as two separate models to best replicate the unique operation of a Filter-in-turn junction and as such the following model priorities were undertaken.

- North-south manoeuvres having priority (Les Bas Courtils Road / Les Banques).
- Right turn having priority (Vale Road).

11.7.42 The results were combined and interpolated to provide an indication of the junction's operation. The assessment further considered that there is no meaningful way of calculating delay, but that the presence of lengthy queues would suggest delays would be high.

11.7.43 The results of the combined analysis for the 2015 baseline scenario shown in **Table 11-20** indicate that the junction is operating significantly over capacity with a maximum RFC of 1.35 which is significantly over the 0.85 recognised threshold for RFC.

Table 11-20: Waste Facility ES (2015) Southern Halfway Filter Junction Capacity Results

WTS Assessment Scenario	Total junction movements	AM Results			
		Additional Traffic	RFC	Queue	Delay (mins/Veh)
2015	1,487	-	1.350	51	-
2018	1,504	+17	1.380	56	-
2018 + Development	1,525	+21	1.360	54	-
2023 + Development + Committed Development	1,607	+82	1.470	69	-

11.7.44 When comparing the Project construction traffic of 21 additional vehicles to the Waste Facility forecast additional traffic in **Table 11-20**, it can be assumed that the results would likely fall between the 2018 + Development scenario (1.360 RFC) and 2023 + Development + Committed Development Scenario (1.470 RFC) and thus would continue to operate well above capacity.

11.7.45 As the junction significantly exceeds the RFC threshold of 0.85, the increase of 21 Project construction vehicle movements would not constitute a material impact with a small amount of queuing occurring between 54 and 69 vehicles. Based on the total approach traffic flow during the AM peak hour of 1467 movements during the 2015 base year scenario, then an additional 21 vehicle movements would result in an increase of 1.43% and therefore classed as negligible and in keeping with daily fluctuations.

Driver Delay Summary

11.7.46 The increase in traffic identified at each sensitive junction would not be discernible from daily traffic fluctuations. The magnitude of effect of the combined profile of HGVs and construction workers is therefore assessed as very low on a high value receptor resulting in a **minor adverse** impact.

11.8 Impacts During Operation

Trip Generation and Assignment

11.8.1 A realistic worst-case traffic demand has been developed by examining:

- Potential additional HGV demand in excess of existing inert waste traffic movements;
- Likely shift patterns; and
- The distribution of traffic.

11.8.2 The assumptions that underpin the worst case are discussed in this section.

HGV Traffic Demand, Distribution and Assignment (Operation)

11.8.3 The operational facility will be located on existing reclaimed land at Longue Hougue (**Figure 4-4**). Over time as infilling works progress, operational activities (such as recycling) will move onto the reclaimed area at the north-east corner of Longue Hougue South. Further details of the traffic demand are discussed within the HGV Demand, Distribution and Assignment (Operation) sections (**paragraph 11.8.6** to **paragraph 11.8.16**).

11.8.4 The site will be operational from 2023 at the earliest and will be receiving and processing waste between 0800 to 1600 Monday to Friday. The site is not operational on weekends or Bank Holidays.

11.8.5 The operational phase will follow a Site Working Plan as described in **Section 4.5**. The following steps has been reproduced here for context.

- Material arrives at the gatehouse and is weighed and checked by the site operative, and payment taken;
- At the same time the material is checked any material in the load that can be recycled will be extracted and stockpiled / recycled on site;
- Vehicles will be marshalled on site and shall be offloaded at appropriate location on site. The tipped load will be inspected. Topsoil received will be stockpiled for alternative use, and any vegetation shall be composted off-site. Any putrescible material will be reloaded onto the vehicle and for the customer to dispose of appropriately;
- Waste stockpiles will be consolidated and moved into the land reclamation area to a line and level in accordance with the Site Working Plan.

HGV Demand (Operation)

11.8.6 The most recent assessment of the capacity of the existing Longue Hougue Reclamation Site provides an accurate and up-to-date picture of the Island's inert waste stream. The worst-case scenario for this assessment would see capacity reached in 2021 before the earliest start of operation of 2023 of Longue Hougue South. A more conservative case would see capacity of the site reached by mid-2022 to 2024 approximately, based on the forecast assumptions at that time. It is expected that transfer of operations would occur once the existing site has reached capacity and Longue Hougue South would begin operation. It is not envisaged that both sites would be in operation at the same time.

11.8.7 To understand the potential traffic demand associated with the operational phase of the Project it is necessary to understand the existing and proposed forecast traffic movements at the site location.

11.8.8 Vehicle movements to and from Longue Hougue and the other associated waste facilities are counted on a regular basis. Consequently, utilising historic data and future predictions the predicted traffic volumes with an inert waste facility being constructed are presented within **Table 11-21** which has been reproduced from **Table 4-4**.

11.8.9 As shown in **Table 11-21,** the operational year of 2024 provides the worst-case daily traffic movements when Longue Hougue South would be in operation.

11.8.10 **Table 11-22** provides a direct comparison between the traffic volumes of the reference year of 2019 and the peak predicted operational year of 2024 for the Longue Hougue Waste Sites.

11.8.11 The results shown in **Table 11-22** show an increase in 2024 of 54 HGV, 60 van, and 0 car daily movements associated with the opening of the Project. Thus, the total increase of 114 vehicle movements will be distributed and assigned to the traffic and transport study area.

11.8.12 Maintenance activities on the site would be limited to maintaining the operational infrastructure such as ensuring the fencing is secure, maintenance of related buildings in the operational footprint of the site and monitoring and maintenance of rock armour. These activities would be limited in scale and likely duration of work or volumes of personnel / equipment / materials required and would be negligible when compared to the daily operational vehicle movements associated with site use.

Table 11-21: Traffic Movements (Into and Out of) the Longue Hougue Waste Sites with Longue Hougue South in Operation

Year	Annual movements			Monthly movements			Weekly movements			Daily movements			Hourly movements		
	HGV	Van	Car	HGV	Van	Car	HGV	Van	Car	HGV	Van	Car	HGV	Van	Car
2019	51,080	18,767	224,454	4,257	1,564	18,705	1,011	370	4,454	202	74	757	25	9	94
2020	49,544	17,886	224,454	4,129	1,491	18,705	980	353	4,454	196	71	757	25	9	94
2021	48,249	23,716	224,454	4,021	1,976	18,705	955	468	4,454	191	94	757	24	12	94
2022	57,209	29,255	224,454	4,767	2,438	18,705	1,132	577	4,454	226	115	757	28	14	94
2023	60,122	31,092	224,454	5,010	2,591	18,705	1,189	613	4,454	238	123	757	30	15	94
2024	64,582	33,905	224,454	5,382	2,825	18,705	1,278	669	4,454	256	134	757	32	17	94
2025	58,944	30,456	224,454	4,912	2,538	18,705	1,166	601	4,454	233	120	757	29	15	94
2026	58,363	30,090	224,454	4,864	2,507	18,705	1,155	593	4,454	231	119	757	29	15	94
2027	57,724	29,687	224,454	4,810	2,474	18,705	1,142	586	4,454	228	117	757	29	15	94
2028	57,021	29,243	224,454	4,752	2,437	18,705	1,128	577	4,454	226	115	757	28	14	94
2029	56,248	28,756	224,454	4,687	2,396	18,705	1,113	567	4,454	223	113	757	28	14	94
2030	55,397	28,219	224,454	4,616	2,352	18,705	1,096	557	4,454	219	111	757	27	14	94
2031	54,462	27,629	224,454	4,538	2,302	18,705	1,077	545	4,454	216	109	757	27	14	94
2032	53,432	26,980	224,454	4,453	2,248	18,705	1,057	532	4,454	211	106	757	26	13	94
2033	52,300	26,266	224,454	4,358	2,189	18,705	1,035	518	4,454	207	104	757	26	13	94
2034	51,055	25,481	224,454	4,255	2,123	18,705	1,010	503	4,454	202	101	757	25	13	94
2035	49,685	24,617	224,454	4,140	2,051	18,705	983	486	4,454	197	97	757	25	12	94
2036	49,848	24,719	224,454	4,154	2,060	18,705	986	488	4,454	197	98	757	25	12	94
2037	49,848	24,719	224,454	4,154	2,060	18,705	986	488	4,454	197	98	757	25	12	94

Year	Annual movements			Monthly movements			Weekly movements			Daily movements			Hourly movements		
	HGV	Van	Car	HGV	Van	Car	HGV	Van	Car	HGV	Van	Car	HGV	Van	Car
2038	49,848	24,719	224,454	4,154	2,060	18,705	986	488	4,454	197	98	757	25	12	94
2039	49,848	24,719	224,454	4,154	2,060	18,705	986	488	4,454	197	98	757	25	12	94
2040	49,848	24,719	224,454	4,154	2,060	18,705	986	488	4,454	197	98	757	25	12	94
2041	49,848	24,719	224,454	4,154	2,060	18,705	986	488	4,454	197	98	757	25	12	94
2042	49,848	24,719	224,454	4,154	2,060	18,705	986	488	4,454	197	98	757	25	12	94
2043	49,848	24,719	224,454	4,154	2,060	18,705	986	488	4,454	197	98	757	25	12	94
	Existing residual inert waste volumes (2019)														
	Worst case peak residual inert waste forecast volumes (2024)														
xxxx	Potential period where the existing reclamation site and Longue Hougue South transfer operations.														

Table 11-22: Existing vs Peak Traffic Movements at Longue Hougue Waste Sites

Year	Annual movements			Daily movements			Hourly movements		
	HGV	Van	Car	HGV	Van	Car	HGV	Van	Car
2019	51,080	18,767	224,454	202	74	757	25	9	94
2024	64,582	33,905	224,454	256	134	757	32	17	94
Net increase	3,502	15,138	0	54	60	0	7	8	0

11.8.13 It is worth reiterating that previous annual traffic movements associated with the existing inert waste deposit facility site have historically generated higher annual Tonnage of inert waste (see **Figure 4-5**) than what is to be assessed within the Longue Hougue South operational assessment. Notwithstanding, by using the traffic demand methodology set out within this section, the assessment will highlight any areas where potential impacts could be experienced through changes in link sensitivity or updated assessment methodology.

HGV Distribution and Assignment (Operation)

11.8.14 The vast majority of inert material destined for the Project would originate from the commercial sector (as is the case for the existing inert waste deposit site). It is considered appropriate to base the distribution of HGVs through the employment land contained within each of the Island's parishes. Precedent for the outlined distribution methodology was set out within the Chapter 12 of the Waste Development at Longue Hougue Environment Statement (Amec Foster Wheeler, 2015).

11.8.15 The quantity of office, industry and storage land within each parish was sourced from a 2013 report titled 'Guernsey Employment Land Survey 2013' (Environment Department of States of Guernsey, 2013). The area of land was combined to provide the total employment land in each parish with the resultant parish proportion percentages and is shown in **Table 11-23**.

Table 11-23: Guernsey Employment Land from 2013 Study

Parish	Office sqm	Industry sqm	Storage sqm	Total GFA	Proportion
Castel	0	6,400	1,900	8,300	1.2%
Forest	870	10,700	15,700	27,270	4.1%
St Andrew	0	17,000	3,300	20,300	3.0%
St Martin	6,520	7,800	3,300	17,620	2.6%
St Peter Port	241,300	75,000	51,000	367,300	54.6%
St Pierre Du Bois	0	1,400	0	1,400	0.2%
St Sampson	15,210	36,000	59,000	110,210	16.4%
St Saviour	2,170	6,400	500	9,070	1.3%
Torteval	0	450	0	450	0.1%
Vale	4,350	58,000	49,000	11,350	16.5%
Totals	270,420	219,150	183,700	573,270	100%

11.8.16 For each parish, one to three commercial activity centres were identified, and percentages for each commercial activity centre was assigned and is shown graphically in **Figure 11-8**. The centres of activity and related percentages form the basis of a gravity model, **Appendix 11.6** details the distribution and final assignment of commercial waste to the traffic and transport study area.

Employee Traffic Demand, Distribution and Assignment (Operational)

11.8.17 The Project will be receiving and processing waste between 0800 to 1600 Monday to Friday. The site is not operational on weekends or Bank Holidays.

11.8.18 The operational activities at the site are limited and therefore the number of personnel present is small, ranging up to 4 at any one time (who would essentially be transferred from the operation at the Longue Hougue site), including the existing recycling contractor.

11.8.19 The equipment used during the operation of the site will be comprised of the following:

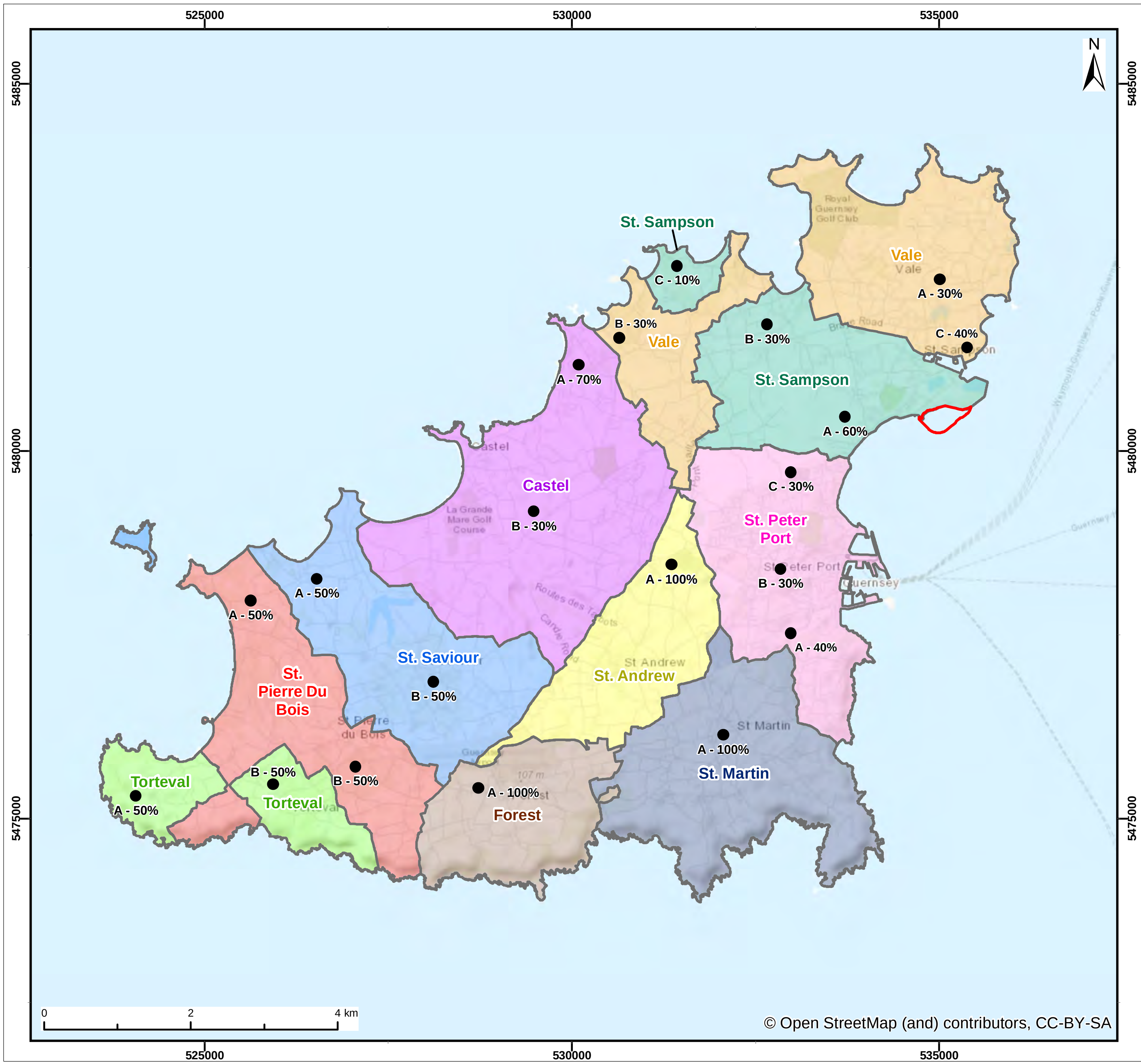
- Volvo 21 Tonne Tracked Excavator;
- Cat 953D Tracked Loader;
- Cat 953C Tracked Loader; and
- 4x4 pick up.

11.8.20 As only four operational employees are to be onsite at any one time, all eight vehicle movements generated by the employees have been assigned to each entry point to the traffic and transport study area, including from the west (Link 4), the north (Link 3) and the east (Link 7).

Traffic Impact Screening (Operation)

11.8.21 With reference to the GEART (Rule 1 and Rule 2), a screening process has been undertaken for the traffic and transport study area to identity routes that are likely to have an increase in traffic flows that would require further impact assessment.

11.8.22 **Table 11-24** summarises the total daily peak vehicle movements (i.e. arrivals and departures) of all materials, personnel and plant for peak construction. The table also provides a comparison of the peak daily construction flows with the forecast background daily traffic flows for 2024 (assumed worst cast year of operation). Cells highlighted blue indicate GEART Rule 1 or Rule 2 screening thresholds have been met.



Legend:

Outline of Proposed Development

Activity Centre

Parish Boundary

- Vale
- St. Sampson
- Castel
- St. Peter Port
- St. Andrew
- St. Saviour
- St. Pierre Du Bois
- St. Martin
- Forest
- Torteval

Client:	Project:
States of Guernsey	Longue Hougue South EIA

Title:

Parishes, Inert Waste Centres of Activity

Figure: 11.8 Drawing No: PB5312-300-024

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	15/08/2019	FC	PT	A4	1:75,000

Co-ordinate system: WGS 1984 UTM Zone 30N

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Table 11-24: Link Screening (Operation)

Link	Description	Link Sensitivity	Background 2024 Flows (24hr AADT*)		2024 Peak Daily Operational Vehicle Movements		Percentage Increase	
			All vehicles	HGVs	All vehicles	HGVs	All vehicles	HGVs
1	Longue Hougue access road (Project access)	Low	1,285	309	121	113	9.4%	36.6%
2	Bulwer Avenue / Les Bas Courtils (south of Project access)	Low	9,609	894	108	100	1.1%	11.2%
3	Vale Road / Route Militaire	High	12,126	451	32	24	0.3%	5.3%
4	Les Banques	Low	25,716	1,263	84	76	0.3%	6.0%
5	Bulwer Avenue (north of Project access)	Low	9,250	723	21	13	0.2%	1.8%
6	South Side / South Quay	Medium	10,943	479	21	13	0.2%	2.7%
7	North Quay / Castle Road / La Rue du Chateau	Medium	5,425	513	15	7	0.3%	1.5%

11.8.23 In accordance with GEART only those links that are showing greater than a 10% increase in total traffic flows (or HGV component) for sensitive links, or greater than 30% increase in total traffic or HGV component for all other links, are considered when assessing the traffic impact upon receptors. It is noted from **Table 11-24** that one of the 7 links are above the GEART screening thresholds during operation with a HGV increase of 36.6% (Link 1) and would be taken forward for further assessment.

OPERATIONAL IMPACT 11.3: Pedestrian and Cycling Amenity

11.8.24 GEART suggests that a threshold of a doubling of total traffic flow or the HGV component may lead to a negative impact upon pedestrian and cycling amenity.

11.8.25 Link 1 experiences traffic flows significantly below the 100% threshold as evidenced within **Table 11-24** resulting in a magnitude of effect as very low on a low sensitive link giving impact significance of **negligible**.

OPERATIONAL IMPACT 11.4: Severance

11.8.26 With reference to **Table 11-24**, it is noted that the forecast daily change in total traffic for Link 1 experiences traffic flows significantly below the 30% change in total traffic threshold for severance whereby very low magnitude of effect is experienced.. Therefore, the magnitude of effect assessed as very low on a low sensitivity link leading to impact significance of **negligible**.

OPERATIONAL IMPACT 11.5: Road Safety

11.8.27 As detailed in **Paragraph 11.5.50**, only one collision cluster was identified from the available personal Injury Collision data. **Table 11-25** provides a summary of the collision cluster and includes details of the peak increase in daily operational flows in comparison to the forecast background daily traffic flows in 2024.

Table 11-25: Collision Cluster Information

Link	Cluster Ref No.	Description	% increase		Summary
			All vehicles	HGVs	
2/3/4	1	Les Banques/Bas Courtils Road/Vale Road	0.3% - 1.1%	5.3% - 11.2%	It is considered that a peak change in total traffic of 1.1% and HGV traffic of 11.2% represents a very low magnitude of effect on a potentially highly sensitive receptor. Therefore, the impact is assessed as **minor adverse**.

11.8.28 **Table 11-25** identifies that the single collision cluster within the traffic and transport study area would experience very low magnitude of effect on a highly sensitive receptor resulting in a **minor adverse** impact.

IMPACT: Driver Delay

11.8.29 The GEART screening thresholds do not apply to this effect as the potential impact is defined as significant when the traffic system surrounding the proposed project under consideration is at or close to capacity.

11.8.30 To provide a robust assessment, the peak operational traffic has been derived based on the following worst-case assumptions:

- The predicted HGV movements are to be divided by 8 based on a working day of 8 hours (0800 to 1600).
- The predicted eight operational employee movements have been divided by two (morning arrival and evening departure). This would result in four movements in each identified hourly periods.

11.8.31 The project's AM peak hour traffic demand has been assigned to the identified sensitive junctions to facilitate an assessment of impact significance. **Table 11-26** details the resultant traffic flows at the junctions during the network AM peak hour.

Table 11-26: Project Peak Hour Traffic Movements Through Sensitive Junctions

Junction	Junction arm	Arrivals per arm		***% increase over Future 2018 - AM (Total Vehicles)
		Light vehicles	HGVs**	
Junction 1: Signalised junction of the Bulwer Avenue / Longue Hougue Access Road / Longue Hougue Lane	Bulwer Avenue (west)	*4	6	
	Longue Hougue Lane	0	0	
	Bulwer Avenue (east)	*4	1	
	Longue Hougue Access Road	4	7	
Total arrivals		8	14	1.65% (1,326)

Junction	Junction arm	Arrivals per arm		***% increase over Future 2018 - AM (Total Vehicles)
		Light vehicles	HGVs**	
Junction 2: Northern Priority junction of the Les Banques / Vale Road / Les Bas Courtils Road	Les Banques	*4	5	
	Vale Road	*4	2	
	Les Bas Courtils Road	4	6	
Total arrivals		8	13	1.1% (1,911)
Junction 3: Roundabout junction of Vale Avenue / North Quay / the Bridge	North Quay	*4	1	
	The Bridge	4	1	
	Vale Avenue	*4	0	
Total arrivals		8	2	0.99% (1,007)
*	As a worst case, employees have been assigned to all potential origin locations. Total figures for junctions only include for one origin.			
**	Arrivals have been rounded to nearest whole number.			
***	Total junction movements taken from Figure 5.5 of the WTS ES chapter (Amec Foster Wheeler, 2015) Future 2018 – AM Scenario for comparison purposes.			

11.8.32 As identified in **Table 11-26**, the worst-case additional traffic associated with the operation of the facility occurs at Junction 1, the signalised junction of Bulwer Avenue and Longue Hougue Access Road. A total of 22 vehicles (14 HGVs and 8 light vehicles). Junction 2 and 3 are also predicted to experience total vehicles of 21 and 10 vehicles respectively during the peak hours.

11.8.33 The above operational traffic flows through the junctions are lower than the flows presented in the construction traffic flows during the 2021 assessment year, thus the increase in traffic through the identified sensitive junctions would not be discernible from daily traffic fluctuations. The magnitude of effect of the combined profile of HGVs and operational employees is therefore assessed as very low on a high value receptor resulting in a **minor adverse** impact.

11.9 Cumulative Impacts

11.9.1 The assessment of cumulative impacts has been undertaken as a two-stage process. Firstly, all the impacts from previous sections have been assessed for the potential to act cumulatively with other projects. This summary assessment has been set out in **Table 11-27**.

11.9.2 The second stage of the CIA is an assessment of the Project's study area and the potential effects of other projects scoped into the CIA upon the same receptors. To identify whether this may occur, the potential nature and extent of effects arising from all projects scoped into the CIA which are to be identified.

Table 11-27: Potential Cumulative Impacts

Impact	Potential for cumulative impact	Data confidence	Rationale
Construction: Impact 1 Severance	Yes	High	Cumulative impacts arising from two or more projects are possible due to the increase in traffic from the projects.
Construction: Impact 2 Pedestrian amenity	Yes	High	
Construction: Impact 3 Road safety	Yes	High	
Construction: Impact 4 Driver Delay	Yes	High	
Construction: Impact 1 Severance	Yes	High	Cumulative impacts arising from two or more projects are possible due to the increase in traffic from the projects.
Construction: Impact 2 Pedestrian amenity	Yes	High	
Construction: Impact 3 Road safety	Yes	High	
Construction: Impact 4 Driver Delay	Yes	High	

Impact	Potential for cumulative impact	Data confidence	Rationale
Decommissioning	No	High	The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and agreed with the regulator. The States of Guernsey will find an alternative use for the site, once its function as an inert waste facility is complete. This has not yet been determined and will depend on the future requirements of the States of Guernsey. This report does not consider the future use of the site.

11.9.3 The projects identified for potential cumulative impacts with the Project have been discussed with the SoG. **Table 11-28** summarises those projects which have been scoped into the CIA due to their temporal or spatial overlap with the potential effects arising from the project. It is worth highlighting that the existing Longue Hougue facility is considered to be part of the baseline and is therefore not assessed as part of the cumulative impacts.

11.9.4 As can be seen within **Table 11-28**, no further cumulative projects are to be taken forward for further assessment.

11.10 Inter-relationships

11.10.1 To address the environmental impact of the Project as a whole, this section establishes the inter-relationships between traffic and transport and other physical, environmental and human receptors. The objective is to identify where the accumulation of impacts on a single receptor, and the relationship between those impacts, may give rise to a need for additional mitigation. **Table 11-29** summarises the inter-relationships that are considered of relevance to traffic and transport and identifies where they have been considered within this ES.

Table 11-28: Summary of Projects Considered for the CIA in Relation to the Transport

Project Name	Description	Distance from Longue Hougue South (m)	Included in CIA	Scope for Cumulative Impact - Transport
Alta Vista Rue Des Monts, St. Sampson	Remove hedge and install oil tank and boiler (Protected Building).	827	No	Growth in housing as adopted by the Housing Allocation site growth factors detailed in Anticipated Trends in Baseline Conditions Section (**paragraph 11.5.52**) has been captured for the 2021 (Peak construction) and 2024 (Peak Operation) assessment years. Therefore, the cumulative effect of housing projects is inherent in the traffic and transport impact assessments.
Rose Cottage La Marette Road, St. Sampson	Erect new dwelling	2,706	No	Refer to Alta Vista Rue Des Monts Cumulative Transport Scope details.
Fougeres Rue Jacques, St. Sampson	Demolish existing dwelling and glasshouse and erect three dwellings.	1,302	No	Refer to Alta Vista Rue Des Monts Cumulative Transport Scope details.

Project Name	Description	Distance from Longue Hougue South (m)	Included in CIA	Scope for Cumulative Impact - Transport
Mont Crevelt Breakwater Longue Hougue, St. Sampson	Infill existing temporary opening formed in existing breakwater as part of works for St. Sampsons marina project	0	No	Insufficient information in the public domain with regards to final scheme proposal.
Pont Colliche (Formerly "Bickleigh") Salt Pans Road, St. Sampson	Variations to plans previously approved to demolish existing dwelling and erect 18 residential units (Revised Scheme) - alterations to roadside windows and replace external granite to facade with smooth rendered finish (units 1 - 4).	1,129	No	Refer to Alta Vista Rue Des Monts Cumulative Transport Scope details.
Warma Le Pre De La Cotte Route De Carteret, Castel	Erect 13 new dwellings with associated car parking, amenity areas and landscaping and create new vehicular access.	4,558	No	Refer to Alta Vista Rue Des Monts Cumulative Transport Scope details.
Pont Colliche Salt Pans Road, St. Sampson	Variation to plans previously approved for Residential Development - Demolish existing dwelling and erect 18 residential units - reposition solar panels to front roof slope.	1,130	No	Refer to Alta Vista Rue Des Monts Cumulative Transport Scope details.

Project Name	Description	Distance from Longue Hougue South (m)	Included in CIA	Scope for Cumulative Impact - Transport
Land Adjacent to Westwood Sohier Road, Vale	Variations to plans previously approved for Residential development to retain existing dwelling and erect 7 new dwellings and alterations to vehicular access - Raise ridge height of units 1,2 and 3 by 600mm, and alterations to fenestration.	1,485	No	Refer to Alta Vista Rue Des Monts Cumulative Transport Scope details.
Le Murier School Baubigny Farm Lane, St. Sampson	Install 4 cabins and 'stores' building to provide units of independent living (revised).	1,436	No	Refer to Alta Vista Rue Des Monts Cumulative Transport Scope details.
Duval Lodge Le Murier, St. Sampson	Erect 7ft retaining wall (retrospective), install 6ft timber fence above retaining wall (east boundary) and install entrance gates (west boundary).	900	No	Refer to Alta Vista Rue Des Monts Cumulative Transport Scope details.
Le Vieux Jardin off Courtil Le Clement, Vale	Erect 20 one bedroom flats comprising Supported Housing and 8 one bedroom dwellings within an Autism Unit, construct associated access road and 29 parking spaces - Variations to design of staff accommodation and communal areas to Autism Unit.	1,724	No	Refer to Alta Vista Rue Des Monts Cumulative Transport Scope details.

Project Name	Description	Distance from Longue Hougue South (m)	Included in CIA	Scope for Cumulative Impact - Transport
Longue Hougue South Industrial & Reclamation Area Bulwer Avenue, St. Sampson	Temporary re-location (for a period of 24 months) of the household waste recycling facility and development of a construction lay down area associated with the development of the Longue Hougue waste facility.	0	No	Construction complete. Operational traffic demand as existing temporary facility located at Longue Hougue.
Warrys Bakery Le Grand Bouet, St. Peter Port	Variations to plans previously approved to erect 20 residential units with parking and landscaping - revised design to Block E, alterations to parking, entrance and roadside walls to Ivy Castle lane and Grand Bouet.	1,600	No	Refer to Alta Vista Rue Des Monts Cumulative Transport Scope details.
Millbrook & Niardua Guelles Road, St. Peter Port	Variations to plans previously approved to provide 20 flats - Demolish "Millbrook" and erect 4 flats, reposition units 13-20 with alterations to fenestration and demolish and reconstruction of communal store.	2,384	No	Refer to Alta Vista Rue Des Monts Cumulative Transport Scope details.
Land Adjacent to Westwood Sohier Road, Vale	Residential development - Retain existing dwelling and erect 7 new dwellings and alterations to vehicular access.	1,493	No	Refer to Alta Vista Rue Des Monts Cumulative Transport Scope details.

Project Name	Description	Distance from Longue Hougue South (m)	Included in CIA	Scope for Cumulative Impact - Transport
Leale's Yard Bridge Avenue, Vale.	Outline planning application for the mixed-use re-development of part of the Leale's Yard site involving the creation of 303 new residential units and 1,074m^2 of commercial/retail/community space; together with creation of associated parking and ancillary/public realm areas	778	No	Superseded by the latest Leale’s Yard Regeneration Area development framework cumulative project, considered later in this table.
Admiral Park, St. Peter Port.	Erection of residential, office, retail, leisure and day nursery facilities at various sites.	1,422	No	Construction complete. Potential for small scale extension works with minimal additional traffic generation. Operational traffic demand contained within 2019 traffic surveys.
Warrys Bakery Le Grand Bouet, St. Peter Port	Demolish former bakery and erect 20 residential units with associated parking and landscaping (Reserved Matters)	1,319	No	Refer to Alta Vista Rue Des Monts Cumulative Transport Scope details.
Guernsey Prison Baubigny Road, Les Nicolles, St. Sampson.	Erect a timber outbuilding for use as a retail shop.	1,346	No	Refer to Alta Vista Rue Des Monts Cumulative Transport Scope details.

Project Name	Description	Distance from Longue Hougue South (m)	Included in CIA	Scope for Cumulative Impact - Transport
Land to front of St Damians Les Grandes Maisons Road, St. Sampson.	Erect 2.5 storey dwelling, create vehicular access (Revised).	267	No	Refer to Alta Vista Rue Des Monts Cumulative Transport Scope details.
Bickleigh Salt Pans Road, St. Sampson.	Residential development - Erect extension and sub-divide existing dwelling to create 6 units of accommodation and erect additional 14 units of accommodation.	1,122	No	Refer to Alta Vista Rue Des Monts Cumulative Transport Scope details.
Leale's Yard Bridge Avenue, Vale.	Demolition of existing buildings on the Bridge/derelict buildings within the site; and the development of two buildings together comprising 109 new residential units and 1,049m^2 of ground floor commercial/retail space, together with associated car parking.	778	No	Part of the Leale’s Yard Regeneration Area development framework application considered later in this table.
Co-op Homemaker Lowlands Industrial Estate Braye Road, Vale.	Demolition of the existing Co-op Homemaker Store at Lowlands Industrial Estate and the construction of two retail blocks (four individual units) comprising a total of 2,600m^2 of retail space, together with 72 car parking spaces.	1,046	No	Superseded by the latest Leale’s Yard Regeneration Area development framework application considered later in this table.

Project Name	Description	Distance from Longue Hougue South (m)	Included in CIA	Scope for Cumulative Impact - Transport
Site within Rodley Park Estate Mont Morin, St. Sampson.	Erect terrace of three dwellings and additional parking area (revised) - install additional roof light (east elevation).	424	No	Refer to Alta Vista Rue Des Monts Cumulative Transport Scope details.
Longue Hougue Reclamation Site Bulwer Avenue, St. Sampson.	Erect a waste transfer station building, with associated hardstanding for up to 180 shipping containers and ancillary plant including a 20 metre high chimney, two weighbridges, fire water tank and pump house, electricity sub-station and fuel storage area	0	No	Construction complete. Operational traffic demand contained within 2019 traffic surveys.
Belstone Les Grandes Maisons Road, St. Sampson.	Erect four two and a half storey semi-detached dwellings, remove section of side boundary wall to create vehicular access and remove sections of front boundary wall to form pedestrian gateways. (Revised Scheme).	268	No	Refer to Alta Vista Rue Des Monts Cumulative Transport Scope details.
Belgrave Vinery	15ha housing allocation, EY: 158-285. Sites b and c assessed as being of high sensitivity to change with regard to flood risk.	765	No	Housing Allocation site utilised to derive future year growth factors for 2021 and 2024. Therefore, the cumulative effect of housing projects is inherent within the traffic and transport impact assessment.

Project Name	Description	Distance from Longue Hougue South (m)	Included in CIA	Scope for Cumulative Impact - Transport
Cleveley's Vinery	0.89ha allocated housing development site, EY: 19-29. A redundant vinery occupies the western half of the site, the rest is greenfield	1,272	No	Refer to Alta Vista Rue Des Monts Cumulative Transport Scope details.
Franc Fief	4.53ha housing allocation, EY: 133-263. All of site is considered available and deliverable.	811	No	Housing Allocation site utilised to derive future year growth factors for 2021 and 2024. Therefore, the cumulative effect of housing projects is inherent within the traffic and transport impact assessment.
Les Bas Courtils	0.63ha housing allocation, EY: 6-12. Comprises a former orchard and vinery.	395	No	Refer to Alta Vista Rue Des Monts Cumulative Transport Scope details.
Pointues Rocques	2.15ha housing allocation, EY: 75-125. Comprises of a part disused and part working vinery.	721	No	Housing Allocation site utilised to derive future year growth factors for 2021 and 2024. Therefore, the cumulative effect of housing projects is inherent within the traffic and transport impact assessment.

Project Name	Description	Distance from Longue Hougue South (m)	Included in CIA	Scope for Cumulative Impact - Transport
Saltpans	2.4ha housing allocation, EY: 84-154. All of site considered to be available and deliverable. Northern 70% is in a flood zone.	1,022	No	Housing Allocation site utilised to derive future year growth factors for 2021 and 2024. Therefore, the cumulative effect of housing projects is inherent within the traffic and transport impact assessment.
Le Maresquet	0.68ha approved DF, estimates 21-38 dwellings. See gov.gg/lemaresquet for map.	1,164	No	Refer to Alta Vista Rue Des Monts Cumulative Transport Scope details.
Leale's Yard Regeneration Area	11.9 ha housing allocation, EY:135-352 permission has now lapsed. High density option: 400 units and 2000m2 of commercial/retail/community space. Low density option: 200 units and 1000m^2.	780	No	Housing Allocation site utilised to derive future year growth factors for 2021 and 2024. Therefore, the cumulative effect of housing projects is inherent within the traffic and transport impact assessment.
Data Park, Saltpans	Currently zoned as industrial within the Island Development Plan, potential for 4.1ha approved housing development.	1,174	No	Two historic documents undertaken for the Data Park include a 'Saltpans Park Transport Assessment' (Feb 2009) and a 'Technical Capacity Summary' (September 2009). Attempts at retrieving copies have been

Project Name	Description	Distance from Longue Hougue South (m)	Included in CIA	Scope for Cumulative Impact - Transport
				unsuccessful. More recent TIAs for Leale's Yard and Pointues Roques include reference to the 2009 documents. However, traffic information is inconsistent with conflicting traffic information with part reproduced traffic data presented. Thus, noting the Data Park documents are 10 years old and out of date and the more recent TIA documents presenting incomplete information it is reasonable to assume that insufficient traffic with regards to final scheme choice is available.
St Sampson's	Extension to school; TIA has been ordered.	1,141	No	Insufficient information in the public domain with regards to final scheme proposal.

Table 11-29: Chapter Topic Inter-relationships

Topic and description	Related Chapter	Where addressed in this Chapter	Rationale
The relationship between traffic delay and traffic related air quality upon local residents.	**Chapter 11 Air Quality**	Traffic data included in the assessment is presented in **Chapter 11 Air Quality**.	Traffic has the potential to temporarily affect air quality.
The relationship between traffic delay and traffic noise upon local residents.	**Chapter 12 Noise and Vibration**	Traffic data included in the assessment is presented in **Chapter 12 Noise and Vibration**.	Increased traffic has the potential to increase noise disturbance temporarily.
The relationship between traffic delay and traffic related emissions upon the health of local residents.	**Chapter 13 Population and Human Health**	Traffic data included in the assessment is presented in **Chapter 11 Air Quality** and **Chapter 13 Human Heath**.	Traffic movements associated with construction may generate localised dust emissions leading to potential complaints.

11.11 Interactions

11.11.1 The impacts identified and assessed in this chapter have the potential to interact with each other, which could give rise to synergistic impacts as a result of that interaction. The worst-case impacts assessed within the chapter take these interactions into account and for the impact assessments are considered conservative and robust. For clarity the areas of interaction between impacts are presented in **Table 11-30** along with an indication as to whether the interaction may give rise to synergistic impacts.

11.12 Summary

11.12.1 This chapter of the ES has assessed the potential impacts of the Longue Hougue South inert waste reclamation project on the surrounding traffic sensitive receptors.

11.12.2 This chapter has been developed with regards to the legislative and policy framework outlined in **Section 11.3** and further informed by consultation with the States of Guernsey.

Table 11-30: Interactions Between Impacts

Potential interaction between impacts				
	1. Severance	**2. Pedestrian Amenity**	**3. Highway Safety**	**4. Driver Delay**
Construction				
1. Severance	-	Yes	Yes	No
2. Pedestrian Amenity	Yes	-	Yes	No
3. Highway Safety	Yes	Yes	-	Yes
4. Driver Delay	No	Yes	Yes	-
Operation				
1. Severance	-	Yes	Yes	No
2. Pedestrian Amenity	Yes	-	Yes	No
3. Highway Safety	Yes	Yes	-	Yes
4. Driver Delay	No	Yes	Yes	-
Decommissioning				
The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and agreed with the regulator. The States of Guernsey will find an alternative use for the site, once its function as an inert waste facility is complete. This has not yet been determined and will depend on the future requirements of the States of Guernsey. This report does not consider the future use of the site.				

11.12.3 In accordance with UK national guidance (GEART) a traffic and transport study area was identified, baseline conditions established and sensitive receptors within the study identified. The traffic and transport study area was screened to identify routes that could be potentially impacted by the Projects' traffic generation.

11.12.4 A total of 7 highway links within the traffic and transport study area have been assessed for the effects of severance, pedestrian and cycling amenity, road safety and driver delay for both the construction and operation phase of the Project. The impacts for all highway links was assessed to be **not significant** for both the construction or operational phases of the project.

11.12.5 A summary of the impacts is detailed in **Table 11-31**.

Table 11-31: Summary of Impacts on Traffic and Transport

Impact	Receptor	Value / Sensitivity	Magnitude	Significance	Mitigation	Residual Impact	Monitoring
Construction							
Impact: Severance	Links 1-7	Screened out of further assessment.					
Impact: Pedestrian and Cycling amenity	Links 1-7	Screened out of further assessment.					
Impact: Road Safety	Cluster 1	High	Very Low	Minor adverse	None required	Minor adverse	None required
Impact: Driver Delay	Junctions 1, 2, 3	High	Very Low	Minor adverse	None required	Minor adverse	None required
Operation							
Impact: Severance	Link 1	Low	Very Low	Negligible	None required	Negligible	None required
	Links 2-7	Screened out					
Impact: Pedestrian and Cycling amenity	Link 1	Low	Very Low	Negligible	None required	Negligible	None required
	Links 2-7	Screened out					
Impact: Road Safety	Cluster 1	High	Very Low	Minor adverse	None required	Minor adverse	None required

Impact	Receptor	Value / Sensitivity	Magnitude	Significance	Mitigation	Residual Impact	Monitoring
Impact: Driver Delay	Junctions 1, 2, 3	High	Very Low	Minor adverse	None required	Minor adverse	None required
Decommissioning							
The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and agreed with the regulator. The States of Guernsey will find an alternative use for the site, once its function as an inert waste facility is complete. This has not yet been determined and will depend on the future requirements of the States of Guernsey. This report does not consider the future use of the site.							

12 Air Quality

12.1 Content and Data

Content

12.1.1 This section of the Environmental Statement (ES) describes the existing environment in relation to air quality, including impacts during the construction and operational phases of the Longue Hougue South inert waste reclamation project ('the Project'). Mitigation measures are detailed, and a discussion of the residual impacts provided where significant impacts were identified.

12.1.2 This section is supported by two appendices:

- **Appendix 12.1:** Construction Phase Dust Assessment Methodology; and
- **Appendix 12.2:** Alternative Approach Model Verification and Results.

Study Area

12.1.3 The study area[5] for the air quality assessment was based on Guidance from the Institute of Air Quality Management (IAQM) (2016a; 2019) and the Design Manual for Roads and Bridges (DMRB) (Highways Agency, 2007), and is defined as follows:

- Construction phase dust and particulate matter assessment:
  - o Human receptors within 350m of the site boundary and within 50m of routes used by construction vehicles (for routes up to 500m from the site boundary); and
  - o Ecological receptors within 50m of the site boundary and within 50m of routes used by construction vehicles (for routes up to 500m from the site boundary).
- Operational phase dust and particulate matter emissions:
  - o Human receptors within 350m of the site boundary; and
  - o Ecological receptors within 50m of the site boundary and within 50m of routes used by operational phase vehicles (for routes up to 500m from the site boundary).
- Construction and operational phase road traffic emissions:
  - o Human and ecological receptors within 200m of roads that are expected

[5] *These guidance documents and distances for inclusion in the study areas for both the dust and particulate matter assessments and the road traffic emissions assessment were confirmed during consultation (via emails dated 12 August 2019) with Catherine Rirsch, Senior Environmental Health Officer (EHO) at the Office of Environmental Health and Pollution Regulation, States of Guernsey.*

to experience a change in traffic flows as a result of the project.

Data Sources

Desk Study

12.1.4 The assessment was undertaken with reference to information from several sources, as detailed in **Table 12-1**.

Table 12-1: Key Information Sources

Data Source	Reference
Department for Environment Food and Rural Affairs (Defra)	Local Air Quality Management Technical Guidance (TG(16), 2018
Design Manual for Roads and Bridges (DMRB)	Highways Agency (2007). Design Manual for Roads and Bridges Volume 11 Environmental Assessment Section 3 Environmental Assessment Techniques Part 1 HA207/07 Air Quality
Institute of Air Quality Management (IAQM)	IAQM (2016a): Guidance on the Assessment of Dust from Demolition and Construction. Version 1.1 IAQM (2016b): Guidance on the Assessment of Mineral Dust Impacts for Planning. May 2016. Version 1.1. IAQM (2018): Guidance on Monitoring in the Vicinity of Demolition and Construction Sites. October 2018 (version 1.1)
IAQM and Environmental Protection UK (EPUK)	IAQM & EPUK (2017): Land-use Planning & Development Control: Planning for Air Quality
Office of Environmental Health and Pollution Regulations, Guernsey	Air Quality in Guernsey Screening and Assessment Document (July 2015)
Office of Environmental Health and Pollution Regulations Environmental Health Officer (EHO), Guernsey	Baseline NO_2 diffusion tube monitoring data from within the study area and continuous NO_2 and PM_{10} 2018 monitoring data from the Bulwer Avenue continuous air quality monitoring station
LAQM Helpdesk	Roadside NO_2 Projection Factors

Surveys Undertaken

12.1.5 Site-specific monitoring of nitrogen dioxide (NO_2), particulate matter (PM_{10} and $PM_{2.5}$) and dust was carried out by Royal HaskoningDHV, for a three-month period, as part of this air quality assessment. Monitoring data were collected to establish baseline air quality conditions in the study area, and for use in the verification of air quality modelling results.

Assumptions and Limitations of Data

12.1.6 It was not possible to carry out a full year of air quality monitoring prior to the submission of the application. Therefore, the monitoring survey was carried out for a three-month period, which meets the minimum requirement to enable the adjustment of diffusion tube monitoring results to an annual mean, as per Defra Technical Guidance (Defra, 2018).

12.1.7 The road traffic emissions assessment is based on traffic data provided by the Transport Consultants for the project and any assumptions made as part of the transport assessment are also applicable to this assessment (see **Section 11 Traffic and Transport**).

12.2 Legislation and Policy Context

12.2.1 Air pollution can have adverse effects on the health of humans and ecosystems. European Union (EU) legislation forms the basis for UK air quality policy. The States of Guernsey does not currently have specific air quality standards and Objectives, so the standards and Objectives set in UK Law *"can be considered to be a benchmark to measure Guernsey's current position against and for future standards to be implemented in local legislation"* (Office of Environmental Health and Pollution Regulations, 2015). The States of Guernsey will be commencing the Air Quality Ordinance later this year, and this Ordinance will introduce local air quality standards and Objectives, which will be the same as those in the UK.

The Air Quality Strategy

12.2.2 The European Union Air Quality Framework Directive 96/62/EC on Ambient Air Quality Assessment and Management entered into force in 1996 (European Parliament, 1996). This was a framework for tackling air quality through setting European-wide air quality limit values in a series of Daughter Directives, prescribing how air quality should be assessed and managed by the Member States. Directive 96/62/EC and the first three Daughter Directives were combined to form the new European Union Directive 2008/50/EC on Ambient Air Quality and Cleaner Air for Europe, which came into force in June 2008 (European Parliament, 2008).

12.2.3 The 1995 Environment Act (HMSO, 1995) required the preparation of a national Air Quality Strategy which sets air quality standards for specified pollutants. The Act also outlined measures to be taken by local planning authorities in relation to meeting these standards and Objectives, which became the Local Air Quality Management (LAQM) system.

12.2.4 The UK Air Quality Strategy was originally adopted in 1997 (Department of Environment, 1997) and has been reviewed and updated to take account of the evolving European Union legislation, technical and policy developments and the latest information on health effects of air pollution. The strategy was revised and reissued in 2000 as the Air Quality Strategy for England, Scotland, Wales and Northern Ireland (Department of the Environment, Transport and the Regions (DETR), 2000). This was subsequently amended in 2003 (DETR, 2003) and was updated in July 2007 (Defra, 2007).

12.2.5 The UK Government published its Clean Air Strategy in January 2019 (Defra, 2019a), which reset the focus for the first time since the 2007 Air Quality Strategy revision. The Clean Air Strategy identifies a series of 'new' air quality issues, including biomass combustion, shipping emissions, and releases from agricultural activities. There is a recognition that the effects of pollutant deposition on sensitive ecosystems and habitats needs greater focus. The concept of an overall exposure reduction approach is raised, in recognition that numerical standards are not safe dividing lines between a risk and a safe exposure, within a population with a varying age and health profile.

12.2.6 The standards and Objectives relevant to the LAQM framework have been prescribed through the Air Quality (England) Regulations (2000) (HMSO, 2000), and the Air Quality (England) (Amendment) Regulations (2002) (HMSO, 2002). The European Union Limit Values have been implemented via the Air Quality Standards Regulations (2010), which set out the combined Daughter Directive limit values and interim targets for Member State compliance (HMSO, 2010).

12.2.7 The current air quality standards and Objectives of relevance to this assessment are presented in **Table 12-2**. Pollutant standards relate to ambient pollutant concentrations in air, set on the basis of medical and scientific evidence of how each pollutant affects human health. Pollutant Objectives, however, incorporate target dates and averaging periods which take into account economic considerations, practicability and technical feasibility.

12.2.8 Where an air quality Objective is unlikely to be met by the relevant deadline, local planning authorities must designate those areas as Air Quality Management Areas (AQMAs) and take action to work towards meeting the Objectives. Following the designation of an AQMA, local planning authorities are required to develop an Air

Quality Action Plan (AQAP) to work towards meeting the Objectives and to improve air quality locally.

Table 12-2: Air Quality Strategy Objectives (England) for the Purpose of Local Air Quality Management

Pollutant	Air Quality Objective		To be achieved by
	Concentration	Measured as*	
Nitrogen dioxide (NO_2)	200µg.m^{-3}	1 hour mean not to be exceeded more than 18 times per year	31/12/2005
	40µg.m^{-3}	Annual mean	31/12/2005
Particles (PM_{10})	50µg.m^{-3}	24-hour mean not to be exceeded more than 35 times per year	31/12/2004
	40µg.m^{-3}	Annual mean	31/12/2004
	18µg.m^{-3} (Scotland only)	Annual mean	31/12/2010
Particles ($PM_{2.5}$)	25µg.m^{-3}	Annual mean (target)	2020
	12µg.m^{-3} (Scotland only)	Annual mean (target)	2020
	15% cut in annual mean (urban background exposure)		2010 - 2020

Note: *how the Objectives are to be measured is set out in the UK Air Quality (England) Regulations (2000). The States of Guernsey does not have specific air quality standards and Objectives, so the standards and Objectives set in UK Law *"can be considered to be a benchmark to measure Guernsey's current position against and for future standards to be* implemented in local legislation" (Office of Environmental Health and Pollution Regulations, 2015).

12.2.9 Possible exceedances of air quality Objectives are usually assessed in relation to those locations where members of the public are likely to be regularly present and are likely to be exposed for a period of time appropriate to the averaging period of the Objective.

12.2.10 Critical Levels are provided for the protection of vegetation and ecosystems and correspond to the concentration of pollutants in air below which adverse impacts are not anticipated. The Critical Levels for the pollutants considered in the assessment are detailed in **Table 12-3**.

Table 12-3: Critical Levels for Pollutants Considered in the Assessment

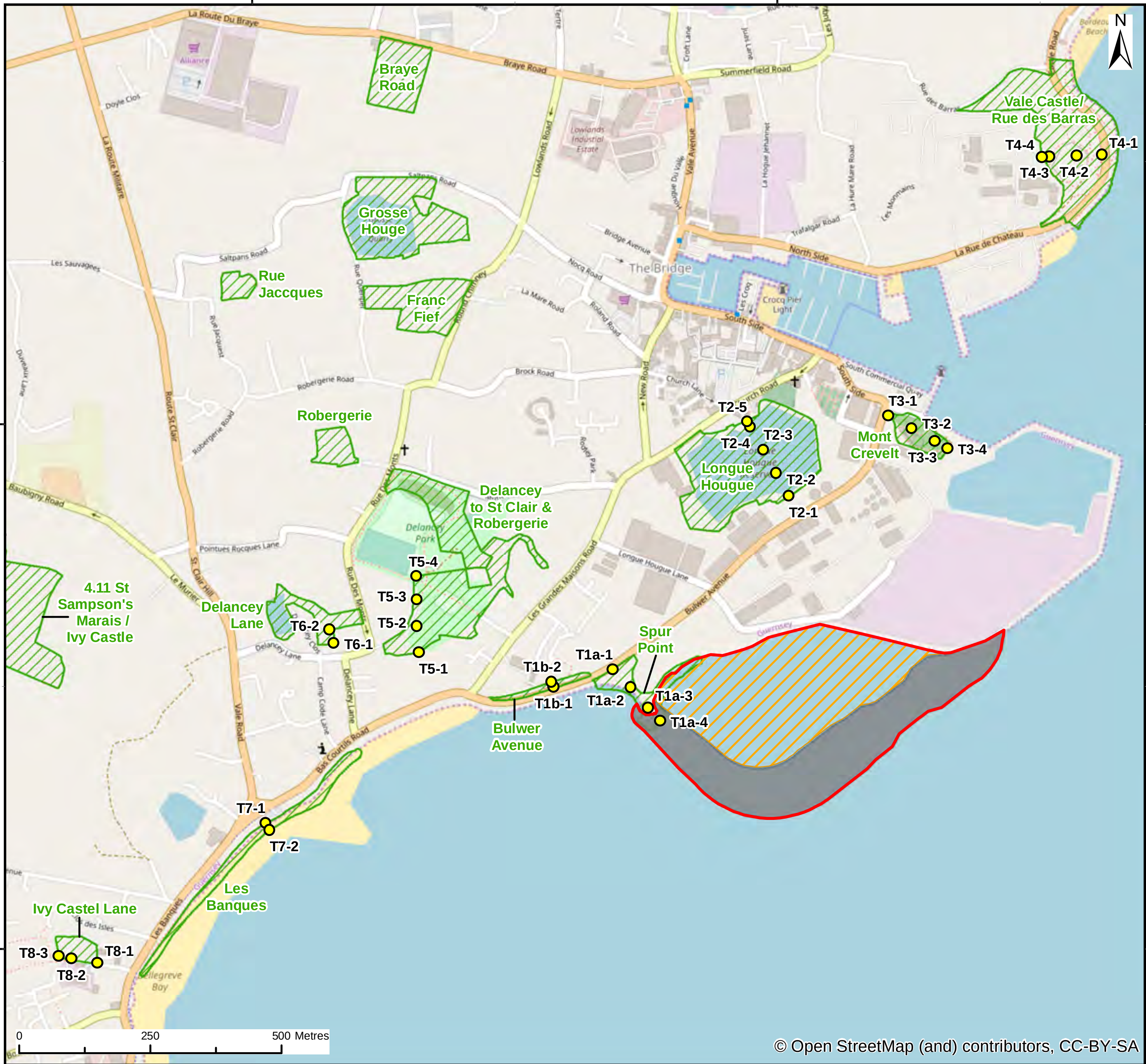
Pollutant	Concentration ($\mu g.m^{-3}$)	Measured As
Oxides of Nitrogen (NO_X)	30	Annual Mean

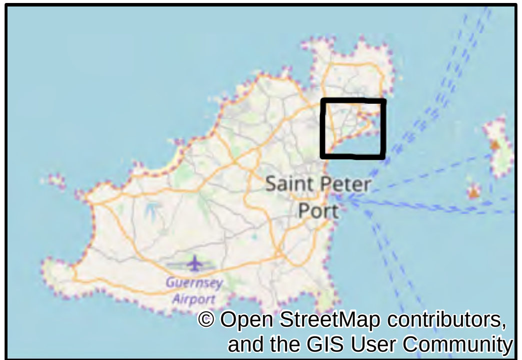
12.2.11 Guidance from the IAQM on assessing the air quality impacts on designated nature conservation sites (IAQM, 2019) states that the *"long term (i.e. annual mean) concentration of NO_X is most relevant for its impacts on vegetation"* and *"recommends that only the annual mean NO_X concentration is used for assessments unless specifically required by a regulator"*. As such, the assessment only considered annual mean Critical Levels at designated ecological sites.

12.2.12 For the purposes of the assessment, it was assumed that all identified ecological sites are sensitive to airborne concentrations of NO_X, which may not be the case for all habitats and species within a designated site.

12.2.13 Statutory designated ecological sites may also be sensitive to nutrient nitrogen and acid deposition resulting from air emissions. Each designated habitat has a prescribed Critical Load which is based upon the sensitivity of specific habitats within each designation, which are obtained from the Air Pollution Information System (APIS) website (Centre for Ecology and Hydrology, 2019). Details of habitats and their relevant Critical Loads are not available for Areas of Biodiversity Importance (ABIs) which are present within the study area, as shown on **Figure 12-1**. In addition, the relevant background nutrient nitrogen and acid deposition values for the ABIs are not available on the APIS website, in order for an assessment of total deposition in relation to the Critical Loads to be undertaken.

12.2.14 The IAQM (2019) makes reference to Natural England's guidance stating that likely significant air quality effects may occur where the contribution of a project, either alone or in-combination with other plans or projects, exceeds 1,000 vehicles (or 1% change of the Critical Load) as an Annual Average Daily Traffic (AADT) flow on roads within 200m of a designated ecological site. AADT flows for this Project were well below 1,000 vehicles (see **Table 12-25**), even in-combination with other projects. As such, impacts on nutrient nitrogen and acid deposition at these locations were not considered in this assessment as the increase in deposition would be **not significant** (according to Natural England (2018) and IAQM (2019) guidance).





Legend:

- Outline of Proposed Development
- Infill Area
- Breakwater
- Area of Biological Importance (ABI)
- Ecological Receptor

Client:	Project:
States of Guernsey	Longue Hougue South EIA

Title: Ecological Receptors

Figure: 12.1 | Drawing No: PB5312-300-026

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	23/08/2019	FC	PT	A4	1:11,000

Co-ordinate system: WGS 1984 UTM Zone 30N

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Local Planning Policy

The Strategic Land Use Plan (2011)

12.2.15 The Strategic Land Use Plan (SLUP) is a statutory document prepared by the Strategic Land Planning Group in November 2011 (Strategic Land Use Planning Group, 2011), under Section 5 of the Land Planning and Development (Guernsey) Law, 2005. The SLUP sets out the land-use planning agenda for Guernsey over a 20-year period.

12.2.16 The SLUP was reviewed for policies of relevance to air quality. The following relevant policy was identified:

> ***"POLICY SLP23***
>
> *In the interests of air quality, the Development Plans will take into account:*
>
> *i. The location of development and the extent to which it is possible to influence a reduction of unnecessary vehicle journeys*
> *ii. The degree to which planning policies may be able to support Environmental Health controls over air pollution."*

12.2.17 The requirements of this policy were considered in this air quality assessment.

Island Development Plan (2016)

12.2.18 The Island Development Plan (IDP) (States of Guernsey, 2016) was adopted in November 2016 and sets out the land planning policies for the island of Guernsey. The IDP replaces both the Urban Area Plan and the Rural Area Plan. The IDP sets out what can be built and where and the Authority must consider the IDP policies when deciding applications for planning permission.

12.2.19 The IDP was reviewed for policies of relevance to air quality. The following relevant policies were identified:

> ***"POLICY GP8: Design***
>
> *In order to achieve high standards of design which respect and, where appropriate, enhances the character of the environment, proposals for new development will be expected to:*
>
> *[…]*
>
> *d. consider the health and well-being of the occupiers and neighbours of the development by means of providing adequate daylight, sunlight and private/ communal open space*
>
> *[…]*

Within areas of higher protection, such as Sites of Special Significance, Areas of Biodiversity Importance and Conservation Areas, and where development relates to protected buildings or protected monuments or their settings, development will be expected to conserve the particular special interest of those areas or buildings and the relevant policies relating to those areas shall apply."

*"**POLICY GP9: Sustainable Development***

Proposals for new development, and the refurbishment, extension and alteration of existing buildings, will be supported where it has been demonstrated that:

a) they have been designed to take into account the use of energy and resources and any adverse impact on the environment through paying particular regard to the location, orientation and appearance of the building, the form of construction, the materials used and its resilience to climate change and flooding; and,

b) they will not have unacceptable impacts on the amenities of neighbouring properties or an adverse effect on the special interest of Conservation Areas, protected buildings or protected monuments; and,

c) the proposals accord with all other relevant policies of the Island Development Plan."

12.2.20 The requirements of these policies were considered in this air quality assessment.

12.3 Baseline

12.3.1 The characterisation of the existing environment was undertaken using data sources listed in **Table 12-1**, consultation with the Environmental Health Officer (EHO) for the States of Guernsey and information collected during surveys undertaken for this air quality assessment.

Air Quality Monitoring

States of Guernsey

12.3.2 States of Guernsey carries out air quality monitoring within the study area. Continuous monitoring of NO_2 and PM_{10} is carried out on Bulwer Avenue, approximately 140m north-west of the proposed development. Monitoring data from 2014-2018 for this monitoring location are detailed in **Table 12-4**.

Table 12-4: *States of Guernsey NO_2 and PM_{10} Monitoring Data from the Continuous Monitoring Station on Bulwer Avenue*

Site Location	Annual Mean Monitored Concentration ($\mu g.m^{-3}$)									
	NO_2					PM_{10}				
	2014	2015	2016	2017	2018	2014	2015	2016	2017	2018
Bulwer Avenue	23.0	21.0	16.0	14.0	14.0	27.0	29.0	28.0	25.0	24.0
Annual data capture (%)	57.63	95.64	99.6	92.0	99.1	84.34	76.06	96.0	95.9	99.1

12.3.3 As detailed in **Table 12-4**, annual mean NO_2 concentrations were 'well below', (i.e. less than 75% of) the UK annual mean Objective of $40\mu g.m^{-3}$. Annual mean PM_{10} concentrations were below the UK annual mean Objective of $40\mu g.m^{-3}$.

12.3.4 States of Guernsey also operates a network of NO_2 diffusion tubes across Guernsey. Monitoring is undertaken at three locations within the study area. Monitoring data from 2013-2017 for the three diffusion tubes are detailed in **Table 12-5**. Diffusion tube data for 2018 was not available at the time of writing.

Table 12-5: *Diffusion Tube Annual Mean NO_2 Concentrations*

Site ID	Location	Monitored Annual Mean NO_2 Concentrations ($\mu g.m^{-3}$)				
		2013	2014	2015	2016	2017
VAL1	Corner of Northside / Hougue Jehannet (near Guernsey Electricity Limited)	28.2	18.8	11.6	14.6	13.4
STS1	Southside, St Sampson (opposite Wayfarers Travel)	18.9	18.1	12.7	16.4	15.3
STS3	Les Banques, St Sampson (by Guernsey Water site)	25.9	21.5	20.8	20.2	19.1

12.3.5 As detailed in **Table 12-5**, annual mean NO_2 concentrations were 'well below', i.e. less than 75% of, the annual mean Objective of $40\mu g.m^{-3}$. This is to be expected in an area which has relatively low traffic flows and no significant sources of industrial pollution.

Air Quality Monitoring Survey

12.3.6 Although monitoring is undertaken by States of Guernsey within the study area, a three-month air quality monitoring survey was commissioned in January 2019 to provide additional data for the air quality assessment which was more representative of receptors in the vicinity of the Project site and along the affected road network. The monitoring survey comprised NO_2 diffusion tube monitoring and particulate matter (PM_{10} and $PM_{2.5}$) spot sampling at five roadside locations and one background site. The diffusion tubes were deployed along roads that are anticipated to experience an increase in vehicle numbers as a result of the project. A set of triplicate diffusion tubes (DT7) was also co-located at the continuous air quality monitoring station on Bulwer Avenue to enable bias adjustment of the diffusion tube results and conversion to annual averaging periods. The diffusion tube survey periods were as follows:

- Survey Period One: 29 January[6] – 1 March 2019.
- Survey Period Two: 1 March – 27 March 2019.
- Survey Period Three: 27 March – 30 April 2019.

12.3.7 Diffusion tubes were deployed at all locations in triplicate to enable the precision of the results to be evaluated. Field and fridge blanks were also included for quality control purposes, to confirm that pollutant exposure during transit was negligible. The diffusion tubes were analysed at a UKAS-accredited laboratory (Gradko International Ltd) using the 20% triethanolamine (TEA) in water preparation method.

12.3.8 The three months of diffusion tube monitoring data were annualised using data from the Bulwer Avenue monitoring station, using the methodology detailed in Defra Technical Guidance (Defra, 2018). Prior to the annualisation, a roadside projection factor was applied to the diffusion tube monitoring data to compensate for the general trend of reducing concentrations in future years. This approach was advised by the LAQM Helpdesk[7].

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[6] DT7 was installed on 30 January 2019
[7] Email correspondence dated 9 May, 25 July and 7 August 2019

12.3.9 Triplicate measurements of PM_{10} and $PM_{2.5}$ were taken as short grab samples, using an Aerocet 531 Handheld Particle Counter, at the same location as the diffusion tubes and at the same time as the monthly change of the diffusion tubes. The particulate matter sampling dates were as follows:

- 29 January 2019 (30 January at DT7);
- 1 March 2019;
- 27 March 2019;
- 1 May 2019.

Survey Locations

12.3.10 The diffusion tube survey locations are shown in **Figure 12-2** and are detailed in **Table 12-6**. DT3 was located approximately 54m from the nearest road and was not within 50m of major sources of pollution (e.g. large multi-storey car park), or within 20m of medium-sized emission sources (e.g. petrol stations, boiler vents, ventilation outlets to catering establishments), and was therefore classified as a suburban background site in accordance with Defra Technical Guidance (Defra, 2018).

Survey Results

12.3.11 The results of the diffusion tube survey are presented in **Table 12-7**. The results represent the average concentration for the triplicate samples collected for each survey period.

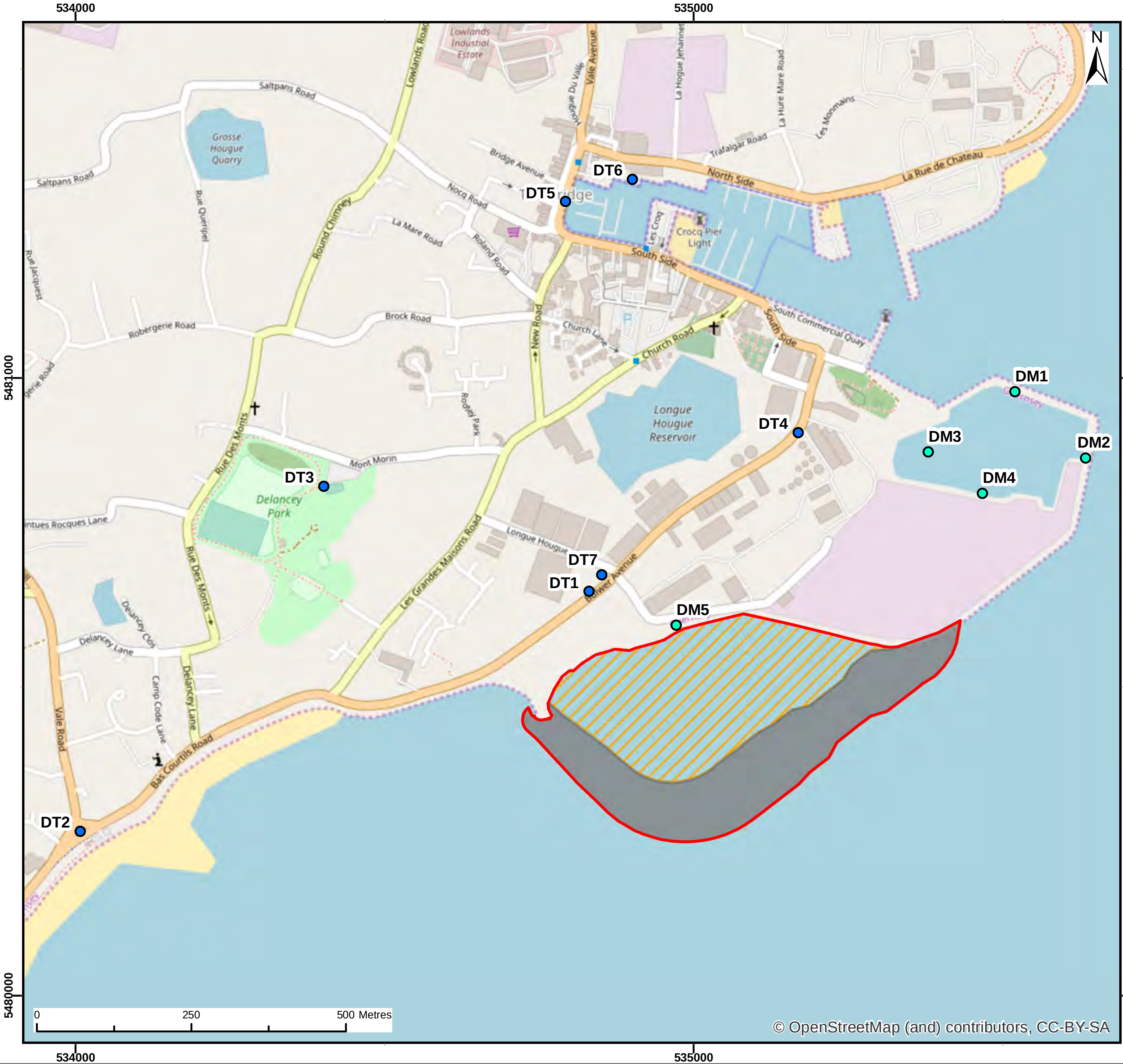
12.3.12 The results of the particulate matter spot sampling are presented in **Table 12-8**. The Table represents the average concentration for the triplicate spot samples collected on each sampling date.

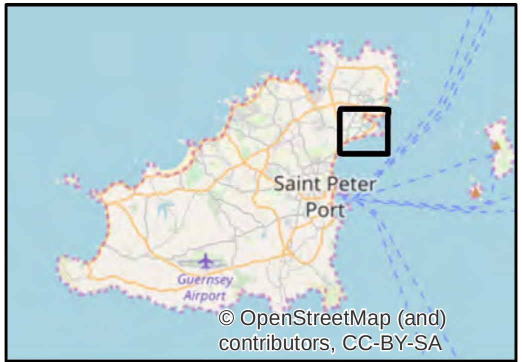
12.3.13 Particulate matter spot sampling was also undertaken at one of the human receptor locations (R3) (as requested by the residents at Gorselea) on 2 May 2019. The locations of the spot sampling are shown on **Plate 12.1** and results are detailed in **Table 12-9**.

Bias Adjustment and Annualisation of Monitoring Data

NO_2 Concentrations

12.3.14 The raw diffusion tube air quality monitoring data were bias adjusted, had a Roadside NO_2 Projection Factor applied to compensate for the general trend of reducing concentrations in future years and were annualised using the methodology provided in LAQM TG(16) (Defra, 2018).





Legend:

- Outline of Proposed Development
- Infill Area
- Breakwater
- Dust Monitors
- Diffusion Tubes

Client:	Project:
States of Guernsey	Longue Hougue South EIA

Title:

Air Quality Monitoring Survey Locations

Figure: 12.2 | Drawing No: PB5312-300-027

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	23/08/2019	IOM	PT	A4	1:9,000

Co-ordinate system: WGS 1984 UTM Zone 30N

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Table 12-6: *Diffusion Tube Survey Locations*

Site Ref.	Location	Site Type	Distance from kerb (m)	Height (m)	Coordinates (WGS84 30N)	
DT1	Bulwer Avenue	Roadside	1.5	2.96	534832	5480652.5
DT2	Intersection of Vale Road, Les Banques and Les Bas Courtils Road	Roadside	2.4	2.48	534008.1	5480265.6
DT3	Delancey Park	Suburban background	-	2.53	534402.4	5480823.8
DT4	Bulwer Avenue	Roadside	1.38	2.49	535169.6	5480910.7
DT5	The Bridge	Roadside	2.83	2.40	534795.6	5481284
DT6	North Quay	Roadside	0.31	2.83	534967.9	5481344.5
DT7	Co-located with the Bulwer Avenue continuous air quality monitoring station	Roadside	2.67	2.81	5480688.5	534855

Table 12-7: *Diffusion Tube Survey Results*

Site Reference	Survey Period			Survey Period Average
	1	2	3	
NO_2 (μg.m^{-3})				
DT1	29.1	22.7	28.6	26.8
DT2	30.6	23.2	30.2	28.0
DT3	10.1	7.6	17.1	11.6
DT4	29.2	25.7	25.7	26.8
DT5	21.8	17.7	22.9	20.8

Site Reference	Survey Period			Survey Period Average
	1	2	3	
DT6	20.0	18.0	18.9	19.0
DT7	23.3	18.3	18.3	20.0

Table 12-8: Particulate Matter Spot Sampling Results

Site Reference	Sampling Date				Average
	30 Jan 2019	1 March 2019	27 March 2019	1 May 2019	
PM_{10} ($\mu g.m^{-3}$)					
DT1	10.7	63.7	42.4	89.7	51.6
DT2	34.0	70.0	35.9	69.9	52.5
DT3	14.3	62.7	28.5	36.0	35.4
DT4	17.3	91.3	44.0	68.5	55.3
DT5	27.0	82.7	38.2	39.0	46.7
DT6	17.7	53.0	39.2	50.7	40.2
DT7	14.3	72.7	116.7	38.9	60.7
$PM_{2.5}$ ($\mu g.m^{-3}$)					
DT1	1.0	12.7	12.4	26.8	13.2
DT2	11.0	13.0	14.4	25.6	16.0
DT3	3.0	13.0	9.2	20.1	11.3
DT4	2.7	14.0	12.8	21.2	12.7
DT5	3.7	15.0	13.7	19.0	12.9
DT6	3.3	12.3	11.2	21.9	12.2
DT7	2.0	12.0	16.5	17.4	12.0

Plate 12.1: Extra PM Monitoring Locations at R3 (Gorselea) (Image Courtesy of Google Earth)

Table 12-9: Average PM_{10} and $PM_{2.5}$ Spot Sample Concentrations from 2 May 2019 at Receptor R3

Readings	Average Concentration* (µg.m^{-3})	
	$PM_{2.5}$	PM_{10}
Mon.1	22.6	95.6
Mon.2	21.3	90.3
Mon.3	20.1	84.7
*average from triplicate samples		

12.3.15 The 2019 survey data were annualised to a 2018 annual mean for use in model verification. Data could not be annualised to 2019, as at the time of writing there was not yet a full calendar year of data to derive an annual mean recorded at the continuous analyser. The annualisation of monitoring data to a 2018 annual mean was agreed with States of Guernsey[8].

[8] *Email consultation with Cathy Rirsch (States of Guernsey Senior Environmental Health Officer (EHO)) (13 August 2019)*

12.3.16 A bias adjustment factor of 0.92 was calculated from the Defra national bias adjustment factors spreadsheet (Defra, 2019b) for 2018, using the Gradko laboratory 20% TEA in water preparation method. The use of this bias adjustment factor was confirmed during consultation[9].

12.3.17 As the co-location was carried out at a roadside location, the LAQM Helpdesk advised applying roadside NO_2 Projection Factors to compensate for the general trend of reducing concentrations in future years. The ratio of 2019:2018 Roadside NO_2 Projection Factors[10] (0.95[11]) was used to calculate a factor to reduce the measured short-term measurements undertaken as part of this assessment.

12.3.18 Annualisation of the monitoring data was conducted using the method detailed in Defra technical guidance (Defra, 2018). **Table 12-10** summarises the details of the continuous analyser including annual and period mean concentrations and the annualisation ratio for 2018.

Table 12-10: Monitoring Survey Annualisation (µg.m^{-3})

Site	Pollutant	Data Capture	Annual Mean 2018 (A_m)	Period Mean 2018 (P_m)	Ratio (A_m/P_m)
Bulwer Avenue	NO_2	99.1%	14.0	14.3	0.979

12.3.19 **Table 12-11** presents the annualised annual mean NO_2 concentrations used for model verification purposes.

12.3.20 As shown in **Table 12-11**, all of the 2018 annualised annual means were well below (i.e. less than 75% of) the NO_2 annual mean Air Quality Objective of 40µg.m^{-3}. DT2 had the highest annualised 2018 mean of 23.9µg.m^{-3}, due to it being located at a queueing section of the main St Peter's Port to St Sampson Road, as well as adjacent to the Vale Road, Les Banques and Les Bas Courtils intersection. The suburban background site (DT3) recorded the lowest concentration, as expected for a background location at a distance from the road network. The 2018 annualised annual mean concentration of 9.9µg.m^{-3} was used as the background NO_2 concentration in this assessment.

[9] *Email consultation with Cathy Rirsch (3 May 2019)*
[10] *https://laqm.defra.gov.uk/tools-monitoring-data/roadside-no2-projection-factor.html*
[11] *As the HGV percentage on Longue Hougue Lane (the road that the continuous analyser is adjacent to) is greater than 10% (see **Table 12-25**), the ratio of 2019:2018 for 'Rest of UK (HDV >10%)' was used. LAQM Helpdesk advised that the 'Rest of UK' factors would be the most suitable for Guernsey.*

Table 12-11: NO_2 Bias Adjustment and Annualisation Corrections ($\mu g.m^{-3}$)

Site Location	Period Average	Bias Corrected Average (x0.92)	2019:2018 Roadside Projection Factor Correction (x0.95)	Annualised Concentration (x0.979)
NO_2 ($\mu g.m^{-3}$)				
DT1	26.8	24.7	23.4	22.9
DT2	28.0	25.8	24.4	23.9
DT3	11.6	10.7	10.1	9.9
DT4	26.8	24.4	23.2	22.7
DT5	20.8	19.1	18.2	17.8
DT6	19.0	17.4	16.5	16.2
DT7	22.2	20.4	19.4	19.0

PM_{10} and $PM_{2.5}$ Concentrations

12.3.21 Hourly PM_{10} data were obtained from the States of Guernsey for the Bulwer Avenue continuous analyser within the survey period, for comparison with the spot sampling data. The comparison between the spot samples and the nearest corresponding hours of sampling is provided in **Table 12-12**.

Table 12-12: Comparison between Spot Samples and Continuous Analyser Data for PM_{10} Measurements at DT7

Reading	Measurement ($\mu g.m^{-3}$)				
	30 January 2019	1 March 2019	27 March	1 May 2019**	Average
Spot Sample*	14.3	72.7	116.7	38.9	60.7
Continuous analyser	16:00 – 8.2 17:00 – 16.0	09:00 – 26.1 10:00 – 29.4	10:00 – 63.9 11:00 – 62.5	15:00 – 55.2 16:00 – 22.2	35.4***
*average of triplicate measurements **Continuous analyser measurements from May have yet to be ratified and are thus provisional ***average of both hourly measurements (average of the higher hourly measurement = 41.1$\mu g.m^{-3}$)					

12.3.22 As can be seen from **Table 12-12**, average PM_{10} spot measurement concentrations were generally higher than the corresponding hourly measurements taken by the continuous analyser.

12.3.23 As the PM_{10} survey data consisted of four triplicate spot samples, rather than a full three-month dataset, it was not considered appropriate use these short-term data to derive a 2018 annual mean.

12.3.24 In the absence of any representative PM_{10} and $PM_{2.5}$ background data, the continuous analyser 2018 annual mean (24µg.m^{-3}) was used to provide a PM_{10} background concentration. The use of these data as a background concentration is considered to be conservative because this location also captures a proportion of PM from road traffic and is therefore not a 'true' background site. As the continuous analyser does not measure $PM_{2.5}$, the $PM_{2.5}$ background concentration was also assumed to be 24µg.m^{-3}; this is also considered to be conservative as only a proportion of all monitored PM_{10} would be $PM_{2.5}$.

12.3.25 As the monitored roadside PM_{10} concentration was used as the background, verification of PM_{10} could not be undertaken. To provide a conservative assessment, modelled PM_{10} and $PM_{2.5}$ concentrations were adjusted using the NO_2 verification factor as detailed in **Table 12-26**, as recommended in Defra technical guidance (Defra, 2018).

Site-Specific Dust Deposition Survey

12.3.26 Monitoring of the current depositional dust levels and direction of windblown dust, at the existing inert waste facility located to the north-east of the project boundary, was undertaken for nine weeks to establish the expected dust generation associated with the project. The dust deposition survey periods were as follows:

- Survey Period One: 19 February – 28 February 2019;
- Survey Period Two: 28 February – 26 March 2019;
- Survey Period Three: 26 March – 30 April 2019.

12.3.27 Frisbee dust gauges measure dust deposition (in mg.m^{-2}.day^{-1}) and were deployed at the four cardinal points around the existing inert waste facility to determine expected operational dust levels from a process of this nature. A fifth dust gauge (DM5) was deployed at an additional location representative of the closest receptors to the site (i.e. Gorselea, south of Bulwer Avenue), in order to establish existing baseline dust deposition in the area.

12.3.28 The frisbee dust gauges were deployed with sticky pad adaptors in order to determine the prevailing direction of windblown dust. The dust gauges were analysed monthly (except for the first month when they were analysed after one week) at an accredited laboratory (SOCOTEC).

12.3.29 The locations at which monitoring was undertaken are shown in **Figure 12-2** and detailed in **Table 12-13**.

Table 12-13: Dust Depositional Survey Locations

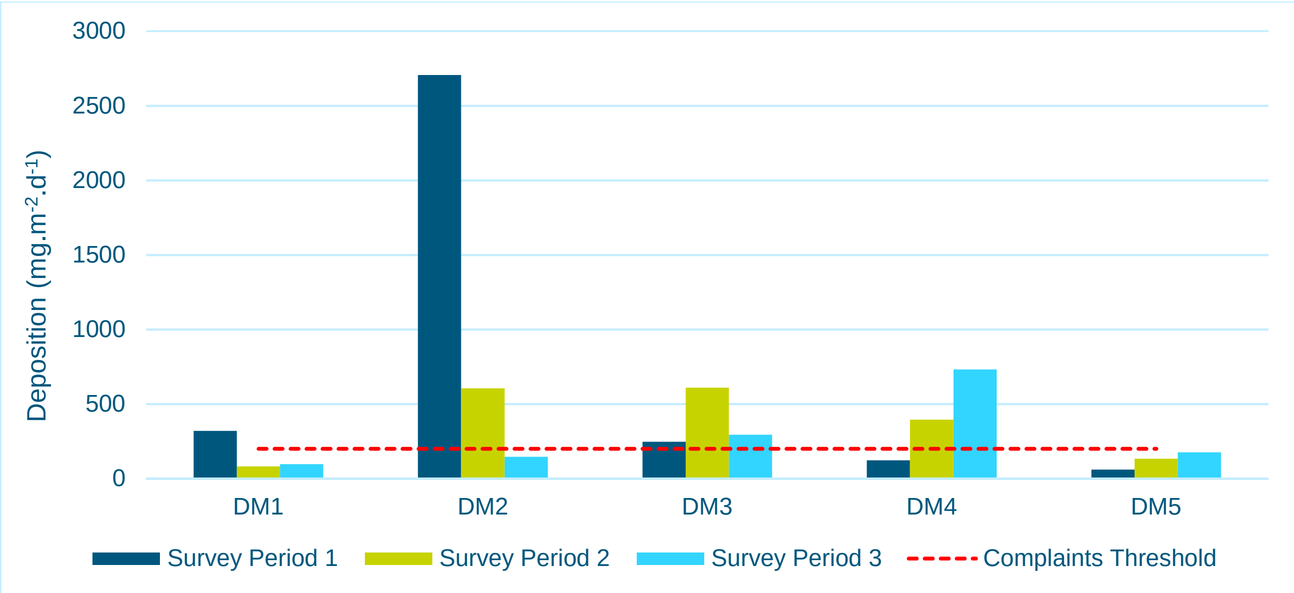
Site Reference	Site Description	Coordinates (WGS84 30N)	
DM1	North of existing inert waste facility	535520.2	5480976.8
DM2	East of existing inert waste facility	535634.5	5480869.5
DM3	West of existing inert waste facility	535379.7	5480879.2
DM4	South of existing inert waste facility	535467.8	5480812.5
DM5	South-east of the sensitive residential receptors on Bulwer Avenue (between the residential receptors and the existing inert waste facility)	534972.3	5480599

12.3.30 **Plate 12.2** shows the results of the dust deposition survey. A threshold limit of 200mg.m^{-2}.d^{-1} was included for reference because UK regulatory authorities conventionally consider a threshold of 200 mg.m^{-2}.d^{-1} (IAQM, 2012; EA, 2013) to be the dust deposition rate above which complaints may be experienced (Vallack & Shillito, 1998).

12.3.31 The measured dust deposition rates were above the complaints threshold during at least one of the survey periods at each of the dust monitors located at the current inert waste facility site (DM1 to DM4).

12.3.32 Dust deposition during Survey Period 1 at DM2 (the dust monitor to the east of the existing site) reached 2,705mg.m^{-2}.d^{-1}, over 13 times the likely complaints threshold. This is likely to be a consequence of the exposed soil stockpiles stored adjacent to DM2 (running horizontally to the west of DM2) after the dust monitor was installed, which remained there until the end of the full survey. Dust deposition at DM2 was lower in the subsequent survey periods (605 and 146 mg.m^{-2}.d^{-1} in Survey Periods 2 and 3 respectively); which may be due to the influence of rainfall. Rainfall data were obtained from measurements taken at Longue Hougue, which indicated rainfall of 0mm, 3mm and 0.4mm for Survey Periods 1, 2 and 3 respectively. The process of creating the stockpiles in combination with the dry weather during that time may have led to the high deposition during Survey Period 1. The subsequent rainfall that occurred during Survey Periods 2 and 3 may have dampened down the stockpiles and controlled the spread of dust, and therefore led to lower deposition rates.

Plate 12.2: Dust Deposition Monitoring Results. The Deposition Threshold of 200mg.m^{-2}.d^{-1} is included for reference, as levels above this may lead to complaints



12.3.33 Dust deposition rates were greater than the complaints threshold during each of the Survey Period at DM3 (to the west of the existing site).

12.3.34 Dust deposition rates were below the likely complaints threshold at the dust monitor location representative of the closest residential receptors (i.e. Gorselea) (DM5), however, deposition rates of 175mg.m^{-2}.d^{-1} were measured during Survey Period 3, which indicate that there might be other dust sources in addition to the existing site (e.g. site access road dust or sea salt aerosol).

12.3.35 **Plate 12.3** shows the direction of windblown dust at the existing inert waste facility based on the results from the sticky pad analysis. **Plate 12.4** shows the direction of windblown dust at the location representing the nearest residential receptors (i.e. south of Bulwer Avenue). It should be noted that the existing site has been nearly completely infilled with inert waste and the area of seawater within the breakwater is now much smaller than shown in **Plate 12.3** and **Plate 12.4**.

12.3.36 The direction of windblown dust or dust flux is measured as the percentage Effective Area Coverage per day (% EAC.d^{-1}); this method considers the darkness of the particles and the discoloration caused (IAQM, 2018).

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Plate 12.3: Dust Flux Results on the Existing Inert Waste Facility Site (DM1 – DM4). Units are in %EAC.d^{-1} (Note the Larger Scale at DM2) (Image Courtesy of Google Earth)

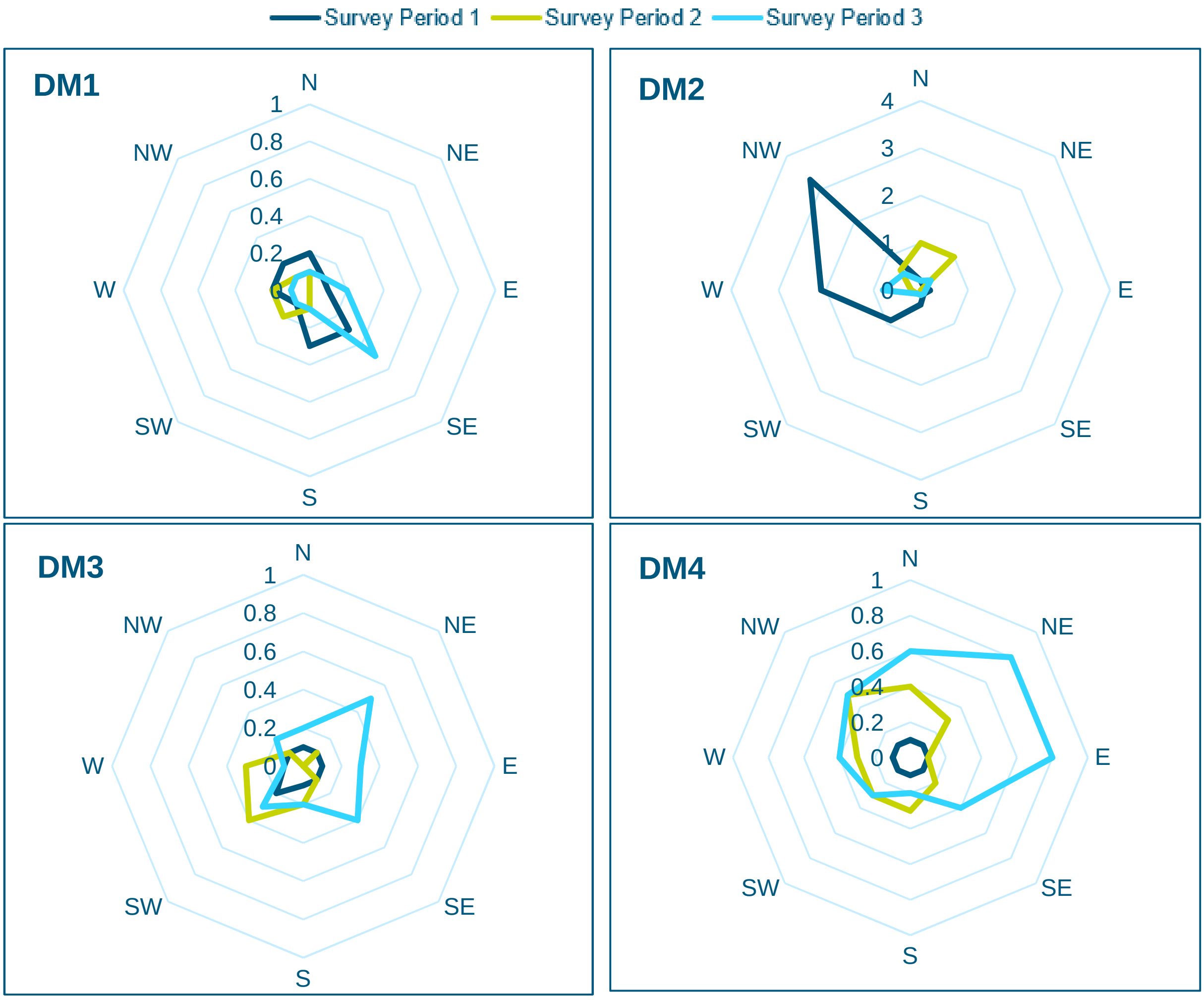
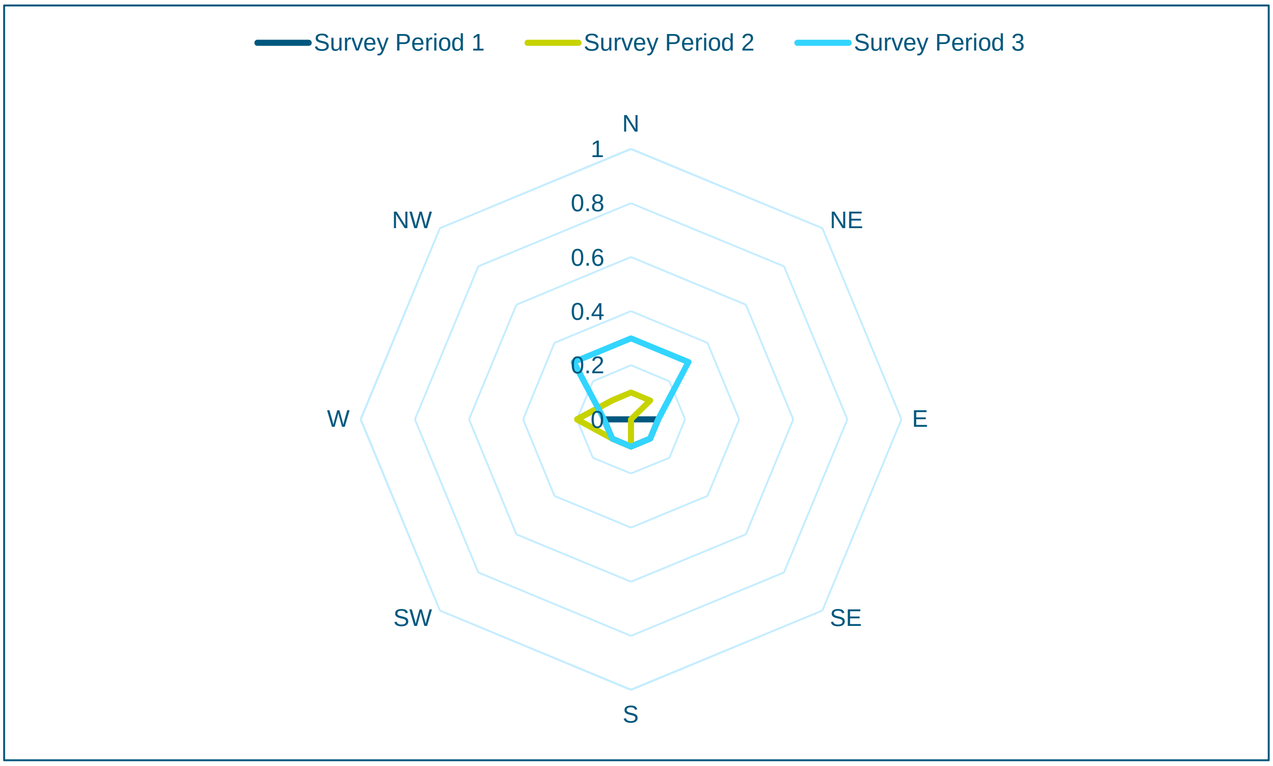


Plate 12.4: *Dust Flux Results for DM5 (Representative Residential Dust Monitor for Gorselea) (Image Courtesy of Google Earth)*



12.3.37 The dust flux results show that the predominant source of windblown dust was from the existing inert waste facility, as in general the main origin of dust at each of the four dust monitors was from the site. Dust flux measurements at DM2 were nearly four times greater than flux measurements at the other three dust monitors. This again may be due to the exposed stockpiles that were stored to the west of DM2 after the dust monitor was installed.

12.3.38 Dust flux measurements at DM5 (the off-site monitor, representative of the closest residential receptors) were lower than those recorded at the on-site dust monitors. The dust primarily originated from the north-west, north and north-east. This suggests that the site access road was the primary source of dust.

12.3.39 **Table 12-14** outlines the total % EAC.d^{-1} at each of the dust monitors during each Survey Period. The IAQM 'Guidance on Monitoring in the Vicinity of Demolition and Construction Sites' (IAQM, 2018) recommends a Site Action Level (a level at which further investigation or action is triggered) of 5% EAC.d^{-1}, measured over a 1-week period. 'The Control of Dust and Emissions During Construction and Demolition Supplementary Planning Guidance' (GLA, 2014) outlines the following deposited dust guidelines for urban areas (based on monthly mean dustfall):

- Possible complaints: 0.5% EAC.d^{-1};
- Serious complaints: 5% EAC.d^{-1}.

12.3.40 The results in **Table 12-14** show the temporal variations in % EAC at each location. No location recorded an exceedance of the IAQM (2018) recommended Site Action Level of 5% EAC.d^{-1}. The highest percentage EAC that was recorded was during Survey Period 1 at DM2 with 3.3% EAC.d^{-1} recorded, originating from the north-west. As described previously, this is likely due to the adjacent stockpiling of material.

12.3.41 All of the dust monitoring sites, except DM3 and DM5, had the potential for possible complaints as %EAC measurements were greater than the >0.5% EAC.d^{-1} recommended by the GLA (2014) at least once during the Survey Period. DM2 showed exceedances of the possible complaint threshold for the duration of the survey; again, this is likely due to the presence of adjacent stockpiles.

Table 12-14: *Highest % EAC.d-1 from Any Direction at Each of the Dust Monitoring Locations for the Duration of the 3 Surveys*

Site	Total % EAC.d^{-1} (Originating Direction)		
	Survey Period 1	Survey Period 2	Survey Period 3
DM1	0.3 (south-east / south)	0.2 (south-west / west)	0.5 (south-east)
DM2	3.3 (north-west)	1.0 (north / north-east)	0.8 (west)
DM3	0.2 (south-west)	0.4 (south-west)	0.5 (north-east)
DM4	0.1 (all directions)	0.5 (north-west)	0.8 (north-east / east)
DM5	0.1 (east / south-east / south / south-west / west)	0.2 (west)	0.3 (north-west / north north-east)

Background Concentrations

12.3.42 Background concentrations of pollutants are not monitored within the study area and Guernsey is not included in the Local Air Quality Management (LAQM) 1km x 1km grid background pollutant maps provided by Defra[12]. Therefore, background concentrations of NO_2, PM_{10} and $PM_{2.5}$ were monitored as part of this air quality assessment.

12.3.43 Diffusion tube DT3 was included in the air quality survey to monitor background NO_2 concentrations (see **Figure 12-2**). As detailed in the **Bias Adjustment and Annualisation of Monitoring Data Section**, spot samples of PM_{10} and $PM_{2.5}$ were not considered representative of average PM_{10} and $PM_{2.5}$ concentrations near the Project site; therefore, the 2018 PM_{10} annual mean recorded at the Bulwer Avenue analyser (24µg.m^{-3}) was used as a conservative background concentration for PM_{10} and $PM_{2.5}$. The annual mean background concentrations used at all receptors in the assessment are detailed in **Table 12-15**.

[12] https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2015

Table 12-15: Bias Adjusted and Annualised NO_2, PM_{10} and $PM_{2.5}$ Background Concentrations

Site	Background Concentration ($\mu g.m^{-3}$)		
	NO_2	PM_{10}	$PM_{2.5}$
DT3 (Background site)	9.9	24.0	24.0

Identification of Receptor Locations

12.3.44 The construction phase of the Project will involve building a rock breakwater that will form a perimeter around a lagoon, which will become the Longue Hougue South site. The operational phase of the Project will involve the gradual infilling of the area between the breakwater and the shoreline with inert waste.

Construction Phase Dust and Particulate Matter Assessment

12.3.45 The IAQM guidance (IAQM, 2016a) states that a Detailed Assessment is required if there are human receptors located within 350m and ecological receptors within 50m of the site boundary. The distance boundaries for the construction dust assessment can be found in **Figure 12-3**.

12.3.46 Parts of the Bulwer Avenue and Spur Point Area of Biodiversity Importance (ABI) and the Foreshore ABI are located within the site boundary. There are human receptors within 350m of the Project site boundary, with the closest human receptors present to the south of Bulwer Avenue, located approximately 20m, 40m, and 90m north of the Project site.

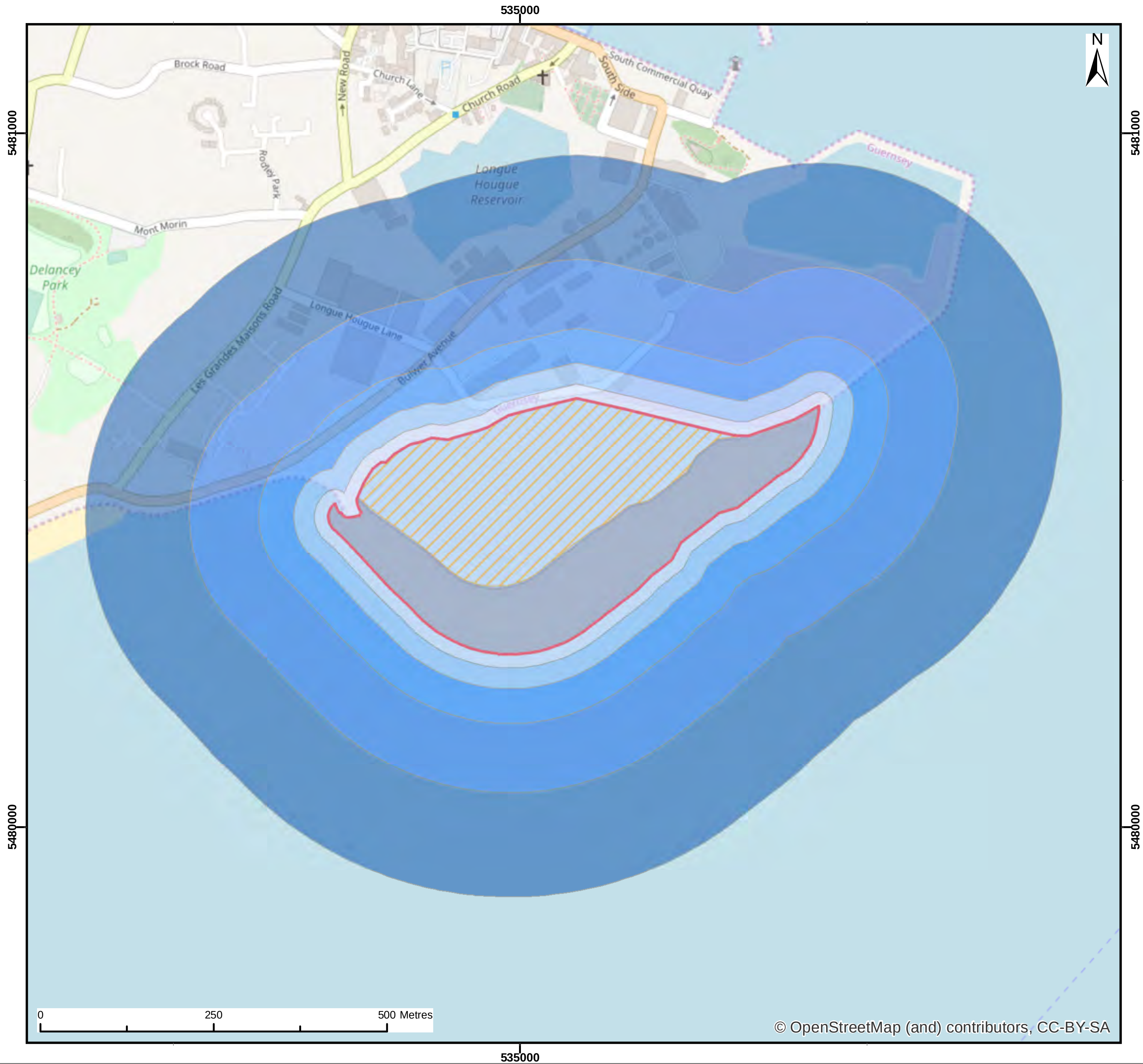
Construction and Operational Phase Road Traffic Emissions Assessment

<u>Human Receptors</u>

12.3.47 Sensitive receptor locations were identified within the study area for consideration in the assessment. Predicted changes in NO_2, PM_{10} and $PM_{2.5}$ concentrations, as a result of development-generated traffic, were calculated at these locations.

12.3.48 The sensitive receptor locations were selected based on their proximity to road links affected by the project, where the potential effect of development-related traffic emissions on local air pollution would be most significant.

12.3.49 The sensitive receptor locations are detailed in **Table 12-16** and **Figure 12-4**.



Legend:

- Outline of Proposed Development
- Infill Area
- Breakwater

Distance Boundaries

- 20m
- 50m
- 100m
- 200m
- 350m

Client: States of Guernsey	Project: Longue Hougue South EIA

Title: Construction Phase Dust Distance Boundaries

Figure: 12.3 Drawing No: PB5312-300-028

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	23/08/2019	IOM	PT	A4	1:8,000

Co-ordinate system: WGS 1984 UTM Zone 30N

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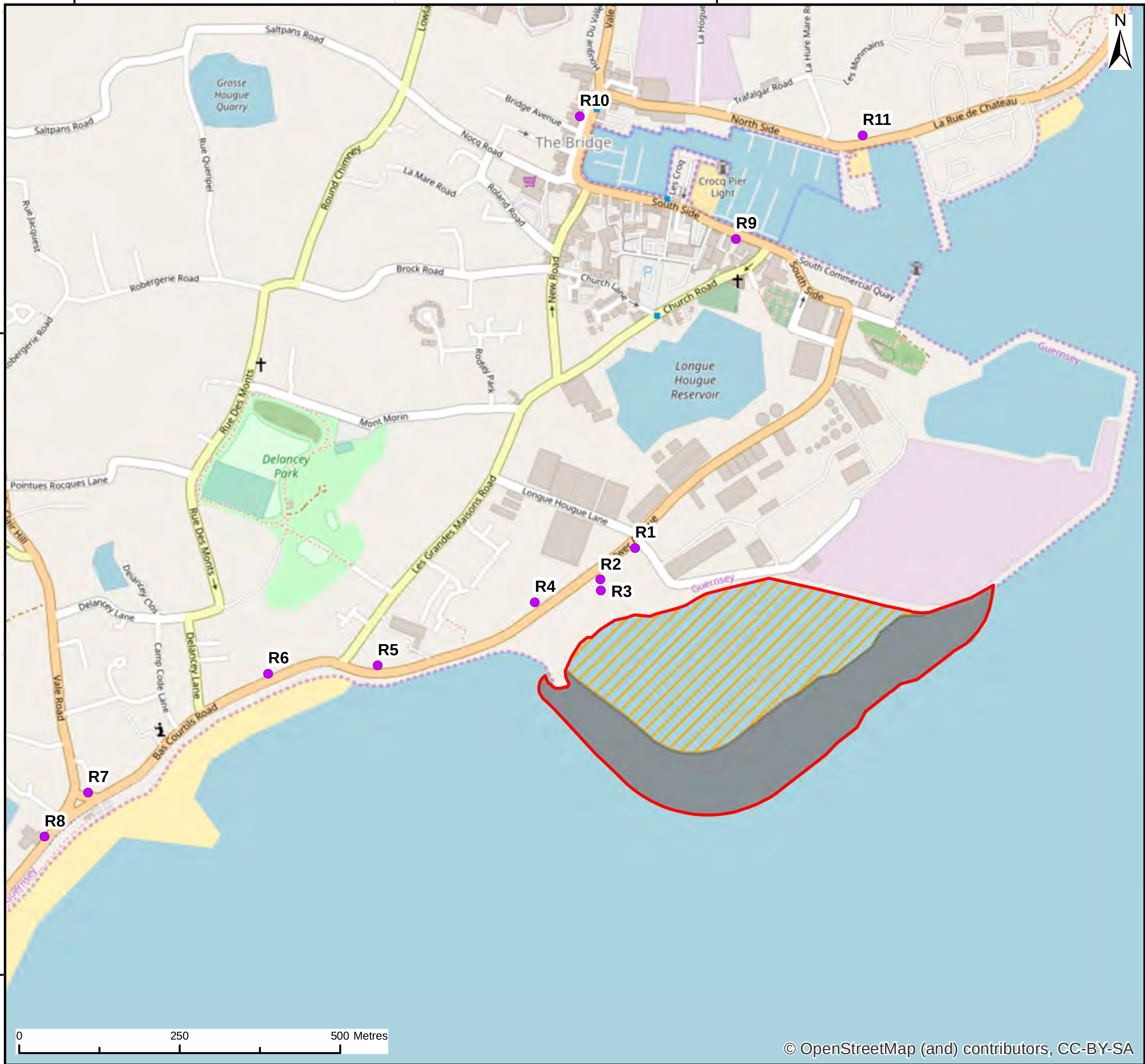
Table 12-16: *Sensitive Receptor Locations*

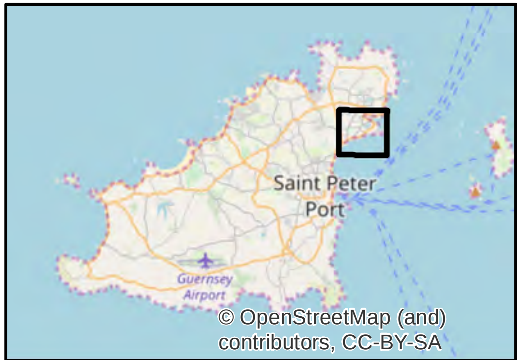
Receptor	Location	Coordinates (WGS84 30N)		Height (m)
R1	House at intersection of Bulwer Avenue and site access road	534873	5480665.1	1.5
R2	House on southern side of Bulwer Avenue	534822	5480616.3	1.5
R3	House on southern side of Bulwer Avenue	534827.3	5480589	1.5
R4	House on northern side of Bulwer Avenue	534724.5	5480585.7	1.5
R5	House on northern side of Bulwer Avenue	534472.2	5480479.4	1.5
R6	House on northern side of Les Bas Courtils	534275.5	5480455.2	1.5
R7	House at intersection of Vale Road and Les Bas Courtils	534020.8	5480281.8	1.5
R8	Saffery Champness apartment complex on Les Banques	533953.8	5480215.5	1.5
R9	House on South Quay	535030.6	5481147.8	1.5
R10	Apartment above Shoezone, The Bridge	534786.8	5481333.5	4.5
R11	House on North Quay	535238.5	5481309.1	1.5

Ecological Receptors

12.3.50 Ecological receptors within 200m of roads that are expected to experience a change in traffic flows as a result of the project were considered in the construction and operational road traffic emissions assessment. **Table 12-17** details the ecological receptors included in the assessment.

12.3.51 The Foreshore ABI is a marine intertidal habitat and according to the APIS website, marine habitats *"don't tend to be sensitive to air pollution impacts or are dominated by other sources of inputs"*, and therefore was scoped out of the road traffic emissions assessment.





Legend:

- Outline of Proposed Development
- Infill Area
- Breakwater
- Human Receptors

Client:	Project:
States of Guernsey	Longue Hougue South EIA

Title:

Air Quality Human Receptors

Figure:	12.4	Drawing No:	PB5312-300-029

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Co-ordinate system: WGS 1984 UTM Zone 30N

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12.3.52 Impacts in relation to the Critical Levels were considered at the sites detailed in **Table 12-17**.

Table 12-17: Ecological Receptors

Ecological Receptor	Description (States of Guernsey, 2014)
Bulwer Avenue and Spur Point ABI	Coastal grassland and pebble ridge above high tide level, including small areas of coastal rocks, and scrub. The area around Spur Point is important for roosting sea birds.
Longue Hougue Quarry ABI	A large water filled quarry surrounded by scrub with some mown areas. There are areas of inaccessible, seasonally flooded grassland vegetation. The quarry is important for gulls as a fresh-water bathing and drinking area. The scrub is important for feeding and nesting birds.
Mont Crevelt ABI	A small hill surmounted by a 'pre-Martello Tower' and fort at the South entrance to St Sampson's Harbour. Supports coastal grassland and scrub.
Vale Castle / Rue des Barras ABI	The Vale Castle stands on a hill on the north side of the entrance to St Sampson's harbour. The ABI also includes the strip between the coast road and the sea, the field to the north and the recently planted wood to the north west. The site is good for birds generally as a nesting and foraging area for common species and as a migrant stop-off.
Delancey to St Clair and Robergerie ABI	Planted and semi-natural Woodland and areas of Delancey Park which are being mowed less frequently and developing to coastal grassland and scrub. The site is in a good position for birds following the East Coast on migration.
Delancey Lane ABI	Woodland and standing water. The site includes a long-abandoned quarry pond and rock face with semi-natural scrub and woodland and is in a good position for birds following the East Coast on migration.
Les Banques ABI	Coastal grassland and pebble ridge above high tide level, including small areas of coastal rocks, and scrub.
Ivy Castel Lane ABI	Vestigial area of reed bed (Swamp) and medieval drainage ditches. Previously neglected, but now being actively managed to restore and conserve the swamp habitat.

12.3.53 In accordance with the Design Manual for Roads and Bridges (DMRB) guidance (Highways Agency, 2007), receptors should be included in a transect at 50m intervals back from the road, up to 200m.

12.3.54 The IAQM guidance document 'Guidance on the assessment of air quality impacts on nature conservation sites' (IAQM 2019) states that *"concentrations should not however be predicted too close to the roadway, since such predictions can be unreliable and may not represent areas of relevance to the assessment. It is recommended, for example, that predictions are not made closer than 2 m from the edge of a road."* As per the guidance, the first transect locations within each designated site that abuts a road link (i.e. the Bulwer Avenue and Spur Point ABI and the Vale Castle/Rue des Barras ABI) were located 2m from the nearest road.

12.3.55 The transect locations are shown in **Figure 12-1** and the locations are detailed in **Table 12-18**.

Table 12-18: Ecological Receptor Transect

Designated Ecological Site	Transect ID	Coordinates (WGS84 30N)		Height (m)
Bulwer Avenue (b) and Spur Point (a) ABI	T1(a)-1	534686.6	5480532.4	0
	T1(a)-2	534721.4	5480498.2	
	T1(a)-3	534753.7	5480459.6	
	T1(a)-4	534776.9	5480433.9	
	T1(b)-1	534574.1	5480499.2	
	T1(b)-2	534570.4	5480508.9	
Longue Hougue Quarry ABI	T2-1	535022.3	5480862.6	0
	T2-2	534997.7	5480906.2	
	T2-3	534973.1	5480950.1	
	T2-4	534948.4	5480993.9	
	T2-5	534942.5	5481003.8	
Mont Crevelt ABI	T3-1	535210.6	5481015.8	0
	T3-2	535255.9	5480991.1	
	T3-3	535299.5	5480967.0	
	T3-4	535323.6	5480953.3	

Designated Ecological Site	Transect ID	Coordinates (WGS84 30N)		Height (m)
Vale Castle/Rue des Barras ABI	T4-1	535617.5	5481512.3	0
	T4-2	535569.2	5481510.7	
	T4-3	535517.0	5481509.0	
	T4-4	535503.5	5481508.5	
Delancey to St Clair and Robergerie ABI	T5-1	534317.7	5480565.0	0
	T5-2	534314.0	5480614.8	
	T5-3	534314.0	5480665.1	
	T5-4	534312.9	5480709.5	
Delancey Lane ABI	T6-1	534156.1	5480581.9	0
	T6-2	534147.7	5480608.8	
Les Banques ABI	T7-1	534026.1	5480239.5	
	T7-2	534034.0	5480226.4	
Ivy Castel Lane ABI	T8-1	533706.3	5479973.6	0
	T8-2	533656.8	5479982.1	
	T8-3	533632.4	5479986.5	

Operational Phase Dust Emissions Assessment

12.3.56 Sensitive receptor locations were identified within the study area for consideration in the operational phase dust assessment.

12.3.57 The sensitive receptor locations were selected based on their proximity to the operational phase of the project, where the potential effect of windblown dust from the infilling of the lagoon would be most significant.

12.3.58 The sensitive receptors included in this assessment correspond to receptors R1 – R3 as considered in the road traffic emissions assessment, detailed in **Table 12-16**.

Summary of Receptors and Value / Sensitivity

12.3.59 The value and sensitivity of all receptors considered are summarised in **Table 12- 19**.

Table 12-19: Value / Sensitivity of Receptors

Phase	Receptor		Value / Sensitivity	Justification
Construction and Operational Phase Dust	Human	R1-R3	High	Human residential receptors.
	Ecological	Bulwer Avenue and Spur Point ABI and Foreshore ABI	Medium	"location with a national designation where the features may be affected by dust deposition" (IAQM, 2018a)
Construction and Operational Phase Traffic Emissions	Human	R1-R11	High	Human residential receptors.
	Ecological	ABIs listed in Table 12.17	Medium	The designated sites which are in the vicinity of the assessed road network are of national designation where features may be affected by deposition.

12.4 Do Nothing Scenario

Construction and Operational Phase Dust

12.4.1 It is assumed that without the construction and operation of the Project, baseline dust at human receptors would be similar to those measured at dust monitor DM5 (see **Plate 12.2**, **Plate 12.4,** and **Table 12-14**). There would be no additional sources of dust without the Project.

Construction and Operational Phase Traffic Emissions

Human Receptors

12.4.2 The predicted NO_2, PM_{10} and $PM_{2.5}$ concentrations for the future 2021 and 2024 baseline (i.e. 'without Project construction' (2021) and 'without operational activities' (2024) scenarios) are detailed in **Table 12-20**. The concentrations include contributions from modelled road network and background pollutant contributions.

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Table 12-20: Predicted NO_2, PM_{10} and $PM_{2.5}$ Future Baseline Concentrations in 2021

Receptor	Predicted Future Baseline (2021) (µg.m^{-3})			Predicted Future Baseline (2024) (µg.m^{-3})		
	NO_2	PM_{10}	$PM_{2.5}$	NO_2	PM_{10}	$PM_{2.5}$
R1	21.9	25.5	24.9	22.2	25.5	24.9
R2	16.2	25.0	24.6	16.4	25.0	24.6
R3	13.2	24.5	24.3	13.3	24.5	24.3
R4	14.4	24.7	24.4	14.5	24.8	24.4
R5	16.1	25.0	24.6	16.3	25.1	24.6
R6	17.1	25.2	24.7	17.2	25.2	24.7
R7	24.9	26.0	25.2	25.3	26.1	25.3
R8	34.4	27.3	26.0	35.3	27.5	26.1
R9	23.1	25.8	25.1	23.4	25.8	25.1
R10	14.3	24.4	24.3	14.4	24.5	24.3
R11	13.4	24.5	24.3	13.5	24.6	24.3
NO_2 Annual Mean Objective – 40µg.m^{-3} PM_{10} Annual Mean Objective – 40µg.m^{-3} $PM_{2.5}$ Annual Mean Target – 25µg.m^{-3}						

12.4.3 As detailed in **Table 12-20**, the predicted 2021 and 2024 baseline show that NO_2 and PM_{10} pollutant concentrations were below the annual mean Objectives.

12.4.4 The highest NO_2 annual mean concentrations were predicted at receptor R8 as 34.4µg.m^{-3} and 35.3µg.m^{-3} in 2021 and 2024 respectively. This was due to R8 being located next to a queueing section of the main St Peter Port to St Sampson road and near the Vale Road, Les Banques and Les Bas Courtils intersection.

12.4.5 The highest PM_{10} annual total concentrations were 27.3 µg.m^{-3} and 27.5µg.m^{-3} in 2021 and 2024 respectively, also predicted at receptor R8. This concentration is well below (i.e. less than 75% of) the PM_{10} Objective of 40µg.m^{-3}.

12.4.6 The predicted 2021 and 2024 results show that $PM_{2.5}$ concentrations were above the annual mean target of 25µg.m^{-3} at R7, R8 and R9. However, this is due to the overly conservative background concentration of 24µg.m^{-3} used in the assessment, which assumed all monitored PM_{10} was $PM_{2.5}$. This is unlikely to be the case, as shown in the spot measurements which were collected, detailed in **Table 12-8**. While the spot measurement results are not representative of a long-term average, they provide some context as to the $PM_{2.5}$:PM_{10} ratio near the Project site. On average at all the spot sample locations (DT1 to DT7), PM_{10} measurements comprised only 27% $PM_{2.5}$, and at the background location PM_{10} measurements comprised 32% $PM_{2.5}$. Therefore, it can be assumed that $PM_{2.5}$ concentrations near the Project site would be below the target value.

Ecological Receptors

12.4.7 A summary of the future baseline (2021 and 2024) Critical Level assessment results of NO_X concentrations at each of the ABIs are provided in **Table 12-21**. The predicted future baseline concentrations are inclusive of background pollutant concentrations, to provide total concentrations at each transect location.

Table 12-21: Predicted NO_X Concentrations at Each ABI Transect Location in 2021 and 2024 Without the Project

Site	Transect ID	NOX Concentration (µg.m^{-3})	
		2021 Predicted Future Baseline	2024 Predicted Future Baseline
Bulwer Avenue (b) and Spur Point (a) ABI	T1(a)-1	25.7	26.0
	T1(a)-2	17.6	17.6
	T1(a)-3	16.8	16.8
	T1(a)-4	16.6	16.6
	T1(b)-1	23.2	23.3
	T1(b)-2	19.1	19.1
Longue Hougue Quarry ABI	T2-1	17.3	17.4
	T2-2	16.8	16.8
	T2-3	16.7	16.7
	T2-4	16.7	16.7
	T2-5	16.7	16.8

Site	Transect ID	NOX Concentration (µg.m-3)	
		2021 Predicted Future Baseline	2024 Predicted Future Baseline
Mont Crevelt ABI	T3-1	21.6	21.9
	T3-2	17.1	17.2
	T3-3	16.6	16.6
	T3-4	16.5	16.5
Vale Castle/Rue des Barras ABI	T4-1	20.9	21.0
	T4-2	16.8	16.8
	T4-3	16.4	16.4
	T4-4	16.3	16.4
Delancey to St Clair and Robergerie ABI	T5-1	16.6	16.6
	T5-2	16.4	16.4
	T5-3	16.3	16.3
	T5-4	16.2	16.2
Delancey Lane ABI	T6-1	16.5	16.5
	T6-2	16.5	16.5
Les Banques ABI	T7-1	24.9	25.2
	T7-2	21.8	22.0
Ivy Castel Lane ABI	T8-1	17.3	17.3
	T8-2	16.6	16.6
	T8-3	16.4	16.5
NO_X Annual Mean Critical Level Assessment Objective – 30µg.m^{-3}			

12.4.8 Background NO_X concentrations were calculated from NO_2 measurements taken at DT3. Two approaches were considered in the conversion of NOx to NO_2, as discussed during consultation with States of Guernsey; the Defra NOx to NO_2 calculator and the Environment Agency methodology for conversion of NOx to NO_2 from stack sources assuming 70% NOx as NO_2. This is discussed in further detail in the **NOX to NO_2 Conversion Section**.

12.4.9 The Defra NO_X to NO_2 calculator calculated a higher NO_X background concentration (15.74µg.m^{-3}) in comparison to the NO_X concentration that was calculated using the Environment Agency stack assessment guidance[13] ('the Alternative Approach') (assuming 70% of NO_X as NO_2) (14.14µg.m^{-3}), therefore 15.74µg.m^{-3} was used as the background concentration in the assessment. The Critical Level NO_X concentrations using the Alternative Approach can be found in **Appendix 12.2**.

12.4.10 As detailed in **Table 12-21**, maximum predicted future NO_X baseline concentrations were well below the Annual Mean Critical Level along each point of the transects.

12.5 Methodology for EIA

Consultation

12.5.1 Consultation undertaken throughout the pre-application phase informed the approach and the information provided in this chapter. A summary of the consultation of particular relevance to air quality is detailed in **Table 12-22**.

Table 12-22: Consultation and Responses

Consultee and Date	Response	Chapter / Section where consultation comment is addressed
Expert Stakeholder Workshop Attendee, 14 March 2019	A question was asked if the operation of the power station will form part of the baseline.	**Chapter 6 EIA Consultation**
Cathy Rirsch (EHO for the States of Guernsey) May – August 2019	Consultation was carried out with the EHO at States of Guernsey regarding the methodology for the assessment.	**Chapter 12 Air Quality**

Construction Dust and Particulate Matter Assessment

12.5.2 An assessment of potential impacts associated with the construction phase was undertaken in accordance with the IAQM guidance (IAQM, 2016a). A summary of the assessment process is provided below.

[13] https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit

12.5.3 Construction phase assessment steps:

1. Screen the need for a more detailed assessment;
2. Separately for demolition, earthworks, construction and trackout:
    a. determine potential dust emission magnitude;
    b. determine sensitivity of the area; and
    c. establish the risk of dust impacts.
3. Determine site specific mitigation; and
4. Examine the residual effects to determine whether additional mitigation is required.

12.5.4 It should be noted that trackout is defined as the transport of dust and dirt from the construction site onto the public road network. Full details of the assessment methodology are provided in **Appendix 12.1**.

12.5.5 Defra technical guidance (Defra, 2018) states that emissions from Non-Road Mobile Machinery (NRMM)[14] used on construction sites are unlikely to have a significant impact on local air quality where relevant control and management measures are employed. As such, emissions from NRMM were not considered quantitively in this assessment, and the relevant control measures to be employed are detailed in **Section 12.6** and **Section 12.7**.

12.5.6 Definitions of the different sensitivity levels for human receptors to dust are given in **Table 12-23**. Sensitivity levels were obtained from the IAQM guidance (IAQM, 2016a).

Table 12-23: Definition of the Different Sensitivity Levels for Receptors to Construction Dust

Sensitivity	Sensitivity of people to dust soiling	Sensitivity of people to the health effects of PM_{10}
High	Dwellings, museums and other culturally important collections, medium and long-term car parks and car showrooms.	Residential properties, hospitals, schools and residential care homes.
Medium	Parks, places of work.	Office and shop workers not occupationally exposed to PM_{10}.

[14] *Non-Road Mobile Machinery is defined as any mobile machinery, transportable industrial equipment or vehicle fitted with an internal combustion engine not intended for passenger or goods transport by road. Explanatory Memorandum to the UK Non Road Mobile Machinery (Emissions of Gaseous & Particulate Pollutants) (Amendment) Regulations (2006)*

Sensitivity	Sensitivity of people to dust soiling	Sensitivity of people to the health effects of PM_{10}
Low	Playing fields, farmland, footpaths, short-term car parks and roads.	Public footpaths, playing fields, parks and shopping streets.

12.5.7 The magnitude of construction phase dust emissions was defined for each type of activity. These are divided into four categories: demolition, earthworks, construction and trackout:

- Demolition: there are anticipated to be no buildings demolished during the construction of the breakwater of the project, therefore demolition was scoped out of the assessment.
- Earthworks: the construction of the breakwater was defined as earthworks in the context of this assessment as the IAQM guidance states that 'earthworks' encompasses haulage, tipping and stockpiling which will be undertaken in the construction of the breakwater.
- Construction: construction is defined in IAQM guidance in relation to construction of buildings, which is not proposed. Therefore, construction was scoped out of the assessment.
- Trackout: is the transport of dust and dirt from the construction sites onto the public road network and was scoped into the assessment.

12.5.8 The dust emission magnitudes can either be small, medium or large and are dependent on the methods of work undertaken and the scale of the activity.

12.5.9 The definitions of the dust emission magnitudes for each activity are detailed in **Table 12-24**.

Table 12-24: Definitions of the Different Magnitudes of Construction Phase Dust Emissions

Activity	Criteria used to determine dust emission class		
	Small	Medium	Large
Earthworks	Total site area <2,500m^2	Total site area 2,500 – 10,000m^2	Total site area >10,000m^2
Trackout	<10 outward HDV trips in any one day. Unpaved road length <50m	10-50 outward HDV trips in any one day. Unpaved road length 50-100m	<10 outward HDV trips in any one day. Unpaved road length >100m

12.5.10 As detailed in **Table 12-24**, the IAQM guidance provides broad ranges of the area of a site, the total building volume and the number of outward vehicle trips which were used to determine the dust emission magnitude.

12.5.11 The dust emission magnitude was combined with the sensitivity of the area to determine the risk of impacts prior to mitigation. This is shown in more detail in **Appendix 12.1**. Once appropriate mitigation measures were identified, the significance of construction phase impacts was determined. The aim of this approach is to prevent significant effects at receptors due to the implementation of effective mitigation.

12.5.12 A matrix is not provided in the guidance to determine significance because it is considered that the residual impacts would be 'not significant' with the implementation of effective mitigation measures in accordance with guidance provided by the IAQM.

Construction and Operational Phase Road Traffic Assessment

12.5.13 Air pollution in urban areas is dominated by emissions from road vehicles. The quantities of each pollutant emitted are dependent on the type and quantity of fuel used, engine type and size, vehicle speeds and abatement equipment fitted.

12.5.14 The assessment considered traffic generated during the construction and operational phases of the Project.

Air Dispersion Model

12.5.15 The Atmospheric Dispersion Modelling System for Roads (ADMS-Roads) v4.1.1.0 was used to assess the potential impact on local air quality impact of vehicle exhaust emissions during the construction and operational phases. The main pollutants of concern with regard to human health are NO_2, PM_{10} and $PM_{2.5}$. Concentrations of these pollutants were therefore the focus of the ADMS-Roads assessment at the identified receptors located adjacent to the assessed road network.

12.5.16 The ADMS-Roads model has been comprehensively validated in many studies by the software manufacturer CERC (Cambridge Environmental Research Consultants). This includes comparisons with data from the UK's Automatic Urban Network (AUN) and specific validation exercises using standard field, laboratory and numerical data sets.

Assessment Scenarios

12.5.17 A base year of 2018 was considered in the assessment, which included traffic flows for the existing road network in the vicinity of the site. These data were derived from traffic count data surveys from 2019 provided by Royal HaskoningDHV except for

Longue Hougue Lane which was calculated from count data from 2015 (from the Waste Development at Longue Hougue ES (Amec Foster Wheeler, 2015)) and factored accordingly. These data were only used in the model verification scenario to more adequately represent concentrations monitored at the continuous analyser located adjacent to the road.

12.5.18 Traffic from the construction phase of the Project is anticipated to be at its peak in 2021 and the operational phase of the Project is anticipated to commence in 2024, therefore these years were used in the assessment.

12.5.19 In summary, the following scenarios were considered:

- Scenario 1 – Verification year (2018);
- Scenario 2 – 2021 'without Project construction';
- Scenario 3 – 2021 'with Project construction';
- Scenario 4 – 2024 'without operational activities'; and
- Scenario 5 – 2024 'with operational activities'.

Traffic Data

12.5.20 Traffic data for use in the air quality assessment were provided by Royal HaskoningDHV as Annual Average Daily Traffic (AADT) flows and percentage Heavy Duty Vehicles (HDVs) on the surrounding road network.

12.5.21 Traffic data for the following roads were included in the air quality assessment:

- Site Access off Bulwer Avenue;
- Bulwer Avenue / Les Bas Courtis;
- Vale Road / Route Militaire;
- Les Banques;
- Longue Hougue Lane;
- Bulwer Avenue;
- The Bridge / South Quay; and
- North Quay / Castle Road.

12.5.22 The road network utilised in the assessment for the Verification Year and Future Year scenarios are detailed in **Figure 12-5**. Traffic speeds were included in the air dispersion modelling as follows:

- Speed data for free-flowing traffic conditions were obtained from the average speed recorded during the traffic survey in 2019 (see **Table 12-25**);
- The speed for Longue Hougue Lane was modelled at 20kph due to the narrow road and high proportion of HGVs;
- Queues were included in the model at junctions where traffic lights / zebra crossings were present, and on entry to roundabouts, and were modelled at 20kph, except for South Quay and The Bridge queues, which were modelled at 10kph to reflect the conditions on these roads experienced during site visits; and
- The average speed on roundabouts was modelled at 20kph, except for the roundabout at The Bridge / North Quay junction which was modelled at 10kph to reflect congestion previously experienced during site visits.

12.5.23 Traffic data used in the assessment are detailed in **Table 12-25**.

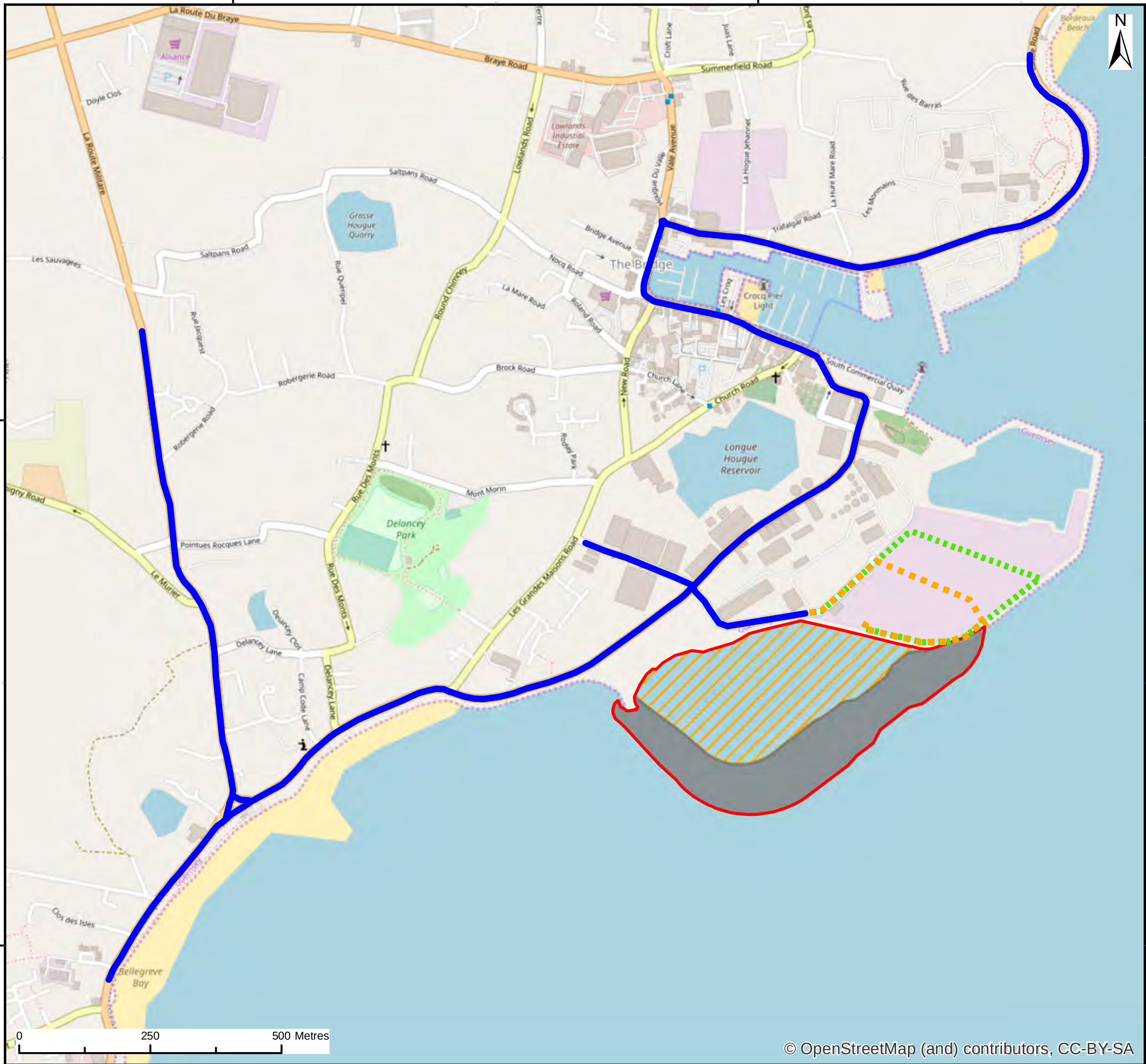
Meteorological Data

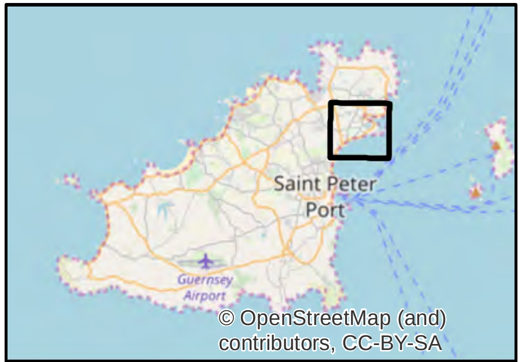
12.5.24 2018 meteorological data from the Guernsey recording station was used in the ADMS-Roads model. This is the only recording station on the island of Guernsey and is considered to be representative of meteorological conditions on the island. The recording station is located adjacent to Guernsey Airport, approximately 7.4km south-west of the Project site. The use of these data was agreed with States of Guernsey during consultation. The Guernsey monitoring station wind rose for 2018 is shown in **Plate 12.5**.

Emission Factors

12.5.25 Emission factors obtained from the Emission Factor Toolkit v9.0 provided by Defra[15] were utilised in the assessment. There is uncertainty regarding the rate of reduction in emissions from road vehicles on Guernsey in the future, therefore in order to provide a conservative assessment, emissions factors for the assessment year 2018 were utilised in the 2021 and 2024 scenarios.

[15] *https://laqm.defra.gov.uk/documents/EFT2019_v9.0.xlsb*





Legend:

- Outline of Proposed Development
- Infill Area
- Breakwater
- Modelled Roads
- Modelled Operational Phase Site Access
- Modelled Construction Phase Site Access

Client:	Project:
States of Guernsey	Longue Hougue South EIA

Title:

Roads Model Setup

Figure: 12.5	Drawing No: PB5312-300-030

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: WGS 1984 UTM Zone 30N

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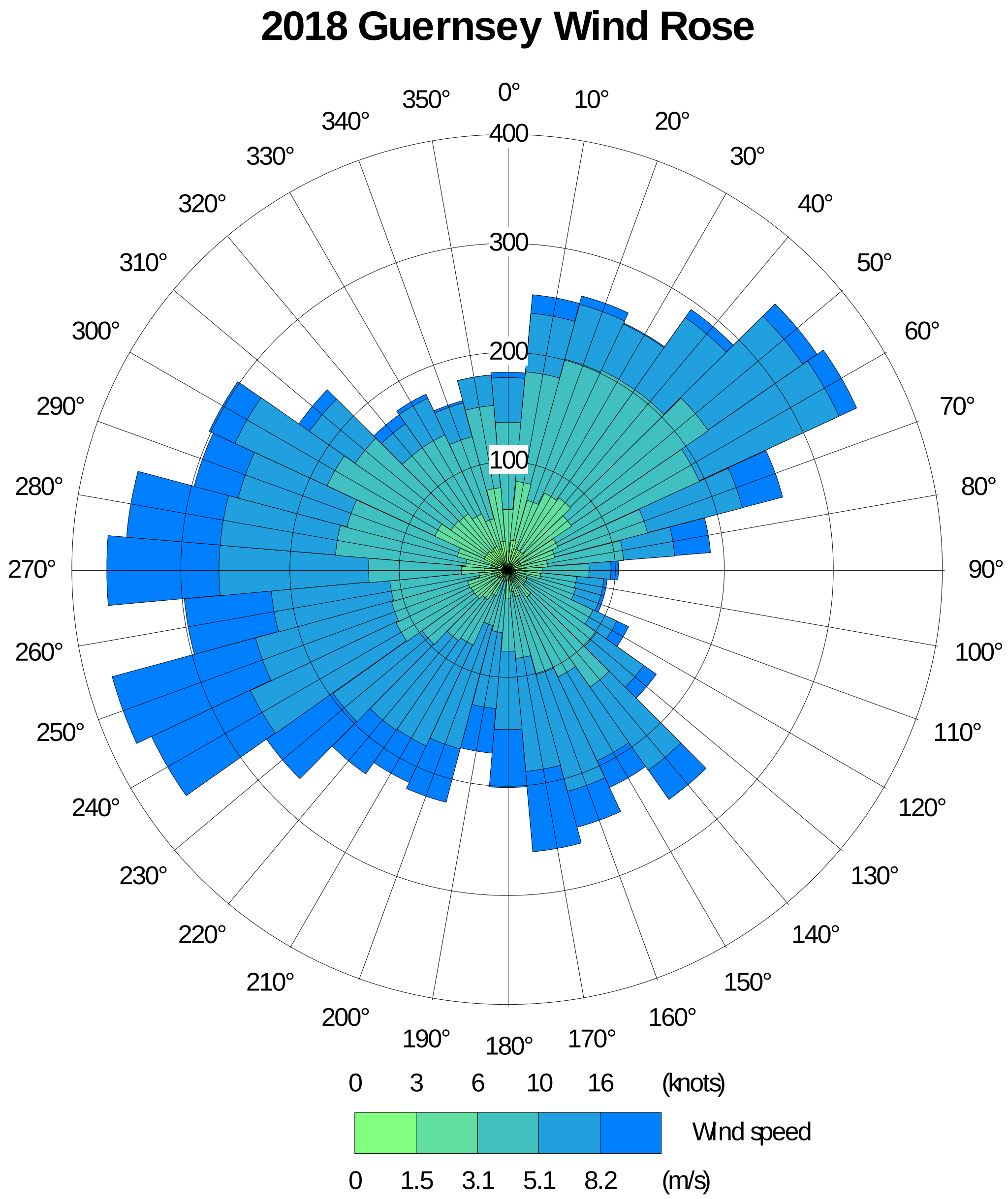
Table 12-25: Traffic Data Used in the Air Quality Assessment

Road Link	Verification Year 2018		2021 without Project construction		2021 with Project construction		2024 without operational activities		2024 with operational activities		Speed
	AADT	HDV (%)	AADT	HDV (%)	AADT	HDV (%)	AADT	HDV (%)	AADT	HDV (%)	kph
Site Access	1,270	24%	1,285	24%	1,365	25%	1,285	24%	1,406	30%	28.7
Bulwer Avenue / Les Bas Courtis	9,260	9%	9,407	9%	9,482	10%	9,609	9%	9,717	10%	47.2
Vale Road / Route Militaire	11,329	4%	11,684	4%	11,725	4%	12,126	4%	12,158	4%	35.0
Les Banques	24,092	5%	24,540	5%	24,605	5%	25,716	5%	25,800	5%	38.2
Longue Hougue Lane*	1,525	16%	-	-	-	-	-	-	-	-	20
Bulwer Avenue	8,394	8%	8,696	8%	8,731	8%	9,250	8%	9,271	8%	42.6
The Bridge / South Quay	10,264	4%	10,664	4%	10,699	5%	10,943	4%	10,964	4%	22.7
North Quay / Castle Road	5,219	9%	5,356	9%	5,387	10%	5,425	9%	5,440	10%	40.7
*Longue Hougue Lane was used for verification (2018) only											

Plate 12.5: 2018 Guernsey Meteorological Station Wind Rose



NO_X to NO_2 Conversion

12.5.26 Oxides of nitrogen (NO_X) concentrations were predicted using the ADMS-Roads model. In the UK, modelled road contributions of NO_X are generally converted to NO_2 using the NO_X to NO_2 calculator (v7.1) (Defra, 2019c), in accordance with Defra guidance (Defra, 2018). As Guernsey is not included in the NO_X to NO_2 calculator, two approaches were used to determine the most conservative method of converting NO_X to NO_2, as agreed with States of Guernsey during consultation. The two approaches were as follows:

- Use of the NO_X to NO_2 calculator using input data for Cornwall as a proxy for

Guernsey, based on proximity and similar coastal characteristics; and

- Use of the Environment Agency's Guidance on stack assessments[13], assuming 70% of long-term road NO_X to be NO_2.

12.5.27 The most conservative of the two approaches was evaluated and taken forward in the assessment; this was determined to be the use of the NO_X to NO_2 Calculator. Model verification and results using the Environment Agency's approach ('the Alternative Approach') are presented in **Appendix 12.2** for comparison purposes.

Model Verification

12.5.28 Model verification is the process of adjusting model outputs to improve the consistency of modelling results with respect to available monitored data. In this assessment, model uncertainty was minimised following Defra (Defra, 2018) and IAQM and EPUK (IAQM & EPUK, 2017) guidance.

12.5.29 Diffusion tube monitoring was undertaken as part of this assessment, as shown on **Figure 12-2** and described in **Section 12.3**. The roadside diffusion tubes were used in the derivation of the adjustment factor utilised in the assessment, in accordance with Defra Technical Guidance (TG(16)) (Defra, 2018).

12.5.30 2018 annualised background concentrations measured at DT3 were used for all locations in the assessment. Model verification was performed using both approaches detailed in above in the **NOx to NO2 Conversion Section**. The approach detailed in **Table 12-26** used the NO_X to NO_2 calculator, as it predicted a higher adjustment factor (and therefore is considered to be more conservative) than the Alternative Approach (adjustment factors of 2.564 and 1.918 respectively). Model verification using the Alternative Approach is detailed in **Appendix 12.2**.

12.5.31 The derivation of the model adjustment factor is detailed in **Table 12-26**.

12.5.32 The Root Mean Square Error (RMSE) of the model was 3.9µg.m^{-3}. The RMSE *"is used to define the average error or uncertainty of the model"* and should be within the ideal value of 4µg.m^{-3} (10% of the annual mean NO_2 Objective of 40µg.m^{-3}) as specified in Defra technical guidance (Defra, 2018). If the RMSE value is higher than ± 25% of the Objective, Defra guidance recommends that model inputs and verification should be revisited. Model performance in this assessment was therefore considered to be suitable, as the RMSE was within the ideal value.

Table 12-26: Model Verification (Using the NOx to NO_2 Calculator Approach)

Derivation Factor	NO_2 Diffusion Tube Monitoring Location					
	DT1	DT2	DT4	DT5	DT6	DT7
2018 Annualised Monitored Total NO_2 (µg.m^{-3})	22.9	23.9	22.7	17.8	16.2	18.9
2018 Annualised Background NO_2 (from DT3) Concentration (µg.m^{-3})	9.9	9.9	9.9	9.9	9.9	9.9
Monitored Road Contribution NO_X (total - background) (µg.m^{-3})	25.0	27.0	24.5	14.8	11.7	17.1
Modelled Road Contribution NO_X (excludes background) (µg.m^{-3})	5.3	11.9	5.9	9.8	3.7	5.2
Adjustment Factor for Modelled Road Contribution	2.564					
Adjusted Modelled Road Contribution NOx (µg.m^{-3})	13.5	30.6	15.0	25.1	9.6	13.3
Modelled Total NO_2 (based on empirical NO_X / NO_2 relationship) (µg.m^{-3})	17.2	25.7	17.9	23.0	15.1	17.0
Monitored Total NO_2 (µg.m^{-3})	22.9	23.9	22.7	17.8	16.2	18.9
% Difference [(modelled - monitored) / monitored] x 100	-25%	7%	-21%	29%	-7%	-10%

Calculation of Short-term Pollutant Concentrations

12.5.33 Defra guidance (Defra, 2018) sets out the method for the calculation of the number of days in which the PM_{10} 24-hour Objective is exceeded, based on a relationship with the predicted PM_{10} annual mean concentration. The calculation utilised in the prediction of short-term PM_{10} concentrations was:

$$No. of\ 24\ hour\ mean\ exceedances = -18.5 + 0.00145\ x\ annual\ mean^3 + \frac{206}{annual\ mean}$$

12.5.34 Research projects completed on behalf of Defra and the Devolved Administrations (Laxen and Marner, 2003) (AEAT, 2008) concluded that the hourly mean NO_2 Objective is unlikely to be exceeded if annual mean concentrations are predicted to be less than 60µg.m^{-3}. This value was therefore used as an annual mean equivalent threshold to evaluate likely exceedance of the hourly mean NO_2 Objective.

Assessment Significance Criteria

Construction Phase Dust and Fine Particulate Matter

12.5.35 In assessing the significance of construction dust impacts using the IAQM guidance (IAQM, 2016a), the dust emission magnitude is combined with the sensitivity of the area to determine the risk of impacts prior to mitigation. Full details are provided in **Appendix 12.1**. Once appropriate mitigation measures were identified, the significance of construction phase impacts was determined.

Construction and Operational Phase Road Traffic Emissions Assessment

Human Receptors

12.5.36 Guidance is provided by the IAQM and EPUK (IAQM & EPUK, 2017) on determining the significance of a development's impact on local air quality. **Table 12-27** details the impact descriptors that take account of the magnitude of changes in pollutant concentrations, and the concentration in relation to the air quality Objectives. The guidance recommends that the assessment of significance of effect will need to consider the following factors:

- The existing and future air quality in the absence of the development;
- The extent of current and future population exposure to the impacts; and
- The influence and validity of any assumptions adopted when undertaking the prediction of impacts.

Table 12-27: Impact Descriptor for Individual Receptors

Long Term Average Concentration at Receptor in Assessment Year	% Change in Concentration relative to the Air Quality Assessment Level (AQAL)			
	1	2 - 5	6 - 10	>10
75% or less of AQAL	Negligible	Negligible	Slight	Moderate
76-94% of AQAL	Negligible	Slight	Moderate	Moderate
95-102% if AQAL	Slight	Moderate	Moderate	Substantial
103-109 of AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial

12.5.37 The guidance also states that a judgement of the significance should be made by a competent professional who is suitably qualified. This air quality assessment and determination of the significance of the development on local air quality was undertaken by Members of the IAQM.

12.5.38 The above criteria relate to impacts based on annual mean pollutant concentrations. Short-term pollutant concentrations were compared to the relevant air quality Objectives; any predicted exceedances of these Objectives would be considered a significant impact.

Operational Phase Dust Emissions Assessment

12.5.39 Regulatory authorities conventionally consider a threshold of 200 $mg.m^{-2}.d^{-1}$ (IAQM, 2012; EA, 2013) to be the dust deposition rate, above which complaints may be received (Vallack & Shillito, 1998). This is the benchmark against which operational dust impacts were considered in this assessment.

12.6 Impacts During Construction

CONSTRUCTION IMPACT 12.1: Construction Phase Dust and Fine Particulate Matter

12.6.1 There is the potential that the existing Longue Hougue Reclamation Site will be infilled before the Project is ready to receive inert waste (i.e. pre-construction). In this event, inert waste will be stockpiled on the existing Longue Hougue Reclamation Site before it can be either used in the construction of the breakwater or as infilled material for the Project. Mitigation measures relating to stockpiles in **Section 12.7** will be implemented to ensure that dust generated by longer-term stockpiling of material is adequately controlled.

12.6.2 A qualitative assessment of construction phase dust and PM_{10} emissions was carried out in accordance with the latest IAQM guidance (IAQM, 2016a). Full details of methodology and dust assessment undertaken are provided in **Appendix 12.1**.

12.6.3 The construction works associated with the project have the potential to impact on local air quality conditions as described below:

- Dust emissions generated by excavation, construction, trackout and earthwork activities associated with the construction phase have the potential to cause nuisance to, and soiling of, sensitive receptors;
- Emissions of exhaust pollutants, especially NO_2, PM_{10} and $PM_{2.5}$ from construction traffic on the local road network have the potential to impact upon local air quality at sensitive receptors situated adjacent to the routes utilised by construction vehicles; and

- Emissions of PM_{10} and $PM_{2.5}$ from non-road mobile machinery (NRMM) have the potential to impact local air quality at sensitive receptors close to the works.

12.6.4 The potential for sensitive receptors to be affected will depend on where within the application site the dust raising activity takes place, the nature of the activity and controls, and meteorological dispersion conditions.

12.6.5 At this stage in the Project, the method for delivering rock for the breakwater to the site has not been confirmed. Two approaches are proposed for delivering rock to the site and transporting it to the breakwater. These are:

- **Option 1: Shoreline deposition** at high tide for a barge to deliver rock onto the shoreline within the Longue Hougue South site. The barge will either comprise a hopper barge whereby the hopper would open, and the rock would be deposited underwater but in an area which will become exposed at low tide, or be deposited from the barge using an excavator. Once onshore, the rock will be transported to the storage area by excavators.
- **Option 2: Berth based deposition** via barge berthing at the north end of Longue Hougue (where barges berthed for the Longue Hougue Reclamation Site Construction) and transfer of rock by truck to a stockpile in the existing Longue Hougue Reclamation Site (see **Figure 4-3**) before being transported to Longue Hougue South for placement.

12.6.6 Option 2 was considered in the construction dust assessment as a conservative scenario due to the length of unpaved road (approximately 830m) that would be travelled by the trucks from the north end of Longue Hougue to the Longue Hougue South site, and the greater potential for dust to be generated.

Step 1: Screen the Need for a Detailed Assessment

12.6.7 The IAQM guidance (IAQM, 2016a) states that a Detailed Assessment is required if there are human receptors located within 350m and ecological sites within 50m of the site boundary. There are human receptors present within 350m of the site boundary. The site boundary includes small areas of the Bulwer Avenue and Spur Point ABI and the Foreshore ABI. A Detailed Assessment was therefore undertaken for both human and ecological receptors.

12.6.8 The distance bands from the site boundary to the sensitive receptors within 350m of the site are detailed in **Figure 12-3**.

Step 2A: Define the Potential Dust Emission Magnitude

12.6.9 The IAQM guidance recommends that the dust emission magnitude is determined for demolition, earthworks, construction and trackout. The works scoped into the construction phase dust assessment are detailed in the **Construction Dust and Particulate Matter Assessment Section**. The dust magnitudes for earthworks and trackout were determined from site plans in accordance with the IAQM methodology as detailed in **Appendix 12.1** and summarised in **Table 12-28**.

Table 12-28: Dust Emission Magnitude for the Site

Construction Activity	Dust Magnitude	Justification
Earthworks	Large	Total site area >10,000m^2, >10 heavy earth moving vehicles active at any one time, total material moved >100,000 tonnes.
Trackout	Large	Unpaved road length >100m, potentially dusty surface material.

12.6.10 The risk of potential impact of construction phase dust and PM_{10} emissions during earthworks and trackout was used to recommend appropriate mitigation measures. The dust magnitude for construction activities was categorised as **Large** for both earthworks and trackout.

Step 2B: Define the Sensitivity of the Area

12.6.11 The sensitivity of receptors to dust soiling and impacts of PM_{10} on human health associated with earthworks and trackout activities during construction of the proposed development were determined and are summarised in **Table 12-29**. The methodology for determining sensitivity is from IAQM guidance (IAQM, 2016a) and is detailed further in **Appendix 12.1**.

Sensitivity of People to Dust Soiling

- Earthworks: there is 1 high sensitivity residential receptor within 20m of the breakwater site boundary. The sensitivity is therefore **Medium**.
- Trackout: there are between 10-100 high sensitivity residential receptors within 20m of the access roads that are within 500m of the site. The sensitivity is therefore **High**.

Sensitivity of People to Health Effects of PM_{10}

- Earthworks: the annual mean background PM_{10} concentration near the site was assumed to be less than 24µg.m^{-3} as the true background would be less than the 2018 continuous analyser annual mean, and there is one high sensitivity residential receptors within 20m of the site boundary. The sensitivity is therefore **Low**.
- Trackout: the annual mean background PM_{10} concentration near the site was assumed to be less than 24µg.m^{-3}, and there are 10-100 high sensitivity residential receptors within 20m of the routes that construction vehicles will use to access the site. The sensitivity is therefore **Low**.

Sensitivity of Ecological Receptors to Dust Soiling

- Earthworks: the Bulwer Avenue and Spur Point ABI and Foreshore ABI are nationally designated sites and therefore medium sensitivity receptors and are less than 20m from the site boundary. The sensitivity is therefore **Medium**.
- Trackout: the Bulwer Avenue and Spur Point ABI and Foreshore ABI are less than 20m from the site access road. The sensitivity is therefore **Medium**.

Table 12-29: Outcome of Defining the Sensitivity of the Area

Potential Impact	Sensitivity of the Surrounding Area	
	Earthworks	Trackout
Dust Soiling	Medium	High
Human Health	Low	Low
Ecological	Medium	Medium

Step 2C: Define the Risk of Impacts

12.6.12 The dust emission magnitude detailed in **Table 12-28** is combined with the sensitivity of the area detailed in **Table 12-29** to determine the risk of impacts with no mitigation applied. The risks concluded for receptor dust soiling and human health are provided in **Table 12-30**.

Table 12-30: Summary of Dust Risk Table to Define Site-Specific Mitigation

Potential Impact	Risk	
	Earthworks	Trackout
Dust Soiling	Medium Risk	High Risk
Human Health	Low Risk	Low Risk
Ecological	Medium Risk	Medium Risk

Step 3: Site-Specific Mitigation

12.6.13 Step three of the IAQM (IAQM, 2016a) guidance identifies appropriate site-specific mitigation. These measures are related to the site risk for each activity.

12.6.14 The dust assessment determined that there was a **high risk** of impacts resulting from construction activities without the implementation of mitigation measures. Additional guidance has been provided by the IAQM in relation to dust and air mitigation measures. It is recommended that the good practice measures outlined in the IAQM guidance are followed.

12.6.15 The recommendations below should be detailed in a Dust Management Plan (DMP) to prevent or minimise the release of dust entering the atmosphere and/or being deposited on nearby receptors. Particular attention should be paid to operations which must unavoidably take place close to the site boundary. The effective implementation of the DMP will ensure that any potential dust releases associated with the construction phase will be reduced.

Mitigation Measures Recommended by the IAQM

12.6.16 A list of mitigation measures that are highly recommended for a **high risk** site by the IAQM are provided below.

Communications

- Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.
- Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary and the head or regional office contact information. This may be the environment manager/engineer or the site manager.
- Display the head or regional office contact information.

Dust Management

- Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by States of Guernsey.
- Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.
- Make the complaints log available to States of Guernsey when asked.
- Record any exceptional incidents that cause dust and/or air emissions, either on- or offsite, and the action taken to resolve the situation in the log book.
- Hold regular liaison meetings with other high risk construction sites within 500m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the off-site transport / deliveries which might be using the same strategic road network routes.
- Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to note any dust deposition, record inspection results, and make the log available to States of Guernsey when asked.
- Carry out regular site inspections to monitor compliance with the DMP, record inspection results and make an inspection log available to States of Guernsey when asked.
- Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.
- Plan the site layout so that machinery and dust causing activities are located away from receptors, as far as is practicable.
- Erect solid screens or barriers around dusty activities, or the site boundary, that are at least as high as any stockpiles on site.
- Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period.
- Take measures to control site run-off of water or mud.
- Keep site fencing, barriers and scaffolding clean using wet methods.
- Remove materials that have a potential to produce dust from site as soon as possible.
- Cover, seed or fence stockpiles to prevent wind whipping.
- Ensure all vehicles switch off engines when stationary - no idling vehicles.

- Avoid the use of diesel or petrol-powered generators and use mains electricity or battery powered equipment where practicable.
- Impose and signpost a maximum-speed-limit of 24kph on surfaced, and 16kph on unsurfaced, haul roads and work areas.
- Implement the Travel Plan that has been produced for the Proposed Scheme, which supports and encourages sustainable travel for contractor operatives and staff (public transport, cycling, walking, and car-sharing).
- Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.
- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.
- Ensure an adequate water supply on the site for effective dust/particulate matter suppression / mitigation, using non-potable water where possible and appropriate.
- Use enclosed chutes and conveyors and covered skips.
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
- Ensure equipment is readily available on site to clean any dry spillages and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.
- Bonfires and burning of waste materials should not be permitted.

Measure Specific to Earthworks

- Re-vegetate or cover earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.
- Use Hessian, mulches or tackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.
- Only remove the cover in small areas during work and not all at once.

Measures Specific to Trackout

- Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site.
- Avoid dry sweeping of large areas.
- Ensure loaded vehicles entering and leaving sites are covered to prevent

escape of materials during transport.

- Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.
- Record all inspections of haul routes and any subsequent action in a site log book.
- Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud) prior to leaving the site where reasonably practicable.
- Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.
- Locate site access gates at least 10m from receptors where possible.

Measures Specific to Non Road Mobile Machinery (NRMM)

12.6.17 Non Road Mobile Machinery[14] (NRMM) and plant would be well maintained. If any emissions of dark smoke occur, then the relevant machinery should stop immediately, and any problem rectified. In addition, the following controls should apply to NRMM:

- All NRMM should use fuel equivalent to ultralow sulphur diesel (fuel meeting the specification within EN590:2004);
- All NRMM should comply with regulation (EU) 2016/1628 of the European Parliament and of the European Council;
- All NRMM will be fitted with Diesel Particulate Filters (DPF) conforming to defined and demonstrated filtration efficiency (load/duty cycle permitting);
- The ongoing conformity of plant retrofitted with DPF, to a defined performance standard, should be ensured through a programme of onsite checks; and
- Fuel conservation measures should be implemented, including instructions to (i) throttle down or switch off idle construction equipment; (ii) switch off the engines of trucks while they are waiting to access the site and while they are being loaded or unloaded and (iii) ensure equipment is properly maintained to ensure efficient fuel consumption.

Step 4: Determine Significant Effects

12.6.18 With the implementation of the above mitigation measures, the residual impacts from the construction phase of the project are considered to be **not significant**, in accordance with IAQM guidance (IAQM, 2016a).

CONSTRUCTION IMPACT 12.2: Construction Phase Road Traffic Emissions

Human Receptors

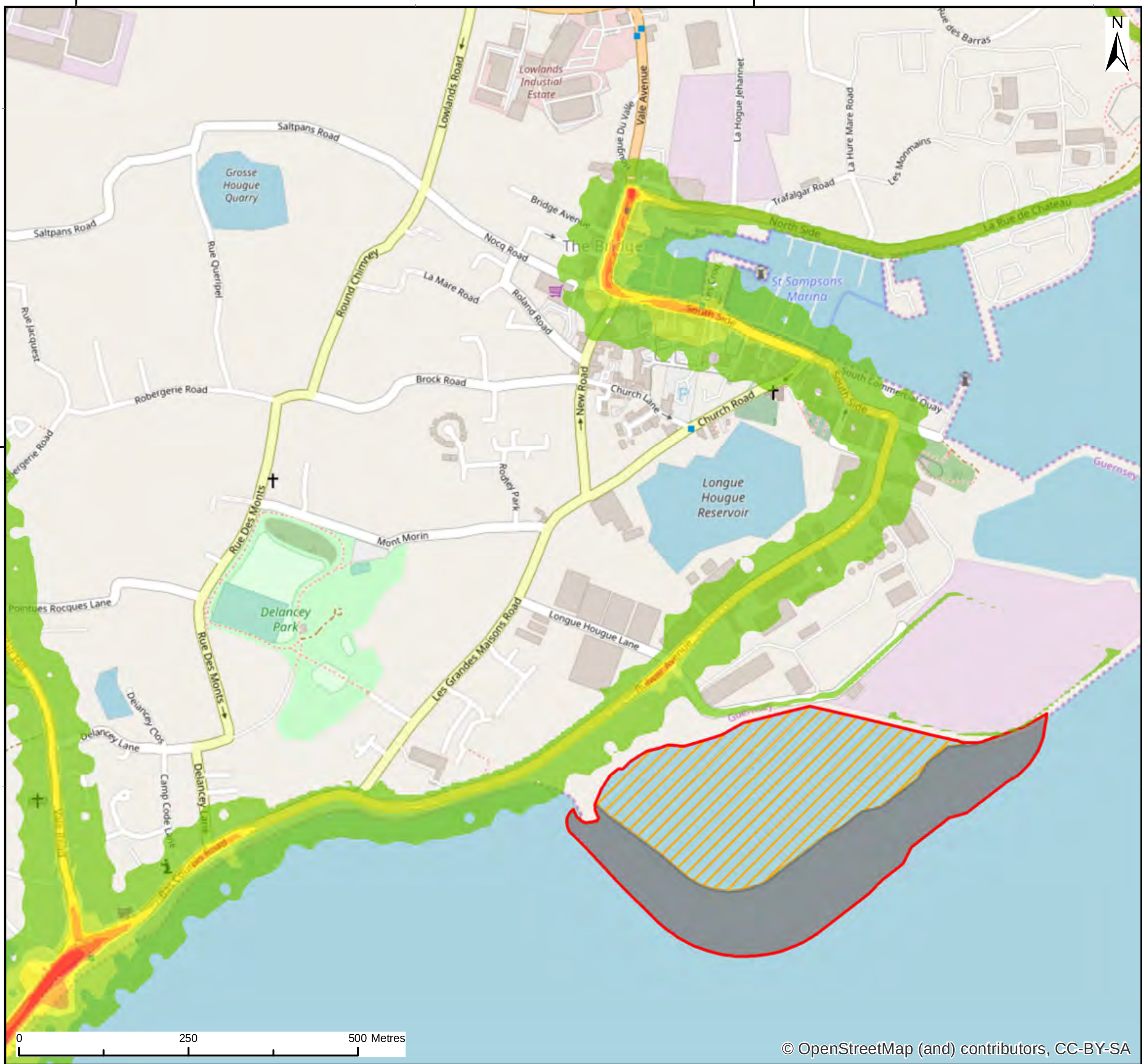
12.6.19 The 24-hour Annual Average Daily Traffic (AADT) flows and HDV percentages used in the air quality assessment scenarios are detailed in **Table 12-25**.

12.6.20 The predicted NO_2, PM_{10} and $PM_{2.5}$ concentrations for the 'with Project construction' (2021) scenario (Scenario 3) are detailed in **Table 12-31**, which include the contribution from the modelled road network and background pollutant concentrations. Concentrations for the 2021 'without Project construction' scenario (Scenario 2) and the predicted change in NO_2, PM_{10} and $PM_{2.5}$ concentrations, as a result of the construction phase, are also shown for comparison purposes. The concentrations include the contributions from the modelled road network and background pollutant concentrations.

12.6.21 NO_X was converted using the NO_X to NO_2 Calculator. Construction phase road traffic NO_2 results using the Alternative Approach are provided in **Appendix 12.2**.

12.6.22 As detailed in **Table 12-31**, the results of the impact assessment showed that there were no exceedances of the annual mean NO_2 and PM_{10} Objectives. The highest NO_2 annual total concentration during peak construction (2021) was 34.6µg.m^{-3} at R8 and this is below the NO_2 Objective of 40µg.m^{-3}. A contour plot of the construction phase road NO_2 concentrations are shown in **Figure 12-6**. The highest PM_{10} annual total concentration was 27.4µg.m^{-3}, again at R8, and this is well below (i.e. less than 75% of) the PM_{10} Objective of 40µg.m^{-3}. The impact was described as **negligible** at all receptors for NO_2 and PM_{10} in accordance with IAQM and EPUK guidance (IAQM & EPUK, 2017).

12.6.23 As detailed in **Table 12-31**, the change in $PM_{2.5}$ as a result of construction traffic was 0% of the Objective and determined to be **negligible** at all receptors. The highest $PM_{2.5}$ annual total concentration during peak construction was 26.1µg.m^{-3} at R8. This concentration would be in exceedance of the Target of 25µg.m^{-3}, however, the reason for the exceedance is because of the overly conservative background $PM_{2.5}$ concentration used in the assessment of 24µg.m^{-3}. This was the PM_{10} annual mean for the roadside continuous analyser on Bulwer Avenue, and was used in lieu of representative background data.



Legend:

- Outline of Proposed Development
- Infill Area
- Breakwater

Construction Phase NO2 Concentrations (ug/m3)

- 15 - 19.9
- 20 - 24.9
- 25 - 29.9
- 30 - 34.9
- 35 - 39.9
- > 40

Client:	Project:
States of Guernsey	Longue Hougue South EIA

Title:

Construction Phase Road NO2 Concentrations (ug/m3)

Figure:	12.6	Drawing No:	PB5312-300-033

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: WGS 1984 UTM Zone 30N

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Table 12-31: Predicted Annual Mean NO_2, PM_{10} and $PM_{2.5}$ Concentrations and Impact of Project During Peak Construction (2021) at Sensitive Receptor Locations

Receptor	Predicted Concentrations 2021 – Construction Phase				
	Without Project construction ($\mu g.m^{-3}$)	With Project construction ($\mu g.m^{-3}$)	Change ($\mu g.m^{-3}$)	Change as % of Objective	Impact Descriptor
Nitrogen Dioxide (NO_2) – Air Quality Objective of 40$\mu g.m^{-3}$					
R1	21.9	22.3	0.4	1%	Negligible
R2	16.2	16.3	0.1	0%	Negligible
R3	13.2	13.3	0.1	0%	Negligible
R4	14.4	14.5	0.1	0%	Negligible
R5	16.1	16.2	0.1	0%	Negligible
R6	17.1	17.2	0.1	0%	Negligible
R7	24.9	25.1	0.2	1%	Negligible
R8	34.4	34.6	0.2	1%	Negligible
R9	23.1	23.3	0.2	1%	Negligible
R10	14.3	14.4	0.1	0%	Negligible
R11	13.4	13.5	0.1	0%	Negligible
Particulate Matter (PM_{10}) – Air Quality Objective of 40$\mu g.m^{-3}$					
R1	25.5	25.5	0.03	0%	Negligible
R2	25.0	25.0	0.02	0%	Negligible
R3	24.5	24.5	0.01	0%	Negligible
R4	24.7	24.8	0.01	0%	Negligible
R5	25.0	25.1	0.02	0%	Negligible
R6	25.2	25.2	0.02	0%	Negligible
R7	26.0	26.0	0.02	0%	Negligible

Receptor	Predicted Concentrations 2021 – Construction Phase				
	Without Project construction (µg.m^{-3})	With Project construction (µg.m^{-3})	Change (µg.m^{-3})	Change as % of Objective	Impact Descriptor
R8	27.3	27.4	0.02	0%	Negligible
R9	25.8	25.8	0.02	0%	Negligible
R10	24.4	24.5	0.01	0%	Negligible
R11	24.5	24.6	0.01	0%	Negligible
Particulate Matter ($PM_{2.5}$) - Air Quality Target of 25µg.m^{-3}					
R1	24.9	24.9	0.02	0%	Negligible
R2	24.6	24.6	0.01	0%	Negligible
R3	24.3	24.3	0.01	0%	Negligible
R4	24.4	24.4	0.01	0%	Negligible
R5	24.6	24.6	0.01	0%	Negligible
R6	24.7	24.7	0.01	0%	Negligible
R7	25.2	25.2	0.01	0%	Negligible
R8	26.0	26.1	0.01	0%	Negligible
R9	25.1	25.1	0.01	0%	Negligible
R10	24.3	24.3	0.00	0%	Negligible
R11	24.3	24.3	0.01	0%	Negligible

12.6.24 As described in **Section 12.5**, the potential for exceedances of the short-term air quality Objectives in relation to road traffic emissions is generally considered based on the relationship with annual mean pollutant concentrations. All predicted NO_2 concentrations were well below 60µg.m^{-3} and therefore, in accordance with Defra guidance (Defra, 2018), the 1-hour mean Objective is unlikely to be exceeded. The short term PM_{10} Objective was predicted to be met at all modelled locations with less than 35 exceedances of the daily mean Objective of 50µg.m^{-3}.

12.6.25 The overall significance of impacts at human receptors during the construction phase, as a result of road traffic emissions, is considered to be **not significant**.

Ecological Receptors

12.6.26 The predicted NO_X concentrations from construction phase vehicle emissions along the transects modelled in each of the ABIs are detailed in **Table 12-32**. The predicted vehicle emissions were added to the background NO_X concentrations to provide total concentrations at each transect location. Background NO_X concentrations were calculated from NO_2 measurements taken at DT3. The NO_X to NO_2 calculator calculated a higher NO_X background concentration (15.744µg.m^{-3}) in comparison to the Alternative Approach (assuming 70% of NO_X as NO_2) (14.14µg.m^{-3}), therefore 15.744µg.m^{-3} was used as the background concentration in the assessment.

Table 12-32: Construction Phase Critical Level Assessment

Site	2021 Annual Mean NO_X Concentrations (µg.m^{-3})			
	Transect ID	NO_X Concentration without Project construction (µg.m^{-3})	NO_X Concentration with Project construction (µg.m^{-3})	NO_X Concentration with Project construction as % of Critical Level
NO_X Annual Mean Critical Level Assessment – Critical Level 30µg.m^{-3}				
Bulwer Avenue (b) and Spur Point (a) ABI	T1(a)-1	25.7	25.9	86%
	T1(a)-2	17.6	17.6	59%
	T1(a)-3	16.8	16.9	56%
	T1(a)-4	16.6	16.6	55%
	T1(b)-1	23.2	23.3	78%
	T1(b)-2	19.1	19.1	64%
Longue Hougue Quarry ABI	T2-1	17.3	17.4	58%
	T2-2	16.8	16.8	56%
	T2-3	16.7	16.7	56%
	T2-4	16.7	16.7	56%
	T2-5	16.7	16.8	56%

Site	2021 Annual Mean NO_X Concentrations (µg.m^{-3})			
	Transect ID	NO_X Concentration without Project construction (µg.m^{-3})	NO_X Concentration with Project construction (µg.m^{-3})	NO_X Concentration with Project construction as % of Critical Level
NO_X Annual Mean Critical Level Assessment – Critical Level 30µg.m^{-3}				
Mont Crevelt ABI	T3-1	21.6	21.7	72%
	T3-2	17.1	17.2	57%
	T3-3	16.6	16.7	56%
	T3-4	16.5	16.5	55%
Vale Castle/Rue des Barras ABI	T4-1	20.9	21.1	70%
	T4-2	16.8	16.8	56%
	T4-3	16.4	16.4	55%
	T4-4	16.3	16.4	55%
Delancey to St Clair and Robergerie ABI	T5-1	16.6	16.6	55%
	T5-2	16.4	16.4	55%
	T5-3	16.3	16.3	54%
	T5-4	16.2	16.2	54%
Delancey Lane ABI	T6-1	16.5	16.5	55%
	T6-2	16.5	16.5	55%
Les Banques ABI	T7-1	24.9	25.0	83%
	T7-2	21.8	21.8	73%
Ivy Castel Lane ABI	T8-1	17.3	17.3	58%
	T8-2	16.6	16.6	55%
	T8-3	16.4	16.5	55%

12.6.27 As detailed in **Table 12-32**, maximum predicted NO_X concentrations were below the Annual Mean Critical Level along each of the transects. The overall impact of the construction phase of the Project on air quality at each of the ABIs is therefore considered to be **not significant**.

Mitigation

12.6.28 As the overall impact of the construction phase of the Project on air quality at human and ecological receptors was considered to be **not significant**, no mitigation measures are proposed for construction phase road traffic emissions.

Residual Impact

12.6.29 The residual impact of construction phase road traffic emissions is **not significant**.

12.7 Impacts During Operation

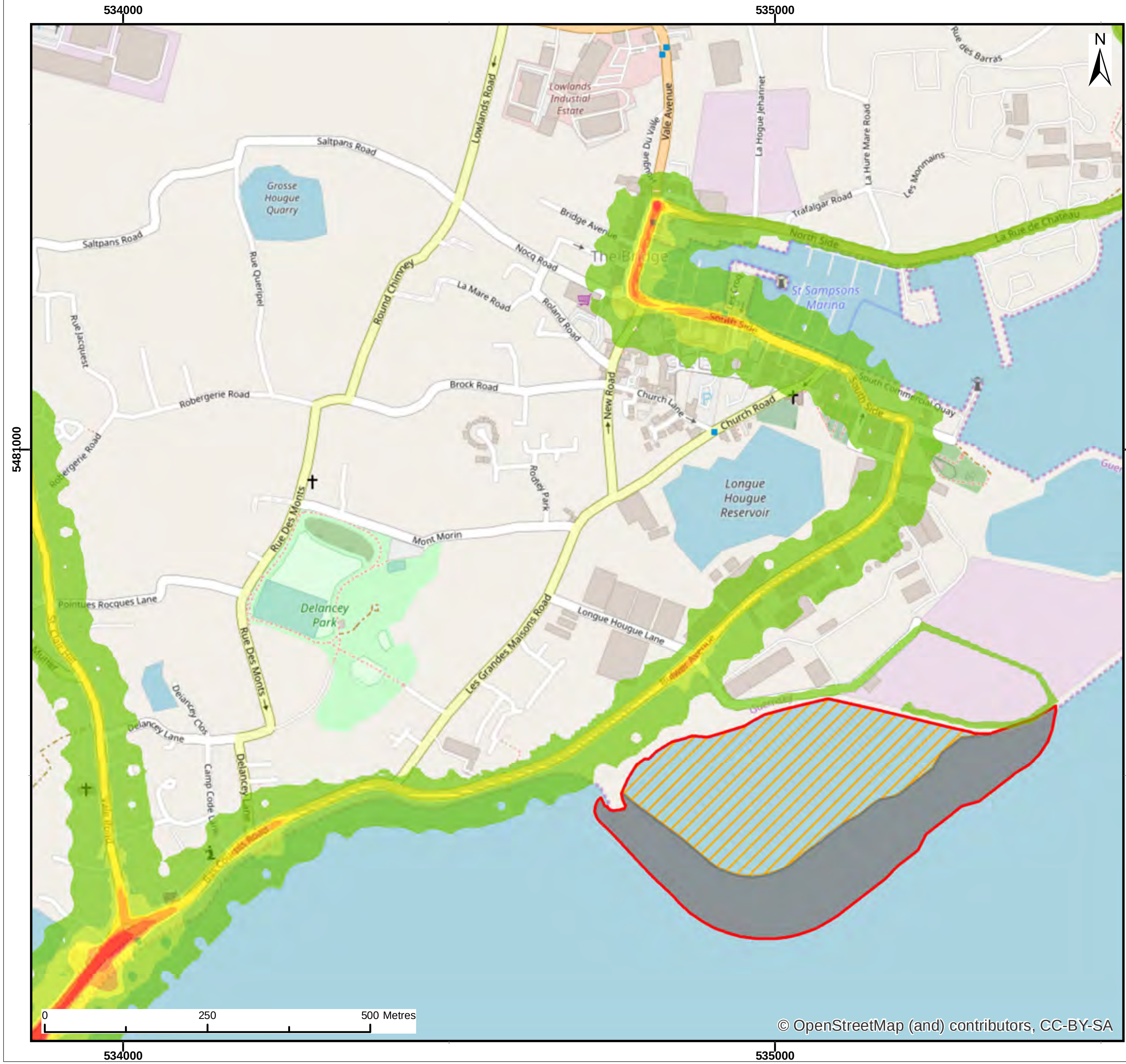
OPERATIONAL IMPACT 12.3: Operational Phase Road Traffic Emissions

Human Receptors

12.7.1 The predicted NO_2, PM_{10} and $PM_{2.5}$ concentrations for the 'with operational activities' (2024) scenario are detailed in **Table 12-33**, which include the contribution from the modelled road network and background pollutant concentrations. Concentrations for the 2024 'without operational activities' scenario (Scenario 5) and the predicted change in NO_2, PM_{10} and $PM_{2.5}$ concentrations, as a result of the operational activities, are also shown for comparison purposes. The concentrations include the contributions from the modelled road network and background pollutant concentrations.

12.7.2 NO_X was converted to NO_2 using the NO_X to NO_2 Calculator approach. Operational phase road traffic NO_2 emission results using the Alternative Approach are provided in **Appendix 12.2**.

12.7.3 As detailed in **Table 12-33**, the results of the impact assessment showed that there were no predicted exceedances of the annual mean NO_2 and PM_{10} Objectives. The highest NO_2 annual mean concentration during operation (2024) was 35.8$\mu g.m^{-3}$ at receptor R8 and this is below the NO_2 Objective of 40$\mu g.m^{-3}$. A contour plot of the operational phase road NO_2 concentrations are shown in **Figure 12-7**. The highest PM_{10} annual mean concentration was 27.5$\mu g.m^{-3}$, again at receptor R8, which is well below (i.e. less than 75% of) the PM_{10} Objective of 40$\mu g.m^{-3}$. This impact was described as **negligible** at all receptors for NO_2 and PM_{10} in accordance with IAQM and EPUK guidance (IAQM & EPUK, 2017).



Legend:

- Outline of Proposed Development
- Infill Area
- Breakwater

Operational Phase NO2 Concentrations (ug/m3)

- 15 - 19.9
- 20 - 24.9
- 25 - 29.9
- 30 - 34.9
- 35 - 39.9
- > 40

Client:	Project:
States of Guernsey	Longue Hougue South EIA

Title: Operational Phase Road NO2 Concentrations (ug/m3)

Figure: 12.7 Drawing No: PB5312-300-034

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
03	22/10/2019	IOM	PT	A4	1:8,500

Co-ordinate system: WGS 1984 UTM Zone 30N

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Table 12-33: Predicted Annual Mean NO_2, PM_{10} and $PM_{2.5}$ Concentrations and Impact of Project for the Operational Phase (2024) at Sensitive Receptor Locations

Receptor	Predicted Concentrations 2024 – Operational Phase				
	Without Operational Activities (µg.m^{-3})	With Operational Activities (µg.m^{-3})	Change (µg.m^{-3})	Change as % of Objective	Impact Descriptor
Nitrogen Dioxide (NO_2) – Air Quality Objective of 40µg.m^{-3}					
R1	22.2	23.0	0.8	2%	Negligible
R2	16.4	16.7	0.3	1%	Negligible
R3	13.3	13.5	0.2	0%	Negligible
R4	14.5	14.7	0.2	1%	Negligible
R5	16.3	16.5	0.2	1%	Negligible
R6	17.2	17.5	0.3	1%	Negligible
R7	25.3	25.7	0.4	1%	Negligible
R8	35.3	35.8	0.5	1%	Negligible
R9	23.4	23.5	0.1	0%	Negligible
R10	14.4	14.4	0.0	0%	Negligible
R11	13.5	13.5	0.0	0%	Negligible
Particulate Matter (PM_{10}) – Air Quality Objective of 40µg.m^{-3}					
R1	25.5	25.6	0.07	0%	Negligible
R2	25.0	25.0	0.04	0%	Negligible
R3	24.5	24.5	0.02	0%	Negligible
R4	24.8	24.8	0.03	0%	Negligible
R5	25.1	25.1	0.04	0%	Negligible
R6	25.2	25.2	0.04	0%	Negligible
R7	26.1	26.1	0.03	0%	Negligible

Receptor	Predicted Concentrations 2024 – Operational Phase				
	Without Operational Activities (µg.m^{-3})	With Operational Activities (µg.m^{-3})	Change (µg.m^{-3})	Change as % of Objective	Impact Descriptor
R8	27.5	27.5	0.04	0%	Negligible
R9	25.8	25.8	0.01	0%	Negligible
R10	24.5	24.5	0.00	0%	Negligible
R11	24.6	24.6	0.01	0%	Negligible
Particulate Matter ($PM_{2.5}$) - Air Quality Target of 25µg.m^{-3}					
R1	24.9	25.0	0.05	0%	Negligible
R2	24.6	24.6	0.02	0%	Negligible
R3	24.3	24.3	0.01	0%	Negligible
R4	24.4	24.5	0.02	0%	Negligible
R5	24.6	24.7	0.02	0%	Negligible
R6	24.7	24.7	0.02	0%	Negligible
R7	25.3	25.3	0.02	0%	Negligible
R8	26.1	26.2	0.03	0%	Negligible
R9	25.1	25.1	0.01	0%	Negligible
R10	24.3	24.3	0.00	0%	Negligible
R11	24.3	24.3	0.00	0%	Negligible

12.7.4 As detailed in **Table 12-33**, the change in $PM_{2.5}$ as a result of operational phase traffic was 0% of the Objective and determined to be **negligible** at all receptors. The highest $PM_{2.5}$ annual total concentration during operation was 26.2µg.m^{-3} at R8. As explained in earlier sections, this concentration is in exceedance of the Target of 25µg.m^{-3}, due to the overly conservative background $PM_{2.5}$ concentration used in this assessment in lieu of any more representative background data. It is assumed that $PM_{2.5}$ concentrations near the site would not exceed the $PM_{2.5}$ target value.

12.7.5 All predicted NO_2 concentrations were well below 60µg.m^{-3} and therefore, in accordance with Defra guidance (Defra, 2018), the 1-hour mean Objective is unlikely to be exceeded. The short term PM_{10} Objective was predicted to be met at all modelled locations with less than 35 exceedances of the daily mean Objective of 50µg.m^{-3}. The overall significance of impacts during the operational phase, as a result of road traffic emissions, is considered to be **not significant**.

Ecological Receptors

12.7.6 A summary of the Critical Level assessment results of NO_X concentrations at the each of the ABIs is provided in **Table 12-34**. Similarly to the construction phase Critical Level assessment, predicted vehicle emissions were added to the 2018 annualised NO_X background concentration measured at DT3 (15.744µg.m^{-3}).

Table 12-34: Operational Phase Critical Level Assessment

Site	2024 Annual Mean NO_X concentrations (µg.m^{-3})			
	Transect ID	NO_X Concentration without operational activities (µg.m^{-3})	NO_X Concentration with operational activities (µg.m^{-3})	NO_X Concentration with operational activities as % of Critical Level
Critical Level Assessment – Critical Level 30µg.m^{-3}				
Bulwer Avenue (b) and Spur Point (a) ABI	T1(a)-1	26.0	26.4	88%
	T1(a)-2	17.6	17.7	59%
	T1(a)-3	16.8	16.9	56%
	T1(a)-4	16.6	16.7	56%
	T1(b)-1	23.3	23.6	79%
	T1(b)-2	19.1	19.3	64%
Longue Hougue Quarry ABI	T2-1	17.4	17.4	58%
	T2-2	16.8	16.9	56%
	T2-3	16.7	16.7	56%
	T2-4	16.7	16.8	56%
	T2-5	16.8	16.8	56%

Site	2024 Annual Mean NO_X concentrations (µg.m^{-3})			
	Transect ID	NO_X Concentration without operational activities (µg.m^{-3})	NO_X Concentration with operational activities (µg.m^{-3})	NO_X Concentration with operational activities as % of Critical Level
Critical Level Assessment – Critical Level 30µg.m^{-3}				
Mont Crevelt ABI	T3-1	21.9	22.0	73%
	T3-2	17.2	17.3	58%
	T3-3	16.6	16.7	56%
	T3-4	16.5	16.5	55%
Vale Castle/Rue des Barras ABI	T4-1	21.0	21.0	70%
	T4-2	16.8	16.8	56%
	T4-3	16.4	16.4	55%
	T4-4	16.4	16.4	55%
Delancey to St Clair and Robergerie ABI	T5-1	16.6	16.6	55%
	T5-2	16.4	16.4	55%
	T5-3	16.3	16.3	54%
	T5-4	16.2	16.3	54%
Delancey Lane ABI	T6-1	16.5	16.6	55%
	T6-2	16.5	16.5	55%
Les Banques ABI	T7-1	25.2	25.5	85%
	T7-2	22.0	22.2	74%
Ivy Castel Lane ABI	T8-1	17.3	17.4	58%
	T8-2	16.6	16.7	56%
	T8-3	16.5	16.5	55%

12.7.7 As detailed in **Table 12-34**, maximum predicted NO_X concentrations were below the Annual Mean Critical Level along each of the transects. The overall impact of the operational phase of the Project on air quality at each of the ABIs is considered to be **not significant**.

Mitigation

12.7.8 As the overall impact of the operational phase of the Project on air quality at human and ecological receptors was considered to be **not significant**, no mitigation measures are proposed for operational phase road traffic emissions.

OPERATIONAL IMPACT 12.4: Operational Phase Dust Deposition

12.7.9 During the operational phase of the Project, the following activities have the potential to generate dust:

- Arrival of material;
- Tipping / offloading;
- Movement and stockpiling of material, at both the Project site and the existing Longue Hougue Reclamation Site (should the existing site be completely infilled before the new one is operational and stockpiles are required to be temporarily located there);
- Import of materials to the site; and
- Movement of HGVs across unpaved haul routes.

12.7.10 The results of the monitoring survey at the existing operational inert waste facility site at Longue Hougue (see **Section 12.3**) demonstrated that high levels of dust may be generated during the operational phase of the Project.

12.7.11 Meteorological data collected at the existing Longue Hougue Reclamation Site were analysed to determine the percentage of observations in which the wind was blowing in each direction, over a period from 16 January to 19 August 2019. The total number of observations made across the monitoring period was 26,095. The results of the analysis, broken down into in 22.5º sectors, are shown in **Table 12-35**; the wind directions in bold indicate those which would blow dust towards the closest sensitive human (R1 to R3) and ecological (Bulwer Avenue and Spur Point ABI and Foreshore ABI) receptors.

12.7.12 As shown in **Table 12-35**, there is the potential for wind to blow towards both sensitive human (R1 – R3) and ecological (Bulwer Avenue and Spur Point ABI and Foreshore ABI) receptors 31% of the time.

Table 12-35: Wind Direction Analysis from Longue Hougue Site

Wind direction (Degrees)	Percentage of observations from direction
0 - 22.5	5%
22.5 - 45	14%
45 - 67.5	9%
67.5 - 90	**4%**
90 - 112.5	**5%**
112.5 - 135	**2%**
135 - 157.5	**5%**
157.5 - 180	**7%**
180 - 202.5	**8%**
202.5 - 225	5%
225 - 247.5	15%
247.5 - 270	10%
270 - 292.5	5%
292.5 - 315	3%
315 - 337.5	2%
337.5 - 360	1%

12.7.13 There is the potential for significant dust impacts to occur during the operational phase of the Project as a result of the high levels of dust that may be generated by operational phase activities, the potential for wind to blow towards receptors and the proximity of sensitive receptors to the Project site boundary. As such, a comprehensive mitigation strategy is recommended to minimise potential impacts. These measures will be incorporated into an Operational Dust Management Plan and are detailed below.

Mitigation Measures

12.7.14 The following mitigation measures are recommended to be implemented during the operational phase of the Project due to the high likelihood of dust production during the infilling of the breakwater, based on operational activities at the existing Longue Hougue Reclamation Site.

12.7.15 The mitigation measures below were adapted from the following sources:

- IAQM 'Guidance on the assessment of dust from demolition and construction' (IAQM, 2016a);
- IAQM 'Guidance on the Assessment of Mineral Dust Impacts for Planning' (IAQM, 2016b);
- Greater London Authority's Supplementary Planning Guidance on 'The control of dust and emissions during construction and demolition' (GLA, 2014); and
- The current Licence for Waste Management Operations for the existing Longue Hougue Reclamation Site, and operational practices observed there during site visits.

12.7.16 These mitigation measures will be implemented into an Operational Dust Management Plan (ODMP), to be approved by States of Guernsey prior to the commencement of works.

<u>Communications</u>

- Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager;
- Display the head or regional office contact information;
- Provide training to the site personnel on dust mitigation. Training should also cover 'emergency preparedness plans' to react quickly in case of any failure of the planned dust mitigation;
- Maintain good communication to help alleviate anxieties between the operators and the surrounding communities. Set up regular, accessible liaison arrangements and provide information as freely as possible; and
- Hold regular liaison meetings with the adjacent reclamation site to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the off-site transport / deliveries which would use the same strategic road network routes.

<u>Preparing and Maintaining the Site</u>

- Develop and implement a stakeholder communications plan that includes community engagement before work commences on site;
- Record all dust and air quality complaints, identify cause(s), take appropriate

measures to reduce emissions in a timely manner, and record the measures taken;

- Make the complaints log available to the States of Guernsey when asked;
- Record any exceptional incidents that cause dust and / or air emissions, either on- or off-site, and the action taken to resolve the situation in the log book;
- Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site;
- For longer periods of activity, erect perimeter screening bunds (ideally vegetated) or semi-permeable fences, and over shorter periods netting screens may be effective. Maintain a standoff distance, separation zone or buffer zone between the site and receptors within which no works take place;
- Maintain an adequate water supply on the site for effective dust/particulate matter suppression / mitigation, using non-potable water where possible and appropriate;
- Minimise drop heights from loading or handling equipment where possible and use fine water sprays on such equipment wherever appropriate;
- Avoid bonfires and burning of waste materials;
- Cover stockpiles of material that will not be immediately placed with hessian, mulches or similar, as soon as practicable, and only remove the cover in small areas as required, and not all at once;
- Keep site fencing, barriers and scaffolding clean using wet methods;
- Apply dust suppressants to locations where a large volume of vehicles enter and exit the site;
- In the event that debris arising from the site is deposited onto public areas outside the site, remedial measures shall be implemented immediately, using a mechanical road sweeper.
- As a general provision, other potential impacts should be mitigated wherever practicable by:
    - clearance of any spillages to minimise accumulations of loose dry material around any structures;
    - control and restrict the duration of the site activities where practicable;
    - screening material to remove dusty fractions prior to external storage;
    - dampen material using sprays, mists, microfoam or foam; and
    - If covering is not practicable, spray exposed surfaces or stockpiles with

chemical binders (after consultation with the regulatory agencies) and spray exposed surfaces of mounds regularly to maintain surface moisture (unless mound surface has formed a crust after rainfall or is grassed).

Site Planning and Management

- Locate stockpiles as far away as practicable from the human receptors located south of Bulwer Avenue;
- Impose and signpost a maximum-speed-limit of 10mph on unsurfaced haul roads and work areas to minimise dust resuspension;
- Design the site to minimise haul route distances and to locate haul routes away from receptors. A separate paved parking area for off-site vehicles, such as staff cars, with no access to the working areas, can help prevent track-out of mud onto the public highway;
- Planning and design of the site should make provision for water supply to meet the site demand for mitigation and damping;
- Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover, seed or fence to prevent wind whipping;
- Cover vehicles entering and leaving sites to prevent escape of materials during transport;
- Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable;
- Record all inspections of haul routes and any subsequent action in a site log book;
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable);
- Design the site with an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits;
- Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use;
- Avoid dry sweeping of large areas; and
- Waste shall only be received at the site through the site entrance. All incoming wastes shall be directed to the appropriate tipping area by the site supervisor.

Monitoring

- The developer and contractor are to actively monitor the site to ensure the control of dust and emissions. Dry and windy conditions increase the likelihood of dust and emissions being produced and dispersed, so extra site monitoring should take place during these times.
- Measures shall be implemented and maintained throughout the operational life of the site to control and monitor emissions of dust, fibres and particulates from the site. The objective of these measures shall be to minimise the release of airborne dust, fibres and particulates arising from the specified waste management operations beyond the site boundary, and to prevent releases in such quantities or concentrations that are likely to cause pollution of the environment or harm to human health or serious detriment to the amenity of the locality.
- All emissions to air from the specified waste management operations on the site shall be free from visible concentrations of dusts, fibres or particulates as are likely to cause pollution of the environment or harm to human health or serious detriment to the amenity of the locality outside the site boundary, as perceived by an authorised officer of the Director of Environmental Health and Pollution Regulations ("the Director"). In the event of any dust, fibres or particulates arising from the site in quantities or concentrations that are likely to cause pollution of the environment or harm to human health of serious detriment to the amenity of the locality outside the site boundary, as perceived by an authorise officer of the Director, measures to reduce and control them to the satisfaction of an authorised officer of the Director shall be implemented immediately;
- Increase the frequency of on-site and off-site inspections (by the person accountable for air quality and dust issues on site) when activities occur during prolonged dry or windy conditions. This should be undertaken where receptors (including roads) are nearby, to monitor dust. The inspection results should be recorded, and the log made available to the States of Guernsey when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars, buildings and window sills within 100m of site boundary, with cleaning to be provided if necessary;
- Carry out regular site inspections to monitor compliance with the ODMP, record inspection results, and make an inspection log available to the local authority when asked; and
- If necessary, agree dust deposition, dust flux, or real-time PM_{10} continuous monitoring locations with the States of Guernsey.

Site Traffic, Operating Vehicles / Machinery and Site Access / Haul Route

- Site traffic is often the greatest source of dust. Standard good practices for site haulage include:
  - avoiding abrupt changes in direction;
  - regular clearing, grading and maintenance of haul routes;
  - fitting heavy plant with upswept exhausts and radiator fan shields;
  - evenly loading vehicles to avoid spillages;
  - regular application of water, whether by bowser or by fixed sprays, in dry conditions; and
  - use paved roads where practicable, ensure mobile plant has upward directing exhausts and radiator fan shields.
- Vehicles are to be switch off engines when stationary - no idling vehicles; and
- Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery powered equipment where practicable.

Residual Impact

12.7.17 If the mitigation measures detailed above are implemented during the operational phase of the Project, dust should be suitably controlled such that the residual impacts from the operational phase of the Project would be **not significant**. This is in accordance with the implementation of mitigation measures for construction phase impacts, as per IAQM guidance (2016a)).

12.8 Cumulative Impacts

12.8.1 The cumulative impact assessment (CIA) for air quality was undertaken in two stages. The first stage was to consider the potential for the impacts assessed as part of the projects to lead to cumulative impacts in conjunction with other projects. The first stage of the assessment is detailed in **Table 12-36**.

12.8.2 The second stage of the CIA is to evaluate the projects considered for the CIA to determine whether a cumulative impact is likely to arise. The full list of considered projects and their anticipated potential for cumulative impacts are detailed in **Section 5.3**.

Table 12-36: Potential Cumulative Impacts

Impact		Potential for cumulative impact	Rationale
Construction			
12.1	Construction dust and particulate matter	Yes	There is potential for cumulative construction dust impacts where projects occur within 700m of each other.
12.2	Construction phase road traffic emissions	Yes	Where the construction phase of the project overlaps with other projects, there is the potential for cumulative impacts associated with project-generated traffic emissions on the local road networks.
Operation			
12.3	Operational phase road traffic emission	Yes	Where the operational phase of the project overlaps with other projects, there is the potential for cumulative impacts associated with project-generated traffic emissions on the local road networks.
12.4	Operational phase dust and particulate matter	Yes	There is potential for cumulative operational dust impacts where projects which would generate dust would occur within 700m of each other.

12.8.3 Traffic associated with future residential / commercial developments in the study area was included in the predicted future traffic growth, which were incorporated into the future baseline traffic flows used in the air quality assessment. A cumulative assessment has therefore been carried out with regard to road traffic. As air quality impacts at receptors were considered to be not significant, there are also no significant cumulative impacts.

12.8.4 Projects which may give rise to cumulative construction and operational phase dust impacts were therefore considered. Of all the projects considered in the CIA, only two were located within 700m of the Project, as detailed in **Table 12-37**.

CUMULATIVE IMPACT 12.5: Cumulative Impacts During Construction and Operation

12.8.5 As both projects listed in **Table 12-37** are within 700m of the Project site at Longue Hougue South, there is the potential for cumulative impacts from construction and operational phase dust, if the construction or operational phases of the projects overlapped. However, it is anticipated that both projects will have carried out a construction dust impact assessment in accordance with IAQM guidance (IAQM, 2016a), and / or would employ best practice mitigation methods to minimise dust to the extent that impacts would be not significant. Significant cumulative impacts are therefore highly unlikely.

Table 12-37: Summary of Projects Considered for the CIA in Relation to Air Quality

Project	Description	Planning code (ID)	Distance from the Project (m)	Rationale
Industrial storage compound	This compound is to be created where the temporary recycling facility on Longue Hougue Industrial and Reclamation Area used to be and extends to the perimeter bund	This planning application is imminent	70	As these projects are within 700m of the Project site, there is potential for cumulative construction dust impacts.
Mont Crevelt Breakwater Longue Hougue, St. Sampson	Infill existing temporary opening formed in existing breakwater as part of works for St. Sampson marina project	FULL/2018/0218 (B003540000)	87	

12.8.6 Therefore, cumulative impacts during construction are considered to be **not significant**. Given that no additional activities / projects are identified in the immediate area which could increase emissions to air during the operation phase, **no cumulative operational impacts** are predicted.

Mitigation

12.8.7 No mitigation measures are proposed as cumulative impacts during construction and operation were considered to be **not significant**.

Residual Impact

12.8.8 Cumulative impacts during construction and operation are considered to be **not significant**.

12.9 Summary

12.9.1 The air quality assessment concluded that construction and operational phase air quality impacts were **not significant** at existing human and ecological receptors. A summary of the impact assessment is provided in **Table 12-38**.

Table 12-38: Summary of Impacts

Impact	Factor	Significance	Mitigation	Residual Impact	Monitoring
Construction					
Construction phase dust and particulate matter	Human receptors	n/a	Best practice dust minimisation and suppression techniques	Not significant	Off-site visual inspections and ongoing monitoring
	Ecological receptors (Bulwer Avenue and Spur Point ABI and Foreshore ABI)				
Construction phase road traffic emissions	Human receptors (R1 to R11)	Not significant	Not required	Not significant	Not required
	Ecological receptors (ABIs listed in **Table 12-17**)				
Operation					
Operational phase dust and particulate matter	Human receptors (R1 to R3)	Significant	Best practice dust minimisation and suppression techniques	Not significant	Off-site visual inspections and ongoing monitoring
	Ecological receptors (Bulwer Avenue and Spur Point ABI and Foreshore ABI)				

Impact	Factor	Significance	Mitigation	Residual Impact	Monitoring
Operational phase road traffic emissions	Human receptors (R1 to R11)	Not significant	Not required	Not significant	Not required
	Ecological receptors (ABIs listed in **Table 12-17**)				
Cumulative					
Dust and particulate matter	Human receptors	n/a	Best practice dust minimisation and suppression techniques	Not significant	n/a
	Ecological receptors (Bulwer Avenue and Spur Point ABI and Foreshore ABI)				
Road traffic emissions	Human receptors (R1 to R11)	Not significant	Not required	Not significant	Not required
	Ecological receptors (ABIs listed in **Table 12-17**)				

13 Noise and Vibration

13.1 Content and Data

Content

13.1.1 This section of the Environmental Statement (ES) describes the existing environment in relation to noise and vibration, including impacts during the construction and operational phases of the Longue Hougue South inert waste reclamation project ('the Project'). Mitigation measures are detailed, and a discussion of the residual impacts provided where significant impacts were identified.

13.1.2 This section is supported by **Appendix 13.1: Noise Contour Isopleths**.

Study Area

13.1.3 The study area for the noise and vibration assessment is defined as follows:

- Construction phase noise and vibration assessment:
  - Human receptors within 350m of the site boundary and within 50m of routes used by construction vehicles, up to 500m from the site boundary; and
  - Ecological receptors within 50m of the site boundary and within 50m of routes used by construction vehicles, up to 500m from the site boundary.
- Operational phase noise and vibration:
  - Human receptors within 350m of the site boundary.
- Construction and operational phase road traffic noise and vibration assessment:
  - Human and ecological receptors within 200m of roads that are expected to experience a change in traffic flows as a result of the project.

13.1.4 The study area for the noise and vibration assessment was agreed with The Office of Environmental Health and Pollution Regulation (OEHPR).

Data Sources

Desk Study

13.1.5 Consideration of the site and surrounding environment was conducted using satellite photography and through consultation with the OEHPR to determine and agree the most appropriate noise sensitive receptors for use in the assessment.

Base Mapping

13.1.6 A detailed noise model was developed using a Mastermap and Landform Profile DTM ASCII XYZ file provided by Digimap.

Traffic Data

13.1.7 Information regarding the anticipated vehicle movements during the construction and operational phase has been supplied in **Chapter 11 Traffic and Transport**.

Construction and Operational Data

13.1.8 Information regarding the anticipated plant used during construction and operational activities was taken from the project description of the proposed scheme provided in **Chapter 4 Project Description**.

Surveys Undertaken

13.1.9 Baseline noise monitoring was undertaken during three separate visits to the study area between January and April 2019. Noise monitoring was undertaken at four locations representing the closest noise sensitive receptors to the proposed project boundary, which were agreed with the OEHPR, **Figure 13-1** presents the location of each of the baseline monitoring positions (MP1 to MP4).

13.1.10 Each survey consisted of both long term unattended and short term attended measurements performed in accordance with the procedure described in BS 7445 parts 1 and 2 and BS 4142:2014+A1:2019[16].

13.1.11 For the construction and operational phases, the assessment of noise from proposed plant and activities associated with the site was considered at the nearest receptors and modelled using SoundPLAN noise modelling software.

Assumptions and Limitations of Data

13.1.12 The road traffic emissions assessment is based on traffic data and any assumptions made as part of the transport assessment are also applicable to this assessment (see **Chapter 11 Traffic and Transport**).

13.1.13 Construction and Operational Phase assumptions are detailed in the **Construction Phase Noise Assessment Section** and the **Operational Phase Noise Assessment Section**.

[16] Baseline survey undertaken prior to BS 4142 amendments in 2019. A review confirmed compliance with BS 4142:2014+A1:2019 requirements.

Legend:

- Outline of Proposed Development
- Breakwater
- Infill Area
- Traffic and Transport Study Area
- Noise Monitoring Location
- Operational/Construction Phase Assessment
- Road Traffic Receptor

Client: States of Guernsey

Project: Longue Hougue South EIA

Title: Baseline Noise Monitoring Locations

Figure: 13.1 | Drawing No: PB5312-300-022

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	13/09/2019	FC	PT	A4	1:12,000
01	26/06/2019	FC	PT	A4	1:12,000

Co-ordinate system: Guernsey Grid

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13.2 Legislation and Policy Context

13.2.1 Noise and vibration can have adverse effects on the health of humans and ecosystems. European Union (EU) legislation forms the basis for UK noise policy. The States of Guernsey does not have specific noise and vibration standards and Objectives, so the standards and objectives set in UK Law *"can be considered to be a benchmark to measure Guernsey's current position against and for future standards to be implemented in local legislation"* (Office of Environmental Health and Pollution Regulation, 2015).

Legislation

13.2.2 This section provides details on key UK legislation which is relevant to this Chapter.

Public Health Ordinance, 1936

13.2.3 Article 3 of the Public Health Ordinance provides the States Board of Health with powers to call for abatement and to enforce provisions in order to abate such nuisances.

Environmental Protection Act 1990

13.2.4 Section 79 of the Environmental Protection Act 1990 (the EPA 1990) defines statutory nuisance with regard to noise and determines that local authorities have a duty to detect such nuisances in their area.

13.2.5 The EPA 1990 also defines the concept of 'Best Practicable Means' (BPM) as:

- "'*Practicable' means reasonably practicable having regard among other things to local conditions and circumstances, to the current state of technical knowledge and to the financial implications;*
- *The means to be employed include the design, installation, maintenance and manner and periods of operation of plant and machinery, and the design, construction and maintenance of buildings and structures;*
- *The test is to apply only so far as compatible with any duty imposed by law; and*
- *The test is to apply only so far as compatible with safety and safe working conditions, and with the exigencies of any emergency or unforeseeable circumstances*."

13.2.6 Section 80 of the EPA 1990 provides local authorities with powers to serve an abatement notice requiring the abatement of a nuisance or requiring works to be executed to prevent their occurrence.

The Control of Pollution Act 1974

13.2.7 Section 60 of the Control of Pollution Act 1974 provides powers to local authority officers to serve an abatement notice in respect of noise nuisance from construction works.

13.2.8 Section 61 provides a method by which a contractor can apply for ‘prior consent’ for construction activities before commencement of works. The ‘prior consent’ is agreed between the local authority and the contractor and may contain a range of agreed working conditions, noise limits and control measures designed to minimise or prevent the occurrence of noise nuisance from construction activities. Application for a ‘prior consent’ is a commonly used control measure in respect of potential noise impacts from major construction works.

Guidance

13.2.9 The guidance in the following sections has been applied to the noise and vibration assessment.

British Standard (BS) 4142:2014+A1:2019 – Method for Rating and Assessing Industrial and Commercial Sound

13.2.10 BS 4142 describes methods for rating and assessing sound of an industrial and/or commercial nature. The methods use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incidental.

BS 5228-1:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 1: Noise

13.2.11 Part 1 of this Standard provides recommendations for basic methods of noise and vibration control relating to construction and open sites where work activities/operations generate significant noise and/or vibration levels. The legislative background to noise and vibration control is described and recommendations are given regarding procedures for the establishment of effective liaison between developers, site operators and local authorities. This British Standard provides guidance on methods of predicting and measuring noise and assessing its impact on those exposed to it.

BS 5228-1:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 2: Vibration

13.2.12 Part 2 of this Standard gives recommendations for basic methods of vibration control relating to construction and open sites where work activities/operations generate significant vibration levels. The Standard includes tables of vibration levels measured during piling operations throughout the UK. It provides guidance concerning methods of mitigating vibration from construction, particularly with regard to percussive piling.

BS 6472-1:2008 – Guide to Evaluation of Human Exposure to Vibration in Buildings

13.2.13 This standard provides general guidance on human exposure to building vibration in the range of 1Hz to 80Hz and includes curves of equal annoyance for humans. It also outlines the measurement methodology to be employed. It introduces the concept of Vibration Dose Value (VDV) and estimated Vibration Dose Value (eVDV) for the basis of assessment of the severity of impulsive and intermittent vibration levels, such as those caused by a series of trains passing a given location.

BS 7445: Parts 1 and 2 – Description and Measurement of Environmental Noise

13.2.14 This Standard provides details of the instrumentation and measurement techniques to be used when assessing environmental noise and defines the basic noise quantity as the continuous A-weighted sound pressure level (L_{Aeq}). Part 2 of BS 7445 replicates International Standards Organisation (ISO) 1996-2.

BS 8233:2014 – Guidance on Sound Insulation and Noise Reduction for Buildings

13.2.15 This Standard provides a methodology to calculate the noise levels entering a building through facades and facade elements and provides details of appropriate measures for sound insulation between dwellings. It includes recommended internal noise levels which are provided for a variety of situations and are based on World Health Organisation (WHO) recommendations.

Calculation of Road Traffic Noise (CRTN) 1988

13.2.16 The Calculation of Road Traffic Noise (CRTN) document provides a method for assessing noise from road traffic in the UK and a method of calculating noise levels from the Annual Average Weekday Traffic (AAWT) flows and from measured noise levels. Since publication in 1988 this document has been the nationally accepted standard in predicting noise levels from road traffic. The calculation methods provided include correction factors to take account of variables affecting the creation and propagation of road traffic noise, accounting for the percentage of heavy goods vehicles (HGV), different road surfacing, inclination, screening by barriers and relative height of source and receiver.

Design Manual for Roads and Bridges, 2011

13.2.17 Volume 11, Part 3, Section 7 provides guidance on the environmental assessment of noise impacts from road schemes. The Design Manual for Roads and Bridges (DMRB) contains advice and information on transport related noise and vibration, which has relevance regarding the construction and operational traffic impacts affecting sensitive receptors adjacent to road networks. It also provides guideline significance criteria for assessing traffic related noise impacts.

WHO (1999) Guidelines for Community Noise

13.2.18 These guidelines present health-based noise limits intended to protect the population from exposure to excess noise. They present guideline limit values at which the likelihood of particular effects, such as sleep disturbance or annoyance, may increase. The guideline values are 50dB L_{Aeq} or 55dB L_{Aeq} during the day, related to annoyance, and 45dB L_{Aeq} or 60dB L_{Amax} at night, related to sleep disturbance.

13.2.19 The Guidance states:

"*The effects of noise in dwellings, typically, are sleep disturbance, annoyance and speech interference. For bedrooms the critical effect is sleep disturbance. Indoor guideline values for bedrooms are 30dB L_{Aeq} for continuous noise and 45dB L_{Amax} for single sound events. Lower noise levels may be disturbing depending on the nature of the source*."

13.2.20 The WHO guidance also highlights that:

"*Night-time, outside sound levels about 1 metre from facades of living spaces should not exceed 45dB L_{Aeq}, so that people may sleep with bedroom windows open. This value was obtained by assuming that the noise reduction from outside to inside with the window open is 15dB. To enable casual conversation indoors during daytime, the sound level of interfering noise should not exceed 35dB L_{Aeq}. To protect the majority of people from being seriously annoyed during the daytime, the outdoor sound level from steady, continuous noise should not exceed 55dB L_{Aeq} on balconies, terraces and in outdoor living areas. To protect the majority of people from being moderately annoyed during the daytime, the outdoor sound level should not exceed 50dB L_{Aeq}. Where it is practical and feasible, the lower outdoor sound level should be considered the maximum desirable sound level for new development.*"

WHO (2009) Night Noise Guidelines for Europe

13.2.21 In 2009, the WHO published the Night Noise Guidelines for Europe, which it describes as an extension to the WHO Guidelines for Community Noise (1999). It concludes that:

"*Considering the scientific evidence on the thresholds of night noise exposure indicated by L_{night} outside as defined in the Environmental Noise Directive (2002148/EC), an L_{night} outside of 40dB should be the target of the night noise guideline (NNG) to protect the public, including the most vulnerable groups such as children, the chronically ill and the elderly. L_{night} outside value of 55dB is recommended as an interim target for those countries where the NNG cannot be achieved in the short term for various reasons, and where policy-makers choose to adopt a stepwise approach*."

WHO (2018) Environmental Noise Guidelines for the European Region

13.2.22 The guidance states:

"*The main purpose of these guidelines is to provide recommendations for protecting human health from exposure to environmental noise originating from various sources: transportation (road traffic, railway and aircraft) noise, wind turbine noise and leisure noise. They provide robust public health advice underpinned by evidence, which is essential to drive policy action that will protect communities from the adverse effects of noise*."

Planning Policy

The Land Planning and Development (General Provisions) Ordinance (2007)

13.2.23 The Land Planning and Development (General Provisions) Ordinance outlines the planning process and considerations. The ordinance states that:

"in determining an application for planning permission, the Department must have regard to –

(d) the likely effect of the development on the character and amenity of the locality in question

(i) the likely effect of the development on the reasonable enjoyment of neighbouring properties."

The Strategic Land Use Plan (2011)

13.2.24 The Strategic Land Use Plan (SLUP) is a statutory document prepared by the Strategic Land Planning Group in November 2011 (Strategic Land Use Planning Group, 2011), under Section 5 of the Land Planning and Development (Guernsey)

Law, 2005. The SLUP sets out the land-use planning agenda for Guernsey over a 20-year period.

13.2.25 The SLUP was reviewed for policies of relevance to noise and vibration. There are no specific policies detailed in the document; however, the following statement was identified:

"….*traffic affects the quality of the urban environment by contributing to localised noise and air pollution and often setting aside considerable amounts of public space for the exclusive use of vehicles*."

Island Development Plan (2016)

13.2.26 The Island Development Plan (IDP) (States of Guernsey, 2016) was adopted in November 2016 and sets out the land planning policies for the island of Guernsey. The IDP replaces both the Urban Area Plan and the Rural Area Plan. The IDP sets out what can be built and where and the Authority must consider the IDP policies when deciding applications for planning permission.

13.2.27 The IDP contains policies with specific relevance to noise and vibration:

Policy OC3: Offices, Industry and Storage and Distribution Outside of the Centres

"*Proposals to extend, alter or redevelop existing industrial, storage and distribution or office premises will be supported.*

In relation to new industrial and storage and distribution uses and works to existing industrial, storage and distribution or office premises, the applicant will need to demonstrate that:

i. *the development is of a scale and form that respects the character of the surrounding area and would not adversely affect or detract from the amenities of existing surrounding uses especially with regard to noise, vibration, smell, fumes, smoke, soot, ash, dust or grit*".

13.2.28 Section 7.2 of The IDP specifically refers to Longue Hougue:

"Longue Hougue Key Industrial Area is reserved for heavy and specialist industrial development which cannot be easily located on other industrial sites owing to its potential negative impacts on neighbours, such as through the noise, dust, vibration, smells and emissions associated with the processes undertaken, and for strategic infrastructure, including development associated with the processing of waste."

13.2.29 Annex 1 of the IDP defines amenities as:

"desirable or useful features or facilities of a building, property or place which support the health and well-being of the occupiers".

13.2.30 Annex 1 later states that one of the main objectives is:

"to use land in an effective and efficient manner in order to make the best use if the finite amount of land available within the Island."

13.3 Baseline Environment

13.3.1 To characterise the existing noise within the study area a baseline noise survey was undertaken at locations representative of the nearest noise sensitive receptors. The locations of the baseline survey and the methods employed during the measurements were agreed with the OEHPR. The results of the baseline survey form the basis for the noise impact assessment for the construction and operational phases.

13.3.2 Measurements were made over the course of three separate visits to the site. For the purposes of baseline noise measurements and to inform the subsequent assessment, four key receptors were identified, labelled as MP1 to MP4. These are described in **Table 13-1** and identified on **Figure 13-1**.

13.3.3 A subjective description of the existing ambient soundscape influencing each of the measurement positions is presented below.

MP1

13.3.4 MP1 represents the closest residential noise sensitive receptor to the proposed development site, situated approximately 30m from the development boundary. The ambient noise climate is predominantly influenced by sound from waves breaking on the shore, noise from traffic on Bulwer Avenue and the sound of trees and vegetation moving in the wind.

MP2

13.3.5 The ambient noise climate at MP2 primarily consists of noise from traffic on the adjacent road network and from people passing in the area. Noise from overhead planes and seagulls was intermittently audible as well as the sound of waves from the reservoir.

Table 13-1: Description of Baseline Noise Monitoring Positions

Receptor ID	Receptor Description	Coordinates	
		Latitude	Longitude
MP1	Long term noise monitoring position representative of the closest noise sensitive residential property to the site.	49.476817	-2.5190411
MP2	Short term measurement position representative of residential receptors off Church Road behind a reservoir to the north-east of the site at approximately 450m distance.	49.480929	-2.5179704
MP3	Representative of residential receptors on the junction between Bulwer Avenue and unnamed road leading to Guernsey Recycling.	49.476225	-2.5231098
MP4	Short term measurement position representative of BBC Guernsey on the opposite side of Bulwer Avenue.	49.477464	-2.5193654

MP3

13.3.6 The ambient noise climate at MP3 primarily consisted of noise from traffic on the adjacent road network and people passing on the street as well as sound from waves breaking on the shore.

MP4

13.3.7 The ambient noise climate at MP4 consists of noise from traffic movements on Bulwer Avenue including HGV movements. Noise from waves breaking on the shore and seagulls were intermittently audible.

13.3.8 **Table 13-2** presents the receptor sensitivity classifications with associated descriptions.

13.3.9 Baseline survey measurements were conducted in accordance with current guidance, including BS 4142:2014+A1:2019 (Method for Rating and Assessing Industrial and Commercial Sound) and BS 7445:2003 (Description and measurement of environmental noise) and the methodology used was agreed with relevant stakeholders during consultation.

Table 13-2: Value/Sensitivity of Receptors

Receptor	Value / Sensitivity	Justification
MP1	Residential / Medium	Residential property 30m from the proposed project boundary. Impacts from construction and operation have the potential to be greatest at this reception.
MP2	Residential / Medium	Residential properties off Church Road in an elevated location with no screening to the site.
MP3	Residential / Medium	Residential properties situated on the opposite side of Bulwer Avenue at an approximate distance of 120m from the site.
MP4	Office / Medium	BBC offices situated approximately 200m from the site.

13.3.10 Sound level meters (SLM) were fully calibrated, traceable to UKAS standards and satisfied the requirements of BS EN 61672-1:2013 for a ‘Class 1’ Sound Level Meter (SLM).

13.3.11 For all measurement locations during the noise survey SLMs were set to record the following:

- L_{Aeq} – the equivalent continuous sound pressure level over the measurement period. This parameter was standardised as pertinent for land use within BS 7445;
- L_{Amax} – the maximum sound pressure level occurring within the defined measurement period;
- L_{A90} – the sound pressure level exceeded for 90% of the measurement period and is indicative of the background noise level; and
- L_{A10} - the sound pressure level exceeded for 10% of the measurement period. The L_{A10} index is used within the CRTN as an appropriate descriptor of traffic noise.

13.3.12 The equivalent continuous sound pressure level (L_{Aeq}) is the conventional descriptor of environmental noise and is defined below:

$$L_{eq,T} = 10 \times log\left[\frac{1}{T}\int \frac{\rho^2(t)\partial t}{\rho_0^2}\right] dB$$

13.3.13 Noise measurements are normally taken with an A-weighting (denoted by a subscript 'A') to approximate the frequency response of the human ear.

13.3.14 Noise measurements were conducted with the SLMs mounted on tripods at a height of between 1.2m and 1.5m above ground level and 3.5m away from any reflecting surface other than the ground, i.e. in free-field conditions.

13.3.15 The instruments were calibrated before and after the survey using a portable calibrator. No significant deviation in the calibration level was observed.

13.3.16 A weather station was installed on the site for the duration of the measurements and any measurements taken during periods of rain or when average wind speeds exceed $5ms^{-1}$ were screened from the results (in accordance with BS 7445:2003, representative environmental noise measurements should be undertaken during favourable weather conditions, i.e. with windspeed <5m/s and no precipitation).

13.3.17 As Continuous logging equipment was installed at the closest noise sensitive receptor (MP1) for a minimum of 24hrs to measure consecutive five-minute records of the noise level as part of the methodology agreed with The States of Guernsey. At the other three locations attended measurements were made for up to one hour during the daytime period (07:00 to 19:00), 15 minutes during the evening period (19:00 to 23:00) and 15 minutes during the night-time (23:00 to 07:00).

Measured Baseline Noise Data – January 2019

13.3.18 Measured baseline sound levels made during the first site visit in January 2019 at each of the receptors are presented in **Table 13-3**.

Measured Baseline Noise Data – March 2019

13.3.19 Measured baseline sound levels made during the site visit in March 2019 are presented in **Table 13-4**. Measurements were only conducted during the daytime period of this visit due to unsuitable weather conditions during the evening and night.

Measured Baseline Noise Data – April 2019

13.3.20 Measured baseline sound levels made during the site visit in April 2019 are provided in **Table 13-5**. Continuous, long-term noise monitoring was conducted in the garden at MP1 between 29 April and 2 May 2019. A weather station was installed on the site and any noise arising from periods of unsuitable weather (e.g. high winds or rain) were screened from the data set. The complete raw baseline survey results are shown in **Appendix 13.2**.

Table 13-3: Measured Baseline Noise Levels, dB, at MP1 to MP4 January 2019

Location	Date and Start Time HH:MM	Period	Duration HH:MM	L_{Aeq}	L_{AMAX}	L_{A10}	L_{A90}
MP1	29/01/2019 14:55	Day	08:05	51.2	74.2	52.3	47.8
	29/01/2019 14:55	Day*	04:05	52.9	74.2	54.4	50.4
	29/01/2019 19:00	Evening**	04:00	48.3	66.4	50.2	45.3
	29/01/2019 23:00	Night***	08:00	52.9	74.6	53.3	47.9
	30/01/2019 07:00	Day	16:00	49.8	76.2	49.4	45.3
	30/01/2019 07:00	Day*	12:00	50.9	76.2	51.6	47.3
	30/01/2019 19:00	Evening**	04:00	41.4	68.5	42.7	39.2
	30/01/2019 23:00	Night***	07:15	54.4	67.4	54.8	50.6
MP2	30/01/2019 13:44	Day	1:00	53.5	70.2	57.0	44.2
	30/01/2019 19:01	Evening	0:15	47.9	71.1	45.0	38.8
	30/01/2019 23:05	Night	0:15	39.7	63.8	37.7	33.6
MP3	30/01/2019 14:55	Day	1:00	59.2	77.3	62.7	44.4
	30/01/2019 19:24	Evening	0:15	57.0	73.7	61.0	41.1
	30/01/2019 23:25	Night	0:15	47.5	65.7	46.8	41.0
MP4	30/01/2019 16:05	Day	1:00	61.0	79.4	64.9	48.8
	30/01/2019 19:44	Evening	0:15	57.3	81.6	56.9	40.7
	30/01/2019 23:44	Night	0:15	48.9	74.2	44.1	37.2

*Refers to BS5228:2009+A1:2014 reference time periods – Daytime 07:00 to 19:00 Monday to Friday and 07:00 to 13:00 Saturdays.

**Refers to BS5228:2009+A1:2014 reference time periods – Evenings and Weekends 19:00 to 23:00 Weekdays, 13:00 to 23:00 Saturdays and 07:00 to 23:00 Sundays.

*** Refers to BS5228:2009+A1:2014 and BS4142:2014+A1:2019 reference time periods – 23:00 to 07:00.

Table 13-4: Measured Baseline Noise Levels (dB) at MP1 to MP4 March 2019

Location	Date and Start Time HH:MM	Period	Duration HH:MM	L_{Aeq}	L_{AMAX}	L_{A10}	L_{A90}
MP1	26/03/2019 16:00	Day	0:45	43.7	69.2	43.0	37.9
MP2*	27/03/2019 13:20	Day	0:34	62.6	82.1	64.9	52.7
	27/03/2019 13:55	Day	0:12	65.8	93.4	64.4	53.8
MP3	27/03/2019 12:22	Day	0:45	68.3	96.0	70.8	56.3
MP4	27/03/2019 14:50	Day	0:45	62.1	81.3	65.5	50.0

**Note – measurement had to be paused and resumed due to conversation from a passing pedestrian.*

Derivation of Background Noise Levels (L_{A90})

13.3.21 Methods of statistical analysis were applied to the datasets to assess the repeatability of the background noise levels (L_{A90}) to form a robust basis for this assessment.

13.3.22 Analytics, including mode, average, average -1 standard deviation, average +1 standard deviation and percentile statistics, were applied to the datasets. A representative value was determined by the statistical analysis and is considered representative of a repeatable and therefore ‘typical’ background noise level each receptor within the vicinity of the measurement position.

13.3.23 **Figure 13-2** and **Figure 13-3** present the graphs on the analysis of the L_{A90} data for the long-term measurements made at MP1 during the visit in April / May 2019.

13.3.24 **Table 13-6** and **Table 13-7** present a summary of the L_{A90} analysis for daytime measurements made at MP1. The data analysis considered the full 16-hour daytime reference period (07:00 to 23:00hrs) and a reduced daytime period based on an hour either side of the proposed operational hours (07:00 to 17:00hrs).

13.3.25 For the full 16hr daytime reference period, the modal range value of 42.5dBA to 43.5dBA (therefore 43dBA) was selected as representative of the daytime background noise levels.

13.3.26 For the reduced daytime period based on operational hours, **Table 13-6** shows a reduced standard deviation from the dataset, and a closer correlation of the modal value (42.5dBA to 43.5dBA, therefore 43dBA) and the arithmetic average value of 42.1dBA. Therefore, the modal value (43dBA) was considered to be statistically valid for the receptor at MP1.

Table 13-5: Measured Baseline Noise Level, (dB) at MP1 to MP4 April 2019 to May 2019

Location	Date and Start Time HH:MM	Period	Duration HH:MM	L_{Aeq}	L_{AMAX}	L_{A10}	L_{A90}
MP1	29/04/2019 15:20	Day	07:40	45.3	76.1	43.9	38.0
	29/04/2019 15:20	Day*	03:40	46.6	71.5	46.9	40.9
	29/04/2019 19:00	Evening**	04:00	43.6	76.1	41.0	35.2
	29/04/2019 23:00	Night***	08:00	46.8	74.9	45.8	42.9
	30/04/2019 07:00	Day	16:00	47.0	88.2	45.9	40.6
	30/04/2019 07:00	Day*	12:00	47.7	88.2	57.9	47.8
	30/04/2019 19:00	Evening**	04:00	43.7	77.0	41.4	35.7
	30/04/2019 23:00	Night***	08:00	54.1	100.4	43.0	39.6
	01/05/2019 07:00	Day	16:00	45.3	75.1	46.1	40.3
	01/05/2019 07:00	Day*	12:00	45.9	75.1	55.7	46.7
	01/05/2019 19:00	Evening**	04:00	42.2	65.9	42.0	35.6
	01/05/2019 23:00	Night***	08:00	46.5	67.3	41.2	35.9
	02/05/2019 07:00	Day	05:00	46.9	69.5	47.8	43.7
MP2	30/04/2019 19:51	Evening	0:15	57.3	87.8	53.3	38.9
	01/5/2019 13:00	Day	1:00	58.7	77.7	61.1	50.9
MP3	30/04/2019 19:31	Evening	0:15	61.1	82.0	62.5	43.3
	01/5/2019 14:09	Day	1:00	63.9	83.6	66.9	52.8
MP4	30/04/2019 19:13	Evening	0:15	54.8	71.6	57.5	39.4
	01/5/2019 11:53	Day	1:00	64.2	88.7	67.2	47.5

*Refers to BS5228:2009+A1:2014 reference time periods – Daytime 07:00 to 19:00 Monday to Friday and 07:00 to 13:00 Saturdays.

**Refers to BS5228:2009+A1:2014 reference time periods – Evenings and Weekends 19:00 to 23:00 Weekdays, 13:00 to 23:00 Saturdays and 07:00 to 23:00 Sundays.

*** Refers to BS5228:2009+A1:2014 and BS4142:2014+A1:2019 reference time periods – 23:00 to 07:00.

Figure 13-2 Background (L_{A90}) Analysis Based on Daytime 16hr Period

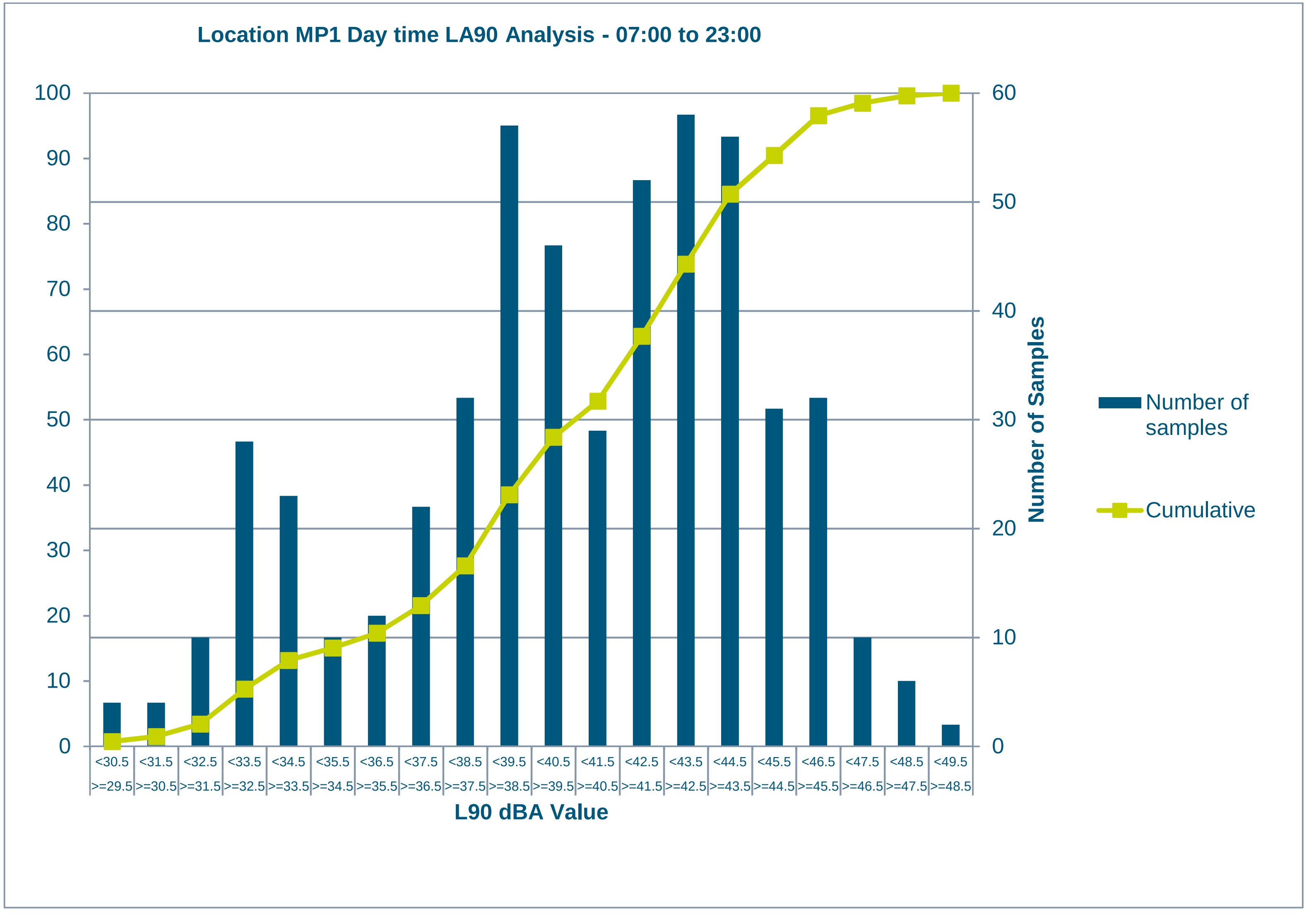


Figure 13-3 Background (L_{A90}) Analysis Based on Proposed Daytime Operational Hours Period (with One Hour Either Side)

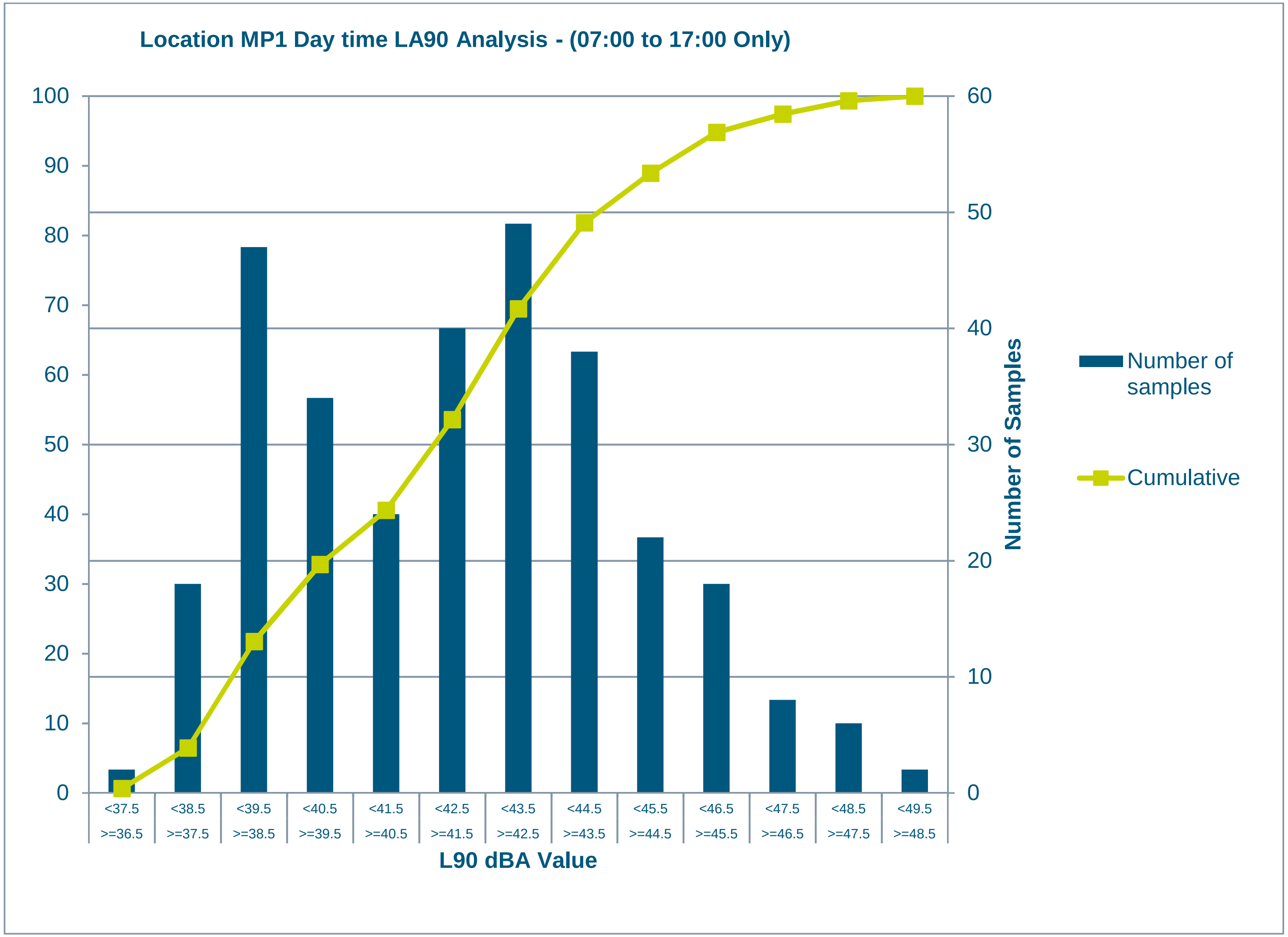


Table 13-6: Statistical Analysis Summary for MP1 April / May 2019 Measurements

Location	Period	Modal Range	Statistical Average	Standard Deviation	Average. -1s.d	Average. +1s.d	75%	90%
MP1	Day	42.5 to 43.5	40.4	4.1	36.3	44.5	43.6	45.1
	Day*	42.5 to 43.5	42.1	2.6	39.4	44.7	43.8	45.6

*Confines the L_{90} to an hour each side of proposed operational hours daytime only (07:00 to 17:00).

Table 13-7: Background (L_{90}) Statistical Analysis Summary for MP2 to MP4 Daytime All Attended Survey Measurements

Location	Period	January	March	April	Arithmetic Average
MP2	Day	44.2	52.7	50.9	49.3
MP3	Day	44.4	56.3	52.8	51.2
MP4	Day	48.8	50.0	47.5	48.8

13.3.27 Spot measurement values obtained during the baseline surveys at MP2 to MP4 are detailed in **Table 13-7** and were used for other locations including the residential receptors.

Identification of Receptor Locations

13.3.28 The construction phase of the Project will involve building a rock breakwater that will form the seaward perimeter of Longue Hougue South. The operational phase of the Project will involve the gradual infilling of the area between the breakwater and the shoreline with inert waste.

Human Receptors

13.3.29 Sensitive receptor locations were identified within the study area for consideration in the assessment. Predicted changes in noise, as a result of development-generated traffic, were calculated at these locations.

13.3.30 There are human receptors present to the south of Bulwer Avenue, located approximately 20m, 40m, and 90m north of the site boundary.

13.3.31 The nearest sensitive representative receptors to the project are denoted by MP1 to MP4 as described above.

13.3.32 The sensitive receptor locations are detailed in **Table 13-8** and **Figure 13-1**.

Table 13-8: Sensitive Receptor Locations

Receptor	Location	Coordinates		Height (m)
RT1	House at intersection of Bulwer Avenue and site access road (Link 1)	39667	47477	4
RT2	House on Les Bas Courtils (Link 2)	38989	47301	4
RT3	House on St Clair Hill (Link 3)	38479	48347	4
RT4	House on Les Banques (Link 4)	38551	46901	4
RT5	Building along Bulwer Avenue (Link 5)	39866	47731	4
RT6	House along South Quay (Link 6)	39659	48046	4
RT7	House along North Quay (Link 7)	39896	48158	4
MP1	Residential Property	39585	47425	1.5
MP2	Residential Property	39619	47840	1.5
MP3	Residential Property	39609	47507	1.5
MP4	Commercial Property (BBC Guernsey)	39307	47365	1.5

13.3.33 The sensitive receptor locations for the road traffic noise assessment were selected based on their proximity to road links affected by the project (as detailed in **Chapter 11 Traffic and Transport**), where the potential effect of development-related traffic noise would be most significant. These receptors are denoted by RT1 to RT7.

Ecological Receptors

13.3.34 Ecological receptors are assessed in **Chapter 18 Terrestrial Ecology and Ornithology**.

Summary of Receptors and Value / Sensitivity

13.3.35 The value and sensitivity of all Human receptors considered are summarised in **Table 13-9**.

Table 13-9: Value / Sensitivity of Receptors

Phase	Receptor		Value / Sensitivity	Justification
Construction and Operational Phase	Human	MP1-MP3	Medium	Human residential receptors.
		MP4	Low	Human commercial Building receptors
Construction and Operational Phase Traffic	Human	RT1-RT4, RT6-RT7	Medium	Human residential receptors.
	Human	RT5	Low	Human industrial building receptors

13.4 Do Nothing Scenario

Anticipated Trends in Baseline Conditions

Human Receptors

13.4.1 The baseline noise monitoring survey provides a clear representation of the existing soundscape within the noise and vibration study area of the proposed project. Noise is managed and driven by EU, UK and local legislation and policies. The States of Guernsey noise strategy and standards are enacted through management actions at a local authority level. There is a policy trend towards the achievement and maintenance of the noise environment across Europe, which is reflected in the planning policies detailed in **Section 13.2.2**. Predicted noise levels due to a change in land use, new developments and associated vehicles are assessed as part of the development planning and consent process.

13.4.2 Potential impacts to the prevailing soundscape should be minimised, avoided, or mitigated to suitable levels (in accordance with current legislation, policy and guidance), avoiding a significant adverse impact, where possible. In addition to planning controls there is a clear trend for noise from vehicle, commercial and industrial sources to be driven down in compliance with stricter legislation and guidance. Consequently, in relation to the proposed project and its immediate receiving environment it is reasonable to predict a general steady baseline soundscape would be maintained.

13.5 Methodology for EIA

Consultation

13.5.1 Consultation is a key part of the EIA process and is an ongoing process throughout the lifecycle of the project, from the initial stages through to consent and post-consent.

13.5.2 Consultation undertaken throughout the pre-application phase informed the approach and the information provided in this chapter. A summary of the relevant consultation to noise is detailed in **Table 13-10**.

Table 13-10: Consultation and Responses

Consultee and Date	Response	Chapter Section where consultation comment is addressed
Expert Stakeholder Workshop Attendee, 14 March 2019	A question was asked if the operation of the power station will form part of the baseline.	Section 6 EIA Consultation
Cathy Rirsch (OEHPR) January 2019	Consultation was carried out with the OEHPR regarding the methodology for the assessment. Emails dated 25 January 2019	Section 13

Construction Phase Noise Assessment

Construction Phase Impact Magnitude

13.5.3 The OEHPR has produced Construction Noise Guidance outlining normal working hours for noisy works: 08:00 – 18:00 Monday to Friday and 08:00 – 13:00 on Saturday. The guidance refers to BS 5228 when assessing noise impact. As construction works are proposed to deviate from these hours, BS 5228-1:2009+A1:2014 has been used to assess noise impacts as a measure to reduce potential impacts during the construction phase.

13.5.4 BS 5228-1:2009+A1:2014 describes several methods for assessing noise impacts during construction projects.

13.5.5 The assessment approach utilised in this ES is the threshold based "ABC" method. The method is detailed within BS 5228-1:2009+A1:2014, which specifies a construction noise limit based on the existing ambient noise level and for different periods of the day. The predicted construction noise levels were assessed against noise limits derived from advice within Annex E of BS 5228. **Table 13-11**, reproduced from BS 5228-1:2009+A1:2014 Table E.1, presents the criteria for selection of a noise limit for a specific receptor location, which are adopted in the noise impact magnitude criteria in **Table 13-19**, **Table 13-20** and **Table 13-21**.

Table 13-11: Construction Noise Threshold Levels Based on the ABC Method (BS 5228:2009+A1:2014)

Assessment category and threshold value period (L_{Aeq})	Threshold value, in decibels (dB)		
	Category A[A)]	Category B[B)]	Category C[C)]
Night time (23.00 – 07.00)	45	50	55
Evenings and weekends (D)	55	60	65
Daytime (07.00 – 19.00) and Saturdays (07.00 – 13.00)	65	70	75
A) Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values.			
B) Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values.			
C) Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values.			
D) 19.00–23.00 weekdays, 13.00–23.00 Saturdays and 07.00–23.00 Sundays.			

13.5.6 The “ABC method” described in BS 5228-1:2009+A1:2014 establishes that there is no impact below the three thresholds presented above.

13.5.7 BS 5228-1:2009+A1:2014 states:

“*If the site noise level exceeds the appropriate category value, then a potential significant effect is indicated. The assessor then needs to consider other project-specific factors, such as the number of receptors affected and the duration and character of the impact, to determine if there is a significant effect*.”

13.5.8 Construction noise impacts were assessed using the impact magnitude presented in **Table 13-12** for the daytime period, **Table 13-13** for the evening and weekend periods, and **Table 13-14** for the night time.

Table 13-12: Day time Construction Noise Impact Magnitude Criteria

Impact magnitude	Construction noise level, decibels (dB)		
	A 65dB threshold	B 70dB threshold	C 75dB threshold
No Impact	<65	<70	<75
Negligible Impact	>65.1 - <65.9	>70.1 - <70.9	>75.1 - <75.9
Low Impact	>66.0 - <67.9	>71.0 - <72.9	>76.0 - <77.9
Medium Impact	>68.0 - <69.9	>73.0 - <74.9	>78.0 - <79.9
High Impact	>70	>75	>80

Table 13-13: Evening and Weekends Construction Noise Impact Magnitude Criteria

Impact magnitude	Construction noise level, decibels (dB)		
	A 55dB threshold	B 60dB threshold	C 65dB threshold
No Impact	<55	<60	<65
Negligible Impact	>55.1 - <55.9	>60.1 - <60.9	>65.1 - <65.9
Low Impact	>56.0 - <57.9	>61.0 - <62.9	>66.0 - <67.9
Medium Impact	>58.0 - <59.9	>63.0 - <64.9	>68.0 - <69.9
High Impact	>60	>65	>70

Table 13-14: Night time Construction Noise Impact Magnitude Criteria

Impact magnitude	Construction noise level, decibels (dB)		
	A 45dB threshold	B 50dB threshold	C 55dB threshold
No Impact	<45	<50	<55
Negligible Impact	>45.1 - <45.9	>50.1 - <50.9	>55.1 - <55.9
Low Impact	>46.0 - <47.9	>51.0 - <52.9	>56.0 - <57.9
Medium Impact	>48.0 - <49.9	>53.0 - <54.9	>58.0 - <59.9
High Impact	>50	>55	>60

Derivation of Construction Phase Noise Threshold Levels ($L_{Aeq,T}$)

13.5.9 Construction noise thresholds at each sensitive receptor were derived in accordance with BS5228:2009+A1:2014 'ABC method'. The thresholds detailed in **Table 13-15** were based on analysis of the measured baseline ambient noise levels for each reference time period (daytime, evening and night) during the January, March, and April/May surveys in 2019.

Table 13-15: Determining Construction Phase Noise Thresholds

Location	Measured Levels			Derived BS5228 Threshold Category		
	Day	Evening	Night	Day	Evening	Night
MP1	45.9 to 47.7	42.2 to 43.7	46.5 to 54.1	A (65)	A (55)	B (50)
MP2	58.7	54.8	39.7	A (65)	B (50)	A (45)
MP3	63.9	61.1	47.5	B (70)	C (55)	B (50)
MP4	64.2	54.8	48.9	B (70)	B (50)	C (55)

13.5.10 A SoundPLAN noise model was used in this construction phase assessment and incorporated noise sources located in the noise and vibration study area, nearby residential dwellings and other buildings, intervening ground cover and topographical information.

13.5.11 Noise levels for the construction phase were calculated using the methods and guidance in BS 5228-1:2009+A1:2014. This Standard provides methods for predicting receptor noise levels from construction works based on the number and type of construction plant and activities operating on site, with corrections to account for:

- The "on-time" of the plant, as a percentage of the assessment period;
- Distance from source to receptor;
- Acoustic screening by barriers, buildings or topography; and
- Ground type.

13.5.12 A proposed construction phase programme detailing duration, deliveries and equipment requirements is provided in **Chapter 4 Project Description**.

13.5.13 Noise modelling scenarios were derived from the proposed construction phase programme. Month 6 to 12 for both the 'Best Case' and 'Worst Case' construction programme is identical in terms of the number of simultaneous activities occurring at the site. This time period was chosen to be representative of a realistic worst-case scenario.

13.5.14 There are two options for the delivery of the material required for the breakwater construction:

- Option 1 Shoreline deposition; and
- Option 2 Berth based deposition.

13.5.15 Additionally, there is an option for works to commence at either end of the proposed breakwater, or both ends at the same time.

13.5.16 The modelled scenarios are detailed below:

- Scenario 1 - Option 1 Construction commences eastern section (1 team);
- Scenario 2 - Option 1 Construction commences western section (1 team);
- Scenario 3 - Option 1 Construction commences at both ends simultaneously;
- Scenario 4 - Option 2 Construction commences eastern section (1 team);
- Scenario 5 - Option 2 Construction commences western section (1 team); and
- Scenario 6 - Option 2 Construction commences at both ends simultaneously.

13.5.17 The construction plant that are proposed are detailed in **Table 13-16** and **Table 13-17** along with explanation of any assumptions associated with noise data.

Table 13-16: Breakwater Construction Plant – Proposed Longue Hougue South – Scenario 1, 2, 4 and 5

Name	No.	Source type	BS5228 Reference	L_{Aeq} (dB) at 10m	On time correction (%)/period
Bulldozer	2	Point	C2.21	71	80/24hrs
Articulated Dump Truck	2	Point	C2.33	81	85
Articulated Dump Truck (Tipping Fill)	3	Point	C2.32	74	See below
Excavator (Long Reach)	2	Point	C7.1	78	80/24hrs
Crane	2	Point	C7.1	78	85
Barge idling during offloading and tide changes	1	Point	C7.2	82	100

Name	No.	Source type	BS5228 Reference	L_{Aeq} (dB) at 10m	On time correction (%)/period
Deliveries Local Quarry	15	Line	C2.33	81	See below
Deliveries Local Quarry tipping at Stockpile	-	Point	C2.32	74	See below
Barge Delivery	1	Line	C7.2	82	See below
Option 1 Dump Zone Excavator to Storage	1	Line			See below
Trucked Rock from Stockpile to Breakwater	-	Line	C2.33	81	See below
Assumptions: Deliveries Local Quarry: Moving Line Source at 24.1km/h, 30 movements per day. Deliveries Local Quarry Tipping: Point source, 30 secs/hr 07:00 to 19:00 only. Articulated Dump Trucks (Tipping): Point source, 10 secs per event, per location, equivalent to 60 seconds/hr across construction zone. Trucked Rock from Stockpile to Breakwater: 6/hr 07:00 to 19:00 only, split between dump locations. Trucked Rocks from Berth to Stockpile: Moving Line source at 24.1km/h, 25 movements per hour 07:00 to 19:00 only. Trucked Rocks from Berth to Stockpile (Tipping): 500 seconds/hr, 07:00 to 19:00hrs only. Barge Delivery Shoreline Deposition: To represent tidal variation, 1 per daytime, 1 per night time, 100% on-time for a full hour. Barge Delivery Berth Deposition: 100% on-time for a 24hrs at berth. Option 1 Dump Zone Excavator to Storage: Moving Line Source at 24.1km/h, 25 movements per daytime construction period only (07:00 to 19:00hrs).					

Construction Phase Vibration Assessment

13.5.18 Ground-borne vibration can result from construction works and may lead to perceptible levels of vibration at nearby receptors, which at higher levels can cause annoyance to residents. In extreme cases, cosmetic or structural building damage can occur, but only at extremely high magnitude vibration levels and such cases are rare.

13.5.19 High vibration levels generally arise from 'heavy' construction works such as piling, deep excavation, or dynamic ground compaction.

Table 13-17: Breakwater Construction Plant – Proposed Longue Hougue South – Scenario 3 and 6

Name	No.	Source type	BS5228 Reference	L_{Aeq} (dB) at 10m	On time correction (%)/period
Bulldozer	4	Point	C2.21	71	80/24hrs
Articulated Dump Truck	4	Point	C2.33	81	85
Articulated Dump Truck (Tipping Fill)	6	Point	C2.32	74	See below
Excavator (Long Reach)	4	Point	C7.1	78	80/24hrs
Crane	4	Point	C7.1	78	85
Barge Idling during offloading and tide changes	1	Point	C7.2	82	100
Deliveries Local Quarry	15	Line	C2.33	81	See below
Deliveries Local Quarry tipping at Stockpile	-	Point	C2.32	74	See below
Barge Delivery	1	Line	C7.2	82	See below
Option 1 Dump Zone Excavator to Storage	1	Line			See below
Trucked Rock from Stockpile to Breakwater	-	Line	C2.33	81	See below

Assumptions:
Deliveries Local Quarry: Moving Line Source at 24.1km/h, 30 movements per day.
Deliveries Local Quarry Tipping: Point source, 30 secs/hr 07:00 to 19:00 only.
Articulated Dump Trucks (Tipping): Point source, 10 secs per event, per location, equivalent to 120 seconds/hr across construction zone.
Trucked Rock from Stockpile to Breakwater: 6/hr 07:00 to 19:00 only, split between dump locations.
Trucked Rocks from Berth to Stockpile: Moving Line source at 24.1km/h, 25 movements per hour 07:00 to 19:00 only.
Trucked Rocks from Berth to Stockpile (Tipping): 500 seconds/hr, 07:00 to 19:00hrs only.
Barge Delivery Shoreline Deposition: To represent tidal variation, 1 per daytime, 1 per night time, 100% on-time for a full hour.
Barge Delivery Berth Deposition: 100% on-time for a 24hrs at berth.
Option 1 Dump Zone Excavator to Storage: Moving Line Source at 24.1km/h, 25 movements per daytime construction period only (07:00 to 19:00hrs).

13.5.20 Annex E of BS 5228-2:2009+A1:2014 contains empirical formulae derived by Hiller and Crabb (2000) from field measurements relating to resultant peak particle velocity (PPV).

13.5.21 The empirical equations for predicting construction-related vibration provide estimates in terms of PPV. Therefore, the consequences of predicted levels in terms of human perception and disturbance can be established through direct comparison with the BS 5228-2:2009+A1:2014 guidance vibration levels.

13.5.22 Ground-borne vibration assessments may be drawn from the empirical methods detailed in BS 5228-2:2009+A1:2014, in the Transport and Road Research Laboratory (TRRL) 246: Traffic: Traffic induced vibrations in buildings, and within the Transport Research Laboratory (TRL) Report 429 (2000): Ground-borne vibration caused by mechanical construction works.

13.5.23 However, these calculation methods rely on detailed information, including the type and number of plant being used, their location and the length of time they are in operation. Given the mobile nature of much of the plant that has the potential to impart sufficient energy into the ground to potentially cause vibrational impacts, and the varying ground conditions in the immediate vicinity of the construction works, it was considered that an accurate representation of vibration conditions using these predictive methods was not possible.

13.5.24 Consequently, a series of calculations, following the methodologies referred to above, were carried out based on typical construction activities that have the potential to impart sufficient energy into the ground, applying reasonable worst-case assumptions to determine set-back distances at which critical vibration levels may occur.

13.5.25 Humans are very sensitive to vibration, which can result in concern being expressed at energy levels well below the threshold of damage. Guidance on the human response to vibration in buildings is found in BS 6472-1:2008 Guide to evaluation of human exposure to vibration in buildings, Part 1, Vibration sources other than blasting.

13.5.26 BS 6472 describes how to determine the vibration dose value (VDV) from frequency-weighted vibration measurements. VDV is defined by the following equation:

$$VDV_{b/d,\ day/night} = \left(\int_0^T a^4(t)dt\right)^{0.25}$$

13.5.27 The VDV is used to estimate the probability of adverse comment which might be expected from human beings experiencing vibration in buildings. Consideration is given to the time of day and use made of occupied space in buildings, whether residential, office or workshop.

13.5.28 BS 6472 states that in homes, adverse comments about building vibrations is likely when the vibration levels to which occupants are exposed are only slightly above thresholds of perception.

13.5.29 BS 6472 contains a methodology for assessing the human response to vibration in terms of either the VDV, or in terms of the acceleration or the peak velocity of the vibration, which is also referred to as PPV. The VDV is determined over a 16-hour daytime period or 8-hour night-time period.

13.5.30 The response of a building to ground-borne vibration is affected by the type of foundation, ground conditions, the building construction and the condition of the building. For construction vibration, the vibration level and effects detailed in **Table 13-18** were adopted based on BS 5228-2:2009+A1:2014. Limits for transient vibration, above which cosmetic damage could occur, are given numerically in terms of PPV.

Table 13-18: Transient Vibration Guide Values for Cosmetic Damage

Line	Type of building	Peak component particle velocity in frequency range of predominant pulse	
		4Hz to 15Hz	15Hz and above
1	Reinforced or framed structures. Industrial and heavy commercial buildings.	$50mm.s^{-1}$ at 4Hz and above	
2	Un-reinforced or light framed structures. Residential or light commercial type buildings.	$15mm.s^{-1}$ at 4Hz increasing to $20mm.s^{-1}$ at 15Hz	$20mm.s^{-1}$ at 15Hz increasing to $50mm.s^{-1}$ at 40Hz and above

13.5.31 **Table 13-19** lists the minimum set-back distances at which vibration levels of reportable significance for other typical construction activities may occur. BS 5228-2:2009+A1:2014 calculation methods were used to derive the set-back distances outlined in **Table 13-19**.

Table 13-19: Predicted Distances at Which Vibration Levels May Occur

Name	Set-back distance at which vibration level (PPV) occurs			
	0.3 mm/s	1.0 mm/s	10 mm/s	15 mm/s
Vibratory Compaction (Start-up)	166m	65m	9m	6m
Vibratory Compaction (Steady State)	102m	44m	8m	6m
HGV Movement* on uneven Haul Route	277m	60m	3m	2m
*Vibration level based on an HGV moving at 5mph				

13.5.32 For construction vibration from sources other than blasting, the vibration level and effects presented in **Table 13-20** were adopted based on Table B-1 of BS 5228-2:2009+A1:2014. These levels and effects are based on human perception of vibration in residential environments.

Table 13-20: Construction Vibration - Impact Magnitude

Vibration limit PPV (mm/s)	Interpreted significance to humans	Impact magnitude
<0.14	Vibration unlikely to be perceptible	No impact
0.14 to 0.3	Vibration might just be perceptible in the most sensitive situations for most vibration frequencies associated with construction	Negligible
0.3 to 1.0	Vibration might just be perceptible in residential environments	Low
1.0 to <10.0	It is likely that vibration at this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents	Medium
>10.0	Vibration is likely to be intolerable for any more than a brief exposure to this level	High

Road Traffic Noise Assessment

13.5.33 The assessment considered traffic generated during the construction and operational phases of the Project.

Assessment Scenarios

13.5.34 Traffic during the construction phase of the project is anticipated to commence in 2021 at the earliest and has therefore been used in the assessment.

13.5.35 Traffic from the operational phase of the Project is anticipated to commence in 2024, therefore these years were used in the assessment.

13.5.36 In summary, the following scenarios were considered:

- Scenario 1 – 2021 'Baseline without Project construction';
- Scenario 2 – 2021 'Baseline with Project construction';
- Scenario 3 – 2024 'Baseline without operational activities'; and
- Scenario 4 – 2024 'Baseline with operational activities'.

Traffic Data

13.5.37 Traffic data for use in the noise assessment were provided as Annual Average Weekday Traffic (AAWT) flows and percentage Heavy Goods Vehicles (HGVs) on the surrounding road network based on predicted waste volumes and traffic volume calculations developed from data from the States of Guernsey by Royal HaskoningDHV's Transport Consultants.

13.5.38 Traffic data (**Table 13-21**) for the following roads were included in the noise assessment:

- Link 1 – Longue Hougue Access Road.
- Link 2 – Bulwer Avenue/Les Bas Courtils.
- Link 3 – Vale Road / Route Militaire.
- Link 4 – Les Banques leading to St George's Esplanade.
- Link 5 – Bulwer Avenue.
- Link 6 – The Bridge / South Quay.
- Link 7 – North Quay / Castle Road / La Rue du Chateau (North Side).

Table 13-21: Traffic Data Used in the Noise Assessment

Road Link	2021 Baseline without Project construction		2021 Baseline with Project construction		2024 Baseline without operational activities		2024 Baseline with operational activities		Speed
	AAWT	HGV (%)	AAWT	HGV (%)	AAWT	HGV (%)	AAWT	HGV (%)	kph
Link 1 – Longue Hougue Access Road	1,439	26.9	1,519	27.5	1,439	26.9	1,560	32.1	28.9
Link 2 – Bulwer Avenue/Les Bas Courtils	10,087	10.6	10,162	10.9	10,304	10.6	10,412	11.5	47.5
Link 3 – Vale Road / Route Militaire	12,072	4.2	12,112	4.5	12,529	4.2	12,561	4.4	35.2
Link 4 – Les Banques leading to St George's Esplanade	25,870	5.5	25,935	5.6	27,110	5.5	27,194	5.8	38.5
Link 5 – Bulwer Avenue	9,313	9.0	9,348	9.3	9,906	9.0	9,927	9.1	42.8
Link 6 – The Bridge / South Quay	11,225	5.0	11,260	5.2	11,518	5.0	11,539	5.1	22.9
Link 7 – North Quay / Castle Road / La Rue du Chateau (North side)	5,658	11.2	5,689	11.7	5,731	11.2	5,746	11.3	41.0

13.5.39 An initial screening assessment was undertaken following the methodology contained in DMRB (Volume 11, Section 3, Chapter 7) to assess whether there would be any significant changes in traffic volume and composition on surrounding local roads as a result of the proposed project. Any road links with a predicted increase in traffic volume of 25% or a decrease of 20% were identified. Such changes in traffic volume would correspond to a 1dBA change in noise level at the relevant road link. A change in noise level of less than 1dBA is regarded as being imperceptible and, therefore, of negligible magnitude. If there are no increases greater than 25% or a decrease of 20% or greater, then the DMRB guidance indicates that no further assessment needs to be conducted.

13.5.40 For completeness, all road links were modelled using SoundPLAN following the calculation procedure within CRTN to predict a decibel change for each link. The calculation also incorporates a correction for mean traffic speed and the percentage of HGVs.

13.5.41 Construction phase road link decibel change was assessed using the impact magnitude criteria in **Table 13-22**. The thresholds for differentiating the criteria are taken from DMRB for short-term impacts and are an indication of the relative change in ambient noise as a result of the proposed project.

Table 13-22: Magnitude Criteria for Relative Change Due to Road Traffic (Short Term)

Change in noise level (L_{A10} (18 hour) dB)	Impact magnitude
0.0	No change
0.1 – 0.9	Negligible Adverse
1.0 – 2.9	Minor Adverse
3.0 – 4.9	Moderate Adverse
5.0+	Major Adverse

13.5.42 Impact magnitude criteria used in the operational phase road traffic impact assessment are detailed in **Table 13-23**.

Operational Phase Noise Assessment

Operational Phase Noise Impacts

13.5.43 Where there are noise sources such as mobile and fixed plant associated with operational processes, the most appropriate assessment guidance is BS 4142:2014+A1:2019. The guidance describes a method of determining the level of noise of an industrial noise source and the existing background noise level.

Table 13-23: Magnitude Criteria for Relative Change Due to Road Traffic (Long Term)

Change in noise level (L_{A10} (18 hour) dB)	Impact magnitude
0.0	No change
0.1 – 2.9	Negligible Adverse
3.0 – 4.9	Minor Adverse
5.0 – 9.9	Moderate Adverse
10.0+	Major Adverse

13.5.44 BS 4142:2014+A1:2019 describes methods for rating and assessing sound of an industrial and/or commercial nature. The methods use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident, and combines procedures for assessing the impact in relation to:

- Sound from industrial and manufacturing processes;
- Sound from fixed installations which comprise mechanical and electrical plant and equipment;
- Sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and
- Sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train or ship movements on or around an industrial and/or commercial site.

13.5.45 This standard is applicable to the determination of the following levels at outdoor locations:

- "*a) rating levels for sources of sound of an industrial and/or commercial nature; and*
- *b) ambient, background and residual sound levels, for the purposes of:*
  - o *investigating complaints;*
  - o *assessing sound from existing, proposed, new, modified or additional source(s) of sound of an industrial and/or commercial nature; and*
  - o *assessing sound at proposed new dwellings or premises used for residential purposes."*

13.5.46 The standard is not intended to be applied to the assessment of indoor sound levels.

13.5.47 The standard incorporates a requirement for the assessment of uncertainty in environmental noise measurements and introduces the concepts of “significant adverse impact” rather than likelihood of complaints. Common principles with the previous edition are consideration of sound characteristics, time of day and frequency of occurrence.

13.5.48 The standard applies to industrial/commercial and background noise levels outside residential buildings and for assessing whether existing and new industrial / commercial noise sources are likely to give rise to significant adverse impacts on the occupants living in the vicinity.

13.5.49 Assessment is undertaken by subtracting the measured background noise level from the rating level; the greater this difference, the greater the magnitude of the impact.

13.5.50 BS 4142:2014+A1:2019 refers to the following:

- “*A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context;*
- *A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context; and*
- *The lower the rating level relative to the measured background sound level the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context*”.

13.5.51 When assessing the noise from a source, which is classified as the Rated Noise Level, it is necessary to have regard to the acoustic features that may be present in the noise. Section 9.1 of BS 4142:2014+A1:2019 states:

- “*Certain acoustic features can increase the significance of impact over that expected from a basic comparison between the specific sound level and the background sound level. Where such features are present at the assessment location, add a character correction to the specific sound level to obtain the rating level.”*

13.5.52 An operational assessment in accordance with BS 4142:2014+A1:2019 was undertaken for the proposed Project. Due to the separation distance from proposed operational activity (infilling of inert waste), penalty corrections for intermittency and impulsivity are required at receptors MP1 and MP2. These acoustic features are added based on perceptibility at the receptor location.

13.5.53 In terms of intermittency, the operation of the mobile plant (excavators/loaders) will typically operate between 08:00 to 16:00hrs each weekday, with expected stops/starts to the compacting/sorting plant. Therefore, in accordance with BS 4142:2014+A1:2019 an intermittency penalty correction of +3dBA is required, where plant may be operating in close proximity to the site boundary.

13.5.54 In terms of impulsivity, compacting, dropping of materials, cleaning of excavator/loader forks could give rise to impulsive characteristics under typical operating conditions. Therefore, an impulsivity penalty correction of +3dBA is required, where plant may be operating in close proximity to the site boundary.

13.5.55 The determination of the specific sound level, free from other influences contributing to the ambient sound at the assessment location, is obtained by measurement or a combination of measurement and calculation. This is to be measured in terms of the $L_{Aeq,\,T}$, where 'T' is a reference period of:

- 1 hour during daytime hours (07:00 to 23:00 hours); and
- 15 minutes during night-time hours (23:00 to 07:00 hours).

13.5.56 The process is daytime only (08:00 to 16:00hrs); therefore, the 1 hour reference period is used in the assessment.

13.5.57 The assessment of noise from proposed fixed plant associated with the proposed project was considered at NSRs.

13.5.58 SoundPLAN noise modelling software was utilised to predict the noise from the operational aspects of the proposed project. The model incorporated proposed plant and additional noise sources associated with the proposed project. The model also included nearby residential dwellings and other buildings in the study area, intervening ground cover and topographical information.

13.5.59 Noise levels for the operational phase were predicted at NSR locations MP1 to MP4. The calculation algorithm described in ISO 9613 *Acoustics - Attenuation of sound during propagation outdoors - Part 2: General method of calculation* was used in the operational noise propagation modelling exercise.

13.5.60 The magnitude of impact that will be applied to the operational assessment, based on a quantitative assessment of noise impact using BS 4142:2014+A1:2019 is summarised in **Table 13-24**.

13.5.61 It is considered and accepted that the smallest perceptible change in environmental noise is 3dBA. Therefore, a difference in noise level above the background of up to +3dBA is detailed as a negligible adverse impact magnitude.

Table 13-24: Operational Noise Impact Magnitude Criteria

BS4142 Rating level (LAr, Tr dB)	BS4142 Impact magnitude
≤ (L_{A90}) Background	No Impact
> L_{90} dBA to + <3dB	Negligible
> L_{90} dBA + >3dB to <5dB	Low
> L_{90} dBA + >5dB to 9.9dB	Medium
L_{90} dBA + ≥10dB	High

13.5.62 BS4142:2014+A1:2019 states that "a difference of around +5dB is likely to be an indication of an adverse impact, depending on the context". Using this principle, a difference in sound level of between +3dBA to +5dBA is detailed as a minor adverse impact.

13.5.63 The allowance for up to +5dBA above the representative background level as minor adverse is considered appropriate as BS4142:2014+A1:2019 states in section 11:

- "*Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night*."

Assessment Significance Criteria

Sensitivity

13.5.64 Sensitive receptors, in the context of noise and vibration, are typically residential premises but can also include schools, places of worship and noise sensitive commercial premises. **Table 13-25** presents the definitions used relating to the sensitivity of the receptor.

Impact Significance

13.5.65 Following the identification of receptor value and sensitivity and magnitude of the effect, it is possible to determine the significance of the impact. A matrix as presented in **Table 13-26** will be used wherever relevant.

13.5.66 The impact significance categories are divided as shown in **Table 13-27**.

13.5.67 Where impacts are considered to be significant (moderate or major), appropriate additional mitigation measures will be considered to give protection to sensitive receptors.

Table 13-25: Definitions of the Different Sensitivity Levels for a Noise Receptor

Sensitivity	Definition	Examples
High	Receptor has very limited tolerance of effect	Noise Receptors have been categorised as high sensitivity where noise may be detrimental to vulnerable receptors. Such receptors include certain hospital wards (e.g. operating theatres or high dependency units) or care homes at night. Vibration Receptors have been categorised as high sensitivity where the receptors are listed buildings or Scheduled Monuments.
Medium	Receptor has limited tolerance of effect	Noise Receptors have been categorised as medium sensitivity where noise may cause disturbance and a level of protection is required but a level of tolerance is expected. Such subgroups include residential accommodation, private gardens, hospital wards, care homes, schools, universities, research facilities, national parks, (during the day); and temporary holiday accommodation at all times. Vibration Receptors have been categorised as medium sensitivity where the structural integrity of the structure is limited but the receptor is not a listed building or Scheduled Monument.
Low	Receptor has some tolerance of effect	Noise Receptors have been categorised as low sensitivity where noise may cause short duration effects in a recreational setting although particularly high noise levels may cause a moderate effect. Such subgroups include offices, shops, outdoor amenity areas, long distance footpaths, doctor's surgeries, sports facilities and places of worship. Vibration Receptors have been categorised as low sensitivity where the structural integrity of the structure is expected to be high.

Sensitivity	Definition	Examples
Negligible	Receptor generally tolerant of effect.	Noise Receptors have been categorised as negligible sensitivity where noise is not expected to be detrimental. Such subgroups include warehouses, light industry, car parks, and agricultural land. Vibration Receptors have been categorised as negligible sensitivity where vibration is not expected to be detrimental.

Table 13-26: Impact Significance Matrix

		Magnitude				
		Major / High	Moderate / Medium	Minor / Low	Negligible	No impact
Sensitivity	High	Major	Major	Moderate	Minor	Negligible
	Medium	Major	Moderate	Minor	Minor	Negligible
	Low	Moderate	Minor	Minor	Negligible	Negligible
	Negligible	Minor	Negligible	Negligible	Negligible	Negligible

Table 13-27: Impact Significance Definitions

Impact Significance	Definition
Major	Very large or large change in receptor condition, both adverse or beneficial, which are likely to be important considerations at a regional or district level because they contribute to achieving national, regional or local objectives, or, could result in exceedance of statutory objectives and / or breaches of legislation.
Moderate	Intermediate change in receptor condition, which are likely to be important considerations at a local level.

Impact Significance	Definition
Minor	Small change in receptor condition, which may be raised as local issues but are unlikely to be important in the decision-making process.
Negligible	No discernible change in receptor condition.
No change	No impact, therefore no change in receptor condition.

13.5.68 Following initial assessment, if the impact does not require additional mitigation (or none is possible) the residual impact will remain the same. If, however, additional mitigation is proposed there will be an assessment of the post-mitigation residual impact.

13.6 Impacts During Construction

CONSTRUCTION IMPACT 13.1: Construction Phase Site Activity

13.6.1 Construction impacts will be temporary in nature and include noise and vibration generating activities associated with earthworks, general construction activities, HGV deliveries, and mobile plant.

13.6.2 At this stage in the Project, the method for delivering rock for the breakwater to the site has not been confirmed. Two approaches are proposed for delivering rock to the site and transporting it to the breakwater. These are:

- **Option 1: Shoreline deposition** at high tide for a barge to deliver rock onto the shoreline within the Longue Hougue South site. Once onshore, the rock will be transported to the storage area by excavators.
- **Option 2: Berth based deposition** via barge berthing at the north end of the existing Longue Hougue Reclamation Site and transfer of rock by truck to a stockpile in the existing Longue Hougue Reclamation Site (see **Figure 4-3**) before being transported to the appropriate point on the Longue Hougue South breakwater for placement.

13.6.3 Option 2 was considered in the construction noise assessment as a conservative scenario due to the length of unpaved road (approximately 830m) that would be travelled by the trucks from the north end of the existing Longue Hougue Reclamation Site to Longue Hougue South, and the greater potential for noise to be generated.

13.6.4 As a worst-case scenario, construction of the breakwater has been assumed to be taking place at the site location any time during the day or night during certain periods and assessed accordingly. The assessment is based on construction between the hours of 07:00 to 19:00 Monday to Friday and 07:00 to 13:00 on Saturday (daytime), 19:00 to 23:00 Monday to Friday and 13:00 to 23:00 Saturdays and 07:00 to 23:00 Sundays. Night time period is 23:00 to 07:00. Daytime and Evening predicted noise levels were based on Ground Floor level (+1.5m above ground). Night time predicted noise levels were based on a receptor height of 4m (representative of first floor level).

13.6.5 **Table 13-28** details the range and the highest predicted unmitigated noise levels from modelling Scenarios 1 to 6 only. Corresponding noise contour isopleths are shown in **Appendix 13.1**, **Figure A13.1** to **Figure A13.12**.

Table 13-28: Construction Noise – Predicted Impacts Month 6 to 12 Scenario 1 to 6

Receptor Identifier	BS5228 Reference Period	BS5228 Derived Threshold Category dBA	Range Predicted Receptor Noise levels dBA	Worst Case Impact Magnitude	Worst Case Impact Significance
MP1	Daytime	A (65)	46.7 to 56.0	No Impact	Negligible
	Evening	A (55)	43.2 to 55.0	No Impact	Negligible
	Night	C (55)	46.7 to 56.2	Low Impact	Minor
MP2	Daytime	A (65)	40.2 to 43.0	No Impact	Negligible
	Evening	A (55)	37.9 to 41.9	No Impact	Negligible
	Night	A (45)	44.1 to 47.8	Low Impact	Minor
MP3	Daytime	A (65)	51.1 to 51.4	No Impact	Negligible
	Evening	B (60)	40.3 to 41.7	No Impact	Negligible
	Night	B (50)	40.7 to 46.9	No Impact	Negligible
MP4	Daytime	A (65)	39.6 to 53.8	No Impact	Negligible
	Evening	B (60)	39.2 to 53.4	No Impact	Negligible
	Night	C (55)	40.3 to 54.3	No Impact	Negligible

13.6.6 The results show that predicted noise levels from construction works during the proposed project would be of no impact magnitude at most medium sensitivity receptors and therefore impacts would be of negligible significance. A low impact magnitude of **minor** significance was predicted at MP1 (+1.2dBA) and MP2 (+2.8dBA) during the night time period.

13.6.7 For both receptors (MP1 and MP2), the impact magnitude was greater during construction scenario 3 and 6 (works at both ends of the breakwater simultaneously). A lower magnitude (up to +1.1dBA in excess of the BS5228 threshold at MP2) was predicted during the night time works commencing at the western section of the breakwater. Additional mitigation is required.

Mitigation

Construction Phase Noise

<u>Standard Mitigation (BPM)</u>

13.6.8 Standard construction noise mitigation practices and good practice construction management will be adopted throughout the construction phase. These will be captured within a Construction Noise Management Plan (CNMP) which forms part of the Code of Construction Practice (CoCP). A summary of the measures is set out in the following sections.

<u>Construction Noise Management Plan</u>

13.6.9 The Control of Pollution Act and BS 5228 define a set of Best Practice working methods and mitigation measures, referred to as BPM. Examples of these measures include:

- Where possible, locating temporary plant so that it is screened from receptors by on-site structures, such as site cabins;
- Using modern, quiet equipment and ensuring such equipment is properly maintained and operated by trained staff;
- Applying enclosures to particularly noisy equipment where possible;
- Ensuring that mobile plant is well maintained such that loose body fittings or exhausts do not rattle or vibrate;
- Ensuring plant machinery is turned off when not in use;
- Providing local residents with 24-hour contact details for a site representative in the event that disturbance due to noise from the construction works is perceived;
- Establishing a community engagement process including informing local

residents about the construction works, detailing the timing and duration of any particularly noisy elements; and

- Keeping noisy deliveries to the middle of the day where possible.

13.6.10 Although the effect of adopting such methods cannot be precisely quantified, these methods are considered to typically reduce noise levels by between 5dB(A) – 10dB(A).

Training of Construction Staff

13.6.11 The site induction programme and site rules should include good working practice instructions for site staff, managers, visitors and contractors to help minimise noise whilst working on the site.

13.6.12 Good working practice guidelines/instructions could include, but not be limited to, the following points:

- Avoiding unnecessary revving of engines;
- Plant used intermittently should be shut-down between operational periods, where possible;
- Avoiding reversing wherever possible;
- Reporting any defective equipment / plant as soon as possible so that corrective maintenance can be undertaken;
- Handling material in a manner that minimises noise; and
- Maintenance of temporary plant and any other construction equipment should be carried out routinely and in accordance with the manufacturers' guidance.

13.6.13 A regular inspection of all plant and equipment should be undertaken to ensure that:

- All plant is in a good state of repair and fully functional;
- Any plant found to be requiring interim maintenance has been identified and taken out of use;
- Acoustic enclosures fitted to plant are in a good state of repair;
- Doors and covers to such enclosures remain closed during operation; and
- Any repairs are being undertaken by a fully qualified maintenance engineer.

Enhanced Mitigation

13.6.14 To ensure these impacts are mitigated as far as reasonably possible, the aforementioned standard mitigation should (where necessary) be augmented by a suite of enhanced mitigation measures. The detail of the enhanced mitigation measures will be drawn up and agreed as part of the CNMP before construction starts.

13.6.15 The enhanced mitigation measures will include the selection and deployment of particularly low noise plant near the identified receptors.

Residual Impact

Construction Phase Impacts

13.6.16 For all receptors the residual impacts from the construction phase of the Project are considered to be **not significant** with the implementation of the above mitigation measures in accordance with BPM guidance during the daytime, evening and night time reference periods.

CONSTRUCTION IMPACT 13.2: Construction Phase Road Traffic Noise

Human Receptors

13.6.17 The 18-hour Annual Average Weekday Traffic (AAWT) flows and HGV percentages used in the noise assessment scenarios are detailed in **Table 13-29**. The percentage change in composition and Total Vehicles is also detailed.

Table 13-29: Construction Road Traffic Flows – 2021 Baseline vs. 2021 Baseline and the Proposed Project Traffic

Link ID	Description	2021 Baseline flows AAWT		2021 Baseline + Development		Overall Change (%)	
		Total Vehicles	Total HGVs	Total Vehicles	Total HGVs	Total Vehicles	Total HGVs
1	Longue Hougue Access Road	1,439	388	1,519	418	5.6	7.7
2	Bulwer Avenue/Les Bas Courtils	10,087	1,074	10,162	1,104	0.7	2.8
3	Vale Road / Route Militaire	12,072	513	12,112	543	0.3	5.9

Link ID	Description	2021 Baseline flows AAWT		2021 Baseline + Development		Overall Change (%)	
		Total Vehicles	Total HGVs	Total Vehicles	Total HGVs	Total Vehicles	Total HGVs
4	Les Banques leading to St George's Esplanade	25,870	1,435	25,935	1,465	0.3	2.1
5	Bulwer Avenue	9,313	837	9,348	867	0.4	3.6
6	The Bridge / South Quay	11,225	561	11,260	591	0.3	5.3
7	North Quay / Castle Road / La Rue du Chateau (North side)	5,658	636	5,689	666	0.5	4.7

13.6.18 **Table 13-30** shows the calculated change in traffic flow on the road links identified by the transport assessment as carrying construction traffic (see **Chapter 11 Traffic and Transport**) for the year 2021 based on the 18hr Annual Average Weekday Traffic (AAWT) flows. Corresponding noise contour isopleths are shown in **Appendix 13.1**, **Figure A13.13** to **Figure A13.14**.

13.6.19 **Table 13-30** shows that predicted impacts from construction traffic are at worst of a negligible impact magnitude at a medium sensitivity receptor resulting in a **minor adverse** significance. Therefore, no additional mitigation is required.

CONSTRUCTION IMPACT 13.3: Construction Phase Vibration

Human Receptors

13.6.20 Vibration levels decay very rapidly with distance from a source (BS 5228-2:2009+A1:2014). Given the distance between sources of vibration during the construction works, the proximity of receptors to existing industrial type activity and the road network, it is expected that PPV levels would generally be below the criteria outlined in **Table 13-19** at the NSRs in the study area.

13.6.21 HGVs on smooth road surfaces do not produce significant levels of vibration at road side receptors. However, vibration can result from sudden wheel impacts as vehicles pass over holes and cracks on the road surface. Potentially this may result in transient exceedances of BS 5228-2:2009+A1:2014 criteria. The majority of buildings would be resilient to the worst-case vibration levels anticipated.

Table 13-30: Calculated Noise Level – 2021 Baseline vs. 2021 Baseline and the proposed Project Traffic

Link ID	Description	Speed (kph)	2021 Baseline dBA L10,18hr	2021 Baseline and the proposed project dBA, L10,18hr	Overall Change dBA	Impact Magnitude
1	Longue Hougue Access Road	28.9	63.3	63.6	0.3	Negligible
2	Bulwer Avenue/Les Bas Courtils	47.5	69.3	69.4	0.1	Negligible
3	Vale Road / Route Militaire	35.2	67.6	67.7	0.1	Negligible
4	Les Banques leading to St George's Esplanade	38.5	71.5	71.6	0.1	Negligible
5	Bulwer Avenue	42.8	68.3	68.4	0.1	Negligible
6	The Bridge / South Quay	22.9	67.6	67.8	0.2	Negligible
7	North Quay / Castle Road / La Rue du Chateau (North side)	41.0	66.6	66.7	0.1	Negligible

13.6.22 Paragraph 3.32 of DMRB states that:

"*PPVs [peak particle velocity] in the structure of buildings close to heavily trafficked roads rarely exceed 2 mm/s and typically are below 1 mm/s. Normal use of a building such as closing doors, walking on suspended wooden floors and operating domestic appliances can generate similar levels of vibration to those from road traffic*".

13.6.23 Construction of the breakwater at its closest location is approximately 130m from receptor MP1. Therefore, vibration impacts from construction vehicles would be of negligible magnitude on receptors of medium sensitivity and therefore of no worse than **minor adverse**. Therefore, no additional mitigation is required.

13.7 Impacts During Operation

OPERATIONAL IMPACT 13.4: Operational Phase Road Traffic Noise

Human Receptors

13.7.1 The 18-hour Annual Average Weekday Traffic (AAWT) flows and HGV percentages used in the noise assessment scenarios are detailed in **Table 13-31**. The percentage change in composition and Total Vehicles is also detailed.

Table 13-31: Operational Phase Road Traffic Flows – 2024 Baseline vs. 2024 Baseline and the Proposed Project Traffic

Link ID	Description	2024 Baseline flows AAWT		2024 Baseline + Development		Overall Change (%)	
		Total Vehicles	Total HGVs	Total Vehicles	Total HGVs	Total Vehicles	Total HGVs
1	Longue Hougue Access Road	1,494	402	1,615	515	8.1	28.1
2	Bulwer Avenue / Les Bas Courtils	1,439	388	1,560	501	8.4	29.2
3	Vale Road / Route Militaire	10,304	1,097	10,412	1,197	1.0	9.1
4	Les Banques leading to St George's Esplanade	12,529	532	12,561	556	0.3	4.5
5	Bulwer Avenue	27,110	1,503	27,194	1,579	0.3	5.0
6	The Bridge / South Quay	9,906	890	9,927	903	0.2	1.5
7	North Quay / Castle Road / La Rue du Chateau (North side)	11,518	576	11,539	589	0.2	2.3

13.7.2 **Table 13-32** shows the calculated change in traffic flow on the road links identified by the transport assessment as carrying operational traffic (see **Chapter 11 Traffic and Transport**) for the year 2024 based on the 18hr Annual Average Weekday Traffic (AAWT) flows and the calculated change in noise levels. Corresponding noise contour isopleths are shown in **Appendix 13.1**, **Figure A13.15** to **Figure A13.16**.

Table 13-32: Calculated Noise Level – 2024 Baseline vs. 2024 Baseline and the Proposed Project Traffic

Link ID	Description	Speed (kph)	2024 Baseline dBA $L_{10,18hr}$	2024 Baseline and the proposed project dBA, $L_{10,18hr}$	Overall Change dBA	Impact Magnitude
1	Longue Hougue Access Road	28.9	63.3	64.3	1.0	Negligible
2	Bulwer Avenue/Les Bas Courtils	47.5	69.4	69.6	0.2	Negligible
3	Vale Road / Route Militaire	35.2	67.7	67.8	0.1	Negligible
4	Les Banques leading to St George's Esplanade	38.5	71.7	71.8	0.1	Negligible
5	Bulwer Avenue	42.8	68.6	68.6	0.0	No Change
6	The Bridge / South Quay	22.9	67.7	67.8	0.1	Negligible
7	North Quay / Castle Road / La Rue du Chateau (North side)	41.0	66.6	66.7	0.1	Negligible

13.7.3 **Table 13-32** shows that predicted impacts from operational traffic are at worst of a negligible impact magnitude at a medium sensitivity receptor resulting in a **minor adverse** significance. Therefore, no additional mitigation is required.

OPERATIONAL IMPACT 13.5: Operational Noise on Sensitive Receptors

13.7.4 The impact assessment has been undertaken using the unmitigated worst-case scenario for the potential operational activities that could be undertaken at the site.

13.7.5 Operations at the site are proposed during daytime hours only, between 08:00 to 16:00hrs. A detailed SoundPLAN noise model was created to assess noise levels as a result of the proposed activity. Ground absorption was incorporated into the SoundPLAN model using a coefficient of 0.6 to represent the mixed hard and soft ground between the sound sources and receiver for the topographical data.

13.7.6 It has been determined by the project team that infilling in the designated area will commence from the most eastern point to the north-west. The model shows infilling occurring at the nearest location to MP1 to assess the worst-case scenario; which will occur towards the end of the Project's lifespan. During this operational period, it is envisaged that the site compound will be relocated to the eastern section of the infilled area.

13.7.7 The design team has predicted the highest hourly vehicle flows of 32 HGVs and 111 cars and vans during the 2024 scenario year of the Project. These on-site traffic flows are included within the operational noise model.

13.7.8 For clarity the operational phase assumptions are detailed in **Table 13-33**.

Table 13-33: Operational Activity – Proposed Project

Location	Name	No.	Source type	BS5228 Reference	L_{Aeq} (dB) at 10m	On time correction (%)/period
Site Compound (labelled as Infrastructure)	Mobile Screening Plant	1	Point	C10.15	81	25%/hr
	Mobile Crusher Plant	1	Point	C8.1	80	25%/hr
	CAT 953C Tracked Loader	1	Point	Manufacturers data	LwA 109dB	10%/hr
	CAT 953D	1	Point	Manufacturers data	LwA 109dB	10%/hr
	Volvo 21t Excavator	1	Point	Manufacturers data	LwA 102dB	10%/hr
	4x4 vehicle	1	Point	SoundPLAN library	80	10%/hr
	Car doors Slamming	n/a	Point	SoundPLAN library	LwA 98.1 maximum level	5%/hr
	Skip Wagon/HGVs	6	Line	C8.21	78	See below
	Cars/Vans	6	Line	SoundPLAN library	47dB/m2	See below

Location	Name	No.	Source type	BS5228 Reference	L_{Aeq} (dB) at 10m	On time correction (%)/period
Infill Zone	CAT 953C/953D Tracked Loader	1	Line	Manufacturers data	LwA 109dB	17%/hr
	Skip Wagon/HGVs	6	Line	Manufacturers data	78	See below
	Skip Wagon/HGVs Tipping	6	Point	C2.32	74	See below
Assumptions: HGVs/Cars/Vans: Moving Line Source at 24.1km/h from entrance to site compound, 12 movements/hr (2-way). Skip Wagon/HGV: Moving Line Source at 16.1km/h from Site compound to Infill Zone, 12 movements/hr (2-way). Skip Wagon/HGV Tipping: Assumed 5s tipping time per vehicle, 6 vehicles/hr. CAT 953C/953D Tracked Loader: Moving line source at 8 km/h distributing tipped material, assumed on-time of 10 mins/hr.						

13.7.9 Calculated operational noise levels have been determined at GF – Ground Floor (Daytime) levels and compared with the background noise levels at each receptor, which have been derived from the measured baseline noise data detailed in **Section 13.3**.

13.7.10 **Table 13-34** details the predicted unmitigated noise levels at ground floor level from modelling Scenario 1 only. A +3dBA acoustic correction for impulsivity and a +3dBA acoustic character correction for intermittency was added to receptor MP1 and MP3, in accordance with BS 4242:2014+A1:2019, due to the plant likely to be stop/start in operation and the potential of impact noise or clattering forks being audible. A noise contour isopleth is detailed on **Appendix 13.1**, **Figure A13.17**.

13.7.11 **Table 13-34** shows the rating level for operational phase impacts at MP2 to MP4 are below the existing background noise level. In accordance with BS4142:2014+A1:2019 the lower the rating level relative to the measured background sound level the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

Table 13-34: Operational Noise – Predicted Impacts

Receptor Identifier	Predicted Specific Noise (dBA)	Predicted Rating Level (dBA)	Background Noise Level (dBA)	Difference (Rating Level – Background) dBA	Unmitigated Worst-Case Impact Magnitude	Unmitigated Worst-Case Impact Significance
MP1	40.3	46.3	43.0	+3.3	Low Impact	Minor
MP2	26.9	26.9	49.3	-22.4	No Impact	Negligible
MP3	33.4	39.4	51.2	-11.8	No Impact	Negligible
MP4	28.6	28.6	48.8	-20.2	No Impact	Negligible

13.7.12 A **minor** impact (based on the matrix detailed in **Table 13-26**) is predicted at MP1 due to +3.3dBA exceedance of the rating level over the background noise level. Mitigation measures are considered to minimise the operational phase impacts at the closest sensitive receptor MP1.

Mitigation

13.7.13 A temporary, demountable 1.8m barrier, screening noise associated with the infill tipping from the receptors to the north, was included as a potential mitigation measure in the SoundPLAN when infill tipping activities are occurring at the nearest locations (within 100m) to receptor MP1. Due to operational constraints, it is recommended that the barrier is positioned closer to the infill tipping area rather than along the boundary of receptor MP1 with the location progressing with the infill works.

13.7.14 **Table 13-35** details the predicted mitigated noise levels. The acoustic character correction for impulsivity and intermittency are included at receptors MP1 and MP3 due to the potential of impact noise or clattering forks having the potential to be audible. A noise contour isopleth is detailed on **Appendix 13.1**, **Figure A13.18**.

Table 13-35: Operational Noise – Predicted Impacts with Mitigation

Receptor Identifier	Predicted Specific Noise (dBA)	Predicted Rating Level (dBA)	Background Noise Level (dBA)	Difference (Rating Level – Background) dBA	Mitigated Worst-Case Impact Magnitude	Mitigated Worst-Case Impact Significance
MP1	39.2	45.2	43.0	+2.2	Negligible	Negligible
MP2	26.9	26.9	49.3	-22.4	No Impact	Negligible
MP3	32.8	38.8	51.2	-12.4	No Impact	Negligible
MP4	28.5	28.5	48.8	-20.3	No Impact	Negligible

13.7.15 **Table 13-35** shows the rating level for operational phase impacts at MP2 to MP4 are below the existing background noise level. In accordance with BS4142:2014+A1:2019 the lower the rating level relative to the measured background sound level the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

13.7.16 Negligible impact (based on the matrix detailed in **Table 13-26**) is predicted at MP1 due to +2.2dBA exceedance of the rating level over the background noise level when infill operations are at the closet point to the receptor.

13.7.17 Consideration also needs to be given to the cumulative sound level outside in free-field conditions at the closest façade or amenity space of the receptor.

13.7.18 The difference between the operational rating noise level at MP1, 45.2dBA, to the prevailing residual sound level at the receptor, 46.6dBA, is under 1dBA. Logarithmically adding the rating level to the measured residual sound level gives an increase in ambient noise level of 2.4dBA; with a cumulative level of 49.0dBA.

13.7.19 The windows, and any purge ventilation (i.e. trickle ventilators) are normally the weakest part of a brick and block façade and building envelope. BS8233:2014 states that "*If partially open windows were relied upon for background ventilation, the insulation would be reduced to approximately 15dB*".

13.7.20 An outside daytime noise level of 49.0dB L_{Aeq} would achieve the internal recommended daytime resting criteria (35dBA) stated for habitable rooms. This is determined on the basis that a partially open window will attenuate the outside noise level by 15dBA.

13.7.21 Furthermore, the operational activity at site may be considered as similar in character to the existing acoustic environment audible at MP1 and will have little impact on residents using their external amenity space during the daytime.

Residual Impact

13.7.22 For all receptors the residual impacts from the operational phase of the Project are considered to be **not significant** with the implementation of the above mitigation measures during the daytime reference periods.

Monitoring

13.7.23 When infilling activities take place closer than 100m from the receptor MP1, regular noise monitoring should be undertaken to ascertain the noise emitted from the site and expected noise levels (through attenuation calculations) at the receptor to ensure the demountable barrier is being used correctly.

13.8 Cumulative Impacts

13.8.1 The cumulative impact assessment (CIA) for noise and vibration was undertaken in two stages. The first stage was to consider the potential for the impacts assessed as part of the projects to lead to cumulative impacts in conjunction with other projects. The first stage of the assessment is detailed in **Table 13-36**.

13.8.2 The second stage of the CIA is to evaluate the projects considered for the CIA to determine whether a cumulative impact is likely to arise. The full list of considered projects and their anticipated potential for cumulative impacts are detailed in **Chapter 5**, **Section 5.3**.

13.8.3 Traffic associated with future residential / commercial developments in the study area was included in the predicted future traffic growth, which was incorporated into the future baseline traffic flows used in the noise assessment. A cumulative assessment has therefore already been carried out with regard to road traffic. As noise impacts at receptors were considered to be not significant, there are also no significant cumulative impacts.

Table 13-36: Potential Cumulative Impacts

Impact		Potential for cumulative impact	Rationale
Construction			
1	Construction Phase road traffic.	Yes	There is potential for impacts associated with noise and vibration generated during the construction phase site works to lead to a cumulative impact with other proposed developments (already consented and those in the planning system) where the construction phases of other schemes overlap with the proposed Project and where activities will occur in proximity to the same receptors. There is a potential for a cumulative impact associated with construction phase road traffic to occur during the Project construction in conjunction with other proposed schemes. Further details are contained within **Chapter 11 Traffic and Transport**.
Operation			
2	Operational phase road traffic	Yes	Where the operational phase of the project overlaps with other projects, there is the potential for cumulative impacts associated with project-generated traffic noise on the local road networks.
3	Operational phase noise	Yes	There is a potential for a cumulative impact associated with operational phase to occur during operation of the Longue Hougue South in conjunction with other operational noise sources within the vicinity. Implementation of appropriate mitigation within the detailed design should ensure that any impacts will be of negligible significance.

13.8.4 Projects which may give rise to cumulative construction and operational phase noise impacts were therefore considered. Of all the projects considered in the CIA, only one is located within close proximity of the Project, as detailed in **Table 13-37**.

Table 13-37: Summary of Projects Considered for the CIA in Relation to Noise

Description	Planning code (ID)	Distance from the Project (m)	Rationale
Infill existing temporary opening formed in existing breakwater as part of works for St. Sampson marina project	FULL/2018/0218 (B003540000)	87	As this project is within 700m of the Project site, there is potential for cumulative construction noise and operational noise impacts.

CUMULATIVE IMPACT 13.6: Cumulative Impacts during Construction and Operation

13.8.5 As the project listed in **Table 13-37** is within close proximity of Longue Hougue South, there is the potential for cumulative impacts from construction and operational phase noise, if the construction or operational phases of the projects overlapped.

13.8.6 However, the Mont Crevelt Breakwater project will employ best practice mitigation methods to minimise noise to the extent that impacts would be not significant. Significant cumulative impacts are therefore highly unlikely.

13.8.7 Therefore, cumulative impacts during construction are considered to be **not significant**.

Mitigation

13.8.8 No mitigation measures are proposed as cumulative impacts during construction and operation were considered to be **not significant**.

Residual Impact

13.8.9 Cumulative impacts during construction and operation are considered to be **not significant**.

13.9 Summary

13.9.1 The assessment concluded that construction phase noise and vibration impacts were **not significant** at existing human receptors during the daytime and evening reference periods. During the night time there is the potential for **minor adverse** impacts at receptor MP1 and MP2; however, with the inclusion of BPM, the residual impact is **negligible**.

13.9.2 Operational phase impacts were predicted to be **minor adverse** at MP1 during the daytime reference period. Mitigation measures included the implementation of a 1.8m moveable barrier near to infill tipping areas to reduce noise impacts at receptor MP1. Residual impacts were predicted to be **negligible** and therefore **not significant**.

13.9.3 A summary of the impact assessment is provided in **Table 13-38**.

Table 13-38: Summary of Noise and Vibration Impacts

Impact	Significance	Mitigation	Residual Impact
Construction			
Construction phase noise	Negligible to Minor Adverse	Best practice measures (BPM)	Negligible
Construction phase road traffic noise	Minor Adverse	Not required	Minor Adverse
Construction phase vibration	Minor adverse	Not required	Minor Adverse
Operation			
Operational phase road traffic noise	Minor Adverse	Not required	Minor Adverse
Operational phase noise	Negligible to Minor adverse	1.8m barrier moveable barrier to screen infill tipping works from receptor MP1.	Negligible
Cumulative			
Cumulative impacts	Not significant	Not required	Not significant

14 Population and Human Health

14.1 Content and Data

Content

14.1.1 This section of the ES describes the baseline conditions and potential impacts to residents, landowners, and recreational activities (including socio-economic impacts) of the proposed scheme, both during the construction and operation phases of the scheme. Where the potential for impacts are described and assessed, mitigation measures are identified, and residual impacts assessed.

14.1.2 The impacts identified during the scoping stage are outlined in **Table 14-1**.

Table 14-1: Impacts Identified in the Draft Informal Scoping Opinion

Potential impacts	Scoped in?	
	Construction	Operation
Impact of increased industrialisation	Yes	No
Impact on recreational resources	Yes	Yes
Impact on community assets	Yes	Yes
Impact on human health	Yes	Yes
Positive impact on key infrastructure	No	No

Study Area

14.1.3 As described in the Informal Scoping Opinion, impacts will be considered on sensitive receptors within 1km.

Data Sources

14.1.4 The studies carried out in some other topic-specific Chapters have been used in this assessment to inform the likelihood of effects on people. This assessment has been informed by **Chapter 11 Traffic and Transport**, **Chapter 12 Air Quality**, **Chapter 13 Noise and Vibration**, **Chapter 16 Landscape Character** and **Visual Amenity**, and **Chapter 20 Natural Capital** to understand how these potential effects may translate to economic, community and health effects.

14.1.5 The data sources used are described in **Table 14-2**.

Table 14-2: Data Sources

Title	Source
Guernsey Facts and Figures 2018	States of Guernsey (2018c)
Local Market Housing Review and Development of Future Housing Strategy. P.2018/61	States of Guernsey Committee for the Environment & Infrastructure (2018)
2016 Travel Survey. Research Report on Q4 2016. January 20th, 2017	States of Guernsey Commerce & Employment Department (2017)
Great Things Happen in Guernsey: 2017 Preview	Visit Guernsey (2017)
115th Annual MOH Report for the year 2013/14	Bridgman (2015)
Guernsey Quarterly Population, Employment and Earnings Bulletin	States of Guernsey (2019a)
Guernsey Annual GVA and GDP Bulletin	States of Guernsey (2019b)
Supplementary Data (Population At September 2018, Employment At March 2019)	States of Guernsey (2019c)
Guernsey Indicators of Poverty Report	States of Guernsey (2018b)
2018 Travel Survey Q4 – Media Release	Guernsey Trade Media (2019)
The Survey of Guernsey Living Standards Report on Phase Two: Poverty and Standard of Living in Guernsey	Gordon et al. (2002)

14.2 Legislation and Policy Context

14.2.1 The following States of Guernsey legislation and policy were relevant to the assessment:

- The Land Planning and Development (Guernsey) Law, 2005;
- The Land Planning and Development (Environmental Impact Assessment) Ordinance, 2007;
- Loi relative à la Santé Publique, 1934;
- The Public Health Ordinance, 1936 (as amended);
- Harbours Ordinance, 1988 (as amended);
- Merchant Shipping (Bailiwick of Guernsey) Law, 2002;
- Merchant Shipping (Bailiwick of Guernsey) Law 2002 (Commencement) Ordinance, 2013;

- Security of Ships and Port Facilities (Guernsey) Ordinance, 2004;
- Prevention of Pollution (Guernsey) Law, 1989;
- The Future Guernsey Plan, 2019;
- The Island Development Plan, 2016; and
- Environmental Pollution (Guernsey) Law, 2004.

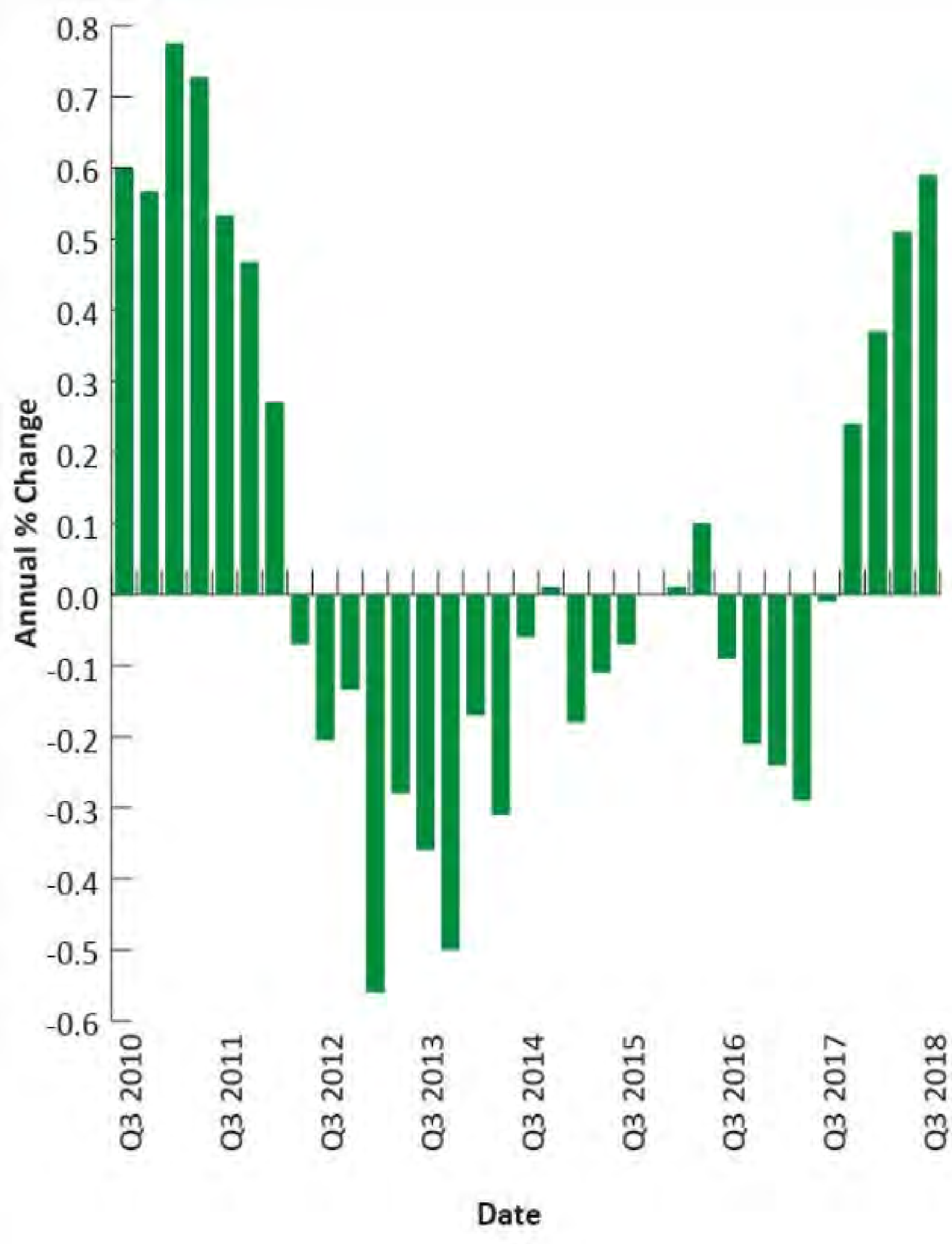
14.2.2 Relevant UK best practice guidance was followed including the following:

- Department of the Environment (DoE) (1989) Environmental Assessment: A Guide to the Procedures, London: HMSO. Early guidance from UK Government suggested that “certain aspects of a project including numbers employed and where they will come from should be considered within an environmental statement”.
- Office of the Deputy Prime Minister (ODPM) (2004) Creating, Using and Updating a Neighbourhood Baseline, London: HMSO.
- Department for Communities and Local Government (DCLG) (2006) Environmental Impact Assessment: A Guide to Good Practice and Procedures, A Consultation Paper, London: DCLG.
- National Planning Policy Framework (Ministry of Housing) (2019)– This is a strategic document that sets out the principles for planning making and decision making for local authorities. It does not contain any specific policies; however, there is a presumption in favour of sustainable development.

14.3 Baseline Environment

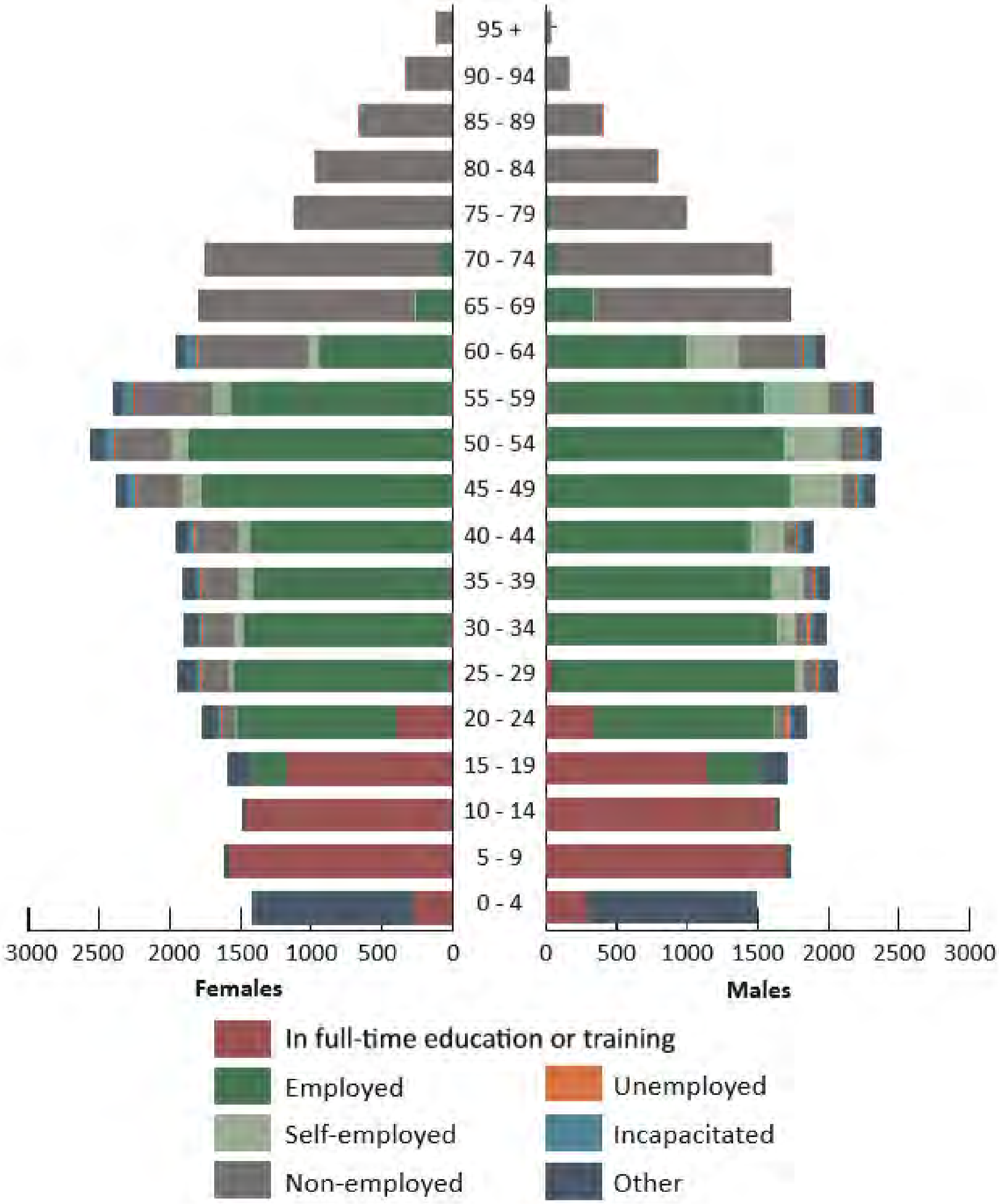
14.3.1 Guernsey had a population of 62,754 people in the third quarter of 2018 (States of Guernsey (2019)). The population rose by about 5% in the ten years to 2011 but has been relatively static since 2012 with fluctuations less than ±1%. In the four years to 2016, natural population increase on the Island was approximately 96 people per annum (0.15%), whilst net migration was approximately 44 people per annum (0.07%), although fluctuating between positive and negative migration rates year on year (**Figure 14-1**). Between 2016 and 2018, the population declined by 121 people. Seasonal migration accounts for most annual population changes, with migration positive during the Q1 and Q2 and negative during Q3 and Q4 in the years between 2013 and 2017. The Island's population is ageing, with the peak age brackets on the island being 40-49 and 50-59. The population structure of Guernsey is shown in **Figure 14-2**. The overall life expectancy is 82.3 years; 82.0 for men and 84.4 for women (States of Guernsey, 2018a; States of Guernsey, 2019)).

Figure 14-1 Guernsey Population Change 2010-2019 (States of Guernsey, 2019)



14.3.2 In September 2018, 81.7% of the working population (16-64 years old) were employed, self-employed or in full time education. Of the 65 to 74-year olds 11.1% (762 people) were in employment (States of Guernsey, 2019a).

Figure 14-2 Population Structure of Guernsey (30th September 2018)



14.3.3 As of March 2019, 31,230 people were in employment, and the unemployment rate of the Island was 2.7%. The unemployment rate saw an overall increase from 2.3% in Q4 2018.

14.3.4 Construction (a key sector for inert waste generation) is the sixth largest employer on the Island; in March 2019 it employed 2,785 people (States of Guernsey, 2019c). The proportion of the working population employed by different sectors is shown in **Table 14-3**.

Table 14-3: Percentage Employed by Sector as of March 2019 (States of Guernsey, 2019c)

Sector	%
Finance	19.6
Public administration	17.2
Wholesale, retail and repairs	12.1
Professional, business, scientific and technical activities	8.8
Construction	8.6
Human health, social and charitable work activities	6.2
Hostelry	5.9
Administrative and support service activities	5.3
Transport and storage	3.5
Information and communication	2.5
Manufacturing	2.1
Education	2.0
Other service activities	1.5
Agriculture, Horticulture, Fishing and Quarrying	1.3
Arts, entertainment and recreation	1.1
Electricity, gas, steam and air conditioning supply	0.9
Real estate activities	0.8
Water supply, sewerage, waste management and remediation activities	0.4
Activities of households as employers; undifferentiated goods and services producing activities of households for own use	0.2
Other	0.0

14.3.5 As of 2018 Guernsey's economy is largely based on the finance sector, with 41% of the Island's Gross Value Added (GVA) coming from this sector (States of Guernsey, 2019b). Professional, business, scientific and technical activities, public administration and trading bodies, households, wholesale, retail and repairs together account for 44% of the Island's GVA, with other industries contributing a smaller amount (States of Guernsey, 2019b). Median earnings in March 2019 were £33,530, 1.7% higher than March 2018 (States of Guernsey, 2019a).

14.3.6 In 2018, Guernsey's total GDP was estimated to be £3,272 million (States of Guernsey, 2019b). GDP Per capita is in 2019 was 65% higher than the UK, at £52,531.

Indicators of Poverty

14.3.7 The States of Guernsey publish an annual report which uses a multi-dimensional index to assess the level of potential social and economic deprivation in Guernsey. The results of the most recent report are presented in **Table 14-4**.

Table 14-4: Indicators of Poverty for 2017 unless another year is stated in brackets (States of Guernsey, 2018b)

Domain	Description	2017 Results	Index figure for domain (based on indicators having equal weighting)
Income	The proportion of the population whose household income is less than 60% of the median.	22.7% (2016)	97.9 (2016)
	Proportion of population who both have a household income of less than 60% of the median and are not in receipt of income support.	16.3% (2016)	
Employment	The proportion of the working age population receiving incapacity, severe disability or unemployment benefits, or carer's allowance.	3.3%	93.2

Domain	Description	2017 Results	Index figure for domain (based on indicators having equal weighting)
Health	Years of potential life lost per 10,000 population.	314 (2015)	106.4 (estimated)
	Proportion of population receiving invalidity or severe disability benefits	2.31%	
	Number of emergency admissions lasting at least 24 hours per capita.	0.046	
	Excess winter mortality (five year average per 10,000 population).	3.07 (2015)	
	Comparison of number of doctor and nurse appointments for those in receipt of Supplementary Benefit compared with those not in receipt of the Benefit.	1.44	
Education	Those not achieving level 4 or higher at key stage 2.	15.5%	92.6
	Those not achieving 5A* to G GCSEs or equivalent at key stage 4.	8.4%	
	Secondary school absence rate.	6.3%	
	Proportion of 16 years olds not in education, employment or training.	2.1%	
	Proportion of 18 to 20-year olds not in education or employment.	13.6%	
	Number of approved applications for uniform grants as percentage of total school children.	11.4%	
Crime	Violent crime per 10,000 population.	62	77.3
	Burglary per 10,000 population.	11	
	Theft per 10,000 population.	55	
	Criminal damage per 10,000 population.	64	

Domain	Description	2017 Results	Index figure for domain (based on indicators having equal weighting)
Housing	Household overcrowding as percentage of households (data held for approximately 92% of properties).	9.7%	93.3 (estimated)
	Affordability: annual rent to earnings ratio.	0.47	
	Affordability: purchase price to earnings ratio.	13.1	
	Affordability: percentage of population in affordable housing (rented from the States or GHA).	9.7%	
	Affordability: percentage of households receiving assistance with social housing rent payments.	7.4% (2016)	
	Number of housing complaints per 1,000 houses.	2.6	
Environment	Outdoor pollutant level, µg/m3 - nitrogen dioxide (three year average).	13.6	85.0
	Outdoor pollutant level, µg/m3 - sulphur dioxide (three year average).	1.7	
	Road traffic accident injuries (three year average).	13	
	Bathing water quality rating.	3117	

14.3.8 The population is concentrated on the north and east of the Island, with highest population density parishes being St. Peter Port, Vale, and St. Sampson. 12.1% of Guernsey's total land area was 'developed' (i.e. used for buildings or infrastructure) in 2018. On average, there has been a net increase of 137 dwellings per year from 2012-2017, which meets the States' 2017 target of achieving 127 new dwellings per year (States of Guernsey Committee for the Environment & Infrastructure, 2018;

[17] *Bathing water quality rating is determined using by assigning a 'score' to the 13 bathing water quality ratings across the island. A reverse sliding scale is used where a classification of "Excellent" is given 1 point and "Poor" is given 4 points.*

States of Guernsey, 2018c). Only 4% of new dwellings built over this period have been built on greenfield land. Of the 26,993 properties on the Island (as of December 2017), in the local market 60% are owner-occupied while 28% are rented and 10% are social housing.

14.3.9 The spatial policy within the Island Development Plan (IDP) divides the island into a hierarchical structure of Main Centres, Main Centre Outer Areas and Local Centres. The IDP identifies 15 new housing sites allocations on the Island, all located within existing Main Centres at St. Peter Port, St. Sampson, Vale, and St. Martin. The location of these new housing sites is summarised in **Table 14-5**. Since the IDP was published, some of these sites have been developed.

Table 14-5: Sites Allocated as Housing Sites in the 2016 IDP

Site	Location of site
Bougourd Ford	St. Peter Port
Education offices	
Former Priaulx Garage	
King's Club	
La Vrangue	
Maurepas Road	
Les Petites Fontaines	
Warry's Bakery	
Belgrave Vinery	St. Sampson
Franc Fief	
Les Bas Courtils	
Pointues Rocques	
Saltpans	
Braye Lodge	St. Martin
Cleveleys Vinery	Vale

14.3.10 The land in the vicinity of the proposed development is largely industrial, with the current Longue Hougue Reclamation Site, Waste Transfer Station (WTS) and a Household Waste Recycling Centre (HWRC) bordering the site. Behind the site there is a wider industrial estate including several fuel storage sites and an abattoir.

14.3.11 The proposed project site is located on the boundary between residential open land uses and industrial land use. There are three residential properties that are directly adjacent to the site, including one of which overlooks Belle Grève Bay. The closest road is Bulwer Avenue, 100 metres north of the landward edge of the proposed development.

14.3.12 Behind Bulwer Avenue on the western side of the bay there is a residential area with approximately 50 houses. This residential area sits between a business park to the west and the Longue Hougue industrial estate to the east.

14.3.13 Grandes Maisons Road, which encloses these properties to the north also hosts approximately 60 residential properties, most of which border Delancey Park. To the north-east of Delancey Park, behind Grandes Maisons road there is a residential estate with approximately 120 properties.

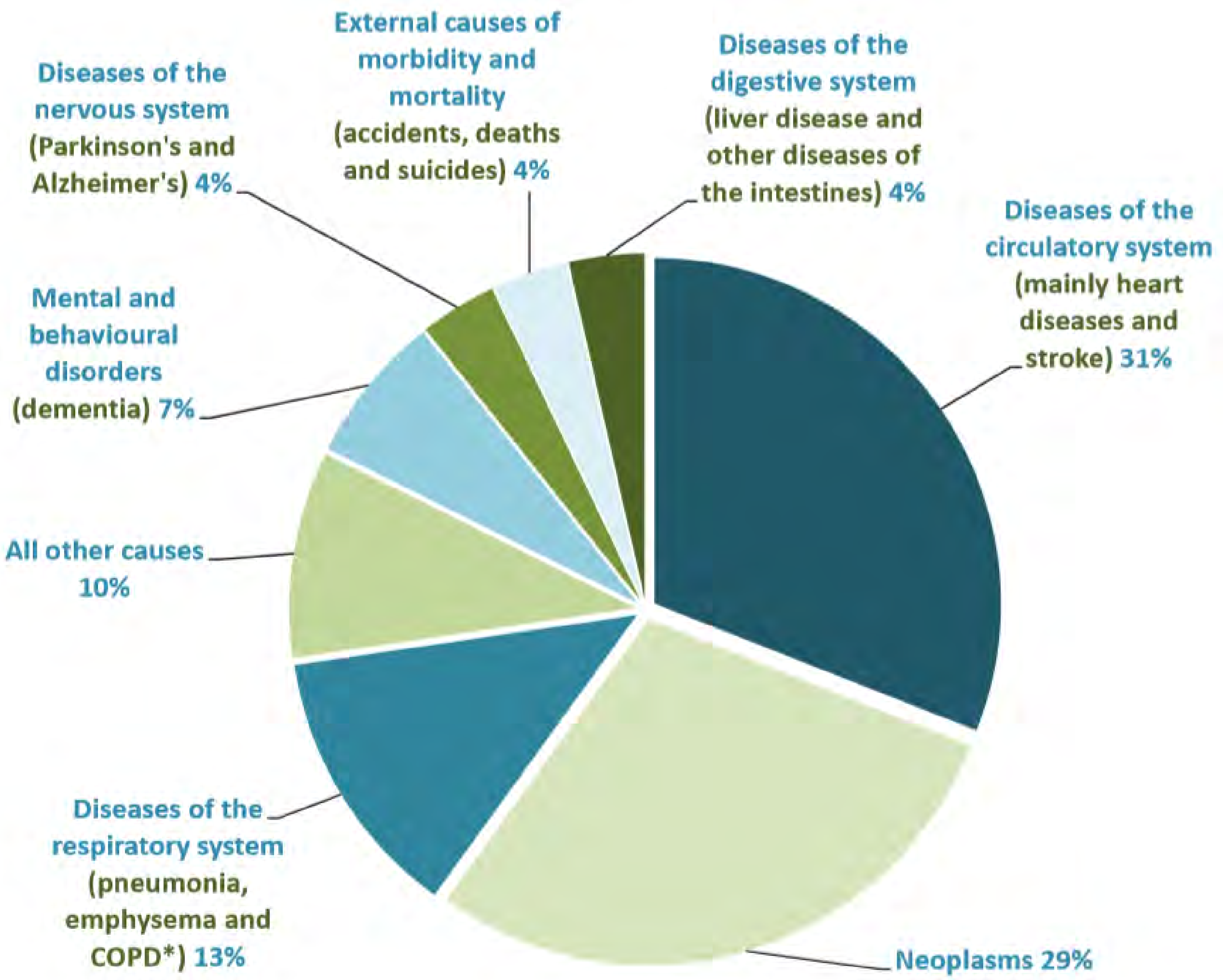
Human Health

14.3.14 Guernsey's Public Health Service collects and publishes data relating to the health of Guernsey people, including Health Profiles, data from population surveys and reports by the Medical Officer of Health. The Medical Officer of Health on Guernsey carries out annual reports and Lifestyle Surveys of Guernsey's population. The most recent publicly available report is for the years 2013 to 2014. The States of Guernsey also publish a Health Profile for Guernsey and Alderney every three years. The latest available health profile is from 2013 to 2015.

14.3.15 The life expectancy on Guernsey increased between 1994 and 2014, becoming one of the highest in the world (Bridgman, 2015). The life expectancy is 84.4 for women and 82.0 for men (States of Guernsey (2019). The fertility rate in 2015 was 1.6, which at the time of publication was one of the lowest in the world (States of Guernsey, 2016).

14.3.16 Between 2013 and 2015, 1643 deaths were recorded in Guernsey and Alderney, an average of 548 per year (States of Guernsey, 2016). The leading causes of death are shown on **Figure 14-3**. Infant and prenatal deaths between 2013 and 2015 were lower than those in England, Wales and Jersey. Malignant melanoma rates are higher in Guernsey than England, and an average of 33 people are diagnosed each year and an age-standardised rate (ASR) of 69 per 100,000 (Public Health England, 2017). Under 18 pregnancy rates, which are associated with an increased risk of poverty in parents and children, are similar between the UK and Guernsey. There were 51 under-18 conceptions in Guernsey and Alderney between 2013 and 2015; an average of 17 per year (States of Guernsey, 2016).

Figure 14-3 Causes of Death in Guernsey (Bridgman, 2015)



14.3.17 The Guernsey and Alderney Wellbeing Survey, 2018 provides an insight into the habits and health of the people aged 16 and over living across the two islands (Island Global Research and States of Guernsey (forthcoming)). The survey revealed that smoking levels have stabilised at 13%. Younger islanders and those who consume alcohol at levels of risk, or high risk are proportionately more likely to smoke.

14.3.18 An estimated 22% of over-16s are classed as having 'risky' drinking behaviour. A further 5% are 'high risk'. Risky and high risk drinking behaviour is more prevalent among males and younger adults.

14.3.19 Fifty-six per cent of people are overweight or obese. An estimated fifty per cent eat five or more portions of fruit and vegetables per day. Thirty-nine per cent report doing physical activity on five or more days per week. Eighteen per cent of people have low mental wellbeing (rising to 34% among 16–24 year-olds; and 45% among those who live in affordable housing) (Island Global Research and States of Guernsey (forthcoming).

14.3.20 Of those that completed the Guernsey Healthy Lifestyle Survey in 2013, 15% were classified as having 'High' wellbeing, 71% were 'Moderate' and 14% were 'Low' (States of Guernsey, 2016). 'Low' wellbeing was more common in households with incomes of less than £20,000 per year, and in States Housing Department or Guernsey Housing Association rental properties (States of Guernsey, 2016).

Tourism and Recreation

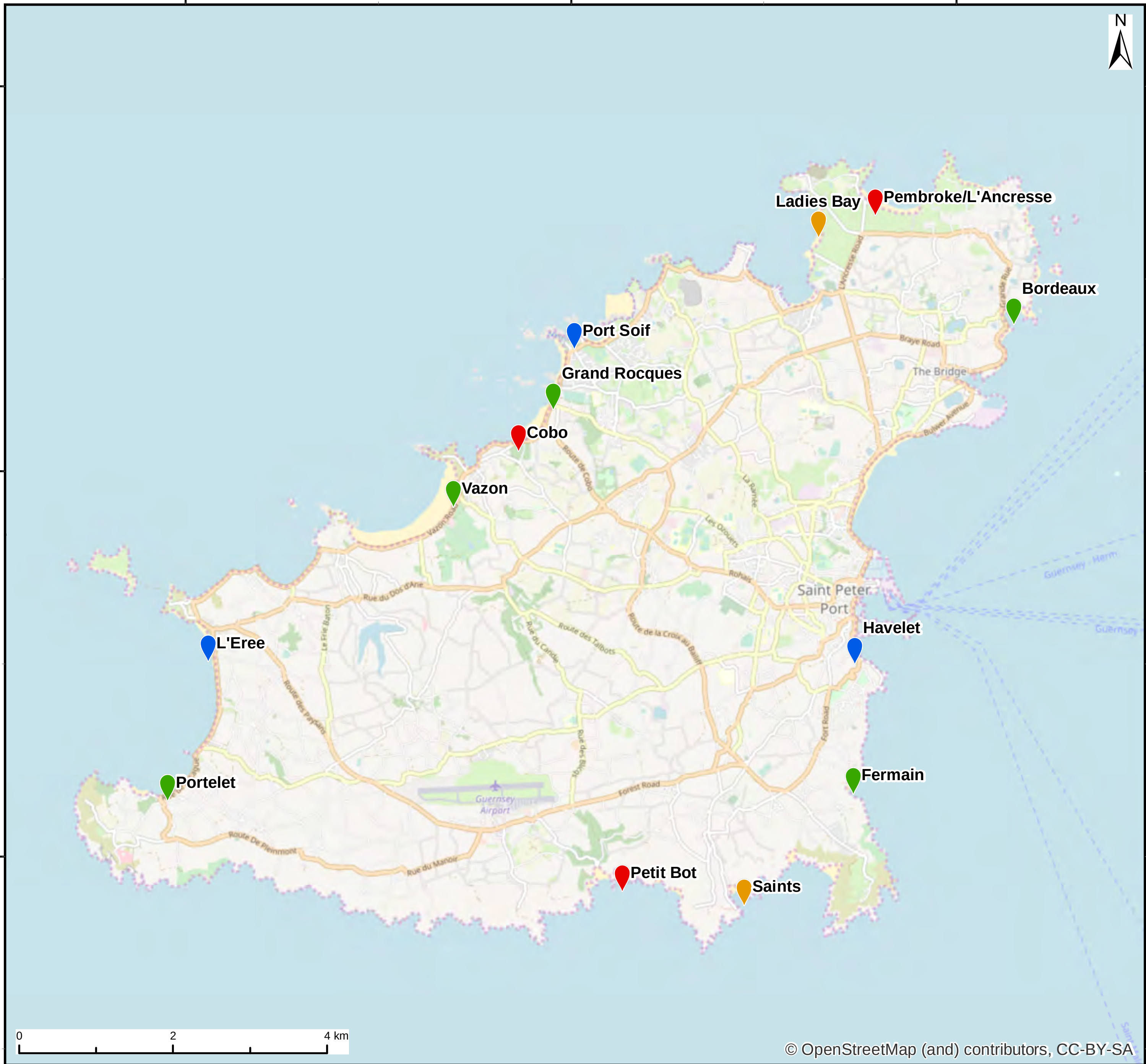
14.3.21 Guernsey accommodated 420,140 visitors during 2018 including cruise passengers and visiting yachtsmen (Guernsey Trade Media, 2019). In 2017, 64.9% of visitors surveyed in Guernsey were visiting for leisure, 19.5% were visiting friends or family and 15.7% were visiting for business (States of Guernsey, 2018c). The majority of visitors were from the UK (71.2%).

14.3.22 The three main tourist activities on Guernsey are experiencing the island's natural beauty, walking, and visiting the island's beaches (Visit Guernsey, 2017). The Island's beaches can be seen on **Figure 14-4**, these are where bathing water quality is sampled and they are considered to be important bathing areas. Beaches where poor water quality are noted are affected by surface water run-off from farmland. Popular recreational activities around the coast include water sports such as sea kayaking and sailing and sea angling. The Island's Cliff Path walking routes are located along the coast of the Island and coastal paths continue largely unbroken around the entire Island.

14.3.23 Four hundred metres to the north-west of the site is Delancey Park, which includes a playground that overlooks Belle Grève Bay. There is a footpath along the coast at the boundary of the proposed development which runs along the edge of Belle Grève Bay from the existing Longue Hougue inert waste facility site to Spur Point. There is a car parking area to the south-west of the bay.

Community Assets

14.3.24 The community assets within the study area are shown on **Figure 14-5** and are listed in **Table 14-6**. The majority of the assets are centred on the main high shopping area in St Sampson known as The Bridge, which includes shops, pubs, restaurants and a sports centre. The closest assets are a shop on Longue Hougue Lane and car parking on Bulwer Avenue.



Legend:

Bathing Water Classification (2014-2017 four-year rolling average)

- Excellent
- Good
- Sufficient
- Poor

Guernsey Government, 2018
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Client:	Project:
States of Guernsey	Longue Hougue South Environmental Statement

Title: Guernsey Main Beach Locations

Figure: 14.4 Drawing No: PB5312-200-010

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	05/11/2018	GC	PT	A4	1:75,000

Co-ordinate system: WGS 1984 UTM Zone 30N

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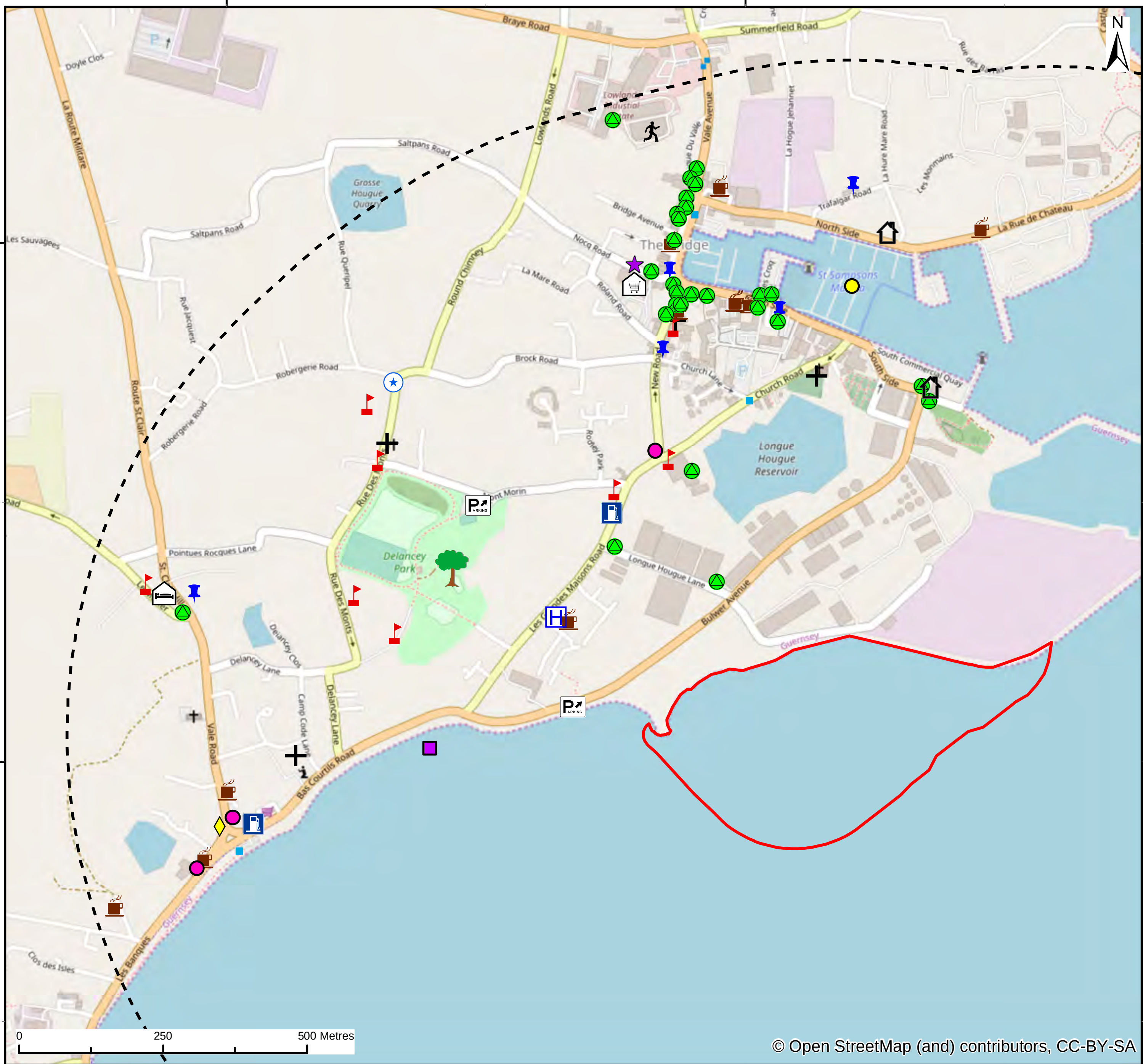

Legend:

- Outline of Proposed Development
- Outline of Proposed Development 1km Buffer

Community Assets

- Barber / Hairdresser
- Bed and Breakfast
- Car Park
- Church
- Community Centre
- Dentist
- Education
- Fuel Station
- Leisure
- Marina
- Medical Centre
- Park
- Pub
- Resturant / Takeaway
- Shop
- Sports Club
- Theatre
- Vet
- Bus Stop
- Supermarket

Client:	Project:
States of Guernsey	Longue Hougue South EIA

Title: Community Assets

Figure: 14.5 | Drawing No: PB5312-300-036

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	23/10/2019	FC	PT	A4	1:10,000
01	18/09/2019	FC	PT	A4	1:10,000

Co-ordinate system: WGS 1984 UTM Zone 30N

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Table 14-6: Community Assets Within 1km of the Project Boundary

Asset Type	Number	Asset Type	Number
Barber/ Hairdresser	3	Marina	1
Bed and Breakfast	1	Medical Centre	1
Bus Stop	3	Park	1
Car Park	2	Pub	5
Church	4	Restaurant/ Takeaway	11
Community Centre	1	Shop	26
Dentist	1	Sports Club	1
Education	8	Supermarket	1
Fuel Station	2	Theatre	1
Leisure	1	Vets	2

14.4 Do Nothing Scenario

14.4.1 In the absence of the proposed development Guernsey's population is forecast to increase to a maximum of 64,000 people by 2034. Beyond this point the population is projected to fall, declining to 59,000 by 2065 (States of Guernsey, 2019a).

14.5 Methodology for EIA

Population and Human Health Assessment Methodology

14.5.1 This section sets out the methods for the identification and assessment of any likely significant effects of the proposed project on human health.

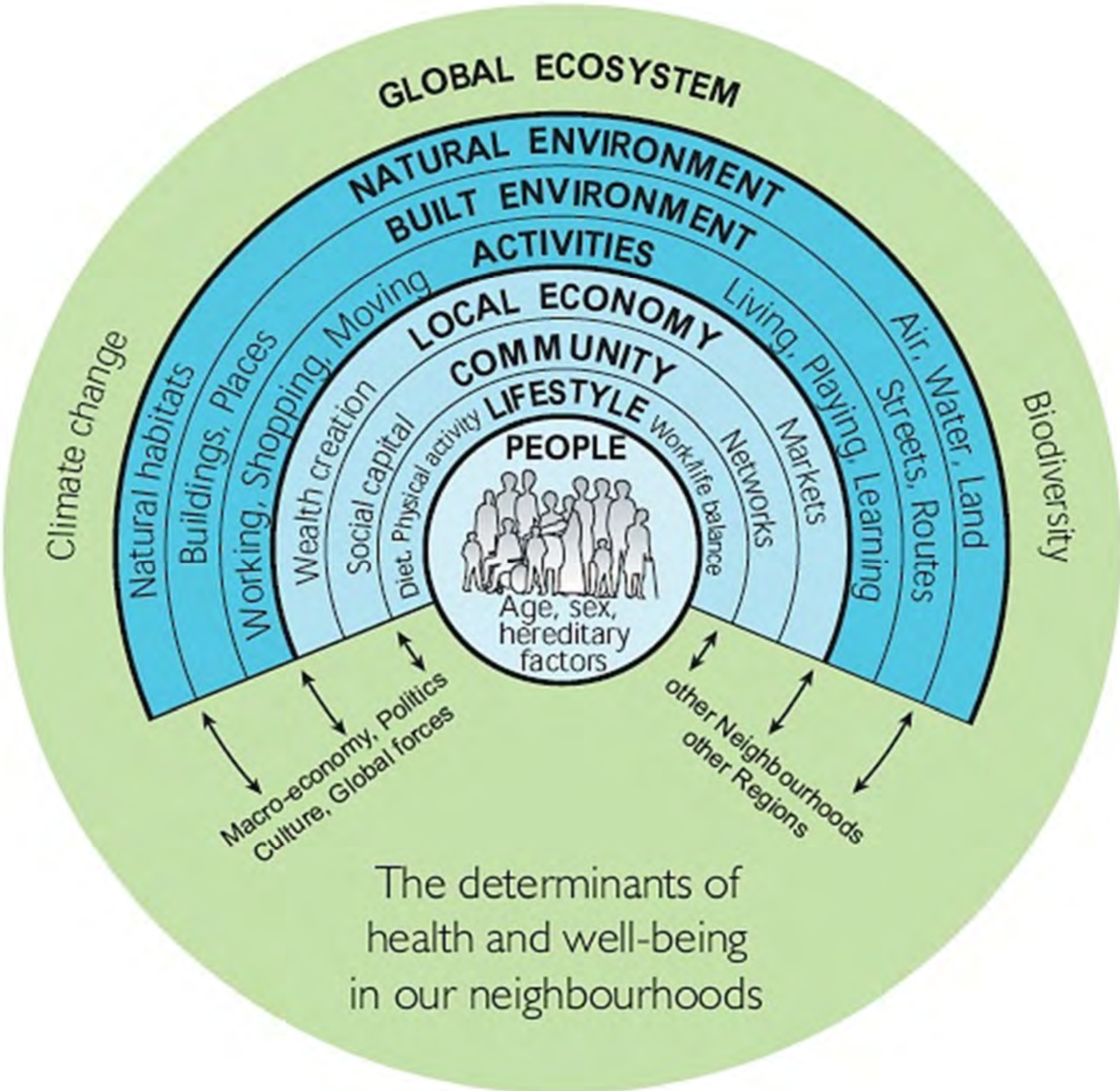
14.5.2 Consistent with the objective of this EIA (as set out in the EU EIA Directive 2014/52/EC) the methods identify effects that provide, or are contrary to providing, a high level of protection to human health. This includes reasoned conclusions in relation to health protection, health improvement and/or improving services.

14.5.3 The methods provide a framework to identify (at both scoping and assessment):

- The ‘likelihood’ of the proposed project having an effect on health; and
- If an effect is likely, whether it may be ‘significant’
- Effects are considered with regards the general population and vulnerable groups. Populations are considered at regional and local levels.

14.5.4 In line with best practice guidance from the World Health Organisation (WHO) (WHO, 2012) and Public Health England (PHE) (PHE, 2017c), "health determinants" (**Figure 14-6**) are considered to understand effects of human health and wellbeing. The methodology uses best practice published by the Institute of Environmental Management and Assessment (IEMA) in line with the 'Health in Environmental Impact Assessment: A Primer for a Proportionate Approach' (Cave *et al*., 2017a).

Figure 14-6 Wider Determinants of Health (Source: Based on the Dahlgren and Whitehead (1991) diagram as amended by Barton and Grant (2006) and advised by Cave et al. (2017))



Health Determinants

14.5.5 Human health can be influenced by a wide variety of direct and indirect factors, from controllable factors such as lifestyle to uncontrollable factors such as genetics. The influences and effects can be wide-ranging and are likely to vary between individuals. In determining 'physical, mental and social wellbeing', external contributory factors, known as 'determinants', are considered. Determinants are a reflection of a mix of influences from an individual's society and environment.

14.5.6 The 'wider determinants of health' model is used to conceptualise how human health spans environmental, social and economic aspects (as illustrated in **Figure 14-6**).

14.5.7 Influences that result in a change in determinants have the potential to cause beneficial or adverse effects on health, either directly or indirectly. The degree to which these determinants influence health varies, given the degree of personal choice, location, mobility, and exposure.

Likelihood

14.5.8 The first issue considered in this assessment is the likelihood of the proposed project having an effect. A likely effect should be both plausible and probable.

14.5.9 Plausible relates to there being a relevant source, pathway and receptor (see discussion of health pathways below).

14.5.10 Probable relates to a qualitative judgement to exclude those effects that could only occur under certain very rare conditions.

14.5.11 The term 'health pathways' describe how a specific activity of the proposed project could change a determinant of health and potentially result in a change in health outcomes (an effect). Health pathways are considered with regards the source, pathway, and impact as follows:

- A 'source' represents an activity or factor that could affect the health outcomes of a receptor population;
- A 'pathway' describes the method or route by which the 'source' could affect the 'receptor' (either causation or association); and
- A 'receptor' is the recipient of an effect from the 'source', via the 'pathway'.

14.5.12 **Table 14-7** shows how the Source-Pathway-Receptor model can be used to identify plausible health effects. Only plausible health effects are considered within the assessment.

Table 14-7: Use of a Source-Pathway-Receptor Model to Identify Plausible Health Effects

Source	Pathway	Receptor	Plausible health effect?	Rationale
✗	✓	✓	No	There is not a clear source from where a potential health effect could originate.
✓	✗	✓	No	The source of a potential health effect lacks a means of transmission to a population.
✓	✓	✗	No	Receptors that would be sensitive and vulnerable to the health effect are not present.
✓	✓	✓	Yes	Identifying a source, pathway and receptor does not mean an effect is a likely significant effect; the probability of the effect should be qualitatively considered, and a professional judgement reached on the significance of effects that are considered likely.

Significance

14.5.13 The determination of significance has two stages:

- Firstly, the sensitivity of the receptor affected, and the magnitude of the plausible health effect upon it are characterised. This establishes whether there is a relevant population and a relevant change in health outcomes to consider; and
- Secondly, a professional judgement is made as to whether or not the change in a population's health is significant. This judgement is based on the collection and presentation of data to evidence reasoned conclusions.

14.5.14 The final significance is provided based on a comparison of several factors following clear guiding questions, as set out below. This is a variation from the general approach set out in **Chapter 5 EIA Methodology**.

Sensitivity

14.5.15 **Table 14-8** sets out factors characterising sensitivity for human health. The table informs the professional judgement on scoring high, medium, low or negligible sensitivity. In line with best practice, a formulaic matrix approach to determining sensitivity has been avoided. The ‘higher’ and ‘lower’ sensitivity characterisations represent instructive positions on a spectrum that would also include more extreme, as well as intermediate, positions. Most situations have a mix of higher and lower characterising factors, so a balanced expert view of sensitivity is taken.

14.5.16 The assessment characterises the relevant populations for each health issue. For each category, the text sets out detail on the one or more relevant factors from **Table 14-8** that informed the score.

Magnitude

14.5.17 **Table 14-9** sets out factors characterising magnitude for human health. The table informs the professional judgement on assigning scoring of large, medium, small or negligible magnitude. In line with best practice a formulaic matrix approach to determining magnitude has been avoided. The ‘larger’ and ‘smaller’ magnitude characterisations represent instructive positions on a spectrum that would also include more extreme, as well as intermediate, positions.

14.5.18 The assessment characterises the relevant changes in health outcomes for each health issue. For each professional judgement on magnitude, the text sets out detail on the one or more relevant factors from **Table 14-9** that informed the score.

Judgement Framework for Significance

14.5.19 A judgement of significance is made within the context of PHE’s statement that “*significant impacts are unlikely to arise from installations which employ Best Available Techniques and which meet regulatory requirements concerning emission limits and design parameters*.”

14.5.20 Therefore, a formulaic matrix approach to determining significance has been avoided. This is because attempting to categorise significance from negligible to major would require quantitative data to a level of detail that would be disproportionate to the likely impacts. Therefore, impacts are presented as either not significant or significant. If a health outcome is found to be significant then further assessment will be undertaken to understand the magnitude of significance.

14.5.21 Following the general approach described above, a source - pathway - receptor relationship is established followed by a consideration of magnitude and sensitivity. Finally, a professional judgement is made using a framework for reporting (guide questions set out in **Table 14-10**) on a range of data sources to ensure reasoned and robust conclusions are reached.

Table 14-8: Factors Characterising Population Sensitivity (Cave et al. 2017a)

	Inequalities	Deprivation	Health status	Life stage	Outlook
Higher sensitivity	High levels of inequalities or inequities.	High levels of overall deprivation or a high level of deprivation for a relevant sub-domain of the indices of multiple deprivation. High levels of poor access to financial, social or political resources.	High levels of poor health and/or disability (particularly multiple or complex long-term health conditions). High reliance on (or low capacity in) healthcare facilities, staff or resources.	Presence of dependants (particularly the elderly or children), pregnant women, shift workers or the economically inactive.	Strong views or high degrees of uncertainty led about a development. Population may anticipate risks to their health and thus be affected by not only actual changes, but also by the possibility of change.
Lower sensitivity	Low levels of inequalities or inequities.	Low levels of overall deprivation or a low level of deprivation for a relevant sub-domain of the indices of multiple deprivation. Good access to financial, social or political resources.	Low levels of poor health and/or low levels of disability. Low reliance on (or high capacity in) healthcare facilities, staff or resources.	Predominantly a working age population in steady good quality employment.	No indication that strong views are held about a development. People are well informed of the issues and potential effects.

Table 14-9: Factors Characterising Magnitude (Cave et al. 2017a)

	Severity	Extent	Frequency	Reversibility	Exposure
Larger magnitude	Large change in the risk of developing a new health condition (or injury) or in the progression of an existing condition. Large change in symptoms, quality of life or day-to-day functioning. Large change in inequalities.	Most members of the relevant population affected or vulnerable. Substantial population displacement or influx.	Continuous or daily effects with chronic (long term) changes in health outcomes.	Permanent change in health outcomes once change ceases. Intergenerational effects.	A low (or high) concentration over a long time, or a high concentration over a short time. Low (or high) exposure to a large population or high exposure to a small population. A high degree of resource sharing with the development.
Smaller magnitude	Small change in the risk of developing a new health condition (or injury) or in the progression of an existing condition. Small change in symptoms, quality of life or day-to-day functioning. Small change in inequalities.	Few members of the relevant population. Little change in population.	Monthly or yearly affects with acute (short term) changes in health outcomes.	Change in health outcomes reverses once change ceases. No intergenerational effects.	A low concentration over a short time. Low exposure to a small population. A low degree of resource sharing with the development.

Table 14-10: Human Health Guide Questions for Determining Significance (Cave et al. 2017a)

Evidence sources	Guide questions
Scientific literature	Is there a sufficient strength of evidence from sufficiently high-quality studies to support an association between the proposed project change, a relevant determinant of health and a relevant health outcome? Does the literature indicate thresholds or conditions for effects to occur? Are particular population groups identified as being particularly susceptible?
Baseline conditions	Are relevant sensitivities or inequalities identified in the scientific literature present? Does the baseline indicate that conditions differ from relevant local, regional or national comparators? Are their geographic or population features of the baseline that indicate effects could be amplified?
Health priorities	Have local, regional or national health priorities been set for the relevant determinant of health or health outcome (e.g. in Joint Strategic Needs Assessments or in Health and Wellbeing Strategies)?
Consultation responses	Has a theme of local, regional or national consultation responses related to the relevant determinant of health or health outcome?
Regulatory standards (if appropriate)	Is the change one that would be formally monitored by regulators? Are there regulatory or statutory limit values set for the relevant context? Has EIA modelling predicted change that exceed thresholds from the scientific literature or set by regulators? Are there relevant international advisory guideline limit values (e.g. by the World Health Organisation)?
Policy context	Does local, regional or national government policy raise particular expectations for the relevant proposed project change, determinant of health or health outcome (e.g. levels should be as low as reasonably practicable)? Is there a relevant international policy context (e.g. treaties or conventions)?

14.5.22 The text of the assessment section provides a structured discussion that responds to each of these questions for each health issue. The discussion provides reasoned conclusions for the professional judgement as to whether in EIA terms an issue is significant, or not. Where appropriate, variation expressed in each evidence source has been reported. This approach is considered proportionate and in line with best practice for the consideration of human health in EIA.

14.5.23 Ultimately for human health, a likely significant health effect is one that should be brought to the attention of the determining authority, as the effect of the proposed project is judged to provide, or be contrary to providing, a high level of protection to human health. This may include reasoned conclusions in relation to health protection, health improvement and/or improving services.

14.5.24 Where significant adverse effects are identified, mitigation has been considered to reduce the significance of such effects. Similarly, enhancements have been considered where significant and proportionate opportunities to benefit population health have been identified. The residual effects represent the output of iterative assessment, taking into consideration the mitigation and enhancement measures.

14.5.25 This assessment takes as its starting point the residual effects as assessed and determined in other relevant EIA topic chapters. This includes taking into account relevant embedded and standard good practice mitigation.

Population Conclusions

14.5.26 A population health approach has been used, as it would be disproportionate to reach conclusions on the potential health outcomes of individuals. To take account of potential inequalities, where appropriate, conclusions on a particular health issue have been reached for more than one population. For example:

- One conclusion for the general population (or for a defined area); and
- A second separate sub-population conclusion for relevant vulnerable group (as a single defined class of sensitivities for that issue).

Mental Health and Well-being

14.5.27 Mental health and well-being are influenced by many factors, specifically:

- External factors (material and economic circumstances, and environment (social and natural)). These include access to many 'facilities' including natural environment, health services, education, employment, shops, transport, housing, etc; other influencing factors which include the quality of the environment in terms of the quality of housing and crime (and can include design of neighbourhoods and landscape and visual character); natural disasters (flooding, heatwaves, etc); violence and abuse from other members of the population (on grounds of race, gender, age, disability, mental health, sexual orientation, etc); and the social (community) infrastructure.
- Internal factors – including psychosocial wellbeing, resilience, social

connections and networks (all of which are influenced by family and environment when growing up as well as life experiences) to name a very few.

14.5.28 The degree to which the Project has the potential to create a perturbance that could extend to and impact on the population is dependent on the zones of influence of the many impacts that arise, for the most many of these are fairly small in scale and the population within those zones is very small. Even the impacts (notably visual) that have the potential to impact on a wider population is still fairly small given the relative lack of visibility of the site (greatest visibility is by users (very limited) and residents (very limited) and then the scale of such impacts is also fairly small for the vast majority of receptors.

14.5.29 When the impact on mental health and wellbeing is considered for the loss of an area where some informal recreational activities take place for a limited number of people, one needs to also consider replacement or alternative sites. For example, if people walk past / through the site as part of a fitness regime or exercising and getting fresh air, it is not a unique location and they could easily use alternative sites (such as Belle Grève Bay next door). Consequently, such a change would not be considered an overall loss and behaviours of the individuals can change to respond to that and overall there would be no affect.

14.5.30 Consequently, the consideration of mental health and well-being would only occur if unique locational assets would be lost or where policy changes or significant behavioural changes occur. Overall these are not reflected for this Project, and the key impact would be in terms of the intrinsic value the site provides to people and how that loss will affect their mental health and wellbeing. We can only predict this is extremely low in the number of people with a personal value (from experience and use) of the site, and therefore at a population level it is insignificant even before we attempt to determine the scale of change to their mental health and wellbeing. Consequently, the likelihood of a population level effect is extremely unlikely, and at an individual level for the majority of people the significance of the project in relation to other competing factors influencing their mental health is not likely to be discernible above background experiences in their environment. As such assessment on mental health and well-being has not been considered further.

Tourism and Recreation Assessment Methodology

14.5.31 The impact assessment methodology is adapted from the general approach described in **Chapter 5 EIA Methodology** and the methodology for Population and Human Health described above. There is no UK guidance on assessing socio-economic, tourism, or recreation impacts, therefore a methodology has been developed using the principles set out in **Chapter 5** and using:

- Good practice from the International Association for Impact Assessment's Social Impact Assessment: Guidance for assessing and managing the social impacts of projects (Vanclay, 2015);
- Emerging best practice published by the IEMA in line with the 'Health in Environmental Impact Assessment: A Primer for a Proportionate Approach' (Cave *et al*., 2017);
- Published guidance from Glasson and Chadwick in Methods of Environmental and Social Impact Assessment (Natural and Built Environment Series) Fourth Edition (Therivel and Wood, 2017):
    - o Chapter 13 Socio-economic impacts 1: overview and economic impacts and Socio-economic impacts; and
    - o Chapter 14 Socio-economic impacts 2: Social impacts.

14.5.32 Value rather than sensitivity has been assigned to tourism and recreation assets. This is because if a tourism or recreation asset is visited by a large number of people this would lead to induced expenditure elsewhere. If a project obstructed this it would generate a wider effect but the asset itself may not be sensitive to the change, i.e. it would continue functioning, whereas the rest of the economy may suffer.

14.5.33 Value has not been assigned to the economy as a single receptor as it is made of many component parts which make it difficult to qualify accurately. The broad economic impact is focussed on the outcomes or results from likelihood and magnitude of impact on the various component parts.

Pathway Model

14.5.34 As described in the above sections, the first issue to consider in the assessment is the likelihood of the proposed project having an effect. A likely effect should be both plausible and probable:

- Plausible in the context of this assessment relates to there being a relevant source, pathway and receptor; and
- Probable in the context of this assessment relates to a qualitative judgement to exclude those effects that could only occur under certain very rare

conditions.

14.5.35 The source-pathway-receptor model describes how a specific activity of the proposed project could change a community capital stock and potentially result in a change in socio-economic outcomes (an effect). These are defined below:

- A 'source' represents an activity or factor that could affect community capital stock;
- A 'pathway' describes whether a community stock is likely to be affected; and
- A 'receptor' is determined based on the impact being assessed.

Tourism and Recreation Sensitivity

14.5.36 The Green Book (HM Treasury, 2018) defines the value of an economic asset (such as a tourism supply business) based on the national status of the asset. This approach was used to assess tourism and recreation assets within the Tourism and Recreation study area but it was found that the result did not describe the importance of the assets with enough rigour. For example, a small Bed and Breakfast would be classified as a low value asset but due to it being small scale any change that reduces guest numbers could have a significant effect for the business owners.

14.5.37 Due to this, an alternative approach was developed. This considers the sensitivity of the receptor based on its capacity to adjust to the proposed change and whether the receptor is interlinked with other receptors. There are no standard sensitivity criteria for tourism and recreational receptors, thus a matrix approach, **Table 14-11**, will be used to inform professional judgement the definitions set out in **Table 14-12** are based on experience and professional judgement.

Table 14-11: Sensitivity Matrix

Local interconnection	Ability to adjust to change			
	Very Vulnerable	Vulnerable	Resilient	Very Resilient
High	High	High	Medium	Low
Moderate	High	Medium	Low	Negligible
Minor	Medium	Low	Low	Negligible
Negligible	Low	Negligible	Negligible	Negligible

Table 14-12: Examples of the Sensitivity Levels for a Tourism and Recreation Receptors

Sensitivity	Examples
High	A small but locally renowned restaurant or guest house. One where people visit and stay to visit other places. A popular beach or nature resort would also be included.
Medium	A regionally or nationally important footpath. One that people are likely to travel to enjoy and spend money in other places to do so.
Low	A medium sized tourist business that is used locally but does not attract national or international visitors.
Negligible	A large attraction with a large turnover of visitors where potential impacts could be temporarily mitigated.

Likelihood of Economic Effect

14.5.38 **Table 14-13** sets out factors characterising likelihood of economic pathways. The table informs the professional judgement on scoring high, medium, low or negligible significance. The 'higher' and 'lower' characterisations represent instructive positions on a spectrum that would also include more extreme, as well as intermediate, positions. Most situations have a mix of higher and lower characterising factors, so a balanced expert view of sensitivity is taken.

Table 14-13: Factors Characterising the Likelihood of a Pathway Existing

Likelihood	Economy	Tourism and Hospitality economy
Likely	There is a significant labour force with appropriate skills, people of working age, low levels of inequality, normal levels of unemployment in relation to the wider economy, plausible transport links, comparative projects being developed in the area, and there is opportunity for an employment pipeline to be created.	There are sufficient bed spaces for non-residential labour force to be accommodated within travelling distance of the development area and the labour curve indicates that non-residential workers would be employed for relatively short to medium durations – i.e. days or weeks. This would indicate that it would be economically viable to stay in hotels or similar for short periods.

Likelihood	Economy	Tourism and Hospitality economy
Unlikely	There is a small population, with low levels of skills, a significant proportion are not of working age, there is high inequality, high levels of unemployment, this project is unique to the area, and there is limited opportunity to that an employment pipeline would be created.	The non-residential labour force far exceeds the available bed spaces and the labour curve shows that non-residential workers would be employed long-term – i.e. months or years. This would suggest that it would be economically viable for them to rent accommodation rather than stay in hotels.

Magnitude

14.5.39 The magnitude is characterised by first considering the size of the change (as defined in **Table 14-14**) and then considering the duration, frequency, and timing of the change (as shown in **Table 14-15**).

Table 14-14: Definitions of Magnitude of Change

Size of change	Employment	Tourism employment	Tourism & recreation
High	Change of + or – 2% on baseline	Change of + or – 50% on baseline levels	Highly likely that majority of visitors would change their behaviour.
Medium	Change of + or – 1-2% on baseline employment levels	Change of + or – 20-50% on baseline levels	Likely that some visitors would change their behaviour.
Low	Change of less than + or – 1% of baseline employment	Change of + or – 10-20% on baseline levels	Plausible that some visitors may change their behaviour.
Negligible	No measurable change in employment levels	Change of less than + or – 10% on baseline levels	Unlikely that the majority of visitors would change their behaviour.

14.5.40 This allows the assessment to differentiate between large short-term effect and smaller long-term effects. For example, construction usually results in the short to medium term employment of a relatively large number of people. But this in itself is not enough to bring about a positive socio-economic benefit. Operation of an industrial site leads to long-term employment. Even if operations employ a smaller number of people the overall socio-economic benefit may be greater because people would have the opportunity to settle and invest in the local economy.

14.5.41 The temporal scope varies for each stage of a project lifetime. Temporal scope is defined in **Table 14-16**.

Impact Significance

14.5.42 Significance for economic impacts is determined using the matrix as presented in **Table 14-17**. Significance of impacts to tourism assets is determined using the matrix as presented in **Table 14-18**.

Table 14-15: Factors used for Characterising Magnitude of Effect

Magnitude	Size of change	Duration	Frequency	Timing	Inter-relationship
Higher	Large change in comparison to baseline conditions.	Medium to long term temporal scope.	Continuous or daily effects.	Clashes with other periods of high turn-over, such as peak tourism season.	Are multiple effects combining on one or more receptors at the same time?
Lower	Small change in baseline conditions.	Very short to short temporal scope.	Monthly or yearly affects.	Supports periods lower turnover, such tourism offseason.	Is the receptor only affected with one disturbance?

Table 14-16: Definitions of Temporal Scope

Temporal Scope	Definition
Very short term	Effects measured in hours, days or weeks (e.g. effects, associated with cable laying activity past a particular dwelling)
Short term	Effects measured in months (e.g. requirements of the overall construction stage, such as workforce use of accommodation)
Medium term	Effects measured in years (e.g. the maturing of screening)
Long term	Effects measured in decades (e.g. the operational stage)

Table 14-17: Economic Impact Significance Matrix

Economic Likelihood	Magnitude				
	High	Medium	Low	Negligible	No change
Likely	Major	Major	Moderate	Minor	No change
Possible	Major	Moderate	Minor	Negligible	No change
Unlikely	Moderate	Minor	Minor	Negligible	No change
Highly unlikely	Minor	Negligible	Negligible	Negligible	No change

Table 14-18: Tourism Asset Impact Significance Matrix

Tourism Asset Sensitivity	Magnitude				
	High	Medium	Low	Negligible	No change
High	Major	Major	Moderate	Minor	No change
Medium	Major	Moderate	Minor	Negligible	No change
Low	Moderate	Minor	Minor	Negligible	No change
Negligible	Minor	Negligible	Negligible	Negligible	No change

14.5.43 It is important that the matrix is seen as a framework to aid understanding of how a judgement has been reached from the narrative of each impact assessment and it is not a prescriptive formulaic method. The magnitude of effect is compared to the sensitivity of the receptor and/or the likelihood that the impact would occur to determine the significance of the impact.

14.5.44 Guide questions set out in **Table 4-19** are used to inform the professional judgement on scoring major, moderate, minor or negligible significance.

14.5.45 As with the definitions of magnitude and sensitivity, the matrix used for a topic is clearly defined by the assessor within the context of that assessment. The impact significance categories are divided as shown in **Table 14-20**.

14.5.46 Note that for the purposes of the EIA, major and moderate impacts are deemed to be significant. In addition, whilst minor impacts are not significant in their own right, it is important to distinguish these from other non-significant impacts as they may contribute to significant impacts cumulatively or through interactions.

Table 14-19: Guide Questions for Determining Significance

Factor	Guide Questions
Type of impact pathway	Is the impact an economic effect or physical disturbance? If the effect were to happen would there be a multiplier effect in Guernsey? Has embedded mitigation avoided the effect?
Baseline conditions	Is there evidence that the baseline is resilient, or would this change be unmanageable? Or are businesses reporting confidence in their future?
Value of Tourism Receptor	Is the tourism or recreation asset nationally significant or has a high visitor number? If it were affected would it lead to a change in the surrounding economy due to lower visitor numbers?
Likelihood of Economic Effect	Is it likely that the effect would occur? Is the asset close enough to actually be disturbed? Is there evidence to show that employment would be realised within the study area?
Size of change	Is the employment opportunity deliverable by the Guernsey labour market? Do physical disturbances breach local regulatory requirements?
Inter-relationship	Do multiple physical disturbances combine to make a more significant effect for one or more receptors?
Duration, frequency, reversibility and timing of effect	Is it a long or short-term effect? If it's a physical effect would it be reversed once the proposed project is complete? Are there any other factors that the effect would clash with such as low or high tourist season?
Policy context	Is the change affecting an area that is a policy priority in the Island Development Plan?
Consultation responses	Have local communities or stakeholders expressed particular concern or support with regards the effect?
Mitigation	Is it possible to mitigate the impact and would this be likely to occur? If this did occur would the residual impact change?

Table 14-20: Impact Significance Definitions

Value	Definition
Major	Very large or large change, both adverse or beneficial, which are likely to be important considerations at a regional or district level because they contribute to achieving national, regional or local objectives, or, could result in exceedance of statutory objectives and / or breaches of legislation.
Moderate	Intermediate change in receptor condition, which are likely to be important considerations at a local level.
Minor	Small change in receptor condition, which may be raised as local issues but are unlikely to be important in the decision-making process.
Negligible	No discernible change in receptor condition.
No change	No impact, therefore no change in receptor condition.

Summary of Receptors

Value of Population and Human Health Receptors

14.5.47 The sensitivity of the socio-economic, recreation and amenity receptors has been determined based on the criteria described in **Table 14-12** and are presented in **Table 14-21**.

Table 14-21: Value of Socio-Economic, Recreation and Amenity Receptors

Name	Sensitivity
Angling	Low
Barber/ Hairdresser	Low
Bed and Breakfast	Medium
Bird Watching	Medium
Bus Stop	Low
Car Park	Low
Church	Low
Community Centre	Medium
Cycling	Medium
Dentist	Low

Name	Sensitivity
Education	Medium
Fuel Station	Low
Hospital	High
Leisure	Medium
Marina	Medium
Park	Medium
Pub	Low
Restaurant/ Takeaway	Low
Shop	Low
Sports Club	Low
Supermarket	Low
Theatre	Low
Vets	Low
Walking	Low
Watersports and Boating (Navigation)	Medium

14.6 Impacts During Construction

CONSTRUCTION IMPACT 14.1: Impact of Increased Industrialisation

14.6.1 The site is located adjacent to St. Sampson Main Centre and the Project may contribute to the industrialisation of the St. Sampson coast. Changes to the Landscape Character and Visual Amenity during the construction phase are assessed in **Chapter 16 Landscape Character and Visual Amenity Section 16.6** and **16.7**. A **minor** to **moderate adverse** impact is predicted for Character Area 5A, which is situated adjacent to the current inert waste site.

14.6.2 The character area has valued qualities, which are susceptible to the type of development where function is the prime consideration. It is picturesque and quiet with little movement and includes residential properties with sea views. A substantial adverse effect is predicted for Character Area 5B – the nearest residential properties and immediately surrounding green area. The link to the sea at the proposed development site will be progressively walled off and the noise and movement of the machinery will reduce the peacefulness of the gardens, public footpath and open space to include the sea shore / beach.

14.6.3 The construction of the project is predicted to have a substantial adverse effect on various viewpoints considered in **Section 16.7**. However, the rocky bay that will be developed is one of a network of rocky bays around Guernsey, so other similar visual amenities are available. Furthermore, some viewpoints already view the substantial industrialisation of St Sampson, which may lessen the gravity of visual impact further industrialisation will have on them.

CONSTRUCTION IMPACT 14.2: Impact on Tourism, Recreation and Amenity

14.6.4 The majority of the receptors shown on **Figure 14-5** sit within the area known as The Bridge in St Sampson or are far enough away from the project boundary that there will be no change to the behaviour of the majority of visitors. Therefore, there will be **no impact** to these receptors.

14.6.5 The reclamation will result in a small reduction in available water for navigation, however this is not considered to be significant given the shallow depth of the site and the presence of sharp sections of bedrock meaning the majority of the project footprint is only accessible to vessels with a very shallow draught. The impact to navigation has therefore been scoped out. Given that there is already an inert waste facility adjacent to the site, there is not likely to be any indirect impact to navigation over and above what is already present, therefore indirect impacts are also scoped out.

14.6.6 Although Delancey Park is located approximately 400m west, it is separated from the site by roads and other developments and is not predicted to be impacted by the development.

14.6.7 The infill of Spur Bay will result in the loss of habitat for birds and consequently reduce birdwatching opportunities. However, all of the birds recorded on site were common. There are other, better locations for birdwatching around Guernsey including the adjacent Belle Grève Bay, the Colin Best Nature Reserve, Little Fort Doyle and La Claire Mare (see **Table 18-5**) therefore the impact is **minor adverse**.

14.6.8 The coastal path currently runs around the landward perimeter of the site. The proposed construction layout (**Figure 4-3**) shows that the site safety and security fencing will close the path at either end, meaning access to the coast path will be lost during construction. The sensitivity and value of the coastal path is medium. However, the length of path to be lost is 0.34km, which is 0.6% of the total path length of 56km. Closure of the footpath would require walkers currently transiting around the edge of the site to take a 0.27km alternative route along Bulwer Avenue. Considering the small proportion of the path to be obstructed and the short length of the diversion and given that the path essentially discontinues along the coast, the magnitude of change is low. Therefore, the short-term impact to walkers during construction will be of **minor adverse** significance. However, this closure will continue throughout operation and is further assessed for the operation phase.

14.6.9 During construction there will be a loss of the intertidal 'green space' or the foreshore which is used by local residents for beachcombing and dog walking. The subtidal areas are also used by local residents for snorkelling, swimming and angling. The value of this resource is low as the site is adjacent to a much larger beach that presents equivalent if not better opportunities for beachcombing. As it is likely that some users would change their behaviour during construction, the magnitude of change is medium. Therefore, the temporary impact to users of the intertidal and subtidal 'green space' during construction will be of **minor adverse** significance

Table 14-22: Summary of Impacts to Tourism and Recreation Receptors

Name	Value	Magnitude of Change	Significance
Leisure	Medium	Low	Minor
Hotel	Medium	No change	No impact
Park	Medium	No change	No impact
Cycling	Medium	Negligible	Negligible
Walking	Medium	Low	Minor
Beachcombing	Low	Medium	Minor
Snorkelling	Low	Medium	Minor
Bird Watching	Low	Medium	Minor
Car Park	Low	Low	Negligible
Pub	Low	No change	No impact
Restaurant/ Takeaway	Low	No change	No impact
Shop	Low	No change	No impact
Sports Club	Low	No change	No impact
Vets	Low	No change	No impact
Angling	Low	Medium	Minor

CONSTRUCTION IMPACT 14.3: Impacts to Community Assets

14.6.10 The majority of the community receptors shown on **Figure 14-5** sit within the area known as The Bridge in St Sampson or are far enough away from the project boundary that there will be no change to the behaviour of the majority of visitors. Therefore, there will be **no impact** to these receptors.

14.6.11 There is a doctor's surgery approximately 210 metres north of the site boundary. Any changes to human health at this receptor are assessed in **Section 14.6.12**. Although the sensitivity of this receptor is high, the majority of visitors will not change their behaviour as a result of the development as the surgery is set within a residential area off the main road and does not look over the site. There will be no barriers to access as a result of the development, therefore the impact significance is **minor adverse**.

Table 14-23: Summary of Impacts to Community Assets

Name	Value	Magnitude of Change	Significance
Medical Centre	High	Negligible	Minor
Education	Medium	No change	No impact
Church	Low	No change	No impact
Transport Hub	Medium	No change	No impact
Fuel	Low	No change	No impact

CONSTRUCTION IMPACT 14.4: Impacts on Human Health

14.6.12 During construction there is potential for a risk to human health to temporarily arise from the following:

- A reduction in air quality from dust and fine particulate matter from construction and HGV movements;
- Noise emitted from the movement of HGVs and construction works; and
- A reduction in road safety due to the movement of HGVs in the area surrounding the proposed project site.

14.6.13 The population groups relevant to this assessment due to proximity are anyone within 1km of the site boundary. Within this population the following groups are considered to be more vulnerable to impacts than the general population:

- Children and young people;

- Older people; and
- People with existing poor health (physical and mental health).

14.6.14 The key health outcomes relevant to noise and air quality as a determinant of health are cardiovascular health (only as a result of chronic noise effects), mental health (including stress, anxiety or depression as a result of chronic noise effects) and cognitive performance in children, particularly at school.

Temporal Scope

14.6.15 Construction is thought to take a maximum of 36 months. Tidally influenced rock deposition and construction of the breakwater will be undertaken 24 hours of the day.

Likelihood

14.6.16 The results of the assessments in **Chapters 11 Noise and Vibration**, **12 Air Quality**, and **13 Traffic and Transport** show that during construction of the proposed project:

Chapter 11 Traffic and Transport

- Predicted impact to road safety during construction would be of a minor adverse significance.

Chapter 12 Air Quality

- Predicted construction phase dust and particulate matter would not be significant; and
- Construction phase road traffic emissions would not be significant.

Chapter 13 Noise and Vibration

- Predicted noise impacts from construction works would not be significant;
- Predicted vibration impact levels from construction works would be of minor adverse significance; and
- Predicted impacts from off-site construction traffic would be of a minor adverse significance.

14.6.17 No additional mitigation is required apart from beyond the embedded mitigation included within the assessment presented in these chapters.

14.6.18 St Sampson's Medical Centre sits approximately 210m north of the proposed project boundary. During the day, vulnerable groups (older people and children) would be present in this asset and may potentially be affected by the construction works.

14.6.19 Potential health effects are considered likely because (based on the methods described in **Section 14.20**) there is a plausible source-pathway-receptor relationship where:

- The source is the construction plant and operations;
- The pathway is noise, dust travelling through the air or the movement of vehicles on nearby roads; and
- Receptors are communities of people.

Sensitivity

14.6.20 As described in **Table 14-8**, the sensitivity of the general population and vulnerable groups can be characterised as medium. The sensitivity of the general population is low however there is a higher proportion of older people than the UK average (potentially with ongoing health conditions).

Magnitude

14.6.21 As described in **Table 14-9** the magnitude of change due to the proposed project is characterised as small (based on the methods described in **Section 14.5**). At these levels, it is unlikely that there would be changes in the risk of developing a new health condition or of exacerbating an existing condition. Reductions in wellbeing associated with short-term or very short-term noise levels would be unlikely to persist beyond the period of elevated exposure.

Table 14-24: Sensitivity of the Population Within the Study Area

Factor	Description
Inequalities	Proportion of population whose household income is less than 60% of the median is 22.7% which is 0.7% higher than the UK average.
Health status	In Guernsey, the health of people is varied, but generally better than the average for England. Life expectancy is higher overall when compared against England averages.
Life stage	Households with no adult in employment and no dependent children correlates with the proportion of people over 65 years old.
Outlook	Consultation indicates that residents closer to the proposed project have a more concerned outlook than other groups.

Table 14-25: Magnitude of Change Due to the Proposed Project

Factor	Description
Severity	**Chapter 11 Traffic and Transport** concludes that impacts to road safety would be of minor adverse significance. **Chapter 12 Air Quality** concludes that residual air quality impacts are not significant. **Chapter 13 Noise and Vibration** concludes that residual noise impacts would have negligible to minor adverse significance.
Extent	Noise, air quality and traffic and transport effects would be localised to the associated construction activity or vehicle movements. Therefore, they would be felt by a small number of people in the local population.
Frequency	Construction related noise, air quality changes and traffic close to particular dwellings or other community receptors would be infrequent and of short duration over a short to medium time period.
Reversibility	Effects would end completely once the associated construction elements has been completed.
Exposure	The general exposure profile would be one of low exposure by a small population.

Significance

14.6.22 The significance of the potential effects has been informed by the guide questions in **Table 14-10**. Although the sensitivity is medium there is only expected to be a small change to noise levels that is short term, localised and fully reversible. Based on this, noise effects are assessed to be of **minor adverse** significance for the general population and for vulnerable groups within the general population.

14.6.23 Changes to air quality were **not significant**, so there is no pathway for effect between those and the sensitive receptors surrounding the site.

14.6.24 Impacts to road safety are predicted to be of a **minor adverse significance**.

Mitigation

14.6.25 No additional mitigation is required apart from beyond the embedded mitigation included within the assessment presented in these chapters.

14.7 Impacts During Operation

OPERATIONAL IMPACT 14.5: Impact of Increased Industrialisation

14.7.1 As described in **Section 14.6** for construction and **Section 16.6** and **Section 16.7**, presence of the proposed project will represent a change to the Landscape Character and Visual Amenity. This impact will only be felt in the areas closest to the development site. During operation, a substantial adverse effect is predicted for Character Area 5B – The Local Landscape/ Rocky Short & Well Vegetated, Green Area to include local residential properties. However, the wider study area is of industrial character, and will not experience a significant change. As described in **Section 14.6**, there are many other rocky bays on Guernsey that are available and there are some viewpoints that view the substantial industrialisation of St Sampson, and the project will not represent a significant change to the baseline from these viewpoints.

OPERATIONAL IMPACT 14.6: Impact on Recreational Use of the Foreshore

14.7.2 During operation the site will obstruct the coastal path that runs around the perimeter of the site, as perimeter fences will connect to those of the property boundary fences along the northern boundary (**Figure 4-4**). The security fence will be in place until infilling operations on the site cease and are completed (estimated to be 2035), after which it is expected that the seaward boundary of the site would become open to access, as well as potentially the landward area of the site depending on future use. The coast path is considered to be of national importance and medium sensitivity. The long-term closure of the access will result in a long-term effect of negligible magnitude effect; due to the limited length affected (0.34km or 0.6%) compared to the total extent of coastal path (56km) as well as the nature of this section which essentially discontinues its link with the coast and connects to highway. The path will remain connected to the highway at the western end, though this will require walkers currently transiting around the edge of the site to take a 0.27km alternative route along Bulwer Avenue. Consequently, the low magnitude effect on a high sensitivity receptor, is therefore predicted to result in a long-term (reversible) **minor adverse impact**.

14.7.3 During operation there will be a permanent loss of the intertidal ‘green space’ or the foreshore which is used by local residents for beachcombing and dog walking. The subtidal areas are also used by local residents for snorkelling, swimming and angling. The value of this resource is low as the site is adjacent to a much larger beach that presents equivalent if not better opportunities for beachcombing. As it is likely that some users would change their behaviour during construction, the magnitude of change is medium. Therefore, the permanent impact to users of the loss of intertidal and subtidal ‘green space’ during operation will be of **minor adverse** significance.

14.7.4 The infill of Spur Bay will result in the loss of habitat for birds and consequently reduce birdwatching opportunities. However, all of the birds recorded on site were common and there are other, better locations for birdwatching around Guernsey, therefore the impact is **minor**. However, all of the birds recorded on site were common. There are other, better locations for birdwatching around Guernsey including the adjacent Belle Grève Bay, the Colin Best Nature Reserve, Little Fort Doyle and La Claire Mare (see **Table 18-5**) therefore the impact is **minor adverse**.

14.7.5 Spur Point, Spur Bay and Belle Grève Bay are all local fishing spots. Once the Project is in place there will be a loss in fish habitat within Spur Bay. Alternative locations for angling will still be available at Spur Point and Belle Grève Bay as well elsewhere on the Island, and so the impact is **minor adverse**.

14.7.6 The operation of the inert waste facility will not change the local cycle network which is located on roads across Guernsey. The increase in traffic volumes would have a **negligible adverse** impact on cycling (see **paragraph 11.8.28**) as the traffic modelling presented in **Table 11-24** predicts a maximum increase of 36.6% of HGVs and 9.4% of all vehicles along the Longue Hougue Access Road but much less on surrounding roads. This is much less than the industry standard (GEART) threshold required for an impact of 100%.

14.7.7 The presence of the breakwater will have a **negligible adverse** impact on water sports such as sea kayaking in the area.

Table 14-26: Summary of impacts to tourism and recreation receptors

Name	Value / Sensitivity	Magnitude of Change	Significance
Walking	Medium	Low	Minor
Bird Watching	Low	Medium	Minor
Angling	Low	Medium	Minor
Cycling	Low	Low	Negligible
Water sports	Low	Low	Negligible

OPERATIONAL IMPACT 14.7: Impact on Human Health

14.7.8 Operation of the proposed development has the potential to impact human health through a decline in road safety, decreased air quality and increased noise levels.

14.7.9 The population groups relevant to this assessment due to proximity are anyone within 1km of the Project boundary. Within this population the following groups are considered to be more vulnerable to impacts than the general population:

- Children and young people;
- Older people; and
- People with existing poor health (physical and mental health).

14.7.10 The key health outcomes relevant to noise as a determinant of health are cardiovascular health (only as a result of chronic noise effects), mental health (including stress, anxiety or depression as a result of chronic noise effects) and cognitive performance in children, particularly at school.

Temporal Scope

14.7.11 Operation will take place for a minimum of 12 years and will occur during the hours of 08:00 and 16:00 Monday to Friday. No work will take place during bank holidays or weekends.

Likelihood

14.7.12 The results of the assessments in **Chapters 11 Traffic and Transport**, **12 Air Quality**, and **13 Noise and Vibration** show that following mitigation during operation of the proposed project:

Chapter 11 Traffic and Transport

- Predicted impact to road safety during operation would be of a minor adverse significance.

Chapter 13 Noise and Vibration

- Predicted noise impacts site operation would be minor adverse; and
- Predicted impacts from off-site operational traffic would be of a minor adverse significance.

Chapter 12 Air Quality

- Predicted operational phase dust and particulate matter would not be significant; and
- Operation phase road traffic emissions would not be significant.

14.7.13 St Sampson's Medical Centre sits approximately 210m north of the proposed project boundary. During the day, vulnerable groups (older people and children) would be present in this asset and may potentially be affected by the operation of the site.

14.7.14 Potential health effects are considered likely because (based on the methods described in **Section 14.20**) there is a plausible source-pathway-receptor relationship where:

- The source is the plant and operations;
- The pathway is noise, dust travelling through the air or the movement of vehicles on nearby roads; and
- Receptors are communities of people.

Sensitivity

14.7.15 As described in **Table 14-8**, the sensitivity of the general population and vulnerable groups can be characterised as medium. The sensitivity of the general population is low however there is a higher proportion of older people than the UK average (potentially with ongoing health conditions).

Table 14-27: Sensitivity of the Population Within the Study Area

Factor	Description
Inequalities	Proportion of population whose household income is less than 60% of the median is 22.7% which is 0.7% higher than the UK average.
Deprivation	People in Guernsey are not as likely to suffer from deprivation than people in the UK (Gordon *et al.,* 2002).
Health status	In Guernsey, the health of people is varied, but generally better than the average for England. Life expectancy is higher overall when compared against England averages.
Life stage	Households with no adult in employment and no dependent children correlates with the proportion of people over 65 years old.
Outlook	Consultation indicates that residents closer to the proposed project have a more concerned outlook than other groups.

Magnitude

14.7.16 As described in **Table 14-9** the magnitude of change due to the proposed project is characterised as small (based on the methods described in **Section 14.5**). At these levels, it is unlikely that there would be changes in the risk of developing a new health condition or of exacerbating an existing condition. Reductions in wellbeing associated with short-term or very short-term noise levels would be unlikely to persist beyond the period of elevated exposure.

Significance

14.7.17 The significance of the potential effects has been informed by the guide questions in **Table 14-10**. Although the sensitivity is medium there is only expected to be a small change to noise levels that is short term, localised and fully reversible. Based on this, noise effects are assessed to be of **minor adverse** significance for the general population and for vulnerable groups within the general population.

Table 14-28: Magnitude of Change Due to the Proposed Project

Factor	Description
Severity	**Chapter 11 Traffic and Transport** concludes that impacts to road safety would be of minor adverse significance. **Chapter 12 Air Quality** concludes that residual air quality impacts are not significant. **Chapter 13 Noise and Vibration** concludes that residual noise impacts would have a minor adverse significance.
Extent	Noise, air quality and traffic and transport effects would be localised to the associated operation activity or vehicle movements. Therefore, they would be felt by a small number of people in the local population.
Frequency	Operation related noise, air quality changes and traffic close to particular dwellings or other community receptors would be infrequent and of short duration over a medium time period.
Reversibility	Effects would end completely once the associated operational elements have been completed.
Exposure	The general exposure profile would be one of low exposure by a small population.

14.7.18 Changes to air quality were **not significant**, so there is no pathway for effect between those and the sensitive receptors surrounding the site.

14.7.19 Impacts to road safety are predicted to be of a **minor adverse** significance.

Mitigation

14.7.20 No additional mitigation is required apart from beyond the embedded mitigation included within the assessment presented in these chapters.

14.8 Cumulative Impacts

14.8.1 The cumulative impact assessment draws on the cumulative impact assessments carried out for construction and operation **Chapters 11 Traffic and Transport**, **12 Air Quality**, **13 Noise and Vibration**, **16 Landscape Character and Visual Amenity**, and **19 Natural Capital.** The cumulative impact assessment is presented in **Table 14-29**.

Table 14-29: Cumulative Impact Assessment

Impact	Potential for cumulative impact	Justification
Increased industrialisation	No	In **paragraph 16.8.9,** if the infill of the breakwater at Mont Crevelt occurs simultaneously with construction of the proposed project, there will be cumulative impacts within Character Area 5A – The Local Landscape/ Rocky Shore & Industrial Area. However, these works will be local and are seen as part of the general construction activities at the existing site, which forms part of the baseline. Based on this, the impact to Character Area 5A will be no different to the impacts during construction assessed in **Section 14.6** and **Chapter 16 Landscape and Visual**.
Impact to recreation	Yes	There are no projects listed in **Table 5-4** that reduce the intertidal habitat in Belle Grève Bay and thus there will be no additional loss of intertidal 'green space' in the study area. There are plans to provide a coastal path around the edge of the existing site at Longue Hougue. The operational facilities and activities of the site (**Figure 4-3**) may interfere with the route of this proposed path.
Human health	Air Quality – No Noise – No Traffic – No	No significant cumulative impacts identified in **Chapters 11, 12** or **13** for construction or operation.

Mitigation

14.8.2 To mitigate for any impact to recreational users of the coastal path around the existing Longue Hougue South site, it is suggested that the proposed footpath is connected to an access route around the Longue Hougue South boundary after site operations have commenced. Operational procedures could aim at infilling works at the landward edge of the breakwater to provide sufficient width for the provision of a path around the seaward boundary of the site, connecting to any path that is opened up around the seaward boundary of the existing Longue Hougue Reclamation site.

Residual Impact

14.8.3 Assuming the above mitigation is followed, there will be no cumulative impacts to recreational users as a result of the proposed project.

14.9 Summary

14.9.1 A summary of the impacts to population and human health is provided in **Table 14-30**.

Table 14-30: Summary of Population and Human Health Impacts

Impact	Significance	Mitigation	Residual Impact	Monitoring
Construction				
14.1 Increased industrialisation	See **Section 16.6.**			
14.2 Recreational resources	Not significant to moderate adverse	Placement of boundary fence on seaward side of coast path	Not significant to negligible	None required
14.3 Community assets	Not significant to minor adverse	None required	Not significant to minor adverse	None required
14.4 Human health	Not significant to minor adverse	See **paragraph 12.6.17** and **paragraph 13.6.8**.	Not significant to minor adverse	See **paragraph 12.6.17**.

Operation				
14.5 Increased industrialisation	See **Section 16.7.**			
14.6 Recreational resources	Negligible to minor adverse	None required	Negligible to minor adverse	None required
14.7 Human health	Not significant to minor adverse	See **paragraph 12.7.15** and **paragraph 13.7.15**.	Not significant to minor adverse	See **paragraph 12.7.15**.

15 Material Assets (Archaeology, Built and Cultural Heritage)

15.1 Content and Data

Content

15.1.1 This section examines the potential impacts arising from the project upon archaeology, and upon built and cultural heritage assets and their settings with respect to the following themes:

- Maritime and aviation archaeology (below high water);
- Buried archaeology and cultural heritage assets (above high water);
- World War II heritage assets; and
- Conservation areas and built heritage assets.

15.1.2 The intertidal and subtidal environment surrounding the proposed development is high energy rocky seabed and rocky intertidal with very little sediment. Around the island in general, the coastal zone is predominantly sediment free or with only a very thin cover of coarse sediment. Due to the absence of *in situ* Pleistocene or early Holocene shallow geology, this means that there is no potential for sub-surface prehistoric remains to be buried within the proposed development area below high water, and seabed prehistory is, therefore, not considered further.

Study Area

15.1.3 The study area is defined as the proposed development site plus a 1km buffer. This buffer has been added to ensure that all relevant heritage assets are captured in data searches and to allow for a full assessment of heritage assets beyond the immediate footprint of the project which may be subject to indirect impact including an assessment of potential impacts to setting and character. The study area is shown on **Figure 15-1**.

Data Sources

15.1.4 The primary sources of data for this assessment are the sites and monuments records and accompanying GIS files provided by the Guernsey Sites and Monuments Record (SMR) following a project specific request for data in November 2018. There are 215 heritage assets recorded in the SMR within the 1km study area comprising:

- 64 buildings of historic interest;

- 13 find spots (recorded locations where isolated discoveries of archaeological material have been found, indicative of archaeological potential);
- 2 records of quarries described as ‘landscapes’;
- 14 maritime records (wrecks and/or reported losses);
- 46 monuments;
- a record of a cemetery for Russian troops recorded as a ‘place’; and
- 75 records of World War II military sites.

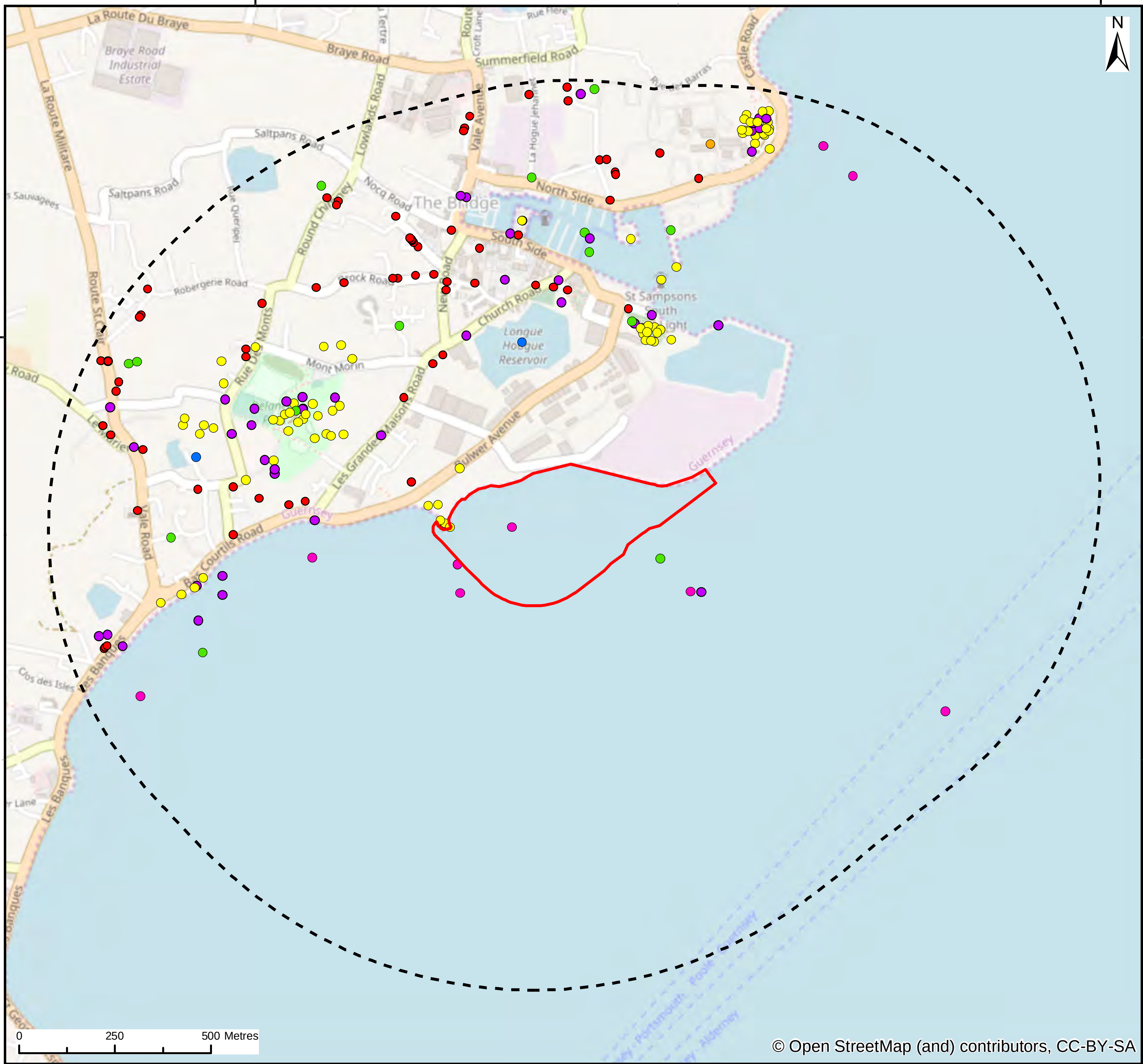
15.1.5 In addition to the SMR data, seven areas and sites of known archaeological importance are recorded from the study area by the Island Development Plan (IDP):

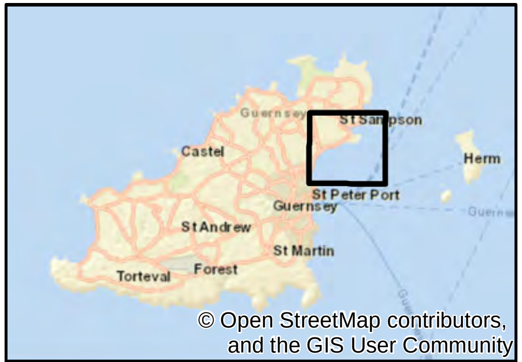
- Mont Crevelt: multi-period fortifications and prehistoric findspot (IDP Map Reference 133);
- La Ronde Cheminee: medieval settlement (IDP Map Reference 135);
- Vale Castle and environs: multi-period fortifications and prehistoric findspot (IDP Map Reference 136);
- St Clair: prehistoric findspots, standing stones and site of medieval chapel, (IDP Map Reference 134);
- Delancey Park: prehistoric monument, site of windmill, multi-period fortifications, (IDP Map Reference 130);
- St Sampson’s Parish Church and Environs: Medieval church (IDP Map Reference 132); and
- St Sampson’s Harbour, Roman findspot, historic harbour (IDP Map Reference 131).

15.1.6 The distribution of recorded locations from the SMR and of the areas and sites of known archaeological importance are shown on **Figure 15-1**.

15.1.7 Published articles, archaeological reports and websites have also been accessed to provide background and context to the assessment as relevant.

15.1.8 This desk-based information was further supplemented by a site visit by Royal HaskoningDHV on 2nd May 2019 in order to ground truth heritage assets located in the immediate vicinity of the proposed development site. This allowed for a fuller understanding of the nature and extent of any surviving features and the potential for impact to those heritage assets from the proposed scheme.





Legend:

Outline of Proposed Development

Study Area

Record Type

- Monument
- Building
- Find Spot
- World War II
- Landscape
- Place
- Maritime

Client:	Project:
States of Guernsey	Longue Hougue South EIA

Title:

Overview of Heritage Assets

Figure: 15.1 Drawing No: PB5312-300-023

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	11/07/2019	FC	PT	A4	1:15,000

Co-ordinate system: Guernsey Grid

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Assumptions and Limitations of Data

15.1.9 Data used to compile this report consists of records provided by the Guernsey SMR in November 2018 and secondary information relevant to this assessment. The assumption is made that the data, as well as that derived from other secondary sources, is reasonably accurate.

15.1.10 The records held by the SMR and the other sources used in this assessment are not a record of all surviving cultural heritage assets, rather a record of the discovery of a wide range of archaeological and historical components of the historic environment. The information held within these datasets is not complete and does not preclude the subsequent discovery of further elements of the historic environment that are, at present, unknown.

15.2 Legislation and Policy Context

15.2.1 Guernsey is a signatory of the Granada Convention for the Protection of the Architectural Heritage of Europe and the identification and protection of the historic environment as part of the planning systems is governed by the Land Planning and Development (Guernsey) Law, 2005. Guernsey also supports the protection of the historic environment through its Strategic Plans.

15.2.2 The Conservation Advice Note 'Principles for Sustaining Guernsey's' Historic Environment' (Development and Planning Authority, 2016: 3) states Guernsey's position that:

We wish to sustain the historic environment for present and future generations, managing change in ways that protect and enhance its special character and interest whilst meeting the needs of those who live in it and care for it.

15.2.3 In order to meet this objective, four Principles are set out which underpin historic environment policy in Guernsey:

- Principle 1: As a community, we recognise our shared interest in sustaining our historic environment;
- Principle 2: As a community, we believe that it is of fundamental importance to understand what is important about our historic environment and why.
- Principle 3: As a community, we will manage the historic environment so as to sustain its special character and interest.
- Principle 4: As a community, we believe that decisions about the historic environment should be reasonable, transparent and consistent.

15.2.4 Conservation aims are delivered through a suite of planning legislation providing ‘tools’ to support the management of change to sustain the special character and interest of the historic environment, protected places and their settings (Development and Planning Authority, 2016: 9). This includes tools which allow for the designation of landscapes, areas, sites, monuments and buildings for special protection and the creation of policy to protect the historic environment through development plans and statutory guidance.

15.2.5 Specific polices relevant to the management of archaeology, built and cultural heritage within the planning system set out in the Island Development Plan (adopted on 2nd November 2016) are detailed in **Section 2.4**.

15.3 Baseline

Maritime and Aviation Archaeology Below High Water

15.3.1 In c. 8,000 BC rising sea levels resulted in Guernsey becoming separated from mainland Europe. As an island, Guernsey’s strong association with the sea is represented through the many small harbours, landing places and slipways required to support the local trade and fishing industries, and through the major harbours such as St Peter Port and St Sampson which today form gateways to the island (Development and Planning Authority, 2016). From the late 17th to the 19th century Guernsey was an entrepôt for shipping, storage and transporting goods, including for privateering, and from the late 18th century, stone export became a primary industry with quarries and stone yards located mainly in the north of the island.

15.3.2 There are no known maritime heritage assets within the proposed development site although there are a total of 28 (of the total 215) records from the SMR which are of maritime origin within the study area (**Figure 15-2**). One of these records is located within the proposed development site although this corresponds to a reported loss (based upon documentary evidence) of the brig *Sovereign*, wrecked near Spur Point on 27 October 1843 (MGU5043), the exact location of any remains associated with this reported loss being unknown.

15.3.3 The proposed development area lies just to the south of St Sampson’s Harbour (MGU6765). Originally a natural harbour, the development of the port was driven by the 19th century exportation of stone, although it also had connections with oyster fishing, ship building and the importation of coal. The IDP (2016: 81) identifies that the harbour has developed as an industrial port, with a strong concentration of industrial premises around the port, although a number of buildings of architectural quality remain around the harbour. It also stated that the historic townscape has been eroded by industrial development and heavy traffic.

Legend:

- Outline of Proposed Development
- Study Area

Record Type

- Recorded Loss
- Wreck of the Fermain
- Findspot
- Monument

Client:	Project:
States of Guernsey	Longue Hougue South EIA

Title: Maritime Heritage Assets

Figure: 15.2 Drawing No: PB5312-300-024

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	11/07/2019	FC	PT	A4	1:15,000

Co-ordinate system: Guernsey Grid

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15.3.4 St Sampson's breakwater is also recorded as a heritage asset (MGU5754), originally built in 1790, largely rebuilt around 1820 and then further developed in 1851. Much of the breakwater is recorded as now lost beneath the existing Longue Hogue reclamation site, with the central breach made in 2001. Two further breakwaters on Belle Grève Beach to the west of the proposed development are also recorded, made of granite and dating to 19th century or earlier (MGU3449, MGU3450). Also, on Belle Grève Beach is a record of an outfall sewer (MGU3453) on the line of the 17th century 'tonnelle' (a conduit) which was part of the drainage system for the Chateau des Marais.

15.3.5 A further maritime asset is the Vivian Beacon (MGU6974), a black and white painted cone which stands on the Vivian rocks off Spur Point at the north end of Belle Grève Bay. There are also two slipways within the study area: a slipway at Mont Crevelt (MGU5582) built before 1898; and one at Richmond Corner (MGU3455), the northernmost of five onto Belle Grève Bay, this one being modern and built in the 1930s.

15.3.6 Fourteen of the records are wreck related although only one records the actual remains of a wreck, the *Fermain* (MGU4635), a steamship, which was wrecked on the Black Rock, off Vale Castle in 1952. Although, it was sold and broken up on 29 December 1952, a remnant of the lower stern is recorded as being visible on the rocks at very low tides. Each of the other 13 records relate to vessels reported as wrecked but for which any remains are yet to be located (reported losses). These are listed in **Table 15-1**.

Table 15-1: Reported Losses Recorded by the SMR

MonUID	Name	Summary
MGU4781	Lady Cecilia Hay at Spur Point	The schooner Lady Cecilia Hay broke up on Spur Point on 12 December 1911.
MGU4544	Cruizer off Vale Castle	The pilot cutter Cruizer was wrecked off Vale Castle on 17 March 1845.
MGU4832	L'Edouard at Les Banques	The chasse maree L'Edouard was wrecked at Les Banques on 1 January 1853. It was later salvaged.
MGU4973	Reliance at Vale Castle	The Reliance, a brig, had to be salvaged after being wrecked off Vale Castle on 5 June 1860.
MGU4829	L'Ami des Grecs on Spur Point	The chasse maree L'Ami des Grecs was wrecked on Spur Point, its hulk sold on 10 November 1830.
MGU5043	Sovereign at Spur Point (1843)	The brig Sovereign was wrecked at Spur Point on 27 October 1843.

MonUID	Name	Summary
MGU5044	Sovereign at Spur Point (1849)	Sovereign, a brig, was wrecked at Spur Point in 1849.
MGU4991	Sabine on Spur Point	The ketch Sabine was wrecked off Spur Point on 27 October 1916.
MGU4915	Nordenskjold at Spur Point	On 28 February 1910 the brigantine Nordenskjold had to be towed in having been wrecked at Spur Point.
MGU5168	Unidentified vessels off Les Trois Grunes	Two unidentified vessels from The Roll of Assize 1309 came to grief off Les Trois Grunes. One was prior to that date and the other was in 1309.
MGU5059	Stella at Vivian	The schooner Stella was salvaged after being wrecked at Vivian, Guernsey, on 12 July 1881.
MGU5223	Unidentified vessel off Vale Castle	An unidentified vessel was wrecked off Vale Castle on 7 February 1865.
MGU4607	Ella at Spur Point	The barque Ella was wrecked at Spur Point on 11 January 1887. The wreck was later resold.

15.3.7 Due to the lack of sediment within which archaeological material could become buried, and the rocky, high energy environment within the proposed development area, the potential for the preservation of material associated with these reported losses is significantly reduced across most of the proposed development site. Any archaeological material which could survive is anticipated to primarily be limited to small and isolated finds. For example, two such find spots are recorded from Belle Grève Bay comprising:

- Amphora sherd found in Belle Grève Bay in 1999 (MGU5476); and
- A gold coin of Charles V of France, minted between 1365-1385, found amongst rocks fairly low down on Belle Grève beach in 2009 (MGU5402).

15.3.8 There are also a number of find spots from within St Sampson's harbour including:

- Roman coins found when excavating for the north arm of St Sampson's Harbour c. 1860 (MGU4573);
- Roman pottery found during dredging of St Sampson's harbour in the 19th century (MGU2217);
- Two stone axes found near St Sampson's harbour in the mid-19th century (MGU3625); and

- Three deadmen made from re-used timbers were salvaged from St Sampson's Harbour in 2003 when the marina was being created (MGU2912).

15.3.9 It is worth noting that no such find spots are currently known from the proposed development site, but from areas where there is greater sediment cover. This suggests that these types of finds are more likely to be encountered where sediment cover exists, including areas of the foreshore within the proposed development site. The foreshore, however, comprises rock and coarse sediment / shingle (**Figure 15-3**) which significantly reduces the potential for the preservation of archaeological material (in comparison to finer sands and silts, for example).

Figure 15-3 Foreshore Within the Project Footprint

15.3.10 Although the potential is considered to be low, such finds could comprise items lost from ships, or thrown into the sea, or possibly disarticulated sections of vessel structure. There is also potential for the remains of aircraft, although no aviation remains or reported losses of aircraft are in the study area. In particular, during World War II several British and German aircraft were lost in and around the Channel Islands. World War II military heritage is discussed further below.

15.3.11 Large sections of vessel or aircraft structure are unlikely to survive in this high energy environment. The section of the *Fermain* (MGU4635) is the only reported wreck structure within the study area, located c. 850m to the northeast of the proposed development site, outside the entrance to St Sampson's harbour. The stern of this metal steamship clearly survives under exceptional circumstances. The steamer was delivering coal to St Sampson's harbour when it was caught by high winds and drifted onto the Black Rock. The importance of the coal cargo was sufficient that a causeway was built out to the wreck so that the ship and its cargo could be salvaged. The reported section survives, partly filled with concrete, at the end of this 'causeway', presumably left *in situ* as it was either too difficult, or not worth salvaging at the time of loss in 1953.

15.3.12 With respect to the settings of these heritage assets, the six findspots, the recorded location of the 'tonnelle' (MGU3453) and the 13 reported losses do not constitute extant archaeological remains and, as such, they are not considered to have a 'setting' which contributes to their significance.

15.3.13 To the north of the proposed development site, the *Fermain* (MGU4635) (visible only at very low tides), St Sampson's Harbour (MGU6765), the slipway at Mont Crevelt (MGU5582) and St Sampson's breakwater (MGU5754) are all located in proximity to the industrial complexes around the harbour and have settings which are heavily influenced by this industrial environment.

15.3.14 The setting of the two breakwaters on Belle Grève Beach (MGU3449, MGU3450) and the slipway at Richmond Corner (MGU3455) is key to their significance as coastal heritage assets. The description of Character Area 3 (Belle Grève Bay) in **Chapter 16** (Landscape and Visual) states that the openness of the seascape of the Bay greatly adds to the character of the area. This open coastal setting is equally important to the setting of these heritage assets with their shoreline locations being fundamental to understanding their intended function. Similarly, the open sea setting of the Vivian Beacon (MGU6974) is also key to understanding its intended function, although views to the shore from this location already include the existing Longue Hougue Reclamation Site.

Buried Archaeology and Cultural Heritage Assets Above High Water

15.3.15 World War II archaeology and cultural heritage is discussed separately below.

15.3.16 There are no records within the proposed development site and one record immediately adjacent which concerns the former location of the Spur Point Battery, dating from before 1816 (MGU222) (**Figure 15-4**). This was one of a series of batteries defending Belle Grève Bay but there are now no visible remains. A 2018 update to the SMR record states that:

“*The site is overgrown and so it is difficult to be sure that there are no traces left. Stone No.2 can still be seen on the western side of the headland just outside the rock armouring. It may have been moved and re-erected when the armour was built*.”

15.3.17 The location of Spur Point Battery was visited by Royal HaskoningDHV during the ground truthing exercise and no remains were observed.

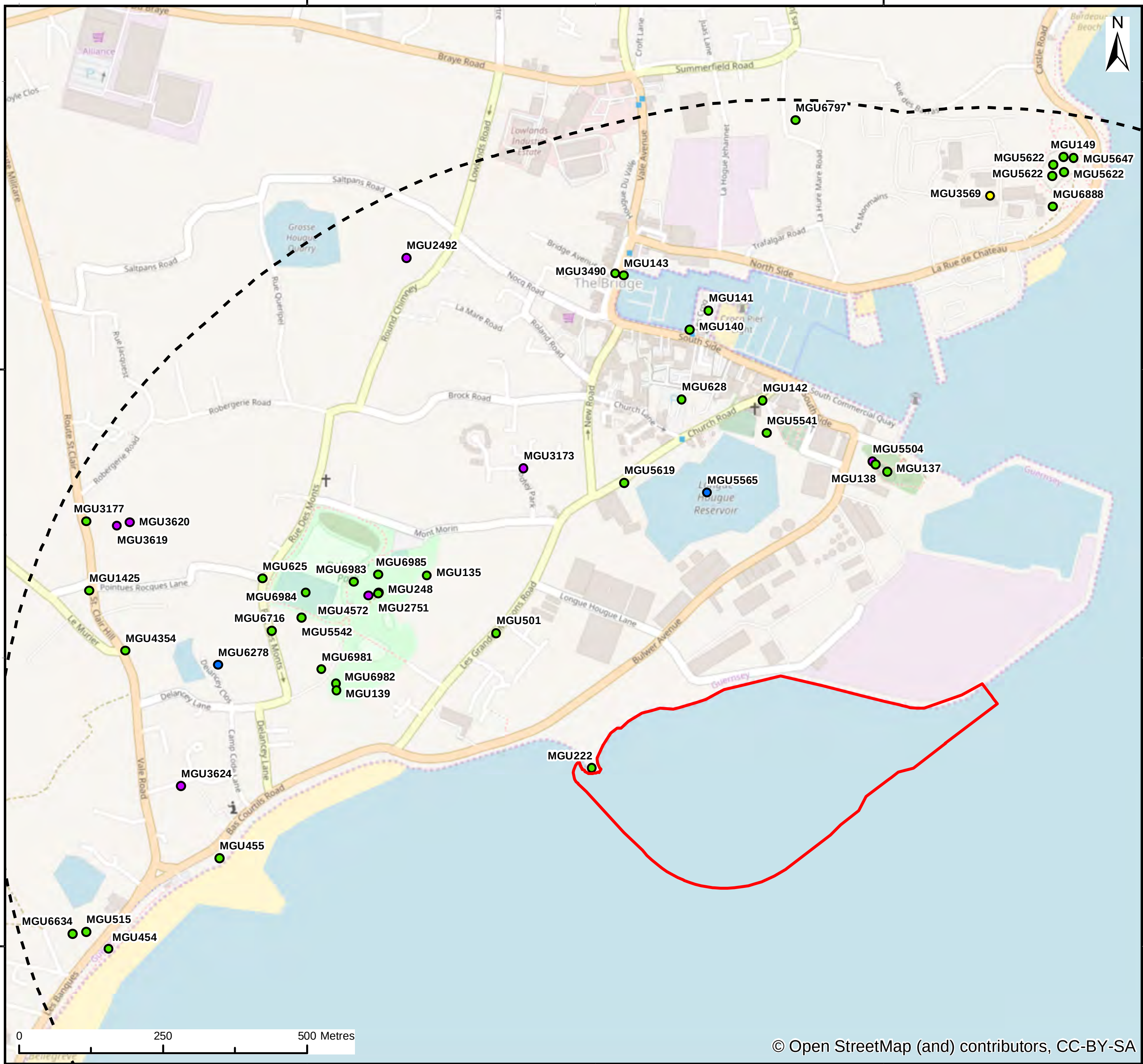
15.3.18 There are 47 further records in the SMR data set relating to archaeological sites, find spots, and to both extant and destroyed cultural heritage assets. These are all located beyond the footprint of the Project boundary (**Figure 15-4**). It is important, however, to consider the potential for impacts to the setting of heritage assets from the project. Thirty-four of these records correspond to archaeological sites or findspots, or to former heritage assets which have been destroyed, including several relating to defensive structures associated with the threat of invasion from France in the late 18th/early 19th century.

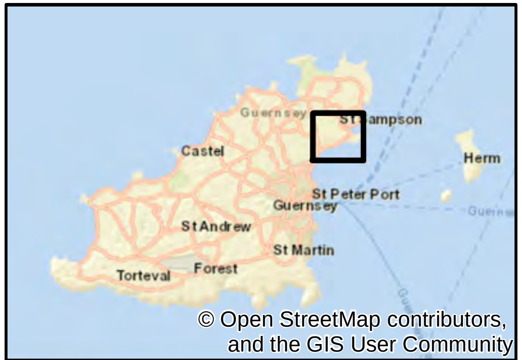
15.3.19 For each of these, setting is not considered to contribute to the significance of the heritage asset as it is either no longer present (i.e. findspots and excavated archaeological sites) or the extent of any surviving archaeological material (i.e. former structures or monuments which have been destroyed) is limited or uncertain. These records can provide an indication of the potential for further buried remains within the study area above the high-water mark, however, due to the limited nature of works above high water (comprising only temporary haul roads, compounds and security fencing), the potential for encountering buried archaeological remains is considered to be low.

15.3.20 Extant cultural heritage assets within the study area are listed in **Table 15-2**.

15.3.21 Vale Castle (MGU149) and the magazine at Vale Castle (MGU149) are located towards the northern edge of the 1km study area and existing views towards the site from Vale Castle are interrupted by the industrial area around St Sampson’s Harbour as shown in **Figure 15-5**. Similarly, Mont Crevelt Fort (MGU137) and the pre-Martello tower (MGU138) and five further extant assets located to the north and north west of the site (MGU140, MGU141, MGU142, MGU143 and MGU5541), are all located within the environs of the industrial complexes around the harbour area, with settings heavily influenced by the existing industrial environment.

15.3.22 The settings of the four recorded assets in the vicinity of Delancey Park (MGU135, MGU139, MGU6716 and MGU501) are largely insular to the park and its environs with limited visibility towards the proposed site due to the presence of intervening vegetation and buildings, as demonstrated by the representative view from Delancey Park included in the landscape and visual assessment **Chapter 16 Landscape and Visual Character** (Viewpoint RV14).





Legend:

Outline of Proposed Development

Study Area

Record Type

- Find Spot
- Landscape
- Monument
- Place

Client:	Project:
States of Guernsey	Longue Hougue South EIA

Title:

Terrestrial Heritage Assets

Figure: 15.4 Drawing No: PB5312-300-025

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Co-ordinate system: Guernsey Grid

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Table 15-2: Extant Heritage Assets Within the Study Area

MonUID	Name	Designation Status
MGU135	Delancey Gallery Grave	Protected Monument - PM83
MGU137	Mont Crevelt Fort	Protected Monument - PM93
MGU138	No.3 Pre-Martello Tower at Mont Crevelt	Protected Monument - PM93
MGU139	Delancey Battery	Protected Monument - PM94
MGU140	De Lisle Brock Memorial Stone	Protected Monument - PM84
MGU141	Obelisk at South Side, St Sampson	Protected Monument - PM85
MGU142	Drinking Fountain	Protected Monument - PM86
MGU143	Parish Boundary Stone on the Bridge	Protected Monument - PM88
MGU149	Vale Castle	Protected Monument - PM124
MGU501	Milestone No.II, Grande Maison Road	Protected Monument - AM.A80/11
MGU5541	Channel Queen Monument, St Sampson's Cemetery	Extant
MGU5647	Magazine at Vale Castle	Extant
MGU6716	Board of Ordnance Stone built into Delancey wall	Extant

World War II Heritage Assets

15.3.23 There are 75 records directly associated with World War II activity within the study area (**Figure 15-6**).

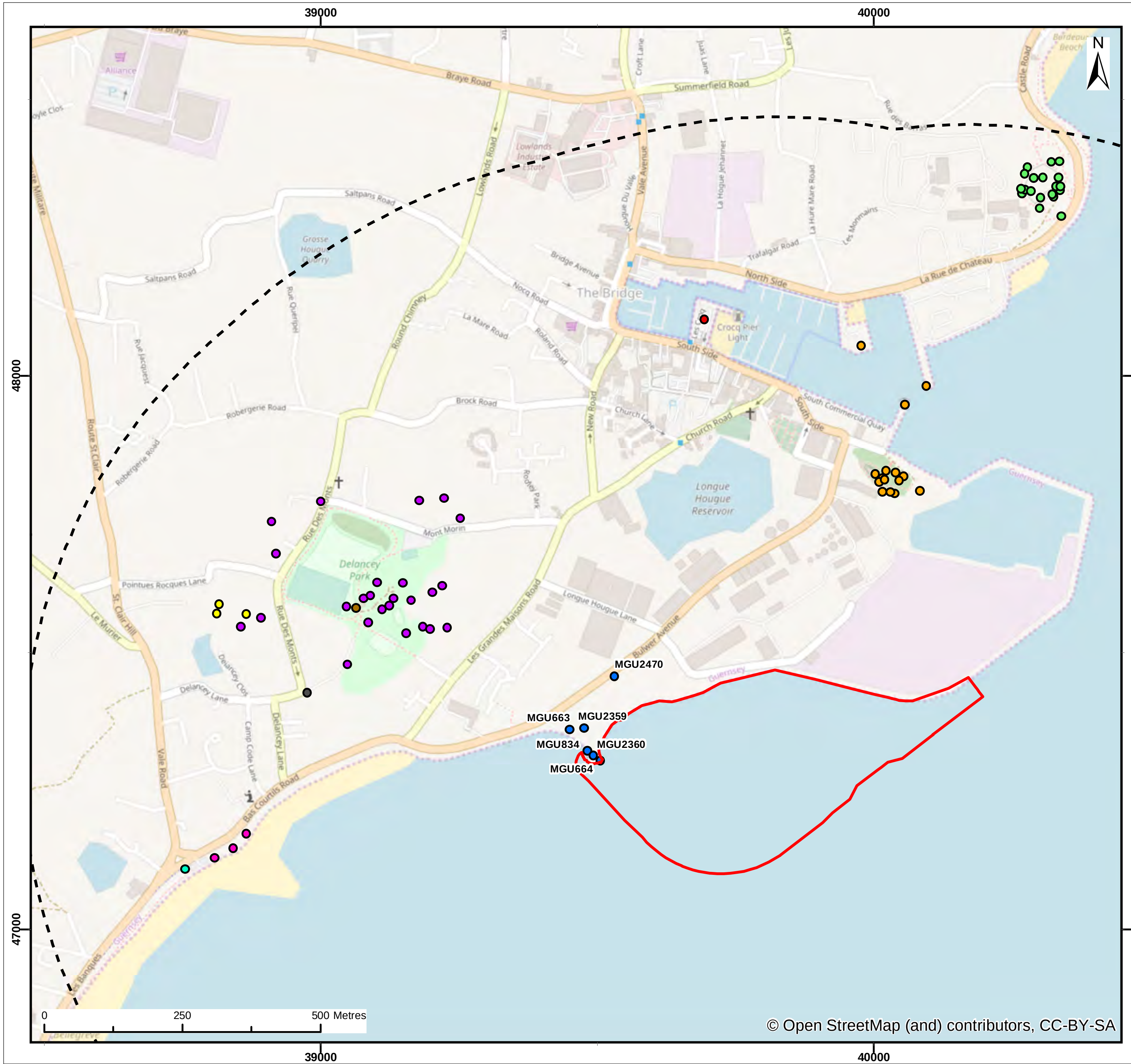
15.3.24 During World War II the Channel Islands were the only part of the British Isles to be occupied by German forces, from 30th June 1940 until 9th May 1945. During this time, the occupying forces constructed fortifications and other facilities as part of the Atlantic Wall, the system of coastal defence against Allied invasion constructed along the coast of Nazi-occupied Europe and Scandinavia.

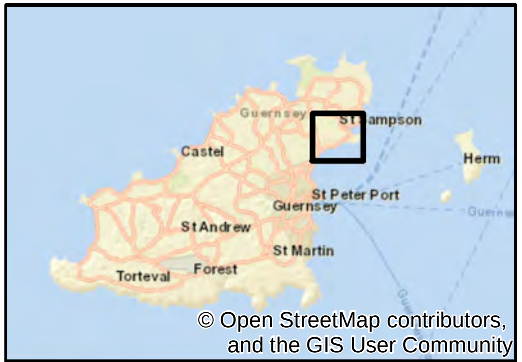
15.3.25 There are six records located immediately adjacent to the proposed development site (**Table 15-3**), all relating to the resistance nest (Widerstandsnest) *Richardseck*, which was constructed during German occupation of the island, partly built into the old fort, presumably referring to Spur Point Battery (MGU222) described above.

Figure 15-5 View from Vale Castle towards Mont Crevelt Over St Sampson's Harbour (Photo Provided by Nicolas Pearson Associates)

15.3.26 The recorded locations for five of these six heritage assets were visited during the site visit on 2nd May 2019 in order to determine the nature and extent of any surviving remains. The only location not visited was that furthest from the site, notably MGU2470. No specific remains were seen at the location of the overall record for the resistance nest (MGU834), assumed to be a general record covering all former emplacements within the area. Neither were any remains observed at the locations of MGU2360, the site of a hut. The recorded location was overgrown with vegetation and no upstanding structures were observed.

15.3.27 At the site of the gun casemate MGU2359 a garden was observed with features including ornaments and a pond. The SMR record is marked as being based upon uncertain evidence and, based upon the observations during the site visit, it has been assumed that this is a duplicate record of the gun casemate MGU663, or an error.





Legend:

- Outline of Proposed Development
- Study Area

Area

- Batterie Sperber
- Hohlgangsanlage 1
- IR 584
- Les Banque German Sign
- Mont Morin Embrasure
- Strongpoint (Stuetzpunkt) Talfeste
- Resistance Nest (Widerstandsnest) Schoenbucht-Mitte
- Resistance Nest (Widerstandsnest) Krevelberg
- Resistance Nest (Widerstandsnest) Simsonhafen
- Resistance nest (Widerstandsnest) Richardseck

Client:	Project:
States of Guernsey	Longue Hougue South EIA

Title: World War II Heritage Assets

Figure: 15.6 | Drawing No: PB5312-300-026

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Table 15-3: Recorded World War II heritage assets immediately adjacent to the proposed development site

MonUID	Name	Summary from SMR
MGU834	Resistance Nest "Richardseck" at Spur Point	Resistance nest (Widerstandsnest) Richardseck between Strongpoints Talfeste and Hafenschloss. Part of the coastal defence designed to prevent enemy landing. Defences included 10.5cm K331(f) casemate (GU663); emplacements for 3x 2cm Flak (GU664); personnel
MGU663	10.5cm K331(f) Gun Casemate at Spur Point (Wn. Richardseck)	Part of German WW2 Resistance Nest (Widerstandsnest) "Richardseck" guarding Belle Grève Bay.
MGU664	2cm Flak Gun Emplacement at Spur Point Battery (Wn.Richardseck)	Part of German WW2 Resistance Nest (Widerstandsnest) "Richardseck" guarding Belle Grève Bay. Collapsing onto the beach. An unusual design.
MGU2359	10.5cm K331 (f) Gun Casemate (part of MGU834)	This Gun Emplacement is part of Wn Richardseck (MGU834)
MGU2360	Site of hut (part of MGU834)	This site is part of Wn Richardseck (GU834).
MGU2470	Tobruk for Tank Turret, part of MGU834	This Tobruk for a Tank Turret is part of Wn Richardseck (MGU834).

15.3.28 The gun casemate MGU663 is the most extant of the surviving remains (**Figure 15-7**) and is located directly on the edge of the foreshore c. 35m south of Bulwer Avenue and c. 45m from the westernmost point of the proposed development site. The setting of this heritage asset is considered to contribute to its significance as a World War II coastal defensive structure. Views towards the proposed development site, however, are largely screened by intervening vegetation with the front of the gun emplacement facing south west, away from the site (**Figure 15-8**).

Figure 15-7 MGU663 10.5cm K331(f) Gun Casemate at Spur Point (Wn. Richardseck)

Figure 15-8 View Towards the South-west from the Landward Side of MGU663

15.3.29 The gun emplacement MGU664 also survives, albeit collapsing on to the beach. The SMR record includes the following note:

"*It looks like the 2cm flak position may be at risk, as it's right where the outside of the new reclamation looks to meets the land on that side. You can see that a small section on the front has already fallen away. The position itself is a one off for Guernsey. This is unusual in that it was intended to form the base for the flak gun, with the emplacement built on top in timber or some other material. The only other examples I know of are in Alderney but these are of a slightly different design (Paul Bourgaize 19/01/2018)*."

15.3.30 **Figure 15-9** shows this emplacement as viewed during the site visit. As described by the SMR this heritage asset is collapsing on to the beach and scattered, fragmented masonry was also observed on the adjacent foreshore. Furthermore, as a coastal defensive structure, the setting of this heritage asset is also considered to form a fundamental part of its significance. However, given the poor condition of the asset (**Figure 15-10**), measures to record and ensure the longevity of the structure may represent a positive outcome of the proposed scheme. Potential mitigation options are discussed further in **Section 15.6**.

15.3.31 The remaining World War II records may be summarised as follows:

- 19 records corresponding to defensive elements at Vale Castle, associated with the Strongpoint (Stuetzpunkt) *Talfeste*, built to guard St Sampson's Harbour;
- 12 records corresponding to defensive elements at Mont Crevelt Fort associated with the Resistance Nest (Widerstandsnest) *Krevelberg*;
- 4 records corresponding to defensive elements within St Sampson's Harbour including the Resistance Nest *Simsonhafen* and a machine gun emplacement, flak emplacement and searchlight associated with the Resistance Nest *Krevelberg*;
- 3 records associated with the Resistance Nest (*Widerstandsnest*) *Schoenbucht-Mitte* guarding Belle Grève Bay;
- A German painted sign on the outside of a tram stop on the east side of Les Banques at The Halfway, discovered during renovation in 2013 (MGU6592);
- 25 records corresponding to defensive elements associated with the army divisional battery (*Batterie Sperber*) at Delancey Park;
- 3 records associated with the headquarters of the 1st Battalion IR 584 Regiment, part of the 319 Infantry Division which manned the coastal defence installations;

- An unfinished German fuel store tunnel *'Hohlgangsanlage* 1' located beneath Delancey Park (MGU2283); and
- An embrasure for a machine gun in a wall at the south-west entrance to Delancey Park (MGU5511).

Figure 15-9 MGU664 2cm Flak Gun Emplacement at Spur Point Battery (Wn.Richardseck)

Figure 15-10 Masonry on the Foreshore Associated with MGU664, Collapsing onto the Beach

15.3.32 None of these are located within the footprint of the Project. With respect to their settings, as described for the extant terrestrial heritage assets described above, those World War II elements at Vale Castle, Mont Crevelt Fort and around St Sampson’s Harbour are already heavily influenced by the strong industrial feel of the harbour and its environs. Also, as above, with respect to those defensive structures which survive in and around Delancey Park (e.g. remains associated with the former *Batterie Sperber* and the headquarters of the 1st Battalion IR 584 Regiment) the settings are largely insular, with views towards the proposed development site curtailed by intervening vegetation and buildings.

15.3.33 The gun casemate (MGU662) and the tobruk pit (MGU2361) are both part of the resistance nest *Schoenbucht-Mitte* built to guard Belle Grève Bay. The gun casemate, and associate tobruk pit, has recently (in 2014) been dug out, restored and opened to the public as a well-preserved World War II bunker, with a range-finding mural and fixtures remaining in place in the structure that originally housed the anti-tank gun. The SMR record describes how the doors, grills, German writing and electrical fittings can all still be seen.

15.3.34 The setting of this heritage asset, in context with the other coastal defences, such as MGU663 and MGU664 on Spur Point, is fundamental to its significance as part of the defences established during the World War II German occupation and to understanding how the defences worked together as well as individually. As described above, the setting of these coastal defences to the north, including those at Vale Castle and Mont Crevelt, is already influenced by the industrial character surrounding St Sampson's harbour. However, the relationship between the resistance nest on Spur Point and this resistance nest in Belle Grève Bay, including sight lines between the two surviving gun casemates (MGU662 and MGU664) are considered to play an important contributory role to the significance of these heritage assets.

Conservation Areas and Built Heritage Assets

15.3.35 Within the study area there are two Conservation Areas (Delancey and The Bridge, Vale and St Sampson) and 64 historic buildings (**Figure 15-11**). All of which lie beyond the footprint of the project and potential activities associated with construction. Although there will be no direct, physical impact, it is important, to consider the potential for impacts to the setting of these heritage assets from the project.

15.3.36 Beyond the study area to the south are located the St Peter Port Conservation Area and further culturally significant buildings, such as Castle Cornet and Hauteville House, Victor Hugo's residence. These are assessed for landscape effects as Character Area 1 in **Chapter 16 Landscape and Visual Character** which concludes that the level of effect upon St Peter Port (Harbour and Principal Town) from both construction and operation will be minor adverse. In terms of visual effects, **Chapter 16 Landscape and Visual Character** also concludes that the level of effect upon viewers within St Peter Port Conservation Area will be **minor-adverse**. As potential impacts upon the setting of these heritage assets beyond the study area will be no more significant than the landscape and visual effects (minor adverse), concluded to be not significant, St Peter Port Conservation Area and associated historic buildings are not considered further within this chapter.

15.3.37 As set out in the IDP, the reason for designation of The Bridge, Vale and St Sampson conservation area is as follows:

"The Bridge is designated as a Conservation Area because of the importance of the special historic and architectural interest of St Sampson's Harbour and the surrounding area with its continuing links with development and industry, as both a recreational and a working port. It explains the pattern of development which grew up around the harbour and which broadly remains, and the different stages in that development. Transitions between small scale residential and commercial development in enclosed back streets through larger scale commercial and industrial buildings in more open surroundings, albeit with strong enclosure formed by historic walls, to the open aspect of the harbour itself and the outlying fortifications protecting the harbour and Le Clos du Valle all contribute positively to the special character and interest of the Bridge as a Conservation Area, added to by the many

features, both large and small scale, which remain so that it is desirable to preserve or enhance its character and appearance as described above."

15.3.38 There are 32 historic buildings recorded by the SMR as located within the Bridge conservation area.

15.3.39 As set out in the IDP, the reason for designation of the Delancey, St. Sampson conservation area is as follows:

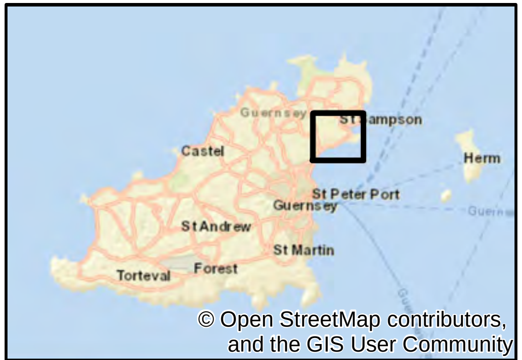
"The Delancey Conservation Area has visible features which make the area interesting in terms of its lengthy and continued historic development since pre-historic times, representing every period and aspect of the Island's history. The settlement pattern is made up of scattered farmsteads and clusters of nineteenth century residential buildings, which followed the historic road pattern and 20th century clos development. The area has some buildings that have historic and/or architectural interest, most of which are included on the protected buildings list. There are also some other structures related to the fortification of the Island that have historic interest and many of which are included on the protected monuments list. The area is designated as a Conservation Area to conserve the historic and architectural character and appearance of the area. The use of traditional materials and the unity of built form in terraces and groups of workers' cottages and the scale of the villas and cottages attractively arranged along the roads, often behind roadside boundaries, along with the open space, hougue landscape and vistas of Delancey Park, represent the particular character of this Conservation Area."

15.3.40 There are 6 historic buildings recorded by the SMR as located within the Delancey conservation area.

15.3.41 The remaining 26 historic buildings are not located within a defined conservation area but only one of these is located within 250m of the proposed development site. Billingbear House (MGU1929) is a protected building dating from before 1900, a large detached house, and one of the first to be built along Bulwer Avenue. However, as demonstrated in **Chapter 16 Landscape and Visual Character**, intervening vegetation prevents views of the Site from Bulwer Avenue (a continuation of the Les Bas Courtils Road as it moves north towards St Sampson) and from the Delancey conservation area beyond.

Summary

15.3.42 A summary of the receptors identified above and their potential value/sensitivity to impacts are included in **Table 15-4**. The justification for the assigned value/sensitivity of the receptors is described further as part of the impact assessment in **Section 15.6** and **Section 15.7**.



Legend:

- Outline of Proposed Development
- Study Area
- Conservation Area

Record Type

- Building

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Client:	Project:
States of Guernsey	Longue Hougue South EIA

Title:

Conservation Areas and Built Heritage

Figure: 15.11 Drawing No: PB5312-300-027

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Table 15-4: Value / Sensitivity of Receptors

Receptor	Value / Sensitivity	Justification
Maritime and aviation finds below high water.	Medium	Low potential for encountering archaeological material, limited to isolated finds due to low levels of sediment cover. Limited value of isolated finds although some finds could have high significance (Wold War II aircraft remains, for example) so assigned medium value / sensitivity as a precautionary measure. Settings to the north are already heavily influenced by the industrial surroundings of St Sampson's Harbour although the open sea setting of the Vivian Beacon (MGU6974) and coastal setting of heritage assets in Belle Grève Bay are key to understanding their intended function.
Buried archaeology and cultural heritage assets above high water	Low	Low potential for encountering archaeological material due to limited extent of temporary works above high water. While extant heritage assets may be considered high value (many are also protected monuments), they are all located beyond the footprint of the proposed development site and associated temporary works with settings either internal to Delancey Park or already heavily influenced by the industrial surroundings of St Sampson's Harbour. Their sensitivity is therefore assessed to be low.
World War II heritage assets	Medium to high	The gun casemate MGU663 is located immediately adjacent to the new breakwater, albeit currently in a poor state of survival. The setting of World War II heritage assets is fundamental to their significance as a system of coastal defences put in place during the German occupation. However, on the whole, settings are either internal to Delancey Park or already heavily influenced by the industrial surroundings of St Sampson's Harbour, sight lines between MGU662 (Belle Grève Bay) and MGU664

Receptor	Value / Sensitivity	Justification
		(Spur Point) would have greater sensitivity to the proposed development.
Conservation areas and built heritage assets	Low	The conservation areas and built heritage assets are all located beyond the footprint of the proposed scheme. Views from the west (Delancey conservation area and Billingbear House (MGU1929)) are screened by vegetation whilst views from the north (The Bridge, Vale and St Sampson) are already heavily influenced by the industrial surroundings of St Sampson's Harbour). Although these assets are of medium to high value, they are considered to be of low sensitivity to the proposed scheme.

15.4 Do Nothing Scenario

15.4.1 In a do-nothing scenario there is no anticipated change to the heritage assets within the study area or their settings with the exception of the Spur Point flack emplacement (MGU664) which would continue to erode on to the foreshore. Without intervention this structure would be lost to the sea in the foreseeable future. Ultimately the shingle ridge and rocky shore would be cut back by a rise in sea level which could also threaten the longer-term survival of the two coastal casemate structures MGU662 (Belle Grève Bay) and MGU663 (Spur Point).

15.5 Methodology for EIA

15.5.1 The assessment of potential impacts mirrors that set out in **Section 5 EIA Methodology** with some adaptation specifically relevant to the assessment of impacts to archaeology, built and cultural heritage.

15.5.2 In defining receptor sensitivity and value the assessment focuses upon the 'significance' of those heritage assets which are identified as being subject to impact and (in assessing potential setting impacts) the extent to which setting contributes to that significance. For each receptor, the justification for the assigned value / sensitivity in **Table 15-4** is explained as part of the impact assessment in **Section 15.6** and **Section 15.7**.

15.5.3 As stated in **Section 5 EIA Methodology**, the ability of a receptor to adapt to change, tolerate, and/or recover from potential impacts is key to assessing its sensitivity to the impact under consideration. However, while impacts to a heritage asset's setting or character can be temporary, impacts which result in damage or destruction of the assets themselves, or their relationship with their wider environment and context, are permanent. Once destroyed a heritage asset cannot recover. For this reason, the sensitivity of heritage assets is often determined solely by their significance when considering direct impacts.

15.5.4 Heritage 'significance' is the sum of the heritage values that we, as a society, recognise in a heritage asset and seek to protect or enhance for future generations. Specific to Guernsey historic environment policy (see **Section 15.2**), Principle 2 emphasises the need to understand what is important to the community about the historic environment and why, and that special character and interest can derive from one or more of the following values (Development and Planning Authority, 2016: 8):

- The evidence that it can provide about all aspects of the way past generations lived;
- Its architectural, artistic and aesthetic quality;
- Its historic associations and archaeological value;
- The way materials, methods or craftsmanship are displayed;
- The way it represents a particular social or economic aspect of island life;
- The way that different layers of history or changes in architectural style contribute to individual special character;
- Its spiritual, commemorative or communal interest; and
- Its rarity or uniqueness.

15.5.5 It is a combination of these factors which forms the 'significance' of a heritage asset. Any judgement on the scale of this 'significance' (high, medium, low, negligible) for the purposes of this EIA, therefore, is necessarily reliant on professional judgement. The judgements set out in **Table 15-4**, therefore, are qualified with a narrative description included below as part of the impact assessment to ensure full transparency for the decision maker on how judgements have been reached.

15.5.6 'Magnitude' is assessed with specific regard to the magnitude of change to the described significance of a heritage asset. Change can be either adverse or beneficial and, while impacts upon the setting of heritage assets may depend upon the scale and duration of a project, the finite nature of archaeological remains means that physical impacts are almost always adverse, permanent and irreversible (i.e.

the ‘fabric’ of the asset and, hence, its potential to inform our historical understanding, will be removed).

15.5.7 The nature of the change from the baseline ‘significance’ will, therefore, be described and a judgement made as to the magnitude of that change (high, medium, low, negligible), again supported by a narrative description of how that judgement has been reached.

15.5.8 For the purposes of this section, the significance of the impact in EIA terms will therefore be presented as an overall judgement (major, moderate, minor, negligible) based upon consideration of the significance of a heritage asset and the magnitude of change to it. This will follow the impact significance matrix in **Table 5-1** and the impact significance definitions in **Table 5-2**.

15.6 Impacts During Construction

CONSTRUCTION IMPACT 15.1: Direct Impact on Maritime and Aviation Archaeology Below High Water

15.6.1 As described in **Section 15.3**, there are no known extant heritage assets below high water and the potential for previously undiscovered archaeological remains to be present within the proposed development site is limited to small and isolated finds which may survive within the rocks of this high energy environment.

15.6.2 Isolated, chance finds are likely to be of limited significance as individual discoveries although the occurrence of a number of seemingly isolated objects within a particular area has the potential to provide information on wider patterns of maritime activity or may even indicate the remains of a previously undiscovered wreck. The significance of individual finds, or a group or finds, would need to be established, if found, on a case-by-case basis. There is also potential for discoveries of finds of high value, such as military aircraft remains which are automatically protected under the Protection of Military Remains Act 1986 (extended to Guernsey and the territorial waters in 1987). For the purposes of this assessment, therefore, isolated finds are assessed as being of medium significance as a precautionary measure.

15.6.3 The mechanism for encountering finds during construction is low as there are no works during which such finds would be brought to the surface (i.e. through seabed preparation works such as dredging) or during which a larger find might be encountered as an obstruction (i.e. through piling). Breakwater construction will use predominantly land-based equipment and techniques to place materials directly onto the seabed. However, any finds which are encountered and brought to the surface, will result in the destruction of their contextual relationship with the seabed, albeit a secondary context (i.e. not in-situ). Isolated artefacts do therefore, have limited capacity to accommodate physical changes or influences therefore resulting in only a minor loss of, or alteration to, key characteristics, features or elements. The impact significance is, therefore, considered to be **minor adverse**.

15.6.4 If finds are noted by work teams during construction, then these should be reported by the means of a protocol for archaeological discoveries.

15.6.5 The main objective of the protocol for archaeological discoveries, to be implemented and applied throughout works, will be for those working on the scheme to report unexpected archaeological discoveries in a manner that is conducive to their everyday work and that allows for efficient reporting so that archaeological advice can be provided in a timely manner. Training to construction staff, site crews and work teams with regard to the practical application of the protocol in their day to day work would be required and the protocol will include provision for archaeological monitoring to support its implementation.

15.6.6 Specific objectives of the protocol will include:

- Ensuring all staff and contractors are fully aware of the mechanisms for reporting under the protocol and are provided with advice on identifying finds, 'first-aid for finds' and initial recording;
- Ensuring that all discoveries are addressed in an efficient and proportionate manner to prevent adverse effects from further impacts associated with the proposed scheme; and
- Ensuring that details of the discovery(ies) are forwarded to the States Archaeologist, the Receiver of Wreck and the MOD (if required), and any other stakeholders, as relevant and required.

15.6.7 The proposed protocol would be agreed in advance of works commencing the States Archaeologist and will be set out in accordance with the principles of the methodology adopted for existing industry good practice protocols including:

- The marine aggregates industry protocol set out in the British Marine Aggregate Producers Association (BMAPA). Protocol for reporting finds of archaeological interest (BMAPA and English Heritage, 2005); and
- The Offshore Renewables Protocol for Archaeological Discoveries (ORPAD) (The Crown Estate, 2014).

15.6.8 If finds are encountered by work teams and brought to the surface, these will be retained for further assessment and provided with conservation as necessary to secure the long-term stabilisation of the artefact as proportionate to their significance.

15.6.9 With the implementation of the reporting protocol, therefore, the impact significance of **Construction Impact 15.1** is considered to be **negligible**.

CONSTRUCTION IMPACT 15.2: Direct Impact on Buried Archaeology and Cultural Heritage Assets Above High Water

15.6.10 There are no known cultural heritage assets within the proposed development area and, consequently, there will be no potential for direct impact.

15.6.11 The potential for encountering buried archaeology above high water during construction is considered to be low. This is due to the limited nature of works, comprising the installation of temporary haul roads, compounds and security fencing. The site compound (within the existing WTS and HWRC Working Area) (**Figure 4-3**) is located on reclaimed land (part of the existing Longue Hougue Reclamation Site that has been reclaimed since the 1990s) and given the shallow depth of ground works which may be required (for the compounds or haul roads, for example) will not impact on any pre-modern deposits. **No impact** is therefore expected.

15.6.12 However, as for potential maritime and aviation finds above, it is recommended that if archaeological material is noted by work teams during construction, this should be reported by the means of the protocol for archaeological discoveries as detailed above which will ensure that any such material can be recorded prior to loss (preservation by record) and, dependent upon the effective implementation of the protocol, would reduce the impact significance of **Construction Impact 15.2** to be **negligible**.

CONSTRUCTION IMPACT 15.3: Direct Impact on World War II Heritage Assets

15.6.13 All but one (MGU664) of the World War II heritage assets are beyond the boundary of the proposed development area and, consequently, there will be no potential for direct impact.

15.6.14 The proposed breakwater will meet the foreshore adjacent to the gun emplacement MGU664 and, without mitigation, it is anticipated that the construction of the breakwater will result in the destruction of the fragmented remains on the foreshore as well as a change to the physical context of the gun emplacement foundation which survives. This is assessed as an asset of high value / sensitivity and, as the potential magnitude of change resulting from the placement of the breakwater should also be considered to be high, this will result in a potentially **major adverse** direct impact.

15.6.15 However, as described for the do-nothing scenario (**Section 15.4**), this asset is currently in a poor state of survival and without intervention this could be lost to the sea in the foreseeable future. Mitigation measures to record and, if possible, to ensure the longevity of this structure as part of the proposed scheme, may, therefore, represent a **major positive** impact. It is recommended that consultation is carried out with the Guernsey Culture and Heritage curatorial team to agree mitigation measures appropriate to the long-term preservation of this heritage asset. This may include further consideration of the placement of the breakwater or working methods to minimise direct impact and fencing / screening of the foundation to prevent accidental damage during the construction phase.

CONSTRUCTION IMPACT 15.4: Direct Impact Conservation Areas and Built Heritage Assets

15.6.16 The two Conservation Areas and all of the built heritage assets are located outside the proposed development area and, consequently, there will be **no impact**.

CONSTRUCTION IMPACT 15.5: Indirect Impact Associated with Changes to Coastal Processes

15.6.17 The full assessment of potential changes to coastal and marine process are assessed in **Chapter 7 Coastal and Marine Processes**. The construction of the proposed facility could cause a range of effects on coastal and marine processes and the magnitude of these effects has been assessed using hydrodynamic numerical modelling and expert geomorphological assessment. The receptors that have been specifically identified in relation to coastal and marine processes are Herm Ramsar and Belle Grève Bay Area of Biodiversity Importance. In both cases, the effects that have been assessed resulted in no impact or negligible impact to these receptors.

15.6.18 There will, therefore, be **no impact** to heritage assets associated with changes to coastal and marine processes (for example, if changes could result in buried heritage assets becoming exposed, or exposed heritage assets becoming buried).

CONSTRUCTION IMPACT 15.6: Impacts on the Setting of Heritage Assets

15.6.19 The proposed development has the potential to cause an indirect impact on the setting of designated and non-designated heritage assets within 1km of the site, through noise and visual disturbance associated with construction activities.

15.6.20 As summarised in **Table 15-4** all heritage assets to the north of the proposed development site, located within the environs of St Sampson's Harbour are already heavily influenced by the current industrial setting and their sensitivity to settings impacts are assessed as low. Similarly, all heritage assets to the west, including those in and around Delancey Park, are screened with intervening vegetation and buildings, with settings largely internal to the conservation area, and their sensitivity to settings impacts are also assessed as low.

15.6.21 The magnitude of change to the setting of these assets is assessed as low. Construction activities will be temporary (limited to the duration of the construction phase) and when considered alongside the activities associated with the neighbouring, existing facility the nature of change relative to the baseline will be small.

15.6.22 Impacts to the setting of heritage assets to the north and west of the proposed development site will, therefore, be **minor adverse**. This is supported by the conclusions of **Chapter 16 Landscape and Visual Character** in which views from Delancey Park and from the Bridge, Vale and St Sampson Conservation Area (excluding Vale Castle) are scoped out of assessment for landscape and visual effects. Also, in **Chapter 16 Landscape and Visual Character**, potential effects upon the view from Vale Castle itself are assessed as being minor adverse to negligible.

15.6.23 To the east of the proposed development site the open sea setting of the Vivian Beacon (MGU6974) is assessed as key to its significance and understanding its intended function. Its value/sensitivity is, therefore, considered to be **medium**. Seawards there will be no change to this open sea setting of the beacon and towards the shore, the existing facility already appears in its setting. Furthermore, given the temporary nature of the construction activities, the magnitude of change from the proposed scheme is assessed as low. The overall impact upon the setting of the beacon, therefore is assessed as **minor adverse**. This is also supported by the assessment of landscape and visual effects in **Chapter 16 Landscape and Visual Character** which concludes that the level of effect upon Character Area 4, The Open Sea with Islands (and Ferry Routes) will be **minor adverse**.

15.6.24 Heritage assets to the south west, within Belle Grève Bay, are assessed as being of medium value / sensitivity with respect to potential setting impacts. In particular, sight lines between MGU662 (Belle Grève Bay) and MGU664 (Spur Point) will be impacted by the construction of the proposed development. However, the presence of the proposed scheme will result in only a small change to the baseline, given the presence of the existing, adjacent facility which is already visible in views towards the site and the temporary nature of construction activities, and the magnitude of this change is considered to be low. The overall impact upon the setting of heritage assets in Belle Grève Bay, therefore is assessed as **minor adverse**.

15.6.25 The assessment of landscape and visual effects presented in **Chapter 16 Landscape and Visual Character** for Character Area 3 Belle Grève Bay concludes that the landscape effects will be **moderate-minor adverse** while the visual effect upon recreational and other beach users in Belle Grève Bay will be **moderate adverse**. However, it is also recognised that much of the view remains unchanged with the magnitude of change being medium for viewers nearer the site and low for viewers further away. For users of the public footpath (from the East Coast Road continuing along the shore near the Site) the level of visual effect is concluded as being substantial adverse.

15.6.26 There will, therefore, be a high magnitude change in the setting of heritage assets closer to the site, in particular to gun casemate MGU664, with access restricted during construction activities due to the construction of the breakwater immediately adjacent to the site. This will result in **major adverse** impact upon the setting of the gun casemate. However, given the poor current condition of the asset, as discussed above, there is potential for a **major positive** benefit through the implementation of mitigation measures to record and ensure the survival of the asset (to be agreed in consultation with the Guernsey Culture and Heritage team) long term.

15.7 Impacts During Operation

OPERATIONAL IMPACT 15.7: Direct Impact on Maritime and Aviation Archaeology Below High Water

15.7.1 The operational phase will involve gradual infilling of the area between the breakwater and the shoreline with inert waste. As described in **Section 15.3**, there are no known extant heritage assets below high water and the potential for previously undiscovered archaeological remains to be present within the proposed development site is limited to small and isolated finds which may survive within the rocks of this high energy environment.

15.7.2 As described for construction above, isolated finds are assessed as being of medium significance. The potential for such finds to be present is considered to be low and there is no mechanism for encountering finds during the placement of inert waste. Any finds would, therefore, remain, albeit buried within the reclaimed area. The magnitude of change therefore, is considered to be low.

15.7.3 The impact significance of **Operational Impact 15.7** is therefore considered to be **minor adverse**.

OPERATIONAL IMPACT 15.8: Direct Impact on Buried Archaeology and Cultural Heritage Assets Above High Water

15.7.4 The infill will proceed up to the current shoreline only and will not extend beyond the existing rock armour on to the path behind it. There will, therefore, be **no impact** to buried archaeology and cultural heritage assets above high water.

OPERATIONAL IMPACT 15.9: Direct Impact on World War II Heritage Assets

15.7.5 As all World War II heritage assets are located landwards of the current shoreline, there will be **no impact**.

OPERATIONAL IMPACT 15.10: Direct Impact Conservation Areas and Built Heritage Assets

15.7.6 As both conservation areas and all built heritage assets are located landwards of the current shoreline, there will be **no impact**.

OPERATIONAL IMPACT 15.11: Indirect Impact Associated with Changes to Coastal Processes

15.7.7 As for construction, the effects that have been assessed for operation in **Chapter 7 Coastal and Marine Processes** resulted in no impact or negligible impact to these receptors. There will, therefore, be **no impact** to heritage assets associated with changes to coastal and marine processes.

OPERATIONAL IMPACT 15.12: Impacts on the Setting of Heritage Assets

15.7.8 As described in **Chapter 4 Project Description** operational activities at the site are limited to the equipment used during the operation of the site will comprise a 21-tonne tracked excavator, two tracked loaders and 4x4 pick up. The operational facility will be located within the existing WTS and, therefore, there will be no change to the baseline setting of heritage assets from operation activities. Once constructed, the presence of the breakwater within the setting of heritage assets will be no more than that assessed for construction above. Therefore, the impact upon the setting of those heritage assets with views of the breakwater is assessed as **minor adverse**.

15.8 Cumulative Impacts

15.8.1 The Screening of projects for the potential for cumulative effects is described in **Chapter 5 EIA Methodology** and presented in **Table 5.4** and **Figure 5.2**. With respect to direct impacts none of the projects shares a footprint with the proposed development site and there is, therefore, no potential for cumulative impact.

15.8.2 With respect to indirect impacts associated with changes to coastal processes (**Chapter 7 Coastal and Marine Processes**) there are no projects scoped-in for assessment for cumulative impacts. The existing Longue Hougue Reclamation Site is considered to be part of the baseline and is therefore not assessed as part of the cumulative impacts.

15.8.3 With respect to impacts upon the setting of heritage assets, the assessment of landscape and visual effects in **Chapter 16 Landscape and Visual Character** considers the following planned works:

- infilling of the temporary opening formed in existing Mont Crevelt breakwater as part of works for St. Sampson's marina project;
- temporary re-location (for a period of 24 months) of the household waste recycling facility and development of a construction lay down area, associated with the development of the Longue Hougue waste facility; and
- housing allocations to the rear of housing that fronts Les Banques and Les Bas Courtils.

15.8.4 **Chapter 16 Landscape and Visual Character** concludes that the works at the existing Longue Hougue Reclamation Site and for the Mont Crevelt breakwater will already have occurred by the time construction starts for Longue Hougue South. Therefore, when considered cumulatively with other planned developments, the impact upon landscape and visual receptors will be no greater than for the facility alone. Furthermore, **Chapter 16 Landscape and Visual Character** concludes that housing development to the rear of Les Banques and Les Bas Courtils will not perceptibly change the East Coast Road, beach frontage and seafront character. Overall, there would be some additional visual change although the additional effects in existing views, beyond those arising from the proposed development, would be barely perceptible and would not result in any significant cumulative visual effects.

15.8.5 Due to the planned completion of works to Mont Crevelt breakwater and the household waste facility before the anticipated commencement of construction at Longue Hougue South, and due to the absence of any significant cumulative visual effects from the proposed housing developments, it is concluded that there will be no significant cumulative effects upon the setting of heritage assets.

15.9 Summary

15.9.1 A summary of the impacts is detailed in **Table 15-5**.

Table 15-5: Summary of Impacts on Material Assets

Impact	Significance	Mitigation	Residual Impact	Monitoring
Construction				
Direct impact on maritime and aviation archaeology below high water	Minor adverse	Protocol for archaeological discoveries	Negligible	N/A
Direct impact on buried archaeology and cultural heritage assets above high water	Minor adverse	Protocol for archaeological discoveries	Negligible	N/A
Direct impact to gun emplacement MGU664	Major adverse	Mitigation to record and preserve the remains (including working methods developed with the Guernsey Culture and Heritage curatorial team)	Major Positive	N/A
Direct impact on all other World War II heritage assets	No impact	N/A	No impact	N/A
Direct impact conservation areas and built heritage assets	No impact	N/A	No impact	N/A
Indirect impact associated with changes to coastal processes	No impact	N/A	No impact	N/A

Impact	Significance	Mitigation	Residual Impact	Monitoring
Impacts on the setting of heritage assets	Minor adverse	N/A	Minor adverse	N/A
Impact on the setting of gun emplacement MGU664	Major adverse	Mitigation to record and preserve the remains	Major Positive	N/A
Operation				
Direct impact on maritime and aviation archaeology below high water	Minor adverse	N/A	Minor adverse	N/A
Direct impact on buried archaeology and cultural heritage assets above high water	No impact	N/A	No impact	N/A
Direct impact on World War II heritage assets	No impact	N/A	No impact	N/A
Direct impact conservation areas and built heritage assets	No impact	N/A	No impact	N/A
Indirect impact associated with changes to coastal processes	No impact	N/A	No impact	N/A
Impacts on the setting of heritage assets	Minor adverse	N/A	Minor adverse	N/A

Impact	Significance	Mitigation	Residual Impact	Monitoring
Cumulative Impacts				
Direct impact to heritage assets	No impact	N/A	No impact	N/A
Indirect impact associated with changes to coastal processes	No impact	N/A	No impact	N/A
Impacts on the setting of heritage assets	No impact	N/A	No impact	N/A

16 Landscape and Visual Character

16.1 Content and Data

Content

16.1.1 This Landscape/ Townscape/ Seascape and Visual Assessment (LTSVIA) has been carried out by Nicholas Pearson Associates Ltd on behalf of Royal Haskoning DHV as part of an Environmental Statement (ES) in support of the planning application for the States of Guernsey for a proposed land reclamation project using inert waste at Longue Hougue South (the Project) on the east coast of Guernsey. This lies adjacent to and south of the current land reclamation facility, Waste Transfer Station (WTS) and Household Waste & Recycling Centre (HWRC) (on the existing Longue Hougue Reclamation Site) and adjacent to the Longue Hougue industrial area.

16.1.2 Nicholas Pearson Associates is a registered practice with the Landscape Institute (LI) and is an IEMA Quality Mark Member. A Chartered Landscape Architect (CMLI) experienced in Landscape and Visual Impact Assessment has prepared this assessment.

16.1.3 For clarity throughout this chapter of the ES, the term ‘landscape’ has been used to describe all combinations of, and relationships between, built form, surrounding ‘open’/undeveloped space and other natural and man-made features within the Site location. Townscape and seascape are included as a type of landscape.

16.1.4 The assessment considers the likely significant effects of the Project on the environment in respect of landscape (including townscape and seascape) and visual effects and is supported by the following figures and appendices:

- Appendix 16.1: Methodology.
- Appendix 16.2: Figures.
- Appendix 16.3: Photomontages.
- Appendix 16.4: Photomontage Methodology.
- Appendix 16.5: List of Representative and Recognised Views.
- Appendix 16.6: Landscape Value Considerations from GLVIA3.
- Appendix 16.7: Table of Relevant Policies from the Island Development Plan.
- Appendix 16.8: Landscape and Visual Scoped Out Cumulative Effects.
- Appendix 16.9: Indicative sketch idea showing peripheral planting areas, access and views.

16.1.5 This chapter should be read in conjunction with other ES chapters particularly the related ES chapters:

- Chapter 15 Material Assets.
- Chapter 17 Marine Ecology.
- Chapter 18 Terrestrial Ecology and Ornithology.

Study Area

16.1.6 The study area is 5km out to sea to include the western edge of the island of Herm and a distance of 1km to the west along the landward side. Refer to **Appendix 16.2** Figures, Figure 1 Study area. The study area was based on the Visual Envelope or area from which the Site may be visible. The sea allows open views from 5km distance, such as from Herm. However, there is reduced visibility from inland areas about 1km west of the East Coast Road, due to intervening higher land/ built form/ trees just west of the East Coast Road.

16.1.7 Impacts are considered on the landscape/ townscape/ character areas and viewers, receiving views, from publicly accessible locations within the study area. The assessment has been based upon the project description which can be found in ES **Chapter 4 Project Description**.

Data Sources and Surveys Undertaken

16.1.8 A review of baseline information includes the following States of Guernsey documents:

- Guernsey Character Study (GCS) (Stage 1) June 2013; and
- The Island Development Plan (IDP) 2016 and the following IDP annexes are relevant in describing the landscape/ townscape/ seascape context: Annex V Landscape Character, Annex VII Conservation Areas.

16.1.9 The GCS does not include coastline / marine character areas, and the IDP includes coastal but not marine character areas, which is where part of the proposed development is situated. This was a limitation of the published baseline data.

16.1.10 However, site-specific character areas were defined to reflect local characteristics and against which to assess effects. These were agreed with States of Guernsey (SoG).

16.1.11 Site visits have been undertaken to survey the Site and its context and to inform the establishment of the baseline, identify receptors and representative viewpoints to inform the assessment. These and the LTSVIA Methodology were agreed with the

SoG in January 2019, when additional viewpoints were requested to include a viewpoint from the sea.

16.2 Legislation and Policy Context

Legislation and Conventions

16.2.1 Relevant legislation and regulations/ conventions include:

- The Land Planning and Development (Guernsey) Law, 2005.

The Land Planning and Development (Guernsey) Law, 2005

16.2.2 This law states that:

"The purposes of the Law are to protect and enhance, and to facilitate the sustainable development of, the physical environment of Guernsey."

2.3.3. In this regard the Law seeks to:

a. protect and enhance the natural beauty and amenity of Guernsey's coasts, cliffs, countryside and other open spaces;

b. protect and enhance Guernsey's heritage of buildings, monuments and sites of historic, architectural or archaeological importance;

d. achieve quality in the design and implementation of development so as to respect Guernsey's historic, architectural and archaeological heritage and make a positive contribution to the built environment;"

Policy Context

The Island Development Plan (adopted 2016), The Strategic Land Use Plan, (revision adopted 2011), & Supplementary Planning Guidance documents (2016-2018)

16.2.3 The Strategic Land Use Plan (SLUP) 'while respecting international efforts to safeguard the global environment … sets a spatial strategy for development' as follows:

"Development… [is]… concentrated within and around the edges of the urban centres of St Peter Port and St Sampson/ Vale with some limited development within and around the edges of the other main parish or local centres to enable community growth and the reinforcement of sustainable centres."

16.2.4 The Principal Aim of the Island Development Plan is:

"to ensure land planning policies are in place that are consistent with the Strategic Land Use Plan and which help maintain and create a socially inclusive, healthy and economically strong Island, while balancing these objectives with the protection and enhancement of Guernsey's built and natural environment and the need to use land wisely."

16.2.5 Details of specific policies relevant to landscape and visual consideration of the Site are in found in **Appendix 16.7**.

16.3 Baseline

16.3.1 In accordance with current good practice, this assessment addresses landscape and visual effects as separate issues. Landscape effects relate to both the effect on the physical features of the Site, and on the landscape character of the Site and surrounding area. Visual effects relate to typical views of the proposed development received by visual receptors from the surrounding area.

16.3.2 The landscape assessment will include townscape and seascape as the Site lies in the sea, in the vicinity of the principal town, St Peter Port.

Landscape / Townscape / Seascape Character

16.3.3 The Island coastline is described as varied. The east coast is less indented and is scoured by the tidal race between Guernsey, Herm and Jethou. It is also more protected, lying in the lee of the island, away from the prevailing wind.

16.3.4 The Site is located adjacent to/ on the east coast. It is coastal/ marine and consists of a rocky foreshore, up to 200m of which is exposed at low tide and extends into the sea. The landward edge of the Site is partially fronted by rock boulders and is adjoined to the current land reclamation site at Longue Hougue by a rock revetment. Another rock revetment runs from the East Coast Road to Spur Point.

Published Documents

Guernsey Character Study (GCS) (Stage 1) June 2013

16.3.5 The GCS was published by the Environment Department of the States of Guernsey. Stage 2, which has not been published yet, will provide a more detailed assessment.

16.3.6 GCS Stage 1 is an outline assessment that considers the elements:

'that define Guernsey's character and distinctiveness' and that which

'makes a place special and different from anywhere else'.

16.3.7 The purpose of the GCS is:

- To understand the common and unique themes that define the identity of the Island.
- To use this understanding to inform development plan policies that guide where and when new development should occur and help to inform the balancing of demands on land so that local character and distinctiveness is reinforced.
- To establish the difference between those areas and features that are important to the whole Island and those that have a more local importance.

16.3.8 In conjunction with the IDP, the GCS provides the landscape and visual context for this assessment.

The Essential Character of Guernsey

16.3.9 The GCS describes the following elements, which in combination with the underlying topography of upland plateau with southern and south-eastern cliffs in the south and lowland and marshy areas in the north, contribute to the unique character of Guernsey:

- Character Areas. - These are split into four categories that help to explain the strategic character of the particular area: Rural, Semi-rural, Built-up, Urban. These categories are mentioned for completeness. Within the study area, they relate to the Urban areas of St Peter Port and St Sampson and to the semi-urban/ Built up area along the East Coast Road.
- Landmarks - Memorable features in the landscape, aiding navigation/ legibility, giving identity.
- Movement - The main paths and routes that people take when moving through the Island.
- Gateways - The major arrival points to the Island.

16.3.10 The GCS acknowledges that interaction with and reclamation of the sea, and defence (from both the sea and from outside invasion) has been part of its historic development. Land reclamation from the sea includes:

- The area between what was the Island of Vale to the north and the main island of Guernsey;
- The building of St Peter Port and St Sampson’s Harbour into the sea; and
- The existing Longue Hougue Reclamation Site. Note: also that the East Coast Road has been constructed on land that used to be part of the

seashore.

16.3.11 Guernsey has two main settlements around the harbours of St Peter Port and St Sampson. These comprise the urban character area of Guernsey, listed above. The Site lies on the south-eastern edge of St Sampson area between St Peter Port and St Sampson's Harbour on the east coast adjacent to the lowland area of the island. The Site and the area surrounding it does not easily fit into one of the strategic character types mentioned above.

16.3.12 One of the major routes on the Island is the East Coast Road, which links the two ports and has a semi-urban / built up character.

16.3.13 Landmarks, providing orientation in the land and from the sea, lend distinctiveness and create a sense of place. They include the stone fortress Castle Cornet, the cranes to the south at St Peter Port, the towers and steeples on the St Peter Port skyline. To the west the pine trees in Delancey Park, the chimneys near St Sampson's harbour and further north the mounded ramparts of Vale Castle.

16.3.14 St Peter Port and St Sampson's Harbour together with the airport in St Martins form the main arrival points and gateways to the Island.

16.3.15 The Site does not lie within one of the designated landscape areas defined in GCS.

16.3.16 Regarding visual amenity, the GSC Figure 11 Strategic Views (presented as **Figure 16-1**), shows recognised locations from where strategic views may be obtained. These are the long-range views / viewpoint locations from which large areas of the Island can be seen. Some of these are from a similar location as the viewing points on the Guernsey Map (2010). These strategic views and viewing points were investigated during the Site visit and are included in the viewpoint locations plan (refer to **Appendix 16.2** Figures).

The Island Development Plan 2016 (IDP)

16.3.17 **Appendix 16.7** lists in tabular form the relevant policies in the IDP.

16.3.18 Policy GP1, Landscape Character and Open Land, states that:

Proposals will not be supported if they would result in the unnecessary loss of open and undeveloped land which would have an unacceptable impact on the open landscape character of an area.

Development will be supported where it:

a) *respects the relevant landscape character type within which it is set; and*

b) *does not result in the unacceptable loss of any specific distinctive features that contribute to the wider landscape character and local distinctiveness of the area concerned; and,*

c) *takes advantage, where practicable, of opportunities to improve visual and physical access to open and undeveloped land; and,*

d) *accords with all other relevant policies of the Island Development Plan.*

Proposals for development that is considered to be significant in terms of scale, setting and appearance will normally be required to include a landscaping scheme.

Figure 16-1 Strategic Views Taken from the GCS (Stage 1) June 2013- Figure 11

Guernsey Character Study (Stage 1) June 2013

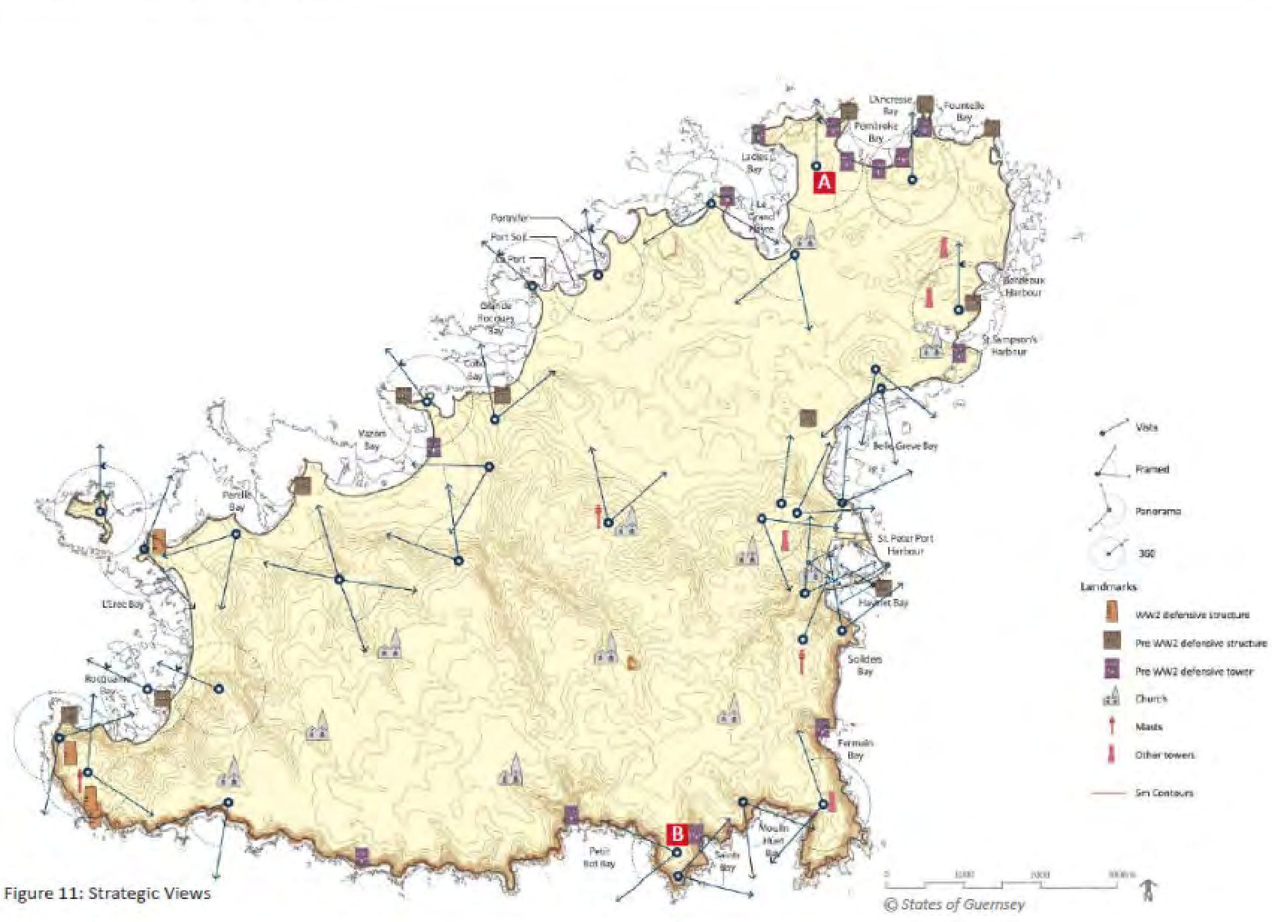


Figure 11: Strategic Views

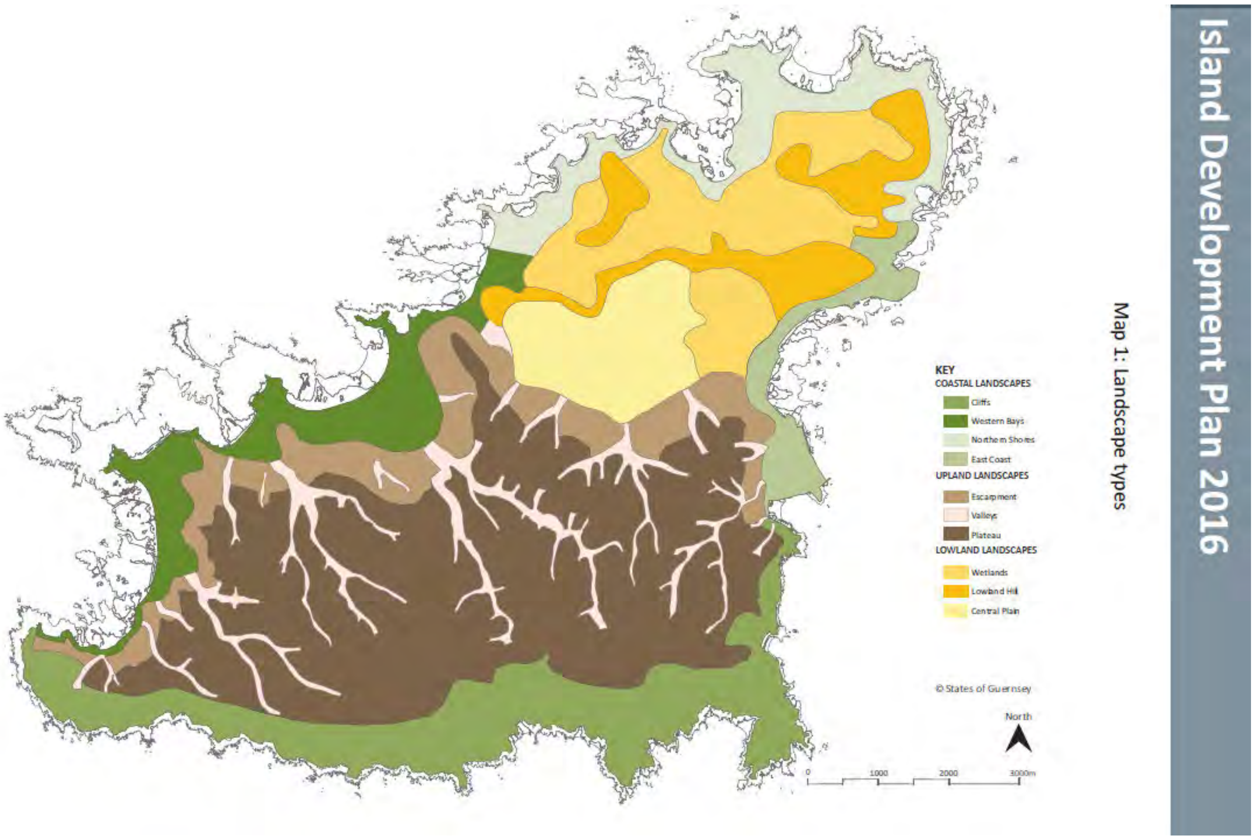
16.3.19 The following annexes are relevant in describing the landscape / townscape context:

- Annex V Landscape Character.
- Annex VII Conservation Areas.

Annex 5 Landscape Character in the IDP

16.3.20 The Site lies on the shoreline and extends into the sea, adjacent to the East Coast near the northern end of the island which lies on lower land. Annex 5 provides the background landscape context. Relevant broad landscape types include the Coastal Landscape Type and the Lowland Landscape Type (**Figure 16-2**).

Figure 16-2 Broad Landscape Types, Taken from the Island Development Plan 2016



<u>Coastal Landscape Type – Sub Category the East Coast</u>

16.3.21 The Site lies within the Coastal Landscape Type within the sub-category, the East Coast (from Bordeaux to Havelet).

16.3.22 The East Coast is further subdivided into the landscape areas described below, which were confirmed during the site visit and formed the basis for some of the landscape receptors. The landscape areas comprise:

- The Harbours -

  with their quays and breakwaters, cranes and dockside buildings are an important feature of Guernsey. Traditional paving, railings and bollards (cast iron in St Peter Port; stone at St Sampson) and substantial masonry structures are significant elements of the harbour scene, contributing to the *local distinctiveness of the Island. The scale and continuity of harbour-front buildings, contrasting with the openness of the harbours themselves, is also an important characteristic.*

- The East Coast Road -

  links the two harbours and forms a major traffic artery, following the sweep of Belle Grève Bay. For much of its length, the road was built on a shingle bank and is at a higher level than the frontage development. The relationship between the road and development is important, particularly in long views. The open views along the coast and to the other islands add greatly to the character of the road which is further enhanced by pleasant grass verges, sea walls and the shingle banks.

- The East Coast Mares -

  originated as ponds impounded behind the coastal shingle banks…drained and reclaimed over time for housing and agriculture…..vegetation is relatively sparse…trees on higher ground form a pleasant backdrop to development.

- The Promontories -

  jutting into the sea…….in the foreground of frontage development .. providing a series of focal points ...many of them support trees and shrubs and most accommodate historic fortifications.

<u>Lowland Landscape Type – sub-categories the Lowland Hills and the Wetlands</u>

16.3.23 The following Lowland Landscape Types lie within the study area but are less relevant to the Site:

- Lowland Hills with characteristic undulating land with small rocky hills or 'hougues', which:

  provided the raw materials for a thriving quarrying industry which gave rise to the more industrial image of the north of the island, which still prevails although most of the industry has gone.

- The Wetlands, another lowland landscape type subset, lie within the study area near the Lowland Hills. The Wetlands to the north of the Island have:

  extensive low-lying basins, all of which tend to be poorly drained and many are below the level of even ordinary spring tides. These wetlands divide into *two sub zones: Le Braye du Valle, which is of marine origin and the freshwater Marais areas (freshwater marsh) with alluvial and peat deposits.*

Annex 7 Conservation Areas in the IDP

16.3.24 The following Conservation Areas (CA)s as described in the IDP Annex 7 Conservation Areas are relevant: Refer also to **Appendix 16.2**, Figure 2 Designations.

- St Peter Port CA.
- Delancey, St Sampson CA.
- The Bridge, Vale & St Sampson CA.

The Site and its Surrounding Landscape / Townscape / Seascape

16.3.25 This section should be read in conjunction with **Appendix 16.2** Figures, which includes relevant plans, photographs and figures.

16.3.26 A visit to the Site and local surroundings was undertaken in October 2018. The above points from published sources were confirmed during the site visit.

16.3.27 The Site lies on the relatively sheltered (and therefore developed) Eastern Coastline of Guernsey about 2km north of St Peter Port. It includes the local beach with sand, shingle, rocky outcrops, reefs, and the sea between the current Land Reclamation Site at Longue Hougue to the north and Spur Point to the south. The islands of Herm and Jethou lie about 5km to the east.

16.3.28 The north-western and northern Site boundary runs along the rock armour wall containing the road and the southern boundary wall of the existing Longue Hougue Reclamation Site. The eastern boundary lies approximately 210m from the shoreline into the sea. The southern boundary runs along Spur Point rocky promontory. The western boundary follows the edge of the beach that is the shoreline, adjacent to a public footpath running through scrubby vegetation and around the eastern boundary of a private residence, Gorselea. The boundary of the private residence is marked by planting behind (west/on the house side of) an approximately 2m high close board wooden perimeter fence and gate, opening on to the footpath and beach.

16.3.29 The Site and surrounding landscape were analysed and the extent of visibility of the Site ascertained leading to the definition of the VE (Visual Envelope) and the selection of landscape and visual receptors.

Landscape / Townscape / Seascape Character Area Receptors

16.3.30 Four of the following character area receptors are derived from three of the landscape character types described in the IDP Annex V:

- The landscape character type 'the Harbours' has been used to define the character area receptor St Peter Port – Harbour and Town.
- The southern part of the landscape character type 'East Coast Road' is subdivided into the character area receptors East Coast Road **-** Les Banques / Les Bas Courtils and Belle Grève Bay, both between St Peter Port and the Site.
- The landscape character type, Promontories, is used in character area receptor, The Local Landscape.
- The Open Sea with Islands and reefs is not described in the IDP as a character type but is used as a character area receptor.

16.3.31 Landscape (to include townscape and seascape) character area receptors to be assessed comprise the following:

- St Peter Port – (Harbour and Principal Town).
- East Coast Road, Les Banques/ Les Bas Courtils Roads and Frontage, and Treed Backdrop.
- Belle Grève Bay.
- The Open Sea with Islands.
- The Local Landscape (Local to the Site).

16.3.32 For locations and photographs of the Character Areas Receptors described below, refer to **Appendix 16.2** Figures (Figure 4 and Figures 5a-5c).

Character Area 1 - St Peter Port (Harbour and Principal Town)

16.3.33 St. Peter Port lies about 1.5km from the Site. It is the main gateway to the island and arrival point from the seas (the other more local gateway being the smaller St Sampson's Harbour). The urban character of St Peter Port, the principal town of Guernsey and the main cultural and administrative centre of the island, lies in its stylish town houses, municipal buildings, shops, and museums, which are arranged around narrow streets rising up locally towards a more treed skyline.

16.3.34 Over the centuries, the town has grown around the busy working port, with quays, breakwaters, and dockside buildings and with cranes piercing the skyline. Combined with the harbour features, the traditional materials used in the stone sea walls, the paving and caste iron bollards provide a distinctive character to the harbour. More recently, additional harbours have been added and rock armour has been used in sea facing harbour walls. The scale and continuity of the buildings fronting onto the sea contrast with the openness of the harbour and the open sea.

16.3.35 The fairly sheltered location on the eastern side of the Island, where the port and town have grown together over the centuries, supports some tree planting to the south along the sea front, with trees and buildings interspersed in the town as it rises up a low local hougue / incline, lending further distinctiveness.

Character Area 2 –East Coast Road – Road, Frontage, and Treed backdrop

16.3.36 The Island Development Plan, Annex V describes the East Coast Road as the main linking road between the two harbours: St Peter Port and St Sampson's Harbour. The East Coast Road lies between approximately 1.5km from the Site at its southern end to almost adjacent at its northern end. The East Coast Road runs between St Peter Port and the Site along the sea front, framing Belle Grève Bay. To the west of the East Coast Road, fronting onto it and forming part of its character, lie pastel coloured terraces with some modern glazed blocks with sea views. They lie against a treed backdrop on the slightly higher land to the immediate west. Numerous car parks on the various promontories and fortifications allow visitors to stop and enjoy the ambience and the sea views. This section of the East Coast Road, (St George's Esplanade, Les Banques and Les Bas Courtils Road) with its built frontage and treed ridge behind (to the west) is selected as a landscape / townscape character area receptor. It lies to the southwest of the Site. The road itself being built on a shingle bank and at a higher level than the base of the buildings fronting onto it, is partially reclaimed land.

Character Area 3 - Belle Grève Bay

16.3.37 The character area comprises the shore and the seas to include the eastern part of the Site. It lies between the Site and St Peter Port. At high tide the sea fills the bay. Low tide reveals the shore comprising sand, shingle, pebbles, rocks, rocky out-crops reefs and promontories. The openness of the seascape of Belle Grève Bay to the east is as described in Annex V 'Landscape Character' as part of the East Coast Road:

"The open views along the coast and to the other islands add greatly to the character …. which is further enhanced by pleasant grass verges, sea walls and the shingle banks."

Character Area 4 - The Open Sea with Islands (and Ferry Routes)

16.3.38 The character area is adjacent to Belle Grève Bay and comprises the Open Sea with inhabited islands (Herm, Jethou) and uninhabited islands / rocky promontories / rocky outcrops / reefs, ferry routes and fishing boats. The rows of reefs, so characteristic of this seascape at low tide, mostly disappear as the tide comes in and the sea fills the bay. There is a history of shipwrecks. Skilled navigators steer through these reefs, along known deep channels. The ever-changing, moving sea contrasts with the solidity of the built environment, of the town and of the rock armoured existing Longue Hougue Reclamation Site. It provides a relatively flat open seascape, allowing views out from the densely populated urban area. It also is part of the public domain.

Character Area 5 - The Local Landscape

Character Area 5A - The Local Landscape / Rocky Shore & Industrial Area

16.3.39 This includes the local landscape/ townscape to the north and west of the Site and the northern part of the Site within the shore. The landscape to the north-west and north of the Site comprises the industrial area, the current reclamation facility, the Waste Transfer Station (WTS) and the Household Waste & Recycling Centre (HWRC) at the existing Longue Hougue Reclamation Site, and the road leading through the industrial area along the western Site boundary to the existing Longue Hougue Reclamation Site:

- The road is without trees and is contained on the northern side by industrial buildings, leading to the existing Longue Hougue Reclamation Site.
- Some industrial buildings, such as the WTS and the HWRC, have been erected on the existing Longue Hougue Reclamation Site. There is no vegetation, although landscape to include planting have been planted.
- The local landscape to the east of the road is the seashore and includes the north-western part of the Site.

Character Area 5B - The Local Landscape / Rocky Shore & Well-Vegetated, Green Area around Gorselea

16.3.40 This includes the local landscape, which is well-vegetated, and the southwestern part of the Site, which is on the seashore[18]. It is derived in part from the IDP Landscape Type, the Promontories. The following elements form this part of the local landscape:

- Spur Point, with its historic fortifications, juts out into the sea and provides a focal point.
- the rocky beach just north of Spur Point, the scrubby vegetation and public footpath running along the beach and through the grassy public open space with memorial bench and tamarisk bushes on another small promontory to the north, contain the space and offer a good vantage point across Belle Grève Bay to St Peter Port and across the sea to the islands of Herm and Jethou.
- the private residence/s and garden/s to the west contained by pine and other garden trees, with views out over the beach and over the open seascape towards Herm and Jethou.
- the adjacent seashore which lies within the Project site.

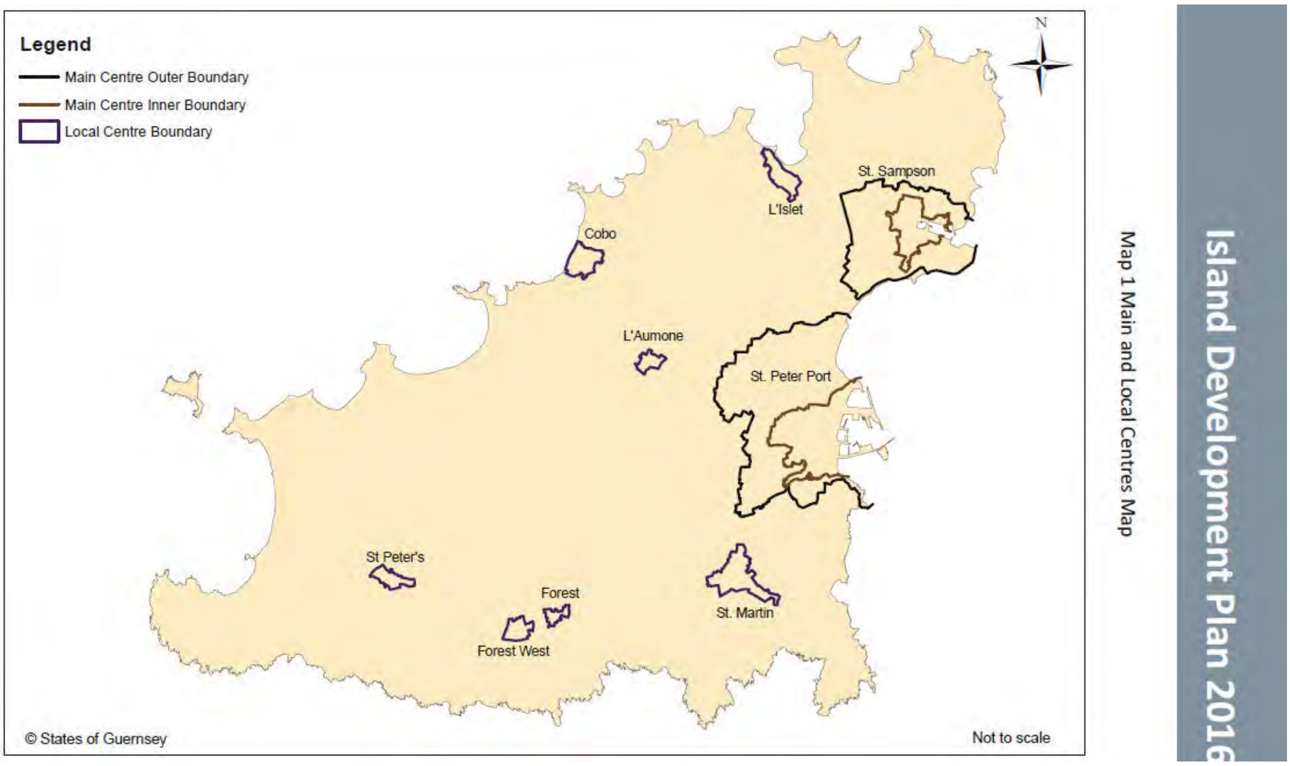
Table 16-1: Summary of Proposed Character Area Receptors (Landscape / Townscape / Seascape Receptors) to be Included in the Impact Assessment

No	Character Area Receptors (landscape/ townscape/ seascape receptors)	Character Area Receptor (CAR) Description
1	Character Area 1 - St Peter Port (Harbour and Principal Town)	Gateway to and from the Island of Guernsey

18 Figure taken from the Island Development Plan 2016, shows areas within and outside of the Main and Local Centres. The green vegetated area local to the Site around Spur Point, is shown as outside of the Main Centre of St Sampson in the IDP Main and Local Centre Plan.

No	Character Area Receptors (landscape/ townscape/ seascape receptors)	Character Area Receptor (CAR) Description
2	Character Area 2 – East Coast Road, Road, Frontage and Treed Backdrop	The section of the road along the east coast between St Peter Port and St Sampson, comprising St George's Esplanade, Les Banques and Les Bas Courtils Road and associated built environment, to include the frontage (the houses fronting onto its landward side) with treed backdrop, sea and military defences, and car parks on the seaward side.
3	Character Area 3-Belle Grève Bay	Belle Grève Bay beach, shingle, rocks, and promontories and the eastern part of the Site lying in the sea.
4	Character Area 4 - The Open Sea with Islands (and Ferry Routes)	Open Sea with inhabited islands (Herm, Jethou) and uninhabited islands/ rocky outcrops, ferry routes and fishing boats.
5A	Character Area 5A - The Local Landscape / Rocky Shore & Industrial Area	The industrial area, the current reclamation site, the WTS and the HWRC on the existing Longue Hougue Reclamation Site, the road leading through the industrial area along the western Site boundary of the existing Longue Hougue Reclamation Site, and the north-western part of the Site along the shore.
5B	Character Area 5B - The Local Landscape/ Rocky Shore & Well-Vegetated, Green Area around Gorselea	The landscape local to the south-western part of the Site, the gardens and residences, the public footpath and open space, Spur point and another local promontory, the local beach north of Spur Point and the south-western part of the Site along the seashore.

Figure 16-3 *Main and Local Centres Map (taken from the Island Development Plan 2016)*



Note: The Site and adjacent area to the east is adjacent to but not included in the St Sampson Main Centre or Main Centre Outer Area.

Visual Amenity and Visual Receptors

The Visual Envelope (VE)

16.3.41 The VE or areas from where the Project could be seen was estimated from desk study and confirmed during the site visit.

16.3.42 Although the site visit did not include visits to private residences, locations where views would be obtained was established through intervisibility, whereby if a location could be seen from the Site, the reverse would also be true.

Views from the South and South-west

16.3.43 From the southern end of St Peter Port, in the vicinity of Castle Cornet, at a distance of circa 2.5km, the Site is visible across Belle Grève Bay. From the higher land on the coast, south of St Peter Port near Fort George, at a distance of circa 3km, the Site may be viewed through and over the port activities.

16.3.44 From the northern end of St Peter Port, from and near Salerie Battery, the Site is visible, about 1.5km away to the north / north-east against the industrial backdrop of St Sampson and the existing Longue Hougue Reclamation Site. As the road moves north round Belle Grève Bay views are continuous and sequential with the Site becoming more oblique and progressively less visible, until totally hidden behind rocks and vegetation west of the Site.

16.3.45 Apart from the road itself, there are numerous views available to visitors from the car parks, from the houses, and from the beach. However due to the low-lying landscape, these views are relatively local and largely confined to the road area, (to include the houses, and the beach).

Views from the West and North-west

16.3.46 To the immediate west of the Site, views are possible from the windows of Gorselea, the residence adjacent to the Site. The boundary to the eastern part of the garden curtilage comprises vegetation and/or a close board wooden fence of around 1.8 to 2m high so views into and out of the garden are limited.

16.3.47 West of Gorselea intervening vegetation prevents views of the Site from Bulwer Avenue (a continuation of the Les Bas Courtils Road as it moves north towards St Sampson).

16.3.48 Further west the land rises forming the Hougue (a small hill) on which Delancey Park is situated. This is on the edge of Landscape Type 'Lowland Hills' dropping down to the lower land of Landscape Type 'Wetlands'. Further west, views of the Site are largely curtailed by intervening vegetation. However, from the more elevated locations on the eastern slope of the park the south-eastern edge of the Site (currently in the sea) is visible. The Strategic Viewing point lies at the southern end of the Park on a concrete platform with views to the south towards St Peter Port. Vegetation and/or landform to the east intervene between the Site and the viewing point.

16.3.49 From the northeast the coast extends around the St Sampson's Harbour and Vale Castle to Bordeaux Bay. Views of the Site are curtailed by intervening built form and vegetation where the landform is relatively flat, low-lying, and in places, reclaimed.

16.3.50 Partial views are available from the elevated, publicly-accessible ramparts / ruins of Vale Castle, which is a historic monument and defensive structure on the coast and which is both a Strategic View in the GCS and a 360 degree panorama on the Guernsey Map. The south-eastern tip of the Site would be visible, seen obliquely, behind (south of) the Longue Hougue land reclamation site with the latter and industrial elements of St Sampson dominating the foreground.

16.3.51 Views from around Mont Crevelt are curtailed by landform, railings and overgrown vegetation. Visitor numbers would seem to be low: the access route to it is difficult to find; the site itself is not inviting due to the overgrown vegetation, the high perimeter railings, and the padlocked entrance to the tower, (so it is not publicly accessible).

16.3.52 From the Site, the buildings and beaches of Herm and of Jethou, which are about 5 km distant, were just discernible as there are no intervening elements, except for the relatively flat expanse of sea. So conversely, the Site area of the sea and shoreline with the private house behind to the west would be just perceptible from these islands, in the context of the built form along the East Coast Road and the cranes and ferries at St Peter Port to the south and the existing Longue Hougue Reclamation Site, with WTS and HWRC, Vale Castle and St Sampson industrial area to the north.

16.3.53 More expansive nearer views are also possible from over the open sea to the north-east, east and south-east from fishing boats and ferries. The nearest ferry route (from Poole, Portsmouth and Alderney) travels within 1km of the Site as it nears its arrival into St Peter Port, the main gateway by sea to Guernsey. Both St Peter Port and the Site will be in the ‘arrival view’.

Visual Receptor Groups / Viewers (VRG)s

16.3.54 For locations of the VRs and viewpoints described below, refer to **Appendix 16.2** Figures, Figure 6 and Figure 7 and for representative photographs of the views they receive, and Figures 8a-8l.

16.3.55 From within locations, where the Site is potentially visible (the Visual Envelope), the following Visual Receptor Groups (VRG)s/ viewers have been selected. Visual Receptor Groups (VRG)s are groups of people/ viewers, grouped according to their activity. Their visual amenity is described and illustrated using the Representative Views (RVs), listed further below:

- Road Users -car and truck users, cyclists, pedestrians.
- Residents.
- Recreational and other beach users.
- Ferry users travelling to and from St Peter Port.
- Fishermen and recreational boat users.
- Users of the public footpath.
- Tourists and sightseers to St Peter Port.
- Workers travelling to and working at the Longue Hougue industrial and

reclamation sites.

- Visitors to Delancey Park.

Viewpoints, the Recognised Views and Representative Views (RV)s

16.3.56 Viewpoints comprised the following types of view, the location of some of which coincide:

- Representative Views (of the VRGs);
- Recognised Views:
  - o Strategic views (taken from the GCS19);
  - o Guernsey map viewing points[20];
- Views afforded to Viewers in the (Heritage) Conservation Areas (CA)s.

16.3.57 The RVs were selected to represent views available to the VRGs from various orientations and include views from the Recognised Views. For viewpoint locations plan and viewpoint photographs, refer to **Appendix 16.2** Figures. For a list of RVs correlated with Recognised Views refer to **Appendix 16.5**.

Recognised Views

16.3.58 The following Recognised Views include the Strategic Views (taken from the GCS), correlated with the Guernsey Map Viewing Points:

- From Salerie Battery - Strategic View at the northern edge of St Peter Port, a framed view (circa 60 degrees), looking north-east. Not shown as a Viewing Point on the Guernsey Map.
- From Beau Sejour Leisure Centre (& Les Cotils) The Strategic View is shown as a narrow single view, a vista, looking directly north, and from Les Cotils, as a framed view (circa 60 degrees), looking directly north-east towards the Site. The Guernsey Map shows a Viewing Point, looking North (180 degree) and for Les Cotils as looking East (180 degrees).
- From Castle Cornet –the Strategic View is a framed view (circa 60 degrees), looking west towards St Peter Port, while the Site lies to the north, out of the frame. It is not shown as a Viewing Point on the Guernsey Map. This is scoped out as a Recognised View but RV 11 is used in the Assessment of effects on VRGs.
- From Fort George - the Strategic View is a framed view (circa 60 degrees).

[19] Figure 11 Strategic Views -Guernsey Character Study (Stage 1) June 2013
[20] Guernsey Map (2010)

On the Guernsey Map, there is a Viewing Point looking north-east (180 degree).

- From Delancey Park - Strategic View is a framed view, looking south-east (not in the direction of the Site, which lies to the east). The view is not shown on the Guernsey Map. The Recognised View is scoped out but a representative view from a different location within the park is considered.
- From Vale Castle - The Strategic View is 360 degrees. The Guernsey Map Viewing Point is also 360 degrees.
- There is a Strategic View from near the Halfway, a framed View (circa 60 degrees) but it is looking south-west towards St Peter Port in the opposite direction to the Site, which lies to the north-east and so is scoped out.

Viewers in the (Heritage) Conservation Areas (CA)s

16.3.59 There are three CAs within the study area:

- St Peter Port CA, which extends around the harbour and includes, Salerie Battery, the higher land around Beau Sejour Leisure Centre / Les Cotils, Castle Cornet and Fort George/ Belvedere.
- Delancey, St Sampson CA, which is located on a Hougue just south of St Sampson and includes Delancey Park, which is elevated above surrounding land to the north-west and east.
- The Bridge, Vale and St Sampson CA, extends around the harbour and includes Vale Castle. From the top of the castle partial views of the Site are available in the visual context of St Sampson's industrial area and Longue Hougue. Otherwise despite the proximity, there is little intervisibility between the CA and the Site.

Summary Lists / Tables

16.3.60 Below are summary lists of the VRG groups and their associated Representative Views (RVs) in **Table 16-2** and then in **Table 16-3** of the Recognised Views (Strategic Views correlated with Guernsey Map Viewing Points), some of which are scoped out and in **Table 16-4** Relevant CAs. For a List of the Representative and Recognised Viewpoints, refer to **Appendix 16.5**.

Table 16-2: VRGs Correlated with RVs

VRG No.	No	VRG Name	Associated Representative Viewpoint (RV)
1 - Road Users on the East Coast Road	1a	Road Users Car and Truck Users	RV1 from Salerie Battery, RV3 from Hougue a la Perre, RV13 from Halfway
	1b	Road Users- Cyclists	RV1, RV3, RV13
	1c	Road Users- Walkers and Pedestrians	RV1, RV3, RV13
2 - Residents	2a	Residents fronting onto or near the East Coast Road	RV1, RV3, RV13
	2b	Residents on the elevated land in/ near St Peter Port town-to include that immediately West of the East Coast Road	RV2 from Beau Sejour Leisure Centre
	2c	Residents near the Site such as Gorselea	RV4 from near Spur Point RV5 from the rocky shore at low tide RV6 from Footpath / Gorselea gate RV7 from the Memorial bench
3 - Beach Users	3	Recreational and other beach users (in Belle Grève Bay)	RV1, RV3, RV13, RV7
4 - Ferry users travelling to and from St Peter Port	4a	Ferry Users travelling through the water between Herm and Guernsey (Little Russell) from the North (from England & Alderney)	RV10 from the sea RV11 from Castle Cornet RV7
	4b	Ferry Users travelling to and from Guernsey from the East/ South (from Herm and south of Jethou, from Sark and France)	RV 10, RV11 Intervisibility- RV7

VRG No.	No	VRG Name	Associated Representative Viewpoint (RV)
5	5a	Fishermen and recreational boat users in the waters between the Guernsey coast and the northern ferry route	RV 10, Inter-visibility -RV5, RV6, RV7, RV8 from the Longue Hougue access road
	5b	Fishermen & recreational boat users in the waters between the northern and the eastern ferry routes	RV 11, RV10 Intervisibility - RV7
6	6	Users of the Public Footpath (from the East Coast Road continuing along the shore near the Site)	RV13, RV6, Footpath / Gorselea, RV7 RV8, RV4
7	7	Tourists, Sightseers and Visitors to St Peter Port	RV1, RV2, RV11 Castle Cornet, RV12 Fort George
8	8	Workers travelling to and working at Longue Hougue industrial estate, WTS and HWRC.	RV8 from the Longue Hougue access road, RV7
9	9	Visitors to Delancey Park	RV14 from Delancey Park

Table 16-3: Recognised Views

Location of Recognised View	Description of Location of Recognised View If scoped out	Associated Representative Viewpoint (RV)
Salerie Battery	Strategic View at on the northern edge of St Peter Port looking north-east. Not shown as a Viewing Point on the Guernsey Map	RV1
Beau Sejour Leisure Centre (& Les Cotils)	The Strategic View is from Beau Sejour is shown as a narrow single view, a vista, looking directly north, and from Les Cotils, as a framed view (circa 60 degrees), looking directly north-east towards the Site. The Guernsey Map shows a Viewing Point, looking North (180 degree) and for Les Cotils as looking East (180 degrees).	RV2

Location of Recognised View	Description of Location of Recognised View If scoped out	Associated Representative Viewpoint (RV)
Fort George / Belvedere Field	The Strategic view is a framed view (circa 60 degrees). On the Guernsey Map, there is a Viewing Point looking north-east (180 degree)	RV12
Vale Castle	The Strategic View is 360 degrees. The Guernsey Map Viewing Point is also 360 degrees The view is in the direction of the Site with Longue Hougue intervening in the foreground.	RV9
Location	**Recognised Views that are Scoped Out**	**Nearby viewpoint – in a different direction**
Castle Cornet	The Strategic View is a framed view (circa 60 degrees), looking west towards St Peter Port, while the Site lies to the north, out of the frame. It is not shown as a Viewing Point on the Guernsey Map. This is scoped out as a Recognised View but RV11 is used in the assessment of effects on VRGs.	RV11
Near Halfway	There is a Strategic View from near the Halfway, a framed View (circa 60 degrees) but it is looking south-west towards St Peter Port in the opposite direction to the Site, which lies to the north-east and so is scoped out. There is no viewing point shown on the Guernsey Map. It is scoped out as a Recognised View RV13 is used in the assessment of effects on VRGs.	RV13

Location of Recognised View	Description of Location of Recognised View If scoped out	Associated Representative Viewpoint (RV)
Delancey Park	The Strategic View is a framed view, looking south-east (Not in the direction of the Site, which lies to the east.). The view is not shown on the Guernsey Map The view is not in the direction of the Site. It is scoped out as a Recognised View. RV14 near this view in a different location and looking east is used on the assessment of effects on VRGs.	None

Table 16-4: Viewers in CAs

Location of CA	Description of Location of CA and reason for designation If scoped out	Associated Representative Viewpoint (RV)
St Peter Port	The CA covers all harbour areas to include the historic stone harbour and later extensions in rock armour, the medieval street layout and historic buildings form the seashore to the top of the Hougue/ hill on which the town lies.	RV1, RV2, RV11, RV12
Delancey, St Sampson CA	The CA covers Delancey Park, with and nearby residential areas. The park includes playing fields, gardens and prehistoric chambers and historic military lookout monuments and large pine trees which act as a landmark from the surroundings.	RV14
Location	**CAs and their viewers that are Scoped Out**	
The Bridge, Vale and St Sampson CA	The CAs cover predominantly the low-lying land including and around St Sampson's historic harbour. It is scoped out as the scheme is also low lying with little intervisibility except for from limited parts of Vale Castle, in the Bridge CA.	RV9

16.4 Do Nothing Scenario

16.4.1 There are various types of sea wall in the landscape in the study area, ranging from formal stone walls in the towns around the harbours to rock armour around the industrial land reclamation areas. There are large rocks set into a bank on the landward edge of the beach just north of Spur Point. These have been in place for many years. They appear to be designed to prevent incursion by the sea at high tides and stormy conditions. Sometimes overtopping occurs and the salt-water can damage the trees, plants and buildings, such as the trees on lower land south of Gorselea garden. The seabed includes rocky reefs. Considering the recent past, it is unlikely that the walls/ stones, or the reefs would be damaged in the Do Nothing scenario. Effectively the Site would remain in its existing condition.

16.5 Methodology for EIA

Assessment Methodology

16.5.1 This full Landscape / Townscape / Seascape and Visual Impact Assessment (LTSVIA) is undertaken to ensure that the sensitive receptors are clearly identified, changes to the landscape and visual environment described and their magnitude assessed, and a judgement made on the level of the effect of such changes. It is in accordance with Landscape Institute and Institute of Environmental Management and Assessment, 'Guidelines for Landscape and Visual Impact Assessment' (Third Edition, 2013) GLVIA 3 (refer to **Appendix 16.1** – Methodology). This differs from the standard EIA methodology as it is tailored to the needs of landscape and visual amenity assessment.

16.5.2 Initial baseline information was obtained by desk study, from published sources and through site survey.

16.5.3 The extent of the study area was determined by the anticipated visual envelope (the area in which the Site and proposed Project are potentially visible). This is described in more detail in **Appendix 16.1** – Methodology.

16.5.4 Photographs and Photomontages were produced in accordance with Landscape Institute Advice Note 01/11, entitled 'Use of Photography and Photomontage in Landscape and Visual Assessment'. For more information refer to **Appendix 16.2** Figures, which should be read in conjunction with the text, and to **Appendix 16.3** and **Appendix 16.4** for the Photomontage Methodology and Photomontages.

16.5.5 Assessments of the potential landscape and visual effects are made:

- during construction;
- during operation.

16.5.6 The effects of lighting are not considered in detail as during the Operation Phase, the Site will not generally be lit outside office hours. However, during the construction phase, it is likely that stone will be imported and that some lighting will be involved.

16.5.7 In accordance with current good practice, this assessment addresses landscape and visual effects as separate issues. The landscape assessment will include townscape and seascape as the Site lies on the shoreline and extends into the sea.

16.5.8 Landscape townscape / seascape character is described by the physical parameters and features of a locality, which are characteristic of the locality, giving it a 'sense of place'. The effect of the Project on the landscape features of the Site in its local context (surrounding area) is assessed.

16.5.9 Visual considerations relate specifically to the views of a landscape / townscape / seascape afforded to people receiving typical views from the surrounding area and the effect of the Project on them is assessed. The Representative Views are used in this process in combination with other views / sequences of views noted on the site visit that the viewer might receive. Recognised Views are Specific Viewpoints marked on published maps or documents and the viewer will typically be visiting the spot to see the view and be focused on the view.

16.5.10 The impact assessment sets out the considered effects of the Project on both landscape receptors and viewers/ visual receptors and the significance of these effects.

16.5.11 Cumulative effects are considered later in this LTSVIA. Refer to the Cumulative Effects in **Section 16.8**.

16.5.12 The baseline was written in 2018 when the site visits were undertaken.

16.5.13 A list of viewpoints (representative of the visual receptors) and the locations of the two photomontages were submitted in November 2018 to the States of Guernsey, who suggested additional viewpoints and an additional photomontage. In January 2019, the additional viewpoints and the location of the three photomontages were agreed. Viewpoints have been provided both looking into and looking out from the Site.

Mitigation

16.5.14 Before considering the effects of the scheme a summary is provided of the main embedded (inherent) mitigation measures which have been incorporated in the scheme during construction and in operation stages. The assessment of effects that follows then accounts for these measures. The assessment of effects that follows then accounts for these measures and the full description of the scheme in **Chapter 4 Project Description**.

Assessment of effects - The Process

16.5.15 The assessment of effects for landscape and visual receptors is carried out in separate sections. Both assessments follow a similar process as described below.

Nature of the Receptor / Sensitivity

16.5.16 The landscape and visual receptors are assessed for their sensitivity by consideration of their susceptibility to change from the type of development proposed and the value of the landscape receptor/ the viewer places on the view. The sensitivity to change is then assessed within a scale of High, Medium, Low.

Nature of Effect / Nature of Change

16.5.17 For each landscape receptor and each type of viewer / visual receptor an assessment will also be made on the magnitude of effect (also referred to as nature of effect / nature of the change / magnitude of change) based on the scale of effect, geographic extent and the duration/ reversibility of effects resulting from the Project. This is assessed on a scale of High Medium Low, Negligible.

Level of Effect

16.5.18 Together, the Sensitivity to Change and the Magnitude of Change are used to judge the Level of Effect on each landscape receptor and each visual receptor group and their view (Substantial, Moderate, Minor, Negligible) and whether this change would be beneficial or adverse. See **Appendix 16.1** Methodology for a more detailed description of these categories.

Construction Effects & Operational Effects

16.5.19 Construction, then operational effects, are assessed first on the landscape and then on the viewers and visibility.

Significance

16.5.20 The Assessment of effects is summarised. Significant effects are selected for further discussion.

16.6 Landscape Impacts During Construction & Operation Phases

Summary Description of Embedded Mitigation Measures during Construction and Operation

16.6.1 Embedded Mitigation measures incorporated into the scheme during construction and operation phases have been summarised below, before then considering the specific landscape and visual effects of the scheme. The full description of the scheme is otherwise included in **Chapter 4 Project Description**.

Mitigation Measures during Construction

16.6.2 During construction, the following measures have been incorporated into the scheme:

- The north western flank and northern part of Spur Point will also be avoided by the Breakwater construction works, so that its positive form and relationship with the adjacent bay and beach is maintained (**Figure 4-6**);
- Originally the site cabin / construction compound and parking was to be located in the green area near the memorial bench. Instead, the construction compound and lay down area has now been located on the existing Longue Hougue Reclamation Site away from neighbouring properties. During Operation, the same location will be used for the ticket collection shed for lorries bringing landfill to the Site;
- Three to seven metres of the elevated upper foreshore on the western boundary of Longue Hougue South will be avoided and maintained / conserved during the works, together with the stones, grass and shrubs forming its seaward edge;
- Digging up of the 'Gabbro' rock boulders from the foreshore and reuse where there is room in publicly accessible areas in the form of linear standing stones, providing a link with the landscape past. These features can be utilised on the southernmost corner where they can be combined with a noticeboard providing interpretation related to the rock and the areas geological history.
- It is likely that the stone for the construction of the perimeter bund will be imported and will arrive on a large barge which will anchor in the deeper water between Longue Hougue and Herm. Two smaller barges will ferry the stone from the large barge to the Site at high tide only, so approximately twice daily (Option1). Alternatively, a barge will berth at the northern end of the existing Longue Hougue Reclamation Site and rock would be offloaded by excavator and loaded onto trucks that would drive along the inside of the existing Longue Hougue Reclamation Site (Option 2). Rock deposition areas

associated with Option 1 (referred to above) for bringing rock for the breakwater to the site, have been targeted to the shoreline north of the Longue Hougue South alongside the existing Longue Hougue Reclamation Site and away from Gorselea.

Mitigation Measures during Operation

16.6.3 The residual Levels of Effect arising from the impacts of the Project would not necessarily be reduced by planting but would be softened.

16.6.4 Mitigation planting which would not prejudice future uses would be provided by introducing planting around the periphery of Longue Hougue South (as indicated on a sketch in **Appendix 16.9**). The following measures would be incorporated:

- Some of the large beach rocks (which represent the local geology), salvaged from the foreshore, receiving and processing areas would be evident during and post operation as they would be grouped around the coastal periphery and alongside access routes and points of arrival;
- The coastal periphery would have low level planting in a grassland dominated green area of varying widths, with an extension to the coastal path running through it, providing a new perimeter pedestrian link with the path established alongside the breakwater, at the existing Longue Hougue Reclamation Site. These grassy areas would continue the wide grass verge character on the coast running north from Halfway and would link into the proposed verges around the existing Longue Hougue Reclamation Site and allow positive views out to the island or Herm and toward St Peter Port;
- Some salt loving plants, such as samphire, sea kale, etc. could be planted into or alongside to encourage them to migrate into the rock armour;
- The private road leading to the existing Longue Hougue Reclamation Site and Longue Hougue South would benefit from some tree planting (species to be agreed with SoG), and is not so exposed, as evidenced by the pines and tamarisks;
- Where space permits and in places which maintain views out to sea near Gorselea, there are some opportunities for some tree planting near the existing footpath. This could include robust, salt and wind tolerant species such as trees (species to be agreed with SoG). These would provide framing of views out from Gorselea and some filtering in oblique views from the property. This planting would be detailed in consultation with the owner of Gorselea, in locations with the most locally protected microclimates;
- The above measures will not restrict or preclude currently undefined future uses for this area at a decommissioning stage.

16.6.5 For the planting to thrive (given the permeability of the proposed rock armour sea walls and the ensuing salinity from the sea), soils and some restriction on porosity would need to be planned ahead and incorporated into final stage of the receiving and processing of inert waste in peripheral areas. The planting would be facilitated by using soil instead of inert waste, in places, set above the inert material, to establish some planting areas. A guideline for this to be specified later as part of a Planning Condition submission, would be: For trees trenches with subsoil to a minimum of 500mm and topsoiling to 300mm (protected so relatively salt free) Topsoil to 150mm – 300mm would support grass/ pockets of marine planting.

16.6.6 A programme for the implementation of planting works and for monitoring can be submitted and agreed as part of planning condition discharge.

Assessment of Potential Effects on Character Area Receptors / Landscape Receptors

16.6.7 Assessment of effects on the character area receptors include an evaluation of sensitivity of the receptor (to include value and susceptibility), the magnitude of change to the receptor (first during construction, then during operation) and a judgement of the potential level of effect, given the magnitude of change and the sensitivity of the receptor. The effects are described as direct if within the character area and indirect if outside of the character area. The landscape effects on all character area receptors are summarised in the table below.

16.6.8 Refer to **Appendix 16.1** Methodology for details of the process and **Appendix 16.2** for relevant Figures and Photographs.

*Character Area Receptor 1 - St Peter Port (Harbour and Principal Town), see **Appendix 16.2**, Figure 05a*

Value

16.6.9 Regarding designated areas/ land, this receptor does not lie within or near a designated landscape, but it does include the St Peter Port Conservation Area (CA) and culturally significant buildings, such as Castle Cornet and Hauteville House, Victor Hugo's residence.

16.6.10 St Peter Port is a busy port and principal town, with narrow historic lanes leading off the main port arrival area and is the main gateway to Guernsey from the sea.

16.6.11 It is well-maintained and has a high-quality townscape and working harbour with large cranes reaching up into the sky. Its character is defined by a combination of elements: rendered town houses; walled harbour and sea walls made from quality materials such as locally quarried stone; some street planting; and a treed back drop in local open spaces on higher ground (such as Les Beau Sejour Leisure Centre, Les Cotils Christian centre). Perceptual aspects include the sounds of the sea, of the working harbour and of the traffic along the busy East Coast Road.

16.6.12 Its value lies in its unique combination of features, described above, providing distinctiveness and giving it a sense of place.

Susceptibility and Sensitivity

16.6.13 St Peter Port is partly surrounded by the sea so lies in an open landscape and may be susceptible to an indirect change as a result of the proposed Project. Susceptibility to the type of land reclamation project proposed is reduced as a similar land reclamation project with typical features is already in the landscape, adjacent to the Site on the edge of the St Sampson Industrial Area.

16.6.14 The proposed Project does not lie within or adjacent to this character area, so the effects are indirect.

16.6.15 Although the receptor is of value, the sensitivity is judged to be **Medium**, as the type of project proposed already features in the landscape local to this receptor.

Magnitude of Change

Construction

16.6.16 St Peter Port lies approximately 1.5km from the nearest boundary of the Site, where the stone bund will be constructed on the seashore / in the sea, to contain the proposed land reclamation area. The works will comprise a local scale intervention of the landscape/ seascape and will not occur within this landscape receptor.

16.6.17 During construction, it is likely that, over the approximately 2-year construction period, one of several large barges, involved in ferrying the stone, will be anchored off shore and that two smaller barges will ferry the stone between the large barge and the Site, at high tide. Construction machinery and cranes will be operating on the Site and extra machinery and materials may be transported in heavy goods vehicles travelling along the East Coast Road. The industrial nature at Longue Hougue forms part of the adjacent working landscape of the site.

16.6.18 Open views will not be lost but the large barge will be an additional large element in the seascape, sometimes coinciding with the cruise ships sporadically anchored off St Peter Port or with other larger ferry boats. Otherwise the seascape comprises small fishing and pleasure boats, rocky out crops and islands.

16.6.19 By the end of construction, the barges, large and small, will no longer be needed and will leave but the stone bund will remain.

16.6.20 The Magnitude of Change is judged to be **Medium-Low**.

Operation

16.6.21 Once construction of the breakwater has been completed, the additional machinery, cranes and so on will leave the site and rock armour stones will no longer be transported to Site. The new breakwater will be an engineered feature replacing some elements of the natural seashore. However, large scale engineering is not a new element in the local landscape, in the context of the reclaimed East Coast Road and the existing Longue Hougue Reclamation Site. The occasional lorry bringing inert waste to the site will be moving across the Site, using their land-fill load to fill in behind the new, engineered, rock-armour, mounded, sea defence. The Magnitude of Change is judged to be **Low**.

<u>Level of Effect</u>

Construction

16.6.22 The Sensitivity is judged to be Medium and the Magnitude of Change is judged to be Medium-Low, the Level of Effect is judged to be **-Minor Adverse** and indirect (outside of this character area). The very large vessel (the large barge), which will be introduced into the deeper water between Herm and Guernsey is slightly out of character but the works occur in the context of the existing industrial and land reclamation area. Cranes, machinery and boats of varying sizes are an integral part of the character of St Peter Port.

Operation

16.6.23 During operation the Level of Effect is judged to be **Minor Adverse** and indirect on this character area. The St Peter Port itself is engineered and the essential character of this receptor will not be changed.

*Character Area 2 – East Coast Road, Road, Frontage and Treed Backdrop (see **Appendix 16.2**, Figure 05a)*

<u>Value</u>

16.6.24 This area is not a designated landscape.

16.6.25 Although it lies between the CAs of St Peter Port to the south and St Sampson to the north, with Delancey CA to the west, it does not lie within any of these designated areas.

16.6.26 The landscape / townscape has, in general, higher quality more picturesque traditional town houses along the section of the road near St Peter Port town. The road is framed by a stone sea wall to the east and by buildings with treed backdrop along the slight ridge to the west, all of which are part of this character area.

16.6.27 The road as the movement corridor connecting St Peter Port with St Sampson's Harbour and the industrial area at St Sampson, is a functional element in the landscape. It is also a residential street with bus route and sea views.

16.6.28 Its recreational value is found in the parking areas which also function as stopping points / picnicking areas / viewing points across the sea to adjacent character areas across Belle Grève Bay. There is a footpath leading from the Halfway to Spur Point to the north away from the road.

16.6.29 As for St Peter Port receptor described above, perceptual aspects include noise from existing traffic along this busy road and from the wind and sea. Although this character area has some valuable features, the busy and noisy functional road is a detractor.

Susceptibility and Sensitivity

16.6.30 This character area includes the traditional residential areas and streets on the land as it rises from the coast. The busy link road might experience some increased heavy vehicular traffic, but the road, currently and historically, links the main port and the St Sampson industrial area, slightly moderating the susceptibility of this character area as a whole to this type of project and to possible increased traffic.

16.6.31 The Sensitivity to is judged to be **Medium**

Magnitude of Change

16.6.32 This receptor is almost adjacent to the Site to the north and to the south circa 1.5km from the nearest Site boundary, where the stone bund will be constructed on the seashore/ in the sea. The works will comprise a local scale intervention of the landscape/ seascape and will not occur within this landscape receptor.

Construction

16.6.33 As for the receptor above, St Peter Port, construction machinery and cranes will be operating on the Site, constructing the stone bund. Extra machinery and materials may be transported in heavy goods vehicles from St Peter Port and be travelling along the East Coast Road to and from the Site. The industrial nature at Longue Hougue forms part of the adjacent working landscape of the site.

16.6.34 Open views will not be lost due to the actual works at the Site is peripheral and at a predominantly low level with some lifting machinery providing some vertical elements. Some of the view may be filled with the slightly out of character, large barge anchored in the water between Guernsey and Herm. There may be a slight increase in noise and movement along the already busy East Coast Road.

16.6.35 The Magnitude of Change is judged to be **Medium-Low** and both Direct (increased traffic within the character area) and Indirect (bund construction and large barge).

Operation

16.6.36 During operation the effects will be similar to Character Area 1. The Project will be similar in character to the existing Longue Hougue Reclamation Site (but without the buildings and immediately post construction without the landfill). The bund will have displaced an area of sea, small in comparison to the surrounding expanse of sea. The occasional lorry bringing inert waste to the site will be moving across the Site in the distance on top of the rock armour sea wall. This phase is estimated to last for circa 12 years.

16.6.37 The Magnitude of Change to the East Coast Road as a Landscape Receptor is judged to be **Low**.

Level of Effect

Construction

16.6.38 The Sensitivity is judged to be Medium-Low and the Magnitude of Change is judged to be Medium-Low. The adjacent character areas to this receptor include Belle Grève Bay a naturalistic seascape in which the barge and bund construction activity will occur in the context of the industrial area and the existing Longue Hougue Reclamation Site.

16.6.39 The Level of Effect is indirect and possibly direct (depending on whether extra machinery travels along the road) and is judged to be **Moderate-Minor Adverse** and mostly indirect.

Operation

16.6.40 The construction machinery will have left the Site. The barges will have gone. There will be little activity on Site except for an occasional land-fill lorry bringing land-fill to the Site.

16.6.41 During operation the Level of Effect is judged to be **Minor Adverse** and indirect.

*Character Area 3 - Belle Grève Bay (see **Appendix 16.2**, Figure 05b)*

16.6.42 The south-eastern part of the Site lies within this character area.

<u>Value</u>

16.6.43 The seaward part of the Site from Spur Point up to the rock armour sea wall of the existing Longue Hougue Reclamation Site defines the north-eastern edge of this receptor, Belle Grève Bay, while St Peter Port frames it to the south.

16.6.44 There are no landscape designations in or near the receptor.

16.6.45 The southern edge is contiguous with but outside of the designated area, St Peter Port CA.

16.6.46 Belle Grève Bay has a large and open character. There are expansive views out across the bay to the islands. It comprises a 1.5km wide sweep from St Peter Port to Spur Point and the Site. Along this sweep, created by the stone sea wall, there are a few indents into the sea formed by promontories. The sea wall separates the shingle beach from the East Coast Road. To the north the sea wall takes the form of the rock armour bund both leading from the East Coast Road to Spur Point and along the south edge of the existing Longue Hougue Reclamation Site.

16.6.47 At low tide, but hidden at high tide, the rocky bedrock in the form of long rows of almost black jagged reefs and the location of deeper channels of water, useful for navigation, are exposed.

16.6.48 The gravel on the beach and rocky seabed and reefs have wildlife value and are designated for biodiverse reasons and/or provide habitat for valued species. Refer to the marine ecology and terrestrial ecology and chapters.

16.6.49 The beach is used by locals and tourists for recreation with ormering and various sea sports occurring on/in the deeper water. The wide bay is valued as it lies on a low area of the usually sheltered east coast.

16.6.50 Other large beaches on Guernsey (with similar ease of accessibility due to road access and low topography), are generally more exposed, while the land on the south coast and at the southern end of the east coast is higher and drops more steeply down into the sea.

16.6.51 Perceptual aspects include the noise of the busy East Coast Road combined with the wind and the waves.

16.6.52 Associations include the novel ‘Toilers of the Sea’ by Victor Hugo written and set on the East Coast of Guernsey and on the local sea with its hidden underlying rocks, reefs and promontories, treacherous to all but the experienced navigator.

16.6.53 The name Hougue a la Perre which translates as Rock of Destruction captures the perils of the sea.

16.6.54 The eastern part of the Project lies within the sea within this character area, so will have a direct impact on this character area. The existing Longue Hougue Reclamation Site together with Spur Point currently forms the edge to the bay.

Susceptibility and Sensitivity

16.6.55 The beach is valued for many reasons. However, the susceptibility is moderated as there is a land reclamation site already in the existing Longue Hougue Reclamation Site, so no new elements are being introduced into this character area.

16.6.56 The Sensitivity to change is judged to be **Medium**.

Magnitude of Change

Construction

16.6.57 This receptor includes the eastern part of the Site, where the stone bund will be constructed on the seaward side of the seashore / in the sea. The works will comprise a local scale intervention of the landscape / seascape.

16.6.58 The proposals will slightly reduce the size of the bay within this receptor by forming a new edge within the northern periphery of the bay. The edge to the bay will be less articulated than the existing one as it replaces the natural rocky seashore.

16.6.59 It will incorporate Spur Point to the south-west and (as similar materials will be used, namely rock armour) will merge with, and add to, the existing rock armour sea wall from the East Coast Road to Spur Point to form a long rock armour wall. To the south-east the bund / wall will continue the rock armour wall to the north-east around the existing Longue Hougue Reclamation Site. This (the lack of articulation combined with the use of similar materials) will add to the apparent length of the walls.

16.6.60 The southern wall extending from Spur Point will form the new edge to the bay, in place of the Longue Hougue industrial area and existing land reclamation site behind to the north, the bund of which previously formed a north-eastern edge to the Bay.

Construction

16.6.61 Construction will involve the temporary introduction of machinery and materials (needed to build the rock armour sea wall described above) in a small area in the north of Belle Grève Bay. There will be a large vessel (the large stone-conveying barge) in the deeper water between Herm and Guernsey in the adjacent Open Sea Character Area with the two smaller barges active at every high tide moving through Belle Grève Bay character area. The Magnitude of Change to this receptor is judged to be **Medium**.

Operation

16.6.62 At the end of construction, estimated to last 2 years, a small portion of the shore/sea will have been taken from the bay and a mounded rock armour sea wall (surrounding and containing a space to be filled with inert waste) will have replaced it as described above. This will be permanent / long duration. During the circa 12 year or greater operation period, landfill lorries will pass across parts of the Site (average hourly would be around 7 HGVs, 8 vans and 1 car). The receiving and processing will involve less machinery and movement than during the construction phase. The Magnitude of Change to this receptor is judged to be **Medium-Low** as although there will be less machinery, noise and movement, the sea north of the new bund will be gradually displaced by landfill.

<u>Level of Effect</u>

Construction

16.6.63 The Sensitivity is judged to be Medium, and the Magnitude of Change is judged to be Medium. Although the Bay as a receptor has many valued features, the Bay and the Site lie adjacent to another land reclamation site. The Level of Effect is judged to be **Moderate-Minor Adverse** and Direct (the works occur within the character area).

Operation

16.6.64 During operation the Level of Effect is judged to be **Moderate-Minor Adverse** and Direct.

Character Area 4, The Open Sea with Islands (and Ferry Routes), see ***Appendix 16.2****, Figure 05b*

<u>Value</u>

16.6.65 No landscape designations apply.

16.6.66 This receptor has varying degrees of intervisibility to the following designated areas: St Peter Port CA, Delancey CA and St Sampson CA.

16.6.67 It includes the seaward edge of the rocky foreshore area, designated locally for its biodiversity interest. The sea around the eastern coast supports ferries, fishing boats and pleasure boats. It is open and ever-changing.

16.6.68 It is framed by the industrial towers of St Sampson, the existing Longue Hougue Reclamation Site, Belle Grève Bay and the East Coast Road and by St Peter Port. It has scenic value and provides a relatively uncluttered foil to the activity of the bustling ports, and road.

16.6.69 In combination with St Peter Port its distinctive character lies in the contrast between the large scale of the open seas and the progressively smaller scales of the promontories and islands, down to buildings and trees. The vegetated islands provide green punctuation points in the marine scene. At low tide the open sea is striped with black jagged rocky reefs. It is relatively wild and yet near a major port and municipal centre. It has recreational value.

Susceptibility and Sensitivity

16.6.70 This character area comprises the open sea with islands. Industry and land reclamation are already in this landscape, moderating the susceptibility of this receptor to change.

16.6.71 Although a landscape with value, the Sensitivity of the Seascape / Open Sea and Islands character area to the type of project is considered to be **Medium-Low**.

Magnitude of Change

Construction

16.6.72 The Open Sea character area lies beyond Belle Grève Bay which extends from the Open Sea to the shoreline, where the stone bund will be constructed. The works will comprise a local scale intervention on the landscape/ seascape and will not occur within this landscape receptor.

16.6.73 During construction the large stone conveying barge will be anchored in the deeper water, which lies within this character area. The smaller barges will move in and out of this area at high tide but remain anchored within it at mid and low tide. Except for the barges, the change involved in constructing the bund is outside this character area. The Project is an extension of the existing Longue Hougue Reclamation Site, and near the Longue Hougue industrial area. Machinery already features in this working area of the seascape. The overall character of the sea, given its extent in the study area will only be slightly and temporarily changed by the sizeable barge.

16.6.74 The Magnitude of Change is judged to be **Low**.

Operation

16.6.75 The landscape change involves a relatively small area of the seashore adjacent to but not in this character area. The reefs, apparent at low tide outside the Site and within this character area, will remain and the character of this area will not have changed. During operation (from the end of construction to the end of the land-fill project) the Magnitude of Change is judged to be **Low**.

Level of Effect

Construction

16.6.76 This Sensitivity is Medium-Low, and the Magnitude of Change is Low. The Level of Effect is judged to be **Minor Adverse** and both Direct (the barges) and Indirect (the bund construction works and the emerging bund). The overall character of the sea will only be very slightly changed by the bund and by the temporarily changes involved in the bund construction works including the sizeable barge.

Operation

16.6.77 During operation the Level of Effect is judged to be **Minor Adverse and Indirect**. As for construction effects, the overall character of the Open Sea with Islands (and Ferry Routes) will only be very slightly changed.

*Character Area 5A - The Local Landscape / Rocky Shore & Industrial Area (see **Appendix 16.2**, Figure 05c)*

16.6.78 The north-western part of the Site lies within this character area.

Value

16.6.79 No landscape designations apply.

16.6.80 Regarding designated areas such as CAs, although near St Sampson CA, and Delancey CA, this character area does not relate directly to either of them, due to intervening industrial or treed landscape / landform. The Site lies at around 1.5km distance from St Peter Port CA, reducing its influence.

16.6.81 The rocky outcrops, (in addition to providing landscape value and adding variety to the natural seashore) have habitat value and are locally designated.

16.6.82 The character area is predominantly industrial, St Sampson being the main industrial area of Guernsey. It lies adjacent to the outer edge of the St Sampson Main Centre Outer Area and includes the Longue Hougue industrial area and the existing Longue Hougue Reclamation Site, the road leading to it, and the rocky fore shore. The road to the Longue Hougue reclamation site separates the Site from the industrial area. In the choice of materials and buildings, the functional dominates over the aesthetic and there is little greenery.

16.6.83 The quality of the views varies. To the west the industrial elements and servicing road dominate the scene; but to the east lies the open area of sea and picturesque islands, influencing the recreational value of the public footpath, which runs along the road.

<u>Susceptibility and Sensitivity</u>

16.6.84 Part of this character area lies within the St Sampson Main Centre Outer Area and is functional and industrial and with few features of value. There is some landscape and ecological value in the rocky foreshore part of this character area, but the seashore ends in an engineered rock armour bund forming a seawall and so its susceptibility to the type of development is moderated.

16.6.85 The seashore is separated from the land by an engineered rock armour bund and given the functional nature of the industrial landscape, the Sensitivity is judged to be **Low**.

<u>Magnitude of Change</u>

Construction

16.6.86 The Local Landscape / Rocky Shore & Industrial Area character area lies partly within the Site, where land fill will occur, but the stone bund will be constructed on the seashore/ in the sea in the adjacent character areas: 3 and 5A. The works will comprise a local scale intervention of the landscape/ seascape.

16.6.87 Construction of the Project will involve the noise and movement of machinery needed to build the sea wall in the adjacent character areas (3 Belle Grève Bay and 5B The Local Landscape/ Rocky Shore & Well-Vegetated, Green Area) on the seabed and to lift the rock armour onto the wall. This character area includes the current reclamation site at Longue Hougue with occasional landfill lorries running across it, creating noise and movement, the adjacent industrial area with industrial sheds to the north-west, the service road leading to the reclamation site, and the existing seashore just south of the reclamation site. The construction compound and staff car park will be placed in this character area. The character of the seashore part of this character area will change, as the stone bund is built and the link to the sea is progressively walled off, creating a lagoon with a fluctuating water level. However, this is only part of the character area. The large barge will lie in a nearby but not adjacent area. The smaller barges will unload stone onto the beach in this character area and in the adjacent character area, where it will be stored and then accessed to build the bund.

16.6.88 The Magnitude of Change on this character area is judged to be **Medium**.

Operation

16.6.89 At the end of construction, the machinery will leave the Site and the character of the industrial areas and road will be as in the baseline. However, the character of the seashore/ sea area will be as for a fluctuating mid-tide contained by the stone bund sea wall. The character of the seashore area of the receptor will increasingly change as the lagoon is progressively backfilled with landfill over a predicted period of circa 12 years behind the sea wall. The machinery involved in the landfill is minimal consisting of the occasional lorry with its load to be discharged.

16.6.90 The Magnitude of Change is judged to be **Medium-Low,** as although there is less machinery than in construction, the seashore / lagoon will progressively disappear.

<u>Level of Effect</u>

Construction

16.6.91 The character of some of this area is mostly industrial, with a marine element. As the stone bund is constructed, a lagoon, with a fluctuating water level will gradually replace the tidal sea on the beach, leaving the beach and seashore relatively undisturbed. Stone brought by small barges at high tide from the sea will be stored on the beach.

16.6.92 The Level of Effect (given that the Sensitivity is judged to be Low and that the Magnitude of Change is judged to be Medium) is judged to be **Minor Adverse** and Direct (as the works will occur in this character area) over the estimated 2-year period of construction.

Operation

16.6.93 During operation the Level of Effect, given the Medium Sensitivity, is judged to be **Minor-Moderate Adverse** and Direct over the 12 years or more as the fluctuating lagoon gradually disappears under land fill as planned.

*Character Area 5B - The Local Landscape / Rocky Shore & Well-Vegetated, Green Area around Gorselea (see **Appendix 16.2**, Figure 05c)*

16.6.94 The south-western part of the Site lies within this character area, which comprises the vegetated area and seashore on the south-eastern edge of the St Sampson Main Centre Outer Area, just North of and adjacent to Spur Point, wrapping round it to the south.

Value

16.6.95 There are no landscape designations. There is intervisibility between this part of the Site and St Peter Port town and CA, but not with either The Bridge, Vale & St Sampson CA or Delancey CA.

16.6.96 The local landscape to the west is residential with terracotta-roofed houses, set in large gardens, planted with trees and shrubs. A small area of shingle beach lies to the east of the residential area with rocky outcrops and rows of jagged reefs revealed at low tide. Landscape value is provided by the organic forms and undulating shoreline. The rocky outcrop habitat is locally designated for its biodiversity value.

16.6.97 To the south-west lies Spur Point with historic fortifications / concrete bunkers. A walking route enters the character area from the parking spots and unofficial viewing points along the East Coast Road at the Halfway and nearer the Site. The public footpath runs between the private gardens and the beach along a low sea wall of blocks of stone set into the bank. It continues into a small grassy area with memorial bench and runs north through a mainly Tamarisk hedgerow onto the road adjacent to the Longue Hougue industrial area and the existing Longue Hougue Reclamation Site.

16.6.98 The cove is framed by the adjacent treed gardens and it has a secluded and natural character with long sea views out to the south-east towards the islands of Herm, Jethou and towards St Peter Port. This provides recreational value.

Susceptibility and Sensitivity

16.6.99 The character area has valued qualities, which are susceptible to, the type of development, where function is the prime consideration. It is picturesque and quiet with little movement, as would suit a memorial bench and beachside house, Gorselea, with sea views.

16.6.100 The character area is judged to have a **High** Sensitivity to change.

Magnitude of Change

Construction

16.6.101 The Local Landscape/ Rocky Shore & Well-Vegetated, Green character area around Gorselea lies partly within the Site, where the stone bund will be constructed on the seashore/ in the sea, to contain the proposed land reclamation area. The works will comprise a local scale intervention of the landscape/ seascape.

Construction

16.6.102 As the mounded rock armour sea wall is built, the character of the seashore area of 5b will change as the link to the sea is progressively walled off creating a lagoon with a fluctuating water level. A three to seven metre section of the upper foreshore will be retained with public access to the existing footpath stopped up at either end by a site security fence.

16.6.103 Construction will introduce additional noise and movement created by the machinery needed to build the sea wall on the seabed and to lift the rock armour onto the wall. This will be a greater change to the character of 5b, than 5a, as it has some separation from the industrial area and is a less noisy, more peaceful character area/ receptor than 5a.

16.6.104 The Magnitude of Change on this character area is judged to be **High**.

Operation

16.6.105 At the end of construction, the machinery will leave the Site leaving the character of the gardens and upper foreshore, and memorial bench in the grassed POS with Tamarisks, as in the baseline. However, as for 5a, the character of the seashore / sea area will increasingly change as the lagoon and beach area is progressively backfilled with landfill over a predicted period of 12 years or more behind the sea wall. The machinery involved in the receiving and processing operations is minimal consisting of a lorry with its load to be discharged, up to four pieces of equipment and 4 personnel (see **paragraph 4.5.4**).

16.6.106 The Magnitude of Change is judged to be **high** as although there is less machinery than in construction, the seashore and the fluctuating lagoon and will progressively disappear and the character of that part of the area will be changed.

Level of Effect

Construction

16.6.107 This Sensitivity is High and the Magnitude of Change is judged to be High, the Level of Effect is judged to be **Substantial Adverse** and Direct (as the bund construction works and stone storage will occur in this character area). The link to the sea will be progressively walled off and the noise and movement of the machinery will reduce the peacefulness of the gardens and retained peripheral sections of public footpath and open space to include the sea shore / beach.

Operation

16.6.108 During operation, the Level of Effect, given the High Sensitivity, is judged to be **Substantial Adverse and Direct** as the character and sense of place of the receptor has almost completely changed.

16.6.109 Certain receptors, Character Area 3, Character Area 5a, and Character Area 5b are selected for further discussion on whether as a whole the changes brought about on the landscape receptors are significant or not. For explanation of and for discussion of significance, refer to **Section 16.8**.

Value, Susceptibility and Sensitivity

16.6.110 Sensitivity of the character areas and the reasons for the conclusion are summarised in **Table 16-5**.

Table 16-5: Value / Sensitivity of Landscape / Townscape / Seascape Receptors

Receptor	Sensitivity	Justification
Character Area 1 - St Peter Port (Harbour and Principal Town)	Medium	Although the receptor is of value, the Sensitivity is judged to be medium, as there are landscape elements (Longue Hougue Land Reclamation Site) of the same type as the Project already in the landscape.
Character Area 2 – East Coast Road - Road, Frontage and Treed Backdrop	Medium	The receptor includes the traditional residences and streets on the land rising from the coast and fronting onto the coast road. The road currently and historically links the main port and the industrial area, slightly reducing the susceptibility of this character area to this type of project.

Receptor	Sensitivity	Justification
Character Area 3 - Belle Grève Bay	Medium	The beach is valued for many reasons, but the susceptibility to the type of change proposed is slightly reduced as this receptor lies adjacent to the existing land reclamation site at Longue Hougue. Part of the Site lies within this area.
Character Area 4 - The Open Sea with Islands (and Ferry Routes)	Medium-Low	Even though, it is a landscape with elements of value, the Sensitivity of the seascape / open sea and islands to the type of project is Medium-Low, as susceptibility is moderated as there are industrial and land reclamation features in the Study Area.
Character Area 5A - The Local Landscape / Shore - Rocky Shore & Industrial Area	Low	Given the engineered seashore landscape and the functional nature of the local landscape with few features of rarity or quality, the susceptibility is moderated. Part of the Site lies within this area. The Sensitivity is judged to be Low.
Character Area 5B - The Local Landscape/ Rocky Shore & Well-Vegetated, Green Area around Gorselea	High	The local green vegetated area and adjacent seashore have valued qualities that could easily be lost in (and are therefore susceptible to) this type of development where function is the prime consideration. Part of the Site lies within this area. The character area is judged to have a High Sensitivity to change.

16.6.111 The Assessment of the Effects on the Character Areas are summarised in **Table 16-6**.

16.7 Visual Impacts during Construction & Operational Phases

Assessment of Potential Effects on Visual Receptors

16.7.1 The visual effects on visual receptors (Viewers at the Recognised viewpoints, Viewers in the Conservation Areas, and the other Visual Receptor Groups) are assessed below.

Table 16-6: Summary of Effects on Character Areas / Landscape Effects

	Landscape Receptor Group	LR1 Character Area 1	LR2 Character Area 2	LR3 Character Area 3	LR4 Character Area 4	LR5a Character Area 5A	LR5b Character Area 5B
		St Peter Port (Harbour & Principal Town)	East Coast Road – Road, Frontage, and Treed Backdrop	Belle Grève Bay	The Open Sea with Islands (and Ferry Routes).	The Local Landscape / Shore - Rocky Shore & Industrial Area	The Local Landscape/ Rocky Shore & Well-Vegetated, Green Area around Gorselea
	Sensitivity to Change from Proposals	Medium	Medium	Medium	Medium-Low	Low	High
Construction Phase	Magnitude of Change	Medium – Low	Medium - Low (both direct and indirect)	Medium	Low	Medium	High
Construction Phase	Level of Effect	Minor Adverse (Indirect)	Moderate-Minor Adverse (both Direct and Indirect)	Moderate-Minor Adverse (Direct)	Minor Adverse (Indirect)	Minor Adverse (Direct)	Substantial Adverse (Direct)

	Landscape Receptor Group	LR1 Character Area 1	LR2 Character Area 2	LR3 Character Area 3	LR4 Character Area 4	LR5a Character Area 5A	LR5b Character Area 5B
		St Peter Port (Harbour & Principal Town)	East Coast Road – Road, Frontage, and Treed Backdrop	Belle Grève Bay	The Open Sea with Islands (and Ferry Routes).	The Local Landscape / Shore - Rocky Shore & Industrial Area	The Local Landscape/ Rocky Shore & Well-Vegetated, Green Area around Gorselea
Operation Phase	Magnitude of Change	Low	Low	Medium-Low	Low	Medium-Low	High
	Level of Effect	Minor Adverse (Indirect)	Minor Adverse (Indirect)*	Moderate-Minor adverse (Direct)	Minor Adverse (Indirect)	Minor-Moderate Adverse (Direct)	Substantial Adverse (Direct)

16.7.2 Each Visual Receptor Group (VRG) and the related Representative View / Views (RV/ RVs-) is considered in turn. First, the sensitivity of the VRG is assessed as a function of value of the view and susceptibility of the VRG to the view. Then the Level of Effect for the construction phase followed by the Level of Effect for the operation phase is considered by examining the Magnitude of Change to the view / views and the Sensitivity of the viewer. The effect on their visual amenity is a function of the size / extent of the change (Magnitude of Change) to their views and their sensitivity to these views.

16.7.3 Note: Recognised Views may be Strategic Views (SV)s as shown on Figure 11 of the GSC, and /or Guernsey Map Viewing Points (VP) as shown on the Guernsey Map 2010.

Assessment of Effects on the Recognised Views for Construction and Operation

16.7.4 The Recognised Views have been selected and published as they are valued views. Viewers going to these viewing points will be susceptible to changes to the view and have a High Sensitivity.

16.7.5 During construction, changes to the view will include the introduction of machinery needed to construct the rock armour bund and the bund itself. Machinery and industry are already on the scene both in the form of cranes at St Peter Port working harbour and the towers of the industrial area of St Sampson.

16.7.6 As machinery, such as cranes, lifting devices, and traffic such as industrial transport lorries, and industrial artefacts are part of this landscape often the construction and operation effect will be similar in views from the more distant locations.

Recognised View from Salerie Battery – SV (Framed View circa 60 Degrees) No VP *(Representative View 1 Figures 8a and 8b, in* ***Appendix 16.2*** *and Photomontage view in* ***Appendix16.3****)*

16.7.7 RV1(a to d) North of St Peter Port, adjacent to the East Coast Road, Looking north and north-east, at a distance of circa 1.5km, from the nearest Site boundary.

16.7.8 The SV Vista (circa 60 degrees) is to the north-east towards the Site. Views include the busy road with residential and other frontage to the west, and the treed hilltop of Delancey Park to the north. Across Belle Grève Bay, to the north-east, the treed area around the rocky promontories at Spur Point, most of the Site except for a small area to the north of Spur point, and the existing Longue Hougue land reclamation further to the north-west are in the view with the open sea and distant islands of Herm and Jethou to the east in the wider view.

Value

16.7.9 The value lies in the unimpeded expansive views of the island of Guernsey and its coast and the sea from the largely urban context of the port, busy town and arterial East Coast Road. Various landmarks include the following: the distinctive hilltop trees at Delancey Park, the chimneys of the St Sampson industrial area; Vale Castle on the skyline in the far distance north of Longue Hougue; and the islands.

Susceptibility and Sensitivity

16.7.10 The Sensitivity is **High** as explained in **paragraph 16.7.4**.

Magnitude of Change

<u>Construction and Operation</u>

16.7.11 From RV1, the Project will be seen to the east of Spur Point, which the proposed bund ties into, against the backdrop of the slightly higher trees and second storey of Gorselea, the St Sampson industrial area and the existing Longue Hougue Reclamation Site, at a distance of circa 1.5km. The long low rock armour bund will be just distinguishable but will not change or break the distant skyline. It will replace (in the view, not physically) the more distant existing bunded, rock armour wall to the north-east (behind it). A rock armour bund already runs from the East Coast Road to Spur Point and the proposed bund continues this line, emphasising its engineered straight appearance and apparent length. However, countering this, the line of the wall is not perpendicular to the viewer, so the wall is seen obliquely shortening its apparent length. It is a comparatively small element in the view from this distance, bringing about a small change. The sea views are for the most part unaltered.

16.7.12 Although construction will involve more machinery, machinery is already part of the adjacent harbour scene at St Peter Port. The Magnitude of Change is judged to be **Low** for both construction and operation.

Level of Effect

<u>Construction and Operation</u>

16.7.13 The Level of Effect is judged to be **Moderate-Minor Adverse** for both construction and during operation. The works will be visible but the expansive sea views across Belle Grève Bay and out to the islands remain largely unchanged by the operations.

Recognised Views from Beau Sejour Leisure Centre - SV single view – vista to the north, VP 180 degrees to the north *(Representative View 2, Figure 8c, View from Beau Sejour Leisure Centre in **Appendix 16.2** and Photomontage view in **Appendix16.3**)*

16.7.14 RV2 Looking north-east towards the Site, from just west of St Peter Port Harbour on the higher land at the treed south-west edge of the town, circa 2km from the nearest Site boundary. RV2 represents the views from the higher land on the edge of St Peter Port town, looking towards the Site.

16.7.15 North of this, the land is lower (at the levels of the East Coast Road or lower) and so, in this view, the urban area west of the East Coast Road appears as rooftops with a few treetops before the land rises up in the view to the treed slopes of and around Delancey Park further north. To the north-west, the views extend to the northern corner of the island.

16.7.16 To the east, the sea in Belle Grève Bay and beyond is visible with Spur Point and the existing industrial and land reclamation areas at Longue Hougue, protruding into the sea and framing the Bay. From this view, the sea on the horizon forms the skyline and both the existing land reclamation site and Spur Point lie below this with Vale Castle distinguishable on the skyline behind (to the north). The surface of the existing land reclamation site and the sea within and outside of the site will be very slightly more visible than in views from a lower elevation.

Value

16.7.17 The value of the view lies partly in its elevation, affording extensive views over both the sea and the Island of Guernsey with various landmarks as listed in RV1 above and additional ones afforded by the elevation, such as the spire of Vale Church in the distance.

Susceptibility and Sensitivity

16.7.18 The Sensitivity is **High** as explained in **paragraph 16.7.4**.

Magnitude of Change

Construction and Operation

16.7.19 This view is elevated, so the new surface of the Site, (i.e. the 'lagoon' in construction or the new landfill surface, which has displaced the sea in operation), will be just noticeable in these oblique views, from a distance of circa 2km. However, the proposed bund and surface of the Site will sit below the horizon and against the backdrop of the existing Longue Hougue Reclamation Site, which lies behind (north-east) the Site in this view. The existing Longue Hougue reclamation lies just below the skyline with the recycling centre and/or the occasional shed piercing the skyline.

16.7.20 The Magnitude of Change is judged to be **Medium-Low**.

16.7.21 Due to distance this will apply for both construction and operation.

Level of Effect

Construction and Operation

16.7.22 The Level of Effect is judged to be **Moderate-Minor Adverse** for both construction and during operation. Most of the view is towards the north of Guernsey, with a partial view of the coast, in which the Site is a small element and the backdrop to the Site area of the view is industrial. The Site / Project sits below both the horizon and skyline.

Recognised View from Fort George / Belvedere Field – SV Framed View (Circa 60 Degrees) to the North-east, VP 180 Degrees to the North-east *(Representative View 12, Figure 8k, in **Appendix 16.2**)*

16.7.23 RV12, South of St Peter Port on higher land, looking north-east towards the Site at a distance of circa 3km from the nearest Site boundary.

16.7.24 RV12 is at a similar elevation to RV2 but at a greater distance from the Site, so the Site will be viewed more obliquely. Similar landscape elements will be in the view, Belle Grève Bay, the industrial area, the East Coast Road, but they will be in the background and will be viewed over and through St Peter Port. The view extends beyond (to the north of the Site) to where Vale Castle and trees in the residential areas on the north of the island form the skyline. The foreground harbour structures, to include large loading cranes, and bustling activity of the port will attract the attention of the viewers and provide the focus and interest of the view.

Value

16.7.25 As for RV2, the value of the view lies partly in its elevation, affording extensive views over both the sea and the Island of Guernsey. However, the main value of this view lies in the overview of St Peter Port and Castle Cornet with the extensive backdrop providing context.

Susceptibility and Sensitivity

16.7.26 The Sensitivity of the viewer is **High** as explained in **paragraph 16.7.4**.

Magnitude of Change

Construction and Operation

16.7.27 During construction the cranes and working harbour at St Peter Port will be in the foreground, so the distant lifting machinery, extending the rock armour walls to form the Project, will not be the focus of the view, but will be part of the background and not be out of context given the adjacent Land Reclamation Site, and the St Sampson industrial area structures.

16.7.28 The Magnitude of Change is judged to be **Low** for both construction and operation.

Level of Effect

Construction and Operation

16.7.29 The Level of Effect is judged to be **Minor Adverse-Negligible** for both construction and during operation. The Project is seen in the distance and merges with other background elements such as St Sampson, the existing Longue Hougue Reclamation Site, and Vale Castle. It is viewed through the cranes and lifting machinery of St Peter Port.

***Recognised View from Vale Castle – SV – Panorama 360 degrees, VP – Panorama 360 Degrees** (Representative Viewpoint 9, Figure 8j, in **Appendix 16.2**)*

16.7.30 RV9 From the southern ramparts of Vale Castle, to the north of the Site, looking south-west towards the Site at a distance of circa 1km from the nearest Site boundary.

16.7.31 The views are 360 degrees. RV9 illustrates the view to the south-west which is the angle of view being considered, looking south-west. The views in the other directions are not affected by the scheme and would be from different locations around the perimeter ramparts of the semi-ruined castle. To the west and centre of this view lies St Sampson's harbour entrance and boats, with a backdrop of the Longue Hougue industrial area sheds. To the east of the view lies the sea and the existing Longue Hougue Reclamation Site with views of the sea, a sliver of which, lies within the Site Boundary beyond. Beyond lies Belle Grève Bay, with St Peter Port, and Castle Cornet in the far distance.

Value

16.7.32 The value lies partly in the availability of views, across the sea and across the local island landscape, afforded by the elevation, so the viewer can orientate themselves within the landscape. It is also a historic monument within but on the outer north-eastern edge of The Bridge, Vale & St Sampson's CA.

Susceptibility and Sensitivity

16.7.33 The Sensitivity is **High** as explained in **paragraph 16.7.4**.

Magnitude of Change

<u>Construction and Operation</u>

16.7.34 The industrial area and the existing Longue Hougue Reclamation Site intervene between most of the Site and the view. To the east of the view, the new bund (construction phase) and gradual landfill (operation Phase) will be seen as an extension to the existing Longue Hougue Reclamation Site but the proposed bund will appear smaller than the existing one as it will be further away.

16.7.35 The Magnitude of Change is judged to be **Low** for both construction and operation.

Level of Effect

<u>Construction and Operation</u>

16.7.36 The Level of Effect is judged to be **Minor Adverse- Negligible** for both construction and during operation. Limited partial views of the site are available adjacent to Longue Hougue industrial and the existing Longue Hougue Reclamation Site in the foreground.

Recognised View from Delancey Park – SV Framed View Circa 60 Degrees to the South-east, No VP

No Representative View as scoped out, see below

16.7.37 Like RV2 and RV12, the SV is an elevated view. The SV is from the south of the park from a bench on a concrete structure with railings on lower land to the south of the park. The view is to the south-east towards St Peter Port. Intervening trees and landform in Delancey Park and trees around Gorselea prevent views of the Site, which lies to the east of the location of the SV. This SV is therefore scoped out and not assessed further. Note: The RV from Delancey Park, RV14 is from a different location on the eastern side of the Park. It looks east, and is covered in the visual receptors section below, in VRG 9 Visitors to Delancey Park.

Recognised View from Castle Cornet - SV Framed View Circa 60 Degrees to the West, No VP

16.7.38 Scoped out as the view is to the west and the site lies to the north. Note RV11 Castle Cornet is covered in the visual receptors section below, in VRG 7 Tourists & Sightseers & Visitors to St Peter Port.

Assessment of Effects on Visual Receptor Groups (VRGs) - General Notes

16.7.39 During construction, changes to the view will include the introduction of machinery needed to construct the rock armour bund and the bund itself. Machinery and industry are already on the scene both in the form of cranes at St Peter Port working harbour and the towers of the industrial area of St Sampson. The change is of local importance and scale.

16.7.40 During construction the large barge will be anchored in the deeper water with two smaller barges ferrying the stone to the beach area within the Site, to unload it at high tide.

16.7.41 As machinery, such as cranes, lifting devices, and traffic such as industrial transport lorries, and industrial artefacts are part of this landscape often the construction and operation effect will be similar in views from the more distant locations.

16.7.42 Distances are from the nearest boundary of the Site and are approximate.

16.7.43 The RVs are single views, used to inform the assessment, whilst recognising that some viewers/ VRGs move through the landscape. For sequential views text descriptions are used to supplement the RVs and describe the views experienced while moving from one static view to another e.g. from RV10 to RV11.

16.7.44 The following VRGs are now assessed:

- Road Users -car and truck users, cyclists, pedestrians;
- Residents;
- Recreational and other beach users;
- Ferry users travelling to and from St Peter Port;
- Fishermen and recreational boat users;
- Users of the public footpath;
- Tourists and sightseers to Guernsey -St Peter Port;
- Workers in the adjacent existing Longue Hougue Reclamation Site; and
- Visitors to Delancey Park.

***Visual Receptors – VRG1- Road users on the East Coast Road** (See viewpoints 1a-d on Figures 08a-b, viewpoints 3a and 3b, on Figure 08d and viewpoint 13 on Figure08l, in Appendix16.2)*

Representative Views for Continuous Sequential Views

16.7.45 RV1 Salerie Battery, RV3a and 3b Hougue a la Perre, RV13 Halfway, Looking north and north-east at distances of circa 1.5km, 1km and 0.5km from the nearest Site boundary.

16.7.46 Panoramic sea views are available when travelling in either direction along the busy East Coast Road, however, views travelling south are scoped out as the site lies to the north-east of this section of the road. Sequential views are available to users of the East Coast Road, travelling north.

16.7.47 The Site is visible to the north-east of the view. It is framed to the north-west by the trees west of Spur Point in Gorselea and other gardens merging with those in Delancey Park. The backdrop to the Site is the existing Longue Hougue Reclamation Site with the sea and islands of Herm and Jethou to the east. The townhouses fronting onto the road to the west are peripherally in the views.

16.7.48 It is seen over a sea wall with places, where people park to enjoy the sea views, to walk along the front, or to visit the town. In other sections of the road, the views afforded to car users (but not cyclists or walkers except in very small sections) are prevented by higher sections of the sea wall in the location of Hougue a la Perre. For car users the sea view is over / through the stream of traffic on the eastern side of the road.

Value

16.7.49 The value lies in the panoramic views of the sea, of the different character areas and of the diverse built elements in the views, providing landmarks and a sense of place.

Susceptibility and Sensitivity

16.7.50 The VRG is subdivided and the sensitivity of the subgroups is judged to be as follows:

- VRG1a – Road Users – Car and Truck Users. Car users are afforded intermittent sequential views, which are transient as they move quickly through the landscape moderating their susceptibility to their surroundings. While passengers are able to appreciate the view, drivers will be focused on the road rather than the view. Their Sensitivity is **Medium-Low**.
- VRG1b- Road Users – Cyclists. Cyclists will have more time than car drivers

to absorb their surroundings, but they still will be concentrating on the route ahead rather than on the view, making them less susceptible. Their sequential views will be almost continuous. Their Sensitivity is **Medium**.

- VRG1c - Road Users-Pedestrians and Walkers. As for cyclists, their sequential views will be almost continuous. Pedestrians and walkers will be travelling more slowly and so have more time and opportunity than car drivers / cyclists to look around and absorb their environment and so will be more susceptible to changes to the valued views. Their Sensitivity is **High**.

Magnitude of Change

Construction and Operation

16.7.51 During construction, changes to the view will include the introduction of machinery needed to construct the rock armour bund and the bund itself.

16.7.52 In the sequential views, over a distance of around 2km, the viewing distance and orientation changes as the viewer moves north along the road.

16.7.53 From RV1, the Project will be seen to the east of Spur Point, which the proposed bund ties into, and against the backdrop of the higher land of Gorselea and the St Sampson industrial area. It is seen obliquely against the backdrop of Gorselea and other garden trees, the large sheds of the Longue Hougue Industrial area and further east the existing Longue Hougue Reclamation Site, at a distance of circa 1.5km.

16.7.54 As the viewer moves north along the East Coast Road, the view will gradually become more like RV3 from Hougue a la Perre at about 1km from the Site. The wall runs perpendicular to the view and so is seen full on and at its full length. It will appear as an extension of the rock armour sea wall from the East Coast Road to Spur Point, increasing its apparent length. As the bund is constructed to its full height, the Site will be seen against the backdrop of the sheds on the existing Longue Hougue Reclamation Site. The existing Longue Hougue Reclamation Site rock armour bund will be concealed by the south-western face of the new bund. The eastern part of the south-western face will lie just above the horizon formed by the sea (Alderney on clear days) to the east. This will make it a more noticeable change to the view, than if it were not viewed full on and not forming a new element on the skyline.

16.7.55 Progressing further north from RV3 to RV13, the Halfway, the existing Longue Hougue Reclamation Site (visible in RV3 at distance from the Site of just over 1km) will gradually disappear behind the local vegetation around Gorselea until gradually the existing Longue Hougue Reclamation Site is no longer in the view at RV13 (at a distance of just over 500m) and the bund will be seen jutting out beyond Spur Point, part of the face forming the skyline and part overlapping with Herm.

16.7.56 Travelling further north along the East Coast Road, the site is hidden from the view by the intervening trees in or adjacent to the residential gardens around Gorselea.

16.7.57 Consideration of the Magnitude of Change includes all the above views but with a weighting towards those around Hougue a la Perre and the Halfway as these are near views and form the majority of the sequential views.

16.7.58 Although from RV1, the expansive sea views remain largely unchanged (within the context of the wider area of sea and islands, with St Peter Port with its cranes and grey stone sea wall in the visual envelope to the south), from views near Hougue a La Perre and Halfway, the wall is viewed full on, revealing its full length, and from these angles / orientations most of the new bund pierces the skyline introducing a more obvious change to the view.

16.7.59 For VRG1a and VRG1b, car and truck users and cyclists, the Magnitude of Change to the sequential views is judged to be **Medium-Low** for both construction and operation. The sequential views are interrupted by sections where the sea wall is higher, and the passage of vehicles travelling south along the road will continually interrupt any views to the north-east further reducing the change to the view.

16.7.60 For VRG1c, Pedestrians and Walkers walking along the seaside of the road, the changes will have a greater impact as the site will be viewed across the Bay and not through the traffic. The sequential views are only interrupted by higher sections of wall at Hougue a la Perre. The Magnitude of Change to the sequential views is judged to be **Medium**.

Level of Effect

Construction and Operation

16.7.61 In the sequential views, travelling north only and moving around the curve of the Bay, the bund at first viewed against the industrial backdrop will gradually appear to jut out into the sea, finally partially obscuring Herm in the view.

16.7.62 VRG1a and 1b Car users and Cyclists will move more quickly through and view the Site through on-coming traffic.

- VRG1a. Road Users- Car and Truck Users. The Level of Effect is judged to be **Moderate-Minor Adverse**.
- VRG1b- Road Users – Cyclists. The Level of Effect is judged to be **Moderate-Minor Adverse**.

16.7.63 VRG1c Pedestrians and Walkers are able to obtain unimpeded sequential views of the sea and the Site, will move more slowly, and. will be more aware of their surroundings.

- VRG1c - Road Users-Pedestrians and Walkers. The Level of Effect is judged to be **Moderate Adverse**.

Visual Receptors – VRG2- Residents

General Note regarding Residents Sensitivity

16.7.64 The value of these views lies in the panoramic views of the open sea and islands of Herm and Jethou across Belle Grève Bay. Residents as a group will be susceptible to changes in the views and given the valued 180 degrees (and wider) views will have a **high** sensitivity.

Visual Receptors Sub-group VRG 2a- Residents fronting onto or near the East Coast Road *(See viewpoints 1a-d on Figures 08a-b, viewpoint 2 on Figure 08c, viewpoints 3a and 3b, on Figure 08d and viewpoint 13 on Figure08l, in Appendix16.2)*

Representative Views for VRG2a Residents RV1 Salerie Battery, RV3 Hougue a la Perre, RV13 Halfway, (views within the context of the East Coast Road) looking north and north-east at distances of circa 1.5km, 1km and 0.5km from the nearest Site boundary.

16.7.65 Panoramic sea views are available from residences on higher land behind (to the west of) and those fronting onto the busy East Coast Road. These are illustrated using the RVs (which being representative, only capture limited views) and are used in the different descriptions capturing the experiences of the viewers in the group.

16.7.66 The Site is visible to the north-east of the view. It is framed to the north-west by the trees west of Spur Point in Gorselea and other gardens merging with those in Delancey Park. The backdrop to the Site is the existing land reclamation site at Longue Hougue with the sea and islands of Herm and Jethou to the east. It is seen over a sea wall with places, where people park to enjoy the sea views, to walk along the front, or to visit the town. In other sections of the road, the views reduced in limited locations by higher sections of the sea wall in around Hougue a la Perre.

16.7.67 The VRG2a residents will experience slightly different views. For VRG 2a, the 180-degree views are static and the orientation changes depending on the location of the house with viewers facing north-east, east, and south-east as the frontage curves around the bay with the residents' front windows facing onto the curved busy road and the seashore. As the road curves, houses to the north-east have nearer but more oblique views of the site than those houses to the south. The Site will appear centrally in some views, (distant views from the south) while in other it will be peripheral (nearer views from the west).

16.7.68 For residents near Salerie Batterie to the south of Belle Grève Bay, and between Salerie and Hougue a la Perre, where the sea wall is higher, second storey rather than ground floor views are available. The frontages of the houses / buildings face the Site, which is central in the view. The views are framed to the north-west by the trees west of Spur Point (in Gorselea and other gardens) merging with those in Delancey Park. The backdrop to the Site is the existing land reclamation site at Longue Hougue. The sea and islands of Herm and Jethou form the skyline and frame the views to the east.

16.7.69 For residents between Hougue a la Perre, and Halfway, the view directly ahead is towards Jethou with the Site in the periphery of the view to the north and St Peter Port harbour in the periphery to the south.

16.7.70 For residents near Halfway, the view straight ahead is towards Jersey between Jethou and St Peter Port harbour. With Herm and some of the sea area within the Site in the periphery of the left (east) of the view, while St Peter Port town is to the right (south-west). Some of the residences, such as those at Halfway, were in existence before the road was built on land reclaimed from the sea. The road is higher than the floor level of the houses, so ground floor views for some of the houses are not be available.

16.7.71 From houses located further north, the Site is hidden from the view by the intervening trees in or adjacent to the residential gardens around Gorselea. These are scoped out.

Value

16.7.72 The value of the available views lies in the panoramic views of the open sea and islands of Herm and Jethou across Belle Grève Bay, framed by Spur Point and St Peter Port harbour, or by Herm and St Peter Port harbour depending on the location of the residence and the orientation of the view.

Susceptibility and Sensitivity

16.7.73 As described in **paragraph 16.7.56**, residents are susceptible to changes in their view and given the valued sea views, their Sensitivity is judged to be **High**.

Magnitude of Change

Construction and Operation

16.7.74 During construction, changes to the view will include the introduction of machinery needed to construct the rock armour bund and the bund itself.

16.7.75 From the more distant viewing locations described above, the expansive sea views remain largely unchanged by the operations seen within the context of the wider area of sea and islands. In views from locations around Hougue a la Perre and between Hougue a la Perre and Halfway, viewers will notice the change, but this will be in the periphery of the view as the houses will follow the curve of the road and to the north.

16.7.76 Even though construction will involve more machinery than the operation phase, machinery is already part of the harbour scene to the south at St Peter Port. The machinery moving around the Site during construction and the completed bund during operation will seem less intrusive because the traffic of the busy road will be in the foreground filtering residents' views of the seashore.

16.7.77 The Magnitude of Change for both construction and operation to the views obtained by VR2a residents along the East Coast Road is judged to be **Medium-Low.**

Level of Effect

Construction and Operation

16.7.78 Given the High sensitivity, the Level of Effect on the VRG as a whole is judged to be **Moderate-Minor Adverse** for both construction and operation. The works will be visible but the expansive sea views across Belle Grève Bay and out to the islands remain largely unchanged by the operations.

Visual Receptors -Sub-group VRG 2b- Residents on the elevated land in and near St Peter Port town to include that immediately West of the East Coast Road

*Representative Views for VRG2b Residents (see viewpoint 2, on Figure 08c in **Appendix 16.2**)*

16.7.79 RV2, the elevated View, looking north-east from Beau Sejour Leisure Centre, represents the views from residences on the higher land on the edge of St Peter Port town, looking towards the Site.

16.7.80 From this elevated position, looking north, the urban area on the lower land, west of the East Coast Road, appears as rooftops with a few treetops in the view. Further north in the distance the land rises up to the treed slopes of and around Delancey

Park further north. To the north-east, the view is along the coast, over Belle Grève Bay towards Spur Point, the Site and the existing Longue Hougue industrial and land reclamation area, which protrudes into the sea, partially framing the Bay, and the view. The sea on the horizon forms the skyline and both the existing Longue Hougue land reclamation site and Spur Point lie below this skyline / horizon.

Value

16.7.81 The value of the views is increased by the elevated location providing a more extensive bird's eye view over the sea and over the north of the island of Guernsey. From some residences on high land further east, views which include the Site will be over St Peter Port.

Susceptibility and Sensitivity

16.7.82 As described in **paragraph 16.7.56**, residents are susceptible to changes in their view and given the valued sea views, their Sensitivity is judged to be **High**.

Magnitude of Change

<u>Construction and Operation</u>

16.7.83 The elevated viewpoint allows the surface of the Project to be discerned, but at the distance of circa 2km, the view of the surface is oblique. The distance also reduces the size of the bund in the view, which sits below the skyline. This slightly reduces the Magnitude of Change, but on the other hand, as the view is elevated, it will not be seen through the stream of the traffic, making changes to the view more obvious. During construction, in addition to the ferries and smaller boats, the large barge and the two smaller barges working at high tide, will be in the view.

16.7.84 The Magnitude of Change is judged to be **Medium-Low** for construction and **Medium-Low** for operation.

Level of Effect

<u>Construction and Operation</u>

16.7.85 Given the High Sensitivity, the Level of Effect is judged to be **Moderate-Minor Adverse** for both construction and operation. The views are towards the north of Guernsey, in the direction of the site with the industrial backdrop, and towards Herm. The views of the Site are more distant than for most of the VRG2a group above and the Site/ Project sits below both the horizon and skyline. The barges will be in the views during construction.

Visual Receptors Sub-group VRG 2c- Residents near the Site such as at Gorselea *(see Viewpoints 5 and 6 on Figure 08g, Viewpoints 4a and 4b on Figure 08f and Viewpoints 7a, 7b and 7c on Figures 08h and 08i, in* ***Appendix 16.2****)*

Representative Views

16.7.86 Although not publicly accessible, the views from the private two-storey residence, Gorselea, have been assessed using views from:

- RV5 (Figure 08g in **Appendix 16.2**) from the adjacent footpath on the western boundary of the Site, to the immediate east of the residences, looking east;
- RV6 (Figure 08g in **Appendix 16.2**) from the rocks at low tide looking west back across the Site at the house -Inter-visibility;
- RV4a & b (Figure 08f in **Appendix 16.2**) from Spur Point concrete shelter, looking north- Inter-visibility;
- RV7a, b & c (Figure 08h & 8i in **Appendix 16.2**) from the memorial bench, looking south-east, south & south-west - adjacent RV.

16.7.87 Views are available from the first and second floor windows over the approximately 1.8m high close board, wooden fence around the garden boundary. The views are over the Site, which includes the local beach area, separated from Belle Grève Bay by the promontory, Spur Point, and the rocks exposed at low tide. The sea beyond the Site and the islands of Herm and Jethou beyond (5km away) are in the distance. On a clear day Jersey is in the distant view.

Value

16.7.88 The value lies in the expansive views of the sea and islands framed by vegetation, both within and outside, of Gorselea garden, and in the views of the adjacent diurnally changing beach as the tides reveal and conceal the rocky foreshore in the context of the sea and islands beyond.

Susceptibility and Sensitivity

16.7.89 As described in **paragraph 16.7.56**, residents are susceptible to changes in their view and given the valued sea views, their Sensitivity is judged to be **High**.

Magnitude of Change

<u>Construction</u>

16.7.90 During construction, the bund being built in the sea and the machinery being used will be in the near to middle distance views. Some of the existing vegetation will be removed such as around Spur Point and along the seaward side of the small public footpath. Instead of an adjacent peaceful beach, there will be machinery moving backwards and forwards over the bund, beach and rocks. It is likely that stone to be used for the bund will be stored in the beach area. Small barges will be in the view at high tide, ferrying the stone from the larger barge to the beach, where it will be unloaded. An area of sea water, which will fluctuate following the tidal pattern, will be retained within the bund. The bund will be 9.5m above half tide local Datum-LD. The Mean High Water Spring Tide (MHWS) is 4.24mLD, Mean Low Water Spring Tide (MLWS) is -3.46mLD[21].

16.7.91 This means 5.26m of the bund will be seen above the water at Spring High Tide and approximately 13m above sea level at Mean Low Water Spring Tide. Views of the sea and possibly the lower parts of the distant islands will be prevented. The large barge in the deeper water may also reduce island views. The Magnitude of Change is judged to be **High**.

Operation

16.7.92 During operation, which will extend for 12 years or more, vehicles will be seen crossing the Site (hourly average would be around 7 HGVs, 8 vans and 1 car) and behind the bund, to unload inert waste for receiving and processing. The areas behind the bund will be progressively backfilled covering the rocks and beach to a similar level as the foreshore and existing footpath. Although operation has reduced machinery compared to construction, the actual change will be high as the rocky foreshore will gradually disappear under inert waste.

16.7.93 The Magnitude of Change is judged to be **High**.

Level of Effect

Construction and Operation

16.7.94 The Level of Effect is judged to be **Substantial Adverse** for both construction and operation, given the proximity to the Site, the scale of the change to the valued sea views, and the sensitivity of the receptor.

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[21]The breakwater drawings are referenced to local datum. Mean High Water Spring Tide (MHWS) is shown on the drawings as 4.24m LD, 1:100 year + SLR level is +6.3m LD, quarry run core crest at +6.9m LD and the rock armour crest at +9.5m LD. Mean Low Water Spring Tide (MLWS) is shown as -3.46m LD/OD

Visual Receptors – VRG3 - Recreational and other beach users (In Belle Grève Bay), *see viewpoint 6, on Figure 08g, in* ***Appendix 16.2***

16.7.95 Note: The small cove within the Site is covered under VRG6 Users of the Public Footpath.

Representative Views for Continuous Sequential Views

16.7.96 RV1b & c, Salerie Battery / Salerie Corner, RV3b & c Hougue a la Perre, RV13 the Halfway, looking north and north-east respectively (shown in **Appendix 16.2**).

16.7.97 From Belle Grève Beach, views are available, out over the sea, towards the islands of Herm and Jethou. The beach is framed/ defined by promontories at Spur Point and Longue Hougue to the north and by St Peter Port to the south. These are less apparent at low tide, when the long rows of rocky reefs are exposed, dividing the beach up further.

Value

16.7.98 The value of the visual amenity lies in the uninterrupted views out to sea, punctuated by the islands, promontories and at low tide the seashore interest provided by the rocky foreshore, reefs and shingle beach.

Susceptibility and Sensitivity

16.7.99 Belle Grève Bay beach is used (particularly during the summer months and during the fine weather) for beach recreation. The viewers will be taking time to look around in all directions. This recreational VRG travels to the beach to enjoy the seashore with sea views, uninterrupted by intervening traffic or vegetation and so these viewers, are susceptible to changes in the view. Given the value of the views, they will have a **High** Sensitivity.

Magnitude of Change

<u>Construction</u>

16.7.100 During construction, viewers will be aware of the movement of machinery in and around the Site which is in the northern part of the bay. The bund will form a man-made promontory on the skyline, as the viewers are viewing from a low vantage point at sea level. They will be looking around not focused on one direction. It will look like the existing rock armour, an unmodulated engineered straight, linear bund, but being nearer will appear larger, being at a different angle (running south-east from Spur Point, perpendicular to the shoreline) will appear as a longer strip, protruding into the Bay. This will be more apparent in views RV3b & c and RV13 due both to orientation and to distance. It will replace the more interesting, organic edges provided by Spur Point and the rocky coast, with the existing Longue Hougue Reclamation Site bund at a more obtuse angle in views from the north-east. The large barge and the two smaller barges ferrying material at high tide will be additional elements in the sea in the context of ferries, cruise ship and smaller fishing or recreational boats.

16.7.101 However, much of the view remains unchanged. The Magnitude of Change on the available views is judged to be Medium for viewers nearer the Site in the northern part of the Bay Illustrated by RV3b & c and RV13; and Low for viewers around RV1b & c.

16.7.102 The Magnitude of Change for VRG 3 as a whole is judged to be **Medium**.

Operation

16.7.103 During Operation the machinery will have left the Site, leaving a rock armour bund, visible in front (to the south) of the one on the southern edge of the existing Longue Hougue Reclamation Site. This will not change as the Site is progressively filled.

16.7.104 The overall Magnitude of Change is judged to be **Medium**.

Level of Effect

Construction

16.7.105 The Level of Effect during construction is judged to be **Moderate Adverse**, as there will be uninterrupted views of the works, forming a new and nearer edge to the Bay. (However, that the activity of the large barge and two smaller barges may add interest to the view is not considered.)

Operation

16.7.106 The Level of Effect during operation is judged to be **Moderate Adverse,** during the summer season / during fine weather, when the beach will be more visited by viewers.

Visual Receptors –Sub group VRG 4a Ferry Users travelling through the water between Herm and Guernsey (Little Russell) from the North (from England & Alderney), *see viewpoints 10 on Figure 08j, 11 on Figure 08k, 07a-c on Figure 08h and 08i, 8 on Figure 08i, in Appendix16.2*

Representative Views for continuous sequential views along a set route

16.7.107 The RVs are as follows:

- RV10 (Figure 08j, in **Appendix 16.2**), from the sea, looking north-west, at a distance of about 1.5km from the shore, circa 1km from the nearest Site boundary (RV10 was taken from almost sea level at low tide from a one deck small boat).
- RV11 (Figure 08k, in **Appendix 16.2**), an elevated view from Castle Cornet, at a distance of around 2.5km, looking north-east.
- Some information can be obtained from intervisibility, refer to RV7a to c and RV8 (Figure 08h & 08i in **Appendix 16.2**).

16.7.108 While RV10 and RV11 (see Figure08j and 08k, in **Appendix 16.2**) are static views, they are used to illustrate the sequential views, which include the views between RV11 and RV10, and views north-east of RV10.

Arrival - Sequential Views

16.7.109 The first sightings of Guernsey and its islands would be followed by views of the east coast. The existing Longue Hougue Reclamation Site would prevent views of the Site until drawing almost parallel. This is represented by RV10 (Figure 08j in **Appendix 16.2**) in which the Site is visible over the sea and against the treed backdrop of Delancey Park. St Peter Port would gradually become the focus and become larger in the view as the ferry sailed along the east coast.

Departure - Sequential Views

16.7.110 On leaving St Peter Port, RV11 (Figure 08k in **Appendix 16.2**) the view from Castle Cornet represents the view at 2.5km distance from the Site, looking north-east from the St Peter Port harbour area, towards the Site.

16.7.111 In this view, the Site is visible over the sea of Belle Grève Bay against the backdrop of the existing Longue Hougue Reclamation Site, Longue Hougue industrial areas and Vale Castle further north along the coast. In the periphery of the view on very clear days, the island of Alderney is visible in the sea further north-east between Guernsey and the island of Herm. West of the Site, the raised tree area of Delancey Park forms the skyline. On most days with moderate or better visibility, continuous sequential views are available from St Peter Port until drawing parallel with the Site and moving past it.

Value

16.7.112 The arrival and departure sea views would be valued for the changing scene giving the traveller introductory or final views of the coastal character of Guernsey with its neighbouring islands, its industrial area, and the characterful, urban buildings / residences / hotels and harbour of its principal city and major port.

16.7.113 In the arrival view, the main focus would be the port rather than the site. In the departure views, the focus would be on the seashore ahead, which would include the Site in the sequential views for over 2km in the direction of travel.

Susceptibility and Sensitivity

16.7.114 VRG 4a, the ferry users, would be alert and anticipating arrival / departure. They would be susceptible to changes in the view and given the value of the views, they would have a **High-Medium** Sensitivity to changes to the views.

Magnitude of Change

<u>Construction and Operation</u>

The Arrival Sequence – Sequential Views Moving South

16.7.115 During construction, from the ferry approaching Guernsey from the north, sequential views of the construction works would be available.

16.7.116 First sightings of Guernsey would include the St Sampson industrial area and then the existing Longue Hougue Reclamation Site, which would at first intervene between the Site and the viewer. The large stone conveying barge with the two smaller barges, the smaller fishing vessels and recreational boats and depending on the day the large cruise ship would be in the view with Guernsey on one side and the island of Herm on the other. As the ferry travelled towards Guernsey, the bund under construction would be viewed, firstly against the sea of Belle Grève Bay with St Peter Port in the distance, then against the gardens around Gorselea with the wooded backdrop of Delancey Park on the skyline behind (further west). The views would be elevated so oblique views of the surface of the Site would be available. When alongside the emerging bund, (RV10 Figure 08j in **Appendix 16.2**)) the works would be clearly distinguishable against the industrial site at the existing Longue Hougue Reclamation Site and, as the works progressed, a long low bund would be seen forming around the small shingle beach near Gorselea. The rocky out crops would be enclosed in the 'lagoon' contained by the new bund and the rock armour of the service road and of the Longue Hougue Reclamation Site. RV10, although not elevated, is used to illustrate these views at a distance of circa 1km.

16.7.117 The long, unarticulated, rock armour bund with a height of 5.26m above high tide at Mean High Water Spring Tide (MHWS) and circa 13m above low tide at Mean High Water Spring Tide (MHWS) sea levels, will be seen as a continuation of the existing one (circa 8mLD) at the existing Longue Hougue Reclamation Site but stepped up (to circa 9.5mLD) with a small increase in height of circa 1.5m as the breakwater at Longue Hougue is at circa 8mLD.

16.7.118 It would be a continuation of the existing engineered bund increasing the impression of length of the unarticulated wall, amplifying its straightness and other engineered qualities. This would be viewed against the backdrop of Delancey Park and Gorselea trees, and the sheds of Longue Hougue industrial estate.

16.7.119 During operation, in the sequence of views, the area (enclosed on the landward side of the low bund and the gradually filling surface of the Site over a period of at least 12 years) would be obliquely visible from the elevated deck views. The landfill would progressively cover the water enclosed by the bund on its landward side, which would be viewed obliquely.

16.7.120 However, once past the Site, with the boat moving in the direction of St Peter Port, the focus would be on the historic St Peter Port with quality stone quays and buildings and industrial-looking, working cranes.

16.7.121 Although the change to the sequential views, illustrated by RV10, is judged to be Medium, as they would be of comparatively short duration in the total sequence of arrival views. They would be seen after (i.e. in the context of) the industrial area and the existing Longue Hougue Reclamation Site.

The Departure Sequence- Sequential Views Moving North

16.7.122 From the ferry leaving Guernsey, although a reversal of movement, the journey does not involve a reversal of viewing sequence.

16.7.123 The exposure to the Site in the departure views will be of greater duration with the Site continually in the view as the ferry moves north towards the gap between Guernsey and Herm, culminating in the change to the view represented in RV10 (Figure 08j, in **Appendix 16.2**).

16.7.124 On embarking from St Peter Port, with its context of cranes and other dockside machinery/ vehicles, the view would be similar to RV11 (Figure 08k in **Appendix 16.2**) at a distance of over 2km from the Site (RV11 is an elevated view of about the same elevation as the view from some of the long-distance ferry decks). Beyond

Belle Grève Bay in the foreground, the Site, the trees around Gorselea, and the existing Longue Hougue Reclamation Site form a small but visible element in the expansive view along the east coast. Spur Point would be amalgamated into the rock armour bund extending along, redefining, and cutting into the edge of the Bay as a low, man-made, unarticulated element in the distance. The following are also in the view: the East Coast Road with its treed backdrop, the Delancey park trees, and the chimneys of the St Sampson Industrial area.

16.7.125 In the sequential views moving north from St Peter Port, from the larboard / port (left) side of the ferry, the Site under construction and the large barge with the two smaller barges would be continuously in the view and progressively become a larger elements as the ferry travelled from the location of RV11 over 2km away to that of RV10, circa 1km distant and almost parallel with the eastern side of the Site. As the ferry approached RV10, the south-eastern side of the bund would form part of the view, as a low strip of rock armour with the upper storey and roof of Gorselea visible over the top. It would be seen combined with the existing rock armour bund enclosing the existing Longue Hougue Reclamation Site, increasing its apparent length. The ferry would then move beyond the Site towards Alderney. The Site would disappear from the view once past the existing Longue Hougue Reclamation Site near the entrance to St Sampson's harbour and the industrial area of Guernsey.

16.7.126 The change to the view would gradually increase from Low in RV11 to Medium as the location of RV10 is approached and passed with the Site still in the view.

16.7.127 The Magnitude of Change for the departure sequential views for construction would be Medium. This would be slightly lowered for operation but still be Medium, even though the machinery used for construction will have left the Site.

16.7.128 Overall for both departure and arrival sequential views, the Magnitude of Change is judged to be **Medium**.

Level of Effect

<u>Construction and Operation</u>

16.7.129 The Level of Effect for arrival and departure views combined during construction is judged to be **Moderate Adverse**. Given the value of the views, the sensitivity of the receptor and the fact that the new engineered bund would be in the sequential departure views from St Peter Port in the direction of travel.

<u>Operation</u>

16.7.130 The Level of Effect for arrival and departure views combined during operation is judged to be **Moderate Adverse**.

Visual Receptors – Sub Group VRG4b Ferry Users Travelling to and from Guernsey from the East / South (from Herm and South of Jethou, from Sark and France), *See Viewpoints 11 on Figure 08k and 7a-c on Figures 08h and 08i, in* ***Appendix16.2***

Representative Views for Continuous Sequential Views

16.7.131 RV11 (Figure 08k, in **Appendix 16.2**), looking north-east. Intervisibility RV7a to c (Figure 08h & 08i in **Appendix 16.2**). These RVs are static views, which are used to describe the sequential views, experienced by the VRG.

16.7.132 As for 4a above, ferry boat users on the starboard (right) side of the boat arriving at St Peter Port, would obtain sequential views of the East Coast and the Site, while those leaving Guernsey would obtain views from larboard / port (left) side.

16.7.133 The first arrival views of the Site when travelling to Guernsey would be obtained on sailing past Jethou. Travellers from Herm would experience a similar sequence of views. The site would be about 5km away, so barely discernible against the local treed backdrop. On nearing St Peter Port, the Site would be circa 2.5 km away and seen against the sheds of Longue Hougue industrial estate, as illustrated in RV11.

16.7.134 The arrival views would include not only the open sea and islands but also the harbour and the town of St Peter Port. The departure views would include the Site and the northern part of the island and the islands and open sea.

Value

16.7.135 The value lies in the quality and variety of all elements (islands, promontories, town and its town houses, working harbour with cranes, industrial chimneys and large sheds) brought together in one sequence of arrival views and another sequence of departure views.

Susceptibility and Sensitivity

16.7.136 The travellers would be susceptible to changes in the view and their Sensitivity would be **High-Medium** with similar reasoning as for 4a.

Magnitude of Change

<u>Construction and Operation</u>

16.7.137 The nearest arrival views travelling west would be circa 2km / 2.5km distant (with the large stone conveying barge anchored during construction in the deeper water slightly nearer) and seen within the wider context of the East Coast, to include St Peter Port, St Sampson chimneys and the Longue Hougue industrial areas. In the departure views travelling east, the Site would be seen within the context of

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Delancey Park trees, St Sampson industrial chimneys, the existing Longue Hougue Reclamation Site, and the islands. Given the wider views available, and that the working landscape features are already in the visual context, the Magnitude of Change (for both construction and operation) will be **Low**.

Level of Effect

Construction and Operation

16.7.138 The Level of Effect during construction and operation is judged to be **Minor Adverse to Negligible** as the quality of the arrival and departure views would only be slightly affected and the focus of the view would be on nearer, quality elements in the view such as St Peter Port or the island of Herm.

Visual Receptors –Sub-group VRG 5a Fishermen and Recreational Boat Users between the Guernsey Coast and the Northern Ferry Route *(See Viewpoints 1 on Figure 08a and 08b, 10 on Figure 08j, 11 on Figure 08k, and 7a-c on Figures 08h and 08i, in* ***Appendix 16.2***

Representative Views for Continuous Sequential Views

16.7.139 RV10 (Figure 08j in **Appendix 16.2**), looking north-west, RV11 (Figure 08k in **Appendix 16.2**), looking north-east, RV1 looking north-east from Salerie battery near the fishing boat harbour entrance. Intervisibility RV7a to c (Figure 08h & 08i in **Appendix 16.2**) and RV8 (Figure 08i in **Appendix 16.2**).

16.7.140 Fishermen and recreational boat users would have a less set route than the ferry users and be able to approach nearer and so obtain a closer view of the Site. Although not confined to the ferry route, the routes available to them would be limited by the rocky outcrops and underwater reefs. They would experience similar but nearer and less elevated views than ferry boat users.

Value

16.7.141 The value lies in the quality and variety of all elements, acting as landmarks (islands, promontories, town and its town houses, working harbour with cranes, industrial chimneys and large sheds) brought together in one sequence of views.

Susceptibility and Sensitivity

16.7.142 Fishermen and recreational boat users would be familiar with the available views on arriving and leaving the harbour near Salerie Battery, St Peter Port and aware of changes to their views. They would be focused on their work, manoeuvring the fishing vessel / boat, using the coastal features functionally as landmarks, making them as susceptible to changes in those views as ferry boat users.

16.7.143 Their Sensitivity to the valued views would be **High-Medium.**

Magnitude of Change

Construction and Operation

16.7.144 Locally the reefs will limit how close the boats can approach the shore to a few known deeper channels, but they will be able to approach the Site nearer than the ferry on its route. There is a known landing point and associated slightly deeper channel just south of Spur Point. During construction, the two smaller barges may also be using this channel at high tide. The large barge might obscure views of the islands from locations in the sea near the Site. There will be a noticeable change in these near views and the bund and lifting machinery will be on the skyline several metres above the boats in some very near, local views. The machinery and the barges will have left during operation, being replaced with the occasional landfill lorry, infilling on the landward side of the bund. The magnitude of change will be slightly lower than for construction.

16.7.145 Given the surrounding elements of a working landscape (the industrial elements around St Sampson, the cranes around St Peter Port, and the continuous urban ribbon along the East Coast Road already in the view), the sea and views towards the east coast as a whole, will only be marginally changed.

16.7.146 As a whole for this receptor in this area of the seashore / sea, the Magnitude of Change is judged to be **Medium-Low** for construction and for operation.

Level of Effect

Construction and Operation

16.7.147 The Level of Effect during construction and operation is judged to be **Moderate Adverse**. When travelling north along the deeper water route from St Peter Port, valued panoramic sea and island views are available. The views would be similar to those afforded to ferry boat users and the new, engineered bund and its works would be in the sequential views from St Peter Port area some directions of travel but they travel along a less set route. They would experience nearer views than the VRG 4A Ferry boat users, giving a similar level of effect.

***Visual Receptors-Sub group VRG 5b Fishermen & Recreational Boat Users in the Waters Between the Northern and the Eastern Ferry Routes** (see Viewpoints 10 on Figure 08j, 11 on Figure 08k, 07a-c on Figure 08h and 08i, in **Appendix16.2**)*

Representative Views for Continuous Sequential Views

16.7.148 RV10 (Figure 08j in **Appendix 16.2**), looking north-west, RV11 (Figure 08k in **Appendix 16.2**), looking north-east, Intervisibility RV7a to 7c (Figure 08h & 08i in **Appendix 16.2**).

16.7.149 These viewers on the fishing vessels and recreational boat users would be travelling in the section between the northern and eastern ferry routes. They would not only use the ferry route but also travel more widely in the deeper water channels with access to or near the islands of Herm and Jethou, limited by the seashore reefs around the islands. Viewing distances from the Site would range from the nearest view at RV10 at 1km to about 5km.

Value

16.7.150 As for Visual Receptors-Sub group VRG 5a, the value lies in the quality and variety of all elements, acting as landmarks: islands, promontories, working harbour with cranes, industrial chimneys and large sheds. However, the islands would be nearer and feature more prominently.in some of the views than Guernsey.

Susceptibility and Sensitivity

16.7.151 The Sensitivity is **High-Medium** for similar reasons to Visual Receptors-Sub group VRG 5a above.

Magnitude of Change

<u>Construction and Operation</u>

16.7.152 The nearest views would be circa 1km distant and the bund under construction or during operation would be seen within the wider context of the East Coast, to include St Peter Port, St Sampson chimneys, and the Longue Hougue industrial areas. The barges would be seen within this wider context. In the more distant views of about 4km to 5km, the islands would be much nearer and more useful landmarks. Given the wider views available, and that the working landscape features already in the visual context, the Magnitude of Change is judged to be **Low** for both construction and operation.

Level of Effect

Construction and Operation

16.7.153 The Level of Effect during construction and operation is judged to be **Minor Adverse-Negligible**. The VRG has a medium sensitivity but at this distance of around 2km, as the quality of the arrival and departure views would only be slightly affected and in addition to working the boat, the focus of the viewer would be on nearer, quality elements in the view such as St Peter Port or the island of Herm.

Visual Receptors – VRG6- Users of the Public Footpath (from the East Coast Road Continuing Along the Shore Near the Site)**, see Viewpoint 6 on Figure 08g in **Appendix 16.2

Representative Views for Continuous Sequential Views

16.7.154 RV13 (Figure 08l in **Appendix 16.2**) the Halfway looking east, RV4a & 4b (Figure 08f in **Appendix 16.2**) from the footpath where it enters the beach area, looking north-east, RV6 (Figure 08g in **Appendix 16.2**) from the Footpath / Gorselea gate to beach looking south-east, RV7b & 7c (Figure 08h & 08i in **Appendix 16.2**) from Memorial Bench looking south-east, south & south-west, RV8 (Figure 08i in **Appendix 16.2**) looking east from the service road leading to the existing Longue Hougue Reclamation Site. Although static RVs are used in the assessment of the views, the views are sequential, mostly continuous, and in both directions of travel.

16.7.155 The footpath runs roughly from the Halfway car park just off the East Coast Road, where the view is represented by RV13. The view includes the following: the sea within the Site boundary; some of the existing Longue Hougue Reclamation Site; and the islands of Herm and Jethou across the sea. The footpath leads from the car park, from the location of RV13 along a dedicated path on the coast towards Spur Point. Travelling north-east, as Spur Point is approached, the Site disappears from the view due to the intervening vegetation around Spur Point and in the garden surrounding Gorselea.

16.7.156 The walker on the path then emerges at the secluded, local beach partially separated from Belle Grève Bay by Spur Point and the views open out. RV4a & b illustrates the view from this location: the beach, the seashore, the sea and the islands of Herm and Jethou. To the north-east, in the background, there is a small patch of grass with a memorial bench separated from the road leading to the existing Longue Hougue Reclamation Site by a thriving line of Tamarisk bushes.

16.7.157 The views continue along the path, which is contiguous with the garden curtilage of Gorselea defined by a wooden fence. The path runs adjacent to the wooden fence up to RV6 at the gated entrance to Gorselea leading from the beach. The footpath then travels further along the curtilage boundary, up to the Memorial Bench (the location of RV7b & 7c looking in the opposite direction) and then through the Tamarisks onto the industrial road, which lacks vegetation. RV8, from the service road bund just off the footpath, illustrates the Site located beyond the Tamarisk line and adjacent to the existing Longue Hougue Reclamation Site. Views are from the top of the existing bund.

16.7.158 RV 7c shows the view in reverse looking from the memorial bench towards the islands to the east, the sea to the south-east, St Peter Port against the wooded backdrop of the higher land to the south of the east Coast, to the East Coast Road, and Spur Point and the local beach with the footpath along the fence of Gorselea.

Value

16.7.159 The value of the views available to the walker lies in the sequential changes to the view: for example the available sequence of views when travelling north-east toward Longue Hougue comprises: extensive sea views, views curtailed by vegetation before opening out onto the small beach area with views of the sea and islands framed by greenery, then moving onto the more industrial looking road and landscape of Longue Hougue industrial estates. Sequential views are available in both directions of travel.

Susceptibility and Sensitivity

16.7.160 The users of the public footpath / walkers / dog walkers will be susceptible to changes in the view. Given the value of the views of the beach, framed by greenery, and the sea, they will have a **High** Sensitivity to changes to the views.

Magnitude of Change

<u>Construction and Operation</u>

16.7.161 For the section of the footpath adjacent to the East Coast Road, the views are available when travelling north only. The views will be partial comprising the south-eastern tip of the Project extending beyond Spur Point, the rest of the Site will lie behind Spur Point. During construction the anchored barge might be in the view beyond the Site.

16.7.162 When the walker approaches the cove near Spur Point, construction fencing will close off the section of the footpath linking to the memorial bench to the east. The sequential views from this point up to the Memorial Bench will no longer be available, at this stage of the project and through most of the operation phase. The change to the remaining view experienced during construction will include the stone stored on parts of the foreshore, to the east, the emerging bund and lagoon with associated construction machinery, the small barges ferrying the stone to the stockpile area at high tide, and the large barge in the distance, east of the bund. Some limited amounts of vegetation on the beach side of the path will have been removed. The outgrown Tamarisk hedgerow and grass area by the memorial bench, would be seen in the foreground, from the retained part of the footpath linking to the Longue Houge Access Road, with a security fencing, beyond. On-site activity and movement will be intense in the view.

16.7.163 During operation the change to the view from the baseline view, will be the bund partially obscuring views of the sea, the fluctuating lagoon being gradually infilled over 12 years or more in place of the tidal sea shore, the loss of some planting on the seaward side of the path and the vehicles crossing the Site (hourly average would be around 7 HGVs, 8 vans and 1 car) and behind the bund, to unload inert waste for receiving and processing. The footpath section alongside Gorselea would be reopened to walkers on completion of the infilling works, when they will experience sequential views which are substantially changed from the baseline situation with the loss of the positive foreground beach and with some interruption of longer scenic views to the south, by the new breakwater. At the end of the operation stage the coastal path network would be extended around the breakwater (as indicated in **Appendix 16.9**) introducing some additional sequential sea views to walkers in this local area, providing some limited mitigation.

16.7.164 Going through the Tamarisks the change will be viewed against the industrial backdrop and with views of the sea and Site limited by the existing service road bund.

16.7.165 As a whole, the Magnitude of Change to the sequential views travelling in both directions is judged to be **High** for both construction and operation.

Level of Effect

<u>Construction and Operation</u>

16.7.166 The Level of Effect is judged to be **Substantial Adverse** for both construction and operation. The Project will change the views of the sea, beach and vegetated path, to a path alongside a construction site and then, during the operation phase, around the edge of a reclamation area.

Visual Receptors –VRG 7 Tourists & Sightseers & Visitors to St Peter Port *(see Viewpoints 1a-d on Figure 08a and 08b, Viewpoint 2 on Figure 08c, Viewpoint 11 on Figure 08k and Viewpoint 12 on Figure 08k, in* ***Appendix 16.2***

Representative Views for Continuous Sequential Views

16.7.167 RV1a to 01d (Figure 08a & 08b in **Appendix 16.2**) from Salerie Battery, RV2 (Figure 08c in **Appendix 16.2**), elevated view from Beau Sejour, RV11 (Figure 08k in

Appendix 16.2), slightly elevated view from Castle Cornet and RV12 (Figure 08k in **Appendix 16.2**), elevated view from Fort George

16.7.168 St Peter Port harbour and town lies between the wooded, southern, elevated part of the island beyond Fort George to the south, and the northern, low-level, industrial part of the island.

16.7.169 Extensive 180-degree sea views are available to the north-east in the direction of the Site from various elevations ranging from views near sea level, (such as from the stone-walled harbour's edge) to more elevated locations, (illustrated by RVs taken from locations, such as Beau Sejour Leisure Centre, Castle Cornet, and Fort George).

16.7.170 To the east the islands of Herm and Jethou are in the view, 5km away in the background over the sea. On very clear days not only Sark, but also Jersey and the coast of France can be discerned.

16.7.171 To the north, views include the Delancey Park pines and the St Sampson industrial chimneys with the existing Longue Hougue Reclamation Site on the skyline framing the Site.

16.7.172 To the west, views are of the historic town with its cultural heritage, expressed in, the period town houses, the winding streets, the towers on the skyline, and the wooded hilltops of the town around Beau Sejour to the west and around Fort George to the south.

Value

16.7.173 All the above are valued elements in the views contributing to the sense of place.

Susceptibility and Sensitivity

16.7.174 Visitors to St Peter Port will be alert to their surroundings but there are industrial and harbour workings already in the sea views, so they will not be particularly susceptible to changes to the view that will be involved in the type of project proposed.

16.7.175 Their Sensitivity will be **Medium**.

Magnitude of Change

<u>Construction and Operation</u>

16.7.176 The Site lies to the north-east at a distance of approximately 1.5km. Changes to the view to the north-east will be against the overall backdrop of St Sampson Industrial area and the sea, more specifically against the Industrial area and the existing Longue Hougue Reclamation Site with sheds at Longue Hougue which form the skyline and the sea with larger ferries, occasional cruise ship and many smaller fishing and recreational vessels. From the orientation of St Peter Port town, the Project will only protrude slightly further into the sea than the existing Longue Hougue Reclamation Site in the view to the north, without breaking the skyline. The views in other directions will remain unchanged by the Project.

16.7.177 During construction, the large barge and smaller barges in these more distant views will be seen in the context of the other boats. Lifting and other machinery will be discernible but will not be out of context in this working seascape around the Port.

16.7.178 The Magnitude of Change for both construction and operation is judged to be **Medium-Low**.

Level of Effect

Construction and Operation

16.7.179 Level of Effect is judged to be **Minor Adverse** for both construction and operation. The Bund and landfill site will be visible in the context of the existing Longue Hougue Reclamation Site and St Sampson industrial areas, but the expansive sea views across Belle Grève Bay and out to the islands remain largely unchanged by the operations

Visual Receptors – VRG8- Workers Travelling to and Working at Longue Hougue Industrial and Longue Hougue Reclamation Site *(see Viewpoint 8 on Figure 08i)*

Representative Views for Continuous Sequential Views - RV8 (Figure 08i in ***Appendix 16.2****), Looking East*

16.7.180 Workers travelling to the Longue Hougue industrial area and the existing Longue Hougue Reclamation Site will have the industrial elements on the one side (north) and the sea on the other (south). The greater part of the view will be of Longue Hougue industrial area with its large sheds and of the existing Longue Hougue Reclamation Site one side and straight ahead. To the other side of the road, the sea element in the view will be seen over and therefore limited by the rock armour bund about 1m higher than the service road. The view from the top of this bund (RV8) comprises: the existing Longue Hougue Reclamation Site and the foreshore gravel, rock armour bund, the seashore reefs remaining after the road was made; and the islands of Herm and Jethou across a body of water. However, the view from the road is more limited.

Value

16.7.181 On one side of the road (to include the road) the views are industrial. On the other side, the sequential views of the sea and the islands are limited by the bund. The road seems to have only occasional traffic (rather than a continuous stream as for the East Coast Road). The valued views, namely the sea and islands, are limited to whatever is visible above the bund on one side of the road.

Susceptibility and Sensitivity

16.7.182 This VRG will not be particularly susceptible to the view, as they will be focused on their work and probably in a car / truck. Given the limited value, they are judged to have a **Low** Sensitivity to changes in the view.

Magnitude of Change

<u>Construction</u>

16.7.183 During construction, the new bund will be built out to the south from the south-eastern edge of the existing Longue Hougue Reclamation Site. This will involve construction machinery. The Tamarisks and associated shrubs will be retained, protected and will prevent views of the cove area of the Site. Views (of the adjacent seashore area within the Site and the fluctuating 'lagoon' forming) will be further limited by the service road bund. The top of the new bund and construction machinery will be in the view and the large barge behind (to the north-east / east) with the two small barges at high tide ferrying stone to be stored on the beach.

16.7.184 The Magnitude of Change to the views will involve not only the Project construction works and associated machinery, but also the construction facilities, additional parking for construction personnel provided on the existing Longue Hougue Reclamation Site, and additional road users accessing the above along the service road.

16.7.185 During construction, the Magnitude of Change is judged to be **Medium**.

<u>Operation</u>

16.7.186 During operation, the new bund will be in place, the construction compound will be replaced by a shed used to record landfill trucks, the construction machinery and construction personnel will have gone, and road use (in addition to existing Longue Hougue Reclamation Site workers) reduced to the Longue Hougue South personnel and occasional landfill truck carrying out the much slower process of residual inert waste infilling over 12 years or more, gradually burying the 'lagoon' creating a platform of reclaimed land.

16.7.187 During operation, the Magnitude of Change is judged to be **Medium-Low** as the works will occur approximately on a level with the service road bund.

Level of Effect

Construction and Operation

16.7.188 Given the Low Sensitivity of the VRG and the industrial nature of elements in the view, the Level of Effect is judged to be **Moderate-Minor Adverse** for construction and **Minor Adverse** for operation once the construction traffic and parking had left and the infilling operation had begun.

Visual Receptors – VRG 9 - Visitors to Delancey Park *(see Viewpoint 14 on Figure 08l)*

Representative Views

16.7.189 RV14 (Figure 08l in **Appendix 16.2**), looking east towards Jethou, is from the southern end of the eastern side of the Park, which slopes down towards the coast. This is not the Recognised View, which is from the viewing point at the south of the park, looking south towards St Peter Port and which is scoped out in **paragraph 16.7.37** in the recognised views section above.

16.7.190 RV14 includes the roofs of buildings along the East Coast Road, the south-eastern tip of the Site (in the sea to the east of Spur Point), the sea and the islands of Jethou with Herm visible through the trees to the north. Most of the Site lies behind (to the east of) the trees in Delancey Park, and/or the treed gardens of Gorselea and other private residences near Spur Point on the coast.

16.7.191 Views are available from the area round RV14 near the top of the slope facing east towards the sea. The terrain in the location of the RV is rough and sloping. Access is under tree branches, so the viewer will have to stop and look up to obtain the view. It is not on a path. Views are also available from the adjacent southern edge of the Rotary Club of Guernsey (End Polio) Garden terrace, from the grass on the upper part of the eastern slope above the southern edge of the Rotary Club Garden terrace, and from the top of the outdoor gym, all on this relatively local area of the slope.

16.7.192 Views may be available from the eastern edge of the privately-owned Kings Premier Health Club green. In less elevated locations, buildings / trees intervene between even the south-eastern part of the Site and the viewer, so the Site is no longer in the view.

16.7.193 The view of the Site is partial and over the roof top of a long white buildings. It is from a small area on the eastern edge of the Park.

Value

16.7.194 The value lies in the interesting views in the context of the park to include partial views of the sea and islands, gently framed by the pine and other trees. Views of the beach areas of the seashore are interrupted by low buildings and trees. From other areas of the park, views are available towards St Peter Port and towards the residences to the west, which are also within the Conservation Area.

Susceptibility and Sensitivity

16.7.195 Some recreational park users as viewers will be more susceptible to changes in the view than other visiting the park for the sports pitches and play area. Given the value of the view, viewers (as recreational park users as a whole) will have a **High-Medium** Sensitivity to changes in the view.

Magnitude of Change

Construction

16.7.196 During construction, as is the bund is built out in the sea to the south, over a period of two years construction machinery will be in the view and partial views of the southern corner of the new bund will gradually appear as a line in the sea (enclosing an area of sea - the lagoon) above the existing long, low, white building rooftop. The barges in the deeper water will be seen further out in the sea.

16.7.197 The machinery and the bund will attract attention to the Site from a very limited area of the Park. These views are partial and obtained by only some of the viewers that visit the park, most of whom will be in the main part of the park with playing fields or in the play area. There are other sea views to the south including the Strategic View from Delancey park to St Peter Port which do not include the Site.

16.7.198 During construction, the Magnitude of Change on the viewers is judged to be **Medium**.

Operation

16.7.199 During operation, the bund will be in place, the construction facilities and machinery removed, and the view will be of the much slower process of infilling by trucks occurring over 12 years or more, gradually filling the lagoon and creating a platform of reclaimed land between the building and the bund, which will be viewed as one shape/ built up element. Although the construction machinery will have left the Site, the lagoon will be progressively filled in so that instead of a bund seen as a thin line enclosing the sea, a block of land will be in the view. However, this will only be a small portion of the view. The interesting sea views with islands will be largely retained. Most of the view is of the park and its trees and its sports equipment. Most of the viewers will be on the play and pitch areas where views of the Site are not available.

16.7.200 During operation, the Magnitude of Change is judged to be **Medium-Low**.

Level of Effect

Construction and Operation

16.7.201 Given the High-Medium Sensitivity of the VRG and the variety of elements in the view, the Level of Effect is judged to be **Moderate-Minor Adverse** for construction and reduced slightly to **Minor Adverse** for operation.as the bund and landfill integrate with the existing rooftops to form one mass and RV14 is only one view.

Assessment of Effects on Viewers within the (Heritage) Conservation Areas (CA)s *(see Below for Relevant Viewpoint and Figure References)*

16.7.202 The viewers within the CAs are as follows:

Viewers Within St Peter Port CA

16.7.203 The IDP Annex VII Conservation Areas describes the reason for designation as follows:

Saint Peter Port or town, the capital of Guernsey, retaining much visible history, has developed from its original fortified core, port and castle, taking full advantage of the river valleys and plateau. It has this unique development and its relationship with the harbour and range of historic types and styles and survival of high quality historic streets and buildings that makes this conservation area of high special architectural and historic interest to Guernsey so that it is desirable to preserve or a enhance its character and appearance as described above in many cases the buildings in this conservation area are the first of a type or style to be built on the island and illustrate fashioning buildings over time.

16.7.204 The site lies approximately 1.5km from the CA, so there are no direct landscape effects.

Representative Views

16.7.205 St Peter Port CA extends around the harbour and includes, RV1a to 1d (Figure 08a & 08b in **Appendix 16.2**) Salerie Battery, RV2 (Figure 08c in **Appendix 16.2**) the higher land around Beau Sejour Leisure Centre, RV11 (Figure 08k in **Appendix 16.2**) Castle Cornet, and RV12 (Figure 08k in **Appendix 16.2**) Fort George / Belvedere.

16.7.206 Views are not specifically mentioned in the reason for designation. They are similar to the views for VRG 7 Tourists & Sightseers & Visitors to St Peter Port.

Value, Sensitivity and Magnitude of Change

16.7.207 The value of the panoramic sea and townscape views and the magnitude of change (**Medium-Low**) is judged to be as for VRG 7 (Tourists & Sightseers & Visitors to St Peter Port). The viewers within the CA are susceptible to change and given the value of the views, the Sensitivity for viewers from St Peter Port CA is judged to be **High** (rather than Medium as for VRG 7).

Level of Effect

Construction and Operation

16.7.208 The Level of Effect is judged to be **Minor Adverse** for both construction and during operation.

16.7.209 Refer to VRG 7 and to RVs in **Appendix 16.2** Figures.

Viewers within Delancey, St Sampson CA

16.7.210 This CA comprises the Delancey Park and nearby residences and streets.

16.7.211 The IDP Annex VII Conservation Areas describes the reason for designation as follows:

The area is designated as a Conservation Area to conserve the historic and architectural character and appearance of the area. The use of traditional materials and the unity of built form in terraces and groups of workers cottages and the scale of the villas and cottages attractively arranged along the roads often behind roadside boundaries along with the open space Hougue landscape and vistas of Delancey Park represent a particular character of this Conservation Area.

16.7.212 The landscape of the park (open space and landmark protected pine trees) are not directly affected as the Project is outside the CA.

Representative Views

16.7.213 Representative View is RV14 which illustrates the available view of the sea which includes the Site.

Value

16.7.214 The value of the Park lies in the open space park landscape and spectacular sea views is described as:

“From this Hougue, spectacular views are available southwards over the eastern seaboard of the island and Jersey and beyond and eastward to Herm and Sark. IDP Annex VII Delancey CA.”

16.7.215 Potential viewers include park users and residents in the CA.

Sensitivity

16.7.216 The sensitivity of viewers in a CA is judged to be **High**.

Magnitude of Change

16.7.217 Views from the upper part of the eastern slope are illustrated by RV14. As for VRG 9 Visitors to Delancey Park, the magnitude of change is judged to be medium-low from the area around this RV. Views from residences are not specifically mentioned and many of the buildings in the CA are west of the Park, so can be scoped out as can most of the park to include the pitches to the west, the play area to the south and the area under the hill top pines and around the base of the Admiral Saumurez monument.

16.7.218 The Recognised View (Strategic Views as shown on Map 11 GCS) from the concrete structure to the south has been scoped out. Refer to Recognised Views and to VRG (Users of Delancey Park). Ruling out the “*spectacular views … available southwards over the eastern seaboard of the island and Jersey and beyond”.*

16.7.219 As views, which include the Site, are not available from most of the CA, the Magnitude of Change on the CA as a whole is reduced (when compared to VRG 9) and is judged to be **Low**.

16.7.220 The Level of Effect given the high sensitivity and low magnitude of change is judged to be **Minor Adverse** for both construction and operation.

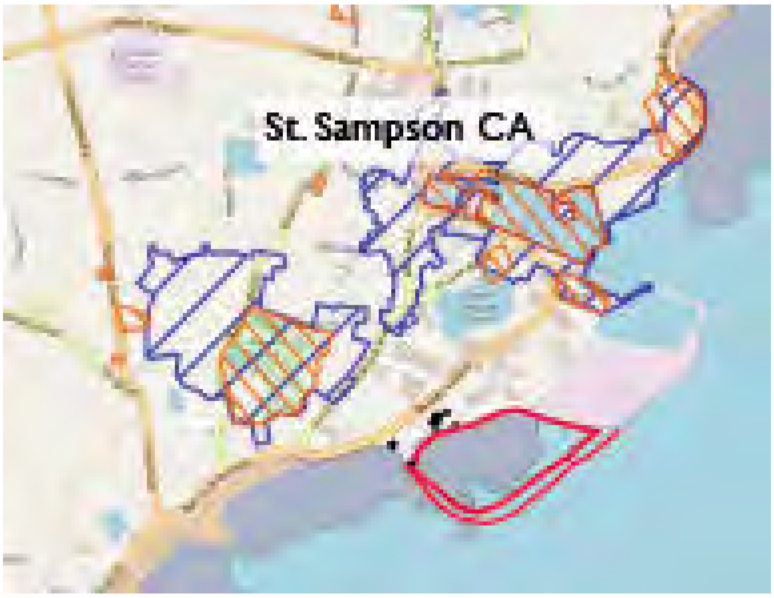
Viewers within The Bridge, Vale and St Sampson CA

16.7.221 The IDP Annex VII Conservation Areas describes the reason for designation as follows:

“The Bridge is designated as a Conservation Area because of the importance of the special historic and architectural interest of St Sampson's Harbour and the

surrounding area with its continuing links with development and industry, as both a recreational and a working port. …Transitions between small scale residential development in enclosed backstreets through larger scale commercial and industrial buildings in more open surroundings, with strong enclosure formed by historic walls, to the open aspect of the harbour itself and the outlying fortifications protecting the harbour .. all contribute positively to the special character in interest of the Bridge as a Conservation Area, … so that it is desirable to preserve or enhance its character and appearance as described above.

Note: Areas marked orange on the extract plan below are area of Archaeological interest within CA'S



16.7.222 The Bridge, Vale and St Sampson CA lies on the lower ground extending around St Sampson's harbour. Vale Castle, a historic monument, from the top of which is a Recognised (panoramic) View, lies within and on the north-eastern edge of the CA Although the south-eastern edge of the Site is discernible from the elevated ramparts of Vale Castle, there is otherwise little intervisibility between the CA and the Site, despite the proximity, so its character and appearance are not affected. The CA as a whole is scoped out but the views from Vale Castle are considered above in the Recognised Views section.

Lighting

16.7.223 Although there will be 24-hour working with associated lighting for the stone conveyancing and construction of the breakwater (which could include some unloading onto the foreshore in the north west corner of the Site) from barges, at high tide, during the construction period of circa 2 years. The lighting will be seen as an extension into the sea of the lighting along the frontage of and including East Coast Road into the northern end of Belle Grève Bay, during some of the hours of darkness. The lighting on the tugs (which would only occur with the 'worst case' Option 1, in **Chapter 4 Project Description** and not Option 2 which would rely on lorry conveyance) will be minimal and the unloading are on the shoreline has been positioned away from Gorselea to avoid direct line of sight. The effect will be intermittent, transient and temporary, with a limited overall landscape and visual impact in the scene, at this stage.

16.7.224 During the operation period of 12 years or more, the working hours will be between 8am and 4pm, there will be no need for night time working and associated lighting will be minimal, to none.

Summary of Sensitivity and Results of the Assessment

16.7.225 Sensitivity of the visual receptors and the reasons for the conclusion are summarised in **Table 16-7**.

Table 16-7: Value / Sensitivity of Visual Receptors

Visual Receptor	Sensitivity	Justification – value and susceptibility
Viewers from Recognised Views/ Viewers in the Conservation Areas		
Viewer at a Recognised View	High	The Recognised Views have been selected and published as they are valued views. Viewers going to these viewing points will be susceptible to changes to the view and have a High Sensitivity.
Viewer from within the CAs: St Peter Port CA, Delancey, St Sampson CA, The Bridge, Vale and St Sampson CA.	High	Viewers within a Conservation Area will have high expectation of the view and so have a high sensitivity to change.
Visual Receptor Groups (VRG)s		
VRG 1 Road Users on the East Coast Road		The value of the sequential sea views are lowered where they are seen through a stream of traffic, as is the case for vehicle users VRGs 1a and 1b below.

Visual Receptor	Sensitivity	Justification – value and susceptibility
VRG 1a Road Users – Car and Truck Users	Medium-Low.	Car users have a lowered susceptibility to their surroundings as they pass quickly through the landscape. Drivers will be more focused on the road than the view, while passengers are more able to look around.
VRG 1b Road Users – Cyclists	Medium	Cyclists will have more time than car drivers to absorb their surroundings but they still will be concentrating on the route ahead rather than solely on the view and so also have a reduced susceptibility.
VRG 1c Road Users – Pedestrians and Walkers	High	Pedestrians and walkers will be travelling more slowly and so have more time and opportunity than car drivers / cyclists to look around and absorb their surroundings and so will be more susceptible to changes to the view. They have the opportunity to walk on the sea side of the road, so will not be looking through the traffic. Walkers will be more concentrated on the valued views.
VRG2 - Residents VRG 2a Residents fronting onto or near the East Coast Road, VRG 2b Residents on the elevated land in/ near St Peter Port town-to include that immediately West of East Coast Road VRG 2c Residents near the Site such as at Gorselea	High	Residents will be interested in 'their view' and be susceptible to changes. Given the value of the view, their Sensitivity is High as they will be attached to their view and notice even very minor changes.
VRG 3 - Recreational and other beach users (in Belle Grève Bay)	High	This recreational VRG is susceptible to changes in the valued views from the beach and have a High Sensitivity.

Visual Receptor	Sensitivity	Justification – value and susceptibility
VRG 4 - Ferry users travelling to and from St Peter Port VRG 4a Ferry Users travelling through the water between Herm and Guernsey (Little Russell) from the North (from England & Alderney) VRG4b - Ferry Users travelling to and from Guernsey from the East/ South (from Herm and south of Jethou, from Sark and France)	High-Medium	The ferry users would be alert and anticipating arrival / departure and would be susceptible to changes in the valued and interesting views of the coast.
VRG 5 Fishermen & recreational boat users VRG 5a Fishermen and recreational boat users in the waters between the Guernsey coast and the northern ferry route VRG 5b Fishermen & recreational boat users in the waters between the northern and the eastern ferry routes.	High-Medium	Fishermen and recreational boat users would be familiar with the available views on arriving and leaving the east coast port. They would be more focused on their work, manoeuvring the fishing vessel/ boat making them less susceptible to changes in those views.
VRG 6 - Users of the Public Footpath (from the East Coast Road continuing along the shore near the Site)	High	The users of the public footpath will be susceptible to changes in the view. They will have a High Sensitivity to changes to the views, given the value of the beach, framed by greenery.

Visual Receptor	Sensitivity	Justification – value and susceptibility
VRG 7 - Tourists & sightseers & visitors to St Peter Port	Medium	Visitors to St Peter Port will be alert to their surroundings but there are industrial and harbour workings already in the distant sea views, so they will not be particularly susceptible to changes to the view that will be involved in the type of project proposed.
VRG8 Workers travelling to and working at Longue Hougue industrial and the existing Longue Hougue Reclamation Site.	Low	They will not be particularly susceptible to the view as they will be focused on their work and probably in a car / truck and the views of the sea are over a rock armour sea wall and other views are industrial.
VRG 9 Visitors to Delancey Park	High-Medium	The value lies in the interesting sea views with islands and the whole scene gently framed by trees. The sea views are over long low buildings, so the view is not wholly naturalistic. Views also include the parkland and protected pine trees. The VRG will be susceptible to changes in the view, but the susceptibility is slightly reduced due to the built form in the sea views.

16.7.226 A summary of the visual effects are presented in **Table 16-8**, **Table 16-9**, **Table 16-10**, **Table 16-11**, and **Table 16-12**. Refer to Recognised Views, Vale Castle, RV 9, and to RVs in **Appendix 16.2** Figures.

16.8 Cumulative Impacts

Developments Considered in Cumulative Effects

16.8.1 Cumulative effects are defined here as the landscape and visual effects of the scheme in combination with other proposed developments (in planning) in the area.

Table 16-8: Summary of Visual Effects – Recognised Views - Rec V (Strategic View-SV, Guernsey Map Viewing Point – VP)

Recognised View	Salerie Battery	Beau Sejour Leisure Centre	Fort George / Belvedere Field	Vale Castle	Delancey Park	Castle Cornet
RV number (refer to Appendix 16.2)	RV1 Looking north-east	RV2 Looking north/ north-east towards the Site	RV 12 Looking north-east towards the Site	RV9 Looking south-west towards the Site	RV14 Looking south-east – might include the edge of the Site to the east	RV11 Looking west
Approx. distance to nearest Site edge	1.5km	2km	3km	1km	0.5km	Just over 2km
Type of View	SV (Framed View circa 60 degrees). No VP.	SV single view – vista to the north. VP 180 degrees to the north. SV –framed 60 degrees. VP 180 degrees to the east.	SV framed view to the north-east. VP 180 degrees to the north-east.	SV - 360 degrees. VP – 360 degrees.	SV framed view to the south-east. Scoped out. No VP. RV from a different location is included in the VRG assessment.	SV. Scoped out as the view is looking west and the site is to the north. RV is included in the VRG assessment.

	Recognised View	Salerie Battery	Beau Sejour Leisure Centre	Fort George / Belvedere Field	Vale Castle	Delancey Park	Castle Cornet
	Sensitivity to Change	High	High	High	High		
Construction Phase	Magnitude of Effect	Low	Medium-Low	Low	Low		
	Level of Effect	Moderate-Minor Adverse	Moderate-Minor Adverse	Minor Adverse-Negligible	Minor Adverse-Negligible		
Operation Phase	Magnitude of Effect	Low	Medium-Low	Low	Low		
	Level of Effect	Moderate-Minor Adverse	Moderate-Minor Adverse	Minor Adverse-Negligible	Minor Adverse-Negligible		

Table 16-9: Summary of Visual Effects – VR1 & VR2

	Visual Receptor Group	VRG1 Road Users On the East Coast Road			VR2 Residents		
		VRG1a - Road Users - Car and Truck Users	VRG1b - Road Users - Cyclists	VRG1c - Road Users – Walkers & Pedestrians	VRG2a - Residents fronting onto or near the East Coast Road	VRG2b - Residents on the elevated land in/ near St Peter Port town-to include that immediately West of East Coast Road	VRG 2c- Residents near the Site such as at Gorselea
	RV number (refer to Appendix 16.2)	RV1, RV3 RV13 Looking north & north-east			RV1, RV3, RV13 Looking north & east	RV2 Looking north-east	RV4, RV5, & RV7 from the adjacent footpath, looking north-east, east, and south / south-west respectively. RV6 from the reefs – looking west intervisibility.
	Sensitivity to Change	Medium - Low	Medium	High	High		
Construction Phase	**Magnitude of Effect**	Medium - Low	Medium- Low	Medium	Medium - Low	Medium-Low	High
	Level of Effect	Moderate - Minor Adverse	Moderate - Minor Adverse	Moderate - Adverse	Moderate - Minor Adverse	Moderate - Minor Adverse	Substantial Adverse

	Visual Receptor Group	VRG1 Road Users On the East Coast Road			VR2 Residents		
		VRG1a - Road Users - Car and Truck Users	VRG1b - Road Users - Cyclists	VRG1c - Road Users – Walkers & Pedestrians	VRG2a - Residents fronting onto or near the East Coast Road	VRG2b - Residents on the elevated land in/ near St Peter Port town-to include that immediately West of East Coast Road	VRG 2c- Residents near the Site such as at Gorselea
Operation Phase	Magnitude of Effect	Medium - Low	Medium - Low	Medium	Medium - Low	Medium - Low	High
	Level of Effect	Moderate - Minor Adverse	Moderate - Minor Adverse	Moderate Adverse	Moderate - Minor Adverse	Moderate - Minor Adverse	Substantial Adverse

Table 16-10: Summary of Visual Effects – VR3 to VR5

Visual Receptor Group	VRG3 - Beach users	VRG4 - Ferry users travelling to and from St Peter Port		VRG5 - Fisher-men and recreational boat users	
	VRG3 - Recreational and other beach users (in Belle Grève Bay)	VRG4a - Ferry Users travelling through the water between Herm and Guernsey (Little Russell) from the North (from England & Alderney)	VRG4b - Ferry Users travelling to and from Guernsey from the East/ South (from Herm and south of Jethou, from Sark and France)	VRG5a - Fishermen and recreational boat users in the waters between the Guernsey coast and the northern ferry route	VRG5b - Fishermen & recreational boat users in the waters between the northern and the eastern ferry routes
RV number (refer to Appendix 16.2)	RV1, RV3 RV13 Looking north & north-east. RV7	RV10, Looking north-west. RV11, Looking north-east. Inter-visibility RV7, RV8.	RV11, Looking north-east. Intervisibility, RV7.	RV10, Looking north-west. RV11, Looking north-east. Inter-visibility RV1, RV7, RV8.	RV10, Looking north-west. RV11, Looking north-east. Intervisibility, RV7.
Sensitivity to Change	High	High- Medium		High-Medium	

	Visual Receptor Group	VRG3 - Beach users	VRG4 - Ferry users travelling to and from St Peter Port		VRG5 - Fisher-men and recreational boat users	
		VRG3 - Recreational and other beach users (in Belle Grève Bay)	VRG4a - Ferry Users travelling through the water between Herm and Guernsey (Little Russell) from the North (from England & Alderney)	VRG4b - Ferry Users travelling to and from Guernsey from the East/ South (from Herm and south of Jethou, from Sark and France)	VRG5a - Fishermen and recreational boat users in the waters between the Guernsey coast and the northern ferry route	VRG5b - Fishermen & recreational boat users in the waters between the northern and the eastern ferry routes
Construction Phase	Magnitude of Effect	Medium	Sequential views - Overall Arrival & Departure - Medium	Low	Medium-Low	Low
	Level of Effect	Moderate Adverse	Arrival / Departure Moderate Adverse	Minor Adverse-Negligible	Moderate Adverse	Minor Adverse-Negligible
Operation Phase	Magnitude of Effect	Medium	Sequential views-Overall Arrival & Departure - Medium	Low	Medium-Low	Low
	Level of Effect	Moderate Adverse	Arrival & Departure Moderate Adverse	Minor Adverse-Negligible	Moderate Adverse	Minor Adverse-Negligible

Table 16-11: Summary of Visual Effects – VRG6 to VRG8

Visual Receptor Group	VRG6 - Users of the Public Footpath (from the East Coast Road continuing along the shore near the Site)	VRG7 - Tourists & Sightseers & Visitors to St Peter Port	VRG8 - Workers travelling to and working at Longue Hougue	VRG9 - Visitors to Delancey Park
RV number (refer to Appendix 16.2)	RV13 Halfway - Looking east. RV4 from the footpath where it enters the beach area, looking north-east. RV6 from the Footpath / Gorselea gate to beach looking south-east. RV7 From Memorial Bench - Looking south-east, south & south-west. RV8, Looking east from industrial area service road.	RV1, RV2. RV11 Castle Cornet. RV12.	RV8. Looking east across the northern part of the Site.	RV14 Looking east towards Jethou across the south-eastern tip of the Site.
Sensitivity to Change	High	Medium	Low	High-Medium

	Visual Receptor Group	VRG6 - Users of the Public Footpath (from the East Coast Road continuing along the shore near the Site)	VRG7 - Tourists & Sightseers & Visitors to St Peter Port	VRG8 - Workers travelling to and working at Longue Hougue	VRG9 - Visitors to Delancey Park
Construction Phase	Magnitude of Effect	Sequential Views - High	Medium - Low	Medium	Medium
	Level of Effect	Substantial Adverse	Minor Adverse	Moderate - Minor Adverse	Moderate - Minor Adverse
Operation Phase	Magnitude of Effect	Sequential Views - High	Medium - Low	Medium - Low	Medium - Low
	Level of Effect	Substantial Adverse	Minor Adverse	Minor Adverse	Minor Adverse

Table 16-12: Summary of Visual Effects – Viewers in CAs

	Visual Receptor Group	Viewers within St Peter Port CA as a whole	Viewers within Delancey, St Sampson CA as a whole	Viewers within The Bridge, Vale and St Sampson CA
	RV number (refer to Appendix 16.2)	RV1 Salerie Battery, RV2 the higher land around Beau Sejour Leisure Centre, Rv11 Castle Cornet and RV12 Fort George/ Belvedere.	RV14	None included as scoped out. Refer to Vale Castle Recognised View.
	Sensitivity to Change	High	High	
Construction Phase	Magnitude of Effect	Medium - Low	Low	
	Level of Effect	Minor Adverse	Minor Adverse	
Operation Phase	Magnitude of Effect	Medium - Low	Low	
	Level of Effect	Minor Adverse	Minor Adverse	

16.8.2 Following consideration of (IDP 2016) housing allocation sites and planning applications currently in the system, an overall list of these projects was prepared in the **Chapter 5 EIA Methodology**. In this chapter this has been scoped down to those projects and sites where there could be potential landscape and visual cumulative effects. A summary of this process can be found on the Landscape and Visual Scoped out Cumulative Effects Tables, in **Appendix 16.8**.

Landscape Cumulative Effects

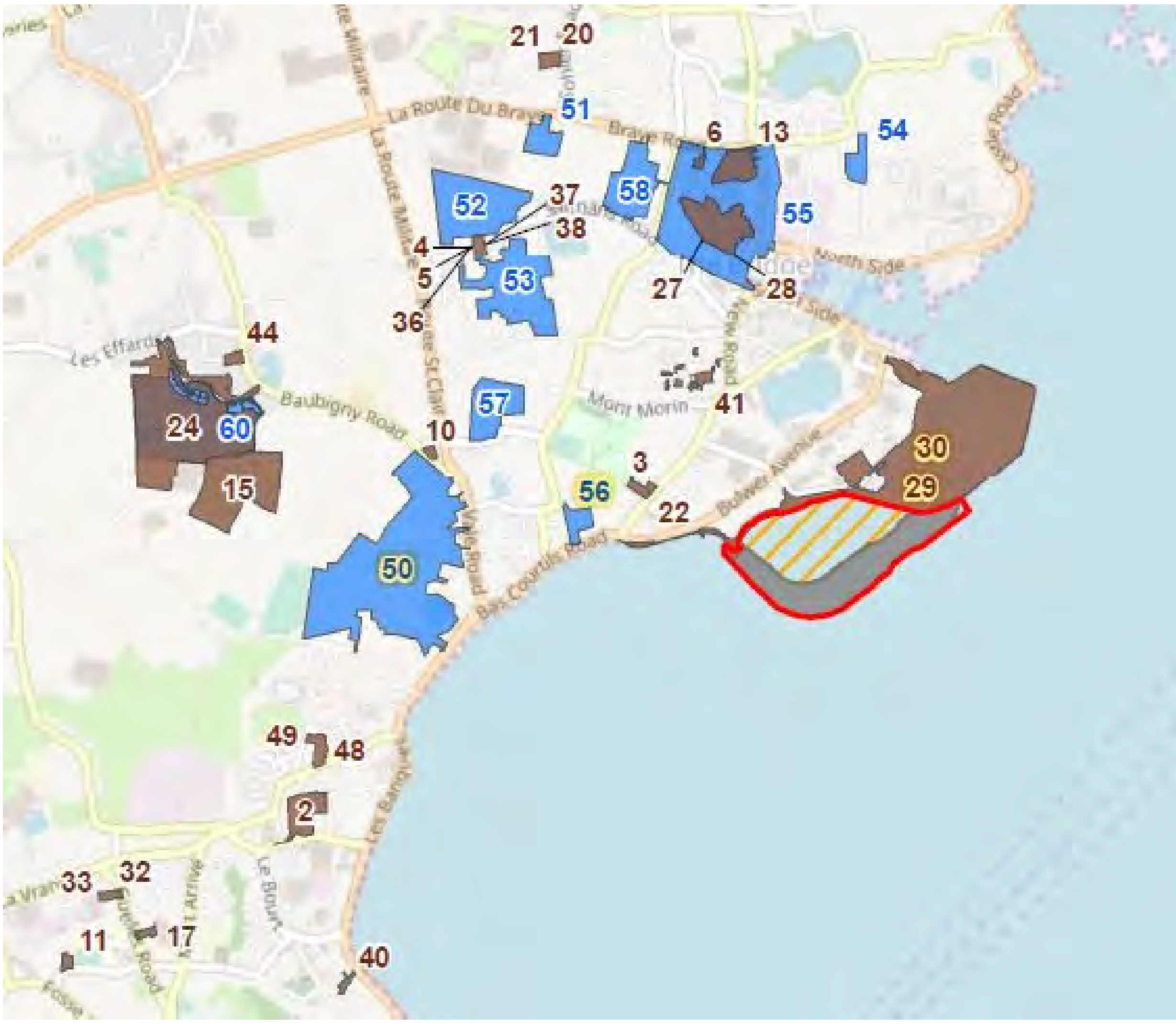
16.8.3 Sites which had the most potential for cumulative landscape effects, given their location and proximity to the seafront, were 29, 30, 50, 56, which are identified / highlighted on the extract below. A more detailed review of other potential projects / sites has identified that their characteristics, location and/or local context would mean that they would not result in any meaningful additional in combination direct or indirect landscape cumulative effects with the Project, within the Study Area.

16.8.4 The infilling of a temporary opening in the Mont Crevit Breakwater, Longue Hougue, St Sampson (associated with Site 29) was a potential albeit small scale indirect landscape cumulative effect arising on Character are 5A, with limited effects on Character area 5B occupied by the Project. However, it is understood that these works are highly likely to be complete before the Project construction phase works commence. Cumulative landscape effects from these works would not appreciably add additional effects and would not be significant, in combination.

16.8.5 Site 30 on the plan below, includes an area for a temporary re-location (for a period of 24 months) of the household waste transfer station and development of a construction lay down area, associated with the development of Longue Hougue South. This has already/ will have been already taken down before the Project construction works begin and will be reinstated and therefore is not considered further as a potentially significant cumulative effect.

16.8.6 The housing allocations on site 50 is large scale and occupies relatively open land, this land is low lying and positioned to the rear of housing that fronts Les Banques. The existing housing will provide containment, interrupting indirect effects between Character area 2 and Character area 5B. Site 56 is also predominantly located behind frontage housing affording the same enclosure to the south and south-east.

Figure 16-4 Sites Considered for Landscape Cumulative Effects



16.8.7 Overall, the additional allocated housing allocation sites and sites with planning permission directly add to the existing urban character and the extent of built form in Character Area 2 shown on **Appendix 16.3**, Figure 04. However, they will not perceptibly change the East Coast Road, beach frontage, treed backdrop and seafront character. Nor would these developments influence Character area 5B (occupied by Longue Hougue South) nor the Character Area 3 foreshore context or Character Area 4, Open sea and islands, in a manner that would appreciably add significant direct or indirect effects to the receptors of the Project.

16.8.8 Although these additional developments would be permanent and the magnitude of indirect effects, greater on some townscape character areas, these effects are not considered to be of a scale, extent or type, which would alter our Project judgments for the levels of effects on these landscape receptors or to result in any significant landscape cumulative effects, in combination with the Project. **No cumulative impact** is therefore predicted.

Visual Cumulative Effects

16.8.9 Sites with the most potential for cumulative visual effects with the Project have been identified following a review of all the surrounding current IDP Housing Allocations and Planning applications. The schemes which would be evident to visual receptors identified for the Project are identified on the extract plan below (with a yellow highlight). Other sites identified on the plan have been scoped out, as they would either be barely perceptible in views including Longue Hougue South, too distant to have a combined effect or would have no intervisibility due to intervening woodland, buildings or landform.

Figure 16-5 Sites Considered for Visual Cumulative e Effects

16.8.10 The visual receptors and the nature of cumulative effects arising from the additional identified IDP Housing allocation sites or planning applications are summarised below:

16.8.11 Visitors to Delancey Park (Represented by RV14) who would experience cumulative visual effects arising from sites 3, 22 and 56 have been judged to be of high to medium sensitivity. The magnitude of effect on receptors at Delancey Park, in the absence of the identified cumulative schemes, was identified as medium during construction and medium to low, in operation. With residual level of effect after operation of minor adverse. With allowance for the other residential projects the additional effects would be small scale and effect a small amount of the view in the context of existing built development. Although these additional effects would be permanent, the magnitude of effect, although greater, is judged to not increase nor alter the original judgments for the effects on these receptors to the next level or to make them significant.

16.8.12 Visitors to Vale Castle (Represented by RV9) who would experience cumulative visual effects arising from sites 29 and 30 have been judged to be of high sensitivity. The magnitude of effect in the absence of the identified cumulative schemes was identified as low during construction and low in operation. With residual level of effect after operation of minor adverse to negligible. The relocation of the Waste Transfer Station would be temporary and replaced by a temporary lay down area, both of which have already been considered under indirect Longue Hougue South construction effects. The magnitude of effect is judged to rise with the localised infill of the existing temporary opening in the Mont Crevelt breakwater, but these works would be of a very small scale and with a limited extent of proposed visible additional works, in the view. Albeit permanent, the cumulative level of effect is therefore not judged be enough to change the level of effect, nor result in cumulative effects that are significant.

16.8.13 Transient road users, walkers, visitors to Hougue a la Perre and users of the beach (Represented by RV3) who would experience cumulative visual effects arising from sites 29, 30,50 and 56 have been judged to range from medium to low to high sensitivity. The magnitude of effect in the absence of the identified cumulative schemes was identified as ranging from medium to low to medium in construction and in operation. With residual magnitude of effect after operation ranging from moderate to minor to moderate adverse. With allowance for the other projects above, the magnitude of effect is judged to increase, due to a very small increase in the amount and extent of frontage housing development in the view experienced. However, the amount of change is not judged to change the previous judgements to the next level nor result in significant cumulative visual effects.

16.8.14 Visitors to Beau Sejour Leisure Centre and to the Viewing point on Bailiwick and from residents in the vicinity, in winter, in particular (Represented by RV2), who would experience cumulative visual effects arising from housing and application sites 2,29, 30, 48,49,50 and 56 have previously been judged to be of high sensitivity. The magnitude of effect in the absence of the identified cumulative schemes was identified as Medium to low during construction and in operation. With residual level of effect after operation of moderate to minor adverse. With allowance for the other residential projects the additional effects would be small scale and effect a small amount of the view in the context of existing built development. Although these additional effects would be permanent, the magnitude of effect, although greater, is judged to not increase nor alter the original judgments for the effects on these receptors to the next level or to make them significant.

16.8.15 Travellers by ferry from and to St Peter Port (Represented by RV10) and boat users, who would experience cumulative visual effects arising from sites 29, 30, 50 and 56 have been judged to be of high to medium sensitivity. The magnitude of effect in the absence of the identified cumulative schemes was identified as medium during construction and in operation. With residual level of effect after operation of moderate adverse. With allowance for the other projects above, the magnitude of effect is judged to increase, due to a very small increase in the amount and extent of frontage housing development in the view experienced. However, the amount of change is not judged to change the previous judgements to the next level nor result in significant cumulative visual effects.

16.8.16 There would also be no greater change effecting residents and footpath users (RV 4 and 8) alongside the site arising from any of the additional developments in combination with that arising from sites 29 and 30 assessed in the previous section.

16.8.17 Overall, there would be some additional visual change experienced by the above receptor groups arising from a small number of the allocated housing sites and sites with planning permission. However, the additional in combination effects in existing views experienced beyond those arising from the Project would be barely perceptible, even in winter. Therefore, our judgment is that additional developments in the planning system would not result in any significant cumulative visual effects. **No cumulative impact** is therefore predicted.

16.9 Overall Significance of (Residual) Effects

Landscape and Visual Significance

16.9.1 A final judgement is made about whether or not the overall landscape and visual effects of the development, effects may be either adverse or beneficial.

Landscape Effects

16.9.2 The Project includes elements that alter the character in the local context. However, it also incorporates components that would not be out of context with existing character area elements/ features.

16.9.3 Construction effects such as lifting and other machinery, although noticeable would be elements already within the study area, cranes at St Peter Port and the Industrial Area and the existing Longue Hougue Reclamation Site. Industry and land reclamation from the sea, have already been taking place in Guernsey for hundreds of years (see **paragraph 16.3.10**).

16.9.4 The Project would cause a noticeable (Moderate - Minor Adverse) and large (Substantial Adverse) effect in the existing landscape Character areas. The receptors most affected are:

- Substantial for both construction and operation:
  - Character Area 5B (refer to Figure 05c in **Appendix 16.2**) - The Local Landscape/ Rocky Shore & Well-Vegetated, Green Area to include Gorselea.
- Moderate-Minor Adverse for both construction and operation:
  - Character Area 3 - (refer to Figure 05b in **Appendix 16.2**) Belle Grève Bay; and
  - Character Area 5A - (refer to Figure 05c in **Appendix 16.2**) - The Local Landscape/ Rocky Shore & Industrial Area.

16.9.5 Although the development would not be detrimental to the wider character of the study area and the changes are local, the character area, which includes the industrial area will not be changed, but the character of the shore within the Site, near Gorselea, and at the northern end of Belle Grève Bay will be changed.

16.9.6 Overall it is considered that the scheme would result in **Significant Adverse** landscape effects.

Visual Effects

16.9.7 The proposed development, would cause a noticeable (Moderate Adverse) and large (Substantial Adverse) effect in the existing visual amenity afforded to some local VRGS:

- Substantial Adverse Level of Effect:
  - VRG2c – Residents near the Site, such as at Gorselea; and

  - VRG6 - Users of the Public Footpath from the East Coast Road continuing along the cove and shore near the Site.

- Moderate Adverse Level of Effect:
  - VRG1c – Road users – Walkers and Pedestrians;
  - VRG3 - Recreational and other beach users (Belle Grève Bay);
  - VRG4a – Ferry users travelling through the water between Herm and Guernsey from the North (from England & Alderney); and
  - VRG5a – Fishermen and recreational boat users between the Guernsey coast and the northern ferry route.

16.9.8 However, the Project would result in Moderate - Minor or Minor effects on the following:

- Moderate-Minor / Minor Adverse / Minor – Adverse - Negligible Level of Effect:
  - VRG1 Road Users (Car and Truck Users, Cyclists, Pedestrians and Walkers);
  - VRG2a Residents fronting onto or near the East Coast Road;
  - VRG2b Residents on the elevated land in/ near St Peter Port town to include higher land immediately West of the East Coast Road;
  - VRG4b Ferry Users travelling to and from Guernsey from the East (Herm, and south of Jethou, from Sark and France);
  - VRG5b Fishermen and recreational boat users between the northern and the eastern ferry routes;
  - VRG7 Tourists & Sightseers & Visitors to St Peter Port;
  - VRG8 Workers travelling to and working at Longue Hougue; and
  - VRG9 Visitors to Delancey Park.

16.9.9 The majority of the viewers fall within the second group of VRGs to include visitors to St Peter Port, users of the East Coast Road and ferry users arriving from Sark and France.

16.9.10 However, viewers such as Road Users-walkers and pedestrians; Recreational and other beach users (Belle Grève Bay); ferry users arriving from England and Alderney; fishermen near the Guernsey coast; and more local viewers such as residents at Gorselea and users of the adjacent footpath would experience a noticeable and large deterioration to their views.

16.9.11 Overall it is considered that the scheme would result in **Significant Adverse** visual effects.

16.9.12 The effects on viewers from the St Peter Port Conservation Area (CA), from Delancey CA, and from St Sampson CA in the long term, are judged to be **Not Significant**.

16.9.13 The Recognised Views considered in this report vary from around 3km distance to 1km distance (Delancey Park at circa 0.5km distance was scoped out). Although some minor differences will be experienced in the views from the south at around 1.5km to 2km distance, the overall nature of the views will remain unchanged. As a whole, the changes to the views received from the Recognised Views (4 SVs and 3 VPs) (panoramas, framed views and vistas) are judged to be **Not Significant**.

Cumulative Effects

16.9.14 Following a review of other projects in the planning system, **no significant** in combination landscape and visual cumulative effects have been identified.

Table 16-13: Summary of Significance of Impacts

Impact	Significance	Mitigation	Residual Impact	Monitoring
Character Areas / Landscape	Significant	Paras 16.6.1-16.6.6	Significant	Para 16.6.6
Viewers at Recognised Views	Not Significant	Paras 16.6.1-16.6.6	Not Significant	Para 16.6.6
Viewers in St Peter Port CA	Not Significant	Paras 16.6.1-16.6.6	Not Significant	Para 16.6.6
Visual Receptor Groups	Significant	Paras 16.6.1-16.6.6	Significant	Para 16.6.6
Cumulative Effects - landscape	Not Significant	Paras 16.6.1-16.6.6	Not Significant	Para 16.6.6
Cumulative Effects Views and visual receptors	Not Significant	Paras 16.6.1-16.6.6	Not Significant	Para 16.6.6

17 Marine Ecology

17.1 Content and Data

Content

17.1.1 This section of the ES provides an assessment of the potential effects on marine ecology arising from the proposed development. Justification for the selected study area is provided, and the current baseline of species within or near the study area is described. The potential impacts associated with the proposed development are then assessed. Any subsequent mitigation measures that are required are also proposed.

17.1.2 This section is interrelated with the following sections within the ES:

- Chapter 7 Coastal and Marine Processes; and
- Chapter 8 Marine Water and Sediment Quality.

17.1.3 Based on the findings of the scoping report and following consultation, the key issues considered within this section of the ES are as follows:

- Loss of intertidal and subtidal habitats;
- Permanent habitat loss;
- Increase in suspended sediments concentrations;
- Impacts to protected sites;
- Increased collision risk for marine mammals;
- Changes to habitats in Herm, Jethou and the Humps Ramsar; and
- Changes to marine habitats due to a change in tidal flow rates.

17.1.4 With regard to marine mammals, it should be noted that the potential for underwater noise impacts have been scoped out of further assessment. This is because the only potential source of underwater noise from this project is from the placement of rock underwater, the use of vessels, if required, for the construction of the breakwater in deeper waters and for the transportation of materials to the site. There will be no piling works undertaken for the project. The following paragraphs outline the potential for underwater noise propagation due to rock placement activities, and the reasoning for the scoping out of further assessment.

17.1.5 Several studies have been conducted into the underwater noise levels associated with rock placement activities, and the effect that it may have on marine mammals. A short summary of relevant studies is provided below.

17.1.6 Noise measurement data as collected by both Nedwell and Edwards (2003) and Wyatt (2008) indicate that the dominating underwater noise from rock placement activity is from the vessels themselves, rather than the noise from the actual placement of the rock on the seabed. For an offshore pipeline in Sweden (Nord Stream 2), it has been shown that the underwater noise associated with rock placement activities would not be sufficient to induce any permanent effect (PTS) on either harbour porpoise, seal species or fish if they were exposed to rock placement activities for a period of two hours, and that both harbour porpoise and seals species would have to remain within 80m of the rock placement activities for a period of two hours to be at risk of any temporary auditory injury (TTS) (Ramboll, 2016). Note that this modelling was undertaken in water significantly deeper than that of the works to be done at Longue Hough South and therefore it can be expected that the impact ranges at Longue Hough South would be considerably smaller because noise propagates further in deeper water. Additionally, underwater noise modelling for the Aberdeen Harbour Extension Project concluded that the noise from rock placement would not be heard over background sound levels (Kongsberg Marine Limited, 2015).

17.1.7 A further review of the underwater noise associated with different man-made noise through construction activities concluded that rock placement activities cannot be heard over the noise associated with the vessel used to undertake that activity (Norfolk Boreas Limited, 2018). The same study found that the source level of noise from rock placement activities is up to 172dB re 1 µPa @ 1m RMS. While the underwater noise associated from the placement of rock underwater has been reported to have negative effects on marine mammal species up to a few hundred metres, these effects are only found in much deeper waters which allows for much larger noise propagation ranges. It should also be noted that the majority of thresholds for impact on marine mammals are well above the sound source level noted above, with the only possible effect at this source level being temporary auditory injury and disturbance effects on all species, and permanent auditory injury to harbour porpoise if individuals are exposed to, and remain in the vicinity of, the sound source for a period of 24 hours (i.e. under the cumulative impact criteria as determined by NOAA (2018)).

17.1.8 However, it considered extremely unlikely that any individual would remain in the vicinity of any such activity for that period of time and would in reality travel away from the rock placement activities. There is no potential for effect on any marine mammal species if they are exposed to the sound of rock placement for a single occurrence (i.e. under the peak impact criteria as determined by NOAA (2018)). Taking the limited effect of rock placement activities on marine mammals, and that rock placement has only been found to have any, but limited, effect on marine mammals in much deeper waters where sound can propagate much further, it is considered unlikely the activities would have any effect on the marine mammal populations in the area, therefore this impact has been scoped out of further assessment.

Study Area

17.1.9 Impacts will be considered on sensitive receptors within the marine environment between Bordeaux Harbour to the north, St Peter Port Southern Breakwater to the south, and 5km to the east of Longue Hougue South. The marine ecology survey extended up to approximately 1km from the Project boundary.

Data Sources

17.1.10 A benthic survey was carried out to develop a more detailed understanding of the conditions of the marine environment adjacent to the Project area. This comprised of 19 sample stations and drop-down video (DDV) survey stations within and around the study area, and seven intertidal locations. More details on this survey can be found in **Appendix 17.1**. An intertidal survey was also completed in August 2019 to map the benthic biotopes present within the Project footprint (Appendix 17.2). The Guernsey Biological Records provided their records within 5km of the site.

17.2 Legislation and Policy Context

17.2.1 The Conservation of Habitats and Species Regulations 2017 (the Habitats Regulations) implemented EC Directive 92/43/EEC on the conservation of natural habitats and of wild flora and fauna (the Habitats Directive) in the UK. These came into force on 30th November 2017. In accordance with Section 61 of the Habitats Regulations, an Appropriate Assessment (AA) is required for any plan or project, not connected with the management of a European site, which is likely to have a significant effect on the site either alone or in combination with other plans and projects.

17.2.2 European sites comprise Special Protection Areas (SPAs), as designated under Council Directive 79/409/EEC (the Wild Birds Directive), or Special Areas of Conservation (SACs), as designated under Council Directive 92/43/EEC (the Habitats Directive). An AA is also required as a matter of government policy for potential SPAs, candidate SACs and listed Ramsar sites for the purpose of considering development proposals affecting them (ODPM, 2005).

17.2.3 Should works, either alone or in combination with other plans or projects, be deemed to have a Likely Significant Effect (LSE) on any European sites (or it cannot be determined that there would not be a significant effect), then an AA must be undertaken by the competent authorities assessing the potential implications of the proposed scheme in view of the conservation objectives of the sites, in accordance with Article 6 of the Habitats Directive and with advice from the government's adviser (in the UK this is Natural England).

17.2.4 The States of Guernsey does not have specific legislation for the adherence to the European Union's Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (the Habitats Directive) or the Council Directive 2009/147/EC on the conservation of wild birds (the Birds Directive). However, the habitats and features fall under the designation of Sites of Special Significance (SSS's) and Areas of Biodiversity Importance (ABI's) under the 2016 Island Development Plan and protected bird features fall under Ramsar sites (States of Guernsey, 2016c). These designations and plans comply with both the Habitats and Birds Directives.

Specific Species Legislation

17.2.5 Several national and international agreements and legislation constitute the legal basis for the protection of seal species in the United Kingdom. This includes specific legislation for seals via the Conservation of Seals Act 1970. However, within the Bailiwick of Guernsey, legislation for the protection and conservation of seals is limited to the Convention of Migratory Species (Bonn Convention), under which both grey seal and harbour seal are listed in Appendix 2 of the Convention.

17.2.6 All species of cetacean are listed on Annex IV of the Habitats Directive (92/43/EEC). It requires regular assessments of the conservation status of all species that cover abundance, distribution and the pressures and threats experienced. The Convention on the Conservation of Migratory Species (Bonn Convention) and the Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas (ASCOBANS), oblige signatories – which include the UK - to apply a range of research and management measures aimed at the conservation of all cetaceans.

17.2.7 International protection of harbour porpoise relevant to the proposed development includes Appendix 2 of the Convention of Migratory Species, and Appendix 2 of the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention). The Habitats Regulations and Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2017 also provide legal protection against the disturbance of cetacean species, requiring developments in the marine environment to carry out assessments of its potential impacts.

Table 17-1: Legislation Relevant for Marine Ecology Receptors in Guernsey

Legislation	Relevance
The Animal Welfare (Guernsey) Ordinance, 2012	This legislation protects animals from acts of violence and neglect. It also protects the young, nests and eggs of wild animals from disturbance.
Island Development Plan 2016	Policy GP2 requires that proposed developments follow the mitigation hierarchy when considering impacts to SSSs, and that development proposals demonstrate that they will not have a negative impact upon SSSs, or that where a negative impact will occur that sufficient mitigation can be provided to ensure no net loss of the SSS special interest features. Policy GP3 requires that proposed developments demonstrate that the biodiversity interest of Areas of Biological Importance (ABIs) have been considered as part of the design and development process, with biodiversity interest being protected or enhanced, and any negative effects mitigated.
Guernsey Biodiversity Strategy	Convention on the Conservation of Migratory Species and Wild Animals (The Bonn Convention) and the Convention on Wetlands of International Importance especially as Waterfowl (Ramsar Convention) – ratified in Guernsey via the United Kingdom's participation - have resulted in the formation of the Guernsey Biodiversity Strategy to carry out the requirements of the conventions. The strategy was commissioned "*in order to provide the means to consider and where necessary, implement conservation legislation and to formalise and structure the Island's commitment to protecting its diverse and treasured natural environment*". The Aims of the Biodiversity Strategy are: • To conserve and enhance key local, regional and internationally important species, habitats and sites; • To ensure that biodiversity objectives and considerations are integral to all states policy, programmes and action; • To increase public awareness and encourage communities and individuals to be involved in the conservation of local biodiversity; and • To monitor and review biodiversity in Guernsey.

Legislation	Relevance
	Biodiversity Strategy Resolution 5 is "*to place a policy obligation on all government departments and committees to ensure that they take account of the Biodiversity Strategy and to ensure that departmental operations and outputs are, as far as possible, consistent with the aims of the Strategy and wherever relevant and applicable, to take practical steps to protect and enhance biodiversity*."

17.3 Baseline

17.3.1 The marine environments surrounding Guernsey are associated with rich and diverse ecology. The strong tidal currents in the area bring nutrient-rich waters that underpin an ecosystem capable of supporting a range of habitats and species. A number of habitats regarded as a priority for conservation under the Guernsey Biodiversity Strategy and the EU Habitats Directive can be found around the island including eelgrass beds, maerl beds[22], and tidal rapids, and several species of marine mammals inhabit the waters around Guernsey.

17.3.2 A review of the Guernsey Biological Records Centre data, within 2km of the LHS site over the previous year, found a number of recorded marine species. Within 0.5km of Longue Hougue South, eelgrass *Zostera marina*, maerl beds green ormer *Haliotis tuberculate* and blonde skate *Raja brachyura* had been recorded, within 1km breadcrumb sponge *Halichondria panicea* and yellow brown kelp *Laminaria ochroleuca* was found to be present, within 1.5km smooth gooseneck barnacle *Lepas anatifera* and mauve stinger *Pelagia noctiluca* were noted, and within 2km of Longue Hougue South bottle-nosed dolphin *Tursiops truncatus*, European spiny lobster *Palinurus elephas* and grey seal *Halichoerus grypus* were recorded. It should be noted that while there is evidence of these species' presence near to Longue Hougue South, there is no indication of how many of each of those species was found to be present, or where they were found. Therefore, a number of further surveys have been undertaken to further determine the presence and abundance of marine species within Longue Hougue South.

[22] *Maerl is an unattached, coralline red algae capable of forming extensive beds in tide-swept channels that often support high benthic biodiversity and productivity through increased habitat complexity (Hall-Spencer, 1998; Grall et al., 2006).*

Designated Sites

17.3.3 The proposed development is located on an area of intertidal and subtidal habitat in Belle Grève Bay, which includes the Foreshore Area of Biodiversity Importance (ABI). The Foreshore ABI includes all intertidal habitat in the north of the Island, from Pleinmont to St Peter Port, with the exception of the commercial harbours (such as Beuacette Marina) and the existing Longue Hougue Facility. ABIs are protected because they represent habitat types that are of significance to nature conservation in the island.

17.3.4 The project is partly within the Foreshore ABI (see **Figure 18-1**), with both the infill area and breakwater overlaying the site; therefore, part of the ABI will be permanently lost.

17.3.5 The Foreshore ABI was proposed to be designated for the following species (States of Guernsey Environment, 2014):

- Scaly cricket *Pseudomogoplistes squamiger*, found at shingle ridges (see **Section 18.3** for more information and assessment of this species);
- Notable species of economic importance (ormers *Haliotis tuberculata*, lady spider *Leucorchestris arenicola*, young edible crabs, and young plaice *Pleuronectes platessa*);
- Diversity of seaweeds;
- Rare and threatened bird species, including (see **Section 18.3** for more information and assessment of this species):
    - breeding birds – shelduck *Tadorna tadorna*, common tern *Sterna hirundo* and oystercatcher *Haematopus ostralegus* at offshore islets, and rock pipits *Anthus petrosus*;
    - major migrants – waders *Charadriiformes sp*., wagtails *Motacilla sp*., pipits *Anthus sp.* and wheaters;
    - wintering birds – divers, grebes, ducks, shag and waders;
    - feeding birds – shag *Phalacrocorax aristotelis*, little egret *Egretta garzetta*, grey heron *Ardea cinerea* and waders. Principle feeding areas are at Richmond, Rocquaine, Belle Grève and Grande Havre; and
    - roosting, refugee and resting birds – *hommet paradis*, *miellette*, *portinfer*, and waders; and
- Grey seals using offshore reefs, such as Les Hanois.

Intertidal Habitats

17.3.6 The key marine habitat categories present within 1km, as shown by the 2018 full habitat survey of Guernsey (**Figure 18-2**), are:

- Intertidal rock and boulders;
- Intertidal shingle;
- Intertidal sand;
- Rock;
- Sand / mud; and
- Shingle.

17.3.7 A Phase II intertidal habitat survey was completed for the site in August 2019 (see **Appendix 17.2** for the Phase 2 Intertidal Survey Report). In general, the recorded habitats and benthic species recorded are considered to be common intertidal species for rocky shores throughout the Channel Islands and the UK (as stated in **Appendix 17.2**). Seabed habitats within the site were recorded as being bedrock, boulders and coarse substrates (including rocks, pebbles, gravel and sands). The classification of the marine biotopes was completed following Conner *et al.* (2004) habitat classifications, and the habitat survey itself was completed following the 'Procedural Guideline 1-1 Intertidal Resource Mapping Using Aerial Photographs' methodology, from JNCCs Marine Monitoring Handbook (Davis *et al.,* 2001).

17.3.8 Twenty-five biotopes were identified throughout the survey (**Table 17-2**). The results of this survey are shown in **Figure 17-1**.

17.3.9 Of the habitats seen throughout the foreshore of the Longue Hogue sites, one is of high ecological significance; SS.SMp.SSgr.Zmar (*Zostera marina / angustifolia* beds on lower shore or infralittoral clean or muddy sand). This biotope is listed on the UK BAP, and is considered to be an important habitat as it is highly productive, supports a variety of marine species and provides a number of ecological functions. Further information on eelgrass is provided in the subsequent sections.

Benthic Habitats

Survey Methodology

17.3.10 A benthic survey was undertaken in May 2019, including DDV sampling, grab sampling, and an intertidal survey. **Appendix 17.1** presents further information on the methodologies of the sampling and analysis for each of the sampling methods as described below.

*Table 17-2: JNCC Habitats Identified from the 2019 Phase II Intertidal Survey (**Appendix 17.2**)*

Habitat type	Habitat Biotope Code	Description	Conservation Importance	Area (m^2)
High energy littoral rock	LR.HLR.MusB.Cht	*Chthamalus* spp. on exposed eulittoral rock.	Low*	573
	LR.HLR.MusB.Cht.Lpyg	*Chthamalus* spp. and *Lichina pygmaea* on steep exposed upper eulittoral rock.	Low*	5,465
	LR.HLR.MusB.Sem	*Semibalanus balanoides* on exposed to moderately exposed or vertical sheltered eulittoral rock.	Medium* – UK Biodiversity Action Plan habitat	5,661
	LR.HLR.MusB.Sem.Sem	*Semibalanus balanoides*, *Patella vulgata* and *Littorina* spp. on exposed to moderately exposed or vertical sheltered eulittoral rock.	Low*	8,266
	LR.HLR.MusB.Sem.FvesR	*Semibalanus balanoides*, *Fucus vesiculosus* and red seaweeds on exposed to moderately exposed eulittoral rock.	Low*	3,482
	LR.HLR.FR.Him	H. *elongata* and red seaweeds on exposed to moderately exposed lower eulittoral rock.	Low*	314
	LR.HLR.FT.FserTX	*Fucus serratus* with sponges, ascidians and red seaweeds on tide-swept lower eulittoral mixed substrata.	Medium – UK Biodiversity Action Plan habitat	6,385

Habitat type	Habitat Biotope Code	Description	Conservation Importance	Area (m^2)
Low energy littoral rock	LR.LLR.F.Fserr.X	*Fucus serratus* on full salinity lower eulittoral mixed substrata.	Low*	11,017
	LR.LLR.F.Fspi.X	*Fucus spiralis* on full salinity upper eulittoral mixed substrata.	Low◆	423
	LR.LLR.F.Fves.X	F. *vesiculosus* on mid eulittoral mixed substrata.	Medium* – UK Biodiversity Action Plan habitat	6,514
	LR.LLR.F.Pel	*Pelvetia canaliculata* on sheltered littoral fringe rock.	Medium* – UK Biodiversity Action Plan habitat	533
Features of littoral rock	LR.FLR.Lic.YG	Yellow and grey lichens on supralittoral rock.	Medium* – UK Biodiversity Action Plan habitat	892
	LR.FLR.Lic.Ver	V. *maura* on littoral fridge rock.	Low*	3,527
	LR.FLR.Rkp.G	Green seaweeds (*Enteromorpha* spp. and *Cladophora* spp.) in shallow upper shore rock pools.	Low*	143
	LR.FLR.Rkp.FK.Sar	S. *muticum* in eulittoral rock-pools.	Low*	311
Ephemeral green or red communities	LR.FLR.Eph.Ent	*Enteromorpha* spp. on freshwater-influenced and/or unstable upper eulittoral rock.	Low*	233
	LR.FLR.Eph.EphX	Ephemeral green and red seaweeds on variable salinity and/or disturbed eulittoral mixed substrata.	Low*	3,643

Habitat type	Habitat Biotope Code	Description	Conservation Importance	Area (m^2)
	LR.FLR.Eph.BLitx	Barnacles and *Littorina* spp. on unstable eulittoral mixed substrata.	Low	17,502
Littoral sediment	LS.LCS.Sh.BarSh	Barren littoral shingle.	Low	156
	LS.LCS.Sh	Shingle (pebble) and gravel shores.	Low	5,540
	LS.LSa	Littoral sand.	Low	270
	LS.LSa.MoSa.BarSa	Barren littoral coarse sand.	Low^	1,000
Other	SS.SMp.SSgr.Zmar	*Zostera marina* / *angustifolia* beds on lower shore or infralittoral clean or muddy sand.	High◆ – UK Biodiversity Action Plan species, considered to be a key habitat for many species.	12,182
	IR.HIR.KSed.LsacSac	*Laminaria saccharina* and / or *Saccorhiza polyschides* on exposed infralittoral rock.	Low*	695

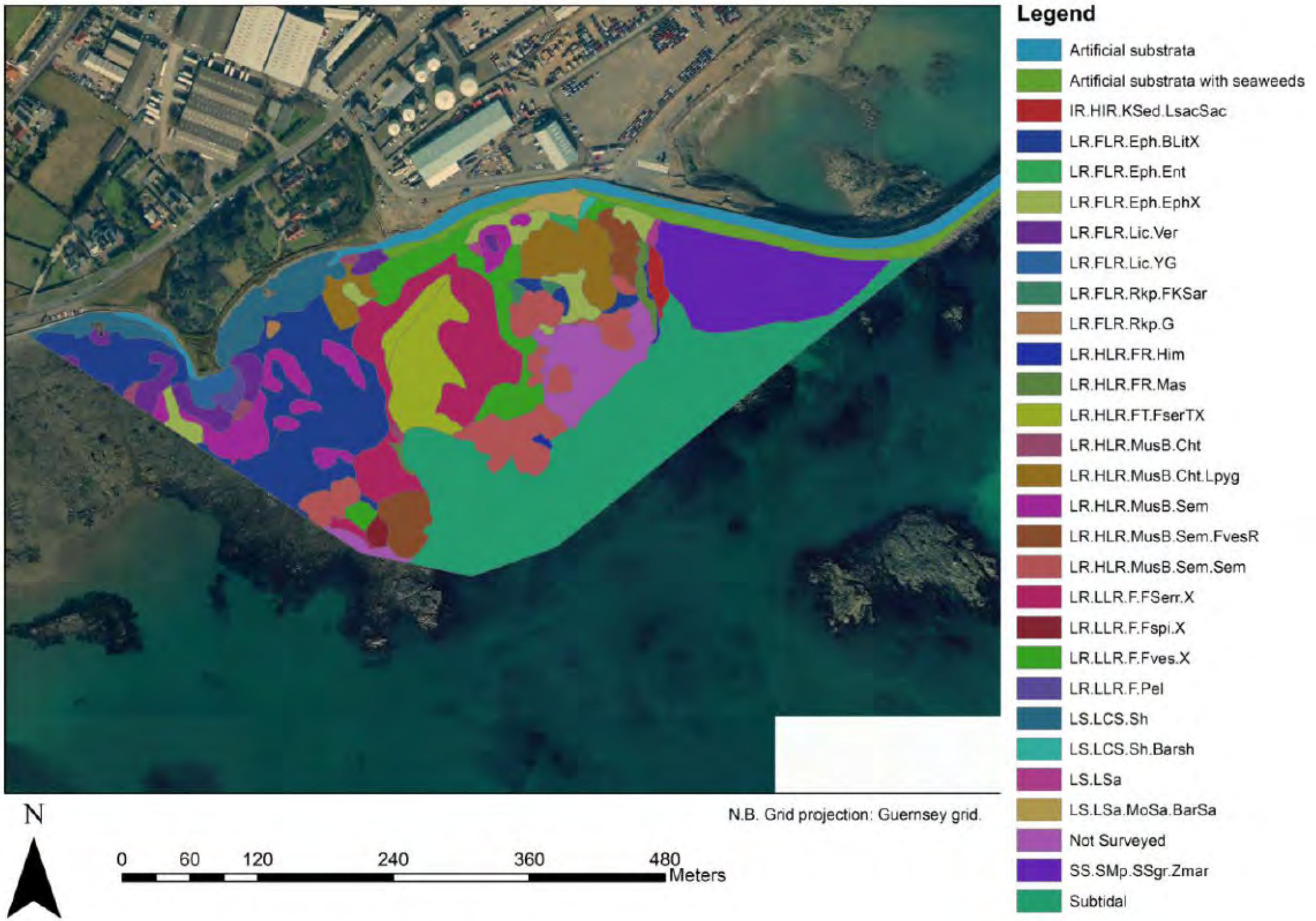
* **Appendix 17.2** notes that these biotopes are considered to be protected under Annex 1 of the Habitats Directive as 'reefs', however, as noted by JNCC (2019)[23], 'intertidal areas are only included within this Annex I type where they are connected to subtidal reefs'. There was no recorded presence of subtidal reefs in the survey, and therefore it is not considered that there are any subtidal reefs present with which the intertidal areas could connect to.

◆ ***Appendix 17.2*** *notes that these biotopes are protected under Annex 1 of the Habitats Directive as a 'large shallow inlet and bay', however, these biotopes are not a feature of this Annex 1 habitat JNCC (2019)[24], and are therefore not protected under the Habitats Directive.*

^ ***Appendix 17.2*** *notes that this biotope is protected under Annex 1 of the Habitats Directive as 'mudflats and sandflats not covered by seawater at low tide', however, this biotope is not indicative of a sand or mudflat JNCC (2019)[25], and is therefore not protected under this Annex 1 habitat.*

[23] https://sac.jncc.gov.uk/habitat/H1170/
[24] https://sac.jncc.gov.uk/habitat/H1160/
[25] https://sac.jncc.gov.uk/habitat/H1140/

Figure 17-1 Results of 2019 Phase II Intertidal Habitat Survey of the Site (**Appendix 17.2**)



17.3.11 The only survey locations that were within Longue Hougue South were the intertidal survey locations 2-5 (within the reclamation area) and 7 (within the breakwater area). The DDV survey point 9 is also in the breakwater site. Within 100m of the breakwater are the intertidal survey location 1, grab sample location 6 and DDV sample location 14. All other survey locations are located more than 100m from the closest point to the Project site.

17.3.12 DDV was collected at a total of 19 locations, which is less than was planned to be taken due to rock and tidal hazards present at the site. At most of these stations, it was determined that the seabed substrate comprised largely of bedrock or large cobbles, unsuitable for subsequent grab sampling. The data taken from the DDVs were analysed to determine the habitat types present, as well as the presence of any microbenthic and epifaunal species. Wherever possible, biotopes present at each DDV locations were determined in accordance with the European Nature Information System (EUNIS) classification scheme. **Figure 17-2** presents the locations of the DDV stations and intertidal survey locations (as described below).

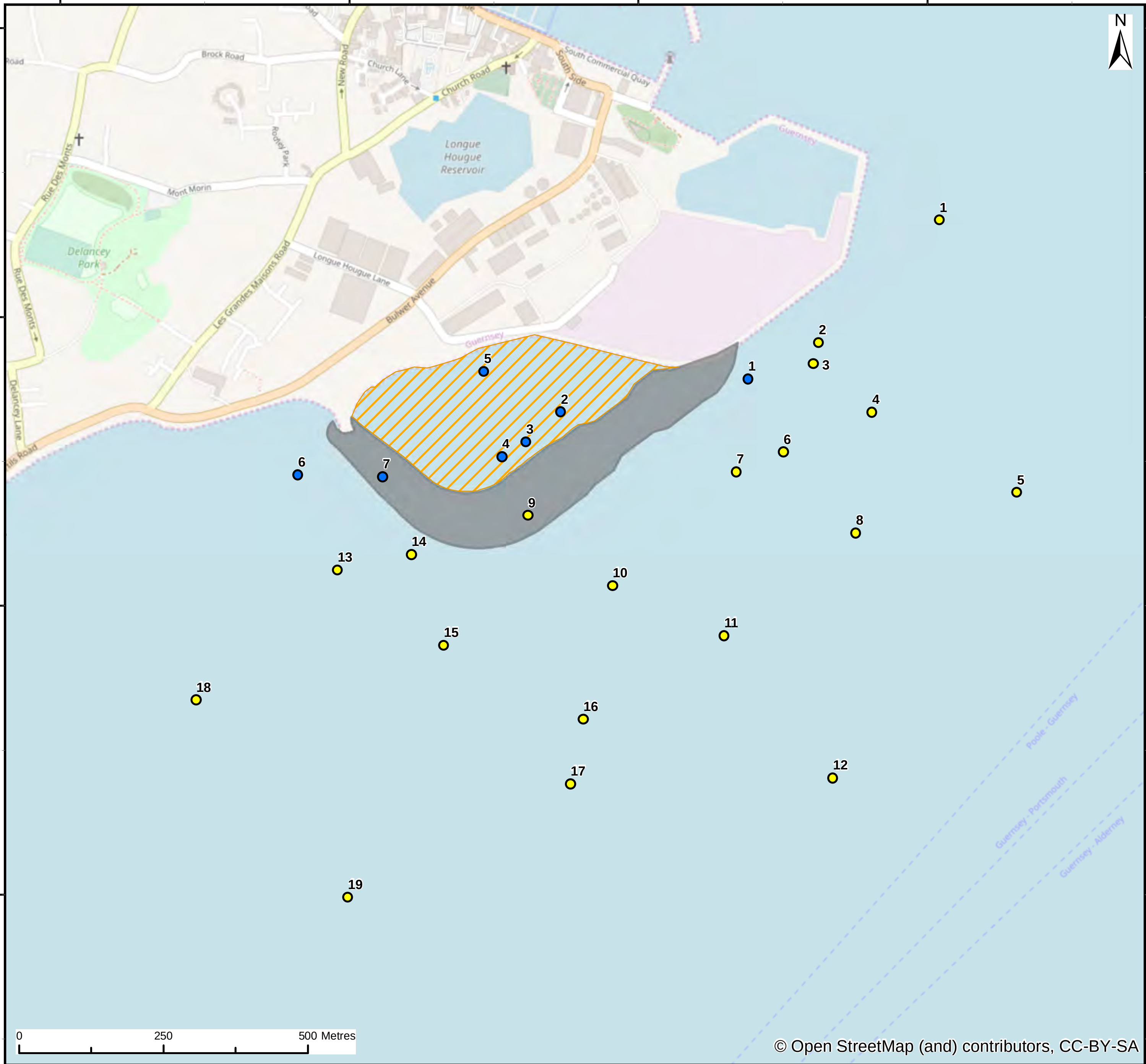
17.3.13 The intertidal area was surveyed on foot, allowing assessment of the intertidal zone along the upper shore area that was likely to be affected by the proposed development. A total of seven locations were included within the intertidal survey during a low-tide period. Biotopes present were assigned using the EUNIS classification system to the highest possible level. **Figure 17-2** presents the intertidal survey locations.

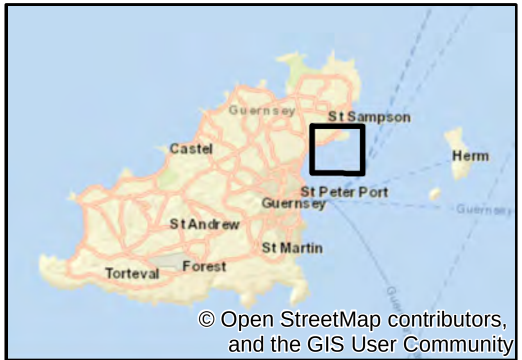
17.3.14 Following the initial review of the DDV data, a total of nine stations were taken forward for grab sampling (the remaining locations were formed of bedrock and boulders and therefore unsuitable for grab sampling). Full analysis was not possible for all grab samples (faunal, Particle Size Analysis (PSA) and contaminants) because not all locations had sufficient sediment coverage over bedrock. **Figure 17-3** for the locations of the samples, and the level of analysis completed for each sample.

Survey Results

Sediments

17.3.15 The sediment composition across the site was dominated by sand (<2mm), although some stations also contained fractions of gravel (>2mm) and mud. The sediment samples were categorised using the Folk Classification system (Folk, 1954). As a whole, the site sediments contained 17.2% gravel, 68.9% sand and 13.9% mud, giving a sediment type of gravelly muddy Sand (gmS), highlighting the mixed nature of sediments at the site.





Legend:

- Infill Area
- Breakwater

Survey Type

- Intertidal
- DDV

Client:	Project:
States of Guernsey	Longue Hougue South EIA

Title:

Intertidal and DDV Sample Locations

Figure: 17.2 | Drawing No: PB5312-300-037

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	03/10/2019	FC	PT	A4	1:10,000

Co-ordinate system: Guernsey Grid

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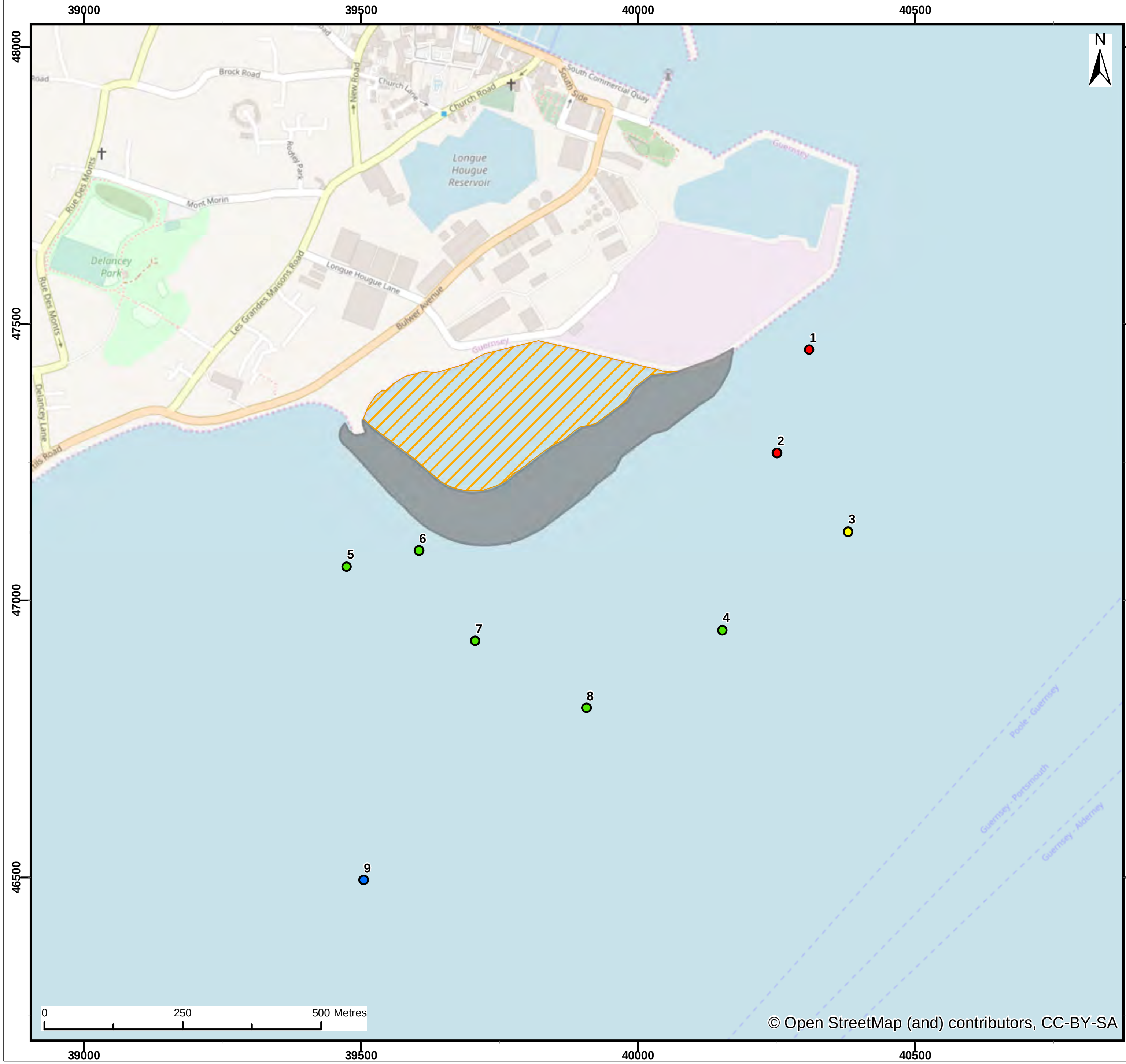

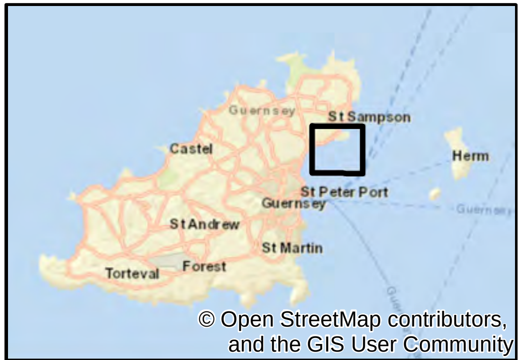

Legend:

Infill Area

Breakwater

Grab Sample Type

- Fauna
- Fauna & PSA
- Fauna, PSA & Contaminants
- PSA & Contaminants

Client:	Project:
States of Guernsey	Longue Hougue South EIA

Title:

Grab Sample Locations and Type of Survey Completed

Figure: 17.3 Drawing No: PB5312-300-038

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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17.3.16 The survey area is subject to very high tidal flow, which is exacerbated in some places by complex channel systems while in other areas pockets of calmer waters may be found. This has resulted in the aggregation of varying proportions of fine and coarse sediments across the site and surrounding area, with the sandiest sediments present closest to shore.

17.3.17 The red coralline algae maerl was observed at several of the stations, being particularly dominant at Stations 3 and 4 where higher proportions of gravel were recorded than in other locations.

Contaminants

17.3.18 Cefas Action Levels are used to determine the degree of contaminant loading of marine sediments in the UK in relation to the disposal of dredged materials and are typically taken into account when assessing marine licence applications. These values can be useful reference points when considering the baseline state of the site and surrounding area. It is understood that contaminant levels in seabed sediments below Action Level 1 are of no concern, and seabed material with contaminant levels between Action Levels 1 and 2 may require further consideration and testing.

17.3.19 The concentration of heavy metals and organotins were recorded at the six stations where contaminant samples could be acquired. None of the contaminants tested exceeded Cefas Action Level 1, except for chromium at grab station 5 which showed a marginal exceedance (with a value of 43.5 mg/kg compared to the Action Level 1 of 40mg/kg), although the concentration recorded at grab station 1 was also close to this limit (with a level of 39 mg/kg recorded). No values exceeded the Action Level 2. Grab station 5 is located 150m from the Project site, and grab station 1 is 139m from the site.

17.3.20 The Canadian Sediment Quality Guidelines (CSQG) for the Protection of Aquatic Life have been developed as guidelines to identify potentially hazardous levels of contaminants in marine sediments that may pose an impact to ecology (CCME, 2001; PLA, 2018). The guidelines identify threshold effect levels (TELs) and probable effect levels (PELs); concentrations below the TEL are unlikely to cause any adverse effects on ecology, concentrations between the TEL and the PEL may cause effects on ecology and concentrations above the PEL frequently cause adverse effects on ecology. Additionally, the European Commission lists contaminants which are priority substances against which environmental quality should be measured as part of the Water Framework Directive (EC, 2008).

17.3.21 All of the Polycyclic Aromatic Hydrocarbons (PAH) contaminants tested in the surrounding area were below the CSQG effect levels and as such the concentrations of contaminants present are unlikely to have any impact on ecology in the vicinity. The concentration of Fluoranthene at grab station 5 was, however, noted to be near the TEL limit (value observed = 111 µg/kg; TEL threshold = 113 µg/kg).

17.3.22 Heavy metal concentrations showed some variability between stations, with grab station 5 recording the highest value, over double the lowest level recorded at grab station 9. No sample had a heavy metal concentration that exceeded a TEL. PAH concentration indicated higher spatial variability, with grab stations 5 and 9 recording elevated levels of hydrocarbons compared to the remainder. Total PAH was greatest at grab station 5, and least at grab station 4. All PAH contaminants were found to be below both the TELs and PELs. **Appendix 17.1** presents more detailed information on the contaminants tested and their results.

Infauna Species

17.3.23 The mean number of taxa recorded per sample was 52 (± 41 standard deviation (SD)) while the mean number of organisms per sample was 457 (±590). Variation in faunal communities between samples collected from across the site was apparent, with the abundance ranging between 141 and 1,885 individuals per sample. Both the faunal abundance and biomass in the survey area are considered to be elevated for the habitat conditions present. Elevated numbers of benthic fauna were especially notable at the stations where maerl was present.

17.3.24 Taxa belonging to *Crustacea* marginally dominated the abundance of the benthic faunal communities, contributing 42% to the total abundance. Taxa from the group *Annelida* were the second most abundant faunal group (comprising 39% of the total abundance recorded). Following *Crustacea* and *Annelida*, abundance was accounted for by *Echinodermat*a (9%), miscellaneous fauna (5%) and *Mollusca* (5%). Though not the most abundant group, *Mollusca* contributed the most to total biomass recorded across all faunal groups (59.3%) followed by *Annelida* which also made large contributions (29.2%).

17.3.25 The faunal communities present within the eight samples collected for analysis were highly diverse and variable for a small survey area. *Annelida* was the most diverse faunal group with a wide range of families & genera present (comprising 43% of the total diversity) followed by *Crustacea* (26%), *Mollusca* (18%), miscellaneous fauna (13%) and finally *Echinodermata* (1%). Faunal communities at Stations 1, 2 and 3 where maerl was present were especially diverse, with 139 taxa alone identified at Station 3. The single most abundant species was the spionid *Spio symphyta*, which represented 10% of the total abundance. This was followed by the amphipod *Leptocheirus tricristatus* (9%) and the dwarf brittle star *Amphipholis squamata* (8%). **Appendix 17.1** presents more information on the infauna species recorded.

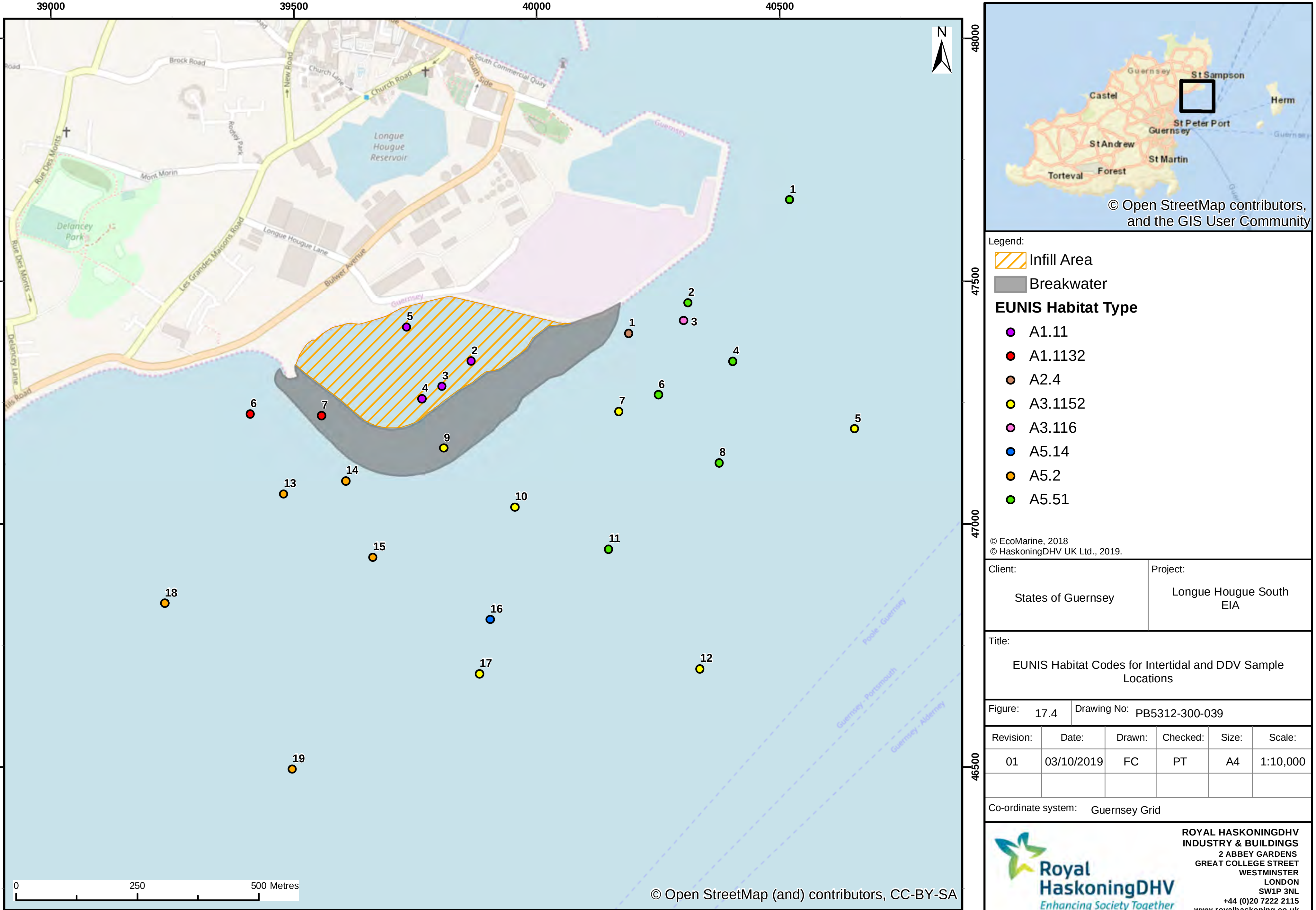
Benthic Communities

17.3.26 Faunal abundance was variable across the site, with peak records occurring at Station 3 (1,885 individuals), Station 2 (536 individuals) and Station 5 (253 individuals). Generally, the highest abundances were seen in the eastern part of the survey area, in a channel subject to high tidal flow where the most extensive maerl beds were identified during the DDV and grab surveys. Maerl is an unattached, coralline red algae capable of forming extensive beds in tide-swept channels that often support high benthic biodiversity and productivity through increased habitat complexity (Hall-Spencer, 1998; Grall *et al.,* 2006). As such, it is probable that the presence of maerl is highly influential on the spatial distribution of abundance (as well as other indices such as diversity) across the site.

17.3.27 The abundance of individual fauna was lowest at the stations located in the outer and slightly more exposed areas (Stations 4, 7 and 8) with the minimum abundance of 141 individuals observed at Station 4. The seabed in the survey area was highly variable and prone to patchiness which is typical of many coastal benthic habitats. High faunal diversity at Stations 1, 2, 3 and 4 is indicative of the presence of complex benthic communities. Substantial amounts of maerl were recovered at each of these four stations, and it appeared to be particularly healthy (high ratio of living to dead structures and well-developed nodules) at Station 3 where abundance and diversity were particularly elevated.

17.3.28 Maps of the extent and distribution of the broad-scale habitats of interest at Longue Hougue South have been produced by analysing field notes and positional data alongside the faunal and PSA data collected during the survey (**Figure 17-4**). A total of eight biotope complexes were identified from the 2019 survey data – three intertidal and five subtidal. These biotopes have been digitised to allow the visualisation of biotope distribution (see **Figure 17-5** for the biotopes identified from the intertidal survey, and **Figure 17-6** for the biotopes identified in the DDV survey). Variation in biotopes across the site is apparent, with infaunal communities transitioning between stations as environmental conditions transform.

17.3.29 The intertidal biotope 'Mussel and/or barnacle communities' (*A1.11;* **Figure 17-5**) was observed at 12% of the stations, located on uneven bedrock frequently occupied by communities of the barnacle *Semibalanus balanoides*, the limpet *Patella spp*., and the winkle *Littorina spp.*. There were numerous cracks, crevices and boulders strewn across the mid-section of the foreshore which provided shelter for small intertidal fauna. Algae present included *Corallina officinalis*, occasional *Ulva spp*., the invasive *Sargassum muticum* in small pools along the foreshore, *Mastocarpus stellatus* and occasional green films.



Legend:

Infill Area

Breakwater

EUNIS Habitat Type

- A1.11
- A1.1132
- A2.4
- A3.1152
- A3.116
- A5.14
- A5.2
- A5.51

Client:	Project:
States of Guernsey	Longue Hougue South EIA

Title: EUNIS Habitat Codes for Intertidal and DDV Sample Locations

Figure: 17.4 | Drawing No: PB5312-300-039

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Co-ordinate system: Guernsey Grid

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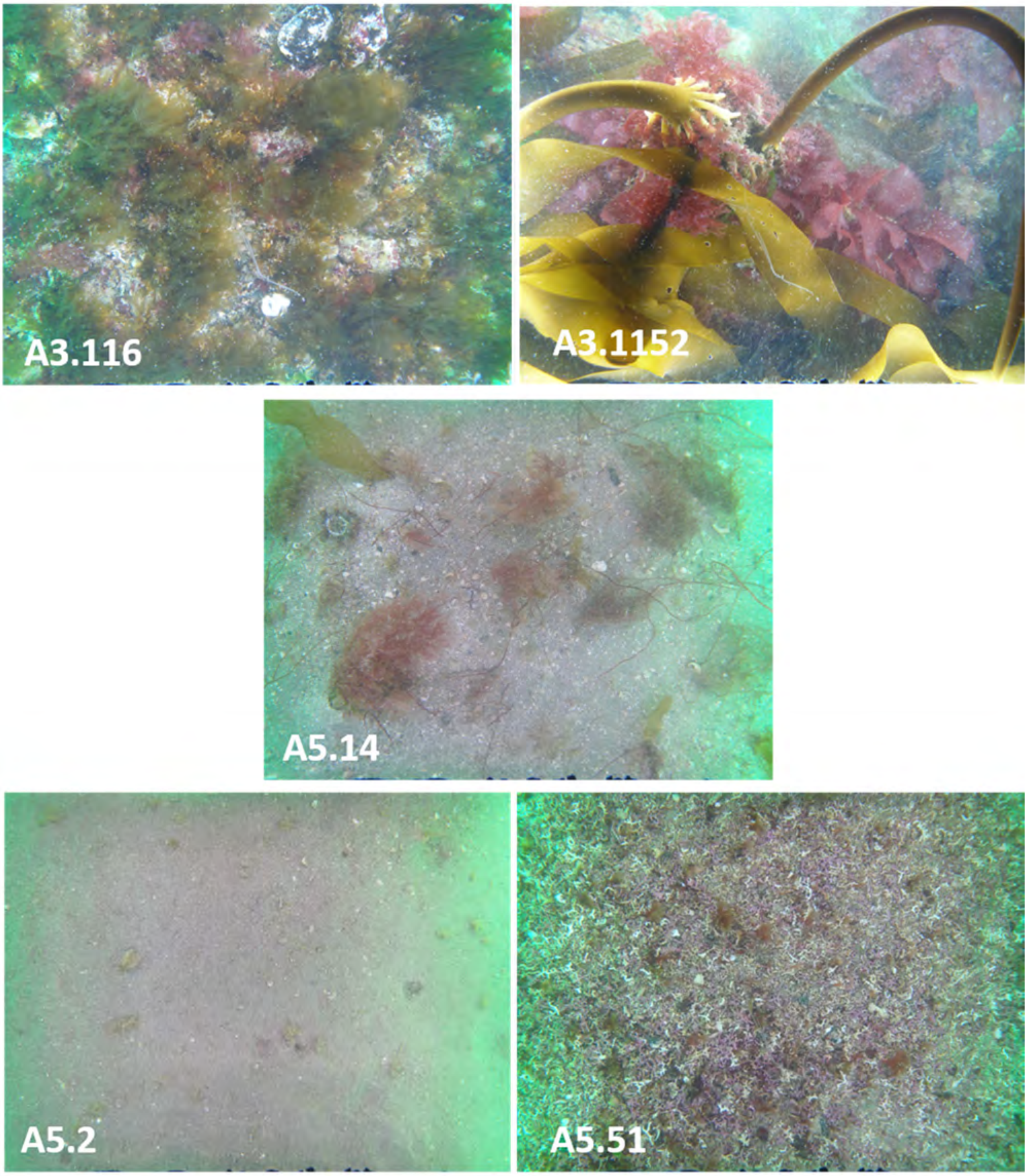
Figure 17-5 Photographs of the Biotopes Identified in the Intertidal Survey

17.3.30 The intertidal biotope '*Semibalanus balanoides*, *Fucus vesiculosus* and red seaweeds on exposed to moderately exposed eulittoral rock' (*A1.1132;* **Figure 17-5**) was observed at intertidal stations, representing 8% of the stations. This biotope is characterised by the exposed bedrock, the presence of *S. balanoides*, *Patella* spp., and occasional pockets of *Fucus vesiculosus*.

17.3.31 'Littoral mixed sediment' (*A2.4;* **Figure 17-5**) was recorded at 8% of the site, in intertidal stations along the edge of the emerging bedrock, bordering the coastal defences. These stations were characterised by a combination of boulders, cobbles with gravel and sand components with little visible fauna. Patches of *Fucus serratus* were present on cobbles and boulders alongside *Enteromorpha spp.*

Figure 17-6 Photographs of the Biotopes Identified from the DDV Samples



17.3.32 The biotope '*Laminaria hyperborea* park with dense foliose red seaweeds on exposed upper infralittoral rock' (*A3.1152;* **Figure 17-6**) was also identified in 23% of the DDV sites. This habitat was found in exposed waters 10m-15m deep across the site both very close to shore, and several hundred metres offshore and often fringed the maerl beds. This biotope was characterised by the presence of the kelp species *L. hyperborea*, bedrocks and large boulders with a dense turf of foliose red algae and encrusting coralline algae as well as some brown algae species.

17.3.33 The habitat ‘Sublittoral sands and muddy sands’ (*A5.2;* **Figure 17-6**) was identified at 19% of the stations surveyed, in the south west portion of the site among a series of rocky outcrops. This biotope was characterised by the muddier nature of the sands, as well as the lack of overlying epibiota and fauna, though a range of benthic annelids, amphipods and bivalves were identified. Some faunal tubes and very sparse patches of green algae were identifiable at the stations assigned to this biotope.

17.3.34 The habitats less frequently observed were ‘Circalittoral coarse sediment’ (*A5.14;* **Figure 17-6**) and ‘Foliose red seaweeds on exposed infralittoral rock’ (*A3.116;* **Figure 17-6**) which were each identified at a 4% of stations each. *A5.14* (**Figure 17-6**) was present in the mid-channel in shallow waters of approximately 10m and was characterised by tide-swept coarse sand with large shell fragments shell. The red algae *Dasysiphonia japonica* and the brown algae *Chorda filum* were common and the dahlia anemone *Urticina felina* was also recorded here. *A3.116* (**Figure 17-6**) was identified in the north eastern portion of the site, bordering the maerl beds. Bedrock and large boulders with a dense turf of foliose and coralline red algae were a dominant feature of this habitat, and though it was found neighbouring the maerl, no overlying maerl was observed on the substrate. The brown algae *Dictyota dichotoma* was abundant because it is characteristic of this biotope.

Maerl Beds

17.3.35 Coralline red algae *Corallinaceae* species forming extensive gravel-like beds of unattached nodules are referred to collectively as maerl. The beds that these hard, three-dimensional structured algae make are made up of both living and dead thalli and can be extensive.

17.3.36 Maerl beds are considered to be fairly rare, with species generally being restricted to the Channel Islands and the south western coasts of Britain and Ireland, as well as the Scottish Isles in the north east Atlantic (Hall-Spencer *et al.,* 2010). Typically, maerl forms in coarse, clean sand and gravel sediments in tide-swept currents on the open coast or in more sheltered marine inlets with a weak current. As maerl beds are formed by algal species, bed depths are shallow (no deeper than 40m) to allow sufficient light supply for photosynthesis (Hall-Spencer *et al.,* 2010). As such, conditions at Longue Hogue South meet all pre-requisite conditions for the establishment of maerl.

17.3.37 As a result of habitat value coupled with international loss and sensitivity to damage, maerl beds are considered a conservation priority. Maerl is a Habitat of Principal Importance/Priority Habitat under the 1994 UK BAP Action Plan (as implemented by the UK Post-2010 Biodiversity Framework) and is also named in the OSPAR List of Threatened and/or Declining Species and Habitats as well as being listed in Annex 1 of the Habitats Directive.

17.3.38 Faunal samples collected from the maerl beds at Longue Hougue South were characterised by high abundance and species diversity as typically reported in relevant literature. The maerl beds at Longue Hougue South were made up of both living and dead maerl and though relatively widespread, were not highly extensive. As described above, maerl beds were found at six of the sampled locations (DDV sites 1, 2, 4, 6, 8 and 11) located to the north-east, at closest point approximately 142m seaward of the proposed breakwater (DDV location 2; **Figure 17-4**).

17.3.39 Maerl has been recorded by Environment Guernsey on the edge of the site. Two maerl beds have been recorded outside of the footprint of the proposed project. One that runs adjacent to the existing Longue Hougue Reclamation Site over an area of 116,004m² and another to the south-east of 146,846m². The 2019 intertidal survey noted the presence of maerl (*Lithophyllum sp*.) washed up on the foreshore, which is thought to be from these beds. There is no data available on the presence of maerl across the rest of Guernsey. **Figure 17-7** presents the location of the recorded maerl beds near Longue Hougue South. It should be noted that these are not within the Project boundary, and at their closest point are located 128m away from the Project footprint.

Eelgrass

17.3.40 Eelgrass (or seagrass) tends to grow in sheltered waters, such as islets and bays. Different species can grow within different tidal regimes, with common eelgrass *Zostera marina* being the only species that occurs below the low water mark. This species mainly forms on sand, but can also be found on fine gravels, to a water depth of 4m. Eelgrass beds form an important habitat for many species, as they can trap sediments from their roots which stabilises the seabed and reduces tidal flow, further increasing the area that eelgrass can thrive in.

17.3.41 Submerged eelgrass beds also provide optimum nursery areas for many fish and shellfish species and can provide a sheltered area for other important species such as pipefish and seahorses. Eelgrass beds can also support commercial fisheries indirectly by providing an increased level of nutrients into the local marine environment (Jackson *et al.,* 2001). Eelgrass beds are included as Article 17 habitats of the Habitats Directive and are therefore highly protected.

Figure 17-7 Maerl Beds Recorded by Environment Guernsey near Longue Hougue South - Shown in Purple (Tim Harvey, 2019)

17.3.42 The habitat preferences of common eelgrass include estuaries and isolated saline waters (such as lagoons), as well as enclosed coastal areas and embayments. The sediments that they prefer include gravel and shingle, muddy gravel, muddy sand and sandy mud. They tend to grow in water depths of up to 5m. They require weak or very weak tidal regimes (of less than 0.5m/s) in sheltered or very sheltered wave environments. Their salinity preferences are variable, between 18-40 psu (Tyler-Walters, 2008).

17.3.43 With regard to the Project site, no eelgrass beds were identified within the intertidal survey of 2015, and the location of potential common eelgrass (see below and **Figure 17-8**) was identified as subtidal habitat in the 2015 intertidal survey (**Figure 17-1**). During the intertidal walkover of the site completed as part of the marine ecology surveys in 2019 (**Appendix 17.1**), no eelgrass was found to be present at the site. Much of Longue Hougue South was identified as intertidal, with a substantial amount of the shore exposed during the spring tide at the time of the intertidal walkover survey.

Figure 17-8 Extent of the Common Eelgrass Located within Longue Hougue South (SoG, 2019)

17.3.44 However, a record of eelgrass within Longue Hougue South and other locations around Guernsey was been reported through Project Seagrass (2019), where a common eelgrass bed was reported in March 2019. This was reported to cover a continuous area totalling more than 50m^2. In addition, the Phase II Intertidal Survey included a further appraisal to determine the presence, location and extent of eelgrass within and around the Project area. The area was surveyed through an additional sublittoral survey, by snorkelling along four transect lines and recording the marine habitats, substrates and species. All transect lines were also recorded using an underwater GoPro camera. This survey found that that the predicted extent of eelgrass beds within the Project site were 12,182m^2.

17.3.45 **Figure 17-8** shows the location of these transects (shown in red). It should be noted that whilst the Phase II Intertidal Survey identifies 12,182m^2 as suitable eelgrass habitat, not all of that area contains eelgrass, with much of the area having no eelgrass coverage.

17.3.46 This survey recorded the presence of eelgrass beds on the lower shore, in areas of infralittoral clean or muddy sand. Several fish species were also recorded during this additional survey, including juvenile pollack *Pollachius pollachius*, gobies and wrasse *Labrus species*.

17.3.47 The largest patch of eelgrass is in the north and western areas of the survey area shown in **Figure 17-9**, with smaller patches in the south-west, intersected by rocky outcrops and areas of no eelgrass growth, there are also larger patches in the south-east, with areas of no coverage and very small patches in the north-east. **Figure**

17-9 provides examples of the coverage of each area, and of the large patch in the north-west parts of the survey area, with the highest levels of coverage.

Figure 17-9 Examples of the Eelgrass Coverage in the North-west (top photo) and the North-east (bottom photo) of the Eelgrass Survey Area (Stills taken from the GoPro Dive Survey (Tim Harvey, 2019))

17.3.48 Sites with eelgrass have been recorded at Bordeaux and St Sampson's Approach on the west side of the Island, with patches recorded to be covering an estimated area of 5,000m^2 (2,000m^2 of which was found to be fully submerged) and 2,000m^2 (1,000m^2 of which was submerged) respectively (Falla, 2019b). There are also records of eelgrass throughout Grande Havre Bay, totalling 28,170m^2 (11,500m^2 of which was fully submerged), and at Port Grat, totalling 11,000m^2 (7,500m^2 of which was submerged) (Falla, 2019a). At Lancresse, a further 2,500m^2 of eelgrass is present (Falla, 2019c). A large eelgrass bed was also recorded at St Peter Port, covering an estimated area of 10m by 50m (500m^2), with a smaller patch close to the northern edge of the Longue Hougue South site, at the outside entrance to the St Sampson's harbour (**Figure 17-10**).

Figure 17-10 Eelgrass Beds at St Peters Port (left; covering an area of 500m^2) and at St Sampson's Harbour

17.3.49 Environment Guernsey have also recorded eelgrass at nine other locations across Guernsey (totalling 109,418m^2). The total area of eelgrass currently known to be around the Island is 158,588m^2 (as surveyed in 2019), with two patches being recorded in Belle Grève Bay of 11,843m^2 and 4,204m^2. It should be noted that the areas described above do not take account of the density of eelgrass in that area, but rather an area where eelgrass habitat is present. This is also the case for the area of eelgrass within the LHS site. Environment Guernsey have also noted 39 other locations where eelgrass has been observed on previous surveys or by recreational users, that requires further survey work to confirm its presence. **Figure 17-11** shows the known areas of eelgrass beds around Guernsey, as surveyed in 2019.

Figure 17-11 Eelgrass Beds Recorded by Environment Guernsey around the Island - Shown in Green (Tim Harvey, 2019)

Invasive Species

17.3.50 The large ‘sand gaper’ bivalve *Mya arenaria* was recorded in one location (DDV station 3; 137m from the Project site). It is considered alien in the UK and the wider north Atlantic and is believed to have colonised European coasts between the 13th and 17th centuries from the Pacific and west Atlantic coasts (Eno *et al.,* 1997). As a long-established species, *M. arenaria* has become an abundant food source for many coastal species and is commonplace in intertidal and subtidal areas. The only other known record of this species in the Channel Islands was a dead valve noted in Guernsey, and as such, it is unlikely to be an established species in Guernsey (States of Jersey, 2017). In other areas of northern Europe, the presence of *M. arenaria* has become ‘naturalised’ due to its long history, which makes impacts relating to its presence difficult to assess, though it may still show some invasive properties when introduced to new areas.

17.3.51 There were no records of other rare or any invasive non-native fauna in the 2019 benthic dataset. However, the invasive Japanese wireweed algae, *Sargassum muticum*, was identified in several locations in rockpools along the mid foreshore during the intertidal survey. This may be of significance for native pool-dwelling algae that find themselves competing with *S. muticum* for habitat space and sunlight.

Marine Mammals

17.3.52 There are several marine mammal species present in the waters off Guernsey. The islands have a remarkably high biodiversity compared with oceanic territories of a similar size. A Biodiversity Strategy for Guernsey (States of Guernsey Environment Department, 2015) set out a strategy to identify ‘priority species’ for Guernsey, which will then be subject to an action plan to ensure their protection. These species are yet to be confirmed, however the list below summarises those species identified as notable species present in Guernsey’s terrestrial and marine habitats by the Joint Nature Conservation Committee (2011).

- Grey seal Halichoerus grypus;
- Harbour seal *Phoca vitulina*;
- Bottle-nosed dolphin *Tursiops truncatus*;
- Common dolphin Delphinus delphis;
- Risso’s dolphin *Grampus griseus*;
- Harbour porpoise *Phocoena phocoena*;
- Long-finned pilot whale *Globicephala melaena*; and
- Minke Whale Balaenoptera acutorostrata.

Cetaceans

17.3.53 It is considered that the English Channel as a whole has a low density and diversity of marine mammals (Department of Environment and Climate Change (DECC) (now Department for Business, Energy and Industrial Strategy (BEIS), 2016). However, a diverse range of cetacean species are regularly sighted in the waters surrounding Guernsey. The distributions of which are driven by many factors, but the primary influence in the area around Guernsey is likely the aggregation of prey.

17.3.54 Within the inshore waterways of Guernsey, sightings of cetacean species include harbour porpoise, bottle-nosed dolphin, and common dolphin. These are the most frequently encountered species in the area and occur year-round. In addition, minke whale, Risso's dolphin and long-finned pilot whale have been previously sighted and indicate the inhabitation of these species in the area (Kiszka *et al*., 2007). The Cetacean Atlas shows the same list of species being recorded near the Channel Islands (Reid *et al*., 2003).

17.3.55 MARINELife undertake surveys during ferry route crossings across Europe. In 2017, six harbour porpoise were recorded in the vicinity of the Channel Islands for ferry crossings from Poole to Jersey, and from Portsmouth to Jersey. Four common dolphin and four bottle-nosed dolphin were recorded near to the Channel Islands (MARINElife, 2017).

17.3.56 The latest Sea Watch Foundation public sightings records for Guernsey show that the only species recorded around the island is bottle-nosed dolphin, although other species have been recorded around Jersey and the north coast of France (common dolphin and harbour porpoise) (Sea Watch Foundation, 2019). **Table 17-3** presents a summary of the sightings recorded around Guernsey, from spring 2018 to summer 2019.

Table 17-3: Sea Watch Foundation Sightings for Guernsey, Spring 2018 to Summer 2019 (Sea Watch Foundation, 2019)

Location	Date	Species recorded (and number of individuals)
Jethou, Guernsey	4th August 2019	Bottle-nosed dolphin (2)
St Peters Port, Guernsey	4th August 2019	Bottle-nosed dolphin (2)
Herm Island	1st August 2019	Bottle-nosed dolphin (2)
Rosaire South Cliffs, Herm Island	29th July 2019	Bottle-nosed dolphin (5)
Guernsey	31 August 2018	Bottle-nosed dolphin (5)
Pembroke, Guernsey	4th August 2018	Bottle-nosed dolphin (7)

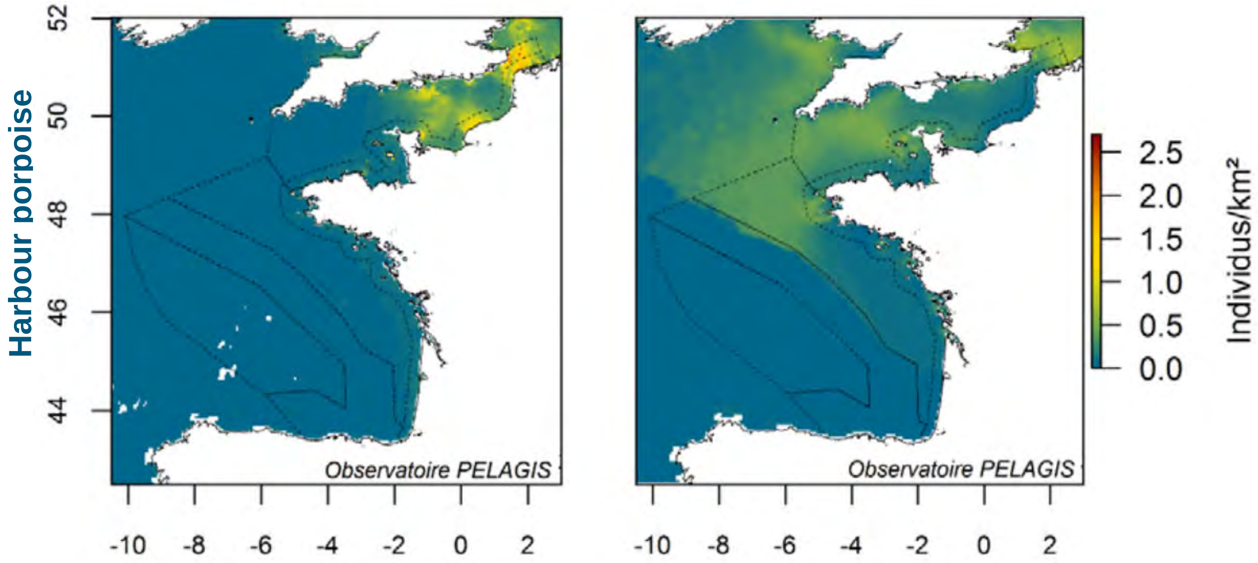
Location	Date	Species recorded (and number of individuals)
Alderney, Bailiwick of Guernsey	1st August 2018	Bottle-nosed dolphin (3)
St Peters Port, Guernsey	18th July 2018	Bottle-nosed dolphin (25)
St Peters Port Guernsey	28th May 2018	Bottle-nosed dolphin (6)
St Peters Port, Guernsey	26th May 2018	Bottle-nosed dolphin (10)
Rousse, Guernsey	17th February 2018	Bottle-nosed dolphin (5)

17.3.57 The SCANS-III survey undertaken in the summer of 2016 surveyed all European Atlantic waters (Hammond *et al.,* 2017). The SCANS-III surveys only recorded two species of cetacean in the relevant survey block for the study area; Block C. Harbour porpoise were recorded to have an abundance of 17,323 (95% CI 8,853-29,970), and a density of 0.213 individuals per km^2. Minke whale were recorded with an abundance of 186 in this survey block (95% CI 0-819), with a density of 0.0002 individuals per km^2 (Hammond *et al*., 2017).

17.3.58 The Suivi Aérien de la Mégafaune Marine (SAMM) undertaken within French waters includes coverage of the Channel Islands. The survey's aim was to document the distribution of marine megafauna (including marine mammals) from aerial surveys, which were undertaken in winter (November 2011 to February 2012) and summer (May to August 2012) to determine the seasonal differences. In total, 1,500 marine mammals were recorded within the winter survey, and 2,000 in summer (Pettex *et al.,* 2014).

17.3.59 The SAMM survey (Pettex *et al.,* 2014) found an abundance of 26,556 (95% CI 16,797-41,984) harbour porpoise in the winter within the English Channel (a very similar abundance was recorded for this species in summer, of 26,417 (95% CI 18,846-36,833)). The Channel covers an area of 92,845km^2, leading to an approximate density of 0.286 harbour porpoise per km^2 for the winter period. **Figure 17-12** presents the harbour porpoise densities within the Channel in both winter and summer. Although the overall abundance of harbour porpoise is higher in the winter, there are relatively higher densities of harbour porpoise around Guernsey in the summer period.

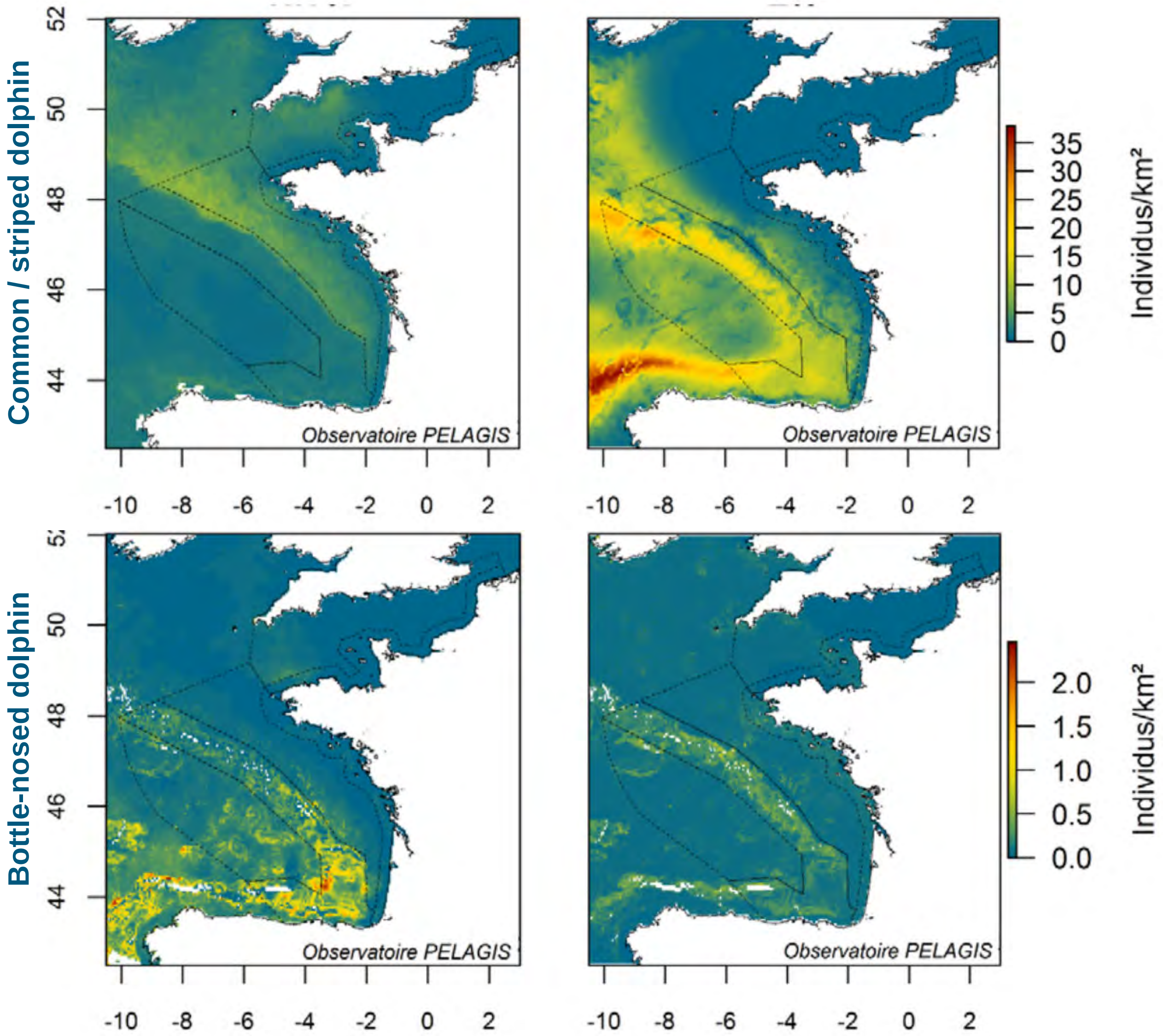
Figure 17-12 Predicted Habitat Use of Harbour Porpoise in Winter (left) and Summer (right) (Pettex et al., 2014)



17.3.60 For common and striped dolphins, the abundance in the winter season was significantly higher (13,484 (95% CI 10,763-17,493)) compared to the summer season (1,209 (95% CI 398-3,671)). Bottle-nosed dolphins were found to have higher densities in the summer season, with 2,317 (95% CI 896-5,992) compared to the summer with an abundance of 1,412 (95% CI 530-3,760). This equates to an approximate density of 0.145 common / striped dolphin per km^2 for the winter period, and 0.025 bottle-nosed dolphin per km^2 in the summer period. **Figure 17-13** presents the dolphin densities within the Channel in both winter and summer. The density of dolphin species is shown to be low in both winter and summer periods, around Guernsey.

17.3.61 Other species recorded within the Channel for the SAMM survey include Risso's dolphin, which were recorded in both seasons in low numbers; with an abundance of 229 in winter (95% CI 55-947) and 84 in summer (95% CI 15-467). Fin whale were also recorded in both summer and winter in low numbers, with a higher abundance in summer of 291 (95% CI 98-863) than in winter (of 76 (95% CI 15-394)). This equates to an approximate density of 0.002 Risso's dolphin per km^2 in the winter period and 0.003 fin whale per km^2 in the summer period. No long-finned pilot whale or beaked whales were recorded in the Channel, but they were recorded in the Atlantic sector of the survey.

Figure 17-13 Predicted Habitat Use of Common / Striped Dolphins and Bottle-nosed Dolphins, in the Winter (left) and Summer (right) (Pettex et al., 2014)



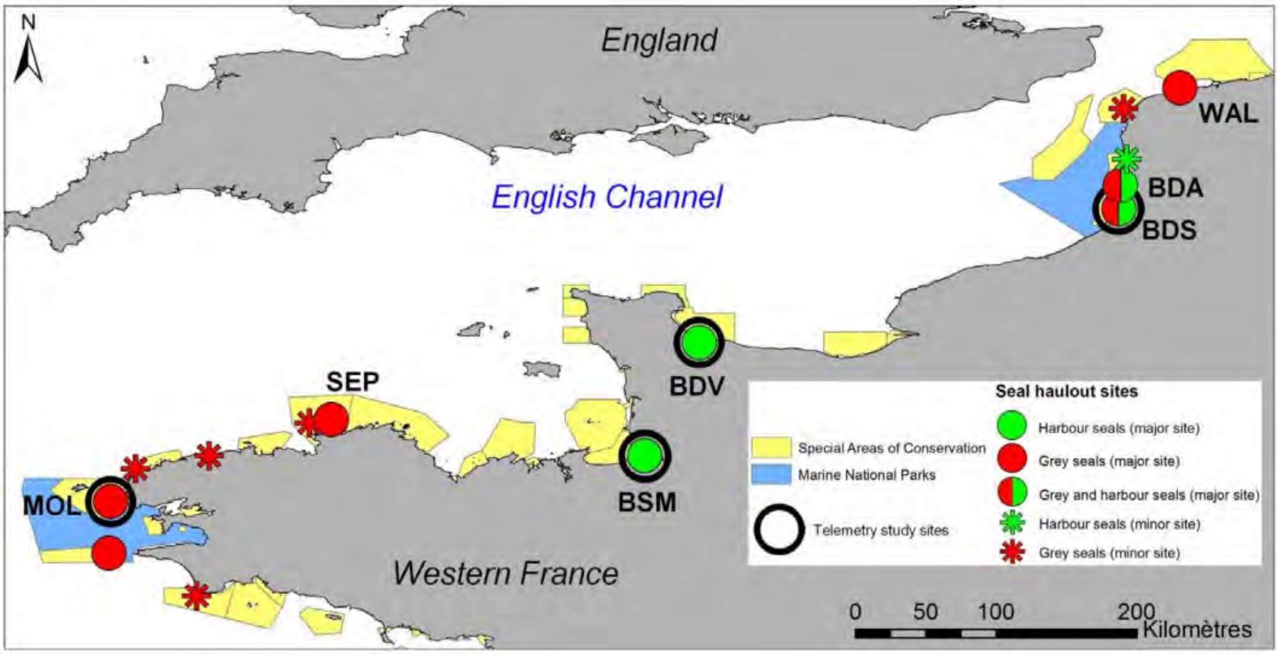
Pinnipeds

17.3.62 In the north-east Atlantic, there are two species of seal commonly present; the grey seal and harbour seal. Within French waters, grey and harbour seals are at their southern limit of extents (Vincent *et al.,* 2005). Both species can be found in the Channel and near Guernsey.

17.3.63 Harbour seal breed from June to July and moult in August, while grey seal breed later in the year, from September to December and moult between February and April. Harbour seal are smaller than grey seal and tend to forage in shallower waters (Bajzak *et al*., 2012) and to move shorter distances from the haul-out sites. Several studies have shown that harbour seal haul-out sites can be considered as discrete populations (e.g. Dietz *et al*., 2013). Juvenile and adult grey seals can exhibit much longer movements (McConnel *et al*., 1999) and studies have shown that they may use different haul-out sites (e.g. Jones *et al*., 2015).

17.3.64 The two main grey seal haul-out sites are located within Brittany (the Molene archipelago (MOL) and the Sept Iles archipelago (SEP). There are three principal harbour seal haul-out sites along the middle and eastern parts of the English Channel; the Baie du Mont-Saint-Michel (BSM), Baie des Veys (BDV) and Baie de Somme (BDS). There are also some minor haul-out sites for both species in the eastern parts of the English Channel. Some of these haul-out sites have been used for seal telemetry studies to understand seal movements through the English Channel. **Figure 17-14** presents the locations of these haul-out sites, with the telemetry study sites shown by the black circle.

Figure 17-14 Locations of the Harbour Seal and Grey Seal Haul-out Sites within the English Channel (taken from Vincent et al., 2017)

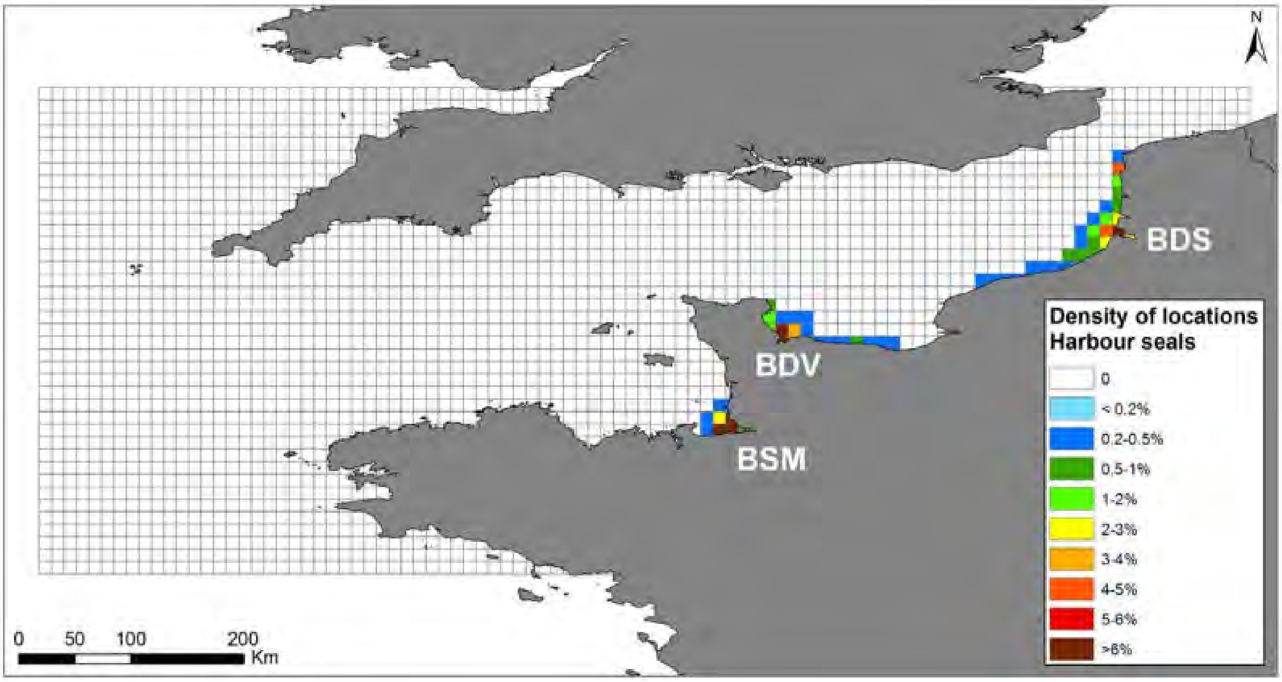


17.3.65 In total, 73 grey and harbour seal were tagged throughout the English Channel, between 1999 and 2013. For harbour seal, significant seasonal variations were seen for all sites except BDV, with higher numbers of harbour seal recorded in the summer months. For grey seal seasonal variations were noted for the BDA and BDS sites, again, with significantly higher abundancies of grey seal during the spring and summer periods.

17.3.66 The largest harbour seal colony is BDS, with 470 adult seals and a pup production of 87 recorded in 2015. The second largest colony is BDV, with a maximum of 200 seals and 40 pups. Both the BDA and BSM colonies reported 80 adult seals, with 1 and 23 pups respectively.

17.3.67 Analysis of the movements of harbour seal tagged from these haul-out sites shows that, for BSM and BDV, the closest harbour seal haul-out sites to Longue Hougue South, seals do not travel far from the haul-out locations, and do not come near to the Channel Islands, resulting in a density of 0 individuals per 0.1° grid cell at Longue Hougue South (see **Figure 17-15**).

Figure 17-15 Density of Harbour Seal per 0.1° Grid Cell from Tagged Harbour Seal (2006-2010) (Vincent et al, 2017)

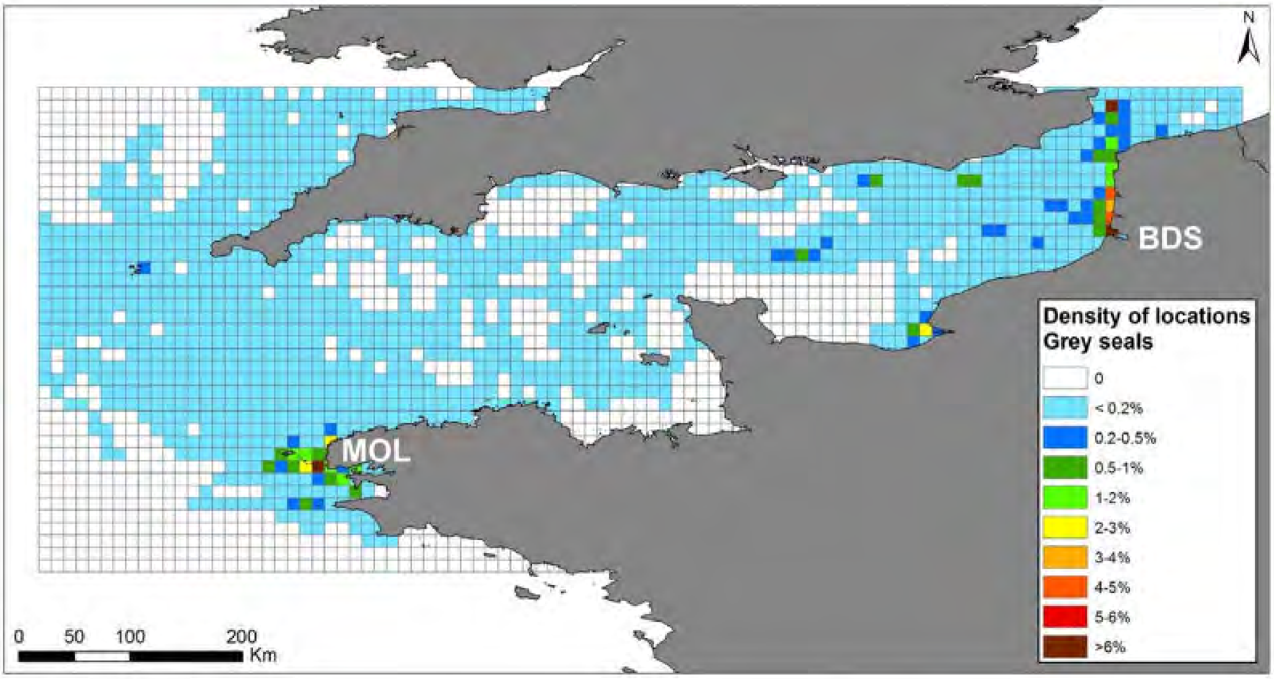


17.3.68 Results from the grey seal tagging show that they have a much wider range than harbour seal, with almost the whole of the English Channel being visited by at least one grey seal, including the coastline around Guernsey, resulting in a density of less than 0.2 individuals per 0.1° grid cell at Longue Hougue South (**Figure 17-16**). It should be noted that grey seal densities are much higher close to the haul-out sites (**Figure 17-16**).

17.3.69 In 2018, seal counts of the French coast amounted to 1,088 adult harbour seals and 198 pups in the colonies of the coasts of Brittany and Normandy. The maximum count along the French coasts amounted to 895 adult grey seals in 2018, and on the breeding sites, 43 pups were observed (ICES, 2019).

17.3.70 Atlantic grey seals are frequently observed near Guernsey because there is a resident population north of Herm – The Humps and Grande Amphroque. In 2014, seven grey seals of varying maturity and size were recorded in this area (La Societe Guernesiaise, 2014). However, the island is located at the southernmost limit of the species' natural range, and so the colony comprises only a small number of individuals.

Figure 17-16 *Density of Grey Seal per 0.1° Grid Cell from Tagged Grey Seal (1999-2013) (Vincent et al, 2017)*



17.3.71 Marine Scotland commissioned the Sea Mammal Research Unit (SMRU) to produce maps of grey and harbour seal distribution in the North Sea and North East Atlantic (Russell *et al.,* 2017). These maps were produced by combining information about the movement patterns of electronically tagged seals with survey counts of seals at haul-out sites. The resulting maps show estimates of mean seal usage (seals per 5km x 5km grid cell). The maps indicate that harbour and grey seal usage is relatively low in and around Longue Hougue South, with an estimated harbour seal density of 0.00004 per km^2, and 0.00007 per km^2 for grey seal (including those grid cells that overlap with Longue Hougue South only; Russell *et al*. 2017).

Fish and Shellfish

Commercial Fisheries

17.3.72 Commercial fishing is an important industry in Guernsey. This section describes the current situation regarding the commercial fishing activities taking place in the area surrounding the proposed Project, considering information on the landings of key commercial species.

17.3.73 Many fishing vessels operate from the shore out to 12 miles, with some angling and potting activities taking place beyond 12 miles. Annual grossing may therefore be made up from fishing activities in a variety of fishing grounds. Due to this wide distribution of fishing effort, monetary values have not been attributed to this specific study area. **Table 17-4** shows the fish landings data for the area, for the most recent data available, up to July 2017.

Table 17-4: Sea Fisheries Landings Data (tonnes) (Adapted from: States of Guernsey Sea Fisheries, 2018)

Species	2011	2012	2013	2014	2015	2016	2017
Anglerfish *Lophius piscatorius*	1.1	1.3	1.9	0.9	0.4	0.5	0.56
Bass *Dicentrarchus labrax*	74	44.4	27.6	30.5	18.5	15.8	11.46
Blackbream *Acanthopagrus butcheri*	13.9	12.7	13.7	21.3	10.4	12.2	18.7
Brill *Scophthalmus rhombus*	10.2	7.9	6.8	8.7	5.4	4	1.6
Cod *Gadus morhua*	3.4	3	1.7	3	3.9	4.6	0.434
Conger *Conger conger*	8.7	10.1	8.8	7.7	6.4	7.6	4.1
Crayfish *Astacus astacus*	0.3	0.2	0.6	0.2	0.1	0.1	0.14
Cuttlefish *Sepia officinalis*	1.4	1.7	1.6	2.6	3.4	1.7	2.89
Dogfish *Scyliorhinus canicula*	18	15.3	16.2	12.5	9.2	12.8	7.36
Edible crab *Cancer pagurus*	692.7	785.6	784.2	878.2	708.9	809.9	674.42
Grey mullet *Mugilidae sp.*	5.5	2.6	1.7	1.6	1.3	2.7	0.76
John dory *Zeus faber*	0.1	0.1	0.2	0.3	0.3	0.3	0.08
Ling *Molva molva*	2.6	2	2	0.9	0.7	0.3	0.13
Lobster (*Homarus Gammarus*) (by weight)	101.5	102.3	98.6	128.2	117.2	101.6	95.02
Lobster (by number)	147,204	146,429	139,654	168,645	164,143	143,571	145,405

Species	2011	2012	2013	2014	2015	2016	2017
Mackerel *Scomber scombrus*	5.4	5.3	9.3	6.5	4.4	2.9	6.144
Plaice	1.8	1.3	1.4	1.7	1.2	1.2	0.43
Pollack	85.8	82.4	64.5	68.1	53.5	53.6	56.36
Ray *Raja sp.*	158.8	136.5	110.2	153.3	144.7	98	53.12
Red mullet *Mullus surmuletus*	4.8	6	4.7	5	4.8	14.9	8.45
Sand sole *Pegusa lascaris*	1.1	0.4	0.7	0.7	0.8	0.2	0.02
Sandeel *Ammodytes sp.*	48.3	55.6	26.4	28.1	21.2	19	11.41
King scallop *Pecten maximus*	108.2	95.7	102.6	101.2	105.2	79.8	103.65
Smoothhound *Mustelus sp.*	3.5	4.4	6.6	5.6	4.6	3.5	1.46
Sole *Solea solea*	4	2.3	4	5.1	2.4	2	3.04
Spider crab *Majoidea sp.*	40.1	40.7	34.9	34.2	57.6	55	61.19
Squid *Cephalopoda sp.*	0.2	0.2	0.3	0.5	0.6	0.3	0.33
Turbot *Scophthalmus maximus*	10.3	10.2	7.8	6	9.2	5.6	3.42
Tope *Galeorhinus galeus*	4.8	3.2	5.7	3.3	0.1	0.7	0.32
Wrasse	8.1	7.9	4	5.6	4.7	3.4	2.98
Total (wetfish)	**474.2**	**414.9**	**325.9**	**376.4**	**308**	**265.9**	**195.558**
Total (shellfish)	**944.4**	**1,026.4**	**1,022.8**	**1,145.3**	**993.1**	**1,048.4**	**934.42**
Grand total	**1,418.6**	**1,441.3**	**1,348.7**	**1,521.7**	**1,301.1**	**1,314.3**	**1,129.98**
Value (£thousand)	**5,704**	**5,438**	**4,960**	**5,832**	**5,089**	**4,767**	**4,236.93**

17.3.74 From the landings shown in **Table 17-4**, it is possible to identify key species of commercial importance targeted in the waters surrounding the island. Edible crab are consistently the most important species, with 59.7% of all landings (by weight) in 2017, and a similar pattern for the five previous years (note that the sensitivity of edible crab is considered to be low with regard to an increase in suspended sediments (MarLIN, 2019). King scallop (or great scallop) and lobster are the next most important species, with 9.2% and 8.4% of all landings respectively (by weight) in 2017. Pollack and ray make up 5.0% and 4.7% respectively of all landings (by weight) in 2017. King scallop are taken by dredging and diving all year round, and crab by potting. The remaining 23 fish and shellfish species make up the remaining 7.6% of landings (by tonne), in much smaller quantities each. The majority of ray, skate, and other demersal fish species are taken in trawl, line and net fisheries.

Fish Spawning

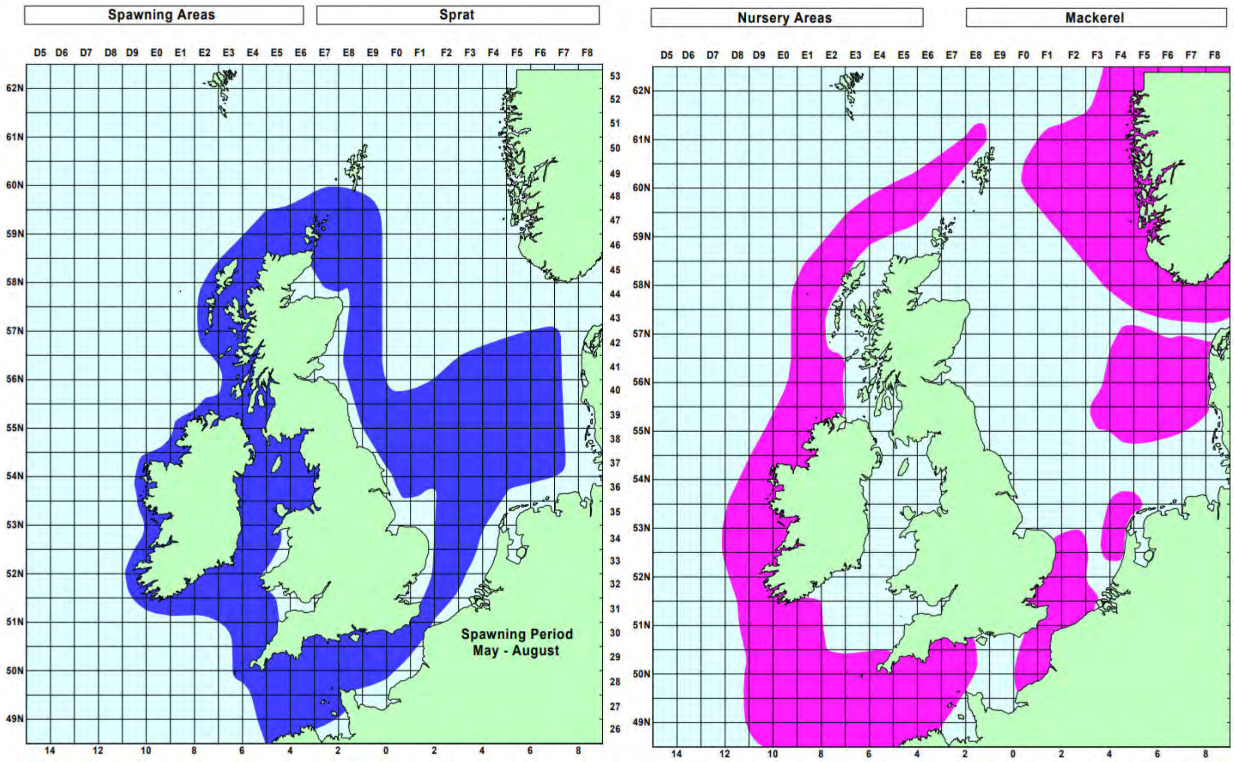
17.3.75 There are several fish species that are known to spawn within Guernsey waters. The Fisheries Sensitivity Maps in British Waters (Coull, 1998) show that the Project site is within the sprat *Sprattus sprattus* spawning area, however, the sprat spawning area covers the majority of UK waters, and is therefore not considered to be a key location for the species (**Figure 17-17**).

17.3.76 Sprat spawning occurs from May to August. A review of the Ocean Biographic Information System (OBIS), that includes 68 datasets of sprat abundance and distribution across Europe, shows that there are no records of sprat in the Channel Islands. The sea fisheries landings data for Guernsey (**Table 17-4)** also shows no catches of sprat. Therefore, it is considered unlikely that this species will be present near the site and is screened out of further assessment.

17.3.77 The nursery area of the mackerel falls within Guernsey waters, and includes the Project site (Coull, 1998; **Figure 17-17**). However, the nursery areas for the species are widespread, including much of the Celtic Sea and English Channel, waters to the west coast of Ireland and Scotland and Shetland. Therefore, the Longue Hougue South site is not considered to provide a key nursery area for the mackerel.

17.3.78 The sea fisheries landings data for Guernsey (**Table 17-4)** shows low levels of mackerel catch, and a review of the OBIS shows that from a total of 88 datasets across Europe, there are no records of mackerel near Guernsey, and are much more likely to be found further offshore. Therefore, it is considered unlikely that this species will be present near the site and is screened out of further assessment.

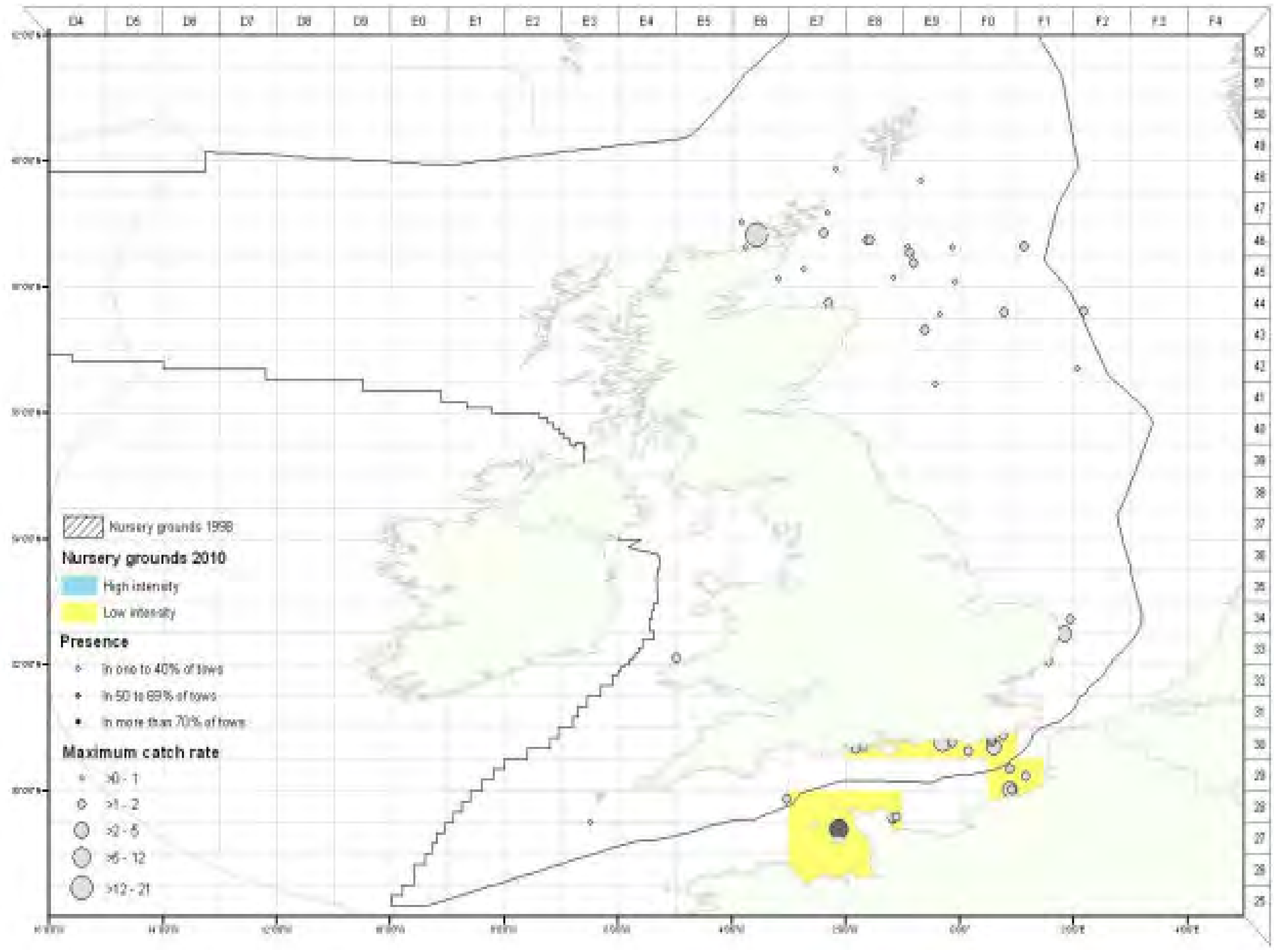
Figure 17-17 *Spawning of Sprat (Shown in Blue on the Left) and Nursery of Mackerel (Shown in Pink on the Right) in UK and Surrounding Waters (Coull, 1998)*



17.3.79 The undulate ray ***Raja undulata*** has a very limited distribution in UK waters, being most commonly found within the English Channel and the Solent (Ellis *et al.,* 2012b). There is limited information on the distribution of egg-cases which can be used to accurately define spawning areas. Across Europe, juveniles are typically found in coastal waters, particularly shallow inshore waters, such as coastal lagoon and estuaries (Coelho and Erzini, 2006; Moura *et al.,* 2007).

17.3.80 A review of several beam trawl surveys conducted in UK waters has shown that juvenile undulate rays tended to occur in the English Channel, with the Channel Islands having the sites of most regular occurrence of juveniles (Ellis *et al.,* 2012b). It is considered that the spawning grounds of the undulate ray would be similar to the nursery grounds, as shown in **Figure 17-18**. The spawning season of the undulate ray is currently unknown (Ellis *et al.,* 2012b).

Figure 17-18 Nursery Grounds of Undulate Ray, as Indicated by the Presence of Juveniles in Groundfish Surveys (Ellis et al., 2012b))

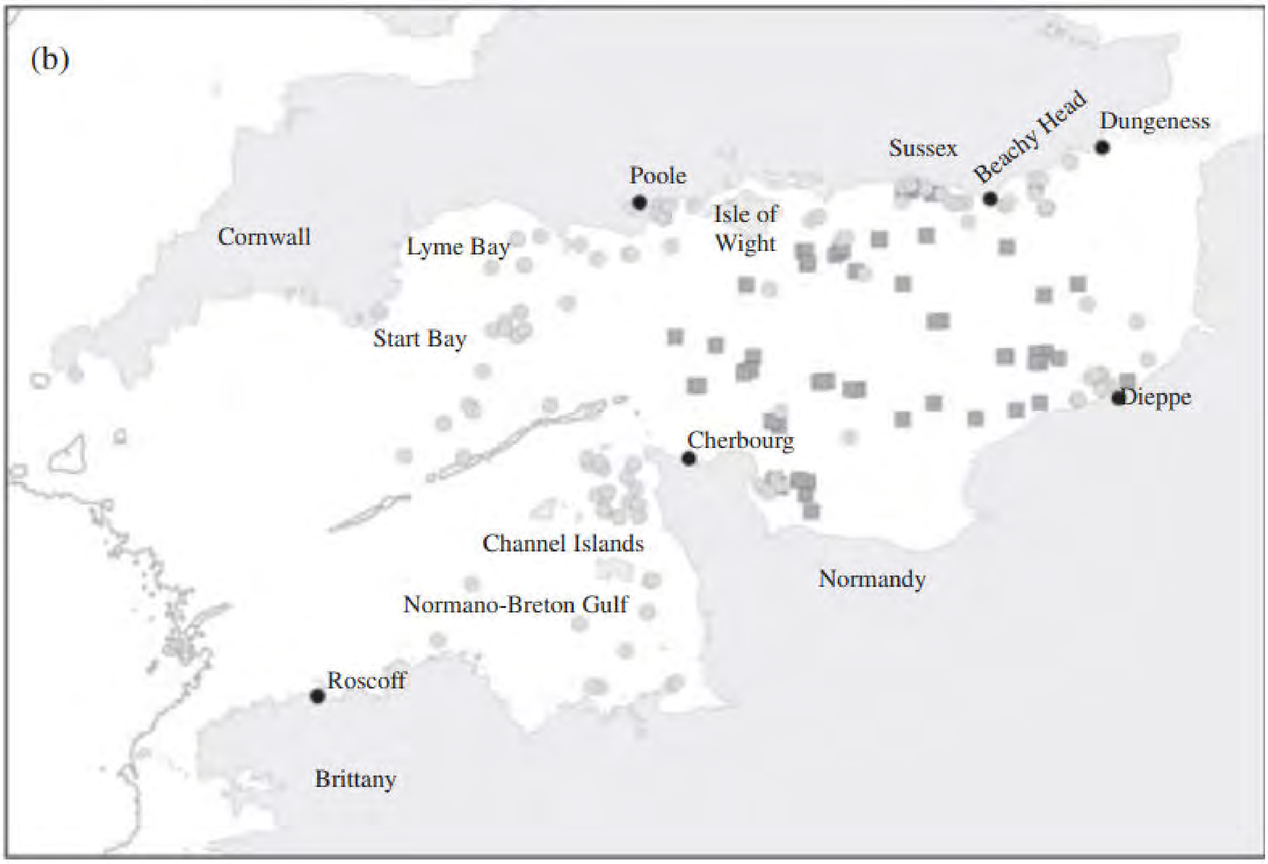


Notes: Records in Northern North Sea Considered to be a Database Error.

17.3.81 The undulate ray is now an EU prohibited species, meaning that the targeting and landing of the species is no longer permitted. The populations have been in decline since the 1980s and are vulnerable to over-exploitation due to their slow-growth and low production rates and are globally considered to be endangered. The undulate ray prefers a sandy and muddy sea bed, and within the English Channel has been recorded in areas with water depths of between 13m and 82m in depth and further offshore than the location of the Longue Hougue South site, being predominantly located to the east side of Herm Island (**Figure 17-19**; Ellis *et al.,* 2012a).

17.3.82 Undulate rays lay their egg cases on the sea bed and therefore are sensitive to changes in water quality and disturbance. Despite the evidence of the presence of the undulate ray in the Channel Islands, it is unlikely that there would be any individuals present within close proximity of the Longue Hougue South site, because the site is not considered to be good habitat for them, and evidence suggests they are found in more offshore waters. Therefore, the undulate ray has been screened out of further assessment.

Figure 17-19 The Distribution of Undulate Ray in the English Channel (Ellis et al., 2012a)



Notes: Squares represent data from the ICES International Beam Trawl Survey working group, circles are for beam-trawl survey data, and squares for data gathered from scientific literature.

17.3.83 The anglerfish has a distribution that covers much of the north-east Atlantic and North Seas, including across Guernsey. Their nursery grounds can be found around Guernsey in low intensity (Ellis *et al.,* 2012b). However, these low intensity nursery grounds are also found across much of the Irish, Celtic and North Seas, as well as the English Channel. High intensity nursery grounds are found in areas off the coast of Cornwall, and the west coasts and offshore of Ireland and Scotland. (Ellis *et al.,* 2012b). The large areas of potential nursery grounds (and therefore spawning) are widespread and available in much of the north-east Atlantic and North Seas, and Guernsey is located within a low intensity ground only, therefore it is not considered that there are and key spawning or nursery grounds within Longue Hougue South. The spawning season of the anglerfish is January to June (Ellis *et al.,* 2012b).

17.3.84 The sea fisheries landings data for Guernsey (**Table 17-4)** shows low levels of anglerfish catch, and a review of the OBIS shows that from a total of 61 datasets across Europe, there are no records of anglerfish near Guernsey, and this species is much more likely to be found further offshore. Therefore, it is considered unlikely that this species will be present near the site and is screened out of further assessment.

17.3.85 The site is also located on the edge of low intensity sandeel and sole spawning grounds, which extend through the eastern English Channel, the southern North Sea, Celtic and Irish Seas and offshore areas off Scotland. The Sandeel spawning grounds also extend to much of the rest of the North Sea (Ellis *et al.,* 2012b). High intensity spawning grounds for both species are located in areas of the North Sea and areas of the Bristol Channel and Celtic Sea, and sandeel high intensity grounds are also located along the east coast of Scotland (Ellis *et al.,* 2012b). The site is not within the nursery grounds of either the sandeel or sole. Given the large nursery grounds of sandeel, and that the site is on the very edge of a low intensity nursery ground only, it is not considered that the site provides a key nursery area for this species. The spawning season for sandeel is November to February, and for sole is March to May, with peak in April (Ellis *et al.,* 2012b).

17.3.86 The sea fisheries landings data for Guernsey (**Table 17-4)** shows moderate levels of sandeel catch in Guernsey, however a review of the OBIS shows that from a total of 125 datasets across Europe, there are no records of sandeel near Guernsey, and this species is much more likely to be found closer to coast of France or the UK. The preferred habitat of sandeels is sandy and silty sediments, with a particle size of less than 2mm. Within the study area, the particle size analysis completed in the marine ecology survey found sediments mainly comprised of sand of less than 2mm, however, much of the site’s sediments could not be fully analysed, and much of the Project site was noted to be composed of bedrock and boulders. While there is the potential for the preferred habitat of sandeel to be present in the area, the Project site contains little sandy sediments, with only the portion to the very east of the site being sandy, it is considered unlikely that this species will be present and is therefore screened out of further assessment.

17.3.87 The sea fisheries landings data for Guernsey (**Table 17-4)** shows low levels of sole catch, however, a review of the OBIS shows that there are records of sole in the Channel Islands, but not around Guernsey or the Project site and this species is more likely to be found along the north France and UK coastlines. The preferred habitat of sole is sandy and muddy sediments, and as described above, the seabed of the site is mostly composed of bedrock and boulders, although there are areas of sandy sediment near the site (or within shallow intertidal areas), as identified in the marine ecology surveys. Therefore, it is considered unlikely that this species will be present near the site and is screened out of further assessment.

17.3.88 Several fish species were noted to be present within the Phase II Intertidal Survey, including juvenile pollack, gobies and wrasse. The sea fisheries landings data for Guernsey (**Table 17-4**) shows that pollack and wrasse are both landed, but in relatively low numbers.

17.3.89 Pollack live in areas of rocky ground, in water depths of up to 200m. Juvenile shoals are common in inshore areas but are rare for adults which only shoal during the spawning period in winter and spring. Spawning takes places in water depths of around 100m (DECC, 2016), and therefore it is not expected that there will be any spawning of pollack within the Project site. Gobies are present in inshore waters and estuaries, and spawn in rocky areas in the spring and summer, where females lay their eggs under empty shells, spawning in waters of between 8 to 15°C (DECC, 2016). Wrasse species tend to be present in rocky areas, and aggregate to spawn in specific locations every year. Except for the juvenile pollack found within the eelgrass survey, there is no evidence of any fish species spawning within the site, and for the three fish species that have been noted within the survey, it is expected that there are many other suitable habitats nearby. In addition, pollack and the goby and wrasse species are all considered to be of least concern on the IUCN red list.

17.3.90 Juvenile and adult fish are mobile and will be able to avoid the localised areas disturbed by increased suspended sediments and sediment re-deposition. If displaced, they would be able to move to adjacent, undisturbed areas within their normal habitat range. However, excessive suspended sediment either in suspension or deposited can have a range of effects on fish, from mortality to gill trauma and a reduction in reproductive success. Significant changes in Suspended Sediment Concentrations (SSC) can have detrimental effects on fish species, however, mortality is seldom recorded in migratory species as a result of increased SSC. Therefore, the sensitivity of fish species to a change in suspended sediment concentrations is considered to be low.

Mariculture

17.3.91 In addition to the commercial fisheries as outlined above, there are two main oyster farms: one located on Guernsey and one on Herm. The Guernsey farm is in Rocquaine North, to the west of the Island (17km from Longue Hougue South around the coastline), and the Herm farm is in Fisherman’s Beach, on the west side of Herm, approximately 4km from Longue Hougue South. There are further oyster farms at Rocquaine South (19km from Longue Hougue South), Torquetil (16km from Longue Hougue South), Chouet (8km from Longue Hougue South) and Grande Havre (8.5km from Longue Hougue South).

17.3.92 Shellfish are prone to absorbing contamination from the surrounding waters because they are filter feeders. Shellfish sampling is therefore important for all production areas around Guernsey to ensure that there is no contamination present. Sampling is routinely undertaken by the Office of Environmental Health and Pollution Regulation (OEHPR), according to the UK Food Standards Agency classification system.

17.3.93 The most recent sampling undertaken has classified two bivalve mollusc production areas in Guernsey (effective from 20th September 2018) (OEHPR, 2018). Both areas are for pacific oyster beds: one at Herm (Fisherman's Beach); and one at Rocquaine North. Both have been given a classification of B. Oysters can only go for human consumption after they have been relayed in an approved Class A area, have been purified in an approved plant, or after a European Commission approved heat treatment process. Note that Rocquaine North was previously classified as a Class A site, but the most recent water quality analysis of the site undertaken in July 2018 indicates a reduction in water quality, and therefore a change in classification. Other bivalve sites, as noted above, have not been classified, either because the site is currently not in use (as is the case for Torquetil, Rocquaine South and Grand Havre); or is still awaiting further sampling (as is the case for Chouet) (OEHPR, 2018).

Summary of Marine Ecology Receptors

17.3.94 **Table 17-5** presents the value and sensitivity of all ecological receptors considered in the assessment.

Table 17-5: Value / Sensitivity of Receptors

Receptor	Value / Sensitivity	Justification
Foreshore ABI	Medium / High	Locally important intertidal habitats, with shingle ridges providing key habitat for the scaly cricket. The presence of the internationally protected scaly cricket at this site means that the ABI is given a higher value.
Intertidal habitats	Low - High	All intertidal habitats are considered to have a low ecological significance. However, most of these habitats are within the Foreshore ABI and have therefore been given a medium value level. The shingle ridges have been given a value of high due to its importance for the scaly cricket.

Receptor	Value / Sensitivity	Justification
Subtidal habitats	Low to medium	The sensitivity of each benthic habitat depends on the effect that it may be exposed to all benthic habitats (except for maerl beds, included separately below) have a value of low.
Maerl beds	High	As this is an ecologically important habitat, it has been assigned a value of high.
Eelgrass	High	Eelgrass beds are of high conservation value because of the diversity of species that they support. This habitat is also listed as Annex 1 habitat types under the EU Habitats Directive and are therefore high in value.
Marine mammals	High	Marine mammals have been given a value of high as they are internationally highly protected.
Commercial fish species	Low to medium	All commercial fish species have been given a value of low, except for edible crab, king scallop, lobster, pollack and ray, which have been given a value of medium as they make up most of the commercial fish take.
Fish species within the site	Low	The fish species that have been found within the Project site (including pollack, gobies and wrasse) have been given a value of low, as they are not protected and are considered to be a common species.
Commercial oyster farms	Medium	Oyster farms have been given a sensitivity of medium as they are a commercially important species

17.4 Do Nothing Scenario

17.4.1 In a 'do nothing' scenario, it is likely that there would be no change to the marine habitats and species present at the site. However, the shingle ridge and rocky shore would be reduced though sea level rise It is expected that initially the shingle ridge would move landwards until it reached the road, where coastal squeeze would occur, and the shingle ridge would be lost.

17.4.2 It is expected that this process will take decades to occur, but it should be noted that this depends greatly on the future rate of sea-level rise. Relative sea-level is predicted to rise by 6cm in five years' time and 26cm in 20 years' time, and therefore the effect is unlikely to occur before 2040. However, as sea-level continues to rise, the effect will become more pronounced, if it is assumed that the sediment supply remains the same as today. Therefore, the rate of shingle beach landward movement, and when it may be completely drowned are difficult to determine, but it is a process driven by longer-term decadal forces (i.e. sea-level rise) with little obvious change in the short-term.

17.5 Methodology for EIA

17.5.1 The EIA has been carried out using the methodology set out in **Section 5 EIA Methodology**.

17.6 Impacts During Construction

CONSTRUCTION IMPACT 17.1: Habitat Alteration / Physical Disturbance

17.6.1 As the proposed development involves covering a section of intertidal and subtidal habitat with the breakwater structure and isolating an area for the foreshore from the wider marine habitat, there is the potential for physical disturbance to the surrounding habitats.

17.6.2 It should be noted that during the detailed design phase of the project, a minor design change was made. This design change involves a change of location at which the breakwater connects to land at Spur Point. The result of this design change is a slight reduction in the footprint of the Project, as shown by **Figure 4-6** (reducing the overall footprint of the site by 0.5%). Given the very small reduction in the footprint, and that all assessments have therefore been based on a slightly worse-case scenario, no assessments have been amended in relation to this design change.

Foreshore ABI

17.6.3 The site is located partly within the Foreshore ABI, therefore a portion of this designated site will be affected through the construction of the breakwater and subsequent infill area. **Table 17-6** and **Table 17-7** assess this impact, which has a resultant summary of minor adverse (not significant), because although the habitats that will be disturbed are protected by its designation, they are not themselves considered to be ecologically important (with the exception of the shingle ridge which provides habitat for the scaly cricket) and only a very small proportion of the designated site will be temporarily affected. No mitigation is required.

Table 17-6: Impact Assessment for the Disturbance of Habitat within the Foreshore ABI

Impact Assessment: Impact on the Foreshore ABI due to disturbance of habitat					
Impact Nature	Positive	Negative			
	The impact on the Foreshore ABI is negative because some of the site will be affected by disturbance to habitats due to the construction of the breakwater and infill area.				
Impact Type	Direct	Indirect	Reversible	Irreversible	
	The impact is direct because it is directly caused by the construction of the breakwater itself and is irreversible as the breakwater and infill area will remain in place after completion of the construction and operational phases of the project.				
Impact Duration	Temporary	Short-term	Medium-term	Long-term	Permanent
	The impact is temporary as the habitats will be disturbed during the construction phase of the project.				
Impact Extent	Local	County	Regional	National	International
	The impact extent is both local and national as it will affect a very small area of the Foreshore ABI, which is of national importance and covers a large proportion of the intertidal areas around Guernsey.				
Impact Magnitude	Negligible	Low	Medium	High	
	There is the potential that any habitats within the Project site, or within 50m of the site, could be temporarily disturbed through the construction process. The impact magnitude is negligible as it will affect 0.95% (9.3ha) of the total area of the Foreshore ABI (979.2ha).				
Receptor Value / Sensitivity	Negligible	Low	Medium	High	
	The receptor value is medium to high because it contains locally important intertidal habitats, and because it also provides key shingle ridge habitat for the scaly cricket.				
Impact Significance	Negligible	Minor	Moderate	Major	
	The impact significance is minor.				

Table 17-7: Residual Impact Assessment for the Disturbance of Habitat within the Foreshore ABI

<table>
<tr><th colspan="5">Residual Impact Assessment: Impact on the Foreshore ABI due to habitat disturbance</th></tr>
<tr><td rowspan="2">Impact Significance</td><td>Negligible</td><td>Minor</td><td>Moderate</td><td>Major</td></tr>
<tr><td colspan="4">No mitigation is required for this impact, and therefore the residual impact is the same as that assessed above.</td></tr>
</table>

Intertidal Habitats

17.6.4 The location of Project site means that some intertidal habitat will be disturbed through the construction of the breakwater and subsequent infill area. **Table 17-8** and **Table 17-9** assess this impact, which has a resultant summary of negligible to minor adverse (not significant), as the intertidal habitats that will be temporarily disturbed through the construction phase are not considered to be ecologically important , and are all expected to be common in the area in similar assemblages (with the exception of the shingle ridge which provides habitat for the scaly cricket) and only a very small area will be disturbed compared to the available habitat that is located nearby and around Guernsey. No mitigation is required.

Table 17-8: Impact Assessment for the Disturbance of Intertidal Habitat

<table>
<tr><th colspan="6">Impact Assessment: Impact on intertidal habitats due to habitat disturbance</th></tr>
<tr><td rowspan="2">Impact Nature</td><td colspan="2">Positive</td><td colspan="3">Negative</td></tr>
<tr><td colspan="5">The impact on the intertidal habitats within the site is negative as they will be disturbed due to the construction of the breakwater and the infill area.</td></tr>
<tr><td rowspan="2">Impact Type</td><td>Direct</td><td>Indirect</td><td>Reversible</td><td colspan="2">Irreversible</td></tr>
<tr><td colspan="5">The impact is direct because it is directly caused by the construction of the breakwater and infill area itself and is irreversible as the breakwater and infill area will remain in place after completion of the construction and operational phases of the project.</td></tr>
<tr><td rowspan="2">Impact Duration</td><td>Temporary</td><td>Short-term</td><td>Medium-term</td><td>Long-term</td><td>Permanent</td></tr>
<tr><td colspan="5">The impact is temporary as the habitats will be disturbed during the construction phase of the project.</td></tr>
</table>

Impact Assessment: Impact on intertidal habitats due to habitat disturbance					
Impact Extent	Local	County	Regional	National	International
	The impact extent is local as it will affect a very small area of the intertidal habitats around Guernsey, none of which have been identified as being ecologically important and are present in other areas around the coastline of Guernsey. The intertidal survey undertaken in 2015 shows that the adjacent bay at the existing Longue Hougue Reclamation Site (to the north-east of Longue Hougue South) has many of the same intertidal habitats as are present in Longue Hougue South, and this is expected to be the case for the rest of the intertidal areas of Guernsey, with very similar intertidal habitat presence at other bays and beaches. Overall the habitats identified in the 2015 intertidal survey are characteristic of a moderately exposed to sheltered rocky shore intertidal environment. The marine ecology survey undertaken for the project indicates that the predominant habitat type within Longue Hougue South was mussel and / or barnacle communities (EUNIS habitat code A1.11) and *Semibalanus balanoides*, *Fucus vesiculosus* and red seaweeds on exposed to moderately exposed eulittoral rock. This translates to the biotopes LR.HLR.MusB.Sem and LR.HLR.MusB.Sem.FvesR respectively; both of which are expected to be present at many other sites around Guernsey, and are not considered to be ecologically important.				
Impact Magnitude	Negligible	Low	Medium	High	
	The impact magnitude is negligible as it will affect a very small proportion of the intertidal habitats around Guernsey.				
Receptor Value / Sensitivity	Negligible	Low	Medium	High	
	The value for the intertidal habitats present here are low to medium, with none being identified to being of ecological importance. However, the shingle ridge provides optimum habitat to the scaly cricket and is therefore given a value of high.				
Impact Significance	Negligible	Minor	Moderate	Major	
	The impact significance is minor for the shingle ridge habitat, and negligible for all other intertidal habitats identified due to the negligible magnitude of impact.				

Table 17-9: Residual Impact Assessment for the Disturbance to Intertidal Habitat

Residual Impact Assessment: Impact on the intertidal habitats due to disturbance				
Impact Significance	Negligible	Minor	Moderate	Major
	No mitigation is required for this impact, and therefore the residual impact is the same as that assessed above.			

Fish Habitats

17.6.5 As stated above, the location of the site means that some intertidal habitats may be affected by disturbance. This may also lead to the disturbance of habitats of importance to fish species. As noted in the baseline sections, there is no evidence that any fish species use the site for spawning, but there is evidence that the species are present within the site.

17.6.6 **Table 17-10** and **Table 17-11** assess this impact, which has a resultant effect of negligible (not significant) as the fish habitats that will be temporarily affected are all expected to be common in the area, and only a very small area will be impacted. No mitigation is required.

Table 17-10: Impact Assessment for the Disturbance to Fish Habitats

Impact Assessment: Impact on fish habitats due to habitat disturbance					
Impact Nature	Positive		Negative		
	The impact on the fish habitats within the site is negative as it has the potential to be impacted by the disturbance to fish habitats.				
Impact Type	Direct	Indirect	Reversible	Irreversible	
	The impact is direct because it is directly caused by the construction of the breakwater and infill area itself and is irreversible as the breakwater and infill area will remain in place after completion of the construction and operational phases of the project.				
Impact Duration	Temporary	Short-term	Medium-term	Long-term	Permanent
	The impact is temporary as the habitats will be disturbed through the construction phase of the project.				

Impact Assessment: Impact on fish habitats due to habitat disturbance					
Impact Extent	Local	County	Regional	National	International
	The impact extent is local as it will affect a very small area of the habitats available to fish species around Guernsey, including the eelgrass habitats, as it is known that there are a further 97,236m^2 of eelgrass habitat available around Guernsey. For other habitats within the site, as noted above, none have been identified as being ecologically important, and are present in other areas around the coastline of Guernsey.				
Impact Magnitude	Negligible	Low	Medium	High	
	The impact magnitude is negligible as it will affect a very small proportion of the habitats available to fish species around Guernsey				
Receptor Value / Sensitivity	Negligible	Low	Medium	High	
	None of the fish species expected to be present within the Project site are considered to be of a high value, or are protected, and are not sensitive to a small loss of habitats.				
Impact Significance	Negligible	Minor	Moderate	Major	
	The impact significance is negligible (not significant) for the impact to fish habitats, due to the very small and localised effect, and the low level of sensitivity and value of these habitats, as well their presence in many other areas nearby and around the Guernsey coastline.				

Table 17-11: Residual Impact Assessment for the Disturbance to Fish Habitats

Residual Impact Assessment: Impact on fish habitats due to habitat disturbance				
Impact Significance	Negligible	Minor	Moderate	Major
	No mitigation is required for this impact, and therefore the residual impact is the same as that assessed above.			

Eelgrass

17.6.7 The site footprint includes an area that has been identified as supporting eelgrass habitat, and this area will be impacted by disturbance through the construction of the breakwater and subsequent infill area. **Table 17-12** and **Table 17-13** assess this impact, which results in a moderate adverse (significant) prior to any mitigation. With mitigation (further details of which are included below), the residual impact significance is minor adverse (not significant).

Table 17-12: Impact Assessment for the Loss of Eelgrass Beds

<table>
<tr><th colspan="6">Impact Assessment: Impact on the eelgrass beds due to loss of habitat</th></tr>
<tr><td rowspan="2">Impact Nature</td><td colspan="2">Positive</td><td colspan="3">Negative</td></tr>
<tr><td colspan="5">The impact on the potential eelgrass bed within the site would be negative as it would be disturbed due to the construction of the breakwater and infill area.</td></tr>
<tr><td rowspan="2">Impact Type</td><td>Direct</td><td>Indirect</td><td>Reversible</td><td colspan="2">Irreversible</td></tr>
<tr><td colspan="5">The impact on the potential eelgrass bed would be direct as it would be directly from the construction of the breakwater itself, and irreversible as the breakwater and infill area will remain in place after completion of the construction and operational phases of the project, leading to a permanent effect.</td></tr>
<tr><td rowspan="2">Impact Duration</td><td>Temporary</td><td>Short-term</td><td>Medium-term</td><td>Long-term</td><td>Permanent</td></tr>
<tr><td colspan="5">The impact is temporary as the habitats will be disturbed through the construction phase of the project.</td></tr>
<tr><td rowspan="2">Impact Extent</td><td>Local</td><td>County</td><td>Regional</td><td>National</td><td>International</td></tr>
<tr><td colspan="5">The impact extent would be local, regional and national as it would affect a very small localised area, but be of regional and national importance, with ten other eelgrass beds currently known to be present in Guernsey, and a potential further 39 locations.</td></tr>
<tr><td rowspan="2">Impact Magnitude</td><td>Negligible</td><td>Low</td><td>Medium</td><td colspan="2">High</td></tr>
<tr><td colspan="5">According to the intertidal survey, the eelgrass bed that falls within the site footprint is 12,182m² and, therefore represents less than 7.68% of the total eelgrass recorded across the island (Falla, 2019a-c). This area does not include the 39 potential locations where eelgrass has been sighted on previous surveys or by recreational users, that have yet to be formally surveyed. The impact magnitude on the potential eelgrass beds would be therefore be low, as while it would mean the disturbance to a moderate proportion of eelgrass currently known to be present in Guernsey, there are other eelgrass patches known to be in the area, including two areas of similar size in Belle Grève Bay. It should be noted that the areas described above do not take account of the density of eelgrass in that area, but rather an area where eelgrass habitat is present. This is also the case for the area of eelgrass within Longue Hougue South.</td></tr>
</table>

Impact Assessment: Impact on the eelgrass beds due to loss of habitat				
Receptor Value / Sensitivity	Negligible	Low	Medium	High
	The receptor value of the potential eelgrass beds would be high as it is an ecologically important habitat, as well as being highly protected.			
Impact Significance	Negligible	Minor	Moderate	Major
	The impact significance on the potential eelgrass beds would be moderate due to its high value and the low-level magnitude of effect.			

Table 17-13: Residual Impact Assessment for the Disturbance of Eelgrass Habitat

Residual Impact Assessment: Impact on the eelgrass beds due to habitat loss				
Impact Significance	Negligible	Minor	Moderate	Major
	Mitigation for the loss of eelgrass could include translocation of the eelgrass beds and / or seeding of eelgrass at a new site, to ensure that there will be no net reduction of this habitat, and no impact on the species that use it. It would be expected however that not all eelgrass could be translocated due to currently known success rates (for an eelgrass patch of this size, the expected survival rate is just 35% of plants), even with the best possible methods and donor site used (MMO, 2019), although the new site may expand to the same size after transplantation). Therefore, if undertaken, the magnitude of impact would be reduced to negligible, with overall a very small loss of total eelgrass habitat across Guernsey lost. If translocation was undertaken, monitoring would be required to confirm the success of the translocation, and the extent of the resultant habitats. See the operational impacts section for more information of the potential mitigation.			

17.6.8 A report was undertaken to assess the recovery of eelgrass habitats to disturbance by d'Avack *et al* (2014). The report found that despite eelgrass being fast-growing and relatively short-lived, it can take a considerable time to recover from damaging events. The recovery of eelgrass habitats is solely due to the rhizome growth from adjacent perennial beds (Boese *et al.,* 2009).

17.6.9 Eelgrass are restricted to horizontal growth which makes the adjacent recolonization of bare patches difficult; a depression in the intertidal area caused by disturbance can cause a restriction in the expansion of the eelgrass (Boese *et al.,* 2009). However, the removal of eelgrass by wildfowl grazing does not have the same impact; a reduction in biomass of over 60% through grazing for one year, did not impact on the abundance of eelgrass the following year, with full recovery of the habitat (Nacken & Reise, 2000).

17.6.10 A four-year study that actively removed 2m^2 plots of eelgrass found that rapid growth and full recovery was seen within 2 years from rhizome growth of adjacent eelgrass. It is therefore considered that short-term disturbance can result in a rapid recovery within 2 years, however a long-term event with continued disturbance on the same patch of eelgrass can result in long-lasting declines (Simons, 2012).

CONSTRUCTION IMPACT 17.2: Changes to Water Quality (including Increased Suspended Sediments, Smothering and Contamination)

17.6.11 The installation of the breakwater may cause a change to water quality in the local environment due to an increase in suspended sediment concentrations in Belle Grève Bay and the surrounding water column, which may also include the suspension of any contaminated sediments present within the Project site. As indicated by the Marine Ecology survey, there is the potential for elevated Chromium levels at one location in the nearby area. Such concentrations have the potential to affect benthos through smothering of sessile species and filter feeders. An increase in turbidity could also cause a reduction in light penetration through the water column, which could have an impact on photosynthesising marine algae. There is also the potential that an increase in suspended sediment concentrations could affect commercial fish species, and therefore also affect marine mammals through their loss of prey species. As the bay is a dynamic environment with high wave action and tidal movements, it is likely that any sediment released will rapidly dissipate.

17.6.12 The release of fine sediment during construction has the potential to enhance the baseline suspended sediment concentrations in the water column, making it more turbid, until the plume becomes dispersed by tidal current and wave action and the sediments settle once again on the sea bed. At the site, and the area adjacent, there is limited surface mobile sediment, with tide-swept bedrock and boulders prevailing. Where sediment does exist in these areas, it is predominantly sand and gravel, which are not particle sizes that can be suspended in the water column, and therefore will not form part of a sediment plume, even if disturbed during construction.

17.6.13 In addition, the method of construction for the breakwater, and the placement of rock in predominantly dry areas means that there will be minimal effect on suspended sediment concentrations. This is because there is limited sources and pathways for the suspended load from placement to enter the water column.

17.6.14 As discussed in **Section 0**, an exceedance of the Cefas Action Level for contamination within sediments was found at one of the grab sample locations within the marine ecology survey. Chromium was found at grab sample site 5, at levels which show a marginal exceedance of the action level 1. This sample site is located 150m from the site, where no disturbance is expected to occur to the sediments. No grab samples were taken within the site itself, and it is therefore unknown whether sediments within the site, which may be disturbed, could contain similar levels of cadmium, however, the majority of the seabed within the site is formed of bedrock and boulders, and it is therefore unlikely that there would be any release of contaminated sediments during construction of the breakwater.

17.6.15 Chapter 8 Marine Sediment and Water Quality concluded that, as there is a lack of fine sediment in and around the study area, and due to the temporary nature of the disturbance (during the construction of the first rock layer only), the impact is expected to be minor adverse (not significant). No mitigation measures are required.

17.6.16 The following sections assess the impact on the subtidal habitats (including a separate section for the assessment of impact on maerl beds), and commercial and spawning fish species, including on oyster farms.

Intertidal and Subtidal Habitats

17.6.17 The location of the site means that some intertidal habitats may be affected by changes to water quality (including increased suspended sediment concentrations, smothering and contamination) during the construction of the breakwater and subsequent infill area.

17.6.18 **Table 17-14** and **Table 17-15** assess this impact, which has a resultant effect of negligible to minor (not significant) because the subtidal and intertidal habitats that will be temporarily affected are not considered to be ecologically important, and are all expected to be common in the area, and only a very small area will be impacted. No mitigation is required.

Table 17-14: Impact Assessment for the Changes to Water Quality on Intertidal and Subtidal Habitats

<table>
<tr><th colspan="3">Impact Assessment: Impact on intertidal and subtidal habitats due to changes in water quality</th></tr>
<tr><td rowspan="2">Impact Nature</td><td>Positive</td><td>Negative</td></tr>
<tr><td colspan="2">The impact on the intertidal and subtidal habitats within the site is negative as they have the potential to be impacted by both an increase in suspended sediments and contamination due to the construction of the breakwater and the infill area.</td></tr>
</table>

<table>
<tr><th colspan="6">Impact Assessment: Impact on intertidal and subtidal habitats due to changes in water quality</th></tr>
<tr><td rowspan="2">Impact Type</td><td>Direct</td><td>Indirect</td><td colspan="2">Reversible</td><td>Irreversible</td></tr>
<tr><td colspan="5">The impact is direct as an increase in suspended sediment concentrations and contaminant levels would be due directly from the construction of the breakwater and infill area itself, and indirect as this may cause a smothering effect on the intertidal and subtidal habitats. The impact is reversible as it is expected that normal conditions would resume after construction has been completed.</td></tr>
<tr><td rowspan="2">Impact Duration</td><td>Temporary</td><td>Short-term</td><td>Medium-term</td><td>Long-term</td><td>Permanent</td></tr>
<tr><td colspan="5">The impact is temporary as it is expected that normal conditions would resume after construction has been completed.</td></tr>
<tr><td rowspan="2">Impact Extent</td><td>Local</td><td>County</td><td>Regional</td><td>National</td><td>International</td></tr>
<tr><td colspan="5">The impact extent is local as it will affect a very small area of the intertidal and subtidal habitats around Guernsey, none of which have been identified as being ecologically important and are present in other areas around the coastline of Guernsey (except for the maerl beds which are assessed separately below).</td></tr>
<tr><td rowspan="2">Impact Magnitude</td><td>Negligible</td><td>Low</td><td colspan="2">Medium</td><td>High</td></tr>
<tr><td colspan="5">The impact magnitude is negligible as it will affect a very small proportion of the intertidal and subtidal habitats around Guernsey Given the lack of fine sediment in and around the study area which could be suspended during construction activities, the lack of any contaminants that will be re-suspended, and the temporary nature of the disturbance (i.e. only during the construction of the first rock layer) the magnitude of this effect is anticipated to be negligible.</td></tr>
<tr><td rowspan="2">Receptor Value / Sensitivity</td><td>Negligible</td><td>Low</td><td colspan="2">Medium</td><td>High</td></tr>
<tr><td colspan="5">The marine ecology survey undertaken for the project indicates that the predominant habitat types within close proximity of Longue Hougue South, and therefore at risk of impact from the increase in suspended sediments and smothering, were A1.1132, A2.4, A3.1152, and A5.2. A5.51 is assessed separately below. The value for the intertidal and subtidal habitats present here are low to medium, with none being identified to being of ecological importance.
For the effect of increased suspended sediment concentrations and smothering, A1.1132 and A2.4 have a sensitivity of low for a change in suspended sediment concentrations, and medium for smothering.</td></tr>
</table>

Impact Assessment: Impact on intertidal and subtidal habitats due to changes in water quality				
	A3.1152 has a sensitivity of medium for a change in suspended sediment concentrations, and low for smothering. A5.2 has a sensitivity of negligible for both a change in suspended sediment concentrations and smothering.			
Impact Significance	Negligible	Minor	Moderate	Major
	The impact significance is negligible to minor (not significant) for all intertidal and subtidal habitats identified, due to the very small and localised effect, and the low level of sensitivity and value of these habitats.			

Table 17-15: Residual Impact Assessment for Changes to Water Quality on Intertidal and Subtidal Habitats

Residual Impact Assessment: Impact on intertidal and subtidal habitats due to changes in water quality				
Impact Significance	Negligible	Minor	Moderate	Major
	No mitigation is required for this impact, and therefore the residual impact is the same as that assessed above.			

Fish Habitats

17.6.19 As stated above, the location of Longue Hougue South means that some intertidal habitats may be affected by changes to water quality (including increased suspended sediment concentrations, smothering and contamination). This may also lead to the loss of habitats of importance to fish species. As noted in the baseline sections, there is no evidence that any fish species use the site for spawning, but there is evidence that the species are present within the site.

17.6.20 **Table 17-16** and **Table 17-17** assess this impact, which has a resultant effect of negligible (not significant) as the fish habitats that will be temporarily affected are all expected to be common in the area, and only a very small area will be impacted. No mitigation is required.

Table 17-16: Impact Assessment for the Changes to Water Quality on Fish Habitats

Impact Assessment: Impact on fish habitats due to changes in water quality					
Impact Nature	Positive		Negative		
	The impact on the fish habitats within the site is negative as it has the potential to be impacted by both an increase in suspended sediments, and contamination due to the construction of the breakwater and the infill area.				
Impact Type	Direct	Indirect	Reversible	Irreversible	
	The impact is direct as an increase in suspended sediment concentrations and contaminant levels would be due directly from the construction of the breakwater and infill area itself, and indirect as this may cause a smothering effect on the habitats used by fish species. The impact is reversible as it is expected that normal conditions would resume after construction has been completed.				
Impact Duration	Temporary	Short-term	Medium-term	Long-term	Permanent
	The impact is temporary as it is expected that normal conditions would resume after construction has been completed.				
Impact Extent	Local	County	Regional	National	International
	The impact extent is local as it will affect a very small area of the habitats available to fish species around Guernsey, including the eelgrass habitats, as it is known that there are a further 146,406m^2 of eelgrass habitat available around Guernsey. For other habitats within the site, as noted above, none have been identified as being ecologically important, and are present in other areas around the coastline of Guernsey.				
Impact Magnitude	Negligible	Low	Medium	High	
	The impact magnitude is negligible as it will affect a very small proportion of the habitats available to fish species around Guernsey. Given the lack of fine sediment in and around the study area which could be suspended during construction activities, the lack of contaminants that may be re-suspended, and the temporary nature of the disturbance (i.e. only during the construction of the first rock layer) the magnitude of this effect is anticipated to be negligible.				
Receptor Value / Sensitivity	Negligible	Low	Medium	High	
	None of the fish species expected to be present within the site are considered to be of a high value and are not sensitive to a small loss of habitats.				

Impact Assessment: Impact on fish habitats due to changes in water quality				
Impact Significance	Negligible	Minor	Moderate	Major
	The impact significance is negligible (not significant) for the impact to fish habitats, due to the very small and localised effect, and the low level of sensitivity and value of these habitats, as well their presence in many other areas nearby and around the Guernsey coastline.			

Table 17-17: Residual Impact Assessment for the Increase in Suspended Sediment and Contamination Concentrations on Fish Habitats

Residual Impact Assessment: Impact on fish habitats due to increased suspended sediment and contamination concentrations and smothering				
Impact Significance	Negligible	Minor	Moderate	Major
	No mitigation is required for this impact, and therefore the residual impact is the same as that assessed above.			

Maerl Beds

17.6.21 Due to very slow growth rates, maerl deposits are highly sensitive to damage from any source. Maerl is also very slow to recruit and as such should be considered a non-renewable natural resource (Perry & Tyler-Walters, 2018; Barbera *et al.,* 2003). Current evidence states that the recovery potential of maerl following removal or damage is next to none, and the impact on local benthic communities (especially for large, long-lived species (such as *Dosinia exoleta* which was present at three stations of the marine ecology survey) will last for up to 50 years (Perry & Tyler-Walters, 2018).

17.6.22 It is considered that physical pressures such as removal, habitat structure change, disturbance of the seabed and smothering would all result in a loss of habitat with no ability to recover (Perry & Tyler-Walters, 2018). Additionally, it is understood that maerl would be highly sensitive to local regime changes such as tidal current flow (Perry & Tyler-Walters, 2018) meaning that indirect impacts such as removal may not be necessary to permanently damage beds.

17.6.23 **Table 17-18** and **Table 17-19** assesses this impact, which has a resultant effect of minor adverse (not significant) as there are no sediments within the site that are likely to be suspended due to construction activities. No mitigation is required.

Table 17-18: Impact Assessment for the Changes to Water Quality on Maerl Beds

<table>
<tr><th colspan="11">Impact Assessment: Impact on maerl beds due to changes in water quality</th></tr>
<tr><td rowspan="2">Impact Nature</td><td colspan="5">Positive</td><td colspan="5">Negative</td></tr>
<tr><td colspan="10">The impact on the maerl beds is negative as they have the potential to be impacted by both an increase in suspended sediments, contaminants and smothering due to the construction of the breakwater and the infill area.</td></tr>
<tr><td rowspan="2">Impact Type</td><td colspan="3">Direct</td><td colspan="2">Indirect</td><td colspan="3">Reversible</td><td colspan="2">Irreversible</td></tr>
<tr><td colspan="10">The impact is direct as an increase in suspended sediment concentrations and contaminants would be due directly from the construction of the breakwater and infill area itself, and indirect as this may cause a smothering effect on the maerl beds. The impact is reversible as it is expected that normal conditions would resume after construction has been completed.</td></tr>
<tr><td rowspan="2">Impact Duration</td><td colspan="2">Temporary</td><td colspan="2">Short-term</td><td colspan="2">Medium-term</td><td colspan="2">Long-term</td><td colspan="2">Permanent</td></tr>
<tr><td colspan="10">The impact is temporary as it is expected that normal conditions would resume after construction has been completed.</td></tr>
<tr><td rowspan="2">Impact Extent</td><td colspan="2">Local</td><td colspan="2">County</td><td colspan="2">Regional</td><td colspan="2">National</td><td colspan="2">International</td></tr>
<tr><td colspan="10">The impact extent is local as it will affect a very small area of the maerl beds, however maerl beds are of regional, national and international importance.</td></tr>
<tr><td rowspan="2">Impact Magnitude</td><td colspan="3">Negligible</td><td colspan="2">Low</td><td colspan="3">Medium</td><td colspan="2">High</td></tr>
<tr><td colspan="10">The impact magnitude is negligible as it will affect a very small proportion of the intertidal and subtidal habitats around Guernsey. Given the lack of fine sediment in and around the study area which could be suspended during construction activities, the lack of contaminants that may be re-suspended, and the temporary nature of the disturbance (i.e. only during the construction of the first rock layer) the magnitude of this effect is anticipated to be negligible.</td></tr>
<tr><td rowspan="2">Receptor Value / Sensitivity</td><td colspan="3">Negligible</td><td colspan="2">Low</td><td colspan="3">Medium</td><td colspan="2">High</td></tr>
<tr><td colspan="10">Maerl beds have a value of high as they are of international importance. For the effect of increased suspended sediment concentrations and smothering, maerl beds have a sensitivity of medium for a change in suspended sediment concentrations, and high for smothering.</td></tr>
<tr><td rowspan="2">Impact Significance</td><td colspan="3">Negligible</td><td colspan="2">Minor</td><td colspan="3">Moderate</td><td colspan="2">Major</td></tr>
<tr><td colspan="10">No impact is predicted on the maerl beds, due them being outside of the zone of effect.</td></tr>
</table>

Table 17-19: Residual Impact Assessment for the Changes to Water Quality on Maerl Beds

Residual Impact Assessment: Impact on maerl due to changes in water quality				
Impact Significance	Negligible	Minor	Moderate	Major
	No mitigation is required for this impact, and therefore the residual impact is the same as that assessed above.			

Commercial Fish Species (including Oyster Farms)

17.6.24 Commercial fish species (including oyster farms) may be affected by changes in water quality (including increased suspended sediment concentrations and contaminants) during the construction of the breakwater.

17.6.25 **Table 17-20** and

17.6.26 **Table** 17-21 assesses this impact, which has a resultant effect of negligible to minor (not significant), as only a very small area will be affected. No mitigation is required.

Table 17-20: Impact Assessment for the Changes to Water Quality on Fish Species

Impact Assessment: Impact on fish species due to changes in water quality					
Impact Nature	Positive	Negative			
	The impact on fish species within Longue Hougue South is negative as they have the potential to be impacted by an increase in suspended sediments due to the construction of the breakwater and the infill area.				
Impact Type	Direct	Indirect	Reversible	Irreversible	
	The impact is direct as an increase in suspended sediment concentrations would be due directly from the construction of the breakwater and infill area itself, and indirect as this may cause a smothering effect on the intertidal and subtidal habitats. The impact is reversible as it is expected that normal conditions would resume after construction has been completed.				
Impact Duration	Temporary	Short-term	Medium-term	Long-term	Permanent
	The impact is temporary as it is expected that normal conditions would resume after construction has been completed.				
Impact Extent	Local	County	Regional	National	International
	The impact extent is local as it will affect a very small area, and therefore has the potential to impact on fish species within close proximity of the project only.				

Impact Assessment: Impact on fish species due to changes in water quality				
Impact Magnitude	Negligible	Low	Medium	High
	The impact magnitude is negligible as it will affect a very small proportion of the intertidal and subtidal habitats around Guernsey. Given the lack of fine sediment in and around the study area which could be suspended during construction activities, the lack of contaminants that may be re-suspended, and the temporary nature of the disturbance (i.e. only during the construction of the first rock layer) the magnitude of this effect is anticipated to be negligible.			
Receptor Value / Sensitivity	Negligible	Low	Medium	High
	Juvenile and adult fish are mobile and able to avoid localised areas of increased suspended sediment concentrations, and if they are displaced can move to adjacent undisturbed areas within their normal habitat range. However, larval fish and shellfish are not as capable of avoiding areas of increased suspended sediments and are therefore considered to be more sensitive to any changes. Fish species are therefore given a sensitivity of negligible to changes in suspended sediment concentrations, and larval and shellfish a sensitivity of medium.			
Impact Significance	Negligible	Minor	Moderate	Major
	The impact significance is negligible (for adult and juvenile fish) to minor (for larval fish) for all species identified, due to the very small and localised effect, and the low level of sensitivity of these species.			

Table 17-21: Residual Impact Assessment for the Changes to Water Quality

Residual Impact Assessment: Impact on fish species due to changes in water quality				
Impact Significance	Negligible	Minor	Moderate	Major
	No mitigation is required for this impact, and therefore the residual impact is the same as that assessed above.			

CONSTRUCTION IMPACT 17.3: Potential Impact on Marine Mammals due to Collisions with Vessels

17.6.27 Although most construction will take place from the land, some sub-tidal areas can only be accessed by boat. An increase in boat movements may generate an increased collision risk to marine mammals.

17.6.28 Marine mammals in the area are expected to be habituated to the presence of vessels due to the location in relation to St Sampson and St Peter Port, and would be able to detect and avoid vessels. Therefore, all marine mammal species are considered to have a low sensitivity to the risk of a vessel strike.

17.6.29 During construction there will be an increase in vessel traffic due to the transport of materials to the site using barges. It is expected that one large barge will transport materials from the source location to an anchoring location off the coast, where it would remain for one week. Fourteen smaller barges will then be used to transport materials to Longue Hougue South, with four transports per day (or two per tide). Twenty-four-hour working will be required due to the tidal constraints of the site. It is expected that there will be a total of 534 small barge transportations (or 1,068 movements) over the two-year construction period. The barge berthing area is shown on **Figure 4-3**

17.6.30 Based on this worst-case scenario, on average over the construction period, between one and two vessel movements per day will occur. This small increase in vessels movements during the construction period is relatively small compared to existing vessel traffic.

17.6.31 Marine mammals are able to detect and avoid vessels. However, vessel strikes are known to occur, possibly due to distraction of animals whilst foraging and socially interacting, or due to the marine mammals' inquisitive nature (Wilson *et al.,* 2007). Therefore, increased vessel movements, especially those outwith recognised vessel routes, can pose an increased risk of vessel collision to marine mammals.

17.6.32 Marine mammals are relatively robust with a thick sub-dermal layer of blubber that provides some protection for their vital organs in the event of a vessel strike (Wilson *et al.,* 2007). However, non-fatal collisions can leave the animal vulnerable to secondary infection, other complications or predation (Wilson *et al.,* 2007).

17.6.33 Studies have shown that larger vessels are more likely to cause the most severe or lethal injuries, with vessels over 80m in length causing the most damage to marine mammals (Laist *et al.,* 2001). Vessels travelling at high speeds are considered to be more likely to collide with marine mammals, and those travelling at speeds below 10 knots would rarely cause any serious injury (Laist *et al.,* 2001). It is not possible to fully quantify strike rates between marine mammals and vessels because it is believed that a number go unnoticed (Evans *et al.,* 2011).

17.6.34 Of the 273 reported harbour porpoise stranding's in 2015 (latest UK Cetacean Stranding's Investigation Programme Report currently available), 53 were investigated at post mortem (27 were conducted in England, 13 in Scotland and 13 in Wales). A cause of death was established in 51 examined individuals (approximately 96% of examined cases). Of these, four (8%) had died from physical trauma of unknown cause, which could have been vessel strikes (CSIP, 2015). Approximately 4% of all harbour porpoise post mortem examinations from the Baltic, North East Atlantic, Irish and North Seas (ASCOBANS area) are thought to have evidence of interaction with vessels (Evans *et al.,* 2011).

17.6.35 **Table 17-22** and **Table 17-23** assess this impact, which has a resultant effect of **minor** (**not significant**), due to the low collision risk of any marine mammals with vessels in the area. No mitigation is required.

Table 17-22: Impact Assessment for the Increase in Vessel Collision Risk for Marine Mammals

<table>
<tr><th colspan="6">Impact Assessment: Impact on marine mammals due to the increased risk of collision</th></tr>
<tr><td rowspan="2">Impact Nature</td><td colspan="2">Positive</td><td colspan="3">Negative</td></tr>
<tr><td colspan="5">The impact on marine mammals is negative because any collision with a vessel has the potential to permanently affect an individual and could be fatal.</td></tr>
<tr><td rowspan="2">Impact Type</td><td>Direct</td><td>Indirect</td><td colspan="2">Reversible</td><td>Irreversible</td></tr>
<tr><td colspan="5">The impact is direct and irreversible, as it could cause permanent impacts on marine mammals, and any collision with a vessel can be fatal.</td></tr>
<tr><td rowspan="2">Impact Duration</td><td>Temporary</td><td>Short-term</td><td>Medium-term</td><td>Long-term</td><td>Permanent</td></tr>
<tr><td colspan="5">The impact is short-term as it will only occur during the two-year construction period, however any collision that occurs could cause permanent effects.</td></tr>
<tr><td rowspan="2">Impact Extent</td><td>Local</td><td>County</td><td>Regional</td><td>National</td><td>International</td></tr>
<tr><td colspan="5">The impact extent is regional because it has the potential to affect marine mammals that have the potential to come from any country along the English Channel, and local as it will only affect a very small area near the site.</td></tr>
<tr><td rowspan="2">Impact Magnitude</td><td>Negligible</td><td>Low</td><td colspan="2">Medium</td><td>High</td></tr>
<tr><td colspan="5">The impact magnitude is low as the increase in vessels will only occur over a very small area, and considering the low densities of marine mammals known to be at the site, and the temporary nature of vessel movements and the low risk of a collision occurring, if a marine mammal is in the vicinity of a vessel, it considered unlikely that any collision with a vessel associated with the construction of the breakwater will occur.</td></tr>
</table>

Impact Assessment: Impact on marine mammals due to the increased risk of collision				
Receptor Value / Sensitivity	Negligible	Low	Medium	High
	The receptor value is low to medium, based on the marine mammals having a low sensitivity to collision with vessels, and a high value due to their national and international protections.			
Impact Significance	Negligible	Minor	Moderate	Major
	The impact significance is minor due to the low risk of a vessel collision with any marine mammal occurring.			

Table 17-23: Residual Impact Assessment for the Increase in Collision Risk for Marine Mammals

Residual Impact Assessment: Impact on marine mammals due to the increased risk of collision				
Impact Significance	Negligible	Minor	Moderate	Major
	No mitigation is required for this impact, and therefore the residual impact is the same as that assessed above.			

17.7 Impacts During Operation

OPERATIONAL IMPACT 17.1: Loss of Habitat

17.7.1 The operation of the project will lead to the loss of intertidal and subtidal habitat in a small area, due to the presence of the breakwater and infill area. The following sections assess the impact on the Foreshore ABI and the intertidal and subtidal habitats that will be lost through operation of the project.

Foreshore ABI

17.7.2 The site is located partly within the Foreshore ABI, therefore a portion of this designated site will be lost through the operation of the reclamation site, which will be a permanent impact. **Table 17-24** and **Table 17-25** assess this impact, which has a resultant summary of minor adverse (not significant), because although the lost habitat is protected by its designation, the habitats to be lost are not themselves considered to be ecologically important (with the exception of the shingle ridge which provides habitat for the scaly cricket) and only a very small proportion of the designated site will be lost. Note that the eelgrass within Longue Hougue South is not located within the Foreshore ABI. No mitigation is required.

Table 17-24: Impact Assessment for the Loss of Habitat within the Foreshore ABI

Impact Assessment: Impact on the Foreshore ABI due to loss of habitat					
Impact Nature	Positive		Negative		
	The impact on the Foreshore ABI is negative because some of the site will be lost during operation of the project.				
Impact Type	Direct	Indirect	Reversible	Irreversible	
	The impact is direct because it is directly caused by the operation of the site and is irreversible as the breakwater and infill area will remain in place throughout operation and will not be removed once the project is completed.				
Impact Duration	Temporary	Short-term	Medium-term	Long-term	Permanent
	The impact is permanent as the infill will not be removed on completion of the operational phase of the project.				
Impact Extent	Local	County	Regional	National	International
	The impact extent is both local and regional, as it will affect a very small area of the Foreshore ABI, which is of regional importance and covers a large proportion of the intertidal areas around Guernsey.				
Impact Magnitude	Negligible	Low	Medium	High	
	The impact magnitude is negligible as it will affect 0.85% (8.3ha) of the total area of the Foreshore ABI (979.2ha). Note that not all of Longue Hougue South is within the ABI, and therefore the loss of habitat within the ABI is lower than the total loss of habitats.				
Receptor Value / Sensitivity	Negligible	Low	Medium	High	
	The receptor value is medium to high due to its designation as an ABI, and because it also provides key shingle ridge habitat for the scaly cricket.				
Impact Significance	Negligible	Minor	Moderate	Major	
	The impact significance is minor.				

Table 17-25: Residual Impact Assessment for the Loss of Habitat within the Foreshore ABI

Residual Impact Assessment: Impact on the Foreshore ABI due to habitat loss				
Impact Significance	Negligible	Minor	Moderate	Major
	No mitigation is required for this impact, and therefore the residual impact is the same as that assessed above.			

Intertidal Habitats

17.7.3 The location of Longue Hougue South means that some intertidal habitat will be lost through the operational phase of the project. **Table 17-26** and **Table 17-27** assess this impact, which has a resultant summary of negligible to minor adverse (not significant), as the intertidal habitats that will be lost are not considered to be ecologically important and are all expected to be common in the area (with the exception of the shingle ridge which provides habitat for the scaly cricket) and only a very small area will be lost compared to the available habitat that is location nearby and around Guernsey. No mitigation is required.

Table 17-26: Impact Assessment for the Loss of Intertidal Habitat

<table>
<tr><th colspan="21">Impact Assessment: Impact on intertidal habitats due to loss of habitat</th></tr>
<tr><td rowspan="2">Impact Nature</td><td colspan="10">Positive</td><td colspan="10">Negative</td></tr>
<tr><td colspan="20">The impact on the intertidal habitats within the site is negative as they will be lost due to the operation of the Project and its footprint.</td></tr>
<tr><td rowspan="2">Impact Type</td><td colspan="5">Direct</td><td colspan="5">Indirect</td><td colspan="5">Reversible</td><td colspan="5">Irreversible</td></tr>
<tr><td colspan="20">The impact is direct because it is directly caused by the construction of the breakwater and infill area itself and is irreversible as the breakwater and infill area will remain in place after completion of the construction and operational phases of the Project.</td></tr>
<tr><td rowspan="2">Impact Duration</td><td colspan="4">Temporary</td><td colspan="4">Short-term</td><td colspan="4">Medium-term</td><td colspan="4">Long-term</td><td colspan="4">Permanent</td></tr>
<tr><td colspan="20">The impact is permanent as the breakwater and infill area will not be removed on completion of the operational phase of the Project.</td></tr>
<tr><td rowspan="2">Impact Extent</td><td colspan="4">Local</td><td colspan="4">County</td><td colspan="4">Regional</td><td colspan="4">National</td><td colspan="4">International</td></tr>
<tr><td colspan="20">The impact extent is local as it will affect a very small area of the intertidal habitats around Guernsey, none of which have been identified as being ecologically important and are present in other areas around the coastline of Guernsey. The intertidal survey undertaken in 2015 shows that the adjacent bay at Longue Hougue (to the north-east of Longue Hougue South) has many of the same intertidal habitats as are present in Longue Hougue South, and this is expected to be the case for the rest of the intertidal areas of Guernsey, with very similar intertidal habitat presence at other bays and beaches. Overall the habitats identified in the 2019 intertidal survey are characteristic of a moderately exposed to sheltered rocky shore intertidal environment.
The Phase II marine ecologyIntertidal habitat survey undertaken for the project indicates that the predominant habitat type within Longue</td></tr>
</table>

Impact Assessment: Impact on intertidal habitats due to loss of habitat				
	Hougue South, with the exception of eelgrass (assessed below) was mussel and / or barnacle communities (EUNIS habitat code A1.11) and Semibalanus balanoides, Fucus vesiculosus and red seaweeds on exposed to moderately exposed eulittoral rock.were *Fucus serratus* on full salinity lower eulittoral mixed substrata and Barnacles and *Littorina spp*. on unstable eulittoral mixed substrata This translates to the biotopes LR.HLR.MusB.Sem and LR.HLR.MusB.Sem.FvesR respectively; both of which have a low value and are expected to be present at many other sites around Guernsey, and are not considered to be ecologically important.			
Impact Magnitude	Negligible	Low	Medium	High
	The impact magnitude is negligible as it will affect a very small proportion of the intertidal habitats around Guernsey.			
Receptor Value / Sensitivity	Negligible	Low	Medium	High
	The value for the intertidal habitats present here are low to medium, with none being identified to being of ecological importance. However, the shingle ridge provides optimum habitat to the scaly cricket and is therefore given a value of high.			
Impact Significance	Negligible	Minor	Moderate	Major
	The impact significance is minor for the shingle ridge habitat, and negligible for all other intertidal habitats identified due to the negligible magnitude of impact.			

Table 17-27: Residual Impact Assessment for the Loss of Intertidal Habitat

Residual Impact Assessment: Impact on the Foreshore ABI due to habitat loss				
Impact Significance	Negligible	Minor	Moderate	Major
	No mitigation is required for this impact, and therefore the residual impact is the same as that assessed above.			

Fish Habitats

17.7.4 As stated above, the location of the site means that some habitats used by fish species will be permanently lost through the operational phase of the project. This may also lead to the loss of habitats of importance to fish species. As noted in the baseline sections, there is no evidence that any fish species use the site for spawning, but there is evidence that the species use the site.

17.7.5 **Table 17-28** and **Table 17-29** assess this impact, which has a resultant effect of negligible (not significant) as the fish habitats that will be lost are all expected to be common in the area, and only a very small area will be impacted. No mitigation is required.

Table 17-28: Impact Assessment for the Loss of Fish Habitats

<table>
<tr><th colspan="6">Impact Assessment: Impact on fish habitats due to habitat loss</th></tr>
<tr><td rowspan="2">Impact Nature</td><td colspan="2">Positive</td><td colspan="3">Negative</td></tr>
<tr><td colspan="5">The impact on the fish habitats within the site is negative as they will be lost due to the operation of the reclamation site.</td></tr>
<tr><td rowspan="2">Impact Type</td><td>Direct</td><td>Indirect</td><td colspan="2">Reversible</td><td>Irreversible</td></tr>
<tr><td colspan="5">The impact is direct because it is directly caused by the construction of the breakwater and infill area itself and is irreversible as the breakwater and infill area will remain in place after completion of the construction and operational phases of the project.</td></tr>
<tr><td rowspan="2">Impact Duration</td><td>Temporary</td><td>Short-term</td><td>Medium-term</td><td>Long-term</td><td>Permanent</td></tr>
<tr><td colspan="5">The impact is permanent as the breakwater and infill area will not be removed on completion of the operational phase of the project.</td></tr>
<tr><td rowspan="2">Impact Extent</td><td>Local</td><td>County</td><td>Regional</td><td>National</td><td>International</td></tr>
<tr><td colspan="5">The impact extent is local as it will affect a very small area of the habitats available to fish species around Guernsey, including the eelgrass habitats, as it is known that there are a further 97,236m^2 of eelgrass habitat available around Guernsey. For other habitats within the site, as noted above, none have been identified as being ecologically important, and are present in other areas around the coastline of Guernsey.</td></tr>
<tr><td rowspan="2">Impact Magnitude</td><td>Negligible</td><td>Low</td><td colspan="2">Medium</td><td>High</td></tr>
<tr><td colspan="5">The impact magnitude is negligible as it will affect a very small proportion of the habitats available to fish species around Guernsey</td></tr>
<tr><td rowspan="2">Receptor Value / Sensitivity</td><td>Negligible</td><td>Low</td><td colspan="2">Medium</td><td>High</td></tr>
<tr><td colspan="5">None of the fish species expected to be present within the site are considered to be of a high value, or are protected, and are not sensitive to a small loss of habitats.</td></tr>
</table>

Impact Assessment: Impact on fish habitats due to habitat loss				
Impact Significance	Negligible	Minor	Moderate	Major
	The impact significance is negligible (not significant) for the impact to fish habitats, due to the very small and localised effect, and the low level of sensitivity and value of these habitats, as well their presence in many other areas nearby and around the Guernsey coastline.			

Table 17-29: Residual Impact Assessment for the Loss of Fish Habitats

Residual Impact Assessment: Impact on fish habitats due to habitat loss				
Impact Significance	Negligible	Minor	Moderate	Major
	No mitigation is required for this impact, and therefore the residual impact is the same as that assessed above.			

Eelgrass

17.7.6 The Project footprint includes an area that has been identified as having the potential for eelgrass habitat presence, and the area will be lost through the construction of the breakwater and subsequent infill area. **Table 17-30** and **Table 17-31** assess this impact, which has a resultant summary of major adverse (significant), although it could be reduced to minor adverse (not significant) if the potential mitigation measures (as outlined below) are taken forward.

Table 17-30: Impact Assessment for the Loss of Eelgrass Beds during Operation

Impact Assessment: Impact on the eelgrass beds due to loss of habitat					
Impact Nature	Positive		Negative		
	The impact on the eelgrass bed within the site would be negative as it would be lost due to the operation of the Project and its footprint.				
Impact Type	Direct	Indirect	Reversible	Irreversible	
	The impact on the potential eelgrass bed would be direct as it would be directly from the operation of the site, and irreversible as the reclaimed area will remain in place after completion of the operational phases of the Project.				
Impact Duration	Temporary	Short-term	Medium-term	Long-term	Permanent
	The impact on the eelgrass bed would be permanent as the breakwater and infill area will not be removed on completion of the operational phase of the Project.				

Impact Assessment: Impact on the eelgrass beds due to loss of habitat					
Impact Extent	Local	County	Regional	National	International
	The impact extent would be local, regional and national as it would affect a very small localised area, but be of regional and national importance, due to the importance of eelgrass habitats to many other marine species.				
Impact Magnitude	Negligible	Low	Medium	High	
	According to the intertidal habitat survey, the eelgrass bed that falls within the site footprint is 12,182m² and, therefore represents less than 7.68% of the total eelgrass recorded across the island (Falla *et al.*, 2019a-c). This area does not include the 39 potential locations where eelgrass has been sighted on previous surveys or by recreational users, that has yet to be formally surveyed. The impact magnitude on the potential eelgrass beds would be low, as while it would mean the loss of a moderate proportion of eelgrass currently known to be present in Guernsey, there are other eelgrass patches known to be in the area, including two areas of a similar size in Belle Greve Bay. It should be noted that the areas described above do not take account of the density of eelgrass in that area, but rather an area where eelgrass habitat is present. This is also the case for the area of eelgrass within Longue Hougue South.				
Receptor Value / Sensitivity	Negligible	Low	Medium	High	
	The receptor value of the potential eelgrass beds would be high as it is an ecologically important habitat, as well as being highly protected.				
Impact Significance	Negligible	Minor	Moderate	Major	
	The impact significance on the potential eelgrass beds would be moderate due to its high value and the low-level magnitude of effect.				

Table 17-31: Residual Impact Assessment for the Loss of Eelgrass Habitat

Residual Impact Assessment: Impact on the eelgrass beds due to habitat loss				
Impact Significance	Negligible	Minor	Moderate	Major
	Mitigation for the loss of eelgrass could include translocation of the eelgrass beds and / or seeding of eelgrass at a new site, to ensure that there will be no net reduction of this habitat, and no impact on the species that use it. If undertaken, it is would, however, be expected that not all eelgrass could be translocated due to			

Residual Impact Assessment: Impact on the eelgrass beds due to habitat loss	
	currently known success rates (for an eelgrass patch of this size, the expected survival rate is just 35% of plants, even with the best possible methods and donor site used, although the new site may expand to the same size after transplantation(MMO, 2019)). With a 35% success rate, and an estimated 7.68% of the eelgrass present on Guernsey to be lost, the residual loss of eelgrass could be reduced to less than 5% of all currently known available habitat. It should also be noted that, if this mitigation is taken forward, while it is possible that the eelgrass will be lost permanently, it is more likely that there will be an initial 5% loss in extent followed by a period of growth, with the eventual full extent restored. Therefore, the magnitude of impact could be reduced to negligible, with overall a very small loss of total eelgrass habitat lost. If this mitigation is taken forward, monitoring would be required to confirm the success of the translocation, and the extent of the resultant habitats. See below for more information of this potential mitigation.

Potential Mitigation Measures for Eelgrass

17.7.7 Further information on the potential mitigation measures, including the potential mitigation plan will be provide post-consent, before construction starts, in the form of an Eelgrass Translocation Plan. The indicative mitigation measures are described below. It is expected that an area to the immediate south-west of the site could be used for translocation or re-seeding, close to the existing eelgrass habitats in Belle Grève Bay, the presence of which provides strong evidence that a large area of eelgrass would be able to thrive in that area. It is possible to use these techniques together to increase the chance of success and using seeds in conjunction with adult plants can be more effective (van Katwijk *et al.,* 2016). A greater chance of success of the seeding or transplantation of eelgrass would be expected if the new site is a short distance from the donor site.

17.7.8 Seeding of eelgrass beds relates to the collection and targeted redistribution of wild seeds (MMO, 2019). The transplantation of eelgrass beds relates to the harvesting of plants from an existing eelgrass bed and transplanting them to the chosen restoration site (MMO, 2019). For this method to be successful, it is necessary to anchor the eelgrass to the seabed until the roots can take hold themselves (MMO, 2019). Transplantation can be done either by hand-diving techniques or via machinery, although it should be noted that while transplantation by machinery has the best short-term results, hand-planting is the best method for long-term success.

17.7.9 A review of the success of difference eelgrass creation techniques however has shown that using seedlings is the least successful method that has been used, whereas seeds have a higher success rate, and the best method is that of transplanting rhizome fragments using weights. It should be noted that any weighting technique (such as using sand bags, stones or shells) used for eelgrass creation is the most successful method (van Katwijk *et al.,* 2016).

17.7.10 The most important factor to consider is the specific habitat that is required by eelgrass, and the need to ensure the chosen site is suitable. Eelgrass beds typically occur in shallow water (up to 7m in depth), in fully marine conditions with muddy to relatively coarse sediments (although can be found with a mixture of gravel). Reduced levels of salinity can be tolerated (as low as 20ppt), but lower salinity impedes growth. Eelgrass beds require areas that are sheltered from strong wave actions, with a required current velocity of 5cm/s - 180cm/s (MMO, 2019).

17.7.11 As shown in **Figure 7-23**, the current velocity at the location of the eelgrass beds within Longue Hougue South on the peak of the high tide is less than 100cm/s close to the coast, and up to 500 cm/s further offshore, and at low tide the current speed is less than 200cm/s. This suggests that the eelgrass beds are growing in current speeds that are higher than should be possible. Once the breakwater is in place, the current speeds will change slightly within the Belle Grève Bay area, indicating an optimal site of potential translocation if this mitigation is taken forward, with a resultant current speed of less than 300cm/s in peak high tides, and less than 100cm/s in peak low tides. Overall, the potential translocation area in Belle Grève Bay has lower predicted current velocities than the location of the eelgrass found in Longue Hougue South. This suggests that this site may be more appropriate for eelgrass habitats than the current location within Longue Hougue South and would be a good potential translocation site.

17.7.12 The number of eelgrass seeds or plants used also has a significant effect on the success rate of eelgrass creation. Between 1,000 and 10,000 seeds or plants has been shown to be the best balance between survival and mean growth rates in the future. Other factors to consider ensuring that the site is deep enough that eelgrass will not be affected by surface wave dynamics, but shallow enough that sufficient light is present (van Katwijk *et al.,* 2016).

17.7.13 Evidence suggests that in several cases eelgrass is successfully transplanted, and will survive for one to two years, but will then be unable to grow or expand for the following years. Therefore, any monitoring of the success of the eelgrass relocation should be undertaken over several years to ensure its long-term success, not just the short-term success of the translocation (of at least 3 years). This should be done in the months were eelgrass is at its most abundance (i.e. in the summer). A supplementary plan of further re-seeding will be implemented if it is observed that there are significant areas of eelgrass die off.

17.7.14 It should be noted that although there is now a large amount of information available for the successful transplantation of eelgrass, the success rates of these projects are still very low, with 60% of transplantation projects failing (MMO, 2019), compared to a few that have resulted in large successes with rapid expansion in eelgrass beds. With transplantations of more than 100,000 shoots, it is expected that more than 40% would survive, however, if there is less than 100, just 20% would be expected to survive. For between 1,000 and 10,000 plants (the expectation for the Project site), the survival rate would be approximately 35%.

17.7.15 A case study has been included below to demonstrate a potential method of re-location of eelgrass beds.

17.7.16 The restoration of eelgrass in a similar setting to that of the site, with a rocky coastline punctuated by sandy bays investigated several different factors that could impact on the successful transplantation of eelgrass (Paolo *et al.,* 2019). The harvesting method used was sods with eelgrass within their natural sediment. Eelgrass plants were taken from water depths of 1m to 5m, collected with their original sediment of 20 x 20 x 5cm in size, by divers using small hand tools before being placed into non-buoyant plastic trays (Paolo *et al.,* 2019; **Figure 17-20**).

17.7.17 These sods were moved by boat to the chosen site, where they were placed back underwater within 30 minutes, and re-planted within 24 to 36 hours. If required to be moved for a longer distance, the sods should be submerged in seawater. Once at the transplant site, sods were removed from the trays by hand and placed in a depression in the seabed created by the diver, being careful to ensure each sod is placed to the same sedimentation depth (Paolo *et al.,* 2019).

17.7.18 The eelgrass transplanted in spring generated bigger eelgrass areas than those done in summer and autumn. The most successful transplantation saw an increase from the transplanted eelgrass bed of 11m^2 to almost 10 times the size (to 103m^2) in a period of eight years (Paolo *et al.,* 2019), whereas the smaller eelgrass beds (of 1m^2) were not as successful (**Figure 17-21**). This was the largest eelgrass bed transplanted, suggesting that the size of the bed is one of the most important factors in the long-term success.

Figure 17-20 Methodology of Harvesting Eelgrass Sods by Hand (Paolo et al., 2019)

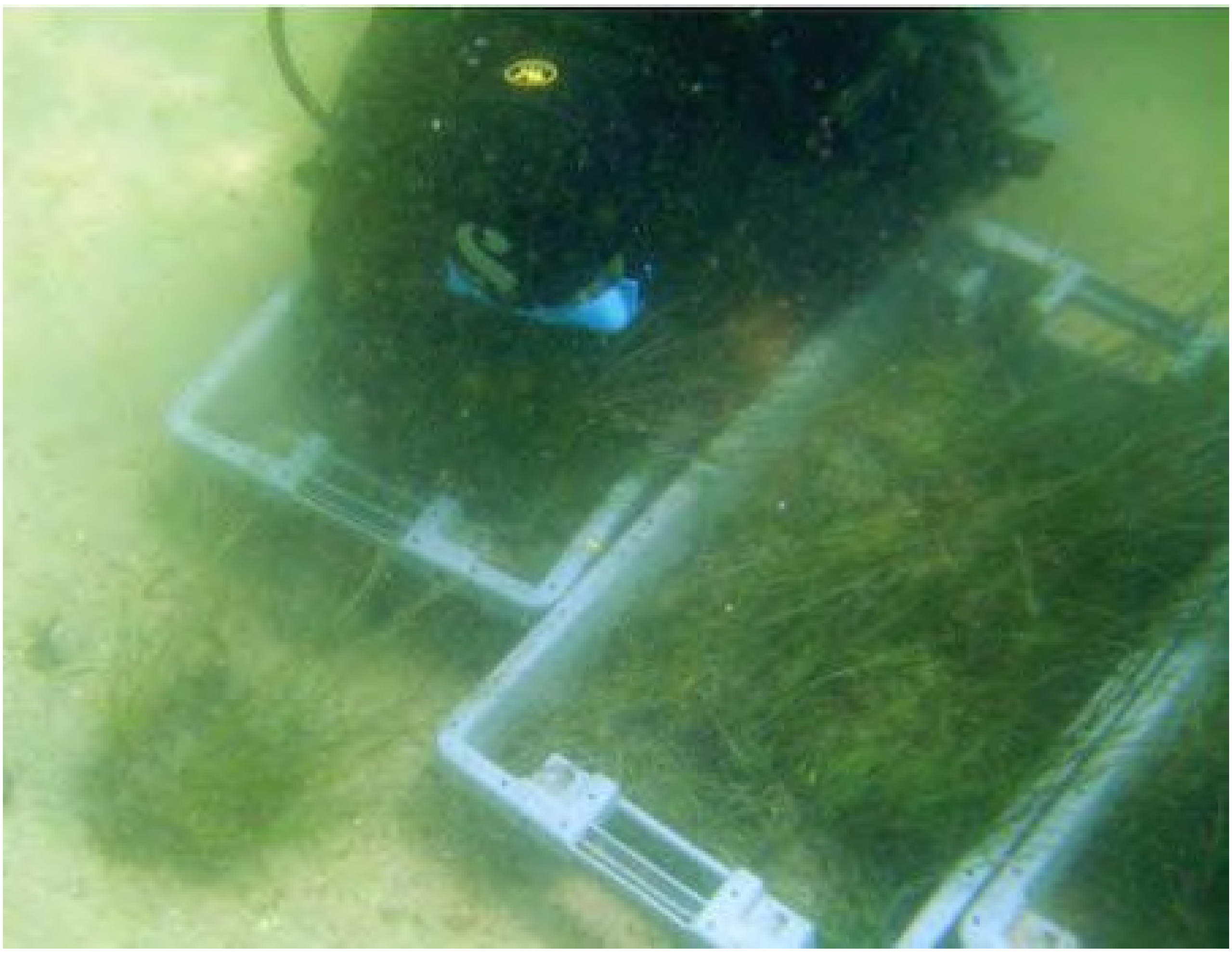


Figure 17-21 Success of Eelgrass Re-location of 11m² (left) Compared to Less Successful Translocation of 1m² (right) (Paolo et al., 2019)

17.7.19 In summary, the following criteria would need to be considered when identifying the most suitable areas of eelgrass creation, if this mitigation was taken forward:

- Be close to the donor site to ensure quick re-planting;
- Water depth of less than 7m to ensure adequate light levels, but deep enough to ensure no interference from surface wave action;
- Seabed made up of muddy to coarse sediments;
- A salinity of more than 20ppt;
- Clear water to allow for strong light penetration; and
- Tidal currents of less than 0.18m/s.

17.7.20 Taking into account the above list of habitat requirements for eelgrass translocation, an area within Belle Grève Bay close to the existing eelgrass beds could be the most suitable area. Its proximity to the current eelgrass habitat within the Longue Hougue South means that swift re-planting of the eelgrass would be possible, water depths in this area are between 1.7m and 3.6m in depth (the same as for the eelgrass beds in Longue Hougue South) and similar seabed sediments.

17.7.21 The most successful methodologies of eelgrass creation include the following:

- Translocation of seeds, rhizome fragments or sods are the most successful methods;
- Plants should be weighted to the sea bed until plants are stable (using sandbags, stones or shells);
- Hand diving techniques provide better long-term success rates; and
- Between 1,000 and 10,000 plants or seeds should be re-located to ensure long-term survivability and high-growth rates.

Monitoring

17.7.22 Following translocation of the eelgrass bed, annual monitoring should be carried out to determine the success of the re-colonisation and growth of the eelgrass. Monitoring should be undertaken for a minimum of 2 years to confirm successful establishment and increasing growth.

OPERATIONAL IMPACT 17.5: Increased Suspended Sediments

17.7.23 The infill operations behind the breakwater could potentially result in some escape of sediments through the breakwater as it is ‘permeable’ and seawater will pass through it on incoming and outgoing tides. The levels of suspended sediment that may ‘discharge’ out of the site will be highly dependent on the inert waste material being infilled, the method of infill (and compaction etc), and the time over which these take place, alongside the relevant tide state.

17.7.24 Seawater flow through the breakwater will be limited at slack tide, whilst the potential for re-suspension and 'discharge' of suspended sediments would only occur on outgoing tides. A function of the potential for sediment re-suspension will also be the degree to which sediments become entrained within the breakwater structure as well as the infill material itself. Given all these uncertainties, consideration of the historical infilling at Longue Hougue has not identified suspended sediment discharges as being a frequent or significant issue or concern. Any resuspended sediment discharges will also have been influenced by the open section of breakwater at the north of Longue Hougue, which would not be present as a 'pathway' for suspended sediments to discharge out from Longue Hougue South.

17.7.25 Finally, the bay is a dynamic environment with high energy wave action and tidal movements, and any sediment released will rapidly dissipate. Overall therefore, given that the infill material is inert, **no impact** is predicted on marine and intertidal habitats and species (or related designated sites) as a result of Longue Hougue South.

OPERATIONAL IMPACT 17.6: Physical Disturbance and Habitat Alteration

17.7.26 The presence of the breakwater within the bay will result in changes to the tidal currents (see **Section 7.8**) and this could result in alteration to the physical characteristics of the marine environment for habitats and species in those areas of change, and changes to the patterns of erosion and deposition of sediments in the surrounding area. **No impact** is expected above which has been assessed for both habitat loss and the increase in suspended sediments as described above, and those assessments are therefore relevant for this impact during the operational phase of the project.

OPERATIONAL IMPACT 17.7: Changes to Habitats in Herm, Jethou and the Humps Ramsar

17.7.27 The Herm, Jethou and the Humps Ramsar site is designated for a range of marine features, including eelgrass beds, maerl beds, and shallow reef systems. The site also supports a range of marine species, including flatfish and shellfish species, seabirds, basking shark, sun fish and marine mammals. The Herm, Jethou and the Humps Ramsar site is located 5km from the proposed development. There is the potential that a change in coastal processes could affect the marine habitats and species within the Ramsar Site, however, as assessed in the coastal processes chapter (**Section 7**), modelling has shown that the change in coastal processes due to the development will only extend as far as Russel Channel, and no effects from the development are expected at that distance. Therefore, no effects on the marine receptors are identified to occur near Herm Island, and therefore there will be **no impact** to this Ramsar site.

OPERATIONAL IMPACT 17.8: Changes to Marine Habitats Due to a Change in Tidal Flow Rates

17.7.28 With the exception of maerl beds, none of the marine habitats that were identified within the Marine Ecology survey, that have the potential to be impacted by a change in current regime due to the constriction of the breakwater, are sensitive to a change in current or tidal flows, and therefore they will not be impacted.

17.7.29 Maerl beds require a certain degree of shelter from strong wave action in order to prevent burial and dispersal into deeper waters, but they also require flow rates sufficient to prevent any smothering from nearby sediments (Hall-Spencer, 1998). Maerl beds are therefore noted to be present in areas with strong tidal currents, of between 0.5m/s and 0.7m/s (Hall-Spencer *et al.,* 2006) with some locations having lower mean flow rates of 0.11m/s to 0.12m/s and 0.21m/s to 0.47m/s, depending on depth above the seabed. In the UK, maerl beds have been noted to be absent at velocities lower than 0.37m/s, and above 0.8m/s, indicating a preference of tidal current speeds of between that value (Hall-Spencer *et al*., 2008).

17.7.30 An increase in tidal flow rates (to strong or very strong) could result in the loss of the surface of maerl beds, and the live layer of *Phymatolithon calcareum*. It is noted however that maerl beds located in moderately strong water flow would be less sensitive to an increase in flow rates of 0.1m/s to 0.2m/s, than maerl beds that are located in weaker flows (Perry & Tyler-Walters, 2018).

17.7.31 The maerl beds located near Longue Hougue South are in already moderately strong tidal flows, and so are less sensitive to any change in flow rates, with tidal flows of 0.5m/s to 1.4m/s in flood tides, and 0.2m/s to 0.4m/s in ebb tides. The change after construction of the breakwater at the locations where maerl beds have been found is expected to be an increase of 0.06m/s to 0.2m/s at some locations and, as well as a reduction of 0.08m/s in flood tides, and no change is expected at the maerl bed locations during ebb tides (see **Chapter 7** for more information on the expected change in tidal flow rates).

17.7.32 Due to the already moderately strong tidal currents maerl beds are exposed to, and the very small change expected at those locations, and that maerl beds within moderately strong tidal areas are not sensitive to small tidal changes, and **no impact** is predicted on maerl beds due to changes to tidal currents after construction.

17.8 Cumulative Impacts

17.8.1 The Screening of projects for the potential for cumulative effects is described in **Chapter 5 EIA Methodology** and presented in **Table 5-4** and **Figure 5-2**. Of the developments identified, three have the potential to have cumulative impacts on the marine ecology receptors with the project:

- Mont Crevelt Breakwater, Longue Hougue, St. Sampson: Infill of existing temporary opening formed in existing breakwater as part of works for St. Sampson's marina project [Application Number: FULL/2018/0218].

17.8.2 All other potential cumulative projects that have been considered are too far away, or do not have the potential to have impacts on the marine environment or have already been completed (and therefore considered to be a part of the baseline environment) and as such are screened out.

Mont Crevelt Breakwater

17.8.3 Although the outer boundary of the Mont Crevelt works is 290m from the project boundary, the distance by sea to the gap in the breakwater to be infilled is approximately 640m. Based on the small scale of the works, assuming the filling process will cause similar impacts to those discussed in the above sections, and the pathway of effect (distance at sea) between the two sites there is no possibility for cumulative effects as a result of the two projects. It is considered that there is no link hydrodynamically due to the intervening Longue Hougue Reclamation Site and breakwater, and there is also therefore no overlap of current flows and sediment and accretion flows. Whilst there is an eelgrass patch to the north of the existing Longue Hougue Reclamation Site, it is outside the entrance to St Sampson's harbour at the northern edge (estimated to be more than 300m from the Mont Crevelt Breakwater) and therefore there will no further disturbance or loss of eelgrass as has been assessed for Longue Hougue South alone. **No cumulative impact** is therefore predicted.

17.9 Summary

17.9.1 **Table 17-32** below provides a summary of all impacts assessed on the designated sites, the intertidal and subtidal habitats (including eelgrass and maerl beds), marine mammals and commercial fish species, including any mitigation required.

Table 17-32: Summary of Impacts on Marine Ecology

Impact	Significance	Mitigation	Residual Impact	Monitoring
Construction				
Disturbance to habitat in the Foreshore ABI	Minor adverse	None	Minor adverse	None
Disturbance to intertidal habitat	Negligible to Minor adverse	None	Negligible to Minor adverse	None
Disturbance to fish habitats	Negligible	None	Negligible	None
Disturbance to eelgrass beds	Moderate adverse	Translocation and / or seeding	Minor adverse	Long term monitoring of success of mitigation
Increased suspended sediments and contamination – marine habitats	Negligible to minor adverse	None	Negligible to minor adverse	None
Increased suspended sediments and contamination – fish habitats	Negligible	None	Negligible	None
Increased suspended sediments and contamination – maerl beds	Minor adverse	Not required	Minor adverse	Not required
Increased suspended sediments – commercial fish species	Negligible to minor adverse	None	Negligible to minor adverse	None

Impact	Significance	Mitigation	Residual Impact	Monitoring
Collision risk with marine mammals	Minor adverse	None	Minor adverse	None
Cumulative Impacts – all marine habitats and species	No impact	None required	No impact	None required
Operation				
Loss of habitat in the Foreshore ABI	Minor adverse	None	Minor adverse	None
Loss of intertidal habitat	Negligible to Minor adverse	None	Negligible to Minor adverse	None
Loss of fish habitat	Negligible	None	Negligible	None
Loss of eelgrass beds	Moderate adverse	Translocation and / or seeding	Minor adverse	Long term monitoring of success of mitigation
Increased suspended sediments - habitats	None	Not required	None	None
Increased suspended sediments – maerl beds	None	Not required	None	Not required
Increased suspended sediments – fish species	None	Not required	None	Not required
Physical disturbance / habitat alteration – Foreshore ABI	Minor adverse	None	Minor adverse	None

Impact	Significance	Mitigation	Residual Impact	Monitoring
Physical disturbance / habitat alteration – intertidal habitats	Negligible to Minor adverse	None	Negligible to Minor adverse	None
Physical disturbance / habitat alteration - fish habitats	Negligible	None	Negligible	None
Physical disturbance / habitat alteration – eelgrass beds	Moderate adverse	Translocation and / or seeding	Minor adverse	Long term monitoring of success of mitigation
Changes to Herm, Jethou and the Humps Ramsar	No impact	None required	No impact	None required
Changes to marine habitats due to a change in tidal flow rates	No impact	None required	No impact	None required
Cumulative Impacts – all marine habitats and species	No impact	None required	No impact	None required

18 Terrestrial Ecology and Ornithology

18.1 Content and Data

Content

18.1.1 This section examines the potential impacts arising from the project, as described in **Section 4** of this report, on the following receptors:

- Designated sites;
- Terrestrial habitats and species;
- Broadscale intertidal habitats (specific intertidal communities are described and assessed in **Section 17: Marine Ecology**);
- Scaly cricket; and
- Terrestrial and marine birds.

Study Area

18.1.2 The study areas for consideration of potential ecological impacts have been selected based the different ecological ranges of sensitive species, and on the location of sensitive habitats and sites. These are described in turn below.

18.1.3 Initially, impacts were to be considered within 5km for the Ramsar Site because of the risk that a change in coastal processes could extend this far. However, following the assessment of the coastal process modelling results and patterns of change (see **paragraph 7.8.7 to paragraph 7.8.12**), which concludes that changes will be localised, this has been reduced to 1km.

18.1.4 Impacts will be considered within 2km for all other designated ecological receptors (SSS and ABI) because it is not expected that indirect impacts would occur outside of this distance.

18.1.5 The study area for disturbance to birds is 500m, because noise and visual disturbance is not anticipated at greater distances (Burton *et al*., (2002); Cutts *et al*., (2009); Mander & Cutts (2003); Mander & Cutts (2004)) indicate that in general, effects are confined to areas within 250m of the sources of disturbance during construction. This is further supported by other studies examining disturbance from humans (Laursen *et al*., 2005).

18.1.6 The study area for scaly cricket and non-designated habitats present on site is 100m based upon professional judgement because it is not expected that indirect impacts would occur outside of this distance.

Data Sources

Desk Study

18.1.7 Data has been obtained from the following sources:

- AmecFosterWheeler (2015). Waste Development at Longue Hougue Environmental Statement.
- Ch2mHill Halcrow (2015). Belle Grève Outfall Environmental Report.
- Environment Guernsey Limited (2015). Terrestrial Habitat Survey Longue Hougue South.
- Guernsey Biological Records Centre Data Search.
- Guernsey Birds Website (Species data records).
- JNCC (2010). UK Overseas Territories and Crown Dependencies: 2011 Biodiversity snapshot.
- Royal HaskoningDHV (2017). Guernsey Inert Waste Management Strategy High Level EIA.
- States of Guernsey Environment Department (2010). Habitat Survey of Guernsey, Herm and Associated Islands.
- States of Guernsey Environment Department (2013). Sites of Special Significance and other designated Nature Conservation Sites.
- States of Guernsey Environment Department (2015). A Biodiversity Strategy for Guernsey.
- States of Guernsey (2016c). Island Development Plan: Written Statement and Proposals Map, November 2016.
- States of Guernsey Environment Department (2019, unpublished). Habitat Survey of Guernsey, Herm and Associated Islands, 2018.
- States of Guernsey Website: Nature Reserves. Available at https://gov.gg/nature.
- Consultation with La Société Guernesiaise and data from their website for scaly cricket data. Available at http://www.societe.org.gg/sections/entomology/scaly/scaly.html.

Surveys

18.1.8 The following surveys have been carried out to inform this EIA:

- Scaly cricket survey (**Appendix 18.1**).
- Overwintering bird survey (**Appendix 18.2**).
- Site walkover by RHDHV ecologist.

18.1.9 An initial survey for scaly cricket was carried out at Spur Point in 2018 to confirm its presence or otherwise. The survey was extended to all suitable habitats (identified as shingle in the 2010 habitat survey) across Guernsey in July 2019 to capture the species data on an island basis. This gives context to the impact to the species population on Guernsey because of the proposed development.

18.1.10 A wintering bird survey was commissioned which included one visit per month through the winter months (October 2018 to April 2019), which established the nature of the use of the site by birds recorded, i.e. seasonal differences and activities (i.e. foraging, overwintering, migrating or other), to determine the importance of the site relative to the wider area for seabirds as well as other bird species that used the area. Detailed analysis of this data will include abundance and density estimates.

Assumptions and Limitations of Data

18.1.11 Ecological surveys are limited by factors which affect the presence of plants and animals such as the time of year, migration patterns and behaviour. All survey data is valid for two years, should construction be delayed beyond this from the date of survey, it will be necessary to repeat surveys to confirm that no changes to the baseline environment have occurred.

18.1.12 The surveys detailed above have allowed for an assessment of the ecological value of the site, the potential for ecological constraints to the works and the likely requirements for mitigation.

18.1.13 The sensitivity of each species will be determined based on the size of its population, its conservation status and its known sensitivity to disturbance. Species identified as sensitive receptors will be subject to full impact assessment against the impacts listed above. The impact assessment will be undertaken in line with guidance by CIEEM (2018) and expert opinion.

18.2 Legislation and Policy Context

18.2.1 The following legislation and policy documents are relevant to this chapter:

- Agreement on the Conservation of Populations of European Bats, EUROBATS, 1991.
- Animal Welfare (Guernsey) Ordinance, 2012.
- Bern Convention (1982).
- Land Planning and Development (Environmental Impact Assessment) Ordinance, 2007.
- The Land Planning and Development (Guernsey) Law, 2005.
- Strategic Land Use Plan, 2011.
- Island Development Plan, 2016.
- Guernsey Biodiversity Strategy (States of Guernsey Environment Department, 2015).

18.3 Baseline

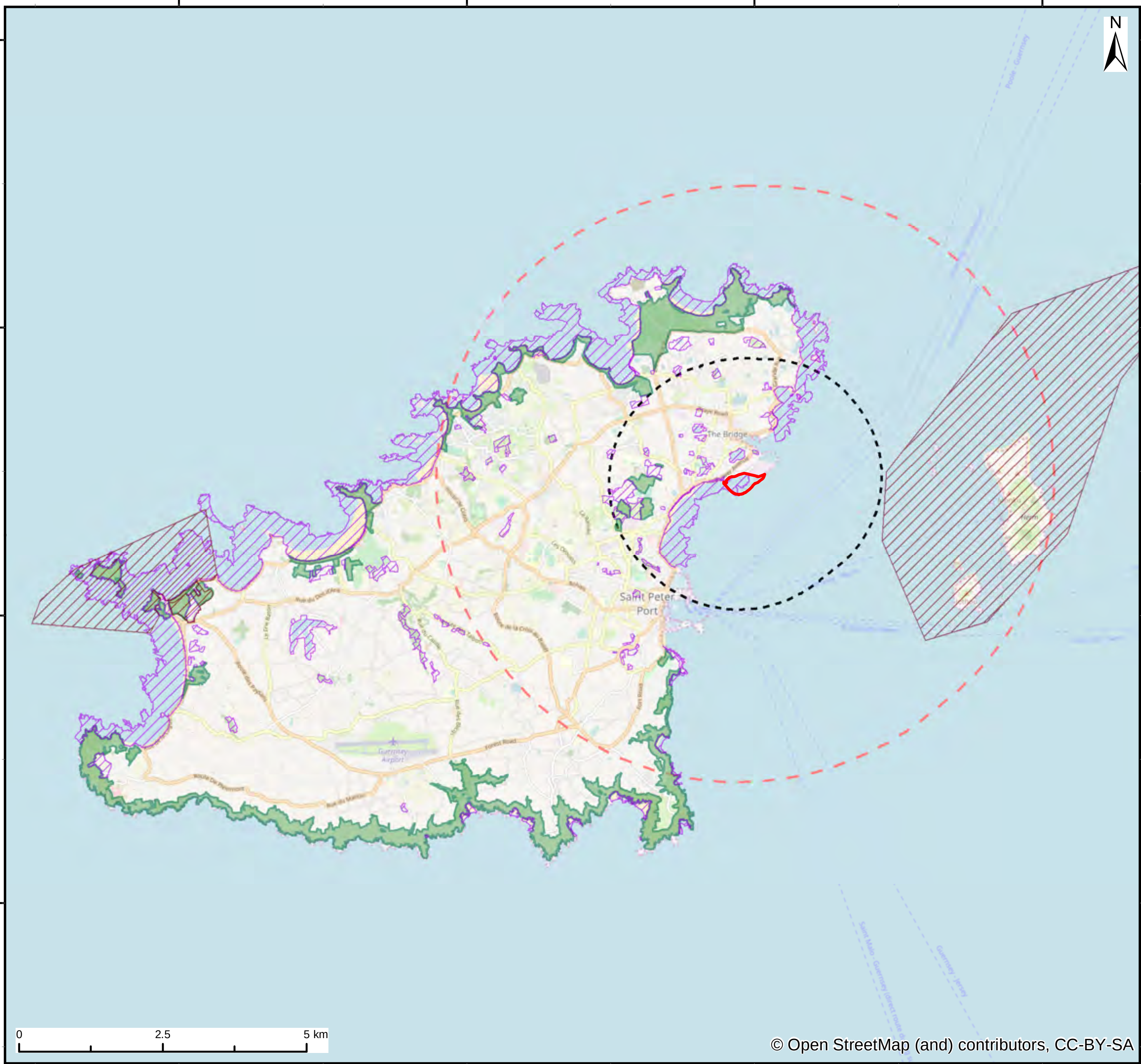
18.3.1 Guernsey uses a spatial approach to protect and enhance biodiversity on and around the Island through delineation of internationally, nationally and sub-nationally designated sites for nature conservation. These include Ramsar sites, Sites of Special Significance (SSS), and Areas of Biodiversity Importance (ABI). The designated sites in Guernsey are shown on **Figure 18-1**.

International Sites

18.3.2 The Herm, Jethou and The Humps was designated as a Ramsar site under The Convention on Wetlands of International Importance on 28th January 2016. The site was designated under Ramsar Criterion 6, as an important breeding area for lesser black backed gull *Larus fuscus*, puffin *Fratercula arctica*, and shag *Phalacrocorax aristotelis*.

National Sites

18.3.3 Areas of Biodiversity Importance (ABI), are areas which contribute significantly to the biodiversity of the Island despite not being designated as Site of Special Significance. Some of the ABIs support the special interest of a SSS by providing either natural buffers or wildlife corridors. Others do not have sufficient special interest to be designated as an SSS but nonetheless are important in supporting the biodiversity of the Island.



Legend:

Outline of Proposed Development
Proposed Development 2km Buffer
Proposed Development 5km Buffer
Ramsar Sites[1]
Sites of Special Significance[2]
Areas of Biological Importance[2]

[1]JNCC 2016
[2]Guernsey Government, 2013,
© HaskoningDHV UK Ltd.

Client:	Project:
States of Guernsey	Longue Hougue South EIA

Title:

International and National Nature Conservation Designations

Figure: 18.1 Drawing No: PB5312-300-001

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01	06/02/2019	FC	PT	A4	1:100,000

Co-ordinate system: Guernsey Grid

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18.3.4 There are 27 ABI sites within the 2km study area, with the Bulwer Avenue & Spur Point ABI being the only terrestrial site within the footprint of the development; the foreshore is also designated as an ABI and this is assessed within **Chapter 17 Marine Ecology**. It is designated for the presence of coastal grassland and pebble ridge above high tide level and small areas of coastal rocks and scrub, in addition to its intertidal habitats (**Plate 18.1 to Plate 18.4**). The area around Spur Point is important for roosting sea birds.

18.3.5 In 1997 Longue Hougue South (including Belle Grève Bay) was designated as an Important Bird Area (Veron, 1997). The use of the wider bay by various gull species and waders such as oystercatcher, turnstone, ringed plover, and grey plover was noted.

Habitats

18.3.6 Guernsey was subject to a full-island habitat survey in 1999, 2010, and 2018. **Figure 18-2** identifies those habitats present within 100m of the Project. **Table 18-1** presents the habitat types and extents. In addition, a site-specific survey was undertaken in 2015, and a walkover survey by RHDHV in July 2019.

18.3.7 The habitats recorded in 2018 noted a series of changes over the preceding decade, specifically:

- There has been an increase in woodland on Guernsey from 380ha to 489ha. Sixty hectares have changed classification following the succession of Dense Scrub to Semi-natural Broadleaved Woodland, and planting schemes.
- Scrub on Guernsey has increased from 315ha to 385ha. This is due to a lack of grazing/cutting management in some grasslands allowing succession to scrub.
- There was a decrease in shingle from 16ha to 13ha. The decrease in area of Shingle since 2010 is mostly due to reclassification to Rock, again due to aerial photographic interpretation rather than an actual change in habitat. In certain locations, such as the western side of Port Grat, erosion has led to the loss of shingle levels. This may be due to recent storm events, rather than highlighting long term trends, again, analysis of beach level surveys may be required to determine this. Rock was recorded as decreasing from 15.97 ha to 11.99ha (25% decrease) and coastal grassland decreased area from 74.03 ha to 11ha (85% decrease).
- The abundance of other rarer habitats has also decreased, especially species-rich dry grasslands contributing to an overall decline in Guernsey's biodiversity (States of Guernsey Environment Department, 2010).

Plate 18.1 Intertidal and Terrestrial Habitats within the ABI

Plate 18.2 Intertidal Habitats within the ABI

Plate 18.3 Scrub Habitat within the ABI

Plate 18.4 Scrub Habitat at Spur Point

Table 18-1: Terrestrial Habitats Recorded on Guernsey during the 2010 and 2018 (draft) Habitat Survey

Habitat category	Habitat classification	2010 Area (ha)	Proportion of greenspace (%)	2018 Area (ha)	Proportion of greenspace (%)
Miscellaneous	Amenity Grassland	691	11	752	12
Tall herb and Fen	Tall ruderal	32	0.5	48	0.68
Woodland	Dense Scrub	315	4.9	385	6.1
Coastland	Dune Grassland	84	1.3	67	1.1
Maritime cliff and slope	Coastal Grassland	74	1.2	11	7.1
Maritime cliff and slope	Hard Cliff	59	0.92	3.4	2.2
Dry grasslands	Parkland	56	0.88	51	0.8
Open water	Standing Water	48	0.75	43	0.68
Woodland	Planted Mixed Woodland	35	0.55	63	0.99
Coastland	Shingle	16	0.26	13	0.2
Coastland	Rock	12	0.19	29	0.46
Coastland	Sand / Mud	4.3	0.07	13	0.2

18.3.8 In addition to the habitats listed above, in 2015 a Terrestrial Habitat Survey was undertaken at Longue Hogue South. This survey identified the presence of a dry-stone wall on the landward boundary of the footpath which supports a rich community of lichens, mosses and ferns. Walls such as this are widely recognised as habitat corridors, offering refuge for invertebrates and small mammals, but are relatively scare in Guernsey (2.5% of all boundaries surveyed during the 2010 habitat survey of Guernsey were dry-stone walls).

Legend:

Outline of Proposed Development

Habitat Type[1]

- A Amenity Grassland
- Bare Ground
- C Coastal Grassland
- Dense Scrub
- Intertidal Rock and Boulders
- Intertidal Sand
- Intertidal Shingle
- Planted Mixed Woodland
- Rock
- Sand / Mud
- Shingle

[1] Guernsey Government, 2018

Client:	Project:
States of Guernsey	Longue Hougue South EIA

Title:

Habitat Survey Results

Figure: 18.2 | Drawing No: PB5312-300-002

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Co-ordinate system: Guernsey Grid

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Species

18.3.9 A data search from the Guernsey Biological Record Centre (GBRC) was undertaken to collate existing records of protected species within 2km of the site (i.e. any species covered by the legislation in **Section 18.2**). The data is summarised in **Table 18-2**. As this data was not available during the scoping report, the potential for impacts is screened in **Table 18-2**. Only those species with the potential for impacts are considered further in this report.

Table 18-2: Protected Species Records from within 2km of the Project Site

Species	Location	Potential for direct or indirect impact?	Scoped in to EIA?
Green hairstreak butterfly	1.5km	No, considered to be too distant from the Project to be affected.	No
Cape cudweed	1.5km	No, considered to be too distant from the Project to be affected.	No
Common pipistrelle	1.5km	Yes, suitable habitat for roosting, foraging and commuting is within the study area.	Yes
Greater white-toothed shrew	2km	Yes, suitable habitat for this species is present in the garden and woodland adjacent to the site as well as the dry-stone wall.	Yes
Dictyna latens (spider species)	2km	Yes, suitable habitat for this species is present in the garden and woodland adjacent to the site as well as the dry-stone wall.	Yes
Grey long-eared bat	2km	Yes, suitable habitat for roosting, foraging and commuting is within the study area.	Yes
Loose-flowered orchid	2km	No, this species grows in wet meadows with alkaline soil which is not present adjacent to the site. The population 2km away is too distant to be affected by the Project.	No
Scaly cricket	>500m	Yes, known to be present at Spur Point.	Yes
Slow-worm	2km	Yes, suitable habitats are present within the grassland and gardens adjacent to the Site.	Yes
West European hedgehog	1km	Yes, suitable habitats are present within the grassland and gardens adjacent to the Site.	Yes

Bats

18.3.10 The GBRC data set identified Common pipistrelle (*Pipistrellus pipistrellus*) and grey long-eared bat (*Plecotus austriacus*) within 2km of the Project.

18.3.11 The 2019 walkover of the site identified several mature trees within the private gardens adjacent to the site boundary that have the potential to support roosting bats. In addition, the scrub / woodland boundary and the intertidal both provide foraging and commuting habitat for bats. These species of bat are listed in EUROBATs (Annex 1) therefore they are considered to be internationally important.

Reptiles

18.3.12 Suitable habitats for slow worm are present in the open grassland habitats, and any grass piles that may be present within the private gardens. There is no suitable habitat within the proposed construction and operational areas.

18.3.13 Suitable habitat for green lizard is present in the dry-stone wall along the boundary of the Project.

18.3.14 All of these reptile species are listed on Annex II of the Bern Convention; therefore, they are considered to be internationally important.

Small Mammals

18.3.15 Suitable habitats for small mammals are present within the dry-stone wall, scrub/hedge habitats and gardens. Greater white-toothed shrew (*Crocidura russula*) and West European Hedgehog have both been recorded within the study area and suitable habitat for both species is present adjacent to the Project boundary. In addition, there is potential habitat for Guernsey vole (*Microtus arvalis sarnius*). Small mammals are listed on the Animal Welfare Ordinance and are therefore considered to be of national value.

Other Species

18.3.16 In addition to the species listed from the site walkover and GBRC data, the following are identified in A Biodiversity Strategy for Guernsey (States of Guernsey Environment Department, 2015). This sets out a strategy to identify priority species for Guernsey, which will then be subject to an action plan to ensure their protection. These species are yet to be confirmed, however the list below summarises those species identified as notable species present in Guernsey's terrestrial habitats (JNCC, 2010). It should be noted, that although scaly crickets are known to be present on Guernsey, they are not detailed in the Biodiversity Strategy and are therefore not present in the list below.

Terrestrial Mammals

- Guernsey Vole *Microtus arvalis sarnius*.

Insects

- Blue-winged Grasshopper *Oedipoda caerulescens*;
- Mole Cricket *Gryllotalpa gryllotalpa*;
- Glanville Fritillary *Melitaea cinxia*; and
- Dung Beetle *Copris lunaris*.

Plants

- Guernsey fern *Asplenium x microdon*;
- Guernsey spleenwort *Asplenium x sarniense*;
- Guernsey centaury *Exaculum pusillum*; and
- Guernsey lily *Nerine sarniensis*.

Invasive Species

18.3.17 Invasive species are a problem within Guernsey because it has been isolated from mainland Europe since the last ice age. The following terrestrial species pose a current threat to native Guernsey flora and fauna as set out in the States' Biodiversity Strategy 2015 (2018):

- Hottentot fig *Carpobrotus edulis*;
- New Zealand pigmy weed *Crassula helmsii*;
- Japanese knotweed F*allopia japonica;* and
- Pampas grass *Cortaderia selloana*.

18.3.18 None of these species listed were identified as present during the 2015 or 2018 habitat survey, nor the 2019 walkover. They are not considered further in this assessment.

Scaly Cricket

18.3.19 The shingle habitat within Spur Point and Grève Bay are known for the scaly cricket *Pseudomogoplistes vicentae*, which is only known from few sites in Great Britain, the Channel Islands and Northern France and consequently is classified as endangered in Great Britain. In 2018, scaly cricket was only known from five beaches within Guernsey: Spur Point, Belle Grève Bay, and at three locations between Portinfer and Pecqueries.

18.3.20 Surveys carried out in 2018 and 2019 (**Appendix 18.1**) have confirmed the presence of scaly cricket at a further seven locations: two separate beaches on the Lihou Island headland, two separate beaches on the Fort Richmond headland, La Banque, Herm Island and L'Ancresse. These locations are shown in **Appendix 18.1**, Figure 1.

Overwintering Birds

18.3.21 Overwintering Bird Surveys were undertaken at Spur Point between October 2018 and April 2019. The findings are presented in **Appendix 18.2** with a summary presented in **Table 18-3**. Incidental bird species were also recorded the wintering bird surveys, these are summarised in **Table 18-4**. **Table 18-5** and **Table 18.6** provides details of the bird activity recorded during the survey and the known contextual information for each species from Guernsey.

Table 18-3: Summary of Overwintering Bird Surveys

Species	Month and peak numbers recorded						
	01/11/18	30/11/18	28/12/18	28/01/19	27/02/19	29/03/19	30/04/19
Shelduck	0	0	0	0	0	0	(2)
Brent goose	0	(7)	(3)	0	4	0	0
Cormorant	(6)	2 (2)	(2)	(1)	1	1	(1)
Shag	5	3 (1)	3 (4)	4	6	2 (1)	3 (1)
Gannet	0	(1)	0	0	(1)	(1)	(1)
Grey heron	1 (1)	0	0	0	0	1	0
Little egret	1	1	0	0	1	1	2 (1)
Peregrine falcon	0	0	(1)	0	0	0	0
Kestrel	1	1	0	0	0	0	0
Oystercatcher	9 (1)	11	10	(1)	12	1	9
Turnstone	7	(35)	0	0	0	0	0
Curlew	2 (10)	1	0	(1)	3	1	1

Species	Month and peak numbers recorded						
	01/11/18	30/11/18	28/12/18	28/01/19	27/02/19	29/03/19	30/04/19
Whimbrel	0	0	0	0	0	0	1
Black-headed gull	12	(41)	(29)	(63)	4 (1)	0	0
Great black-backed gull	2 (3)	(3)	(4)	(6)	2 (3)	2 (6)	(7)
Lesser black-backed gull	0	0	0	(1)	(2)	(6)	10 (7)
Herring gull	93 (9)	(65)	(79)	3 (10)	7 (42)	2 (75)	12 (29)
Sandwich tern	2	0	0	0	0	0	0

Note: Numbers shown in brackets indicate bird species flying over the site but not using the foreshore.

Table 18-4: Incidental Bird Sightings during Wintering Bird Survey

Species	Month and peak numbers recorded						
	01/11/18	30/11/18	28/12/18	28/01/19	27/02/19	29/03/19	30/04/19
Woodpigeon	2 (6)	0	1	2 (2)	1 (12)	6	3
Stock dove	0	0	0	(1)	2	2	1 (3)
Collared dove	0	0	2	0	1	2	(2)
Kingfisher	0	3	0	1	0	0	0
Swallow	0	0	0	0	0	0	(1)
Meadow pipit	1	0	0	0	1	0	0
Rock pipit	1	3	0	1	1	0	0
Grey wagtail	0	0	0	2	0	0	0
Pied wagtail	1 (3)	1	2	2	3	0	0
Magpie	1 (1)	0	0	1	2	1	2
Carrion crow	1 (2)	0	(4)	(8)	1 (4)	(6)	1 (4)

Species	Month and peak numbers recorded						
	01/11/18	30/11/18	28/12/18	28/01/19	27/02/19	29/03/19	30/04/19
Wren	1	3	1	1	2	2	1
Dunnock	1	1	1	0	2	1	1
Blackcap	0	0	0	0	0	0	1
Chiffchaff	1	2	0	0	0	0	0
Firecrest	0	0	1	0	0	0	0
Robin	2	1	4	4	2	3	1
Black redstart	0	1	0	1	1	0	0
Blackbird	2	3	2	2	4	1	2
Song thrush	0	5	0	0	0	0	0
Great tit	0	1	3	1	0	1	0
Blue tit	1	3	0	1	0	0	1
Long-tailed tit	0	0	6	1	0	0	0
House sparrow	15	0	12	2	11	3	12
Chaffinch	0	1	3	0	2	1	(2)
Greenfinch	0	3	7	3 (1)	3	(3)	2
Goldfinch	3	0	(2)	(2)	3	2 (5)	8
Linnet	0	(7)	0	0	0	0	0

Note: Numbers shown in brackets indicate bird species flying over the site but not using the foreshore.

18.3.22 A total of 46 species was recorded during the survey. The number of species recorded at each visit was relatively constant, varying between 24 (December, March) and 27 (November, February, April). None of the wildfowl, waders or gull species were noted as breeding within the Project boundary. Shelduck, gannet and peregrine falcon were only recorded flying over the site and are not considered to be using the site at all.

Table 18-5: Site and Guernsey Context for Wintering Birds

Species	Activity at Spur Point	Direct Impact Yes/No	**Known habitats and locations within Guernsey** (data from http://www.guernseybirds.org.gg/)
Shelduck	2 birds passing through in April 2019. No incidences of shelduck using the site.	No	Shelducks have recently increased as a local breeding species and now also gather in a pre-breeding group, numbering up to 50 individuals. Found at 32 locations around Guernsey on a variety of habitats. Highest numbers in 2018 were recorded at the Colin Best Nature Reserve (76).
Brent goose	Four Brent geese foraged at Longue Hougue South in February and two records of birds moving across the site in November and December. Other birds which were present in the north of the island did not use the area, indicating it was not a favoured foraging site.	Yes	Found at 40 locations within Guernsey, highest numbers in 2018 were recorded at Bordeaux (102).
Cormorant	Cormorants and shags are able to feed on the site when the tide is high and they were recorded on every survey visit. Both species tend to hunt as individuals, only loosely associating with other birds. Although only small numbers were observed (1 or 2 cormorant per month and between 2 and 6 shag), it is likely that the same birds were habitually foraging at the site.	Yes	The cormorant is a widespread but uncommon resident species whereas the Bailiwick of Guernsey has supported nationally important numbers of shag in the past. Due to a long-term decline however, the islands no longer meet this threshold and the species is red-listed in the UK. Despite this downturn, Guernsey still hosts significant numbers year-round. Found at 45 locations within Guernsey, highest numbers in

Species	Activity at Spur Point	Direct Impact Yes/No	Known habitats and locations within Guernsey (data from http://www.guernseybirds.org.gg/)
			2018 were recorded at Little Russel (50) and Herm 50).
Shag	Cormorants and shags are able to feed on the site when the tide is high, and they were recorded on every survey visit. Both species tend to hunt as individuals, only loosely associating with other birds. Although only small numbers were observed (1 or 2 cormorant per month and between 2 and 6 shag), it is likely that the same birds were habitually foraging at the site	Yes	Found at 30 locations within Guernsey, highest numbers in 2018 were recorded at Little Fort Doyle (20).
Gannet	Single gannets were recorded flying past on four visits. The shallow inshore nature of the site makes it unsuitable for Gannets to feed.	No	Found at 30 locations within Guernsey as well as recorded at sea. Highest numbers in 2018 were recorded at Longis Common (100).
Grey heron	Two incidences of a single bird were recorded in the 2018/19 wintering bird survey in November and March. Grey Heron is a non-breeding near-resident species found around the island's coasts. It favours sheltered bays and the relatively exposed nature to this site may make it less suitable as a feeding area.	Yes	Found at 60 locations within Guernsey. Highest numbers in 2018 were recorded at La Claire Mare (16). Individuals can be found throughout the year with 5-10 first year birds summering in most years. In autumn and winter roosts can develop with up to 25 birds at La Claire Mare, the Track Marais and Fort le Crocq. The highest counts tend to be in December and January particularly during periods of cold weather.

Species	Activity at Spur Point	Direct Impact Yes/No	**Known habitats and locations within Guernsey** (data from http://www.guernseybirds.org.gg/)
Little egret	The frequent use of the area by a little egret throughout the survey suggests the same individual was probably involved. The two birds recorded in April, with another flying over, highlights the likelihood that birds from the small colony on Jethou, the only breeding site in the Bailiwick, regularly forage at Longue Hougue South. The colony has remained small but stable since it was established in the 2000s.	Yes	Little egrets can now be found year-round with one or two non-breeding individuals remaining into May and June. Numbers start to increase from early July with birds dispersing from their colonies in France. Since both adults and immatures move away from the breeding areas it is likely that birds arriving in Guernsey will include both age groups. These birds tend to stay for the winter dispersing around the coasts. Communal roosts at high tide have been found at Les Rouvets, Hougue Pere Quarry and Lihou. Most birds will have departed by the end of March. Found at 54 locations around Guernsey. Highest numbers in 2018 were recorded at La Claire Mare (23) and Colin Best Nature Reserve (24).
Peregrine falcon	1 bird flying over in December 2018. Peregrines may frequently pass over the site as part of a network of locations visited. There was no evidence however, that the area was a preferred one for the species.	No	Found at 54 locations around Guernsey. Low numbers were recorded generally with a maximum of 5 recorded in 2018 at Fort Saumerez and Longis Common.

Species	Activity at Spur Point	Direct Impact Yes/No	Known habitats and locations within Guernsey (data from http://www.guernseybirds.org.gg/)
Kestrel	Two records of a single individual were observed in November 2018 (early and late month survey). There are very limited opportunities for kestrels to hunt at Longue Hougue South due to a lack of suitable grassland habitats.	Yes	Found at 54 locations around Guernsey. Low numbers were recorded generally with a maximum of 2 recorded in 2018 at a number of locations.
Oystercatcher	Typically 9 to 12 oystercatchers frequently foraged on the intertidal zone, favouring the rocky wave-cut platform on the northeast half of the area, with records made for all but one month of the 2018/2019 survey. The birds arrived 2-3 hours after high water, fed for several hours and then either rested or preened as the tide started to rise again. It is reasonable to assume that this small population is near-resident at Longue Hougue South, at least outside of the breeding season. Oystercatcher also occurs as a widespread breeding species and may use the area during the breeding season as well.	Yes	Found at 54 locations around Guernsey. Highest numbers in 2018 were recorded at Rocquaine (105) and Herm (50).
Turnstone	A small group (7 birds) of turnstones fed on site on one visit and a larger flock flew past on another occasion.	Yes	Found at 46 locations around Guernsey. Highest numbers in 2018 were recorded at Cobo (25) and Point Soif (25).

Species	Activity at Spur Point	Direct Impact Yes/No	Known habitats and locations within Guernsey (data from http://www.guernseybirds.org.gg/)
Curlew	1 to 3 curlews used the same parts of the site as oystercatcher and behaved in a similar fashion.	Yes	Found at 41 locations around Guernsey. Highest numbers in 2018 were recorded at Colin Best Nature Reserve (80).
Whimbrel	A single migrant whimbrel was present in April.	Yes	Found at 41 locations around Guernsey. Highest numbers in 2018 were recorded at Fort le Crocq (50).
Black-headed gull	This small gull overwinters in Guernsey and migrates to the Continent or the UK to breed. Reflecting this behaviour, black-headed gulls were commonly recorded during the first five survey visits but were absent in March and April. Birds were seen to forage at Longue Hougue South (12 in early November and 4 in February), mostly on higher tides and typically only in small numbers. The species was more often recorded in flight.	Yes	Black headed gulls were recorded at 49 locations around Guernsey. Highest numbers in 2018 were recorded at Grandes Havres (200).
Great black-backed Gull	This species was recorded in 30 of the 42 survey hours, usually as single birds or pairs flying over with two birds occasionally using the site (early November, February and March). Other sightings were of birds resting or roosting amongst herring gulls or by themselves on rocky outcrops just offshore.	Yes	Great black-backed gulls are widespread breeders on cliffs and islets although they do not generally form colonies: they prefer to establish a territory away from rival pairs. Recorded from 51 sites in Guernsey. Highest numbers in the 2018 survey were recorded at Lihou Island (100).

Species	Activity at Spur Point	Direct Impact Yes/No	Known habitats and locations within Guernsey (data from http://www.guernseybirds.org.gg/)
Lesser black-backed gull	Birds were recorded at Longue Hougue South from January onwards in increasing numbers as spring arrived. As with the other gull species, birds were not seen to forage on the site and most records were of flyovers, with the exception of April when 10 birds were observed using the site.	Yes	The Lesser Black-backed Gull is migratory and on the whole, winters in Southern Europe and North Africa. Early each year, birds journey north to reach Guernsey and re-establish breeding territories. They nest in various small colonies around the Bailiwick. Recorded from 35 sites on Guernsey with the highest numbers recorded at Colin Best Nature Reserve (129).
Herring gull	Herring gulls were numerous throughout the survey period with up to 93 recorded each hour either flying over or roosting on the intertidal reefs. On average, only a small number of birds would routinely use the bay for foraging but occasionally flocks were displaced from the nearby Longue Hougue quarry and would land on the beach. The flooded quarry was heavily used for drinking and feeding and most of the flyovers were heading to or from the site.	Yes	Despite the herring gull being the commonest breeding gull in the Channel Islands, it is red-listed as a UK species of conservation concern having experienced widespread declines in recent decades. Recorded from 69 sites on Guernsey with the highest numbers recorded at Rue des Hougues (129).
Sandwich tern	This species was only recorded in the first two hours of the early November 2018 visit. The 2 to 3 birds were probably late passage migrants although some individuals overwinter occasionally.	Yes	Recorded from 45 sites on Guernsey with the highest numbers recorded at Salerie Corner (115).

Table 18-6: Site and Guernsey Context for Incidental Birds

Species	Activity at Spur Point	Direct Impact yes/no	Known habitats and locations within Guernsey (data from http://www.guernseybirds.org.gg/)
Woodpigeon	Recorded using the site on six of the seven survey visits with a peak of six in March 2019. These birds were often recorded flying over the site but were associated with the wooded private property adjacent to Longue Hougue South, where several pairs held territory and were presumed to nest.	Yes	A resident species in the Bailiwick the Wood Pigeon is widespread but not particularly numerous. The scarcity of woodland habitat is probably a contributing factor combined with the small amount of arable cultivation. The evidence from British ringing recoveries is that their population moves very little in winter. This suggests that the large flocks which occur in the islands in both spring and autumn are continental in their origin. Recorded from 40 sites around Guernsey with the highest numbers in the 2018 breeding season recorded at Les Fauconnaires (40).
Stock dove	Two individuals using the site from February onwards. These birds were often recorded flying over the site but were associated with the wooded private property adjacent to Longue Hougue South, where several pairs held territory and were presumed to nest.	Yes	Primarily a bird of parkland, the forest edge and wooded farmland stock doves are now resident and occur widely on farmland and along the cliffs in the islands. Flocks of between 10 and 25 birds are regularly recorded in autumn and winter and these are believed to be local birds as the populations in both northern France and the UK are thought to be sedentary. However, obvious influxes have been reported with 180 birds in September 1993 and flocks of over 400 birds in November 1996 around Saumarez Park and Rue

Species	Activity at Spur Point	Direct Impact yes/no	Known habitats and locations within Guernsey (data from http://www.guernseybirds.org.gg/)
			des Transquesous. These are most likely to have been continental birds moving out of central Europe. The watch site at Carolles in Normandy which normally reports annual figures of between 100 and 800 had over 1,500 passing south at the end of October of the same year. In Guernsey, it is now a regular breeding species and species can be found around the south coast cliffs and in farmland, especially around the Fauxquets Valley area throughout the year. Recorded from 38 sites around Guernsey with the highest numbers in the 2018 breeding season recorded at Courtil de Bas (16).
Collared dove	Occasionally using the site from December onwards. These birds were often recorded flying over the site but were associated with the wooded private property adjacent to Longue Hougue South, where several pairs held territory and were presumed to nest.	Yes	Local concentrations occur around particular food sources with high counts of over 50 at Vale Pond, Paradis and Les Varendes. Recorded from 32 sites around Guernsey with the highest numbers in the 2018 breeding season recorded at Longis Common (9).

Species	Activity at Spur Point	Direct Impact yes/no	Known habitats and locations within Guernsey (data from http://www.guernseybirds.org.gg/)
Kingfisher	Kingfisher (Alcedo atthis) was seen fishing on the foreshore on two visits (late November and January). The bird recorded in January was present for three hours, indicating that the individual may have been favouring the area for extended periods.	Yes	Kingfishers are non-breeding visitors to the island in very small numbers. Those which overwinter often select a network of preferred freshwater and marine feeding locations for use in different weather conditions and tidal states. It is feasible that the November and January sightings were of the same individual which may have used Longue Hougue South frequently during the winter but remained largely undetected. Records of kingfisher from a number of east coast sites were submitted to the Guernsey Birds website during winter 2018-2019, including Belle Grève Bay, Salerie Corner and Candie Gardens (St Peter Port). Kingfisher was recorded in low numbers from 23 locations around Guernsey in 2018 including Longue Hougue and Belle Grève Bay.
Swallow	The single swallow passing over the site in April was considered to be a migrant heading north. No birds were recorded using the site.	No	Swallow was recorded at 55 locations around Guernsey in 2018, the highest numbers were recorded at Herm, Pleinmont, Mannez Lighthouse and Corblets Bay (500).

Species	Activity at Spur Point	Direct Impact yes/no	Known habitats and locations within Guernsey (data from http://www.guernseybirds.org.gg/)
Meadow pipit	Single meadow pipits were recorded using the site in November and February. These were considered to be wandering wintering birds or migrants.	Yes	Meadow Pipits are one of the most widespread and common species throughout the whole of the Bailiwick. They breed in high densities in areas of maritime heath, rough grassland, coastal scrub and wherever there is any rough land. During the Guernsey Breeding Bird Survey, meadow pipits were recorded as breeding in 11 out of 23 tetrads. Its distribution tended to be coastal, reflecting the current availability of suitable habitat on Guernsey. During spring and autumn, large numbers of meadow pipits pass through the islands. inland, especially on areas of bare till, golf courses, coastal heath and also fields in which livestock graze. In winter, there is little information on the distribution of meadow pipits within the islands although it is likely they tend to be more widespread, occur either singly or in small flocks and make more extensive use of agricultural and waste land as well as their usual coastal haunts. Recorded from 51 locations in Guernsey in 2018 with highest numbers being recorded at Longis Common (240).

Species	Activity at Spur Point	Direct Impact yes/no	Known habitats and locations within Guernsey (data from http://www.guernseybirds.org.gg/)
Rock pipit	Rock pipits were occasionally recorded at Longue Hougue South, peaking at three birds in late November. Although the species breeds in small numbers locally, rock pipits were not recorded after January and it is therefore likely that most of the sightings relate to wintering birds which established temporary feeding territories.	Yes	During the Guernsey Breeding Bird Survey, rock pipits were slightly more widespread than Meadow Pipits, occurring in 13 out of 23 squares. Birds occur all-round the islands, both in low-lying sandy areas and also on in areas of cliff land. In winter, rock pipits congregate on piles of rotting vraic on tidelines, areas of short rabbit-grazed coastal turf and in the few areas of sand-dunes remaining on the islands. Numbers appear to rise in winter and ringing has shown that large numbers can pass through one site. This influx of birds is due to migrants from further north arriving in the islands as it is unlikely that all the birds seen in winter could all be local resident birds. The Guernsey birds data base does not hold any records of rock pipit since 1998.
Grey wagtail	Grey wagtail was only recorded in January and February but probably headed back to breeding grounds elsewhere during March. Wagtails tended to forage for invertebrates in the sheltered sections of rock armouring	Yes	Uncommon winter visitor and migrant. Bred in 1977 and 2009. They can hold winter territories wherever there is water including streams and douits, along green lanes and around still water bodies. Water is not essential and birds may hold territories in large gardens or in parks with suitable damp areas. Although predominately a migrant and winter visitor, a pair bred in 1977 (Unknown Site) and in 1980 a pair were

Species	Activity at Spur Point	Direct Impact yes/no	Known habitats and locations within Guernsey (data from http://www.guernseybirds.org.gg/)
			present on Herm during the whole of June and breeding was a possibility. A pair bred in 2009. In autumn, the birds start to appear in in August and September but also exceptionally in late July. Numbers build up throughout September and migration peaks in October. By November, migration has virtually ceased, and the wintering population remains fairly stable throughout November and December. Numbers drop slightly in January but rise again in February, presumably corresponding with the return migration of birds which have wintered further south. The majority of birds leave in February and there are only sporadic records between March and May, often referring to fly-overs (GBN). In Guernsey, birds can appear virtually anywhere on the island but are regularly seen in the south and west coast valleys, including the Petit Bot Saints, Moulin Huet, Talbot and Silbe valleys and also the Vaux de Monel and Saumarez Park.
Pied wagtail	Pied wagtails were recorded on every visit until the end of February, suggesting that they headed back to breeding grounds elsewhere during March. Wagtails tended to forage for	Yes	Since 1993 birds have been recorded in every month of the year. From the limited data available, the pattern of migration is of small numbers of birds arriving back in the islands in August and September. The main migration of birds takes place in October and flocks of 50+ birds on fields, especially

Species	Activity at Spur Point	Direct Impact yes/no	Known habitats and locations within Guernsey (data from http://www.guernseybirds.org.gg/)
	invertebrates in the sheltered sections of rock armouring		those which are grazed, are not uncommon. Most records are from coastal areas, especially Pleinmont, but this probably reflects observer bias to these areas rather than any true preference. From late-November onwards migration ceases, and birds take up winter territories. These can occur almost anywhere, but they are especially common in coastal areas and pied wagtails, are a feature of sea walls in winter and also large gardens, industrial estates and car parks.
Magpie	Recorded using the site on five of the seven visits but were considered marginal users only, which occasionally 'spilled over' into the site. Birds using the area in this way would typically forage at the top of the beach, sing or rest in associated scrub or rarely, engage in territorial disputes with rivals.	Yes	The magpie is now a common resident in all the islands, except Alderney where it is still a vagrant. Birds are seen in most habitats although they seem most abundant in agricultural areas and along the south coast cliffs.
Carrion crow	A small number of carrion crows were recorded on every visit and 1-2 pairs were presumed to be resident. They showed territorial behaviour from late winter onwards whereby any passing crows were intercepted and pursued until they had left the area. The birds probably nest in	Yes	Carrion crows are a very common resident species although the local population is joined by wandering or wintering birds from elsewhere. Carrion crows can be seen in most habitats across the islands. They were found breeding in 16 of the 22 squares in the 1989-91 Guernsey Breeding Bird Census and were common in farmland, woodland and large gardens. In

Species	Activity at Spur Point	Direct Impact yes/no	Known habitats and locations within Guernsey (data from http://www.guernseybirds.org.gg/)
	the mature trees of the adjacent property and the foreshore formed part of their foraging area. In late autumn and early winter, there was less territorial activity and a group of birds was observed collecting acorns of Holm Oak (*Quercus ilex*) and hiding them under leaves near the public car park west of the site.		winter, numbers are swelled by migrants and flocks of up to 100-200 birds can be found, especially in the areas around Fauxquet Valley and the Reservoir. Smaller flocks of between 50-100 birds are common on beaches where they feed amongst piles of vraic (seaweed) that have accumulated.
Wren	Recorded within the site on every visit but were considered marginal users only, which occasionally 'spilled over' into the site. Birds using the area in this way would typically forage at the top of the beach, sing or rest in associated scrub or rarely, engage in territorial disputes with rivals.	Yes	Wrens are one of the most common birds and widespread birds in the Bailiwick. They are found on all the major islands and also on some of the permanently vegetated islets where suitable cover is available. The Breeding Bird Survey recorded birds breeding in every square in Guernsey and this is presumably true for the other islands in the Bailiwick. Birds occur in most habitats on the island but seem to be most numerous in coastal and inland scrub, especially where there are areas of bracken.
Dunnock	Recorded within the site on six of the seven visits but were considered marginal users only, which occasionally 'spilled over' into the site. Birds using the area in this way would typically forage at the top of the beach, sing or rest in	Yes	The dunnock is a common and widespread resident in all the islands of the Bailiwick, including the smaller islands of Jethou, Burhou and Lihou (any other islands). It can be found in all habitats where there is suitable cover and was found

Species	Activity at Spur Point	Direct Impact yes/no	Known habitats and locations within Guernsey (data from http://www.guernseybirds.org.gg/)
	associated scrub or rarely, engage in territorial disputes with rivals.		breeding in every square in the 1989-91 Breeding Bird Survey.
Blackcap	Seen or heard only on the periphery of the site in April. Those which were observed were not considered to be directly using the site	No	Blackcap is more numerous during the breeding season and a common spring and autumn passage migrant. Since the early 1960s, small, but increasing, numbers have wintered in the islands. During the breeding season, blackcaps can be found in most of the wooded valleys along the south coast, in suitable habitat along the west coast escarpment and in the parks and larger gardens. The Breeding Bird Survey showed it to be widespread across the southern end of the island but rare or absent from the low-lying north, presumably due to the lack of suitable wooded habitat. The increase in the number of breeding pairs is likely to reflect the increased availability of woodland on the islands from the middle of the twentieth century. In autumn, passage birds pass through later than most other warblers with the peak passage in the last half of September and the first half of October

Species	Activity at Spur Point	Direct Impact yes/no	Known habitats and locations within Guernsey (data from http://www.guernseybirds.org.gg/)
Chiffchaff	Seen or heard only on the periphery of the site in November. Those which were observed were not considered to be directly using the site	No	Chiffchaffs are the commonest warbler species to breed in the Bailiwick. Breeding birds can be found in most habitats including large gardens, wooded valleys, in trees around the edge of fields and along coastal cliffs and escarpments. During the Breeding Bird Survey it was recorded as breeding in every square. Small, but increasing, numbers overwinter in the islands and can be found in most wooded or scrub habitats. Although difficult to separate from wintering birds, chiffchaffs are amongst the earliest spring migrants to arrive back in the Bailiwick. The first migrants arrive back in the islands during the first week in March and migration continues throughout March and April to the first week in May. Although difficult to quantify peak passage seems to occur in the second half of April The return migration starts in August and peaks during September. Chiffchaffs continue to pass through in October.
Firecrest	Seen or heard only on the periphery of the site in December. Those which were observed were not considered to be directly using the site	No	Scarce breeder. Firecrest numbers are prone to being very variable between years. The peak passage takes place in autumn, starting in mid-September before the main passage throughout October and into November. Variable numbers of birds remain to winter and by December small numbers of

Species	Activity at Spur Point	Direct Impact yes/no	Known habitats and locations within Guernsey (data from http://www.guernseybirds.org.gg/)
			birds tend to widespread across the islands until they depart for their breeding grounds in March. In autumn and winter, firecrests can be found all across the islands and frequent gardens, areas of scrub, woodland and almost any area that has a few bushes.
Robin	Observed on every visit. recorded within the site but were considered marginal users only, which occasionally ‘spilled over’ into the site. Birds using the area in this way would typically forage at the top of the beach, sing or rest in associated scrub or rarely, engage in territorial disputes with rivals	Yes	The robin is a common resident and can be found in most habitats across the islands. It has always been common in Guernsey and Sark but Dobson remarks both he and other naturalists visiting Alderney between 1923 and 1946 only found 1 to 2 pairs of birds. It was recorded as breeding in every square of the 1989-91 breeding bird census and is now common and widespread on the other main islands. Birds can be found breeding in gardens, wooded valleys, in coastal scrub and in hedges around agricultural land. In autumn there is a large passage of robins through the Bailiwick and birds from northern and eastern countries pass through the islands to wintering grounds further south

Species	Activity at Spur Point	Direct Impact yes/no	Known habitats and locations within Guernsey (data from http://www.guernseybirds.org.gg/)
Black redstart	The species was observed feeding amongst the rock armouring in late November, January and February. It is likely that the individual used the wider Longue Hougue area as a winter territory, frequenting the sheltered beach where invertebrate prey may have remained more active in lower temperatures.	Yes	Very small numbers of black redstart overwinter although more pass through on passage. Breeding is recorded occasionally and was last confirmed in 2015. Most records are from coastal areas and birds can be seen on beaches, along sea walls, and on coastal headlands. Areas such as the Shingle Bank, Fort le Crocq, Fort Hommet, Grandes Rocques, the Chouet Headland, Fort Doyle, Fort le Marchant, and Belle Grève Bay regularly hold this species. Small numbers are recorded inland in gardens and industrial estates.
Blackbird	Recorded within the site on every visit but were considered marginal users only, which occasionally 'spilled over' into the site. Birds using the area in this way would typically forage at the top of the beach, sing or rest in associated scrub or rarely, engage in territorial disputes with rivals.	Yes	The blackbird is one of the commonest and most widespread species in the Bailiwick and is a familiar sight in gardens, woods, parks and farmland. Migrant blackbirds move through the island between late September and November and that it is a common passage migrant as well as a common resident.
Song thrush	Seen or heard only on the periphery of the site in November. Those which were observed were not considered to be directly using the site	No	Song thrush is a common species, occurring throughout the islands in gardens, woods, agricultural land and in coastal areas. It was found to be breeding in every square during the 1989-91 Breeding Bird Survey.

Species	Activity at Spur Point	Direct Impact yes/no	Known habitats and locations within Guernsey (data from http://www.guernseybirds.org.gg/)
			In autumn, migrants from Britain and Europe pass through the islands, although a few do winter in the islands. Passage occurs from late September and continues through until November. Migration occurs during the day and birds are also regularly heard flying overhead at night.
Great tit	Seen or heard only on the periphery of the site on four of the seven visits. Those which were observed were not considered to be directly using the site	No	Great tits may be found in all habitats with bushy vegetation or trees and favour woods, gardens and scrub. In winter it occurs in roving tit parties and large numbers concentrate around those gardens where supplementary food is provided. Large numbers of great tits may also pass through the islands in autumn.
Blue tit	Seen or heard only on the periphery of the site on four of the seven visits. Those which were observed were not considered to be directly using the site	No	Blue tits are now a common resident in Guernsey, Herm and Jethou, Sark and Alderney. During the 1989-91 GBBS, Blue Tits were found breeding in all 26 squares. Outside the breeding season, birds concentrate around gardens and ringing has shown over 100 individuals can regularly visit one site over the course of a winter.
Long-tailed tit	Seen or heard only on the periphery of the site in November and December. Those which were observed were not considered to be directly using the site	No	The long-tailed tit is now an uncommon resident in Guernsey and Alderney although it is not known whether it has now become established as a breeding species in Sark although there are records of it occurring there in July (Rountree). In

Species	Activity at Spur Point	Direct Impact yes/no	Known habitats and locations within Guernsey (data from http://www.guernseybirds.org.gg/)
			Guernsey, it was recorded as breeding in 10 out of 26 squares in the 1989-91 Guernsey Breeding Bird Survey and it tended to be concentrated in the southern, higher, parts of the island. Birds are on territory by the end of March and large family parties can be seen from the end of June onwards. Flocks of 10 to 20 birds are common and exceptionally 30 to 40 birds. These large flocks remain together until approximately November when smaller parties (generally <20 birds) are seen. These remain together until the end of March, when records tend to be of single or pairs of birds.
House sparrow	Recorded within the site on every visit but were considered marginal users only, which occasionally ‘spilled over’ into the site. Birds using the area in this way would typically forage at the top of the beach, sing or rest in associated scrub or rarely, engage in territorial disputes with rivals. The records of house sparrow are noteworthy as it is red-listed as a UK species of conservation concern. A flock of 12 to 15 birds was usually present in a tamarisk hedge near the top of the beach.	Yes	House sparrows are a common resident in gardens, parks and around farmyards.

Species	Activity at Spur Point	Direct Impact yes/no	Known habitats and locations within Guernsey (data from http://www.guernseybirds.org.gg/)
Chaffinch	Seen or heard only on the periphery of the site on four of the seven visits. Those which were observed were not considered to be directly using the site	Yes	Chaffinches are today resident and tolerably common. It was found breeding in all but one squares in the 1989-91 GBBS and, in summer, is a common feature of gardens, parks, woods and anywhere with trees. Large numbers pass through the islands in autumn. Peak passage takes place from mid-October onwards and very large flocks (100+) of birds can be seen passing through the island. Although these records are most often reported from coastal headlands, large numbers of birds pass through inland area. In winter numbers vary but flocks of 100+ birds are often seen in weedy fields and other seed rich areas.
Greenfinch	Seen or heard only on the periphery of the site on five of the seven visits. Those which were observed were not considered to be directly using the site	Yes	Greenfinches are a common breeding species, passage migrant and winter visitor to Guernsey. During the 1989-91 GBBS, greenfinches were recorded as breeding in every square. After the breeding season birds form flocks and parties up to 20-150 birds can be seen in gardens, weedy fields and along the coast where large numbers congregate and feed on the seed heads of Sea Radish. Large numbers pass through the islands in autumn, peaking in October.

Species	Activity at Spur Point	Direct Impact yes/no	Known habitats and locations within Guernsey (data from http://www.guernseybirds.org.gg/)
Goldfinch	Seen or heard only on the periphery of the site on four of the seven visits. Those which were observed were not considered to be directly using the site	Yes	Goldfinches are almost entirely restricted to breeding in gardens, parks and in the scrubby habitats of the coastal fringe and escarpment.
Linnet	Observed flying over the site in late November.	No	Generally a summer visitor only. Linnets are reasonably common on Guernsey. Birds were found breeding in every square in the 1989-91 GBBS and occurred in most habitats on Guernsey. Coastal scrub, the coastal escarpment and areas of gorse and common land are the most favoured habitat. Large numbers of migrants pass through the islands in September and the first half of October. By November, the bulk of the migrants have passed through and numbers remain low until March. In autumn, numbers are at their highest and several hundred birds can occur in flocks. Small numbers of linnets winter in the islands and flocks are rarely larger than 30-40 birds

Incidental Birds

18.3.23 No specific breeding bird survey was undertaken for this assessment. Incidental records were recorded during the overwintering bird survey, this along with a habitat suitability assessment based on the desk study and walkover have been used to determine the likely presence of nesting birds in the area.

18.3.24 All scrub and tree habitat provide suitable breeding bird habitats adjacent to, and partially within the Site boundary provide suitable nesting bird habitat.

18.3.25 Of the species recorded in **Table 18-4** the following are not considered to be using the site: swallow and linnet were only recorded flying over the site; blackcap, chiffchaff, firecrest, song thrush, great tit, blue tit, long-tailed tit, chaffinch and greenfinch. Goldfinch were seen or heard in the habitats adjacent to the site but not observed using it.

18.3.26 Several species were considered to be marginal users only, which occasionally 'spilled over' into the site. Birds using the area in this way would typically forage at the top of the beach, sing or rest in associated scrub or rarely, engage in territorial disputes with rivals. This category includes magpie, wren, dunnock, robin, blackbird and house sparrow.

Summary of Receptor Sensitivity and Value

18.3.27 **Table 18-7** presents the value and sensitivity of all ecological receptors considered in the assessment.

Table 18-7: Value / Sensitivity of Receptors

Receptor	Value / Sensitivity	Justification
Herm, Jethou and the Humps Ramsar	High	Internationally important site for lesser black backed gull, puffin and shag.
Spur Point ABI and associated habitats	Medium	Island wide important site with a range of habitats that support important birds
Scaly Cricket	High	Considered to be endangered as it is only known from few sites in Great Britain, the Channel Islands and Northern France.
Bats	High	Internationally important

Receptor	Value / Sensitivity	Justification
Reptiles	High	Internationally important
Small mammals	Medium	All animals on Guernsey are protected under the Animal Welfare Ordinance
Overwintering birds – herring gull, shag, curlew, gannet, turnstone, black-headed gull, sandwich tern, oystercatcher, great black-headed gull, lesser black-backed gull, brent goose, shelduck	High	Internationally important as they are listed on the red and amber lists of Species of Conservation Concern for UK and Channel Islands.
Overwintering birds - grey heron, cormorant	Medium	Not listed on Species of Conservation Concern for UK and Channel Islands. Considered to be important at an Island Level
Other bird species – house sparrow, song thrush, linnet, grey wagtail, black redstart, stock dove, kestrel, meadow pipit, kingfisher, dunnock	High	Internationally important as they are listed on the red and amber lists of Species of Conservation Concern for UK and Channel Islands.
Other bird species – wren, robin, blackbird, woodpigeon, collared dove, magpie, carrion crow, great tit, blue tit, chaffinch, pied wagtail, rock pipit, long-tailed tit, swallow, blackcap, chiffchaff, whimbrel, firecrest. peregrine falcon	Medium	Not listed on Species of Conservation Concern for UK and Channel Islands. Considered to be important at an Island Level

18.4 Do Nothing Scenario

18.4.1 In a do-nothing scenario, existing management (cutting and mowing) practices of terrestrial habitats would continue and the grassland and scrub continue to exist in their current proportions.

18.4.2 The shingle ridge and rocky shore would be cut back by a rise in sea level. It is expected that the scaly cricket would move with the shingle initially, and then where the coast nears the road, coastal squeeze would occur, and the shingle ridge would be lost. This would result in a loss of the scaly cricket population at this location.

18.4.3 The site would continue to be of interest for overwintering birds until coastal squeeze occurs as described above.

18.5 Methodology for EIA

18.5.1 The EIA has been carried out using the methodology set out in **Section 5 EIA Methodology**.

18.6 Impacts During Construction

CONSTRUCTION IMPACT 18.1: Direct Habitat Loss / Disturbance within Spur Point ABI

18.6.1 The proposed development lies within the Bulwer Avenue & Spur Point ABI as shown on **Figure 18-2**. The construction methodology is described in **Section 4.4**, with locations of the proposed construction compounds shown on **Figure 4-3**. Both potential compound locations are within the existing waste facility and will be located on hardstanding. There is already an access road within the existing waste facility which will be used to access the construction site, therefore there is no requirement for additional disturbance of terrestrial habitats outside of the footprint of the development. There will be **no impact** to terrestrial habitats over and above those required for operation (described in **Section 18.7**).

CONSTRUCTION IMPACT 18.2: Indirect Disturbance to Terrestrial Habitats within Spur Point ABI from Dust and Particulate Matter Emissions

18.6.2 Dust and particulate matter emissions from construction of the breakwater and from the movement of vehicles (during construction) could have an impact on the Spur Point ABI habitats within and adjacent to the development boundary. The nearest point of the ABI to the Project works is 20m, however the access route is partially paved. The breakwater is located adjacent to the ABI, however, during construction of the breakwater, only small volumes of material will be placed into a wet habitat. Access to the site is identified on **Figure 4-3**.

18.6.3 The potential for dust and emissions is assessed in **Chapter 12 Air Quality**. Suitable mitigation measures were recommended for the Project (in **Section 12.6** and **Section 12.7**) and if these mitigation measures are implemented, it is unlikely there will be a significant impact from dust on the ABI. There will be **no impact** from dust to the terrestrial habitats within Spur Point ABI.

18.6.4 The critical phase assessment for NO_X is presented in **Table 12-32**. As detailed in **Table 12-32**, maximum predicted NO_X concentrations were below the Annual Mean Critical Level along each of the transects. The overall impact of the construction phase of the Project on air quality at Spur Point ABI is therefore considered to be not significant and there will be **no impact.**

CONSTRUCTION IMPACT 18.3: Indirect Disturbance to Coastal Habitats within Spur Point ABI from Dust Emissions

18.6.5 Dust emissions produced during construction of the breakwater may have an adverse effect on local flora and fauna through smothering of habitats and invertebrates. This could result in direct habitat degradation and loss of foraging habitat for birds. The habitats are of high value for roosting birds. Any dust settlement that does occur would be washed out by the tide, therefore any smothering that may occur will be temporary and therefore the impact is considered to be **negligible**.

CONSTRUCTION IMPACT 18.4: Direct Impact to Potential Bat Roosts

18.6.6 Trees that have the potential to support roosting bats are located adjacent to the Site boundary. There will be no direct impact to any trees as they are located outside of the site boundary and consequently there will be **no impact** to any roost that may be present.

CONSTRUCTION IMPACT 18.5: Indirect Impact to Potential Bat Roosts

18.6.7 The nearest tree with bat roost potential is located 75m from the breakwater, with construction moving away from this point. Construction of the breakwater will require work at any time throughout the day and night (due to the restrictions of the tide). This will require night lighting from the movement of vehicles and potential stand lights for people. At present the details of the lighting are not known. Lighting disturbance to bats generally occurs with 100m of the roost. The best-case duration of construction is 20 months and the worst-case duration is 36 months.

18.6.8 Lighting of a bat roost can cause disturbance (Institute of Lighting Professionals, 2018) and this may result in the bats deserting the roost or even becoming entombed within it. Light falling on a roost access point will at least delay bats from emerging and this shortens the amount of time available to them for foraging. As the main peak of nocturnal insect abundance occurs at and soon after dusk, a delay in emergence means this vital time for feeding is missed. This has been shown to have direct impacts on bats' reproductive ecology. Bats and their roosts are protected the European Habitats Directive and are of high value. The disturbance described above would be of high magnitude, therefore a **medium term major adverse impact** would occur for the duration of the construction period.

Mitigation

18.6.9 The positioning of lights during construction will be considered during the detailed design phase to ensure that light spill avoids the areas where bats may be roosting.

Residual Impact

18.6.10 Successful design and implementation of a lighting strategy during construction would remove the source of disturbance and the indirect impact to bat roosts will change to **no impact**.

CONSTRUCTION IMPACT 18.6: Disturbance to Foraging Bats

18.6.11 The data from GBRC has identified the presence of common pipistrelle and grey long-eared bat within the study area. The habitats on site provide suitable foraging habitat for both of these bat species. Construction of the breakwater will require work at any time throughout the day and night (due to the restrictions of the tide). This will require night lighting from the movement of vehicles with the potential requirement for floodlights on stands for people. At present the details of the lighting are not known.

18.6.12 Pipistrelles are fast flying foraging species that are not affected by light during foraging or commuting (Voight *et al*, 2018) there would be **no impact** to this species.

18.6.13 Grey long-eared bats actively avoid lights, and this can disrupt foraging. Any reduction in foraging effort has been shown to have direct impacts on bats' reproductive ecology.

18.6.14 The best-case duration of construction is 20 months and the worst-case duration is 36 months.

18.6.15 All species of bats are of high value. The disturbance described above to grey long-eared bat would be of high magnitude, therefore a **medium term major adverse impact** would occur for the duration of the construction period.

Mitigation

18.6.16 The positioning of lights during construction will be considered during the detailed design phase to ensure that light spill avoids the areas where bats may be foraging such as along the edge of the terrestrial habitats and the strandline. This will follow the Institute of Lighting Professionals (2018) Advice Note.

Residual Impact

18.6.17 Successful design and implementation of a lighting strategy during construction would remove the source of disturbance and the indirect impact to bat foraging will change to **no impact**.

CONSTRUCTION IMPACT 18.7: Disturbance to Reptiles

18.6.18 Suitable habitats for slow worm are present in the gardens adjacent to but not within the Site boundary. There will be no direct impact to this species.

18.6.19 There is the potential that slow worm could be present basking within the Site boundary during construction. This species is considered to be high ecological value and the disturbance or accidental killing of such species is prohibited under the Animal Welfare Ordinance (2012). Any loss of an individual would be of medium magnitude and therefore there would be a **major adverse impact**.

Mitigation

18.6.20 It is highly likely that any basking slow worm will move away of its own accord when disturbed, and in most instances no mitigation will be required. A Precautionary Method of Working (PMOW) will be prepared as part of the Construction Environmental Management Plan to advise the contractors what to do if a slow worm is identified during construction.

Residual Impact

18.6.21 Adherence to the PMOW will reduce the impact to **no impact**.

CONSTRUCTION IMPACT 18.8: Noise Disturbance to Wintering Birds

18.6.22 Impacts to bird species using Spur Point within the Site Boundary are assessed in **Section 18.7**. The following text considers disturbance from the noise and vibration related to construction and installation activities in Belle Grève Bay adjacent to the Project during construction.

18.6.23 At the closest point, works would be undertaken within 20m of suitable bird habitat within Belle Grève Bay. There is no bird survey data for Belle Grève Bay, but it is reasonable to assume that as the habitats are similar to Spur Bay that similar species are foraging / roosting in both locations (cormorant, shag, oystercatcher, curlew and sandwich tern). These species are using the Site at different states of the tide.

18.6.24 The noise impact assessment is presented in **Chapter 13 Noise and Vibration**. As can be seen **Figure A13.3** to **Figure A13.6** in **Appendix 13.1**, construction of the breakwater at the western end will result in noise levels between 74.3dBA (at 20m from the location of the noise) and 55dB(A) (at 150m from the location of the noise) for both daytime and night time works. Initially the construction of the breakwater will avoid high tide, however after the toe has been created and the haul route is complete, works would be carried out at all states of the tide.

18.6.25 Measurement of noise during construction and survey of bird disturbance has been undertaken in the Wadden Sea (IECS, 2008). This indicated that at levels in excess of 84dB(A) there is a flight response in waterfowl; whilst below 55dB(A) there is no effect. Between 55dB(A) and 84dB(A), noise appeared to result in local behavioural change including cessation of feeding, taking up of alert postures and short distance movement.

18.6.26 Overall, studies suggest that any disturbance effects during construction are temporal and in only a small number of cases have disturbance events actually been shown to cause birds to permanently vacate a site Burton *et al*., (2002), Cutts *et al*., (2009), Mander & Cutts (2003), Mander & Cutts (2004).

18.6.27 Based on the findings of these studies, there will be low level disturbance to birds present within 150m of the works during the wintering bird period (October to April inclusive). This impact will occur for construction activities along 200m of the breakwater from Spur Point, after which time the 150m distance over which noise effects are present would move into habitats that are unsuitable for foraging. The construction programme is set out in **Table 4-2,** with both the best case (20 months) and worst case (36 months) scenario provided.

18.6.28 Shag, oystercatcher, curlew, and sandwich tern are species of high value, low level disturbance to this receptor would result in a **short term, reversible moderate adverse impact**.

18.6.29 Cormorant is of medium value, low level disturbance would result in a **short term, reversible minor adverse impact**

18.6.30 Outside of the 150m distance, noise levels would not cause any disturbance effect to any birds using the site.

Mitigation

18.6.31 During the preparation of the construction management plan by the contractor the timings of the works shall be considered. Construction of the western 200m extent during the period May to September would avoid impacts to wintering birds.

Residual Impact

18.6.32 Successful implementation of the above mitigation would reduce the impact to **no impact**.

CONSTRUCTION IMPACT 18.9: Visual Disturbance to Wintering Birds

18.6.33 Impacts to bird species using Spur Point within the Site Boundary are assessed in **Section 18.7**. The following text considers disturbance from the presence of people related to construction and installation activities in Belle Grève Bay adjacent to the Project during construction. For the purposes of assessment, it has been assumed that the same bird species are using Belle Grève Bay as were recorded in Spur Point.

18.6.34 Most of the works are contained within Spur Bay, which is visually separated from Belle Grève Bay by the presence of Spur Point. The only element of works that will be visible to overwintering birds within Belle Grève Bay will be the construction of the Western arm of the breakwater towards Spur Point. This will be undertaken by machinery, with no people present.

18.6.35 Low level disturbance will often lead to birds foraging on intertidal habitats to react through a change of behaviour (e.g. cessation of feeding to standing in a 'head up' alert posture), with increasing levels of disturbance causing birds to fly a short distance and, with still further disturbance to move away from the affected area (i.e. to become displaced). Disturbance can result in a deterioration in the condition of the specific bird species, which over time can increase mortality and population decline.

18.6.36 The term displacement is used to describe the movements away from areas that would normally be used in the absence of disturbance or other perturbations and as such can reflect either short distance movements within a home-range (both walked or flown) or longer distance movements to unfamiliar areas. Displacement to other less suitable habitat can result in a significant deterioration over a shorter timescale.

18.6.37 The effects of disturbance or displacement are governed by the frequency of disturbance event, the duration of the disturbance event, the area over which disturbance occurs, the availability of other suitable habitat in the area, the quality of the suitable habitat in the area, the ability for individuals to exploit unfamiliar habitat patches, and the level of competition with the available habitat. Consequently, a single disturbance event from an area of the home-range used infrequently or rarely will result in a lesser magnitude of impact to that associated with frequent disturbance of a core foraging area. It should be noted, however that birds are less disturbed by the presence of machinery than people, and they easily become habituated to a low-level repetitive disturbance which is what would occur at Longue Hougue South.

18.6.38 At the closest point, works would be undertaken within 20m of suitable bird habitat within Belle Grève Bay, at which distance low level disturbance is expected to occur.

This would have a **negligible** impact to the wintering bird population at Belle Grève Bay

CONSTRUCTION IMPACT 18.10: Impacts upon Prey Species

18.6.39 The impact of suspended sediments on subtidal and intertidal habitats is assessed in **paragraph 17.6.11** to **paragraph 17.6.18**. It is expected that only very minor changes in suspended sediment concentrations (less than 1mg/l) over a small area (less then 200m) is predicted, with a return to normal levels very soon after completion of the activity. Within this 200m suspended sediments will affect a very small area of the intertidal and subtidal habitats around Guernsey, none of which have been identified as being ecologically important and are present in other areas around the coastline of Guernsey.

18.6.40 Therefore, only those habitats that are within 200m of Longue Hougue South would be temporarily affected by increased suspended sediment concentrations and smothering. Given the short-term reversible nature of the impact, and the abundance of the habitats across the island, the impact is **negligible**.

18.6.41 The impact of suspended sediments on fish and shellfish are assessed in **paragraphs 17.6.19** to **paragraph 17.6.26**. Juvenile and adult fish are mobile and able to avoid localised areas of increased suspended sediment concentrations, and if they are displaced can move to adjacent undisturbed areas within their normal habitat range. However, larval fish and shellfish are not as capable of avoiding areas of increased suspended sediments and are therefore considered to be more sensitive to any changes. The impact significance is negligible to minor for all fish species identified, due to the very small and localised effect, and the low level of sensitivity of these species. Given the short-term reversible nature of the impact, and the abundance of the prey species across the island, the impact is **negligible**.

CONSTRUCTION IMPACT 18.11: Indirect Disturbance to Breeding Birds

18.6.42 Construction of the breakwater will be undertaken around Spur Point as shown on **Figure 4-3**. This supports suitable nesting bird habitat in the form of scrub and trees. The timing of the construction activities has yet to be confirmed, therefore there is the potential for disturbance to nesting birds during the nesting bird period (1^{st} March to July 31^{st} inclusive) that are present within 30m of the working area (scrub habitats only).

18.6.43 All wild birds are protected under the Animal Welfare Ordinance (2012). Red and amber list species are of high value and other breeding birds are considered to be of medium value. The duration of the disturbance is not known. Any disturbance would have a medium magnitude therefore there would be a **medium term reversible major adverse impact** to breeding birds.

Mitigation

18.6.44 There is a hierarchy of mitigation that should be applied to avoid impacts to breeding birds:

- Undertake the works nearest to the scrub habitat outside of the breeding bird period (i.e. during the period 1st August to 28th February).
- Clear a 30m buffer of scrub adjacent to the working area before the nesting bird period to temporarily remove the habitat (and keep clear during the nesting bird period) thus avoiding nesting bird disturbance during the construction period.

Residual Impact

18.6.45 Implementation of either of the above measures would reduce the impact to **a short term, reversible minor adverse impact** that would occur for a maximum of three nesting seasons. Once construction of the western end of the breakwater is completed the impact would reduce to **no impact**. At present this timescale cannot be confirmed as the construction methodology is not known.

18.7 Impacts During Operation

OPERATIONAL IMPACT 18.12: Change to Habitats in Herm, Jethou and the Humps Ramsar

18.7.1 Herm, Jethou and the Humps Ramsar is located 5km from the proposed development. There is the potential that a change in coastal processes could affect the habitats within the Ramsar Site. Coastal processes are assessed in **Section 7.6** and **Section 7.7**, modelling has shown that the change in coastal processes because of the development will only extend as far as Russel Channel. No effects are identified eastwards of this point, and therefore there will be **no impact** to the Ramsar Site.

OPERATIONAL IMPACT 18.13: Terrestrial Habitat Loss within Spur Point ABI

18.7.2 The boundaries of the Operational Site are shown on **Figure 4-4**. The Site boundary is located immediately adjacent to footpath around the bay, and the habitats to the seaward side of this would be lost to the footprint of the development. The habitat at this location comprises 500m^2 of grassland and scrub habitat (bramble, ivy, tamarisk), as well as a length of dry-stone wall both of medium value that forms part of the Spur Point ABI. The permanent loss of part of the ABI would be of high magnitude, therefore there would be a **major adverse impact**.

Mitigation

18.7.3 Terrestrial habitat within the ABI can be retained by agreeing an operational boundary for infill along the edge of the shingle and retaining a vegetated buffer between 3m and 7m wide (width varies with coastline).

Residual Impact

18.7.4 Implementation of the above mitigation would reduce the habitat loss to a small area ($50m^2$) of tamarisk on the shoreline only. Tamarisk is a Mediterranean shrub that grows on the coasts of Guernsey, SW England and NW France. It a common species and grows easily. There is a second, larger area of Tamarisk on the boundary adjacent to the Longue Hougue South that will be retained. The impacts would reduce to **negligible**.

OPERATIONAL IMPACT 18.14: Indirect Disturbance to Terrestrial Habitats within Spur Point ABI from Dust and Particulate Matter Emissions

18.7.5 Dust and particulate matter emissions from the ongoing placement of materials and use of the site for inert waste could have an impact on the Spur Point ABI habitats within and adjacent to the development boundary. Operational access to the site is identified on **Figure 4-4**.

18.7.6 The potential for dust and emissions is assessed in **Section 12.7**. Suitable mitigation measures were recommended for the Project (in **Section 12.7**) and if these mitigation measures are implemented, it is unlikely there will be a significant impact from dust on the ABI. There will be **no impact** from dust to the terrestrial habitats within Spur Point ABI.

18.7.7 The critical phase assessment for NO_X is presented in **Table 12-34**. As detailed in **Table 12-34**, maximum predicted NO_X concentrations were below the Annual Mean Critical Level along each of the transects. The overall impact of the operational phase of the Project on air quality at Spur Point ABI is therefore considered to be not significant and there will be **no impact**.

OPERATIONAL IMPACT 18.15: Loss of Bat Foraging Habitat

18.7.8 Both common pipistrelle and grey-long eared bat forage along woodland edges, whilst the literature does not state that these species forage over the intertidal zone, it is likely that they will opportunistically forage over the intertidal area at Spur Point if flies, moths and mosquitos are present.

18.7.9 As described in **paragraph 18.7.2**, approximately $500m^2$ of grassland and scrub habitat on the seaward edge of the footpath would be lost as it lies within the Project boundary. This edge habitat forms a corridor for bats to forage and commute along.

It is adjacent to a line of trees and shrub within the private gardens that lies outside of the Project boundary which will be retained. Removal of the 500m^2 of habitat will have a **negligible** impact due to the availability of alternative habitats within the gardens immediately adjacent to that which will be lost.

18.7.10 Infill of the intertidal area would gradually reduce the area of intertidal available for foraging, however this is not the preferred foraging habitat for pipistrelles and grey long-eared bat. A new strandline would establish over time on the seaward face of the breakwater which would provide suitable alternative habitat, therefore there would be **no impact** in the longer term.

Mitigation

18.7.11 Although no mitigation is required for this impact, the habitat can be retained by agreeing an operational boundary for infill along the edge of the shingle and retaining a vegetated buffer between 3m and 7m wide (width varies with coastline).

Residual Impact

18.7.12 Implementation of the above mitigation would retain all of the habitats that foraging bats, the impact of the loss of scrub would reduce from **negligible** to **no impact**. The impact on the intertidal would remain as **no impact**.

OPERATIONAL IMPACT 18.16: Disturbance to Bat Foraging Activity

18.7.13 Pipistrelle foraging activity is not affected by lighting. Grey-long eared bats will actively avoid foraging in areas that are lit., the reduction in foraging activity can affect reproductive success and therefore the bat population. Once operational the site will be receiving and processing waste between 0800 to 1600 Monday to Friday. There will be no lighting or activity outside of these hours and therefore there will be **no impact** to foraging bats.

OPERATIONAL IMPACT 18.17: Loss of Small Mammal Habitat

18.7.14 The boundaries of the Operational Site are shown on **Figure 4-4**. The Site boundary is located immediately adjacent to footpath around the bay, and the habitats to the seaward side of this would be lost to the footprint of the development. The habitat at this location comprises 500m^2 of grassland and scrub habitat, as well as a length of dry-stone wall which provide supporting habitat for small mammals such as hedgehog, greater white-toothed shrew and Guernsey Vole. Both of these species are of medium value, the magnitude of the loss of this small area of habitat would be low and therefore there would be a **permanent minor adverse impact**.

Mitigation

18.7.15 Supporting habitat for small mammals can be retained by agreeing an operational boundary for infill along the edge of the shingle and retaining a vegetated buffer between 3m and 7m wide (width varies with coastline).

Residual Impact

18.7.16 Implementation of the above mitigation would retain all of the habitats that support small mammals. The impact would reduce to **no impact**.

OPERATIONAL IMPACT 18.18: Loss of Slow Worm Habitat

18.7.17 The boundaries of the operational project are shown on **Figure 4-4**. The Project boundary is located immediately adjacent to footpath around the bay, and the habitats to the seaward side of this would be lost to the footprint of the development. The habitat at this location comprises 500m^2 of grassland and scrub habitat, as well as a length of dry-stone wall which provide supporting habitat for slow worm. This species is of high value, the magnitude of the loss of this small area of habitat would be low and therefore there would be a **permanent moderate adverse impact**.

Mitigation

18.7.18 Supporting habitat for slow worm can be retained by agreeing an operational boundary for infill along the edge of the shingle and retaining a vegetated buffer between 3m and 7m wide (width varies with coastline).

Residual Impact

18.7.19 Implementation of the above mitigation would retain all of the habitats that support small mammals. The impact would reduce to **no impact**.

OPERATIONAL IMPACT 18.19: Loss of Wintering Bird Foraging Habitat

18.7.20 The site footprint includes an area that has been identified as supporting eelgrass habitat, and this area lost through the operation of the infill area. Eelgrass is a food resource for brent geese which occasionally use Spur Bay, although this is not considered to be a favoured area for this species.

18.7.21 The loss of eelgrass is assessed **Table 17-12** and

18.7.22 **Table** 17-13 which results in a **moderate adverse** (significant) prior to any mitigation. With mitigation (translocation), the residual impact significance is **minor adverse** (not significant).

18.7.23 The loss of other intertidal habitats is assessed in **paragraph 17.6.7** to **paragraph 17.6.10** and **paragraph 17.7.6** to **paragraph 17.7.21,** which concludes that the impact is negligible to minor adverse (not significant), because the other intertidal habitats that will be lost are not considered to be ecologically important and are all expected to be common in the area and only a very small area will be lost compared to the available habitat that is location nearby and around Guernsey.

18.7.24 Although the Project is located within Spur Point ABI which is of medium importance for birds, all of the birds recorded using the intertidal during the 2018/2019 wintering bird surveys are common on Guernsey and are found in a variety of other locations around the Island (Guernsey Birds Website). Suitable alternative habitat including eelgrass is present immediately adjacent to the site at Belle Grève Bay, as well as across Guernsey therefore the loss of the foreshore would have a **minor adverse impact** to the bird populations of Guernsey.

OPERATIONAL IMPACT 18.20: Noise Disturbance to Wintering Birds at Belle Grève Bay

18.7.25 During the operation of the Inert Waste Site there will be ongoing noise from deliveries and sorting and placement of the inert materials within the breakwater. At the closest point, works would be undertaken within 40m of suitable bird habitat within Belle Grève Bay, which will be screened from the infill area by the presence of the breakwater and vegetation on Spur Point.

18.7.26 The noise impact assessment is presented in **Section 13.7,** with noise contours shown in **Appendix 13.1** (**Figure A13.17** to **Figure A13.18**). The noise levels during operation outside of the breakwater for all operational scenarios are 35dBA which is below the 55dBA threshold for bird disturbance (IECS, 2008), therefore there will be **no impact**.

OPERATIONAL IMPACT 18.21: Loss of Breeding Bird Habitat

18.7.27 The boundaries of the operational Project are shown on **Figure 4-4**. The Project boundary is located immediately adjacent to footpath around the bay, and the habitats to the seaward side of this would be lost to the footprint of the development. The habitat at this location comprises 500m^2 of grassland and scrub habitat, both of medium value that provides suitable nesting habitat for breeding birds. This is not the area that supports the house sparrow population (identified in **Appendix 18.2**), which will be retained. There is suitable alternative habitat immediately adjacent to the site boundary as well as across Guernsey therefore the magnitude of this habitat loss would be low, therefore there would be a **permanent minor adverse impact**.

Mitigation

18.7.28 Breeding bird habitats can be retained by agreeing an operational boundary for infill along the edge of the shingle and retaining a vegetated buffer between 3m and 7m wide (width varies with coastline).

Residual Impact

18.7.29 Implementation of the above mitigation would reduce the habitat loss to a small area of Tamarisk on the shoreline only, the impacts would reduce to **negligible**.

OPERATIONAL IMPACT 18.22: Reduction in Scaly Cricket Population

18.7.30 Spur Point is one of the 12 known sites that supports Scaly Cricket within Guernsey. This species is rare because it is currently only found at few sites in England, Wales, France and the Channel Islands and is therefore of high value. The operation of the inert waste facility will result in the loss of 2,000m^2 of shingle habitat that supports scaly cricket at Spur Point representing 5% of the known species habitat across Guernsey. This would eliminate the population at this location. The permanent loss of species of a high value would result in a **major adverse impact**.

Mitigation

18.7.31 The following mitigation measures have been identified for scaly cricket. These will be developed and agreed with the States of Guernsey and La Société Guernesiaise to determine the final strategy.

18.7.32 Translocation of scaly cricket to a suitable alternative locations where scaly cricket are present would allow the population numbers to be retained. Monitoring of scaly cricket would be required for two years post construction to ensure that the translocation has been successful.

18.7.33 If, after monitoring, it is clear that the translocation has not been successful, an alternative would be for States of Guernsey to identify scaly cricket as a rare species in the Biodiversity Strategy and look to preserve habitat through protection such as ABI.

18.7.34 In addition, shingle from Spur Point can be placed at a location that requires shingle re-nourishment to enhance this habitat within Guernsey.

Residual Impact

18.7.35 While this mitigation would seek to retain the population within Guernsey, there would be a 5% reduction of available habitat for scaly cricket which is already limited across its known range. The residual impact would be **minor adverse**.

18.8 Cumulative Impacts

18.8.1 The Screening of projects for the potential for cumulative effects is described in **Chapter 5 EIA Methodology** and presented in **Table 5-4** and **Figure 5-2**. The scoping stage of the CIA identified 59 developments were identified within this process as having the potential to interact with terrestrial ecology.

18.8.2 During the EIA process the zone of influence was reduced from 5km to 2km as **Chapter 7 Coastal and Marine Processes** has identified that there will be no coastal processes change. A further 25 developments that are located over 2km distant from the project boundary were therefore screened out.

18.8.3 Of the remaining 34 developments, 21 projects were considered unlikely to have significant ecological impacts as they are either redevelopment within an existing footprint or are small scale projects.

18.8.4 The following 13 projects have the potential for terrestrial ecological impacts through habitat loss and the potential for protected species disturbance both during construction and operation:

- Les Bas Courtils.
- Pointues Rocques.
- Belgrave Vinery.
- Leale's Yard Bridge Avenue, Vale.
- Leales Yard Regeneration Area.
- Franc Fief.
- Saltpans.
- Co-op Homemaker Lowlands Industrial Estate Braye Road, Vale.
- St Sampson's.
- Le Maresquet.
- Data Park.
- Cleveley's Vinery.
- Admiral Park, St. Peter Port.

18.8.5 These projects have not yet been assessed and are likely to be constructed after Longue Hougue South. Any impact of these projects would be mitigated through the planning process. There will be **no cumulative impact** during the construction phase.

18.8.6 The only significant impact during the operational phase of Longue Hougue South is the loss of scaly cricket habitat. None of the developments listed above are located in the intertidal, therefore there will be **no cumulative impact** during the operational phase.

18.9 Summary

18.9.1 **Table 18-7** provides a summary of the ecological construction and operational impacts that are expected to arise.

Table 18-8: Summary of Impacts on Terrestrial Ecology and Ornithology

Impact	Significance	Mitigation	Residual Impact	Monitoring
Construction Impacts				
Temporary habitat loss / disturbance within Spur Point ABI	No Impact	None required	No Impact	None required
Indirect disturbance to terrestrial habitats within Spur Point ABI from dust and particulate matter emissions	No Impact	None required	No Impact	None required
Indirect disturbance to coastal habitats within Spur Point ABI from dust emissions	Negligible	None required	Negligible	None required
Direct impact to potential bat roosts	No Impact	None required	No Impact	None required

Impact	Significance	Mitigation	Residual Impact	Monitoring
Indirect impact to potential bat roosts	Medium term Major Adverse	The positioning of lights during construction will be considered during the detailed design phase to ensure that light spill avoids the areas where bats may be roosting.	No Impact	None required
Disturbance to foraging bats (Pipistrelle)	No Impact	None required	No Impact	None required
Disturbance to foraging bats (grey long-eared bat)	Medium term Major Adverse	The positioning of lights during construction will be considered during the detailed design phase to ensure that light spill avoids the areas where bats may be foraging	No Impact	None required
Disturbance to reptiles	Major Adverse	PMOW to be prepared for construction	No Impact	None required
Noise disturbance to birds in Belle Grève Bay (shag, oystercatcher, curlew and sandwich tern)	Short term, reversible, Moderate Adverse	Consider whether wintering bird period can be avoided.	No Impact	None required
Noise disturbance to birds in Belle Grève Bay (cormorant)	Short term, Reversible, Minor Adverse	None required	Short term, Reversible, Minor Adverse	None required
Visual disturbance to wintering birds	Negligible	None required	Negligible	None required

Impact	Significance	Mitigation	Residual Impact	Monitoring
Impacts upon prey species	Negligible	None required	Negligible	None required
Indirect disturbance to breeding birds	Medium term Reversible Major Adverse	Avoid nesting bird period. Or clear vegetation in advance of nesting bird period and keep clear	No Impact	None required
Operational Impacts				
Change to habitats in Herm, Jethou and the Humps Ramsar	No Impact	None required	No Impact	None required
Terrestrial habitat loss within Spur Point ABI	Major Adverse	Agree an operational boundary for infill and retain vegetated buffer.	Negligible	None required
Indirect disturbance to terrestrial habitats within Spur Point ABI from dust and particulate matter emissions	No Impact	None required	No Impact	None required
Loss of bat foraging habitat (terrestrial)	Negligible	Agree an operational boundary for infill and retain vegetated buffer.	No Impact	None required
Loss of bat foraging habitat (intertidal)	No Impact	None required	No Impact	None required
Disturbance to bat foraging activity	No Impact	None required	No Impact	None required
Loss of small mammal habitat	Permanent Minor Adverse	Agree an operational boundary for infill and retain vegetated buffer.	No Impact	None required

Impact	Significance	Mitigation	Residual Impact	Monitoring
Loss of slow worm habitat	Permanent Moderate Adverse	Agree an operational boundary for infill and retain vegetated buffer.	No Impact	None required
Loss of wintering bird foraging habitat	Minor Adverse	None required	No Impact	None required
Noise disturbance to wintering birds at Belle Grève Bay	No Impact	None required	No Impact	None required
Loss of breeding bird habitat	Permanent Minor Adverse	Agree an operational boundary for infill and retain vegetated buffer.	Negligible	None required
Reduction in scaly cricket population	Major Adverse	Translocation of supporting habitat to suitable location	Moderate Adverse	Two years of monitoring
Cumulative Impacts - Construction				
Les Bas Courtils. Pointues Rocques. Belgrave Vinery. Leale's Yard Bridge Avenue, Vale. Leales Yard Regeneration Area. Franc Fief. Saltpans. Co-op Homemaker Lowlands Industrial Estate Braye Road, Vale.	No Impact	None required	No Impact	None required

Impact	Significance	Mitigation	Residual Impact	Monitoring
St Sampson's. Le Maresquet. Data Park. Cleveley's Vinery Admiral Park, St. Peter Port.				
Cumulative Impacts - Operation				
Les Bas Courtils. Pointues Rocques. Belgrave Vinery. Leale's Yard Bridge Avenue, Vale. Leales Yard Regeneration Area. Franc Fief. Saltpans. Co-op Homemaker Lowlands Industrial Estate Braye Road, Vale. St Sampson's. Le Maresquet. Data Park. Cleveley's Vinery. Admiral Park, St. Peter Port.	No Impact	None required	No Impact	None required

19 Natural Capital

19.1 Content and Data

Content

19.1.1 Natural capital is another term for the stock of renewable and non-renewable natural resources (e.g. plants, animals, air, water, soils, minerals) that combine to yield a flow of benefits to people either directly or indirectly (Natural Capital Coalition, 2016). The resources are in four categories:

- Provisioning – for example food, water, and other materials;
- Regulating – for example controlling or contributing to climate, air quality, or water quality;
- Cultural – these are non-material and include education, recreation, as well as aesthetic experience; and
- Supporting – for example in the provision of habitats or nutrient cycling which add to the above.

19.1.2 The natural capital assets are a blend of spatial elements which may have intrinsic (provisioning) natural capital such as providing food, energy, minerals, freshwater, ornamental resources, biochemical / medicines, and genetic material. These in turn may through various activities provide other services including regulation services (such as regulating water flows, water quality, air quality, and climate) and cultural services (usually by their location or historical remnants and the activities that humans can carry out on them), and also supporting services (such as soil formation, primary production, nutrient cycling, water cycling, and photosynthesis). The natural capital is the total of these services provided by the footprint and study area of the proposed development.

19.1.3 This chapter describes the natural capital assets present within the study area and then considers how the operation of the proposed development will affect these assets. Mitigation measures are described, and a discussion of the residual impacts provided where significant impacts are identified.

19.1.4 Short-term perturbation (i.e. during construction) is not considered in the assessment of natural capital as the assumption is that the natural systems will revert back to existing unless a long-term activity continues to impact on them to the extent that this is inhibited or prevented. All long-term impacts on natural capital are considered in the operation phase.

Study Area

19.1.5 The study areas for natural capital assets defined by the individual receptor that the asset belongs to (landscape, ecology, material assets, population) and are described in the relevant technical chapters.

Data Sources

19.1.6 Each of the topic chapters have undertaken their own desk studies, and surveys where applicable. These have been carried into this assessment where appropriate.

19.1.7 Online digital mapping has also been used to identify services during screening.

Assumptions and Limitations of Data

19.1.8 Data obtained from digital mapping is correct at the time that that aerial photo was taken. The immediate environs of the Site have been visited and the data ground-truthed, but some of the more distant services may have changed recently. This assessment has been carried out with the most up to date data available and is considered to be robust.

19.2 Methodology for EIA

19.2.1 The overall approach to identifying ecosystem services, their values and the subsequent changes is described below and based on the following steps:

- Establish baseline (incorporates the Screening Stage reporting);
- Identify and provide qualitative assessment of potential impacts on ecosystem services (incorporates the Scoping Stage reporting);
- Quantify the impacts on specific ecosystem services;
- Assess the effects on human welfare; and
- For Significant effect - value the change in ecosystem services.

Screening

19.2.2 There is no Guernsey-specific Natural Capital guidance at present, so UK standards have been used for assessment.

19.2.3 This stage entails screening the list of possible ecosystem services from the UK National Ecosystem Assessment (UK NEA, 2011) and identifying which are, or may be, present within the study area of the proposed development. In our approach we have identified the relevant ecosystem services according to the environmental, social, and economic assets present by using matrices we have devised based on previous work and published examples, as well as having derived services from standard listings of the regulatory, cultural, and supporting services in this environment. This work was undertaken alongside and combined with the baseline environment preparation. The matrix is presented in Appendix

Scoping

19.2.4 Following on from screening, we identified the nature of the physical, chemical, and biological changes likely from the options, building on our engineering and geomorphological knowledge of the study area and typical option effects to scope out any services where no change is expected to occur. Where it is unlikely that an ecosystem service is present or provided for, or that it is present in negligible quantities, it will be excluded at this stage. The scoping will identify whether changes to the ecosystem services will only potentially arise or would arise to a significant degree.

19.2.5 The definition of potential in this case is where a service is not likely to be important in terms of the study area; or where change would occur, but it would not be expected to radically alter the current service provision or be very small.

19.2.6 The definition of significant is taken that a large-scale change would be likely, and certainly one that is likely to quantifiable.

Evaluating the Services

19.2.7 Based on the remaining services following scoping, we have evaluated the importance of those where a significant (measurable / quantifiable) change is likely. Their importance will be evaluated within their national context, using existing studies and reports. If there is relevant data and information, we would identify indicative economic values, but none were suitable for the proposed development and services / assets in the study area. Using the value of the assets / services we identified constraining and sensitive services to ensure they were considered within the relevant topic chapters.

Quantifying Impacts

19.2.8 At this stage we provided an initial appraisal of the proposed development with respect to the ecosystem services, identifying positive and negative effects, and significance weighting.

Effects on Human Welfare

19.2.9 We then identified the scale (quantity) of change to the relevant ecosystem services, and determine whether these affect human welfare, and identify the societal groups (based on local, regional, national, and international groupings) that would be affected.

Value the Changes

19.2.10 With the key ecosystem services identified and quantities of change developed, we explored existing ecosystem services assessment work to identify where possible similar or appropriate ecosystem services (that have been monetised) and apply transfer values to provide an indicative estimate of the services and the resulting change for the options. The setting of the proposed development on an Island is unique in terms of this assessment; therefore, we could not identify any proxy values.

19.2.11 We then summarised all the results using both qualitative and quantitative (value) changes.

19.3 Baseline

Screening

19.3.1 Screening was undertaken to identify presence of assets and service provision (the baseline) using the derived matrix of services and assets obtained from various studies and the baseline environment extracted for the study area. The completed screening matrix is presented in **Appendix 19.1**. The following services were screened into the next stage (scoping):

- Food - managed (fish);
- Food – wild (fish, ormer);
- Energy – hydropower (intertidal habitat, tidal currents);
- Ornamental resources (shells, stone);
- Climate regulation (carbon sequestration);
- Flood protection and regulation (barriers – topography);
- Cultural heritage (iconic landscape, location/heritage asset, wildlife (habitats and species);
- Recreation and tourism (walking, angling, water sports, bird watching, cycling); and
- Aesthetic value (landscape, heritage asset).

Scoping

19.3.2 A high-level scoping of the effects on the present or potentially present ecosystem services and assets was undertaken based on our professional understanding of the likely physical, chemical and biological interactions and impacts (derived from consideration of the source-pathway-receptor model approach) of the options. The completed scoping matrix is presented in **Appendix 19.2**, which provides a justification for each conclusion. **Table 19-1** presents the positive or negative effects with respect to the ecosystem services.

Table 19-1: Predicted Impacts to the Services Scoped in to the Assessment

Typology of Services	Sub category	Impact
Provisioning		
Food - managed	Fish	x
Food - wild	Fish	x
	Shellfish	0
Energy	Hydropower	0
Ornamental resources	Shells	x
	Stone	x
Regulation Services		
Climate regulation	Carbon sequestration	x
Flood regulation / protection	Barriers	+
Erosion regulation		0
Cultural Services		
Cultural heritage	Landscape	xx
	Location/ heritage asset	xx/++
	Wildlife (habitats and species)	0
Recreation and tourism	Walking	0
	Coastal angling	x
	Water sports (including surfing / windsurfing / canoeing / rowing / sailing)	0
	Bird watching/ wildlife watching	x
	Cycling	0
Aesthetic value	Physical landscape/ townscape/seascape	xx
	Heritage asset	x

Key overleaf.

Key	
Significant positive impact	++
Negligible/minor positive impact	+
No impact	0
Negligible/minor negative Impact	x
Significant negative impact	xx

19.3.3 Of the ecosystem services affected (either positively or negatively) there is an overlap which should be noted to ensure no double counting occurs at a later stage. The main significant overlap is between the cultural heritage (location/heritage assets) and aesthetic value (heritage assets), though the cultural heritage (location/heritage assets) includes heritage assets that are not 'visible' such as buried sites and finds (unknown).

19.3.4 Overall, the key ecosystems services that are to be taken forward for further consideration are:

- Food - managed (fish);
- Food - wild (fish);
- Ornamental resources (shells, stone);
- Flood regulation (barriers);
- Climate regulation (carbon sequestration);
- Cultural heritage (iconic landscape, location/heritage asset);
- Recreation and tourism (angling, bird watching); and
- Aesthetic value (landscape, heritage asset).

Valuing the Resource

19.3.5 The importance of the relevant assets and the associated services scoped into this assessment based on their national context is presented in **Table 19-2**.

19.4 Do Nothing Scenario

19.4.1 In a do-nothing scenario the existing range of services would continue to exist in a fluctuating state. The professional opinion provided in **Chapter 7 Coastal Processes** identifies that sea level rise and coastal squeeze would result in the loss of assets within the bay at the project site over the long term.

Table 19-2: Value of Services Scoped in to the Assessment

Natural Capital Asset	Importance	Justification / Context
Food - managed (fish)	National	Fish stocks are a valuable resource for Guernsey.
Food - wild (fish)	Local	Spur Point, Spur Bay and Belle Grève Bay are all local fishing spots (https://micksfishing.co.uk/where-to-fish.html)
Flood regulation (barriers)	National	Reduction in risk to life.
Ornamental resources (shells)	Local	Naturally occurring at most beaches around Guernsey.
Ornamental resources (stone)	Local	Naturally occurring at most beaches around Guernsey
Climate regulation (carbon sequestration)	National	Seagrass is a scarce, slow growing species.
Cultural heritage (iconic landscape)	Local	Spur Bay is a rocky cove, similar to many on Guernsey.
Cultural heritage (heritage asset)	National	The setting of World War II heritage assets is fundamental to their significance as a system of coastal defences put in place during the German occupation.
Recreation and tourism (coastal angling)	Local	Spur Point, Spur Bay and Belle Grève Bay are all local fishing spots (https://micksfishing.co.uk/where-to-fish.html)
Recreation and Tourism (bird watching)	Local	Spur bay is a small cove, with a low number of common species.
Aesthetic value (landscape, heritage asset)	Local	Spur Bay is a rocky cove, similar to many on Guernsey.
Aesthetic value (landscape, heritage asset).	National	The setting of World War II heritage assets is fundamental to their significance as a system of coastal defences put in place during the German occupation.

19.5 Assessment of Impact

Quantifying the Impacts

19.5.1 **Table 19-3** presents the changes associated with the Project and a quantifiable measure (if possible) of the change.

Table 19-3: The Changes to the Key Ecosystem Services as a Result of the Options

Ecosystem Service	Quantifiable Impact	Description and Quantification
Food - managed (fish)	Increased suspended sediment	A localised effect could occur (within 200m of the breakwater). Juvenile and adult fish are mobile and able to avoid localised areas of increased suspended sediment concentrations, and if they are displaced can move to adjacent undisturbed areas within their normal habitat range.
Food - wild (fish)	Loss of angling location	Spur Point, Spur Bay and Belle Grève Bay are all local fishing spots (https://micksfishing.co.uk/where-to-fish.html). Once the Project is in place there will be a loss of angling access and habitat at Spur Bay. Alternative access and habitat for the fish will still be available on the southern area of Spur Point and Belle Grève Bay as well as around the Island.
Flood regulation (barriers)	Improved flood defence	The proposed development will build upon the existing defences along the frontage. This will reduce risk to life.
Ornamental resources (shells)	Loss of resource	The proposed development will lead to a small reduction in intertidal habitats which support this resource. However, shells are available for collection at other Island beaches.
Ornamental resources (stone)	Loss of resource	The proposed development will lead to a very small reduction in intertidal habitats which support this resource, however stones are available for collection at other Island beaches, with gabbro present across Belle Grève Bay.
Climate regulation (carbon sequestration)	Loss of resource	An 8% reduction in known extent of eelgrass would reduce the capability for carbon sequestration, commensurate to the size of the eelgrass extent. This will be offset by translocation of eelgrass, reducing it to at most

Ecosystem Service	Quantifiable Impact	Description and Quantification
		5% in the short-term but reducing over time as seagrass is expected to continue to grow. Therefore, the magnitude of impact would be reduced to negligible, with overall a very small loss of total eelgrass habitat across Guernsey lost. There would be no noticeable effect in the provision of carbon sequestration services.
Cultural heritage (iconic landscape)	Loss of resource	The creation of a breakwater and infill of the bay at the proposed project site with inert waste would fundamentally change the character and sense of place.
Cultural heritage (heritage asset)	Loss / Damage to resource Preservation against sea level rise	The proposed breakwater will meet the foreshore adjacent to the gun emplacement MGU664 and, without mitigation, it is anticipated that the construction of the breakwater will result in the destruction of the fragmented remains on the foreshore as well as a change to the physical context of the gun emplacement foundation which survives. However, as described for the do-nothing scenario (Section 15.4) the asset is in poor condition and without intervention would be lost to the sea in the foreseeable future.
Recreation and Tourism	Coastal angling	Spur Point, Spur Bay and Belle Grève Bay are all local fishing spots (https://micksfishing.co.uk/where-to-fish.html). Once the proposed development is in place there will be a loss of angling access and habitat at Spur Bay. Alternative access and habitat for the fish will still be available at Spur Point and Belle Grève Bay as well as around the Island
Recreation and Tourism (birdwatching)	Loss of resource	The infill of Spur Bay will result in the loss of habitat for birds and consequently reduce birdwatching opportunities. However, the birds recorded on site were common and there are other, better locations for birdwatching around Guernsey. A similar experience is available at Belle Grève Bay adjacent to Spur Point.

Ecosystem Service	Quantifiable Impact	Description and Quantification
Aesthetic value (landscape, heritage asset)	Loss of resource	The creation of a breakwater and infill of Spur Bay with inert waste would fundamentally change the character and sense of place.
Aesthetic value (landscape, heritage asset).	Loss / Damage to resource Preservation against sea level rise	The presence of the breakwater would alter the setting of gun emplacement MGU664, however this asset is currently in a poor state of survival and is at risk of loss from sea level rise.

Assess the Effects on Human Welfare

19.5.2 **Table 19-4** presents the societal groups (based on local, regional, national, and international groupings) that would be affected by a change in the ecosystem services scoped in to this assessment.

Table 19-4: Societal Groupings affected as a result of the Options

Ecosystem Service	Population	Description and Quantification
Food - managed (fish)	National	Due to the fish stocks being in the sea around the Island.
Food - wild (fish)	Local	Due to the local use of the site by anglers and alternative availability.
Flood regulation (barriers)	National	Due to the reduction in risk to life.
Ornamental resources (shells)	Local	Due to the availability of resource around the island.
Ornamental resources (stone)	Local	Due to the availability of resource around the island.
Climate regulation (carbon sequestration)	National	Due to the scarcity and slow growing nature of seagrass.
Cultural heritage (iconic landscape)	Local	Due to the value being linked to the experience at Spur Bay.
Cultural heritage (heritage asset)	National	Due to the value of the asset.
Recreation and tourism (coastal angling)	Local	Due to the local use of the site by anglers and alternative availability.
Recreation and tourism (birdwatching)	Local	Due to the small scale of the site with common species.
Aesthetic value (landscape, heritage asset)	Local	Due to the value being linked to the experience at Spur Bay.

Ecosystem Service	Population	Description and Quantification
Aesthetic value (landscape, heritage asset).	National	Due to the value of the asset.

Valuation of the Changes

19.5.3 Following the consideration of the importance of the ecosystem services scoped in, and subsequently the determination of the measurable changes between options, it has been identified that only four ecosystem services would experience a magnitude change that could potentially provide a valuation:

- Cultural Heritage (landscape).
- Aesthetic Value (landscape).
- Recreation and tourism (coastal angling).
- Recreation and tourism (birdwatching).

19.5.4 However, the magnitude of change with respect to the cultural heritage and aesthetic value (landscape) is influenced by the response of members of the public, and the potential changes to recreation and tourism (bird watching / angling) would be influenced by the perceived change of users of the footpath at Spur Bay. Without some form of Contingent Valuation or response survey from users of the footpath, the actual effects on perceived change cannot be determined without being based on assumptions that would be significantly influenced by the author's personal values. Consequently, no value has been provided.

19.5.5 To attempt the calculation of an economic value for the ecosystem services, the use of Contingent Valuation, Proxy, or Travel Cost Methods could be used. For example, one could use the cost of participating in the fishing club activities as a proxy value for 'social interaction', though more likely a mix of Travel Cost and Contingent Valuation would be more appropriate. For the recreation and tourism (bird watching / angling) ecosystem service a Contingent Valuation method would be more appropriate.

19.5.6 The following bullet points provide the process and list of questions that would need to be answered (by footpath users/ bird watchers and anglers– through survey) in order to derive a value for differentiation between the options in relation to the cultural heritage (social interaction) ecosystem service:

- Number of people using the site;
- Number of footpath users who would travel to an alternative location to enjoy the same experience of the rocky bay landscape / angling / birdwatching; and

- Costs incurred of travelling to Spur Bay. Of those who would visit another location, costs for travel should be identified to determine whether there is a net increase / decrease.

19.6 Conclusions

19.6.1 This assessment was carried out at a high level to determine the changes to natural capital and associated ecosystem services. Screening and scoping were undertaken to determine what key ecosystem services would experience notable change that could enable economic valuation of the change to be undertaken (see **Section 19.3**).

19.6.2 Following analysis of the ecosystem services and the changes as a result of the various options, economic valuations were not possible (see **Section 19.5**). However, scoping did reveal likely positive and negative impacts to the ecosystem services associated with the options that provide subtle indications of difference and preference for the options. These are presented in **Table 19-2** and **Appendix 19.2** (in detail).

19.6.3 There are several positive and negative impacts in relation to natural capital:

- Small scale loss of shell and stone resource (9ha of Spur Bay);
- Small scale change in angling locations (215m of angling frontage);
- Small scale loss of bird watching habitat (215m of frontage for birdwatching);
- Small scale loss of carbon sequestration for a medium-term (reduction in extent of eelgrass by 5% reducing over time);
- Small scale improvement in flood defence (275m of frontage would be protected);
- Medium scale damage to one heritage asset offset by the preservation of this asset by avoiding sea level rise;
- Medium scale loss of landscape.

19.6.4 No cumulative impacts were identified for the technical topic chapters that quantified the natural capital and associated ecosystems services. Consequently, **no cumulative impacts** are identified with respect to the above natural capital receptors.

20 Summary

20.1 Findings

Table 20-1: Summary of Impacts during Construction

Description of Construction Impact	Residual Impact
Chapter 7 - Coastal and Marine Processes (Section 7.7)	
Changes in suspended sediment concentrations due to the construction of the breakwater	No Impact (**paragraph 7.7.8**)
Changes in sea-bed level due to the construction of the breakwater	No Impact (**paragraph 7.7.12**)
Chapter 8 - Marine Sediment and Water Quality (Section 8.5)	
Deterioration in water quality due to increased suspended sediment concentrations	Minor Adverse (**paragraph 8.5.2**)
Release of contaminated sediments	Minor Adverse (**paragraph 8.5.7**)
Accidental release of contaminants	Low Risk (**paragraph 8.5.12**)
Deterioration in water quality due to changes in hydrodynamic regime	See impacts during operation (**paragraph 8.5.13**)
Chapter 9 - Surface Water and Flooding (Section 9.5)	
Pollution of marine waterbody due to accidental release of fuels, oils, lubricants and construction materials	See **Chapter 8 Marine Sediment and Water Quality** (**paragraph 9.5.1**)

Description of Construction Impact	Residual Impact
Chapter 10 - Land Use, Land Quality, Soil Quality, Geology and Hydrogeology (Section 10.6)	
Disturbance to potentially contaminated sites	Minor Adverse (**paragraph 10.6.9**)
Disturbance to geological sites	Moderate Adverse (**paragraph 10.6.15**)
Disruption to land use	No Impact (**paragraph 10.6.18**)
Chapter 11 - Traffic and Transport (Section 11.7)	
Road safety	Minor Adverse (**paragraph 11.7.25**)
Driver delay	Minor Adverse (**paragraph 11.7.46**)
Chapter 12 - Air Quality (Section 12.6)	
Construction phase dust and particulate matter	Not Significant (**paragraph 12.6.18**)
Construction phase road traffic emissions	Not Significant (**paragraph 12.6.29**)
Chapter 13 - Noise and Vibration (Section 13.6)	
Construction phase site activity	Not Significant (**paragraph 13.6.16**)
Construction phase road traffic noise	Minor Adverse (**paragraph 13.6.19**)
Construction phase vibration	Minor Adverse (**paragraph 13.6.23**)

Description of Construction Impact	Residual Impact
Chapter 14 - Population and Human Health (Section 14.6)	
Impact of Increased industrialisation	See **Chapter 16 Landscape Character and Visual Amenity** (**paragraph 14.6.1**)
Impact on tourism, recreation and amenity	Minor Adverse (**paragraph 14.6.7**, **paragraph 14.6.8**, and **paragraph 14.6.9**)
Impacts to community assets	Minor Adverse (**paragraph 14.6.11**)
Impacts on human health	Minor Adverse (**paragraph 14.6.22** and **paragraph 14.6.24**)
Chapter 15 - Material Assets (Archaeology, Built and Cultural Heritage) (Section 15.6)	
Direct impact on maritime and aviation archaeology below high water	Negligible (**paragraph 15.6.9**)
Direct impact on buried archaeology and cultural heritage assets above high water	Negligible (**paragraph 15.6.12**)
Direct impact on all other World War II heritage assets	Major Positive (**paragraph 15.6.15**)
Direct impact conservation areas and built heritage assets	No Impact (**paragraph 15.6.16**)
Indirect impact associated with changes to coastal processes	No Impact (**paragraph 15.6.18**)
Impacts on the setting of heritage assets	Major Positive (**paragraph 15.6.26**)
Chapter 16 - Landscape Character and Visual Amenity (Section 16.6 and Section 16.7)	
Effects on Landscape Character Area 1 – St Peter Port	Minor Adverse (**Table 16-6**)

Description of Construction Impact	Residual Impact
Effects on Landscape Character Area 2 – East Coast Road	Minor to Moderate Adverse (**Table 16-6**)
Effects on Landscape Character Area 3 – Belle Grève Bay	Moderate-Minor Adverse (**Table 16-6**)
Effects on Landscape Character Area 4 – Open Sea (and Ferry Routes)	Minor Adverse (**Table 16-6**)
Effects on Landscape Character Area 5a – Local Landscape (Rocky Shore and Industrial Area)	Minor Adverse (**Table 16-6**)
Effects on Landscape Character Area 5b – Local Landscape (Green Area and Gorselea)	Substantial Adverse (**Table 16-6**)
Visual effects on viewers at Recognised View 1 – Salerie Battery	Moderate-Minor Adverse (**Table 16-8**)
Visual effects on viewers at Recognised View 2 – Beau Sejour Leisure Centre	Moderate-Minor Adverse (**Table 16-8**)
Visual effects on viewers at Recognised View 3 – Fort George / Belvedere Field	Minor Adverse- Negligible (**Table 16-8**)
Visual effects on viewers at Recognised View 4 – Vale Castle	Minor Adverse- Negligible (**Table 16-8**)
Visual effects on Visual Receptor Group 1a – Road users on the East Coast Road (Car and Truck Users)	Moderate - Minor Adverse (**Table 16-9**)
Visual effects on Visual Receptor Group 1b – Road users on the East Coast Road (Cyclists)	Moderate - Minor Adverse (**Table 16-9**)
Visual effects on Visual Receptor Group 1a – Road users on the East Coast Road (Walkers & Pedestrians)	Moderate - Adverse (**Table 16-9**)
Visual effects on Visual Receptor Group 2a – Residents (Fronting onto East Coast Road)	Moderate - Minor Adverse (**Table 16-9**)
Visual effects on Visual Receptor Group 2b – Residents (On elevated land)	Moderate - Minor Adverse (**Table 16-9**)

Description of Construction Impact	Residual Impact
Visual effects on Visual Receptor Group 2c – Residents (Near the site)	Substantial Adverse (**Table 16-9**)
Visual effects on Visual Receptor Group 3 – Beach users	Moderate Adverse (**Table 16-10**)
Visual effects on Visual Receptor Group 4a – Ferry users (through the water between Herm and Guernsey)	Negligible to Moderate Adverse (**Table 16-10**)
Visual effects on Visual Receptor Group 4b – Ferry users (to and from Guernsey from the East/ South)	Minor Adverse- Negligible (**Table 16-10**)
Visual effects on Visual Receptor Group 5a – Fishermen and recreational boating (between the Guernsey coast and the northern ferry route)	Moderate Adverse (**Table 16-10**)
Visual effects on Visual Receptor Group 5b – Fishermen and recreational boating (between the northern and the eastern ferry routes)	Minor Adverse-Negligible (**Table 16-10**)
Visual effects on Visual Receptor Group 6 – Users of the public footpath	Substantial Adverse (**Table 16-11**)
Visual effects on Visual Receptor Group 7 – Tourists and sightseers and visitors at St Peter Port	Minor Adverse (**Table 16-11**)
Visual effects on Visual Receptor Group 8 – Workers travelling to and working at Longue Hougue	Moderate - Minor Adverse (**Table 16-11**)
Visual effects on Visual Receptor Group 9 – Visitors to Delancey Park	Moderate - Minor Adverse (**Table 16-11**)
Visual effects on viewers within the St Peter Port Conservation Area	Minor Adverse (**Table 16-12**)
Visual effects on viewers within the Delancey and St Sampson Conservation Area	Minor Adverse (**Table 16-12**)

Description of Construction Impact	Residual Impact
Chapter 17 - Marine Ecology (Section 17.6)	
Habitat alteration / physical disturbance - foreshore ABI	Minor Adverse (**Table 17-7**)
Habitat alteration / physical disturbance - intertidal habitats	Negligible to Minor Adverse (**Table 17-9**)
Habitat alteration / physical disturbance - fish habitats	Negligible Adverse (**Table 17-11**)
Habitat alteration / physical disturbance - eelgrass	Minor Adverse (**Table 17-13**)
Changes to water quality (including Increased suspended sediments, smothering and contamination) – intertidal and subtidal habitats	Negligible to Minor Adverse (**Table 17-15**)
Changes to water quality (including Increased suspended sediments, smothering and contamination) – fish habitat	Negligible Adverse (**Table 17-17**)
Changes to water quality (including Increased suspended sediments, smothering and contamination) – Maerl beds	Minor Adverse (**Table 17-19**)
Changes to water quality (including Increased suspended sediments, smothering and contamination) – commercial fish species	Negligible to Minor Adverse (**Table 17-21**)
Potential impact on marine mammals due to collisions with vessels	Minor Adverse (**Table 17-23**)
Chapter 18 - Terrestrial Ecology and Ornithology (Section 18.6)	
Direct habitat loss / disturbance within Spur Point ABI	No Impact (**paragraph 18.6.1**)
Indirect disturbance to terrestrial habitats within Spur Point ABI from dust and Particulate Matter emissions	No Impact (**paragraph 18.6.4**)

Description of Construction Impact	Residual Impact
Indirect disturbance to coastal habitats within Spur Point ABI from dust emissions	Negligible (**paragraph 18.6.5**)
Direct impact to potential bat roosts	No Impact (**paragraph 18.6.6**)
Indirect impact to potential bat roosts	No Impact (**paragraph 18.6.10**)
Disturbance to foraging bats (Pipistrelle) (Grey long-eared bat)	No Impact (**paragraph 18.6.17**)
Disturbance to reptiles	No Impact (**paragraph 18.6.21**)
Noise disturbance to wintering birds	No Impact (**paragraph 18.6.34**)
Visual disturbance to wintering birds	Negligible (**paragraph 18.6.40**)
Impacts upon prey species	Negligible (**paragraph 18.6.43**)
Indirect disturbance to breeding birds	No Impact (**paragraph 18.6.47**)
Chapter 19 - Natural Capital	
See Impacts during Operation	

Table 20-2: Summary of Impacts during Operation

Description of Operational Impact	Residual Impact
Chapter 7 - Coastal and Marine Processes (Section 7.8)	
Changes to the wave regime due to the presence of the Project	No Impact (**paragraph 7.8.7**)
Changes to the tidal current regime due to the presence of the Project	Negligible (**paragraph 7.8.16**)
Changes to sediment transport and erosion / accretion patterns due to the presence of the Project	Negligible to No Impact (**paragraph 7.8.21** and **paragraph 7.8.22**)
Changes in suspended sediment concentrations due to the operation of the breakwater	Negligible to No Impact (**paragraph 7.8.26** and **paragraph 7.8.27**)
Chapter 8 - Marine Sediment and Water Quality (Section 8.6)	
Release of contaminated sediments	No Impact (**paragraph 8.6.1**)
Increase in suspended sediment concentrations	Negligible (**paragraph 8.6.7**)
Deterioration in water quality due to long-term changes in the hydrodynamic regime	No Impact (**paragraph 8.6.13**)
Accidental release of contaminants	Very Low Risk (**paragraph 8.6.18**)
Chapter 9 - Surface Water and Flooding (Section 9.6)	
Increased surface (pluvial) water run-off and risk of flooding	No Impact (**paragraph 9.6.10**)
Reduced flood risk	Minor Beneficial impact (**paragraph 9.6.11**)

Description of Operational Impact	Residual Impact
Chapter 10 - Land Use, Land Quality, Soil Quality, Geology and Hydrogeology (Section 10.7)	
Alteration to land use	Moderate Beneficial (**paragraph 10.7.2**)
Chapter 11 - Traffic and Transport (Section 11.8)	
Pedestrian and cycling amenity	Negligible (**paragraph 11.8.25**)
Severance	Negligible (**paragraph 11.8.26**)
Road safety	Minor Adverse (**paragraph 11.8.28**)
Driver delay	Minor Adverse (**paragraph 11.8.33**)
Chapter 12 - Air Quality (Section 12.7)	
Operational phase road traffic emissions	Not Significant (**paragraph 12.7.7**)
Operational phase dust deposition	Not Significant (**paragraph 12.7.17**)
Chapter 13 - Noise and Vibration (Section 13.7)	
Operational phase road traffic noise	Minor Adverse (**paragraph 13.7.3**)
Operational noise on sensitive receptors	Negligible (**Table 13-35**) / Not Significant (**paragraph 13.7.22**)

Description of Operational Impact	Residual Impact
Chapter 14 - Population and Human Health (Section 14.7)	
Impact of Increased industrialisation	See **Chapter 16 Landscape Character and Visual Amenity** (**paragraph 14.7.1**)
Impact on recreational use of the foreshore	Minor Adverse (**paragraph 14.7.2**, **paragraph 14.7.3**, **paragraph 14.7.4**, **paragraph 14.7.5)** and Negligible (**paragraph 14.7.6** and **paragraph 14.7.7**)
Impact on human health	Minor Adverse (**paragraph 14.7.17** and **paragraph 14.7.19**)
Chapter 15 - Material Assets (Archaeology, Built and Cultural Heritage) (Section 15.7)	
Direct impact on maritime and aviation archaeology below high water	Minor Adverse (**paragraph 15.7.3**)
Direct impact on buried archaeology and cultural heritage assets above high water	No Impact (**paragraph 15.7.4**)
Direct impact on World War II heritage assets	No Impact (**paragraph 15.7.5**)
Direct impact conservation areas and built heritage assets	No Impact (**paragraph 15.7.6**)
Indirect impact associated with changes to coastal processes	No Impact (**paragraph 15.7.7**)
Impacts on the setting of heritage assets	Minor Adverse (**paragraph 15.7.8**)

Description of Operational Impact	Residual Impact
Chapter 16 - Landscape Character and Visual Amenity (Section 16.6 and Section 16.7)	
Effects on Landscape Character Area 1 – St Peter Port	Minor Adverse (**Table 16-6**)
Effects on Landscape Character Area 2 – East Coast Road	Minor Adverse (**Table 16-6**)
Effects on Landscape Character Area 3 – Belle Greve Bay	Minor to Moderate Adverse (**Table 16-6**)
Effects on Landscape Character Area 4 – Open Sea (and Ferry Routes)	Minor Adverse (**Table 16-6**)
Effects on Landscape Character Area 5a – Local Landscape (Rocky Shore and Industrial Area)	Minor to Moderate Adverse (**Table 16-6**)
Effects on Landscape Character Area 5b – Local Landscape (Green Area and Gorselea)	Substantial Adverse (**Table 16-6**)
Visual effects on viewers at Recognised View 1 – Salerie Battery	Minor to Moderate Adverse (**Table 16-8**)
Visual effects on viewers at Recognised View 2 – Beau Sejour Leisure Centre	Minor to Moderate Adverse (**Table 16-8**)
Visual effects on viewers at Recognised View 3 – Fort George / Belvedere Field	Negligible to Minor Adverse (**Table 16-8**)
Visual effects on viewers at Recognised View 4 – Vale Castle	Negligible to Minor Adverse (**Table 16-8**)
Visual effects on Visual Receptor Group 1 – Road users on the East Coast Road	Minor to Moderate Adverse (**Table 16-9**)
Visual effects on Visual Receptor Group 2 – Residents	Minor to Substantial Adverse (**Table 16-9**)
Visual effects on Visual Receptor Group 3 – Beach users	Moderate Adverse (**Table 16-9**)
Visual effects on Visual Receptor Group 4 – Ferry users	Negligible to Moderate Adverse (**Table 16-9**)

Description of Operational Impact	Residual Impact
Visual effects on Visual Receptor Group 5 – Fishermen and recreational boating	Negligible to Moderate Adverse (**Table 16-9**)
Visual effects on Visual Receptor Group 6 – Users of the public footpath	Substantial Adverse (**Table 16-9**)
Visual effects on Visual Receptor Group 7 – Tourists and sightseers and visitors at St Peter Port	Minor Adverse (**Table 16-9**)
Visual effects on Visual Receptor Group 8 – Workers travelling to and working at Longue Hougue	Minor Adverse (**Table 16-9**)
Visual effects on Visual Receptor Group 9 – Visitors to Delancey Park	Minor Adverse (**Table 16-9**)
Visual effects on viewers within the St Peter Port Conservation Area	Minor Adverse (**Table 16-12**)
Visual effects on viewers within the Delancey and St Sampson Conservation Area	Minor Adverse (**Table 16-12**)
Chapter 17 - Marine Ecology (Section 17.7)	
Loss of habitat - Foreshore ABI	Minor Adverse (**Table 17-25**)
Loss of habitat - Intertidal habitats	Negligible to Minor Adverse (**Table 17-27**)
Loss of habitat - Fish habitat	Negligible (**Table 17-29**)
Loss of habitat - Eelgrass	Minor Adverse (**Table 17-31**)
Increased suspended sediments	No Impact (**paragraph 17.7.25**)
Physical disturbance and habitat alteration	No Impact (**paragraph 17.7.26**)
Changes to habitats in Herm, Jethou and the Humps Ramsar	No Impact (**paragraph 17.7.27**)

Description of Operational Impact	Residual Impact
Changes to marine habitats due to a change in tidal flow rates	No Impact (**pargraph 18.7.35**)
Chapter 18 - Terrestrial Ecology and Ornithology (Section 18.7)	
Change to habitats in Herm, Jethou and the Humps Ramsar	No Impact (**paragraph 18.7.1**)
Terrestrial habitat loss within Spur Point ABI	Negligible (**paragraph 18.7.4**)
Indirect Disturbance to Terrestrial Habitats within Spur Point ABI from Dust and Particulate Matter Emissions	No Impact (**paragraph 18.7.7**)
Loss of bat foraging habitat	Negligible to No Impact (**paragraph 18.7.12**)
Disturbance to bat foraging activity	No Impact (**paragraph 18.7.13**)
Loss of small mammal habitat	No Impact (**paragraph 18.7.16**)
Loss of wall lizard habitat	No Impact (**paragraph 18.7.19**)
Loss of wintering bird foraging habitat	Minor Adverse (**paragraph 18.7.23**)
Noise disturbance to wintering birds at Belle Grève Bay	No Impact (**paragraph 18.7.25**)
Loss of breeding bird habitat	Negligible (**paragraph 18.7.28**)
Reduction in scaly cricket population	Minor adverse (**paragraph 18.7.34**)
Chapter 19 - Natural Capital (Section 19.5)	
Loss of shell and stone resource	Small-scale Negative (**paragraph 19.6.3**)

Description of Operational Impact	Residual Impact
Loss of angling locations	Small-scale Negative (**paragraph 19.6.3**)
Loss of bird watching habitat	Small-scale Negative (**paragraph 19.6.3**)
Loss of carbon sequestration	Small-scale Negative (**paragraph 19.6.3**)
Improvement in flood defence	Small-scale Positive (**paragraph 19.6.3**)
Damage to a heritage asset	Major Positive (**paragraph 19.6.3**)
Loss of landscape	Small-scale Negative (**paragraph 19.6.3**)

Table 20-3: Summary of Cumulative Impacts

Cumulative Impact	Residual Impact
Chapter 7 - Coastal and Marine Processes	
No projects scoped in, therefore no cumulative impacts (**paragraph 7.8.26**)	
Chapter 8 - Marine Sediment and Water Quality (Section 8.7)	
Marine Sediment and Water Quality impacts	No Impact (**paragraph 8.7.3**)
Chapter 9 - Surface Water and Flooding	
No projects scoped in, therefore no cumulative impacts	
Chapter 10 - Land Use, Land Quality, Soil Quality, Geology and Hydrogeology (Section 10.8)	
Disturbance to geological sites	No Cumulative Impact (**paragraph 10.8.5**)
Disruption to land use	No Cumulative Impact (**paragraph 10.8.6**)
Chapter 11 - Traffic and Transport (Section 11.9)	
No projects scoped in, therefore no cumulative impacts (**paragraph 11.9.4**).	
Chapter 12 - Air Quality (Section 12.8)	
Construction phase road traffic emissions	Not Significant (**paragraph 12.8.4**)
Construction dust and particulate matter	Not Significant (**paragraph 12.8.8**)
Operation phase road traffic emissions	Not Significant (**paragraph 12.8.4**)

Cumulative Impact	Residual Impact
Operation phase dust and particulate matter	Not Significant (**paragraph 12.8.8**)
Chapter 13 - Noise and Vibration (Section 13.8)	
Cumulative impacts during construction and operation	Not Significant (**paragraph 13.8.7**)
Chapter 14 - Population and Human Health (Section 14.8)	
Impact to recreation	No impact (**Paragraph 14.8.3**)
Chapter 15 - Material Assets (Archaeology, Built and Cultural Heritage) (Section 15.8)	
Direct Impact to heritage assets	No Impact (**paragraph 15.8.1**)
Indirect impact associated with changes to coastal processes	No Impact (**paragraph 15.8.2**)
Impacts on the setting of heritage assets	No Impact (**paragraph 15.8.3**)
Chapter 16 - Landscape Character and Visual Amenity (Section 16.8)	
Landscape	Not Significant (**paragraph 16.8.8**)
Cumulative effects - views and visual receptors	Not Significant (**paragraph 16.8.17**)
Chapter 17 - Marine Ecology (Section 17.8)	
Disturbance to or loss of eelgrass	No Cumulative Impact (**paragraph 17.8.3**)

Cumulative Impact	Residual Impact
Chapter 18 - Terrestrial Ecology and Ornithology (Section 18.8)	
Habitat loss	No Cumulative Impact (**paragraph 18.8.5**)
Scaly cricket	No Cumulative Impact (**paragraph 18.8.6**)
Chapter 19 - Natural Capital (Section 19.6)	
Cumulative effects	No Impact (**paragraph 19.6.4**)

20.2 Mitigation Measures

20.2.1 The following summarises the mitigation measures recommended for the construction phase. Where a topic is not identified, no mitigation measures have been proposed.

Construction Phase Mitigation Measures

Chapter 8 - Marine Sediment and Water Quality (Table 8-13)

20.2.2 CEMP required to ensure accidental spills and leaks are reduced as far as possible (**paragraph 8.5.12**).

Chapter 10 – Land Use, Land Quality, Soil Quality, Geology and Hydrology (Table 10-8)

20.2.3 Prepare and implement an Asbestos Management Strategy and adopt cover layers to break pollutant pathways (**paragraph 10.6.8**).

20.2.4 Minimise construction footprint to reduce scale of impact and site compound on existing infilled land (**paragraph 10.6.13**). Excavation of gabbro boulders and installation on site perimeter (**paragraph 10.6.14**).

Chapter 12 - Air Quality (Table 12-38

20.2.5 Best practice dust minimisation and suppression techniques (**paragraph 12.6.25** to **paragraph 12.6.27**).

Chapter 13 - Noise and Vibration (Table 13-40)

20.2.6 Best practice measures through a Construction Noise Management Plan (CNMP) (**paragraph 13.6.8** to **paragraph 13.6.15**).

Chapter 15 - Material Assets (Table 15-5)

20.2.7 Implementation of Protocol for Archaeological Discoveries (**paragraph 15.6.4** to **paragraph 15.6.8);** and

20.2.8 Record and preserve remains of WWII gun emplacement (**paragraph 15.6.15**).

Chapter 16 - Landscape Character and Visual Amenity (Table 16-13)

20.2.9 If rock deposition is undertaken on the foreshore (rather than at the north end of Longue Hougue) the deposition should be undertaken in the north-eastern area of the site (**paragraph 16.6.2**);

20.2.10 The proposed site compound location was selected over an alternative (**paragraph 16.6.2**);

20.2.11 Use of excavated gabbro rock features to provide installation along accessible perimeter areas (**paragraph 16.6.2**).

Chapter 18 - Terrestrial Ecology and Ornithology (Table 18-8)

20.2.12 Positioning of lights during construction will be considered during the detailed design phase to ensure that light spill avoids the areas where bats may be roosting (**paragraph 18.6.9** and **paragraph 18.6.16**).

20.2.13 PMOW to be prepared for construction (**paragraph 18.6.20**).

20.2.14 Avoid nesting bird period where possible. If not possible, clear vegetation in advance of nesting bird period and keep clear to prevent nesting (**paragraph 18.6.44**).

20.2.15 Where possible undertake construction at the western extent between May and September (**paragraph 18.6.31**).

20.3 Operation Phase Mitigation Measures

20.3.1 The following summarises the mitigation measures recommended for the operation phase. Where a topic is not identified, no mitigation measures have been proposed.

Chapter 8 - Marine Sediment and Water Quality (Table 8-13)

20.3.2 Use of geotextiles (**paragraph 8.6.6**); or

20.3.3 Operational planning to prioritise placement of fines away from breakwater (**paragraph 8.6.6**).

Chapter 9 – Surface Water and Flooding (Table 9-10)

20.3.4 Site Operational Plan to develop approach to protecting or extending the surface water outfall from the Household Recycling Plant (**paragraph 9.6.9**).

Chapter 12 - Air Quality (Table 12-38)

20.3.5 Best practice dust minimisation and suppression techniques (**paragraph 12.7.16**).

Chapter 13 - Noise and Vibration (Table 13-40)

20.3.6 Demountable acoustic fence to be used close to infill area when infilling has reached within 100m of MP1 (**paragraph 13.7.13**).

Chapter 16 - Landscape Character and Visual Amenity (Table 16-13)

20.3.7 Planting on landward perimeter boundary areas, eventually leading to development of embankment and planting on seaward boundary in the long-term (**paragraph 16.6.4**); and

20.3.8 Design of breakwater to tie-in at the north-east / east end of Spur Point (**paragraph 16.6.4**).

Chapter 17 - Marine Ecology (Table 17-32)

20.3.9 Translocation and where required re-seeding of eelgrass to a site to the immediate west of Longue Hougue South (**paragraph 17.7.7** to **paragraph 17.7.21**).

Chapter 18 - Terrestrial Ecology and Ornithology (Table 18-8)

20.3.10 Provision of a natural buffer zone along the landward boundary to avoid terrestrial ecology features on the landward boundary (**paragraph 18.7.3**, **paragraph 18.7.11**, **paragraph 18.7.15**, **paragraph 18.7.18**, and **paragraph 18.7.25**).

20.3.11 Translocation of scaly cricket population to suitable location (**paragraph 18.7.29**).

20.4 Monitoring

20.4.1 The following summarises the monitoring recommendations in the construction and operation phases. Where a topic is not identified, no monitoring recommendations have been proposed.

Construction Monitoring

Chapter 8 - Marine Sediment and Water Quality

20.4.2 Monitoring in adherence to CEMP will be required (**paragraph 8.5.12**).

Chapter 12 - Air Quality

20.4.3 Identify contractor accountable during site construction and implement regular on-site and off-site visual inspections of dust soiling and completion of a record of all inspections (**paragraph 12.7.16**) with focus on dry weather periods.

Operation Monitoring

Chapter 8 - Marine Sediment and Water Quality

20.4.4 Daily visual inspections of suspended sediment concentrations (**paragraph 8.6.6**).

Chapter 12 - Air Quality

20.4.5 Identify person accountable in Site Operational Plan and implement regular on-site and off-site visual inspections of dust soiling and completion of a record of all inspections (**paragraph 12.7.16**).

Chapter 13 – Noise and Vibration

20.4.6 Regulat noise monitoring when activities take place within 100m of receptor MP1 and demountable barriers are in use (**paragraph 13.7.23**).

Chapter 16 – Landscape and Visual Character

20.4.7 During the operation phase of the site, every 3 to 5 years a review of landscape planting should be undertaken.

Chapter 17 - Marine Ecology

20.4.8 Annual monitoring of eelgrass beds (**paragraph 17.7.22**).

Chapter 18 - Terrestrial Ecology and Ornithology

20.4.9 Two years of biannual monitoring of scaly cricket populations (**paragraph 18.7.31**).

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22 Abbreviations and Acronyms

Acronym	Acronym Description
%	Percentage
µg	Microgram (one thousandth of a milligram (mg))
2D	Two dimensional
AA	Appropriate Assessment
AADT	Annual Average Daily Traffic
AAWT	Annual Average Weekly Traffic
ABI	Area of Biodiversity Importance
ADMS	Atmospheric Dispersion Modelling System
AOD	Above Ordnance Datum
APIS	Air Pollution Information System
AQAL	Air Quality Assessment Level
AQAP	Air Quality Action Plan
AQMP	Air Quality Management Plan
ASCOBANS	Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas
ATC	Automatic Traffic Counter
AUN	Automatic Urban Network
BAP	Biodiversity Action Plan
BAT	Best Available Technique
BDS	Baie de Somme
BDV	Baie des Veys
BEIS	Department for Business, Energy and Industrial Strategy
BPEO	Best Practicable Environmental Option
BPM	Best Practicable Mean / Measure / Method
BS	British Standard
BSM	Baie du Mont-Saint-Michel
CA	Conservation Area
CCME	Canadian Council of Ministers of the Environment

Acronym	Acronym Description
CD	Chart Datum
Cefas	Centre for Environment, Fisheries and Aquaculture Science
CEMP	Construction Environmental Management Plan
CERC	Cambridge Environmental Research Consultants
CA	Conservation Area
CI	Confidence Interval
CIA	Cumulative Impact Assessment
CIEEM	Chartered Institute of Ecology and Environmental Management
CIHT	Chartered Institute of Highways and Transportation
CMLI	Chartered Landscape Architect
CNMP	Construction Noise Management Plan
CoCP	Code of Construction Practice
CRTN	Calculation of Road Traffic Noise
CSIP	Cetacean Stranding Investigation Programme
CSQG	Canadian Sediment Quality Guidelines
CTMP	Construction Traffic Management Plan
dB	Decibel
DCLG	Department for Communities and Local Government
DDV	Drop Down Video
DECC	Department of Environment and Climate Change
Defra	Department for Environment Food and Rural Affairs
DETR	Department of the Environment, Transport and the Regions
DMP	Dust Management Plan
DMRB	Design Manual for Roads and Bridges
DOE	UK Department of Environment
DPA	Development and Planning Authority
DTM	Digital Terrain Model
EAC	Effective Area Coverage
EC	European Commission

Acronym	Acronym Description
EEC	European Economic Community
EGA	Expert Geomorphological Assessment
EHO	Environmental Health Officer
EIA	Environmental Impact Assessment
ELC	European Landscape Convention
EPA	Environmental Protection Act
EPUK	Environmental Protection Unite Kingdom
ES	Environmental Statement (reporting outcome of EIA)
ES	Environmental Statement (reporting outcome of EIA)
EU	European Union
EU	European Union
EUNIS	European Nature Information System
eVDV	Estimated Vibration Dose Value
FAQs	Frequently Asked Questions
FWMA	Flood and Water Management Act
GBRC	Guernsey Biological Record Centre
GCS	Guernsey Character Study
GD	Guernsey Datum
GDP	Gross Domestic Product
GEART	Guidelines for the Environmental Assessment of Road Traffic
GLVIA3	Guidelines for Landscape and Visual Impact Assessment 3rd Edition
gmS	Gravelly muddy Sand
Ha	Hectare
HAT	Highest Astronomical Tide
HDV	Heavy Duty Vehicle
HGV	Heavy Goods Vehicle
HMSO	Her Majesty’s Stationery Office
HWRC	Household Waste Reclamation Centre
IAQM	Institute of Air Quality Management

Acronym	Acronym Description
ICES	The International Council for the Exploration of the Sea
IDP	Island Development Plan
IEEM	Institute of Ecology and Environmental Management
IPCC	Intergovernmental Panel on Climate Change
ISO	International Standards Organisation
JNCC	Joint Nature Conservation Committee
kg	Kilogramme
km	Kilometre
km^3	Square kiilometre
LAQM	Local Air Quality Management
LAT	Lowest Astronomical Tide
LD	Local Datum
LHS	Longue Hougue South
LI	Landscape Institute
LSE	Likely Significant Effect
LTSVIA	Landscape / Townscape / Seascape Visual Impact Assessment
m	Metre
m/s	Metres per second
m^2 / m^{-2}	Square metre
m^3	Cubic metre
MHWN	Mean High Water Neaps
ml	Millilitres
MLWN	Mean Low Water Neaps
MLWS	Mean Lower Water Springs
mm	Millimetre
MMMP	Marine Mammal Mitigation and Monitoring Plan
MMO	Marine Management Organisation
MOL	The Molene archipelago
MP	Monitoring Point

Acronym	Acronym Description
mph	Miles per Hour
NNG	Night Noise Guideline
NO_2	Nitrogen dioxide
NOAA	National Oceanic and Atmospheric Administration
NOx	Nitrogen oxides
NPPG	National Planning Practice Guidance
NRMM	Non Road Mobile Machinery
NTS	Non-technical summary
OD	Ordnance Datum
ODPM	Office of the Deputy Prime Minister
ODMP	Operational Dust Management Plan
OEHPR	Office of Environmental Health and Pollution Regulation
OSPAR	Oslo and Paris Convention
OTMP	Outline Traffic Management Plan
PAH	Polycyclic Aromatic Hydrocarbons
PEL	Probable Effect Level
PHE	Public Health England
PLA	Port of London Authority
PM_{10}	Particulate matter of less than 10 microns average diameter
$PM_{2.5}$	Particulate matter of less than 2.5 microns average diameter
PPE	Personal Protective Equipment
PPG	Planning Policy Guidance
PPV	Peak Particle Velocity
PSA	Particle Size Analysis
PTS	Permanent Threshold Shift
RAP	Rural Area Plan
RCP	Representative Concentration Pathways
RHDHV	Royal HaskoningDHV
RMS	Root Mean Square

Acronym	Acronym Description
RMSE	Root Mean Square Error
RV	Representative View
SAMM	Suivi Aérien de la Mégafaune Marine
SAC	Special Area of Conservation
SD	Standard deviation
SEA	Strategic Environmental Assessment
SEP	Sept Iles archipelago
SLM	Sound level meter
SLUP	Strategic Land Use Plan
SMR	Sites and Monument Record
SMRU	Sea Mammal Research Unit
SO_2	Sulphur Dioxide
SoG	States of Guernsey
SPA	Special Protection Area
S-P-R	Source-Pathway-Receptor
SSC	Suspended Sediment Concentrations
SSS	Sites of Special Significance
St	Saint
SV	Strategic View
t	Metric tonne
TEA	Triethanolamine
TEL	Threshold Effect Level
TG	Technical Guidance
TTS	Temporary Threshold Shift
UAP	Urban Area Plan
µg/kg	Micrograms per kilogram
UK	United Kingdom
UKAS	United Kingdom Accreditation Service
UKBAP	UK Biodiversity Action Plan

Acronym	Acronym Description
µPa	Micro pascal
VDV	Vibration Dose Value
VE	Visual Envelope
VP	View Point
VRG	Visual Receptor Groups
WFD	Water Framework Directive
WHO	World Health Organisation
WTS	Waster Transfer Station