REPORT

States of Guernsey Inert Waste Management Strategy

Options Report

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Enhancing Society Together

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Executive Summary

The States of Guernsey ('the States') requires a 'high level' Environmental Impact Assessment (EIA) assessing all options for the management of inert waste to enable it to determine the Best Practicable Environmental Option (BPEO), and identify the optimal solution for the management of Guernsey's inert waste stream over the next 20 years (as required under the Environmental Pollution (Guernsey) Law, 2004, and the Land Planning and Development (EIA) Ordinance, 2007).

The High Level EIA process initially focussed on independently reviewing options previously considered during an internal option appraisal process conducted by the States for the management of all inert wastes, following which it identified and considered any additional options before providing strategic recommendations for the future management of Guernsey's residual inert waste. This document provides strategic assessment of the options following the BPEO process – a systematic and balanced assessment of options, to identify which one(s) provide the maximum environmental, economic and social benefits, as well as meeting technical and legislative constraints – to deliver a proposed shortlist.

The long list of options for inert waste management that was identified by the States were assessed and a number of sites were immediately ruled out as a consequence of specific constraints (capacity limitations, safeguarded/protected status, and policy or regulatory constraints) that would make a specific option unviable. The medium list of options was then assessed using BPEO criteria, which were developed to consider economic, social and environmental implications of each option, using an appropriate assessment framework for Guernsey.

Based on the environmental and cost and affordability criteria selected options were identified as 'leading sites and options' by virtue of their BPEO score. None contained a major negative environmental constraint.

The sites and options were further evaluated during a sensitivity assessment; and a consultation workshop staged with stakeholders in July 2017 to conclude a short-list of strategic options.

The sensitivity analysis was conducted on the most significant indicator that was identified during previous workshops and consultation. This was the cost indicator. The sensitivities of cost assessment were tested by flexing the parameters associated with the cost scoring mechanism. The assessment was evaluated against having no cost parameter; and also by reducing scoring bands above and below the relevant cost baseline value (which is the current gate fee for Longue Hougue). The outcome of the sensitivity assessment was a slight shift in the parameters used for scoring by increasing the sensitivity of more expensive options. This was considered entirely in line with the conclusions of the workshops and consultation process on BPEO indicators and weighting factors held in April and May 2017.

The outcome of the sensitivity analysis led to the following ranking of the medium list of options, which consists of new site options, behavioural change options and temporary measures:

Option	Site / Option	Rank
1	Airport Runway Extension (eastern end)	1
4.15	Guillotine Quarry	2
11	Raising level of existing Land Reclamation at Longue Hougue	3
5	Les Vardes Quarry	4
13	Increase in re-use / recycling of inert waste.	5
14	Temporary Stockpile at Longue Hougue	6
4.19	Paradis Quarry	7
4.18	L'Epine Quarry	8
8.1	Longue Hougue South	9
8.3	Black Rock Option 2	10
8.5	North of Mont Cuet/Creve Coeur	11
8.6	Albecq	12
8.8	Havelet Bay (St Peter Port)	13
8.2	Black Rock Option 1 (Harbour)	14
8.4	Baie De Pecqueries	15
15	Longue Hougue Reservoir	16
8.7	East of QEII Marina (St Peter Port)	17
3.1	Beach-raising on West Coast	18
4.1	Cotes des Amarreurs	19
4.24	Barker's Quarry	20

A 'leading list' incorporating the top five sites (noting that Paradis Quarry and L'Epine Quarry represent one option of combined sites) was selected for assessment to create a shortlist. This shortlist 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.

A number of sites were not taken further at this stage as they did not present a single viable option. The option for the airport runway (option 1) was not included because, at the time of assessment, it is uncertain whether this will proceed. Raising levels at Longue Hougue (option 11) and temporary stockpiling (option 14) were not included in the assessment because these are short-term solutions which do not present a viable long-term option. Increase in reuse (option 13) does not provide a solution for managing all residual inert waste and so was not taken further. Black Rock Option 2 (option 8.3), does present a viable long-term solution, however was not selected for further assessment due to major environmental constraints.

Option	Site / Option	Rank
4.15	Guillotine Quarry	2
5	Les Vardes Quarry	4
4.19	Paradis Quarry	7
4.18	L'Epine Quarry	8
8.1	Longue Hougue South	9
8.5	North of Mont Cuet/Creve Coeur	11

The potential site options for the management of residual inert waste in the leading list were appraised at a Workshop held in July 2017 to identify advantages and disadvantages of the site to facilitate a shortlist of options.

The recommendation of the site evaluation was that Longue Hougue South 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.

This option would partner well with the Les Vardes option in providing a strategic option that could last almost 50 years. However, further work would be required to demonstrate the potential of this because Les Vardes is currently safeguarded.

The option for Infill of the rocky bay north of Mont Cuet/Creve Coeur was also raised as a possible solution, given the reasonably long potential operational life. In combination, these two sites could deliver a 20 year solution. However, it is noted that this site has greater disadvantages compared to Longue Hougue South.

The two smaller inland quarry solutions were identified as 'Unlikely' at the workshop in July 2017 mainly due to their limited potential lifespan; but also because of access restrictions; ownership issues; the fact that they contain considerable amounts of water; and void space that would be lost to allow space for site infrastructure. However, it was noted that if these sites could be brought on line quickly, they could provide a short-term stop-gap pending a more medium/long term option. Contrary to this, however, are options elsewhere, such as temporary stockpiling, which would require less investment and would be more immediate.

Following identification of the shortlist of options, the States undertook a cost/benefit analysis of the shortlisted options, using a tool for assessing risk and return for capital expenditures. This included an assessment of the benefits and critical success factors identified for the project. The cost/benefit analysis supported the findings of the BPEO assessment, that Longue Hougue South is the 'leading option' for the medium term.

The leading solution for the management of inert waste for the next 20 years will not focus on one site as a sole solution. It will be achieved by a combination of solutions that account for behavioural changes and a new facility in the most appropriate location. The leading solution will therefore include the following elements:

- **Short Term (up to five years):** Stockpiling of inert waste and/or use strategic or other projects that may come forward, followed by deposit at a new facility once it becomes available.
- **Medium Term (up to 10-15 years):** Provision of services and facilities at the proposed leading site, Longue Hougue South.
- **Long Term (10-15 years+):** Further work will be required to explore a long term solution or solutions which will be informed by monitoring and review and considered in the context of other strategic projects.

1 Introduction

1.1 Background

1.1.1 The States of Guernsey ('the States') developed a Solid Waste Strategy in 2012 for providing a strategic framework for solid waste management of Guernsey. The primary focus of the Solid Waste Strategy is the management of household and commercial waste. A perceived gap in the Solid Waste Strategy is how it considers the management of inert waste. When it comes to inert waste, the strategy focusses solely on its disposal and does not provide a strategic or sustainable direction for the future management of inert waste. The States are therefore engaged in the process of developing an Inert Waste Strategy to formalise the States' position in relation to inert waste, which complements the approved Solid Waste Strategy, and which will provide a framework for the future which can be taken into account by Islanders and businesses and against which sound investment decisions can be made.

1.1.2 A key element of the Inert Waste Strategy will be the development of a solution to manage inert waste. In recent years the States has relied on coastal land reclamation for the disposal of inert waste from the construction and demolition industry. The Longue Hougue Reclamation Site, 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 five years void space remaining. Therefore, an alternative, long-term solution is required to take over the sustainable management of Guernsey's residual inert waste stream.

1.1.3 A list of potential site options was provided by States for evaluation (Options Matrix v11 081116). In order to inform the development of the Inert Waste Strategy, the long-list of selected sites were assessed to determine the Best Practicable Environmental Option (BPEO), as required under the Environmental Pollution (Guernsey) Law, 2004. The Land Planning and Development (Environmental Impact Assessment) Ordinance, 2007) ("the EIA Ordinance") also requires a 'high level' Environmental Impact Assessment (EIA) to support the identification of the BPEO.

1.1.4 Schedule 6 of the EIA Ordinance sets out the requirements for an EIA. In the absence of any published guidelines on undertaking this High Level EIA, the approach taken by the study follows best practice from elsewhere regarding strategic high level appraisal – specifically following the Strategic Environmental Appraisal (SEA) approach set out in the Strategic Environmental Assessment Directive 2001/42/EC; and the guidelines on SEA set out in the UK's Office for the Deputy Prime Minister SEA guidelines (ODPM, 2005).

1.2 Objective

1.2.1 To establish robust criteria to demonstrate BPEO at a High Level EIA level for the long-list of potential site selection options, to enable a valid shortlist to be produced in accordance with Guernsey Law.

1.3 Note on Terminology

1.3.1 A number of terms are used in this document which require some further explanation assist in navigating the document. For clarify, some key notes on terminology are set out here.

Table 1: Terminology

Term	Definition / use
Site / option	Use to interchangeably refer to the possibly individual solutions for managing inert of waste on Guernsey. 'Site' is used where the solution is a residual waste management project, 'option' where the solution involves a policy or plan.
Lists of sites and options	
Long list	List of 55 sites and options identified by the States as of July 2016. This list is the starting point for the BPEO assessment.
Sites and Options for Second-Pass Assessment	List of 20 sites and options identified following the high level screening of sites (Step 4 of the BPEO)
List of leading sites and options	List of 12 sites identified as the top ranking sites during Step 7 (Leading sites and options) of the BPEO process
Leading list	Revised and shortened leading list of five sites and options following Step 8 (Sensitivity Analysis) of the BPEO process.
Shortlist	Not a defined list of options, but instead the outcome of Step 9 of the BPE) process (create shortlist). Outcome includes an assessment of the relative merits of the sites and options on the leading list.
Leading Option / BPEO	The selected single leading solution for managing residual inert waste.

1.4 Assessment Process

1.4.1 The assessment process considered the following:

- Reviewing the identified long list of options for inert waste management provided by the States against defined BPEO criteria.
- Identifying any specific constraints (for example capacity limitations, safeguarded/protected status, and policy or regulatory constraints) which immediately rules out any options.
- Develop economic, social and environmental indicators against which each option can be evaluated, according to an appropriate assessment framework for Guernsey.
- Identifying the potential high-level social, environmental or economic impacts and benefits associated with each option.
- Critically evaluating each option to provide a transparent process for using the BPEO approach to generate a shortlist of potential options.
- Subjecting key elements of the process of stakeholder review (i.e. the BPEO criteria, the short-listed options, the outcomes of the impacts assessment).

1.5 Strategic Policy and Legislative Context

1.5.1 In order to determine the BPEO and inform the relevant high level EIA, the key policy and legislative drivers that would influence the management of Guernsey's residual inert waste stream were identified. This ensures that the BPEO aligns with the States' adopted Waste Management Plan and best practice.

1.5.2 These policy and regulatory constraints are discussed within *'Environmental Impact Assessment - Options Review (Stage 1, Task 1)'* (Royal HaskoningDHV, 2017a).

1.5.3 The approach to the policy and legislative context review incorporated an assessment of:

- Relevant land-use policies, plans and planning decisions. This included a strategic evaluation of the key requirements of the relevant and important aspects of the States of Guernsey Waste Strategy (States of Guernsey, 2012), Strategic Land Use Plan (SLUP) (States of Guernsey, 2011), Island Development Plan (IDP) (States of Guernsey, 2016) and associated policy requirements. The BPEO was also developed in parallel with the Inert Waste Strategy, and the developing policies of this strategy were considered during the BPEO process.
- Legislation relevant to the production, management and disposal of inert waste that would have a bearing on the development application. The following were the relevant pollution and waste management regulations in the States at the time of drafting this report:
    - Refuse Disposal Ordinance, 1959.
    - The Transfrontier Shipment of Waste Ordinance, 2002.
    - The Environmental Pollution (Guernsey) Law, 2004 ('The Law').
    - Land Planning and Development (Guernsey) Law, 2005.
    - Land Planning and Development (Environmental Impact Assessment) Ordinance, 2007.
    - The Environmental Pollution (Waste Control and Disposal) Ordinance, 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 Building (Guernsey) Regulations, 2012.
    - The Environmental Pollution (Guernsey) (Amendment) Law, 2015.
    - The Waste Disposal and Recovery Charges Regulations, 2017.
- Schemes that are in place to encourage segregation of inert construction and demolition waste to maximise use of the reclamation facility and minimise impact on landfill space.
- UK Policy, legislative drivers / European Directives and Regulations, which although do not apply in Guernsey, they can be considered as providing guidance on best practical options in assessing waste management within a Guernsey context. This includes:
    - Directive 2008/98/EC on waste (Waste Framework Directive).
    - The Waste (England and Wales) Regulations 2011.

- National Planning Policy Framework (NPPF) for England (DCLG, 2012).
- National Waste Planning Policy (NWPP) for England (DCLG, 2014).
- National Waste Management Plan for England 2013 (Defra, 2013).
- Waste & Resources Action Programme (WRAP) Aggregates Quality Protocol (Environmental Agency, 2013).
- Contaminated Land: Applications In Real Environments (CL:AIRE) Definition of Waste: Development Industry Code of Practice (the CoP).

Inert Waste Definition

1.5.4 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*."

1.5.5 The Law does not define inert waste. The Waste Disposal and Recovery Charges Regulations 2016[1] describes 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*)."

1.6 Factors Influencing Inert Waste Management Provisions

1.6.1 In addition to the legislative context, a number of economic, social and environmental factors have been considered during the BPEO process.

1.6.2 'Decision Criteria' were developed to establish BPEO at a High Level EIA level within the local context, i.e. the area that can influence the development of the management option under the strategic appraisal, or can be influenced by it.

1.6.3 The Decision Criteria consider economic, social and legal implications of the options, as well as site-specific environmental sensitivities on the local population, flora and fauna, soil, water, air/climate, material assets, landscape, and transport and access. These are discussed in greater detail in **Section 5**.

1.6.4 A variety of environmental information sources exist which assist in undertaking the strategic evaluation of all options, and thus the High Level EIA. This information is contained within '*Guernsey Inert Waste Management Solution – High Level EIA Scoping Report*' (Stage 1, Task 3.6) (Royal HaskoningDHV, 2017b). The report contains a description of the environmental baseline and identification of environmental

[1] *These Regulations will be replaced with the accepted Waste Disposal and Recovery Charges Regulations 2017 as of 1st January 2018. The definition of inert waste remains the same for the 2017 Regulations.*

receptors against which to assess the strategic options. The Decision Criteria and relevant indicators used in this BPEO assessment are similar in nature to those in the High Level EIA Scoping Report, and are consistent with those listed in Schedule 6, paragraph 1(c) of the EIA Ordinance.

2 Inert Waste Management Capacity

2.1 Introduction

2.1.1 The inert waste quantities for 2011 to 2015 were provided by States with the ITT information package in July 2016. The data showed variance in the annual proportions of inert waste used for the different purposes over that period, in addition to variance in annual deposits in the land reclamation area.

2.1.2 Additional data concerning inert waste management was provided by the States between July 2016 and July 2017. This was evaluated to discern any patterns or trends that could legitimately provide a realistic extrapolation of the data to establish future capacity. Where trends were not able to be logically identified, assumptions were made regarding the proposed approach to forecasting arisings.

2.1.3 '*Environmental Impact Assessment - Inert Waste Management Capacity Assessment*' (Stage 1, Task 2) (Royal HaskoningDHV, 2017c) (as updated by the '*Inert Waste Data Assessment – 2017 Update*' (Royal HaskoningDHV, 2017d)) provides an assessment of the historic profile of Guernsey's inert waste management capacity, to define a strategic viewpoint for future capacity requirements. Those requirements are summarised here for the purpose of this BPEO.

2.2 Current Inert Waste Management

Longue Hougue Reclamation Facility

2.2.1 The Longue Hougue reclamation facility provides the current strategic option for the disposal 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, 2015.

2.2.2 The Inert Waste definition is provided in **paragraph 1.5.5** above and generally covers wastes such as: soil, stone, hardcore, gravel, sand, non-recyclable glass, concrete and ceramics.

Alternative Management of Inert Wastes other than Longue Hougue

Re-use

2.2.3 Some inert waste has historically been used in developments where there is a need to use it for construction as part of the scheme. Uses generally comprise backfill and construction. However, there is very limited data held by the States associated with this type of use. It is anticipated that data relating to this use scenario are likely to improve

with the implementation of Site Waste Management Plans, which are a requirement of the newly adopted IDP.

2.2.4 A Site Waste Management Plan will demonstrate how waste associated with the proposed development is to be minimised; how existing materials are to be re-used on or off the site; and how residual waste will be dealt with. This will be required for any development of five or more dwellings or of a minimum of 1,000 square metres of floor area. They will also be required for the demolition and redevelopment of a redundant building or a dwelling that has planning permission to be subdivided, or a replacement dwelling, on a one for one basis.

Recovery

2.2.5 Mont Cuet landfill site uses inert material for covering waste, in accordance with the Waste Management Licence for the site. There is a defined specification for 'Cover Material', which is: *Clean fine inert material (e.g. soil) that is substantially free of stone and odour free. Any stone in the cover material shall be <40mm.* Blended Cover is also used and this comprises Cover Material mixed with waste wood shredded to a maximum of 25mm, at a volume ratio of 6 parts inert material/soil, 1 part shredded wood.

2.2.6 Site Preparation Materials (including soil, hard core and waste tarmac) are also required at Mont Cuet and Longue Hougue. Mont Cuet has a limited lifespan, and is due to close in 2018, meaning that the requirement for these materials at Mont Cuet will soon cease.

2.2.7 The States records the quantities of these waste streams, based upon weighbridge data at Mont Cuet and Longue Hougue.

2.3 Inert Waste Data Assessment

Longue Hougue Baseline Capacity

2.3.1 The current Longue Hougue facility started receiving inert waste in August 1995. According to the original policy letter the void space was estimated at 1,480,000m^3 with a predicted fill life of 16-20 years. This allows for an anticipated annual volume of 74,000m^3 to 92,500m^3.

2.3.2 The assumed density for calculation is 1.75 (pers. comm. R Roussel, email Mon 28/11/2016 17:49). Therefore, the approximate total capacity of the facility in terms of mass was 2,590,000 tonnes, which represented 129,500 to 161,875 tonnes per annum based on a 16-20 year lifetime.

2.3.3 The weighbridge was installed at Longue Hougue and was operational from February 1998; however records are incomplete for 1998 and 1999; therefore, the data from the year 2000 sets the starting point for reliable inert waste data.

2.3.4 The current facility is surveyed by the Waste Disposal Authority (WDA) biannually.

Data Provided

2.3.5 The States provided MS Excel data tables that provided data on inert waste management from 1998- July 2017. These were analysed in depth in '*Environmental Impact Assessment - Inert Waste Management Capacity Assessment'* (Stage 1, Task 2) (Royal HaskoningDHV, Feb 2017c). Further data relating to July 2016 - July 2017 was provided by the States in August 2017 (Royal HaskoningDHV, 2017d)).

2.3.6 The data provided from January to July 2017 was extrapolated to provide an estimated volume for 2017.

Analysing Trends

2.3.7 The variance in the inert waste data provided was assessed to determine an appropriate quantity to use for estimating future arisings. The overall profile (see **Figure 1**) shows an increase in deposits to a maximum in 2003; then a varying trend with another peak in 2012, followed by a year on year decrease since then.

2.3.8 Trends were applied to the data to identify potential data to predict future arisings. Given the variance in historical data shown in **Figure 1**, analysis of the trends in historical data and predictions of future arisings are precautionary. To ensure that any predictions are still useful, a range of future scenarios have been determined to give a range possible estimates of future arisings, including 'worst-case' and 'best case' scenarios. These scenarios are considered to give a reasonable estimate of the bounds of future arisings, and therefore estimates of future lifespan, of the Longue Hougue facility. These future predictions should be revised annually as new data becomes available.

2.3.9 The average quantity (ignoring data from 1998 and 1999) of inert waste received at Longue Hougue is 130,299 tonnes (see **Figure 1**). This was taken to represent a '**Maximum (worst) case**' arisings predictor on the basis that it flattens out any peaks over all recorded deposits in Longue Hougue.

2.3.10 A five-year assessment of the data was carried out, based on the most recent data; and extrapolating forwards for five years. There has been a linear decline in inert waste production since 2012 (see **Figure 2**).

2.3.11 The average quantity of inert waste received in the five-year rolling period is approximately 101,964 tonnes. Given that this is the mean of the recent five-year data set it is considered to represent the '**conservative case**' quantity; and is justified on the basis that it flattens out any peaks in recent deposits.

2.3.12 To determine a '**best-case**' prediction trend for future arisings, the most conservative trend line (on the basis of extrapolated quantity at five years) was selected. This was selected to protect against under-estimation.

2.3.13 Therefore, the trendline assessment enabled three assumptions to be carried forward for forecast predictions:

- **Maximum 'worst–case'** - this is the mean quantity since 2000 = 130,299 tonnes (74,457 m^3 using a density of 1.75).
- **Conservative case** - this is the mean of the last 5 years = 101,964 tonnes (58,265 m^3).
- Predicted '**best- case**' curve – The data to be used for future predictions will be the extrapolated quantity in year 2022 from the MS Excel generated 'power-curve' trendline based upon the last four years of data year predicted annual quantity estimate = 51,000 tonnes (29,143 m^3).

2.3.14 The predicted 'best case' trend provided an estimate of the following annual inert waste arisings requiring disposal at Longue Hougue for the extrapolated five year period:

- 2017 – 67,000 tonnes[2];
- 2018 – 61,000 tonnes;
- 2019 – 57,000 tonnes;
- 2020 – 54,000 tonnes; and
- 2021 – 51,000 tonnes.

[2] *NB: the extrapolation is started from 2017, as we don't yet have full data for 2017. As a consequence, 'best-case' extrapolated arisings for 2017 (67,000) are different to those predicted based on the arisings to date (January to July) (60,000).*

Figure 1: Total Inert Waste Deposited at Longue Hougue

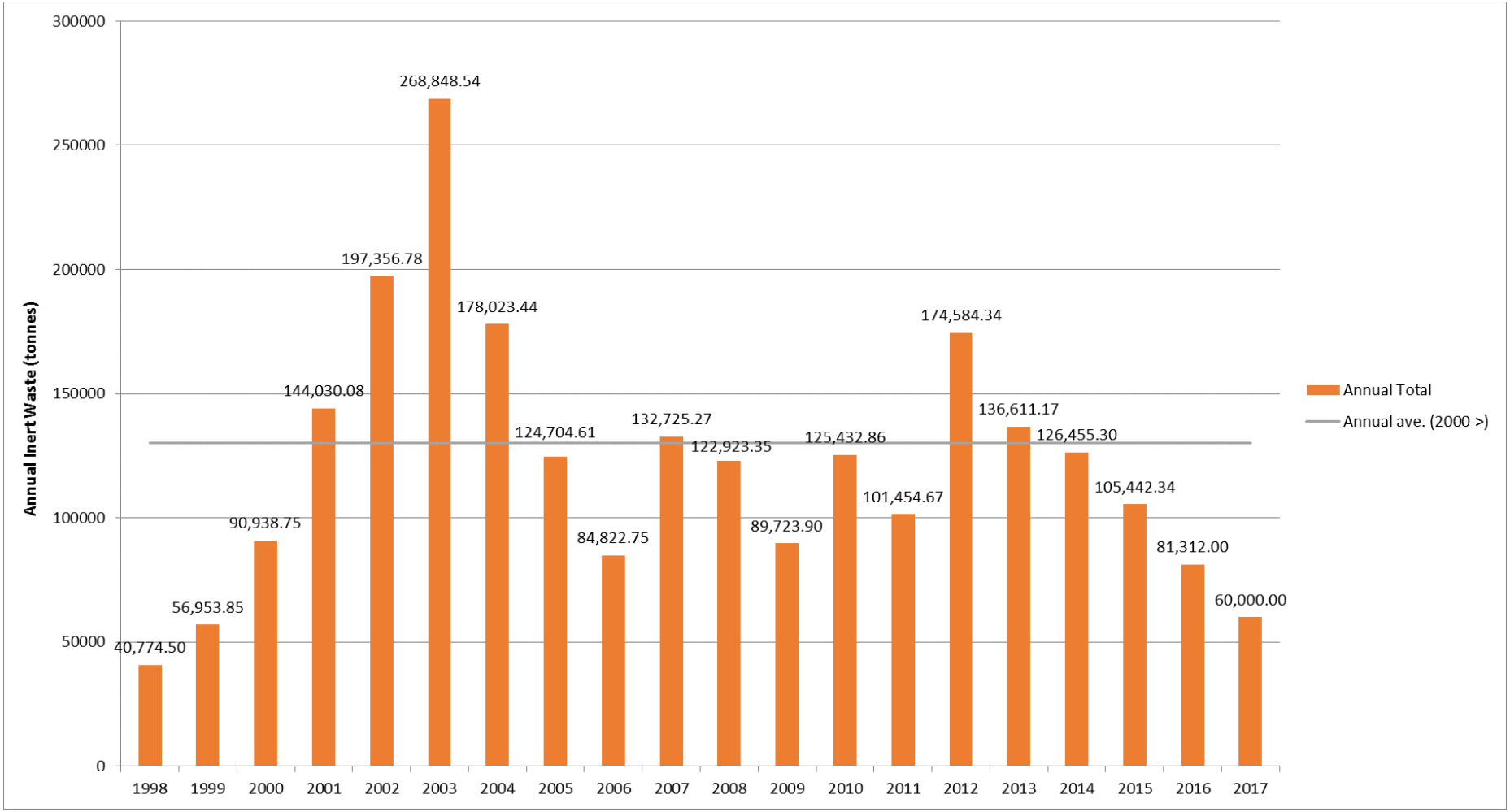
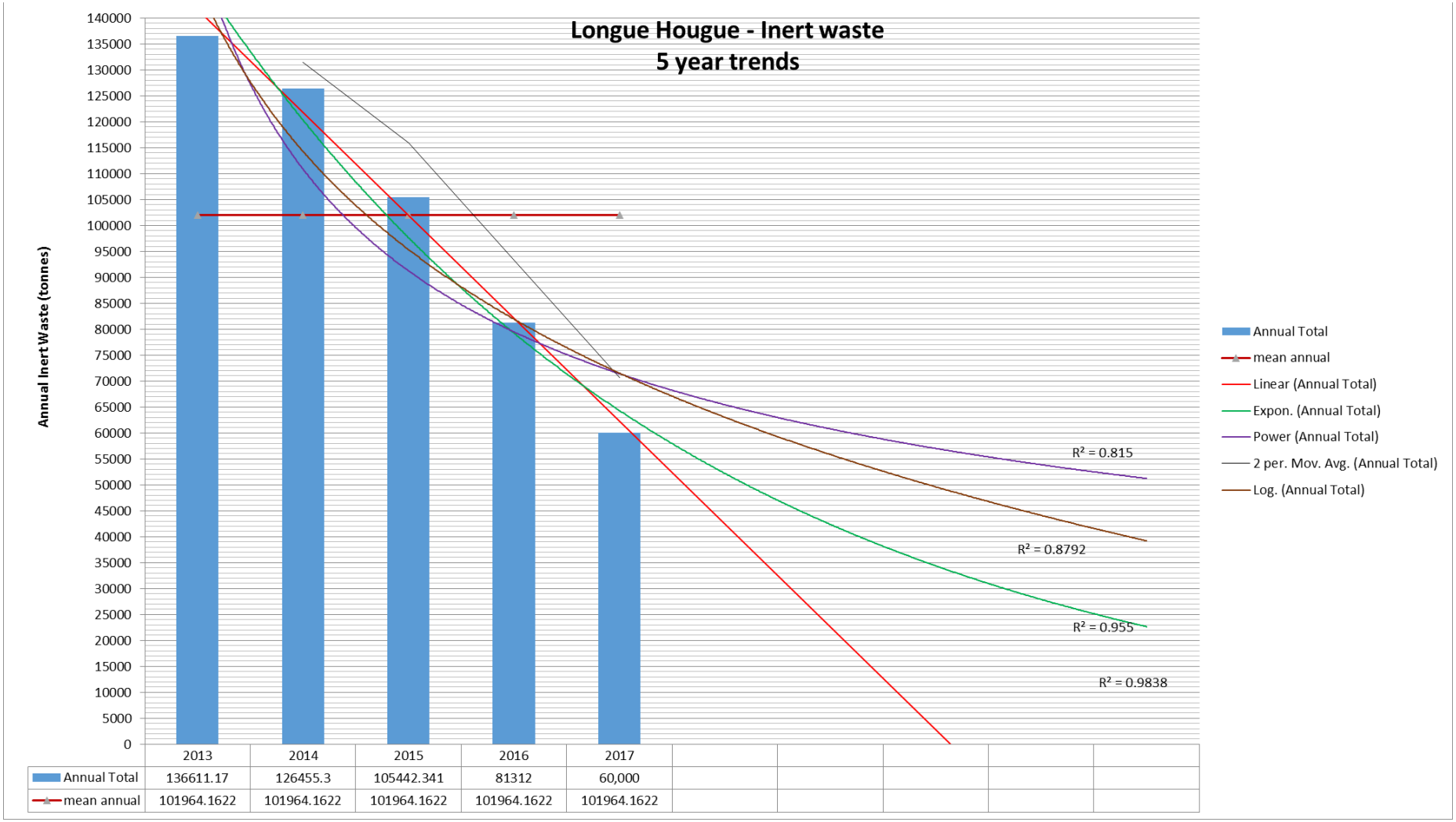


Figure 2: Trendline Assessment over Recent Four-year Period



	2013	2014	2015	2016	2017					
Annual Total	136611.17	126455.3	105442.341	81312	60,000					
mean annual	101964.1622	101964.1622	101964.1622	101964.1622	101964.1622					

2.4 Future Predictions

Remaining Capacity

Survey Data

2.4.1 The most recent survey data provided at the time of writing was for July 2017. This estimated that the remaining capacity was 185,708m^3 which would effectively provide **3.5 years** life (i.e. at capacity in January 2021).

Forecast Prediction

2.4.2 If the remaining capacity is assessed using the three assumptions, this provides the following capacity estimates, assuming the capacity in tonnes = 324,990 tonnes (185,708m^3 x 1.75 (density in tonnes/m^3):

- **Maximum 'worst case'** – predicted annual deposits = **130,299 tonnes** (74,457m^3), therefore predicted lifespan is: 2.5 years (**2 years 6 months**) at capacity in January 2020.
- **Conservative case** – predicted annual deposits = **101,964 tonnes** (58,265 m^3) therefore predicted lifespan is: 3.2 years (**3 years 2 months**) at capacity in September 2020.
- Predicted '**best- case'** curve – predicted annual deposits = **51,000 tonnes** (29,143m^3), therefore predicted lifespan is 5.69 years (**5 years 8 months**) at capacity in March 2023.

2.5 Conclusion

2.5.1 The data shows a declining trend in inert waste management at Guernsey's Longue Hougue facility. Although large construction projects are the key driver of year-on-year variation, there are several reasons that suggest a general declining trend is likely to continue:

- Uncertainty over development – although the Island Development Plan may provide some incentive / momentum;
- General market conditions;
- The impact of indecision over the mechanism of the UK leaving European Union;
- The cost of primary materials being produced locally and imported from the mainland means developers are likely to re-use as much inert material for construction purposes as possible; and
- Waste prevention, minimisation, recycling and recovery measures introduced by the States as a consequence of policy changes (for example, the promotion of Site Waste Management Plans and sustainable design in the Island Development Plan).

2.5.2 However, it is a certainty that 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. Therefore, the strategic solution for inert waste management must be capable of managing the residual inert waste that cannot be prevented or recovered.

2.5.3 It is considered that the life-expectancy estimate identified in the survey data is not unreasonable, based on a predictive decline in arisings. However, it would be prudent to consider a more 'conservative-case' estimate for planning purposes to allow for any potential surge in quantities because of developments that may be kick-started by the implementation of the Island Development Plan; to compensate for the forthcoming closure of Mont Cuet Landfill Site in 2018 and consequent loss of a deposition site for inert waste as cover material, and to allow for potential overlap in commissioning a new facility.

2.5.4 The 'three assumptions' would be used for planning purposes to determine life expectancy of site capacity for the proposed long list of options:

- Maximum 'worst case' – predicted annual arisings of 130,299 tonnes (74,457m^3).
- Conservative case - predicted annual arisings of 101,964 tonnes (58,265 m^3).
- Predicted 'best- case' – predicted annual arisings of 51,000 tonnes (29,143m^3).

3 High Level Screening

3.1 First-Pass Screening Assessment of Sites and Options

3.1.1 To define an appropriate long list of sites for review, a set of high-level criteria were set to identify those options that could be ruled out on a first-pass. Where any one or more of the criteria was not met by an option, the option was ruled out. This screening is identified in **Table 2**. Where there are more nuanced reasons being ruling a site in/out against the criteria, this has been identified within **Table 2** and the reasoning set out in the remainder of this section.

3.1.2 The criteria developed were as follows:

- **Capacity**: A site with an estimated life-span of less than one year is not considered to be suitable, because of the disproportionate costs associated with the short-term benefit and time and resources associated with setting up the proposed facility to receive waste; and the upheaval associated from having to move from one short-term solution to another option.
- **Site is safeguarded / protected / in use**: If the site has been allocated via planning or another States department for a specific purpose that would preclude the use of the site for inert waste disposal; or has a current viable use, this will rule out the potential for the site.
- **Policy or Regulatory constraints**: Where Guernsey Law, the Guernsey planning system, European Law, or international convention places a policy or regulatory restriction on the proposed option to the extent that it is unlikely to be viable, the option will be ruled out.

Table 2: First-Pass Screening Assessment of Sites and Options

Option	Site / Option	Capacity	Protected / Safeguarded / In use	Regulatory	Outcome
1	Airport Runway Extension (eastern end)	> 1 year	Yes, but not in a manner that would prevent this being a solution for inert waste.	Would need a Development Framework, but this is not an immediate restriction.	Pass
2	Hydrocarbons Project / Deep Water Berth	Likely to be < 1 year	No	None	Reject
3	West Coast Sea Defences / Overtopping Protection				
3.1	Beach-raising on West Coast	Unknown	No	None	Pass
3.2	Off-shore Reefs	Unknown	No	The required permit would demand a guarantee of clean material to a defined specification. Material would have to be processed and tested first. Not all material is of natural origin. Disposal at sea would not be considered Best Available Technique.	Reject
4	Infill of Old Quarries				
4.1	Cotes des Amarreurs	> 1 year	No	None	Pass
4.2	Marais Nord	Unknown, shallow, so potentially <1 year	No	None	Reject
4.3	Ville Baudu	1 year	Yes – water supply for Earlswood Garden centre	None	Reject
4.4	Jamblin Quarry	> 1 year	Yes – Guernsey Water: required for future water resources	None	Reject
4.5	Corvee Quarry	< 1 year	No	None	Reject
4.6	Les Hougues Peres	Unknown	Yes – important wetland	None	Reject
4.7	La Grande Maison Rd	1 year	Yes, commercial water supply	None	Reject
4.8	Rue Mainguy	< 1 year	No	None	Reject

Option	Site / Option	Capacity	Protected / Safeguarded / In use	Regulatory	Outcome
4.9	Capelles	< 1 year	Yes – Guernsey Water: required for future water resources	None	Reject
4.10	Baubigny	< 1 year	Yes – Guernsey Water: required for future water resources	None	Reject
4.11	Saltpans Quarry	< 1 year	No	None	Reject
4.12	Hougue Ricart Quarry	> 1 year	Yes – Guernsey Water: required for future water resources	None	Reject
4.13	Vale Mill Quarry	< 1 year	No	None	Reject
4.14	Les Rocques Barrees Quarry	< 1 year	No	None	Reject
4.15	Guillotine Quarry	> 1 year	No	None	Pass
4.16	Marais Quarry	< 1 year	No	None	Reject
4.17	Le Grand Pre Nature Reserve	Unknown, shallow, so potentially <1 year	No	None	Reject
4.18	L'Epine Quarry	> 1 year	No	None	Pass
4.19	Paradis Quarry	> 1 year	No	None	Pass
4.20	Hougue Noirmont	>1 year	Yes, used commercially by Guernsey Sea Farms	None	Reject
4.21	La Lande Quarry	Unknown, shallow, so potentially <1 year	No	None	Reject
4.22	Carteret	< 1 year	No	None	Reject
4.23	Irene & Robine	< 1 year	No	None	Reject
4.24	Barker's Quarry	> 1 year	Currently used by Guernsey Water as a source of water for cleansing Belle Grieve Sewage Works, but this is not thought to be a definitive restriction.	None	Pass

Option	Site / Option	Capacity	Protected / Safeguarded / In use	Regulatory	Outcome
4.25	Torrey Canyon	< 1 year	No, however, strategic emergency oil spill back-up facility	None, however, significant contamination issues	Reject
4.26	La Hougue Biart	< 1 year	No	None	Reject
5	Les Vardes Quarry	> 1 year	Yes, however, the safeguarded option may not be required (**see below for further explanation**)	None	Pass
6	Export	Ongoing	No	Export for disposal is banned apart from in exceptional circumstances. It is unlikely that exports for inert waste would be allowed given potential for other on-island solutions (**see below for further explanation**)	Reject
7	Disposal At Sea	Ongoing	No	The required permit (**see below for further explanation**) would demand a guarantee of clean material to a defined specification. Material would have to be processed and tested first. Not all material is of natural origin. Disposal at sea would not be considered Best Available Technique.	Reject
8	Coastal Land Reclamation				
8.1	Longue Hougue South	> 1 year	No	None	Pass
8.2	Black Rock Option 1 (Harbour)	> 1 year	No	None	Pass
8.3	Black Rock Option 2	> 1 year	No	None	Pass
8.4	Baie De Pecqueries	> 1 year	No	None	Pass
8.5	North of Mont Cuet/Creve Coeur	> 1 year	No	None	Pass
8.6	Albecq	> 1 year	No	None	Pass

Option	Site / Option	Capacity	Protected / Safeguarded / In use	Regulatory	Outcome
8.7	East of QEII Marina (St Peter Port)	> 1 year	No	None	Pass
8.8	Havelet Bay	> 1 year	No	None	Pass
9	Belle Greve Bay flood protection	< 1 year	No	None	Reject
10	Raising level of land in low-lying areas in advance of development				
10.1	Belgrave Vinery	< 1 year	No	None	Reject
10.2	Leale's Yard	Unlikely to provide a realistic short-term solution	Unlikely	Unlikely	Reject
10.3	Saltpans Data Park	Unlikely to provide a realistic short-term solution	Unlikely	Unlikely	Reject
10.4	Mare de Carteret High School	Unlikely to provide a realistic short-term solution	Unlikely	Unlikely	Reject
11	Raising level of existing Land Reclamation at Longue Hougue	Approx. 1 year	No	None	Pass
12	Public / Private Partnership Developments	Unknown	Unknown	Unknown	Pass (**see below for further explanation**)

Option	Site / Option	Capacity	Protected / Safeguarded / In use	Regulatory	Outcome
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.	> 1 year	No	None	Pass
14	Temporary Stockpile at Longue Hougue	> 1 year	No	None	Pass
15	Longue Hougue Reservoir	> 1 year	Yes, however, may not be required	None	Pass

Option 5: Les Vardes Quarry

3.1.3 Guernsey Water has prepared a Water Resource & Drought Management Planning paper (March 2017) for the Committee for the Environment & Infrastructure (CfE&I). The briefing paper states (point 8): "*Given the very small deficiency in our supply-demand forecast, an adaptive approach for Guernsey would not require major investment in developing Les Vardes Quarry for water storage until there is greater certainty of its need. Our water resource management plan indicates that this may materialise after 2040, particularly if a more extreme climate change scenario materialises.*" Any future investment by Guernsey Water in Les Vardes will depend on the outcomes of the Drought Management Plan, which is not due to be considered by the States' Trading Supervisory Board until April 2018.

3.1.4 Point 13 of the briefing paper states: "*It is estimated that Les Vardes Quarry could store an additional 60% of Guernsey Water's current total water storage capacity. Therefore, it would provide substantially more protection from the risk of water use restrictions than our drought plan. However, this would require major investment and is not in line with the adaptive approach that is being advocated by Guernsey Water*."

3.1.5 Recommendation point 2 states: "*Therefore it is recommended that once fully extracted, unless an alternative use of greater value is identified for Les Vardes Quarry, it remain safeguarded for water storage in the States' Strategic Land Use Plan (Resource Plan)*".

3.1.6 This will affect the decision to retain the strategic allocation of Les Vardes as a potential for water storage for the foreseeable future. But that is with the proviso that demonstration of an alternative use of greater value isn't made. In this context, Les Vardes Quarry cannot be ruled out in the initial first pass screen because safeguarding can be removed where it can be demonstrated that there is a use of greater value. It is important to bear in mind that Les Vardes will not be immediately available as it is still being worked. However, it does represent a >10 years hence solution, and it is also noted that it has substantial capacity.

Option 6: Exporting Inert Waste

Legislative Reasoning

3.1.7 The rules for importing and exporting waste are governed by several Regulations and Conventions:

- 'Basel Convention' means the Basel Convention of 22 March 1989 on the control of transboundary movements of hazardous wastes and their disposal. The Bailiwick of Guernsey is a UK Crown Dependency. For the purpose of the EU Regulation, it is regarded as an independent country outside the EU, or a 'third country'. It is ratified to the Basel Convention.
- The 'OECD Decision' means Decision C(2001)107/Final of the OECD Council concerning the revision of Decision C(92)39/Final on control of transboundary movements of wastes destined for recovery operations. This would apply to export for recovery to OECD countries. Export for recovery is banned to non-OECD countries.

- The 'EU Regulation' means Regulation (EC) No. 1013/2006 of the European Parliament and of the Council of 14 June 2006 on shipments of waste. This would apply where the waste was imported into a Member State from a third country.

3.1.8 The Transfrontier Shipment of Waste Ordinance 2002 ('TFS Ordinance') refers to Council Regulation (EEC) No. 259/93 of the 1st February 1993 on the supervision and control of shipments of waste within, into and out of the European Community (which was replaced by The EU Regulation). The TFS Ordinance will shortly be replaced to accommodate the provisions of the EU Regulation. The Transfrontier Shipment of Waste Ordinance, 2002 ('TFS Ordinance') states that "*all exports of waste for disposal shall be prohibited, except those to EFTA countries or EU Member States which are also parties to the Basel Convention*." However, it also states that "*exports of waste for disposal to an EFTA country or MSEU shall also be banned:*

a) Where the EFTA country or MSEU of destination prohibits imports of such wastes or where it has not given its written consent to the specific import of this waste;

b) If the Board in Guernsey has reason to believe that the waste will not be managed in accordance with environmentally sound methods in the EFTA country or MSEU of destination concerned."

3.1.9 At the present time, it is not possible to know exactly what operation would be carried out off-island. The exact nature of that operation would affect the classification of the export under the legislation. The crucial aspect is whether it would be considered disposal or recovery.

Disposal

3.1.10 Crown Dependencies to which ratification has been extended may use the duly reasoned request procedure in the EU Regulation in respect of the shipment of waste for disposal. Duly reasoned request (DRR) means a request presented by a Party to the Basel Convention outside the EU, who wishes to send waste to a Member State for disposal, to the competent authority of destination within a member State. The DRR should give reasons why the country of dispatch does not have and cannot reasonably acquire the technical capacity and the necessary facilities to dispose of the waste in an environmentally sound manner.

3.1.11 Procedure in the EU Regulation: stricter procedures apply to the export of waste for disposal under the EU Regulation. As a Basel Convention party, Guernsey would be required to present a prior duly reasoned request to the competent authority of destination (Article 41(4)) on the basis that they do not have and cannot reasonably acquire the technical capacity and the necessary facilities to dispose of the waste in an environmentally sound manner. The procedure in Article 42 would apply to the import. This applies the normal procedure in Title II of the Regulation subject to some modifications. Under Article 3 to the EU Regulation all wastes (even inert waste) are subject to the prior informed consent procedure set out in Title II to the EU Regulation if they are destined for disposal operations (see Article 3(1)(a)). Therefore, there would be a risk of objection under that procedure under Article 11. In particular, it is possible that the shipment could be objected to in relation to conflict with national policy in waste

disposal plans or with national legislation (see 11(1)(b) or 11(1)(g)). Also, it is possible that there *could* be objections on grounds relating to proximity and self-sufficiency 11(1)(a) or relating to conflict with self-sufficiency and other principles in the EU Waste Framework Directive (Article 11(1)(g)). It *could potentially be* argued that Guernsey is not subject to the obligations in the EU Waste Framework Directive relating to self-sufficiency and proximity as a non-EU member State and that some leeway should be allowed in view of its geographical circumstances and small size.

3.1.12 Given that the States currently operate a facility for the management of inert waste, it cannot be reasonably argued that the States are incapable of managing inert waste; and do not have the economic or technical feasibility for developing means to manage inert waste. In that respect, any EU Member State would be directed to refuse a DRR to dispose of such waste on grounds of proximity, self-sufficiency and to prioritise the recovery of such waste. The same principles are likely to be applied by EFTA countries.

Recovery

3.1.13 Export for recovery is not banned, except to those countries to where the OECD Decision does not apply. However, as described above, the Island already demonstrates self-sufficiency for inert waste where it is re-used for construction purposes in development projects; and also in the Longue Hougue reclamation facility. Recovery would need to be considered a beneficial use:

3.1.14 The term 'recovery' has been debated across EU Member States and has been the subject of case law at a European level. In ruling on the Abfall case (Abfall Service AG ASA) C-6/00), the European Court stated that "*the essential characteristic of a waste recovery operation is that its principal objective is that the waste serve a useful purpose in replacing other materials which would have been used for that purpose, thereby conserving natural resources*".

3.1.15 In line with this, inert waste can be recovered for the purposes of use in construction where it can be demonstrated that the use is beneficial.

- Is there a clear benefit from the activity?
- Is the waste material suitable for its intended use?
- Is the minimum amount of waste being used to achieve the intended benefit?
- Is the waste being used as a substitute for non-waste material?
- Will the proposal be completed to an appropriate standard?

3.1.16 In line with the proximity principle, it would not be appropriate to look to export the material for recovery in preference of recovery options on the Island. Therefore, the only waste that could be considered for export would be inert waste that is not suitable for recovery because it is in surplus; or the quality does not meet standards that would be required for recovery. This would be 'residual' inert waste. Given the current approach to this material, there is no certainty that an overseas recovery option exists. For export of residual inert waste for recovery to be feasible, an appropriate recovery facility would have to be in place within the intended destination country or countries. The residual inert waste would have to be of a quality that would guarantee recovery at all times. However, this would be difficult to establish given that the material would be residual for recovery on Guernsey. This would imply that the material is either residual because it is in surplus; or residual because it is lower quality than what is needed. It would be difficult to justify the off-island recovery of the latter.

3.1.17 At the present time, all inert waste that cannot be recovered on site in construction works are disposed in the Longue Hougue reclamation facility.

3.1.18 General construction and demolition waste does not come under one single entry in the waste lists that are associated with the EU Regulation. It is a mixture of wastes that are covered by a single entry (e.g. concrete, bricks). This means that as a mixed waste, it will be subject to the complex prior informed consent procedure of notification and approval prior to shipment.

3.1.19 There would have to be infrastructure developed on Guernsey to stockpile the residual inert waste, and port-based facilities that would allow the inert material to be loaded in sufficient quantities to justify the costs for transfer overseas. This is likely to be hard to justify given that the residual inert material is of low value and the receiving country will also be generating inert material itself. Therefore, strategically, a focus would have to look for an overseas solution that has a shortfall of inert material for recovery purposes. It is difficult to envisage where such a country exists.

Logistics

3.1.20 Regardless of the legal and regulatory position, logistically Guernsey does not have the necessary infrastructure to enable the export of inert waste.

3.1.21 The States' looked at exporting bulk shipments of refuse derived fuel (RDF) via St Sampsons Harbour (shipping in bulk is the only logical method of exporting inert waste) as part of the strategic approach to this waste stream. It became apparent that not only was this option far more expensive than preferred options, logistically it was also very difficult to achieve given the short window of opportunity vessels would be able to dock in St Sampsons (fuel vessels take priority over other vessels). This was down to several issues:

- Lack of storage space on the pier, meaning alternative delivery arrangements during loading were required;
- Extended loading times due to delivery being restricted to loading periods only - vehicle movements wouldn't have been able to keep up with the speed of loading the vessel;

- Additional cost due to double handling of waste;
- Issues with storage in advance of shipments; and
- Restrictions on the size of vessels that can use St Sampsons Harbour (we would be looking at almost weekly shipments for inert waste; where monthly shipments would have taken place for RDF).

3.1.22 The only way that the States' could viably export inert waste would be to construct a dedicated berth alongside Longue Hougue, which would require significant capital investment.

3.1.23 There is an accessible competitive market for RDF, however, no such market exists for inert waste because it has very little value; and proportionately costs a lot to move.

Option 7: Disposal at sea

3.1.24 In addition to the logistical points raised above with respect to the export of inert waste, the following points make disposal at sea also unpractical:

3.1.25 The UK Food and Environmental Protection Act 1985 (FEPA), was extended to the Bailiwick of Guernsey in 1987. This prohibits the deposit of substances and articles in the sea without a licence.

3.1.26 There is also international legislation regarding disposal of waste at sea - the OSPAR Convention restricts disposal at sea to "*inert materials of natural origin that is solid, chemically unprocessed geological material the chemical constituents of which are unlikely to be released into the marine environment*". Consideration of alternative disposal routes is a requirement of OSPAR. Although the OSPAR Convention has not been extended to Guernsey, it should be considered as a guide to best practice.

Option 12: Public / Private Partnership Development

3.1.27 Whilst the screening assessment of sites and options was being undertaken, the States confirmed that '***Option 12: Public/Private Partnership Development***' should be considered as a potential funding mechanism rather than a potential solution. Therefore, although Option 12 passed the first assessment given that there were no apparent reason to rule it out (based on the criteria defined in **Table 2**); it will not be further considered as a potential option for future inert waste management.

3.2 Sites and Options for Second-Pass Assessment

3.2.1 **Table 3** contains a list of the sites and options that were evaluated as part of the second-pass assessment.

Table 3: Second-Pass Assessment of Sites and Options

Option	Site / Option
1	Airport Runway Extension (eastern end)
3.1	Beach-raising on West Coast
4.1	Cotes des Amarreurs
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

4 Best Practicable Environmental Option

4.1 BPEO Process

4.1.1 BPEO is one of the key tools to guide progress towards more sustainable waste management practices. It entails a systematic and balanced assessment of options, to identify which one(s) provide the maximum environmental, economic and social benefits, as well as meeting technical and legislative constraints. The BPEO concept is thus clearly consistent with the objectives of sustainable development. However, although a system option may perform very well against a range of criteria, it may not be possible to implement due to simple practical constraints. Considering the possibility of such constraints before deciding on a management system option is particularly important since there are potentially huge economic, planning and legal risks associated with developing options which encounter practical difficulties to implement.

4.1.2 The BPEO process can be broken down into ten simple steps, as outlined in **Table 4**. This multi-stage process has been adapted from 'BPEO – Decision Makers Guide' (Environment & Heritage Service, 2001). Note**:** the SNIFFER Decision Criteria, which underpins this guide, does not consider non-municipal waste arisings (i.e. inert wastes). As such, the principles have been adapted for the purpose of this assessment.

Table 4: Ten-Step BPEO Process (Adapted from Environment & Heritage Service, 2001)

Step	Process
Step 1	**Define Study Objectives:** Define the objectives of the Waste Management Plan that influence the selection of the preferred integrated waste management option. This should be comprehensive, flexible, iterative and transparent, whilst looking at long-term targets and accounting for intermediate objectives.
Step 2	**Identify Decision Criteria:** Compile a list of all the relevant Decision Criteria against which the performance of alternative waste management options should be assessed. Such decision criteria should take into account local relevance.
Step 3	**Develop Options:** Identify a set of alternative integrated waste management option which address Step 1, and, between them, include all the waste management routes available. At one end of the spectrum is the '*do nothing*' option. This represents a projection of what will happen with no intervention, continuing with business as usual. This option is a very useful baseline against which to compare the others. At the other extreme is the '*do everything*' option, where a combination of all of the interventions are implemented at maximum levels.
Step 4	**Apply Constraints:** Remove non-starters' from the set of options through considering legal, financial and practicality constraints. If an option does not satisfy one of the identified constraints, it may well be appropriate to drop the option at this stage, before a complete evaluation is undertaken.
Step 5	**Evaluate Options:** Evaluate the performance of the identified options (Step 3) against the identified Decision Criteria (Step 2) indicating the costs and benefits of each. This can be done using qualitative or qualitative methods, providing the process is transparent so that when it comes to performing the sensitivity analysis it is clear where the adjustments might be most usefully made.

Step	Process
Step 6	**Weighted Decision Criteria:** Discuss and reach a consensus on the relative significance of the individual Decision Criteria. The Weighted Decision Criteria used to assess the environmental 'topics' are outlined in **Table 5**.
Step 7	**Generate Final Option Scores:** Combine the option performance with the relative significance of the Decision Criteria to identify which options perform best across the relevant factors. The range of scores assigned must be normalised and scaled by their importance.
Step 8	**Sensitivity Analysis:** Step 7 will likely identify one or a few options as 'lead options', and others as less desirable. Examine how sensitive are the option scores to changes in the assumptions made during each previous stage.
Step 9	**Create Shortlist:** Select the option(s) which are most preferred on balance and refine by mitigation of their poor points and further improvement where they do well. Repeat the process from Step 4.
Step 10	**Identify the BPEO:** Draw overall conclusions on the process and the option which emerges as BPEO, and report the process thoroughly and transparently.

4.1.3 The cumulative effects of the options/sites, i.e. upon other projects within Guernsey, are not part of the scope of this BPEO assessment at this stage, however will be assessed in the site selection process for the detailed EIA.

4.1.4 Identifying BPEO is a complex task in the context of waste management systems. It requires assessing the performance of options against objectives, and resolving the conflicts between these objectives by making appropriate trade-offs. In short, the above methodology aims to demonstrate that the assessment adheres to the basic tenets of the concept – namely:

1. A full set of options are compared (i.e. analysis of alternatives).
2. Performances are assessed against all relevant criteria.
3. The relative significance of criteria is addressed explicitly.
4. Sensitivity analysis is conducted to demonstrate the robustness of the methodology.
5. The process of determining BPEO is transparent.

4.1.5 A preferred outcome is chosen which, for a given objective(s), provides the optimum balance in terms of economic, social, environmental, practicable and policy considerations (including transport) - that is emissions and discharges to land, air and water, to minimise harm and ensure the protection of the environment, taking account of what is affordable and practicable.

4.2 Stakeholder Consultation – April 2017

4.2.1 Two workshops were held in Guernsey in April 2017. The workshops introduced the background to the project, including the need to identify solutions to inert waste management. They provided an outline of the structure for the High Level EIA and focussed on the core environmental parameters that were scoped in and out of the EIA decision making. Interactive sessions with the stakeholders were carried out to offer an opportunity to assess whether the scoping process was appropriate for the project, to identify any parameters that may warrant inclusion in the EIA and to flag any issues that may have been included unnecessarily.

4.2.2 The environmental Objectives, Criteria and Indicators to be used in the BPEO process were introduced to the stakeholders in the workshops in an interactive session. The breakdown of Objectives, Criteria and Indicators was explained in more detail prior to discussions and stakeholder feedback.

4.2.3 A core objective of the stakeholder workshops was to review the environmental criteria that would be used in the BPEO process to assess whether there were any key omissions and confirm the relevancy of the criteria used.

4.2.4 A separate Consultation Document was prepared outlining the feedback from the workshops and the subsequent proposed weightings to be applied to each environmental criterion. It was circulated to stakeholders that were invited to the workshops for consultation in May 2017.

4.2.5 The feedback received during the workshop and the comments received in relation to the Consultation Document have been considered, and the objectives, criteria and indicators for the BPEO and the subsequent proposed weightings to be applied to each environmental criterion have been updated in light of these comments.

4.2.6 The comments which relate to the objectives, criteria and indicators for the BPEO are shown in full in Appendix A of the Inert Waste High Level EIA Scoping Report (consultation comments are provided in **Appendix 1** of this document). **Appendix 1** includes commentary on how these comments have been included in this report. Where comments have not been included, an explanation for this has been provided.

4.2.7 The feedback received in relation to proposed weightings to be applied to each environmental criterion, and how these comments have been incorporated into this report, is shown in **Table 7**.

4.3 Decision Criteria for Second-Pass Assessment

4.3.1 **Step 1** (define study objectives), **Step 2** (inert waste management options) of the BPEO assessment process have been undertaken as part of the previous tasks / sub-tasks of the assessment.

4.3.2 For **Step 3**, a long list of all potential options was provided by the States and the consequences of '*do nothing'* were covered in the previous tasks in assessing future

capacity. To assess the performance of second-pass inert waste management sites and options, additional Decision Criteria have been developed based on local/site-specific relevance.

4.3.3 **Step 4** (apply constraints) was undertaken above (see **Section 4**) to identify those options that could be ruled out on a first-pass.

4.3.4 The Decision Criteria provided in **Table 5** set the framework for which the strategic options were assessed. The Decision Criteria ask the question '*will implementing the proposed strategic option affect… [environmental receptor]?*' The Decision Criteria specifies an environmental 'goal' for specific receptors. Indicators are used to ensure that achievements against these goals are measurable. Indicators quantify the assessment criteria. The use of indicators makes the EIA process measurable and accountable. The indicators identified for the assessment criteria are presented alongside the relevant Decision Criteria. The objectives, criteria and indicators presented in **Table 5** are those which have been modified following stakeholder consultation identified in **Section 4.2**.

4.3.5 The Decision Criteria and indicators aim to consider both the positives and negatives associated with each option / site. The added value of each option/site when completed (i.e. possible flood defence, use for future infrastructure development) has also been identified, where applicable.

4.3.6 The cost and affordability of the solutions was also introduced along with the environmental criteria at this stage so that the economically viable solutions were assessed as part of the second-pass assessment. Cost and affordability was determined using the predicted mid-range gate fees (cost per tonne) for each option. These predicted gates fees were determined based on the estimated capital, operating and financial costs of each option across the option's lifespan (States of Guernsey, 2017). This criterion is also shown in **Table 5**.

Table 5: Environmental Decision Criteria

Topic	Environmental Objective	Assessment Criteria	Indicator
Population	Supporting the role of the main and local centres as socially inclusive and diverse communities and neighbourhoods	Protect and enhance existing population centres	Is the site located in a Main or Local Centre?
	Support the maintenance and enhancement of access to indoor and outdoor recreation	Protect and enhance existing outdoor recreational spaces	Is the site located adjacent to / on the access route of school parks, play areas, etc.?
	Maintenance and enhancement of modern key strategic infrastructure	Protect key infrastructure	Is the site located in Development Proximity Zone, Airport Public Safety Zone, etc.? Are there any critical buried and overhead service assets are within or adjacent to the site? Are there any outfalls located within any marine area functionally connected to the site?
		Create new key infrastructure	Will the site result in the creation of new infrastructure for use post-decomissioning?
	Support and enhance key tourism offerings	Protect and enhance existing tourism infrastructure	Is the site located adjacent to any 'Visit Guernsey' activity sites?
Flora and fauna	Conserve and enhance key local, regional and internationally important species, habitats and sites	Protect and enhance Sites of Special Significance	Is the site located within or adjacent to a Site of Special Significance?
		Maintain and enhance Areas of Biological Importance (including the foreshore)	Is the site located within or adjacent to an Area of Biological Importance?

Topic	Environmental Objective	Assessment Criteria	Indicator
Soil and ground conditions	Encouraging brownfield development in the interests of the most sustainable use of land	Utilise existing brownfield land	Is the site located wholly or partially on brownfield / a redundant glasshouse site?
		Protect best and most versatile land	Is the site located within an Agricultural Priority Area?
		Protect land with other economic uses	Is the site on land reserved for stone extraction?
	Management of solid and liquid waste	Minimise the risk of contamination	Is there a risk of ground contamination at the site?
	Ensuring the physical and natural environment of the Island is conserved and enhanced	Minimise the risk of soil erosion	Are there any factors present on site which may give rise to a risk of soil erosion?
		Minimise the risk of coastal erosion	Are there any factors present on site which may give rise to a risk of coastal erosion?
		Protect areas of geological importance	Are there any areas of geological importance (including rare geological features) present?
Water	Wise management of Island resources such water	Protect and enhance existing water bodies (including streams)	Is there a water body / course present within the site?
		Protect and grow existing surface water supplies	Is the site area reserved for water storage? Is the site located within an area of high existing water demand?
		Protect and grow existing groundwater supplies	Is the site located above a productive aquifer? Is the site located adjacent to a site of groundwater extraction (borehole / well)?
		Maintain or reduce level of flood risk	Will the site be located within the location of an existing flood defence? Will the site be located within an area at risk from a 1:10 year or greater flood event?
	Ensure bathing water quality is acceptable	Maintain and improve bathing water classification at the Island's beaches	Is the site adjacent to / upstream of a classified bathing water?
	Protect marine environment	Maintain existing coastal process	Is the site in an area of high hydrogeomorphological activity?

Topic	Environmental Objective	Assessment Criteria	Indicator
Air / climatic factors	Ensure air is safe and breathable for Island residents	Maintain or reduce air pollution levels	Is the site next to an air pollution hotspot? Would potential site access routes pass through an air pollution hotspot? Do opportunities for air pollution mitigation measures exist for the site?
	Ensure dust-sensitive receptors are safeguarded	Maintain existing dust emissions	Are there any dust-sensitive receptors within 2km of the site?
	Ensure greenhouse gas emissions are minimised	Limit the increase in greenhouse gases arising from inert waste management	Will use of the site lead to an increase in greenhouse gas emissions?
Material assets (including built heritage and open spaces)	Ensure protection of the historic environment, but as part of the wider task of balancing economic, social and environmental objectives	Protect protected buildings and their interpretation (setting)	Is the site on or adjacent to a protected building?
		Protect protected monuments and their interpretation (setting)	Is the site on or adjacent to a protected monument?
		Protect Conservation Areas and their interpretation (setting)	Is the site on or adjacent to a Conservation Area?
		Protect area of archaeological interest	Is the site within or above an area of archaeological interest? Is the site located adjacent to a wreck site?
Landscape	Ensure protection of important landscapes	Maintain landscape character	Are there any distinctive landscape features that contribute to the wider landscape character and local distinctiveness of the area present within the site? Is the scale of the site commensurate to the surrounding infrastructure?
		Maintain protected trees	Are there any tree protection orders located within the site?
		Maintain existing views of wider landscape	Are there any important viewpoint locations adjacent to the site?

Topic	Environmental Objective	Assessment Criteria	Indicator
Transport and access	Maintenance and enhancement of modern key strategic infrastructure	Maintain traffic flow around the Island	How many major roads will fall within the site access routes? Is the site on or adjacent to a key Island entry / exit point?
		Maintain and enhance the provision of ruettes tranquilles	Is the site located on a ruette tranquille?
		Maintain access to and from the Island	Is the site located in an Island gateway or sea channel?
	Ensure the safety of road users	Maintain and reduce the number of collisions	Is the site located along a route which collisions occur?
	Support the maintenance and enhancement of access to indoor and outdoor public access and ensure safety of vulnerable road users	Maintain and enhance the provision of public access	Is the site located on a public footpath? Is the site located along a cycle route?
Cost and Affordability			
Topic	**Objective**	**Assessment Criteria**	**Indicator**
Cost and affordability	Ensure cost of option is sustainable and does not place unmanageable burden on site users	Maintain costs in line with existing cost per tonne of inert waste disposal on the Island[3]	What percentage of the existing Longue Hougue gate fee (cost per tonne of inert waste disposal) do the predicted gate fees represent?

4.3.7 Separate figures for each of the second-pass inert waste management sites identified in **Table 3** have been produced, which highlight the infrastructure and designations relative to the site (i.e. agricultural productivity areas, conservation areas, Ramsar sites, archaeological sites, arrival points etc.), refer to **Appendix 2**. Such representation allows for easy visual identification of potential constraints that are applicable to the option in question when assessed against the Decision Criteria contained within **Table 5**.

4.3.8 The Weighted Decision Criteria used to assess the environmental 'topics' reflect the level of significance set at a national scale, as outlined in **Table 6**.

Table 6: Weighted Decision Criteria Used in the Assessment of Environmental Topics

Score	Criteria	Description
Major Positive **+++**	Environmental	Strategic selection of the site is likely to lead to a positive impact on nationally (or internationally) important parameters, or a significant achievement of the sustainability objective. The positive impacts may be short-term large-scale or long-term and national in scale. In addition, significant cumulative and indirect positive impacts are likely within and outside the site.
	Cost and affordability	Initial estimated costs per tonne for inert waste disposal are 25% or less of the gate fee for inert waste disposal for land reclamation (2017 Longue Hougue standard rate, £17.32).

[3] *Based on the costs of rock armour identified by Alan Hill in 2003 (States of Guernsey, 2017)*

Score	Criteria	Description
Moderate Positive **++**	Environmental	Strategic selection of the site is likely to lead to a positive impact on regionally important parameters, or a moderate achievement of the sustainability objective, or a significant positive impact of local scale. The positive impacts may be short-term large-scale or long-term and regional in scale. Positive cumulative impacts would arise between local areas or a number of parameters.
	Cost and affordability	Initial estimated costs per tonne for inert waste disposal are 50% or less of the gate fee for inert waste disposal for land reclamation (2017 Longue Hougue standard rate, £17.32).
Minor Positive **+**	Environmental	Strategic selection of the site is likely to lead to a positive impact to locally important parameters, or a minor achievement of the sustainability objective. Impacts would be short and long-term, or could be moderate negative impacts in the short-term. There may be limited if any cumulative or indirect impacts within the site.
	Cost and affordability	Initial estimated costs per tonne for inert waste disposal are 95% or less of the gate fee for inert waste disposal for land reclamation (2017 Longue Hougue standard rate, £17.32).
Neutral **O**	Environmental	Strategic selection of the site would have no positive or negative impacts or change to the objective in either the short or long-term. A neutral score arises when there is a fair degree of certainty that no positive or negative impact is predicted, or where an impact would be dependent on the location of the measures of such a policy.
	Cost and affordability	Initial estimated costs per tonne for inert waste disposal are between 95% - 110% of the gate fee for inert waste disposal for land reclamation (2017 Longue Hougue standard rate, £17.32).
Minor Negative **x**	Environmental	Strategic selection of the site is likely to lead to a negative impact to locally important parameters, or a minor reduction to the sustainability objective. Impacts would be short and long-term, or could be moderate negative impacts in the short-term. There may be limited if any cumulative or indirect impacts within the site.
	Cost and affordability	Initial estimated costs per tonne for inert waste disposal are 110% or greater of the gate fee for inert waste disposal for land reclamation (2017 Longue Hougue standard rate, £17.32).
Moderate Negative **xx**	Environmental	Strategic selection of the site is likely to lead to a negative impact on regionally important parameters, or a moderate reduction of the sustainability objective. Impacts would be short and long-term, or could be significant negative impacts in the short-term. The policy may have limited cumulative and indirect impacts within a project area.
	Cost and affordability	Initial estimated costs per tonne for inert waste disposal are 200% or greater of the gate fee for inert waste disposal for land reclamation (2017 Longue Hougue standard rate, £17.32).
Major Negative **xxx**	Environmental	Strategic selection of the site is likely to have a negative impact on nationally (or internationally) important parameters or a series of long-term small scale (cumulative) impacts. The policy is likely to significantly disrupt the achievement of the sustainability objective. Indirect impacts may also extend outside the site.
	Cost and affordability	Initial estimated costs per tonne for inert waste disposal are 400% or greater of the gate fee for inert waste disposal for land reclamation (2017 Longue Hougue standard rate, £17.32).

Score	Criteria	Description
Mixed	Environmental	Strategic selection of the site is predicted to result in both positive and negative impacts. Mixed impacts could potentially be significant in the long-term and result in cumulative impacts.
++/x or +/xx	Cost and affordability	This category is not relevant for the assessment of affordability in this strategic assessment.
Indeterminable	Environmental	The scale of the effect of the strategic selection of the site is unpredictable, but a value judgement is made on the scale in relation to the overall influencing environment. The effect may be dependent on many factors that cannot be ascertained at this strategic level, for example where the option covers a range of issues, or where the implementation will determine the impact.
?	Cost and affordability	Estimated cost per tonne of inert waste disposal are not available for this option.

4.3.9 Weighting has been used because, following the SNIFFER guidance, it is necessary to consider not only the absolute importance of the Decision Criteria, but also the significance of the difference between the highest and lowest rated options. Draft weightings were developed by the States' Project Team and issued to stakeholders for comment. This process has involved allocating them a mark, and a weighting (the total of which for all the objectives is 100%). Following consultation, both the magnitude of change, the agreement in the direction of change and the number of consultees suggesting a change in score were considered when adjusting the scores to reflect the feedback from consultation.

4.3.10 **Table 7** shows the original weightings developed by the States, and the adjusted weighting following the consultation exercise. The final weightings have been applied to the Decision Criteria during the environmental assessment conducted under Step 7 of the BPEO process. Full details of the revision to the weighting following consultation are shown in **Appendix 4**.

Table 7: Weighting changes following consultation

Score	Proposed Weighting %	Stakeholder Responses[4]									% change in weight, following consultation	Final weighting %
		1	2	3	4	5	6	7	8	9		
Cost/Affordability: Of solution	22	33	19			30	25				+2%	**24%**
Flora & Fauna: Conserving and enhancing key local, regional and internationally important species, habitats and sites.	11	8			15		8				-1%	**10%**
Material Assets (A): Strategic Infrastructure & assets, including maintenance of key infrastructure *and the beneficial/added value aspect of land reclamation as a future asset.*	11		8								-1%	**10%**
Water: Natural Water Resources geomorphology & protection of *marine topography* and water/sea water environment.	8		11		10						+2%	**10%**
Population: Broaden recreation to include wider open space provision for people as well. Supporting role of main and local centres.	8	7	5								-1%	**7%**
Material Assets (B): Historic and Cultural Heritage, Conservation Areas	8	7			15		5				-1%	**7%**
Traffic Safety & Traffic Management	8	6									-1%	**7%**
Air & Climate (A): Local Impacts (Nuisance factors) (noise, dust, air quality)	8	7	11		15		11				+2%	**10%**

[4] *If blank, no change proposed*

Score	Proposed Weighting %	Stakeholder Responses[4]									% change in weight, following consultation	Final weighting %
		1	2	3	4	5	6	7	8	9		
Soil & Ground Conditions: Physical and natural environment of Island is conserved and enhanced, minimise coastal erosion and contamination.	5	4	8	8				Increase			+2%	**7%**
Landscape: Including protection of viewpoints, gateway locations, landscape character.	5	4			8						No change	**5%**
Accessibility: Public Access, recreation access	3	1									-1%	**2%**
Air & Climate (B): Global Impacts, pollution/climate change	3				6						-1%	**2%**

5 Steps 5 and 6: Applying the Decision Criteria

5.1 Introduction

5.1.1 **Appendix 3** – '*High Level EIA Environmental Appraisal'* - contains a detailed evaluation of the Second-Pass sites and options against the Decision Criteria (**Step 5**) and Weighted Decision Criteria (**Step 6**) (including the buffer zones used for each of the environmental topics). **Step 5** and **Step 6** of the BPEO process have been combined for this evaluation; thus clearly identifying which sites and options perform best across the relevant factors (**Step 7**). The overall outcomes of the appraisal against the Weighted Decision Criteria is summarised in **Table 8**.

Table 8: Summary Table of all Options and their Overall Weighted Score following the environmental assessment (full results are in Appendix 3)

Site Options		Environmental Topics		
ID	**Name**	**Final weighted score**	**Rank**	**Major environmental constraint present?**
1	Airport Runway Extension (eastern end)	0.968	1	
3.1	Beach-raising on West Coast	-1.322	20	Yes – major constraint posed by SSS, tourist sites, archaeological sites and coastal erosion
4.1	Cotes des Amarreurs	-0.644	12	
4.15	Guillotine Quarry	0.141	2	
4.18	L'Epine Quarry	-0.331	8	
4.19	Paradis Quarry	-0.265	7	
4.24	Barker's Quarry	-0.684	14	
5	Les Vardes Quarry	0.030	4	Yes[5] - major constraint posed by water supply
8.1	Longue Hougue South	-0.360	9	
8.2	Black Rock Option 1 (Harbour)	-0.748	16	Yes – major constraint posed by sensitive ecological receptors (maerl)[6]
8.3	Black Rock Option 2	-0.748	16	Yes – major constraint posed by sensitive ecological receptors (maerl) [7]
8.4	Baie De Pecqueries	-0.770	18	Yes – major constraint posed by recreational resources and SSS

[5] *Major constraint identified at Les Vardes is due to its potential future use as part of Guernsey's water supply strategy. As set out in section 3.1, although identified as major constraint for the purposes of generating a BPEO score, this will not exclude this option from further consideration.*

[6] *This major constraint was excluded from the decision criteria by stakeholders during the consultation exercise conducted in April 2017. However, despite being excluded from the decision criteria and therefore the from the BPEO assessment, the fact the major constraint was identified to selecting a shortlist of sites, further on in the BPEO process (Step 9).*

[7] *This major constraint was excluded from the decision criteria by stakeholders during the consultation exercise conducted in April 2017. However, despite being excluded from the decision criteria and therefore the from the BPEO assessment, the fact the major constraint was identified to selecting a shortlist of sites, further on in the BPEO process (Step 9).*

Site Options		Environmental Topics		
ID	Name	Final weighted score	Rank	Major environmental constraint present?
8.5	North of Mont Cuet/Creve Coeur	-0.599	11	
8.6	Albecq	-0.671	13	
8.7	East of QEII Marina (St Peter Port)	-0.512	10	Yes – major constraint posed by critical infrastructure
8.8	Havelet Bay (St Peter Port)	-0.708	15	Yes – major constraint posed by recreational resources and critical infrastructure
11	Raising level of existing Land Reclamation at Longue Hougue	0.107	3	
13	Increase in re-use / recycling of inert waste.	-0.044	5	
14	Temporary Stockpile at Longue Hougue	-0.252	6	
15	Longue Hougue Reservoir	-1.010	19	Yes – major constraint posed by critical infrastructure and water supplies

6 Step 7: Leading Sites and Options

6.1.1 Based on the environmental and cost and affordability criteria selected sites and options have been identified as 'leading sites and options' by virtue of their high BPEO score as shown in **Table 8**. These leading options are listed in **Table 9**. None of the sites has been identified with a major environmental constraint.

Table 9: Leading Sites and Options

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

6.1.2 The leading list of sites and options in **Table 8** were subject to the next phase of the BPEO assessment process. These were conducted in consultation with relevant stakeholders as part of workshops held in Guernsey on 26 July 2017.

7 Step 8: Sensitivity Analysis of Lead Sites and Options

7.1 Cost

7.1.1 Sensitivity analysis forms **Step 8** of the BPEO process.

7.1.2 **Section 5.2** above identifies that a previous stakeholder workshop and consultation was used to review the environmental criteria that would be used in the BPEO process to assess whether there were any key omissions and confirm the relevancy of the criteria used. It also provided opportunity to comment upon proposed weightings to be applied to each environmental criterion.

7.1.3 The outcome of the assessment of weighting factors is presented in **Table 7** above. This table confirms that the most significant criterion was cost.

7.1.4 Therefore, the sensitivity assessment focussed upon the most significant criterion.

7.1.5 The sensitivities of cost assessment were tested by flexing the parameters associated with the cost scoring mechanism. The assessment was evaluated against having no cost parameter; and also by reducing scoring bands above and below the relevant cost baseline value (which is the current gate fee for Longue Hougue).

7.1.6 The following was assessed:

- removing cost from the assessment – making it cost neutral;
- The original assessment;
- banding set at +/- increase from RPI (assuming RPI=2.5%) increase of 1xRPI, 2xRPI and 4xRPI from gate fee – this is the tightest band;
- banding ranges narrowed to 75-125% of gate fee;
- banding ranges narrowed to 60-140% of gate fee;
- Cost bands narrowed at bottom end (down to 65% min), top end remains the same (400%);
- Cost bands narrowed at top end (down to 150% max), bottom end remains the same (25%); and
- Cost bands altered at the top end to ensure the most expensive options fall within the higher cost band, but the lower band remains the same.

7.1.7 The options are represented in **Table 10** below.

Table 10: Cost sensitivity bandings

Option	Band	% of gate fee	Cost bands
Removing cost from the assessment – making it cost neutral			
The original assessment	+3 +2 +1 -1 -2 -3	25.00% 50.00% 95.00% 110.00% 200.00% 400.00%	£4.33 £8.66 £16.45 £19.05 £34.64 £69.28
banding set at +/- increase from RPI (assuming RPI=2.5%) increase of 1xRPI, 2xRPI and 4xRPI from gate fee – this is the tightest band.	+3 +2 +1 -1 -2 -3	90.0% 95.0% 97.5% 102.5% 105.0% 110.0%	£15.59 £16.45 £16.89 £17.75 £18.19 £19.05
banding ranges narrowed to 75-125% of gate fee	+3 +2 +1 -1 -2 -3	75.00% 85.00% 95.00% 105.00% 115.00% 125.00%	£12.99 £14.72 £16.45 £18.19 £19.92 £21.65
banding ranges narrowed to 60-140% of gate fee	+3 +2 +1 -1 -2 -3	60.00% 80.00% 95.00% 105.00% 125.00% 140.00%	£10.39 £13.86 £16.45 £18.19 £21.65 £24.25
Cost bands narrowed at bottom end (down to 65% min), top end remains the same (400%)	+3 +2 +1 -1 -2 -3	65.00% 80.00% 95.00% 110.00% 200.00% 400.00%	£11.26 £13.86 £16.45 £19.05 £34.64 £69.28
Cost bands narrowed at top end (down to 150% max), bottom end remains the same (25%)	+3 +2 +1 -1 -2 -3	25.00% 50.00% 95.00% 110.00% 125.00% 150.00%	£4.33 £8.66 £16.45 £19.05 £21.65 £25.98
Cost bands altered at the top end to ensure the most expensive options fall within the higher cost band, but the lower band remains the same	+3 +2 +1 -1 -2 -3	25% 50% 95% 110% 140% 170%	£4.33 £8.66 £16.45 £19.05 £24.25 £29.44

7.1.8 A summary of the ranking distribution of the sites is shown in **Appendix 5 Sensitivity Analysis.**

7.1.9 The outcome of the sensitivity assessment was a slight shift in the parameters used for scoring by increasing the sensitivity of more expensive options. The selected outcome of the analysis was that the last option presented in the table above '*Cost bands altered at the top end to ensure the most expensive options fall within the higher cost band, but the lower band remains the same*'. This is because the banding distribution provided the best representation of the gate fees of the options by ensuring that the most expensive options were receiving the highest negative scores.

7.1.10 This was considered entirely consistent with the conclusions of the workshops and consultation process on BPEO indicators and weighting factors held in April and May 2017.

7.1.11 The BPEO assessment was re-run against the second-pass sites to incorporate the revised cost banding criteria above. This resulted in the following ranking of options as shown in **Table 11**:

Table 11: Sensitivity analysis rankings

Option	Site / Option	Rank
1	Airport Runway Extension (eastern end)	1
4.15	Guillotine Quarry	2
11	Raising level of existing Land Reclamation at Longue Hougue	3
5	Les Vardes Quarry	4
13	Increase in re-use / recycling of inert waste.	5
14	Temporary Stockpile at Longue Hougue	6
4.19	Paradis Quarry	7
4.18	L'Epine Quarry	8
8.1	Longue Hougue South	9
8.3	Black Rock Option 2	10
8.5	North of Mont Cuet/Creve Coeur	11
8.6	Albecq	12
8.8	Havelet Bay (St Peter Port)	13
8.2	Black Rock Option 1 (Harbour)	14
8.4	Baie De Pecqueries	15
15	Longue Hougue Reservoir	16
8.7	East of QEII Marina (St Peter Port)	17

Option	Site / Option	Rank
3.1	Beach-raising on West Coast	18
4.1	Cotes des Amarreurs	19
4.24	Barker's Quarry	20

7.1.12 A 'leading list' incorporating the top five sites (noting that Paradis Quarry and L'Epine Quarry represent one option of combined sites) was selected for assessment to create a 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 recycling options.

7.1.13 A number of sites were not taken further at this stage as they did not present a single viable option. These include:

7.1.14 **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 is uncertain whether this option will proceed.

7.1.15 **Option 11 Raising levels at Longue Hougue** – this option offer 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.

7.1.16 **Option 14 Temporary stockpiling** – as with option 11, this option offer 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.

7.1.17 **Option 13 Increase in reuse** – reuse is not an option which can manage all inert waste, as residual waste will remain and require management following the reuse process. As with option 11 and 14, this option may be considered in combination, but it not considered further as the leading option

7.1.18 **Option 8.3 Black Rock option 2** – this option does present a viable long-term solution, however was not selected for further assessment as major environmental constraints posed by costal ecological resources identified during the BPEO process that would potentially present a significant constraint in bringing forward this option.

7.1.19 Therefore, the leading list of sites identified for assessment shortlisting are those shown in **Table 12**:

Table 12: Leading list of sites for shortlisting

Option	Site / Option	Rank
4.15	Guillotine Quarry	2
5	Les Vardes Quarry	4
4.19	Paradis Quarry	7
4.18	L'Epine Quarry	8
8.1	Longue Hougue South	9
8.5	North of Mont Cuet/Creve Coeur	11

8 Step 9: Create shortlist

8.1.1 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 (see **Appendix 3** of this report), and the mitigation measures identified during this process;
- an engineering review; and
- stakeholder consultation.

8.1.2 This section summarises how these 'non-environmental' Decision Criteria have been applied to create the final shortlist of options. A review of each option on the leading list is presented, which includes the findings of the engineering review, stakeholder consultation, and environmental impact mitigation measures, and each leading list option is evaluated against these criteria.

8.2 High Level EIA

8.2.1 The High Level EIA has fed into the BPEO process, as reported in **Section 5** of this report, and therefore influenced the earlier stages of this options appraisal process. The High Level EIA also identified those mitigation measures which would be required in order to mitigate environmental impacts assessment identified in the High Level EIA. These mitigation measures help inform what the requirements of a detailed feasibility study of the leading option would require.

8.3 Engineering review

8.3.1 A high-level concept design for the land reclamation options was developed to understand the outline engineering requirements of the more complex options (i.e. those involving land reclamation). Development of the concept design also involved identifying the estimated material requirements for the land reclamation options.

8.4 Stakeholder Consultation – July 2017

8.4.1 Following identification of the leading sites and options, the next step in the BPEO process was consultation workshops on the options and on the assessment process followed to reach this list.

8.4.2 Two workshops were held in Guernsey on 26 July 2017. A list of the relevant stakeholder attendees is provided in **Appendix 6**. The aims of the workshops were to review of progress to date in the approach to Inert Waste solution development and the BPEO approach to identify lead sites, followed by an appraisal of the lead sites identified above.

8.4.3 The workshops had two interactive breakout sessions to allow the stakeholders to debate the site options.

8.4.4 The first part was a quick exercise to identify the underlying function of the site, using functional analysis to seek better understanding of the operational and strategic needs from the proposed solutions. This would assist in identifying the functions for the proposed solutions under scrutiny as either- Business focussed (Strategic) or Operational focus (Tactical) - needs (which are imperative) or wants (which are desirable).

8.4.5 The second was a site limitations exercise to assess each proposed location on its merits. This would identify advantages and disadvantages associated with each site; and site risks.

8.4.6 The outcome of the functional analysis exercise is summarised below.

	BUSINESS NEEDS	OPERATIONAL NEEDS
NEEDS	• Somewhere to dispose of residual inert waste • Minimise Environmental impacts • A site that is available to ensure continuity of service • Cost Recovery • Financial cost certainty • Awareness of external, non-financial costs e.g. on future generations	• Good and safe access for large vehicles • Safe for operational staff and site users • Adequate capacity • Permanent "fill option" • Waste Management Licence
WANTS	• Low Cost • Potential Social Benefits at the end of the site's life (Amenity value) • Positive visual aspect (short/long term) • Potential flexibility in operation • Minimal site preparation requirements • Cheap – so as not to drive unwanted behaviour or dis-incentivise development	• Architectural salvage opportunities (potential income) • On-site Reuse/Recycling facilities • Minimise neighbour impacts (over and above licensing requirement)

8.4.7 These parameters set the tone for the assessment of the options themselves. The assessment of the options is set out below. The outcomes of the site assessment conducted during the stakeholder workshop form the basis of the assessment of the options, with a summary of the relevant outputs from the High Level EIA process and the engineering review also included where they are relevant for a informing the options appraisal process. The conclusion of the options appraisal process set out below is to inform the final stage of BPEO – Stage 10, selection of a leading option.

8.4.8 The estimates for capacity, gate fees and operational life provided for each option below are based on a gates fees review (*Inert_Waste_Options_Gate_Fees20170711*) conducted in July 2017 by the States, and subsequently provided for use during Step 9.

8.4.9 Capacity estimates were generated using existing contour maps of each site to predict potential fill volumes. Operation lifespan estimates were then generated by dividing the estimates landfill volume by the current annual landfill usage values (5 year mean based on tonnages received at Longue Hougue from 2012 -2016).

8.4.10 Estimated gate fees were subsequently generated for each site. These were calculated based on predicted capital, operating and financial costs for each site. A range of potential gate fees were developed for each site, and the mid-range case was selected to be used for stakeholder discussion.

8.4.11 These estimates were based on a set of common assumptions for all options. Full details of the assumptions are set out in the gates fees review *Inert_Waste_Options_Gate_Fees20170711*. The values presented here have been generated for use in comparing options against each other, and represent the current understanding as of July 2017, More detailed gate fee estimates for the shortlisted options will continue to be developed throughout the optioneering process.

8.5 Option 4.15: Guillotine Quarry

Description:	Infill of a private quarry

Assumptions about the option (all figures are estimates, as of July 2017):

Capacity: 129,885m^3

Gate Fee: £16.25/tonne

Accessibility: Some narrow roads may be required

Operational life: 1.8 years

Other Implications: Time; Quality;

Currently filled with water

Check designation on IDP –question whether it is currently classified as an ABI?

How quickly could this be developed? Potentially approach owners and gauge their appetite for infilling – it may be something they have already considered?

Advantages	**Disadvantages**
Few environmental constraints. Land-based solution so no coastal effects (sediment migration & hydrogeomorphology). Loss of liability for current owner.	Site currently full of water Privately owned Short term solution – is it worth the time taken to obtain approvals given the short fill life?

Potential to extend the amenity value of Bordeaux tip and the surrounding area. Access into site is good, assuming access via field adjoining the main coast road	Proximity to landfill may cause leachate ingress when water is removed Noted Tufted Duck habitat – loss of established ecosystem No development value (designated agricultural/open land) Access to site involves minor roads, if field access is not an option Too small More costly Land created would only be 'open land' value at the end Void space taken up by access, weighbridge and welfare.

Overall Risks Associated with Option: Identify the extend of risk of the site in terms of overall inert waste management solution- High, Med, Low

Risk level	Medium
Risk identification	Uncertainty regarding leachate issue Short-term option – would need to be part of a combined solution Loss of established ecosystem would require mitigation measures Anecdotal evidence of some private filling of predominantly inert material in recent years from the north of the site (possibly unauthorised)

Mitigation measures

8.5.1 The following mitigation measures and further were identified with the High Level EIA as being required should this option be developed:

- A review of the Guernsey Water storage portfolio, and identification of alternative water storage assets;
- Archaeological investigations to identify the nature of the archaeological sites potentially affect by the option; and
- A settings assessment to determine the sensitive areas of foreshore to affecting local landscape and historic building setting.

Summary

- It was considered that this option is more of a contingency option for short term gain assuming that it can be brought into line quickly.

- A general disadvantage of smaller sites, rather than just limited capacity, is the space to install required infrastructure, i.e. weighbridges etc.
- The group also felt that small sites with a very limited lifespan 'hardly seemed worth it'.
- In contrast, there was agreement that the faster a site could be prepared would be an advantage.
- It was also felt the future value of completed sites should not be solely judged in financial terms.
- In terms of timescale, it was generally felt that short-term options could be required to get the inert waste strategy in place; after which, the best option may be the one with longest availability.

8.5.2 The workshop delegates identified that this option is an option of short term potential but only if it can be brought on line quickly. In this respect, it does not represent a strategic good fit. Furthermore, the capacity of the site is unlikely to represent the available void once space for ancillary developments such as access ramps, weighbridge and welfare facilities have been accommodated.

8.5.3 Therefore, although the workshop identified this as a possible site, it is relegated to 'Unlikely' based on the above reasons.

8.6 Option 5: Les Vardes Quarry

Description/:	Infill of a quarry (which is currently being worked)

Assumptions about the option (all figures are estimates, as of July 2017):

Capacity: 2,700,000m^3

Gate Fee: £11.35/tonne

Accessibility: Excellent

Operational life: 38 years

Other Implications: Time; Quality;

Not available until after 2026; therefore not an immediate option, but need to keep it in mind as a potential med/long term option.

Currently operational

High initial capital costs

Unique in quarry terms due to its size

Advantages/ Disadvantages of Option:

Advantages	**Disadvantages**
Huge capacity – beyond 20 year solution	Site currently operational

Land-based solution so no coastal affects (sediment migration & hydrogeomorphology) Access currently used by HGVs Potential to partially fill and still retain for water resources Potential for dual use (water management and inert waste)	Not available immediately Safeguarded (this influenced the BPEO assessment – would have scored higher otherwise) – would need to demonstrate that the need for inert waste disposal was greater than the need for the site to be retained as a strategic water reserve – assuming that one replaces the other. Not owned by the States (additional process) Costs may be high. Potential cost to provide water infrastructure elsewhere A change would be required to the SLUP - additional process Land would only be 'open land' value at the end

Overall Risks Associated with Option: Identify the extend of risk of the site in terms of overall inert waste management solution- High, Med, Low

Risk level	Medium
Risk identification	Not available immediately – medium / long term option only Safeguarded for an alternative use – would need to demonstrate a greater value as a resource for inert waste disposal than future water storage

Mitigation measures

8.6.1 The following mitigation measures and further were identified with the High Level EIA as being required should this option be developed:

- Habitat surveys to search for the presence of species for which the SSS is designated;
- A settings assessment to determine the sensitive areas of foreshore to affecting local landscape and historic building setting.

Summary

8.6.2 The site is not an immediate strategic solution because it is an active quarry, which has been safeguarded for future water storage.

8.6.3 However, given the capacity of the site, there exists the potential to bring in into line after 2026 to add to the capacity of the facility that will be operating then.

8.6.4 Furthermore, there is an additional option of Les Vardes as a combined option that could be used for both inert waste disposal and water storage, with inert waste being

used to raise the level of the quarry floor. However, the logistics of this option require further investigation.

8.6.5 Therefore, this option is identified as 'Possible' as a medium to long term option only; and will not be available as an option to carry on from the current Longue Hougue facility.

8.7 Combined Options: 4.19 Paradis Quarry and 4.18 L'Epine Quarry

Description/:	Infill of two quarries

Assumptions about the option (all figures are estimates, as of July 2017):

Capacity: 238,472m^3

Gate Fee: £11.35/tonne

Accessibility: Reasonable – some narrow roads with tight bends

Operational life: 3.3 years

Two separate quarries to be combined for a single option

Other Implications: Time; Quality;

L'Epine: Owned by Guernsey Water - no infrastructure for water supply, ranked number 4 on the list of Guernsey Water quarries they own that could be filled

Paradis quarry is privately owned.

Negotiations with two property owners may delay delivery and result in additional costs

Advantages	**Disadvantages**
Available (subject to purchase) Land-based solution so no coastal affects (sediment migration & geomorphology) There is a Guernsey Water access road into L'Epine site Potential to develop into a wooded area – new valuable habitat to replace existing	Paradis is privately owned – two different owners(potential difficulties on agreement) Site preparation required to join the two quarries. A road runs between them, this would need to be considered in the solution (potential to reinstate once filling was completed). Currently both filled with water Access issues – would need one way system Limited development value (designated agricultural/open land)

Overall Risks Associated with Option: Identify the extend of risk of the site in terms of overall inert waste management solution- High, Med, Low

Risk level	Medium

Risk identification	Acquisition of private quarry Not a long term solution, would need to be developed alongside other options Anecdotal evidence – one of the property owners was previously planning to sell to La Societe/National Trust, but pulled out of the deal and opted to retain the site themselves – may be unwilling to sell.

Mitigation measures

8.7.1 The following mitigation measures and further were identified with the High Level EIA as being required should this option be developed:

- A review of the Guernsey Water storage portfolio, and identification of alternative water storage assets;
- Archaeological investigations to identify the nature of the archaeological sites potentially affect by the option; and
- A settings assessment to determine the sensitive areas of foreshore to affecting local landscape and historic building setting.

Summary

- It was considered that this option is more of a contingency option for short term gain assuming that it can be brought into line quickly.
- A general disadvantage of smaller sites, rather than just limited capacity, is the space to install required infrastructure, i.e. weighbridges etc.
- The group also felt that small sites with a very limited lifespan 'hardly seemed worth it'.
- In contrast, there was agreement that the faster a site could be prepared would be an advantage.
- It was also felt the future value of completed sites should not be solely judged in financial terms.
- In terms of timescale, it was generally felt that short-term options could be required to get the inert waste strategy in place; after which, the best option may be the one with longest availability.

8.7.2 The workshop delegates identified that this is an option of short term potential, but only if it can be brought on line quickly. In this respect, it does not represent a strategic good fit. Furthermore, the capacity of the site is unlikely to represent the available void once space for ancillary developments such as access ramps, weighbridge and welfare facilities have been accommodated.

8.7.3 Given 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. This counters one of the few benefits of a small site, which is the potential for being made ready to receive material over a shorter period of time compared to land reclamation in the marine environment.

8.7.4 Therefore, although the combined site volume is greater than that for Guillotine Quarry, given the relatively small nature of the site and poor access; this site was considered to be 'Unlikely' to represent a strategic option.

8.8 Option 8.1: Longue Hougue South

Description:	Extension of the current land reclamation area for inert waste.

Assumptions about the option (all figures are estimates, as of July 2017):

Capacity: 845,728m^3

Gate Fee: £16.95 /tonne

Accessibility: Good

Operational life: 11.8 years

Other Implications: Time; Quality;

Experience of working a similar facility in the location is an advantage.

Requires engineering infrastructure to be provided before placement to ensure marine protection.

More environmental factors to consider, less social/population impacts

Advantages	Disadvantages
Large capacity	High initial capital costs
Good access – co-located with existing facility, so user familiarity with location and negligible increase in traffic	Coastal reclamation – effect on sediment transport, current flow currently unknown
Provides potential flood alleviation measure	Could impact Belle Greve outfall dispersion
Industrial land availability on decommissioning – therefore value to the land in the future.	Not a 20 year option – would require a combination solution
Up to date background environmental data and other information regarding the site is available – potentially, less work for EIA	Potential visual impacts on approach via an Island Gateway
No significant availability issues	Direct neighbour with a high value house
Less impact on people than other main centre sites	Unique geology
	Purchase agreement for Crown Estate land (foreshore) may be required

Suggested an additional option - extension of this option down to Salerie Corner with added benefit of providing coastal defence, renewable energy, transport link between centres etc.	

Overall Risks Associated with Option: Identify the extend of risk of the site in terms of overall inert waste management solution- High, Med, Low

Risk level	Medium
Risk identification	Requires significant engineering to set up prior to receiving material. Unknown effects on coastal processes (would be a focus of the EIA)

Mitigation measures

8.8.1 The following mitigation measures and further were identified with the High Level EIA as being required should this option be developed:

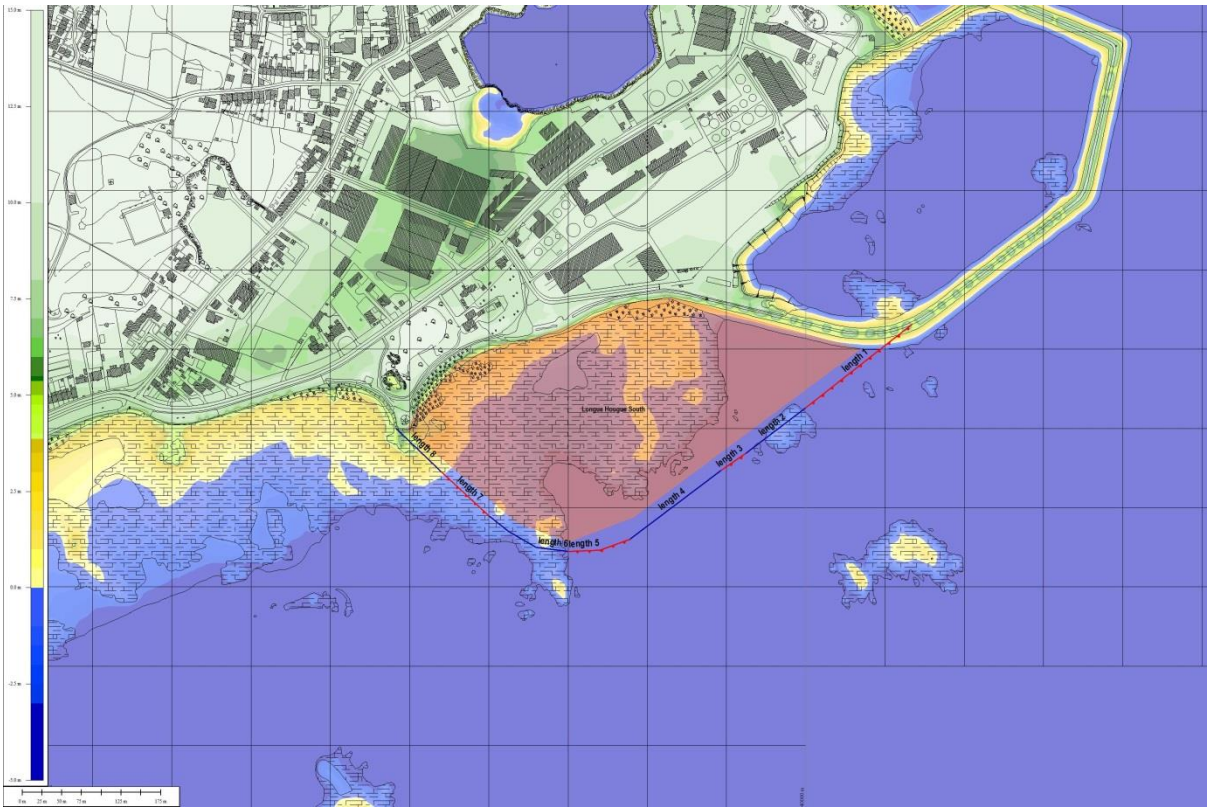
- Modelling of coastal process would be required to predict the likely changes in coastal processes due to creation of the land reclamation site. Following this, built structures or design changes may be required to ensure that the option does not adversely affect local coastal processes or ecology;
- Habitat surveys to identify sensitive areas of the foreshore to be avoided during option development;
- A settings assessment to determine the sensitive areas of foreshore to affecting local landscape and historic building setting.

Engineering concept design

Description

8.8.2 The site is to be reclaimed in full over the intertidal and subtidal area, extending, in a similar form, the works undertaken to protect the existing Longue Hougue Site. A typical outline shape is included in **Figure 3**.

Figure 3: Typical layout of reclaimed area



Design Considerations and Criteria

8.8.3 The following basic design criteria have been used in developing at a high level an outline design of protection and costs of the engineering infrastructure.

Table 13: Design criteria for Longue Hougue South

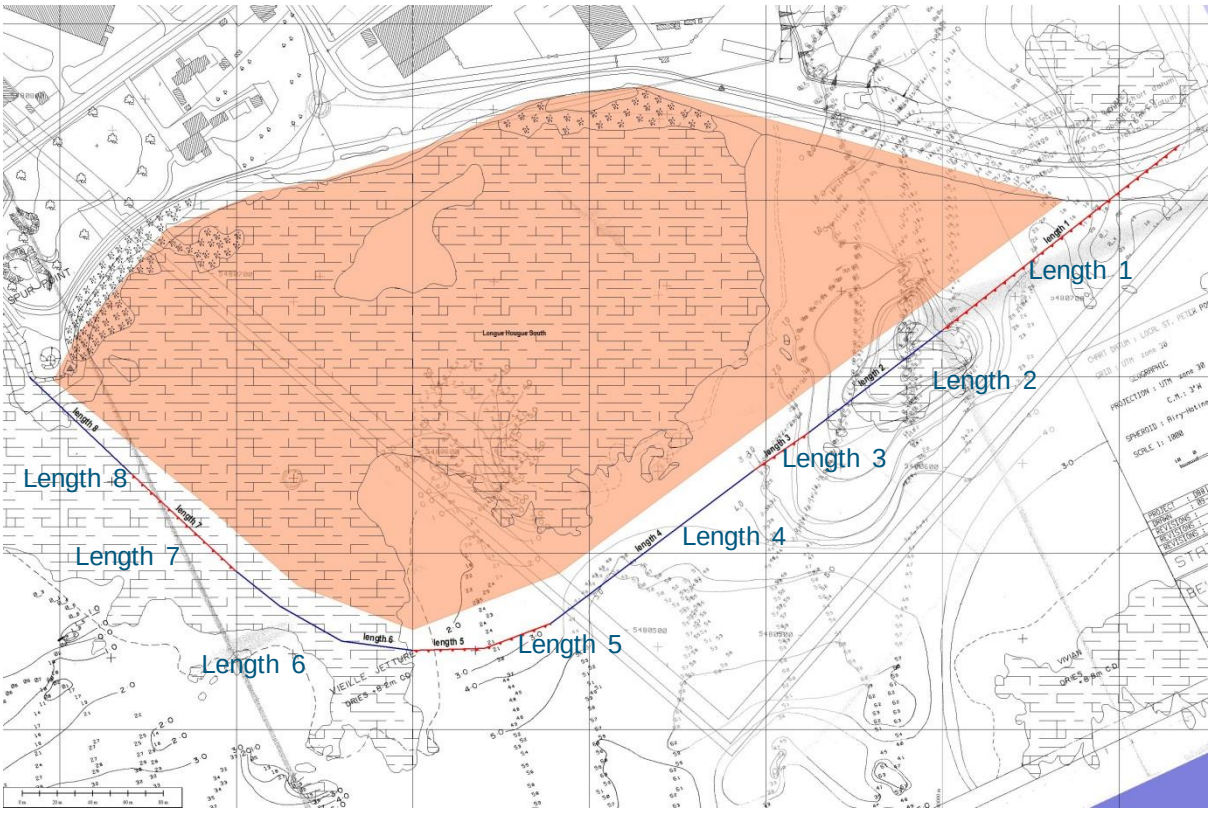
Requirements/ criteria	Assumptions	Notes/ risks
Volume	The enclosed area needs to deliver around 850,000m^3 capacity, assuming finished grounds level at around 7.5m to 8m OD.	To achieve this volume there is the need to extend reclamation to include areas of locally relatively deep water.
Length of protection	803m	This alignment has not been optimised but attempts to maximising use of areas of higher bed level, while still enclosing areas necessary to deliver the required volume.
Water Levels	6.3m OD	Based on 1 in 100 year water level with 0.4m SLR.
Wave exposure	2.5m (8 seconds wave period)	Based on wave point 36 (Guernsey FRAS 2012)

Outline Design Shape

8.8.4 Available bathymetry has been provided from Oct 1988 survey of Belle Greve Bay, this was recorded to Chart Datum St Peter Port (-5.06m OD). This has been combined with basic topographic data for the Island to OD.

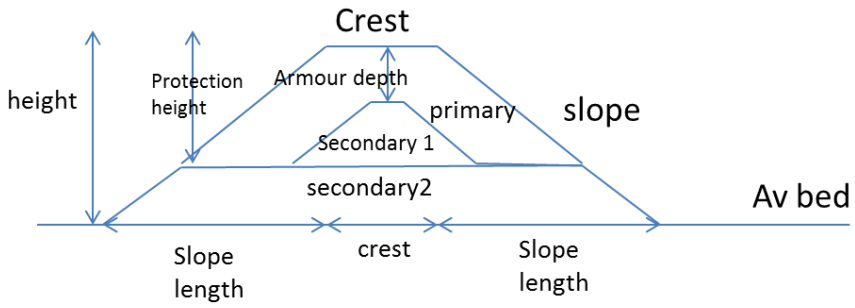
8.8.5 The topographic / bathymetric data shows two areas in particular where the sea bed drops to around an average depth of -6.5m OD (length 1) and between -9.5m OD and -7.5m OD (lengths 3, 4 and 5) as shown on Figure 4.

Figure 4: Bathymetry in relation to alignment of reclamation area



8.8.6 Based on the above information an outline design shape has been developed as shown in **Figure 5**. The concept slope for the structure has been taken as being 1 in 2. With a nominal crest width of 3m to address limited over topping. Where necessary, the structure would be constructed upon more general infill over deeper areas, with the principle armoured face being taken down to low water minus one wave height.

Figure 5: Typical design shape



Summary

- 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).
- Should be linked to the St Sampsons Harbour Master Plan.
- 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). 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.

8.8.7 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.

8.8.8 It was also suggested that this option would partner well with the Les Vardes option in providing a strategic option that could last almost 50 years.

8.9 Option 8.5: North of Mont Cuet/Creve Coeur

Description:	Infill of rocky bay north of Mont Cuet/Creve Coeur

Assumptions about the option (all figures are estimates, as of July 2017):

Capacity: 705,000m^3

Gate Fee: £22.04/tonne

Accessibility: Reasonable – landfill has regular access

Operational life: 9.9 years

Other Implications: Time; Quality;
Would require the extension of the leachate outfall for the landfill Chouet Headland due to be quarried from 2026

Advantages	**Disadvantages**
Potential to raise flood defences and enhance protection at this location – although consideration is required to the potential number of houses that would be protected and whether the aims of the Coastal Defence Strategy would be met. Medium term solution Vehicle access and regular traffic movements currently experienced in the area due to landfill. Potential to use landfill facilities Quarrying of Chouet will reduce environmental impacts Considered location beside existing landfill facilities would remove need for provision of infrastructure and reduce cost Potential private investment could be attracted	High initial capital costs, leading to high gate fee Extension of leachate outfall required Coastal reclamation – effect on sediment transport, current flow and coastal erosion currently unknown Not a 20 year option – would require a combination solution Close to L'Ancresse Common SSS/Foreshore ABI Potentially higher breakwater costs due to exposed location Land would only be 'open land' value at the end Ownership is questionable, plus there would be further process as the Crown estate is involved (taking up to 12 months to get approval from Crown) High gate fee Purchase agreement for Crown Estate land (foreshore) may be required

Overall Risks Associated with Option: Identify the extend of risk of the site in terms of overall inert waste management solution- High, Med, Low

Risk level	Medium/High
Risk identification	Requires significant engineering to set up prior to receiving material. Unknown effects on coastal processes (would be a focus of the EIA) Potential lack of value of reclaimed land Ownership issues Proximity to SSS and ABI

Mitigation measures

8.9.1 The following mitigation measures and further were identified with the High Level EIA as being required should this option be developed:

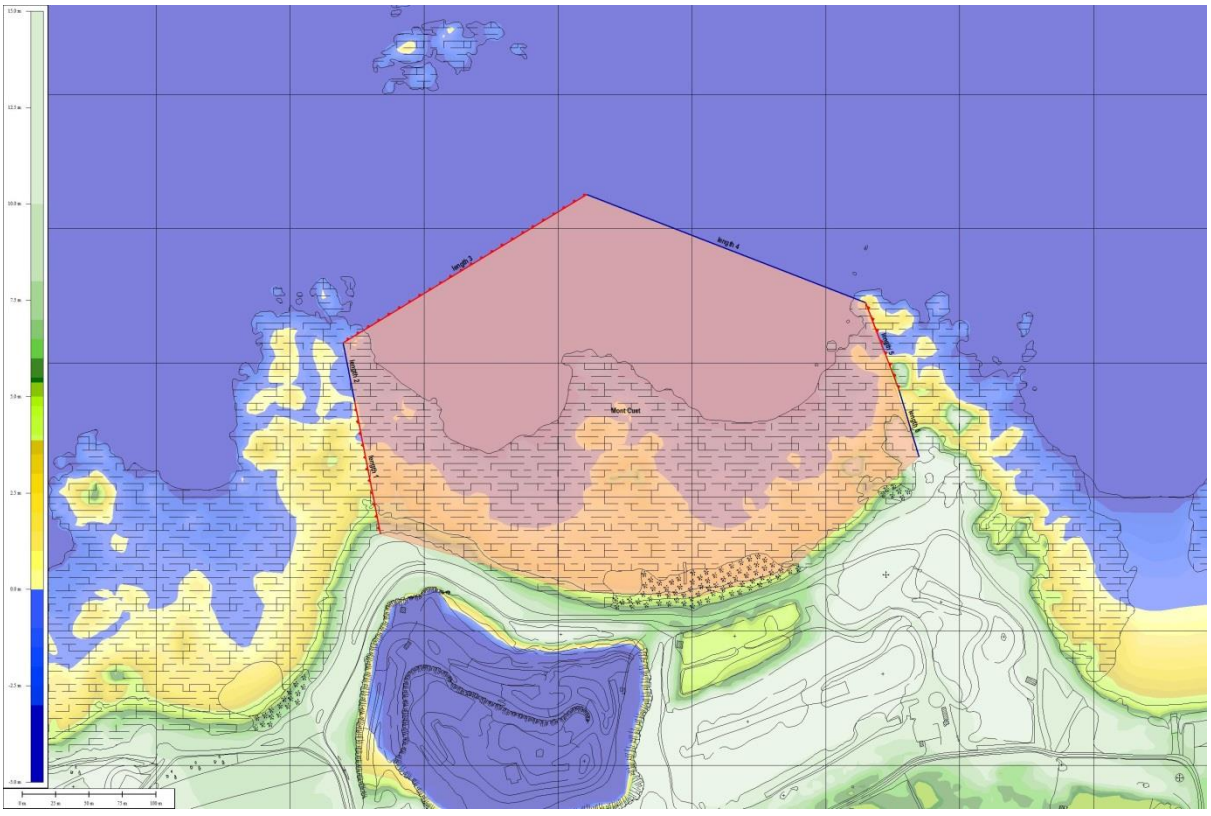
- Habitat surveys to search for the presence of species for which the SSSs are designated and to identify sensitive areas of the foreshore to be avoided during option development;
- Modelling of coastal process would be required to predict the likely changes in coastal processes due to creation of the land reclamation site. Following this, built structures or design changes may be required to ensure that the option does not adversely affect local coastal processes or ecology; and
- Archaeological investigations to identify the nature of the archaeological sites potentially affected by the option.

Engineering concept design

Description

8.9.2 The site is to be reclaimed in full over the intertidal and subtidal area. A typical outline shape is included in **Figure 6**.

Figure 6: Typical layout of reclaimed area



Design Considerations and Criteria

8.9.3 The following basic design criteria have been used in developing at a high level an outline design of protection and costs of the engineering infrastructure.

Table 14: Design criteria for North of Mont Cuet/Creve Coeur

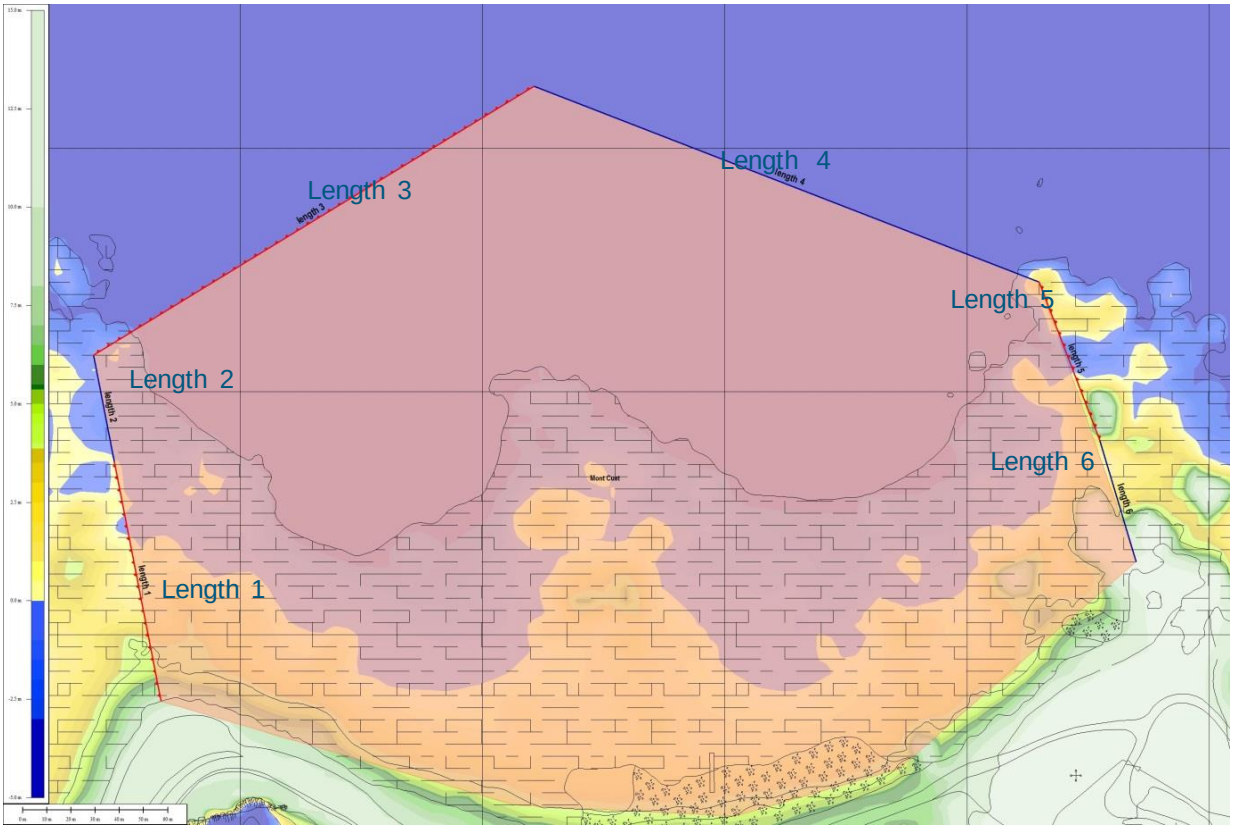
Requirements/ criteria	assumptions	Notes/ risks
Volume	The enclosed area needs to deliver around 705,000m^3 capacity, assuming finished grounds level at around 7.5m to 8m OD.	To achieve this volume there is the need to extend reclamation into the subtidal area.
Length of protection	700m	This alignment has not been optimised but attempts to maximising use of the rock promontories, while still enclosing areas necessary to deliver the required volume.
Water Levels	5.8m OD	Based on 1 in 100 year water level with 0.4m SLR.
Wave exposure	4m (15 seconds wave period)	Based on wave point 26 (Guernsey FRAS 2012). Wave heights are significantly larger offshore.

Outline Design Shape

8.9.4 There is limited bathymetry for the area and a general bed level of -3.5m OD has been assumed of the area of reclamation in the offshore area. Basic topographic data has been used for the intertidal and upper beach areas.

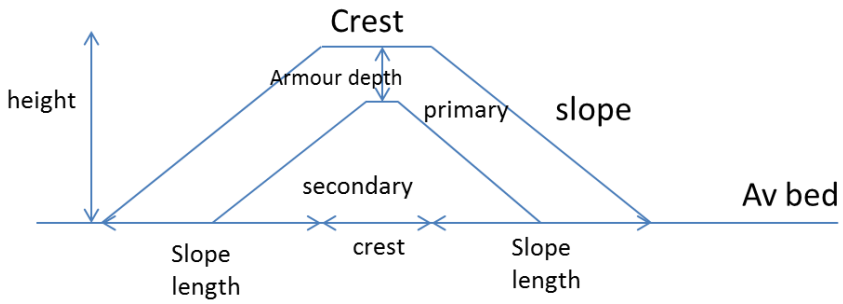
8.9.5 The reclamation works have been considered in six different sections as shown in **Figure 7**, reflecting the change in topography and bathymetry. For each length an assessment has been made of depth limited wave conditions impacting on the enclosing structure. Only in the case of length 6 does this significantly alter exposure conditions.

Figure 7: Bathymetry in relation to alignment of reclamation area



8.9.6 Based on the above information an outline design shape has been developed as shown in **Figure 8**. Due to the high degree of exposure, there is little opportunity to in fill with quarry run material. The design slope is taken as 1 in 3, with a nominal crest width of 5m to address substantial risk of over topping.

Figure 8: Typical design shape



There would be a need for both a significant size of primary armour in the 6 – 10T range, with a secondary armour layer in the 1 – 3T range. Beneath that there would be a bed stone layer of 60 – 300kg rock, with minimum opportunity for a quarry run core.

Summary

- The greatest potential advantage of this facility is the location to existing landfill facilities, which already have appropriate weighbridge and ancillary infrastructure, thereby removing the need for provision of infrastructure and reduce cost.
- However, there are ownership issues and questions about the potential use of the land following reclamation; plus environmental constraints.
- Furthermore, although technically feasible the location would be subject to significant coastal marine effects, so the level of breakwater protection would require significant investment.

8.9.7 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.

8.10 Option assessment recommendations

8.10.1 Based on the assessment outlined above, Longue Hougue South is the recommended site for receiving residual inert waste that cannot be managed using options further up the waste hierarchy.

8.10.2 The site is located to the south of current land reclamation site, extending to Richmond Corner. The land is owned by The Crown and would require no purchase cost. The estimated capacity of the site is 850,000m^3, with an estimated fill life of almost 12 years. The estimated gate fees used for the purposes of comparing options under Step 9 of the BPEO was £16.95per tonne, which is slightly below current rates approximately £17.32 per tonne in 2017, which is reasonable when compared with the other short-listed options.

8.10.3 The option provides a medium term solution to inert waste disposal, and as it is essentially an extension of the existing land reclamation site, the transition would be easier to manage. The cost of developing the site would be less than an equivalent site at North of Mont Cuet/Creve Coeur. A Local Planning Brief (based on a planning enquiry) would set the planning framework for the area and guide future land use, however given the location it could be used for commercial activity.

8.10.4 The owner of one large private property nearby may object due to views across the proposed reclamation area, however landscaping/mounding of the site could increase the capacity and reduce the visual impact from the south of existing facilities on the current land reclamation site.

8.10.5 A summary of the environmental topics assessed, and associated impacts, for the site are outlined below:

- **Population:** There is no important social infrastructure adjacent to the site, nor is the site located in a Development Proximity Zone or Airport Public Safety Zone. However, the site is

located adjacent to St Sampson Main Centre and so may contribute to the industrialisation of the St Sampson coast. Further, open beach space is located adjacent to option, and so experience of using the beach may be affected if option selected. Emergency services are located along main road servicing option site. The potential effects on access routes from the selection of this option should be considered.

- **Flora and Fauna:** The site is not located within a Ramsar site or within 1km of a Site of Special Significance (SSS). However, the site is located within Foreshore Area of Biodiversity Importance (ABI). The loss of ABI habitat will occur if the option was chosen. Maerl beds may be present in the area of the site; however this is not confirmed. Further assessment of Foreshore ABI and the Maerl beds would be required.
- **Soil and Ground Conditions:** The site is not located on best and most versatile land in active agricultural use, nor is it on land reserved for stone extraction. However, the land is entirely 'greenfield' (land reclamation). An existing landfill site is adjacent to the option; as the option involves land reclamation rather than excavation, the risk of ground contamination is low. The existing Longue Facility already provides the key features affecting sedimentation locally, and new land reclamation will move coastal erosion further down the coast. The Longue Hougue key industrial area contains an important geological site, which would be beneath the option.
- **Water:** No water bodies or water courses are present within the site, nor is the site area reserved for water storage. The site is not site adjacent to / upstream of classified bathing water. Land reclamation at this site has the potential to beneficially raise flood defences and enhance protection at this location.
- **Air/Climatic Factors:** The site is located within an existing industrial area, which while currently operating at safe air pollution level may be subject to an increase in traffic. A traffic assessment should be carried out at the site to understand the potential increase of traffic flow within the industrial area.
- **Material Assets:** The site is not on or adjacent to a protected building, protected monument or an area of archaeological interest. A conservation area is located approximately 400m to the north, however is separated from the site by an industrial area. Open beach space is located adjacent to the option; experience of using the beach may be affected if the option is selected.
- **Landscape:** The site is located within an existing industrial area. There is no tree protection orders located within the site, although there is one strategic view from Delancy Park out to sea, which would be altered in character (although not blocked) by the option.
- **Transport and Access:** The site is located on the Inter-Harbour route, the Island's main road. The site is not located on a ruette tranquille or a public footpath. A traffic assessment should be carried out at the site to understand the potential increase of traffic flow along the Inter-Harbour route.

8.11 Conclusion

8.11.1 The Longue Hougue South 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.

8.11.2 It was also suggested that this option would partner well with the Les Vardes option in providing a strategic option that could last almost 50 years. However, further work would be required to demonstrate the potential of this because Les Vardes is currently safeguarded.

8.11.3 The option for Infill of the rocky bay north of Mont Cuet/Creve Coeur was also raised as a possible solution, given the reasonably long potential operational life. In combination, these two sites could deliver a 20 year solution. However, it is noted that this site has greater disadvantages compared to Longue Hougue South.

8.11.4 Two smaller inland quarry solutions were identified as 'Unlikely' mainly due to their limited potential lifespan; but also because of access restrictions; ownership issues; the fact that they contain considerable amounts of water; and amount of void space that would be lost to developing site infrastructure. However, it was noted that if these sites could be brought on line quickly, they could provide a short-term stop-gap pending a more medium/long term option. Contrary to this, however, are options elsewhere, such as temporary stockpiling, which would require less investment and would be more immediate.

9 Step 10: Identification of the BPEO

9.1.1 This final step of the process is to recommend the leading option, which will accommodate a number of options.

9.2 Waste Hierarchy Assessment

9.2.1 In order to ensure that the BPEO selected is in accordance with the Solid Waste Strategy and in accordance with the Inert Waste Strategy being drafted in parallel with this process, a waste hierarchy assessment is necessary to ensure that the leading solution fits within the waste hierarchy set out within these strategies. A summary of what the waste hierarchy assessment must contain is set out below.

9.2.2 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.

9.2.3 The States of Guernsey Solid Waste Strategy was formulated with the principle of the Waste Hierarchy at its core. The Waste Hierarchy is in order of priority: *Prevention* –

Re-use – Recycling – Recovery – Disposal. The Solid Waste Strategy focuses on minimising residual waste (gradually increasing up to a 70% recycling target in 2030) and prioritises measures to minimise the amount of waste that requires treatment and disposal. No target has yet been set within the Inert Waste Strategy.

9.2.4 The approach to the consideration of the waste hierarchy must accommodate constraints of a small island; particularly the availability of facilities that would provide a higher waste hierarchical option, and the limited markets for re-use / recycling aggregates on the Island. Waste holders have to demonstrate the highest possible hierarchical option for their wastes. Lower hierarchical options cannot be justified by cost alone, but can be justified by the absence of higher options; or where a higher option for the management of inert waste would represent significant logistical difficulties compared to a lower hierarchical option. Good land use planning is essential in delivering sustainable development and this will be delivered by the policies provided in the IDP. However, sustainability can be difficult to achieve on a small island, as recognised in the SLUP.

9.2.5 In terms of the development of a strategic approach to managing solid waste, any solution for inert waste management must bear in mind the following objectives in line with the Strategy:

- Secure the future management of Guernsey's residual Inert Waste stream for the next 20 years;
- Compliance with States of Guernsey Waste Management Plan;
- Minimise cost of treatment and ensure the solution is economic;
- Fulfil the legislative (including planning) process required to secure potential future sites; and
- Deliver a new solution before current solution expires (estimated 2021).

9.2.6 There are potential opportunities for use of inert waste on the Island. The SLUP identifies that almost all building materials are imported into the Island. Maximising the re-use potential of inert waste should be considered a priority strategic option for all developments that are likely to generate inert waste; and this will be encouraged via the adoption of Site Waste Management Plans.

9.2.7 In this regard, the most relevant hierarchical option and proposed strategic approach for inert waste management on Guernsey is recommended to be to maximise the re-use potential of inert waste in construction, or use of excavated waste materials in secondary aggregate production; followed by deposit in an inert waste facility where re-use is not possible.

9.2.8 As such, it is considered that whilst on-site or off-site recycling or recovery of inert waste should be prioritised for construction projects, it would be inevitable that surplus arisings would be generated and these would require to be dealt with in a sustainable way. Therefore, options for alternative management via waste management

infrastructure need to be considered. The need for a leading option for inert waste management is therefore required.

9.3 The Leading Option

9.3.1 Following identification of the shortlist of options, the States undertook a cost/benefit analysis of the shortlisted options, using a tool for assessing risk and return for capital expenditures. This included an assessment of the benefits and critical success factors identified for the project, and looked at combined options combinations for delivering a 20 year service option. The table below provides the ranking outcome of the assessment. The cost/benefit analysis supported the findings of the BPEO assessment, that Longue Hougue South is the 'leading option' for the medium term.

Table 15: Cost benefit analysis of shortlist options

20 year Service Options	Rank	Estimated Fee per tonne for Break-even (based on combined options 20 year services options)
1. Longue Hougue South – followed by Les Vardes	**1**	(£25)
2. Longue Hougue South – followed by Creve Coeur	**2**	(£29)
3. Creve Coeur – followed by Les Vardes	**3**	(£31)

9.3.2 The Longue Hougue South site option is the leading option at this stage because it offers 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. It is also likely to have beneficial after use once it has reached capacity and can therefore be classed as recovery under the terms set out in the waste hierarchy assessment outlined above.

9.3.3 This leading option will form part of the Inert Waste Strategy to provide an inert waste management solution for the next 20 years, which will involve the following elements:

- **Short Term (up to five years):** Stockpiling of inert waste and/or use strategic or other projects that may come forward, followed by deposit at a new facility once it becomes available.
- **Medium Term (up to 10-15 years):** Provision of services and facilities at the proposed leading site, Longue Hougue South.

- **Long Term (10-15 years+):** Further work will be required to explore a long term solution or solutions which will be informed by monitoring and review and considered in the context of other strategic projects.

10 Next Steps

10.1.1 Following identification of the leading option, this option will now be presented to stakeholders and the public via formal presentation and drop-in sessions to be conducted during November 2017, and presented to the States through a Policy Letter in December 2017.

10.1.2 Following this stage, the leading option may be taken forward for detailed design development and detailed EIA as the preferred way forward. The environmental assessment identified during the High Level EIA will be undertaken during detailed EIA stage.

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Acronyms and Abbreviations

Acronym / Abbreviation	Description
APSZ	Airport Public Safety Zone
ABI	Areas of Biological Importance
BPEO	Best Practicable Environmental Option
CL:AIRE	Contaminated Land: Applications In Real Environments
CoP	Code of Practice
DPZ	Development Proximity Zone
EIA	Environmental Impact Assessment
IDP	Island Development Plan
LPB	Local Planning Brief
mOD	Metres above ordnance datum
NGO	Non-governmental Organisation
NPPF	National Planning Policy Framework
NWPP	National Waste Planning Policy
SEA	Strategic Environmental Appraisal
SLUP	Strategic Land Use Plan
SNCI	Site of Nature Conservation Importance
SSS	Sites of Special Significance
SWMP	Site Waste Management Plan
TFS	Transfrontier Shipment
WDA	Waste Disposal Authority
WRAP	Waste & Resources Action Programme

Appendix 1: Consultation Responses

Appendix 2: High Level Assessment Figures

Appendix 3: High Level EIA Environmental Appraisal

Appendix 4: Decision Criteria Weightings

Appendix 5: Sensitivity Analysis

Appendix 6: List of Stakeholders attendant at Inert Waste Workshops, 26th July 2017