Photograph 1: Vazon Bay

Weathering the Storm

(Tni dur dans la tàmpaête)[1]

A Strategy for the Bailiwick's Coastline

1. Coastal Defence Programme; and
2. Coastal Features Programme.

[1] "Tni dur dans la tàmpaête" is Guernésiais for 'weathering the storm' and means 'holding fast.' 'Weathering the Storm' was translated by the Guernsey Language Commission: www.language.gg.

Contents

Introduction

There are two main parts of the strategy for the management and maintenance of the Bailiwick's coastline: the Coastal Defence Programme and the Coastal Features Programme.

Both programmes are a series of planned and reactive operations. They are carried out by a team of officers from various States services who work together as one organisation. Both programmes serve to protect or enhance the 60km of Guernsey and 6km of Herm coastal frontage. Both programmes, Coastal Defence and Coastal Features, have separate methods to prioritise planned and reactive work and are set out in this document.

The States has increased investment in coastal defence infrastructure in recent years and continues to prioritise work on areas in the worst condition. This was in order to minimise the risk of failure, and to ensure that funding was available for a rapid response, to coastal infrastructure failures. The strategy has been further updated and revised to ensure that other coastal infrastructure can be prioritised along with coastal defence infrastructure.

The Committee *for the* Environment & Infrastructure take overall responsibility for this strategy; from time to time, important strategic decisions are for the States Assembly to make.

Coastline overview

The coastline is where the land and the sea meet: the technical term for this space is called, 'coastal frontage.' The coastline of Guernsey and Herm is defined as where the land meets ("fronts onto") the sea and the associated areas of land behind and around this. At such points there are manmade and natural coastal defence structures that protect critical infrastructure.

Coastal defences and coastal features connect us with our natural environment and they play a significant role in our daily lives. Their infrastructure anchors the fundamental resilience, security and safety we need to feel in our daily lives in order to thrive, and for the economic, ecological, and cultural sustainability of the island. The States approach must encompass how we interact with the coastline, and its significance to the Island's culture, as well as demonstrate that the programmes' outcomes are aligned with the public's best interests.

The coastline of Guernsey has historically been managed for coastal defence purposes, but some of the elements either do not fit into the coastal defence element or do not score highly enough to be considered for prioritisation. Two categories are therefore suggested under the coastline strategy:

1. Coastal Defences; and
2. Coastal Features

Manmade (e.g. coastal walls and rock armour revetments) and natural (e.g. sand dunes and shingle banks) coastal defence structures are part of the coastal defence programme: they protect the island against flooding and erosion.

The States maintain and manage the Island's coastal defences to prevent storm damage and coastal erosion.

Military structures, slipways, the coastal paths and coastal car parks are also an important part of the Island's coastline. We refer to these parts as 'coastal features.' Land

Coastal features contribute to the Island's unique coastal beauty; they do not significantly protect us from coastal flooding or erosion. Features often provide access to beaches and bays. They are sometimes an important part of the Island's military history or fishing industry and can continue to support industry. Many are used and enjoyed and immensely. In some cases, a feature may act as part of a coastal defence – e.g. a slipway can act as a groyne – and can help coastal defence units to reduce and prevent sediment loss or erosion overall as they often appear in the middle of a coastal defence unit. Whilst both programmes are separate, there is some crossover in how work in these areas can be approached.

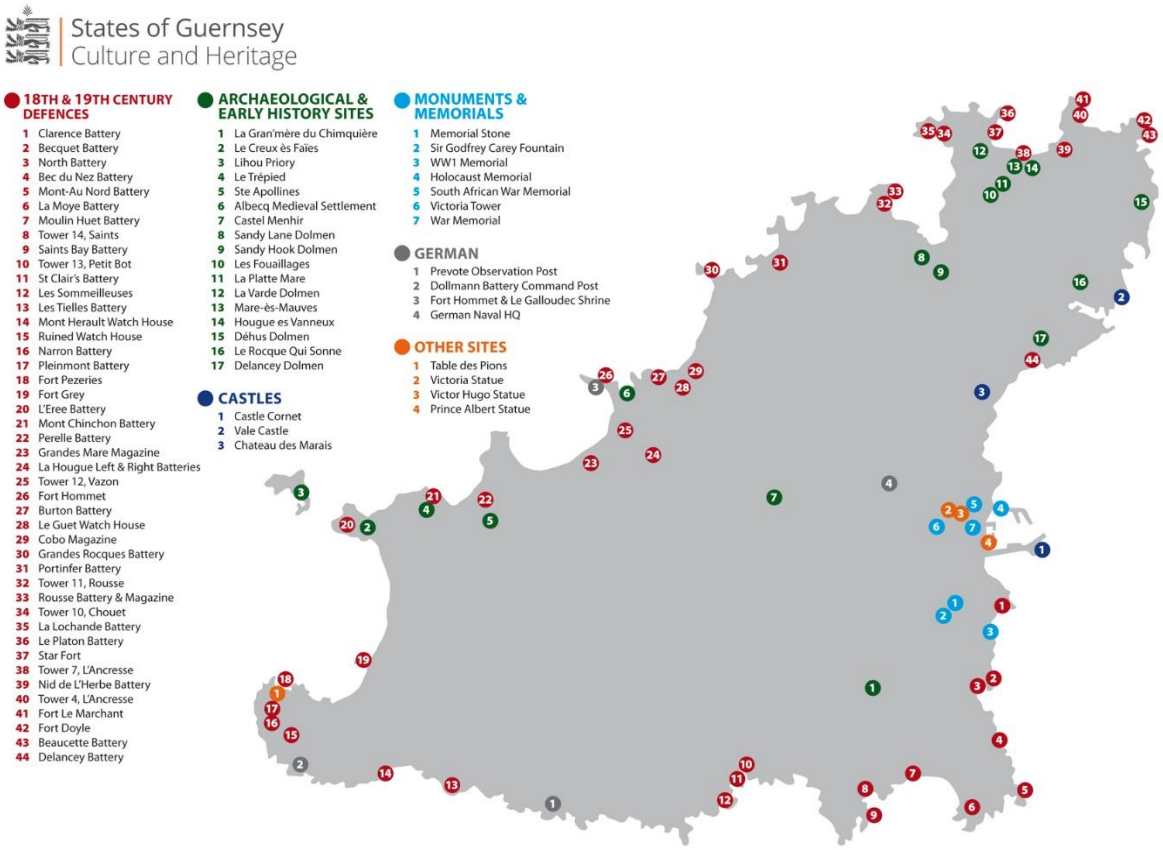
The Coastal Features programme enhances and improves access, usage and enjoyment of the Islands coastline, beaches and bays.

The coastline, or coastal frontage, can therefore be taken to include as far as, and including, the coastal pathways we have around the island, but does not include the coastal roads, kiosks, toilets or inland fortifications. The harbours and marinas also form part of the coastline, as do a number of historical heritage sites; however, these are managed separately within the States under their own strategies and so are not covered by this document.

The Harbours team repair and maintain coastal harbour infrastructure to safeguard the continuation of port operations. The infrastructure is routinely inspected by States' engineers, in order to provide condition assessments that inform prioritisation of any necessary works. The Ports aim to "build back better" and to "build in resilience" whenever works are undertaken, which can include activities such as reinforcing existing features and looking at futureproofing options.

Culture and Heritage are responsible for the care of many of the Island's historic sites. Guernsey Museum cares for over 70 historic sites from Neolithic tombs that are 6,000 plus years old through to German fortifications built during the Second World war. They have a rolling programme of planned maintenance for all historic sites, including reactive works for any issues and damage. Where necessary Culture and Heritage sites are assessed by States engineers, who work collaboratively across all areas. Figure 1, below, outlines the locations of the sites managed by Guernsey Museums, with a large number on or near the coastline.

Fig 1 Map of Culture and Heritage managed sites



One organisation

The coastal defence and coastal features team work together with a wide range of service areas within the States. Recently, repointing work has been undertaken at Fort Grey and Fort Hommet and, work to address coastal erosion at Fort Grey is ongoing.

States' Property Services work across the organisation to support all aspects of the Bailiwick's coastline strategy, including harbours and heritage programmes and projects.

Officers share expertise, experience and collaboratively plan how to best use limited resources. All teams and projects aim to deliver value for money to the taxpayer, with increased transparency on prioritisation processes and to achieve improved public satisfaction. When tendering and procuring works, a great deal of consideration is given to other service areas who may also be undertaking works; collaborative working relationships help to achieve best value and efficiencies for the States to deliver on their strategic aims.

Coastal defences overview

Coastal defences are sections of frontage that provide direct protection to the land behind. These may be man-made structures, such as walls or rock armour revetments, or natural features, such as shingle banks and sand dunes, or a combination of the two. Coastal Defence is the general term used to encompass both protection against coastal erosion and sea defence against coastal flooding.

A major factor in deciding the defence value of the infrastructure is what the coastal defence infrastructure is protecting. Coastal defences are therefore assessed and prioritised based on the protection they provide to other infrastructure, such as roads, utilities and property, which are scored and ranked in terms of their importance.

There is a well-established procedure for prioritising the expenditure on coastal defences, and this covers both hard and soft defences. The coastal makeup and defences are illustrated in the image below. Some coastal structures, such as slipways and former military defences, are not considered as coastal defences in their own right; however, they can offer some additional coastal protection value either through reducing the wave action and scour of a beach or preventing or minimising coastal erosion. In terms of prioritisation, though, they are viewed as coastal features unless a specific issue can be identified as having the potential to impact on the coastal defences and wider infrastructure. Certain breaches of failures of coastal features may, in certain circumstances, lead to it being considered under coastal defence prioritisation – where there is an underlying risk to an adjacent coastal defence.

Coastal defences are managed in line with the prioritisation ranking method set out later in this document, as well as current coastal engineering practices and guidelines. This can be used to evolve or alter the existing defences. A different engineering approach can be undertaken if it may have an impact on future costs or the enjoyment and usage of a coastal area.

Background information

The winter storms of 2014 were severe, and the coast suffered badly. The aftermath showed how significant underinvestment in our coastline had been; it was, figuratively speaking, the perfect storm. The States' reputation for taking care of coastal infrastructure was also damaged. Coastal infrastructure has been afforded significantly more investment since 2014, which has enabled a more proactive, effective and appropriate approach.

The aim of the Coastal Defence strategic approach is to increase the island's resilience to storm damage

Prior to 2014, the States predominantly carried out 'reactive' repairs to coastal defences, and this led to the widescale decline in the condition and resilience overall of the Island's coastal infrastructure.

A proactive approach to maintenance increases future resilience and reduces the cost burden – therefore increasing value for money to the States of Guernsey.

The proactive approach to maintenance allows for a more effective use of States funds than a reactive approach. This is best demonstrated by the work that was undertaken following the 2014 storms. Comparing the breach at Vazon to preventative works undertaken around the same time, the cost of repairing the breach was approximately 13 times more expensive as small scale preventative work would have been.

The aims of the strategic approach to coastal defences is to increase resilience over time and reacting to failures as they occur. The need for the reactionary element of the strategy should diminish over time as the overall standard of current coastal defences improves due to the maintenance programme. Naturally, however, there will always be some failure risk due to exposure from storms: this factor can never be wholly eliminated. A great deal of 'invisible work' goes on behind the scenes to increase the island's resilience to storm damage. The work is planned, flexible and very much alive to sudden failures that can shift resources sideways.

The Capital Defence programme which is typically used for large projects that are coastal defence infrastructure works, and the number of revenue projects that are completed an annual basis for coastal features. Revenue projects are typically smaller projects, with no less importance, that are funded and delivered year round.

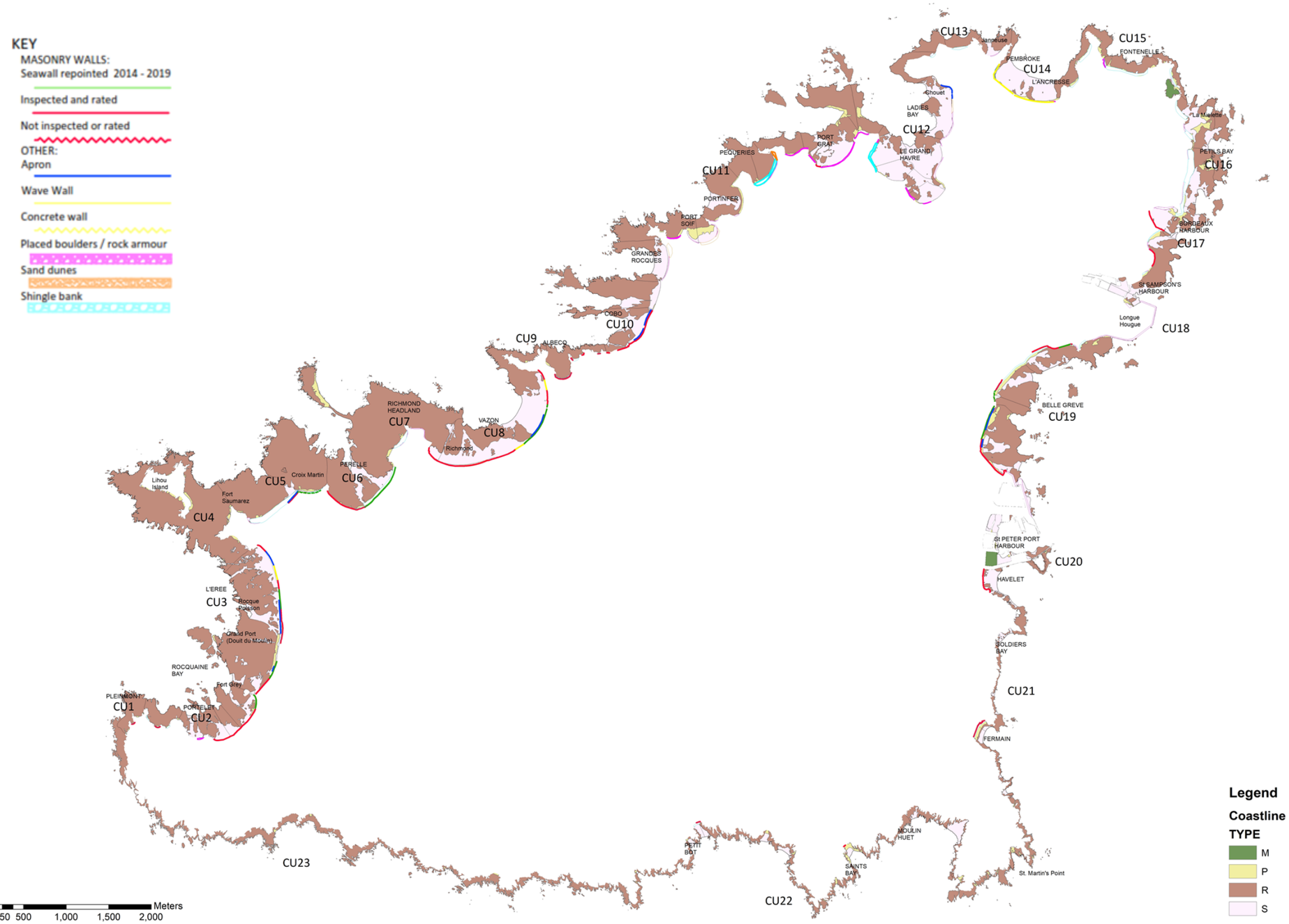
Tide timings and heights are very predictable every single day of the year, however the force and power of each wave can be unknown until the damage is done. Coastal defences can go from being in good condition to poor condition due to gradual degradation or due to sudden failures. Islanders obviously need to feel secure and protected from the incursion of the sea.

Guernsey's tidal range of 33ft is one of the largest in the world, transforming the coastline every six hours or so.

Masonry sea walls stretch along nearly a third of the coastline of the island, over 12km, covering a surface area of over 32,000m^2, not including the piers, slipways, St Sampson's or St Peter Port harbours. The location and type of coastal defence has been digitally mapped, as illustrated below.

The coastal defences are divided into Coastal Units (CU's) which correspond to an area of coast as outlined in the below image, and within each CU there are Defence Units (DU's) which align to the defence types in each CU.

Fig 2 Map of Guernsey coastal defence types



In addition to the 12km of masonry sea walls the coast is defended by 5km of boulders, 15km of granite cliffs to the south and south east, and approximately 20km of naturally occurring, carefully monitored and maintained sand dunes and earth banks. The sea walls are augmented by over 1km of concrete wave walls and over 2km of masonry or concrete aprons. These are all managed under the Sea Defence Programme.

Table 1 Coastline defences by type in km

12km masonry sea walls
5km boulders
15km granite cliffs (to the south and south east)
20km sand dunes and earth banks
1km concrete wave walls
2km concrete aprons

Coastal features

The Coastal Features Programme enhances and improves access, usage and enjoyment of the Island's coastline, beaches and bay**s.**

Coastal features are parts of the coastline that are managed by the Committee *for the* Environment & Infrastructure that either do not directly contribute to the defence of the coastline or score lowly on coastal defence value but have other significance to the community – perhaps through their amenity and usage and/or their historic importance or cultural context.

The coastal paths, which facilitate complete access around the coast of the island, are key coastal features, and are complemented by the coastal car parks.

La Vallette bathing pool area (including the toilets) is a key coastal feature and conservation area as it is a part of the island's heritage and a unique part of the coastline; however, it does not contribute to the defence of the coastline.

Former military walls which prevent small scale land loss, but do not protect other infrastructure or property, can also be considered coastal features as their management as defences would not be a high priority.

Slipways and other coastal access points, such as steps and ladders, are considered coastal features, although slipways can contribute to the protection and evolution of the coastline as well as contributing to its safe use.

Finally, bay moorings and causeways are also coastal features.

The harbours and marinas as well as the many historical monuments and fortifications around the coastline (such as the pre-Martello towers) are not considered coastal features for the purposes of this strategy.

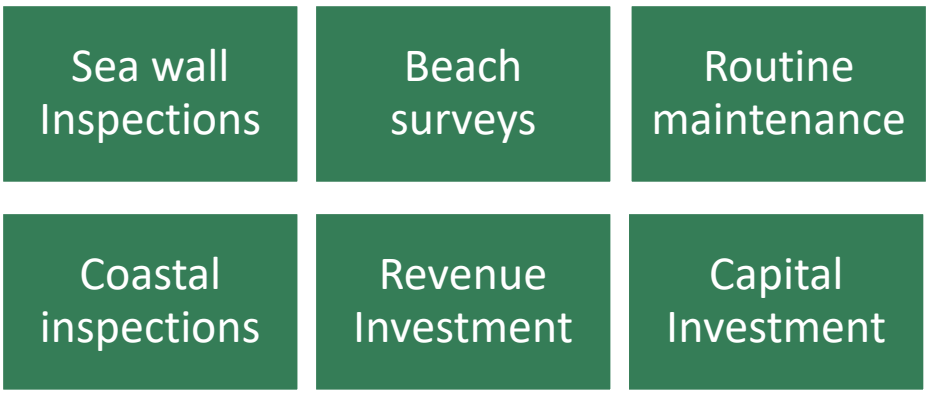
Some areas that are not listed above but score lowly on the sea defences assessment may also be considered under the coastal features category. Similarly, breaches within coastal features can under some circumstances be prioritised under the sea defence programme.

Coastal features are prioritised based on their prominence, their popularity, uniqueness and impact of loss.

Section One - Coastal Defence Programme

Prioritisation

Prioritisation of work is not easy. Managing this wide-ranging infrastructure requires several ongoing and continual actions taking place in a timely way:

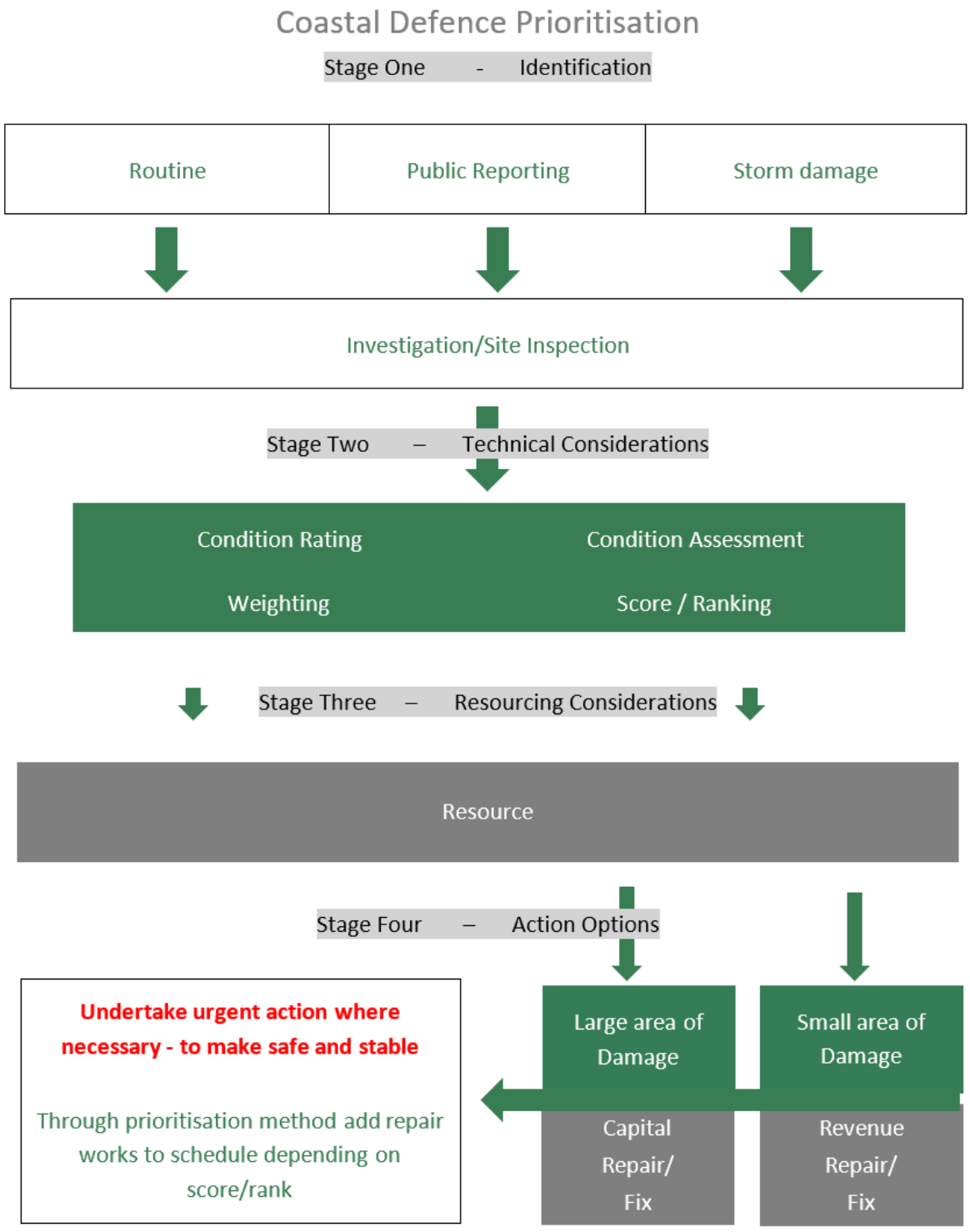


The prioritisation process for the Coastal Defence Programme is triggered by the planned, and proactive management of all defence units and through reactive issues, usually following storm events. If there was a sudden failure after a bad storm, the prioritisation method will ensure that the Island's coastal defence infrastructure can be repaired in line with importance. The process has been designed to withstand scrutiny on overall performance of the programme and expenditure of taxpayer's money. Often, public and

political interest may disagree with the outcome of this process, and the States Assembly may be asked by the Committee *for the* Environment & Infrastructure to form a consensus on the best approach to take. Typically, the political interest is around coastal features rather than coastal defences. This highlights the importance of separating the features from the coastal defences and resourcing them accordingly.

The prioritisation process is outlined below:

Fig 3 Coastal defence prioritisation flow chart



Stage One

Identification

Damage to, and deterioration of, coastal defences can be identified through routine inspection, public reporting or additional inspections following storm events.

Routine inspection

Through routine inspections the defences are inspected, assessed, and scored by a member of engineering staff (the same member for consistency). The States aims to inspect each beach at least once every six months. The beach inspections include the whole beach and all piers, aprons, rock armour, natural embankments, walls and slipways. The inspections record the current condition of the beach and defences and note any areas of concern. They help prioritise the works undertaken. Additional surveys of specific structures may be undertaken either following a storm event or following a report from a member of the public**.**

There are three types of inspections that take place:

- Beach surveys – using GPS and height above datum measurements, these surveys record the level of materials on the beach (sand and some shingle) and the location of permanent structures such as walls, steps and piers. From this information a pattern of material movement can be monitored and used to plan maintenance.
- Sea wall inspections – undertaken every three years (with the first having taken place in 2016), the inspections are more specific than the beach surveys. The inspections consider the condition of the sea walls to identify areas requiring maintenance which can be included in the routine maintenance programme.
- Coastal inspections – each beach is inspected at least once every six months. The beach inspections include the whole beach, including piers, aprons, rock armour, natural embankments, walls and slipways. The inspections record the current condition of the beach and defences and note any areas of concern. The data inform the process of prioritisation of the work to be undertaken.

Storm event inspection

Following storm events and periods of extended wind and rain, the States team undertakes to investigate for damage along the coastline.

Public reporting

The public play an important role in reporting damage to the States due to their familiarity and relationship with the areas they regularly frequent. For example, people who regularly walk along or use the same stretches of coastline are often the first to notice damage that has appeared and any sudden changes to the condition of sea defences. Following notification from the public a States team would assess the damage and this process would also asses any immediate risk to people's health and remedial action required to mitigate this.

Stage Two

Technical Considerations

Following the identification process outlined in stage 1, a prioritisation process to determine when the repair should take place, what kind of repair is required and how much it is likely to cost is undertaken. This process would also asses any immediate risk to people's health and remedial action required to mitigate this.

Condition Assessment and Rating

The condition of the coastal defences are assessed looking for signs of damage or deterioration and are rated on a 1-10 scale (outlined in greater detail below) from new structure/just repaired (1) to failed (10).

Weighting

The scores are then weighted (as detailed below) to assess and order the works. This enables factors such as the presence of roads and sea exposure to be taken into consideration. Those sections of seawall with higher weighted scores will be prioritised over those sections with lower weighted scores.

Score/Ranking

The conditions assessment and the weighting combine to provide a weighted score and ranking that is used to prioritise the order of works.

Stage Three

Resource

The total area and value of works are considered against the marketplace and financial resource availability. There is a limited supplier market currently able to deliver sea wall repointing annually. The works are programmed be undertaken during the Spring to Autumn period, due to risks associated with repairs during poor weather conditions. Projects are procured in a number of ways, depending on the project, in order to provide value for money.

Options

The options for delivery are also assessed based on the damage and any other works that may be due to happen in the area.

Stage Four

Once the issue has undergone a technical appraisal it can be immediately stabilised if required or prioritised with other works, including coastal features.

Funding

As outlined above, there are two streams for assigning funds, revenue and capital, and management of these funds is important. The cost of the work will be assessed against other projects in the programme. Funding for urgent work due to storm damage is usually

made available to secure a sight, pending a full repair. The full repair would be identified and prioritised as described in this section.

Immediate Action

Action can be taken to immediately begin remediation on storm damage, issues that are reported by the public and flagged during routine inspection where funding is available and the works are prioritised.

Sea Wall Inspections

These inspections consider the condition of the sea walls to identify areas requiring maintenance which can be included in the Routine Maintenance or Capital Investment Programme. These more detailed inspections are undertaken every 3 years and are a vital part of the continual assessment for prioritisation of planned maintenance.

The inspections play an important role in the programme as they allow for a regular update on the condition of defences and so can highlight where a defence, or part of a defence, is deteriorating and allow for reprioritisation as appropriate.

As well as the planned and targeted inspections, there are a number of ad-hoc inspections that take place every year. These can be initiated by stormy weather, issues identified during beach surveys, in response to public reports of damage or in response to public concern.

The following information details the technical approach taken for coastal defence infrastructure.

In 2014 sea wall inspections were undertaken to address the storm damage and to put together a strategy and a programme to make sure that the States could now adequately care for its coastal infrastructure.

The Inspections are ideally undertaken in similar and fair conditions, and on dry days. Ad-hoc inspections can be triggered for a range of reasons. The engineer will consider any previous inspection or account of the sea wall.

Table 2 Seawall inspections overview

The seawalls are visually inspected by an Engineer who considers:		
The size, shape, material, and condition of the stonemasonry.	The age, size, and condition of all joints.	The condition of the ‘structure as a whole’
Vertical or horizontal cracking.	Patterns of missing joints.	Areas of erosion, weakened, or undermined.

Table 3 Seawall Condition Rating Table

Sea wall Condition Rating Table		
Condition Rating	Significance	Description
0	**Good condition wall**	The wall has just been repointed and is in excellent condition
1		
1.5		The wall has recently been maintained and is in good condition
2		
2.5		
3	**Weathered – wall degrading**	The wall is deteriorating normally, there are some worn joints and is more vulnerable to damage from storms.
3.5		
4		
4.5		
5		
5.5		
6		
6.5	**Very poor condition wall**	The wall is deteriorating and is in poor condition, it is likely that there is localised cracking, small holes and weathered joints. The stone may be weathering also, with some cracks appearing in the laminar structure of the stone.
7		
7.5		
8		
8.5		There are consistent and prolific areas of weathered joints, cracking in the joints and potential for larger joints or small stones being loose or missing.
9		
9.5	**Failure likely**	There are longitudinal or vertical cracks in the joints, and potentially through the stones, there are open joints and loose stones, the remaining joints are in highly weathered condition. It is possible that we know the wall hearting is in poor condition due to emergency works. There is a high risk of failure of this section of wall.
10		

Without resource constraints, including market capacity, the engineering recommendation would be to immediately address all areas of repointing which have a condition rating of ≥6.5. However, the resources of project management, budget and suppliers to implement the repointing limit the volume of work possible to be completed annually, as such the Sea wall Repointing Programme prioritises the works to be completed.

Weighting method

The weightings were developed to assist the prioritisation of the works programme as part of the beach inspections, by providing a quantitative interpretation and analysis of qualitative data. To maintain continuity, the same weightings have been applied as to the sea wall inspections, which is explained in detail below.

Once the sea wall inspection is complete for the Defence Unit, the condition ratings are then weighted, taking into account the use of the land behind the sea wall, sea exposure and aspect.

Land Use - The physical location of a sea wall, considering the use of the land directly behind the coastal infrastructure, and associated risks of its failure affect the prioritisation and extent of any repair work. In order to quantify this an assessment has been made to prioritise the land uses. For example, a length of sea wall abutting a road will have higher priority than a length of sea wall abutting an area of coastal grass land, since failure of the latter will likely have a lower impact on people, utilities and services. It should be noted that the significance of the services within roads are considered equal across the island to maintain simplicity. For the "Land Use" we are referring to the use directly behind the coastal defence structure and includes only 1 element for weighting purposes. Therefore, if a section of sea wall fronts a road directly abutted by private property, the scoring would be 10 (for a road) and not 15 (road plus private property).

Land Use	Factor
Road	10
Car Park	7
Private Property	5
Amenity Grass	5
Coastal Path	5
Footpath	2
Coastal grass land	2

Sea Exposure - Equally the location of damage to the sea wall within a bay can be a deciding factor. Areas subject to prevailing storms and effects of wave action will have a higher priority than those areas in the more sheltered shoulder areas of a bay or marine structure where all other factors are equal.

Sea Exposure	Factor
High	10

Moderate	7
Medium	5
Low	3

Aspect - Finally the aspect of the wall is considered. The seaward side of the wall is exposed to more of the wave actions and is therefore a higher priority than the roadside, which is generally more sheltered.

Aspect	**Factor**
Seaward	2
Landward	1

The factors are multiplied together to give a weighting applied to the sea wall repointing rating. This process is effectively scaled up for assessing which bays and areas are to be prioritised for the maintenance programme.

The sea wall inspections document the condition of the wall, and this is then used to provide an overall mark based on the weighted condition. This assessment provides the basis for the analysis which informs the programme of investment into the island's coastal defences.

The way that Coastal Features are prioritised is detailed in Section 2 of this document. These coastal features form part of the coastal frontage. There is an alternative way of prioritising these features because they 'compete against' projects that form part of the vital sea defence programme in the defence of infrastructure. Feature failures are therefore not usually immediately prioritised.

Section Two – Coastal Features Programme

Coastal infrastructure features

Piers	Slipways	Ramps	Steps and staircases	Banks	Moorings

Coastal infrastructure features are made up of a combination of access or entry points to the sea, interesting elements of the built environment and the multitude of footpaths lining our coast. They are used and enjoyed a great deal by islanders and tourists. These features all contribute significantly to the Island's unique coastal beauty. As they do not greatly or directly contribute to the island's coastal defences, they are subject to different

prioritisation and allocation of funding by the States. Generally, these features have been in place for a significant period of time (in living memory) and are a part of the historic or economic functionality of the coastline, e.g. the military defence of the coast or slipways for fishing. There is significant public interest in features as they are often used and enjoyed immensely by individuals and groups, and if they deteriorate or fail this is seen as a failure by the States.

Table 4 Coastal Features overview

43 Slipways
11 Piers
13 sets of steps/staircases
7 access points to beaches (including access to the Bathing Pools)
Lihou Causeway
Fort Grey Causeway
Coastal paths

The following four options are usually considered if a coastal feature fails:

1. Maintain health and safety for the site but do not	2. Enact a repair to the structure in some form,	3. Enact a repair in keeping with the	4. Pursue an alternative approach

enact a repair (and restrict access to the feature)	but not restore to its previous state	original structure	

Option 1 is understandably usually the least preferable option as far as the public are concerned because this spoils the enjoyment or use of the feature. However, not all projects can be carried out to repair, restore, or reinstate to its original form, or an alternative form, as funding is not limitless and has to be carefully prioritised.

Health & Safety

Maintaining health and safety is a primary concern whenever damage occurs at a site, and the long-term health and safety requirements will need to be met.

Access

Accessibility for everybody to the Island's coastline is important to the States. Some features, such as slipways, provide access to areas that would otherwise be difficult to get to, or are needed for fishing, leisure or social enterprise. This is something that is considered when prioritising works – i.e. whether the feature provides the only access to certain areas or to certain activities, or whether it enables social enterprise.

Usage & Enjoyment

The public popularity and usage of a site (consisting of how commonly used the place is, how unique a feature is and the impact of removal of the feature) is something that informs the prioritisation of a repair.

Land loss

When a coastal feature protects against erosion, there may not be any significant infrastructure (e.g. housing, industry, fishing, leisure, or social enterprise activities) on the protected land. One consideration is whether land would be lost if a repair were not undertaken and, if so, what impacts this would have on the Island and for the community. In some instances, although the land may not be significant in terms of infrastructure, the long-term loss of land may not be acceptable.

Opportunities may present themselves to reduce the impact of hard frontages on the coastline and reduce the long term (and short term) costs on maintaining the coastline. The loss of part or whole of a coastal feature could improve the long-term management of the coastline through alternative hard defence structure, such as sloped aprons or rock revetment, or where space allows a return to a soft defence. Soft engineering options are often less expensive than hard engineering options. They are also typically more sustainable, with less far impact on the environment, although they often require space to implement. These alternative approaches also need to be fully considered.

Features Ratings

The condition rating of these features can be assessed in a similar way as the coastal defence infrastructure. It is important to note that coastal features are now prioritised within their own group rather than against coastal defence projects.

Weighting

The way that coastal features are weighted needs to consider different aspects to coastal defence infrastructure. Sea exposure is still considered, given that this may influence the longevity of the structure in its current state.

Public Importance can be scored on an additive basis with marks allocated as follows:

Table 5 Public importance scoring for Coastal features

Public importance	1	2	3	4	5
Prominence of location – is the area frequently visited by islanders and/or tourists?	Isolated location				Major bay
Proportion of use – is the feature utilised by a small number of people or a large number of people?	Usage by a small number of people				Usage by a large number of people
Uniqueness of feature – is the feature the only, or a particularly good/special, example of the type of feature (e.g. the "fishtail" slipway along Route de la Rocque Poisson)	Common feature of the coast				Unique or excellent example of feature
Impact of removal of feature – does the feature provide access to an area that would otherwise be/become off limits	Make no change in access	Limits access but does not remove access	Removes access		

Land Loss

Land Loss can also be scored. Whilst a feature may not offer direct protection for infrastructure (as scored in coastal defences) the likelihood and area of any land losses influence the desirability of undertaking an intervention at any given site. The scoring system is 1-3, where 1 is no / little loss of land, 2 is some incursion but anticipated to stabilise, and 3 is land loss expected and further intervention is likely to be required in the future.

Choice of Option

As outlined in above, there are generally four options for addressing a failure or issue with a feature: to manage the deterioration, enact a form of repair, enact a direct replacement repair or pursue an alternative approach.

Value for money is a significant driver in the selection of the preferred way forward: both the short-term capital commitment and the longer-term ongoing maintenance costs need to be considered. However, the most cost-effective option may not be as publicly desirable as an alternative approach.

Where a structure is already 30% or greater reconstituted (i.e. not in keeping with the original structure) the least-cost option is pursued. In addition, where the cost of the status quo is greater than 1.5 times the cost of the least-cost option (where the least-cost option is not “do nothing”), the least-cost option will be pursued.

The opportunity value of an intervention is also a consideration. This is where undertaking an intervention which alters the existing feature in some way (such as changing materials or reconfiguring the feature) offers coastal frontage/feature improvements or savings over the longer term. This could be through the removal of a structure to a more natural frontage, a change of approach to reduce long-term costs or using materials that are cheaper to maintain.

The analysis of option choice is undertaken on a scored basis by officers who work collaboratively, across several service areas. A scored assessment is produced considering these factors and a preferred way forward is then presented to the Committee *for the* Environment & Infrastructure to decide.

Prioritisation – Defences vs Features

The document outlines the prioritisation processes that take place for both coastal features and coastal defences. However, there is a need to consider how they can be prioritised alongside each other for funding purposes.

Funding, Conflict and Cross Over

Coastal features are predominantly maintained through general revenue, however the scale of some of the interventions now required make this unsustainable. As a result of this capital funding applications for coastal features have been through the Property Minor Capital allocation, however the justification for this is that there has been no other funding stream, not that it is the logical funding source. Where coastal features require capital funding it therefore makes sense that the Coastal Minor Capital allocation could be utilised.

A known limitation is the availability of industry to deliver the works required to maintain and upgrade the island's coastal defences. This is somewhat mitigated by the variety of defences the island has, meaning there is a requirement for different disciplines (and therefore a range of contractors) to help deliver coastal defence projects. As a result of the uplift in funding it is anticipated there will be additional funds available to facilitate the delivery of a wider range of coastal projects – including coastal features.

A further consideration is the potential conflict in terms of external resources available to deliver the coastal features and coastal defences. For example, where a feature project would require a substantial masonry element there is likely to be conflict with the ongoing coastal defence masonry programme, with the same suppliers likely to be required to deliver both projects. In order to facilitate this there would need to be a considered plan to allow for multiple projects to run sharing the resources, however the priority would remain on the critical infrastructure. The split between masonry and civil engineering works should allow for works in both coastal defences and coastal features categories to be undertaken. A further consideration is the need to balance the availability of external resources across other sections, such as harbour works, which may further impact on the deliverability of coastal works. The works under the coastline strategy will seek to deliver best outcomes for the organisation through the continued engagement with other sections on project needs.

It is therefore recommended that the Minor Capital Coastal category is appropriately utilised to deliver wider coastal features infrastructure projects at a level of around 25% of the available funds so long as this does not impact on or impede the delivery of the coastal defence works.

3-year plan

The coastal defences have a rolling programme of maintenance on the masonry walls, and it is also acknowledged that several the non-masonry aprons are in need of upgrading and unplanned events can influence prioritisation. The Coastal features programme is less well defined and, currently, functions as a more reactive programme.

This excludes other works related to aprons, which still require development, and is subject to change based on deterioration of the structures.

Summary

- Since 2014 coastal defence infrastructure in the worst condition, that protects important infrastructure, has been prioritised;
- Increased investment in coastal defence infrastructure was to minimise the risk of failures, as had been witnessed in the aftermath of the storms in 2014;
- This led to increased and significant upgrading of coastal defence infrastructure;
- The document sets out robust prioritisation methodologies for implementation of this strategy, for both the Coastal Defence Programme, and the Coastal Features Programme.
- Coastal features are now prioritised based on their prominence, their popularity, uniqueness and impact of loss.
- Coastal features contribute to the Island's unique coastal beauty; they are enjoyed and valued a great deal by the community. Coastal features that do not significantly protect us from coastal flooding or erosion can now be prioritised sooner alongside other coastal defence projects.
- Whilst both programmes are distinct in what parts of the coastline they cover, there is now increased crossover, with collaborative planning and prioritisation, in order to lead to increased public satisfaction with the implementation of the Bailiwick Coastline Strategy.
- Whilst this strategy rigorously and robustly captures the planning, prioritisation and implementation of ongoing work being undertaken by the States on the Bailiwick coastline, it will be tested time and time again in the coming months and years with every storm.