Coastal Communities 2150

Adaptation Planning
For the Community of Solent Breezes

March 2014

Photos: East Solent Coastal Partnership

"Investing in your future"
Crossborder cooperation programme
2007-2013 Part-financed by the European Union
(European Regional Development Fund)

Hampshire County Council

Part One CCATCH and the need for Adaptation

1.1 Scope of the Coastal Adaptation Plan

This Coastal Adaptation Plan outlines the detailed actions to achieve the long term vision of the community. The actions will help the community adapt to future change, thereby reducing negative consequences and enhancing beneficial consequences of climate or coastal change.

1.2 Background to the project

Coastal Communities 2150

Coastal Communities 2150 (CC2150) Project started in January 2011. The project partners put together a successful bid to the INTERREG 2 Seas Programme and we were awarded European Regional Development Funds to cover 50 per cent of the €2.9 million costs. The partners involved are: Environment Agency, Kent County Council, Hampshire County Council, Alterra (Stichting DLO), Province West-Vlaanderen and Agency for Maritime and Coastal Services – Coastal Division.

The aim of the partnership is to work together, sharing experiences and learning to enhance knowledge on how to best communicate the long-term issues of changing coastlines. This is something that will be greatly impacted by future climate change; especially rising sea levels, accelerating erosion rates, higher storm surges and rainfall. Increased air and sea temperatures will bring additional challenges, as will pressures to build new developments and homes.

Partners are working with selected pilot areas to develop innovative tools and ideas to help communicate these issues to communities at risk. The aim is to involve those impacted by change in the decision-making processes. Engaged people will be much better placed to deal with the future risks and changes.

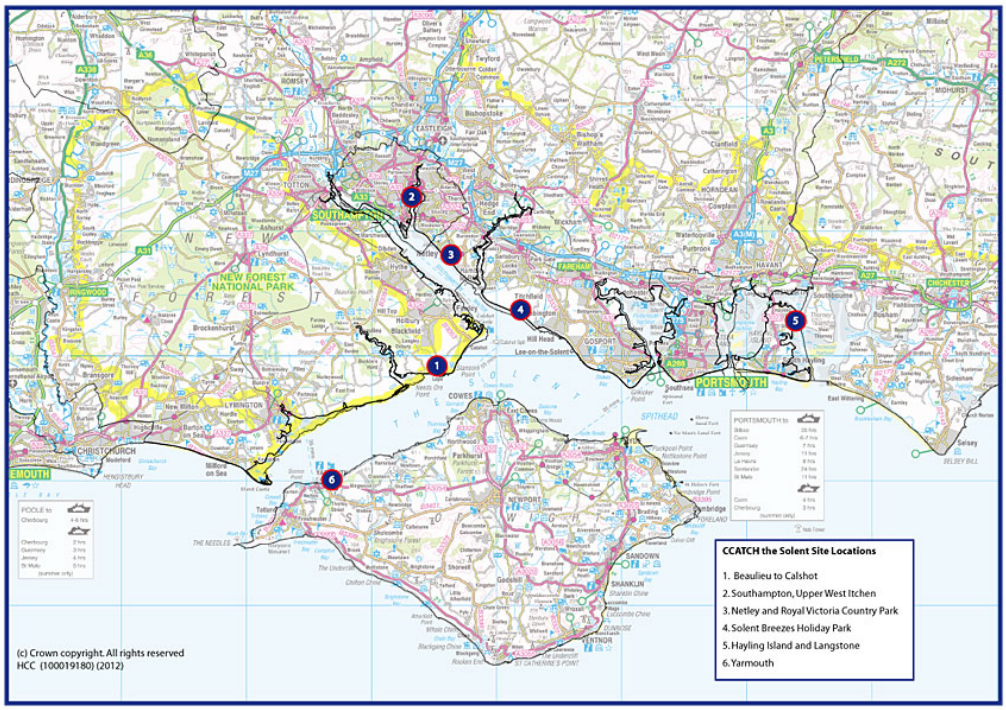
CCATCH the Solent

Hampshire County Council (HCC's) chose 6 sites for Community Engagement after a short-listing process conducted with members of the HCC's Project Overview Group.

The sites selected include the following:

1. Beaulieu to Calshot - an area with a small number of large private landowners and includes Calshot Activities Centre and Lepe Country Park (Engagement occurred here within the HCC pathfinder project.

2. Southampton, Upper West Itchen - an area of mixed urban community with social housing, private landlords and owner occupiers. There are also numerous commercial waterside properties.
3. Netley and Royal Victoria Country Park - a small urban coastal community and a Country park which draws numerous recreational visitors.
4. Solent Breezes Holiday Park - an area with a holiday park with some permanent residents, holidaymakers and numerous recreational uses, also includes farmland and utilities infrastructure.
5. Langstone – a small rural communities with tourist and recreational assets at risk.
6. Yarmouth - small affluent town with a working harbour



1.3 Climate, Coastal Change and Adaptation

Sea level rise

Sea level rise is considered to be one of the most significant effects associated with climate change to threaten the UK. Sea levels have been rising for thousands of years since the last ice age and will continue to do so in the future due to the thermal expansion of sea water and melting of the polar ice caps. Scientists predict that by 2100 sea levels will rise by up to 1m in the English Channel, and that they will continue to rise for the next several hundred years. It is plausible that we will get 3.5 m rise in 300 - 400 years and even a 10m rise in the next 1000 years. With a predicted rise in the number of storms, the risk of flooding and erosion of land along the coast will increase.

According the Southampton Strategy, sea levels are predicted to rise in the Southampton Itchen area by up to 1 metre over the next 100 years as a result of climate change.

There are three main factors contributing to sea level rise. The first is the melting of the glacial ice sheets as a result of the climate warming on a global scale, causing the release of water that would otherwise be stored. Oceans trap heat and in doing so the water warms and expands in a process called thermal expansion. Surface waters are quick to release heat; however heat absorbed into the deeper ocean takes longer to be released and is generally stored. With temperatures rising, more heat is trapped and the oceans continue to expand. The third contributing factor is a process called isostatic rebound. This is the readjustment of the land masses in response to pressure exerted on the land by ice during the last glacial period. In the past much of Britain was covered by glacial ice which caused land masses to sink. As a result of the ice melt the North of the UK is slowly rising, whilst the South-East is sinking to compensate, making it appear that sea level rise is happening faster in the South. In the future sea level rise could mean land becoming flooded permanently but will also put pressure on local drainage systems, as tidal entry to culverts and drainage networks will reduce the drainage efficiency, which could in turn lead to flooding in areas away from the immediate coast.

As well as the tide, weather conditions can influence the height of water. Offshore winds can decrease the height of water by moving it away from the coast, whilst onshore winds exert drag on the surface bringing it up towards the coast, increasing the height. The greatest effect from weather comes from atmospheric pressure. A change in pressure by 1 millibar can cause a 1cm change in water level, with the sea falling under high pressure and rising under low pressure. A storm surge results from these adverse conditions and has the potential to cause a flood event, especially when they coincide with high tide. A drop in pressure combined with high tide can create a powerful driving force that can cause large waves to break through any existing defences (breach) and/or cause the water level to reach above the defence (or land) level, allowing water to reach the land behind.

Coastal change

Coastal Change describes the effects of a natural, ongoing process that has always happened. As sea water meets cliffs and shores, sediment or rocks are broken down and washed out to sea. Sometimes, this material is moved to a different part of the coast and deposited, causing 'accretion' - the opposite of erosion - where shorelines may build up with sediment over time. Within the study area, the beaches are comprised of sand and shingle as a product of this process, and need a continual supply of material. The rate of erosion tends to increase when waves are powerful and water levels are high - for instance during storms or in high winds. It is therefore likely that the rate of coastal change may increase under rising sea levels.

Planning for future change

As a response to climate change the primary mechanism over the last 20 years has been that of mitigation and in particular a reduction in greenhouse gas emissions has been and is at the forefront of the environmental and political agenda.

Whether mitigation can be effective or not, it is imperative that communities and Government respond to the threats of climate change through the alternative process of adaptation.

Numerous definitions may be cited with regard to the nature and meaning of *adaptation.* The United Nations Development Programme (UNDP) report on Adaptation Policy Frameworks, Lim *et al*., (2004) state "adaptation is a process by which strategies to moderate, cope with and take advantage of the consequences of climate events are enhanced, developed and implemented"

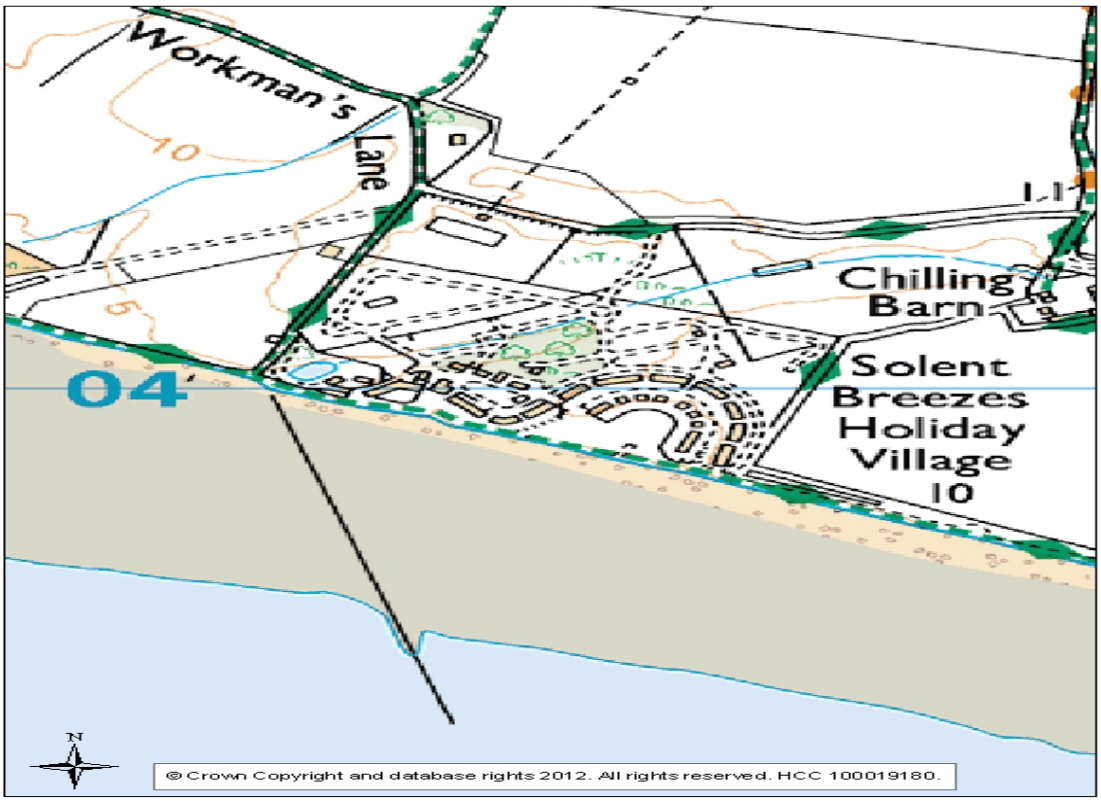
Adaptation in the context of this report can be seen as a process of becoming adjusted to new conditions, in a way that makes individuals, communities or systems better suited to their environment.

An adaptation strategy must look beyond the short term and be based on a long term vision. It needs to take into account the dynamic nature of coastal processes, particularly in the light of climate change. Adaptation presents many challenges as to how to continue to deliver services and maintain infrastructure, and at the same time there will be considerable opportunities, such as potential improvements and the enhancement of landscape and nature conservation.

In the long term it is unlikely that we will be able to maintain all areas of the coast as they are today; so it is important to think realistically about what the coastline could look like in future, consider more sustainable solutions and plan for these changes and adapt.

Part Two – Solent Breezes Adaptation Planning

Solent Breezes is situated on a largely undeveloped stretch of coast between Hook and Titchfield Haven. It is a Holiday Park comprising caravans, chalets and businesses and fronts a shore of over 100m of eroding soft sandy cliffs.



Solent Breezes is a very contained community, consisting of privately and commercially owned holiday caravans and chalets. Some chalets and caravans are privately owned and are 2nd homes, there are also a handful of permanent residents too. To the west of the site is a Hampshire County Council (HCC) managed local nature reserve and to the east is a HCC farm estate property, and to the north west: a National Grid operational asset.

2.1 Current Situation

The following points are key to understanding the need for this community to consider the impact of coastal change now and in the future:

- Natural processes: The site comprises permanent residential chalet bungalows and holiday properties on a soft geology cliff edge. The cliff line is undergoing considerable erosion and the beach material is not being replenished by natural processes thereby does not offer any defence against further erosion. Consequently the community is at risk in the short term from continuing cliff erosion.

- Policy framework: The North Solent SMP 2010 sets a policy of No Active Intervention over the next 100 years for this and the adjacent section of coast. Due to this policy framework the location is unlikely to get government funding for future coastal defences. (The National Grid asset to the north of the site may attract funding for localised defence work). International and national environmental designations may impact upon future coastal defence decisions.

- Current state of sea defences: The existing sea defences are variously owned and maintained by a number of parties in various states of repair. The modelled rate of erosion suggests that in the next 12 years 3 properties will be lost, and in the next 40 properties will be lost to the sea.

- Complexity of land and property ownership: There are a number of land and property owners involved with a range of responsibilities and requirements from that ownership

- Property issues: A number of issues of concern for property owners including:
    - Risk of damage/loss of property
    - Implications for future insurance of properties, value of houses, mortgages etc
    - How to protect homes, how effective will it be, what are the costs and how will it be paid for?

- Known barriers to communication: Previous contentious contact with government agencies, not all residents have been willing to engage previously, remote ownership. In the 1980's the whole site worked together, but now it is a lot more fragmented partly due to the historical and current reluctance of site owners; Park Holidays to engage. The site is only fully occupied between April & October.

- Opportunity: to develop a sustainable coastal management strategy that responds to sensitivities of the undefended adjacent sites.

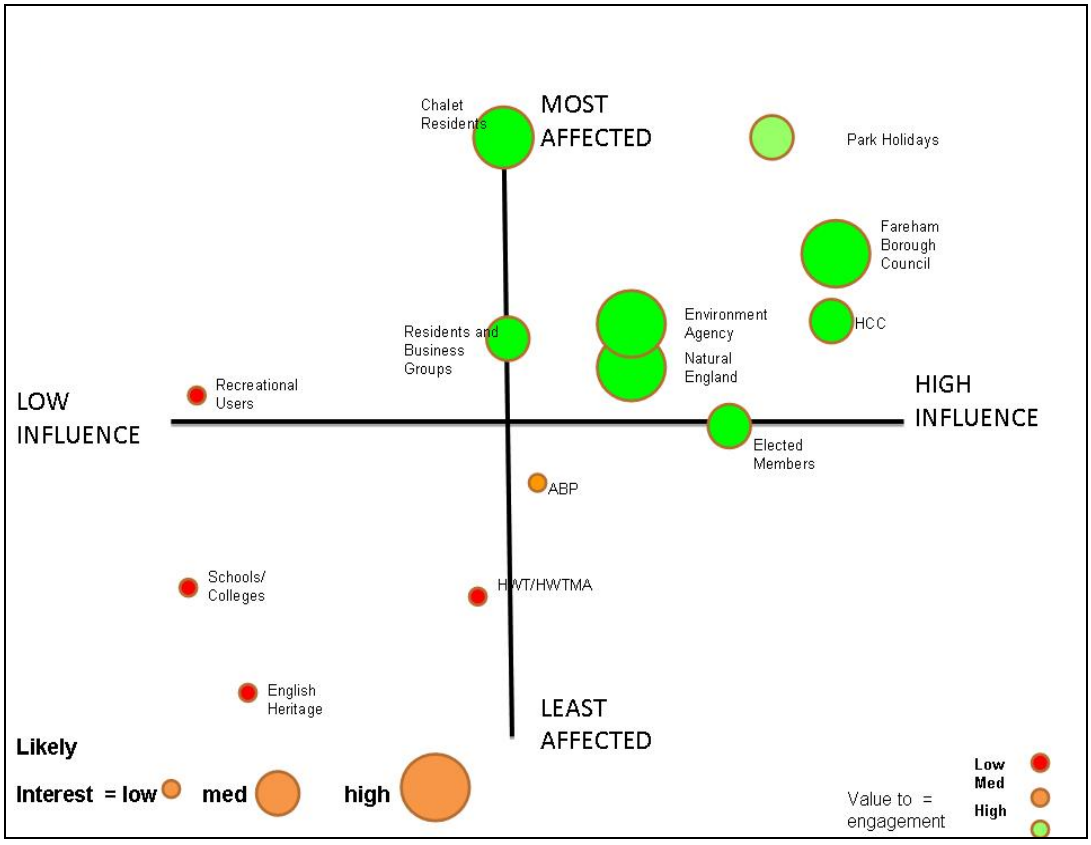
2.2 Who needed to be involved (Stakeholder Analysis)

To help to identify stakeholders, different sectors and interests, such as public, private, voluntary, community sectors, service providers, business and industry, schools were considered. Stakeholders include any individual, group or organisation with an interest in this project.

The stakeholder analysis this was based on three attributes:

- Influence - the level of influence they will have on the project now and in the future
- Affected - how they will be affected by the project now and in the future
- Interest - what is their current and future interest in the study area

This allowed for the identification of the most important or influential stakeholders. Looking at the current levels of knowledge and engagement then enables us to identify those stakeholders who will be able to provide most input and also those stakeholders who we would like to be more involved. The following stakeholder map resulted for the analysis.



2.3 Community Engagement – Summary of activity

- June 2013 - Commissioning of a Sea Defence 'Conditions' report from consultants

- Ist Community meeting – September 2013 attended by 15 Chalet owners and local authority representatives. Consideration of the Conditions report and the joint commissioning (CCATCH & Community) of a Sea Defences 'Options' report.

- 2nd Community meeting – November 2013 attended by 20 chalet owners, local authority representatives and the site owners; Park Holidays. Consideration of the 'Options' Report and discussions around mechanisms for moving forward on a more collaborative basis.

- 3rd Community meeting January 2014 attended by 12 chalet owners, local authority representatives and the site owners; Park Holidays. Further discussions on mechanisms were inconclusive. CCATCH produced a 'Current Situation' report that identified options for moving forward is respect to collaborative working.

2.4 Community Aspirations

Through the process of community engagement it the community were encouraged to consider future flood risk and how that might change in the future. From the response to that engagement process the following aims and objectives emerged.

Aim

The whole community of Solent Breezes to be aware of implications of coastal change and be able to manage adaptation as the shoreline erodes.

Objectives

- To raise awareness of the current risks to different sectors of the community.
- To help the community understand the future options available to them in respect to protecting their properties from coastal erosion
- To explore the financial, legal and practical implications of those options to help identify a preferred option(s) and the actions required for implementation.
- To encourage partnership working among landowners.

Deliverables

- A community led 'options appraisal' for the future of the Solent Breezes coastline with an increased understanding among local property owners of the associated implications and actions.
- Guidance for private land owners implementing coastal defence works.

2.5 A community led 'options appraisal'

The Solent Breezes situation is characterised by high levels of complexity (especially related to property rights and responsibilities) and uncertainty (related to coastal change and community dynamics), which has led to a considerable amount of mistrust between the key players. To attempt to rebuild trust the CCATCH team adopted a Joint Fact Finding approach to identifying the key adaptation measures for the site. Joint Fact Finding involves the joint commissioning by all the key players of research or advice about a particular issue. It helps engender a sense of participation in the research process and an ownership of the outcome.

In respect to Solent Breezes this was a three stage process:

1. The CCATCH project commissioned consultants CH2M HILL to assess the conditions of the current sea defences and to provide a report and a consultant to present that report to a community workshop.
2. Armed with information about the current situation the community were then able to identify what they needed to know about future options. This information was used to develop a brief for an Options Appraisal, again undertaken by CH2M HILL
3. The Options Appraisal was these then presented back to the community at a subsequent workshop, followed by discussions between the community, the consultant and other stakeholders to develop a common understanding of the implications of the options.

Copies of the 2 reports can be found in the Annex 1 & 2 of this document

2.6 Situation Report

At the final workshop it was hope to identify and agree for the Solent Breezes Community the key next steps in pursuing a collaborative approach to future coastal defence. However, due to the range of views and requirements among different sections of the community it was not possible to achieve this in the timeframe of the CCATCH project. It was agreed that the facilitators would produce a summary report of the current situation to act as a bridge between the CCATCH projects activities and future discussions on coastal defence. This summary can be found in Annex 3.

2.7 Outcomes

- The Solent Breezes Community has its own commissioned 'Condition' and 'Options' reports
- Facilitated discussions have taken place between about coastal change the different parties where such discussions had been difficult in the past
- Channels of communication established between key stakeholders.
- A Situation Report has been produced that identifies options for moving forward is respect to collaborative working and the mechanisms that could be put into place to facilitated that.

Annex 1: Solent Breezes Coastal Defence Assessment

Annex 2: Solent Breezes Options Appraisal

Annex 3: Solent Breezes Situation Report

TECHNICAL MEMORANDUM CH2MHILL®

Solent Breezes Coastal Defence Assessment

PREPARED FOR: Hampshire County Council

COPY TO: Rachael Gallagher

PREPARED BY: J Pang & A Frampton

DATE: September 24, 2013

1 Introduction

The 'Coastal Communities Adapting to Change (CCATCH) – the Solent' project forms part of a larger European funded project led by the Environment Agency (EA) titled 'Coastal Communities 2150 and Beyond' (CC2150). CC2150 is primarily a communications project which will engage with communities who are at risk from coastal change.

'CCATCH - the Solent' will raise awareness and understanding amongst Solent communities of coastal change and in particular sea level rise. It will help communities understand the process of coastal change to enable adaptation and increase resilience. The Objectives of CCATCH the Solent are:

- To engage the local community in all aspects of coastal change and how it will impact on existing residents, businesses and visitors.
- Explore the full range of hazards and risks to which coastal communities may be exposed i.e. flooding by the sea, coastal erosion and coastal instability.
- To provide educational and interpretational opportunities that can communicate coastal change and build a high level of understanding within the local community.
- To raise awareness of long term sea level rise amongst politicians and elected Members.

One of the six CCATCH sites that have been identified is the community at Solent Breezes, on the stretch of largely undeveloped coast between Hook and Titchfield Haven (Figure 1).

TECHNICAL MEMORANDUM CH2MHILL®

Solent Breezes Phase 2 Report

PREPARED FOR: Hampshire County Council
COPY TO: Rachael Gallagher
PREPARED BY: A Frampton & I Ball
DATE: 18th October 2013

Contents

1 Introduction

The 'Coastal Communities Adapting to Change (CCATCH) – the Solent' project forms part of a larger European funded project led by the Environment Agency (EA) titled 'Coastal Communities 2150 and Beyond' (CC2150). CC2150 is primarily a communications project which will engage with communities who are at risk from coastal change.

'CCATCH - the Solent' will raise awareness and understanding amongst Solent communities of coastal change and in particular sea level rise. It will help communities understand the process of coastal change to enable adaptation and increase resilience. The Objectives of CCATCH the Solent are:

- To engage the local community in all aspects of coastal change and how it will impact on existing residents, businesses and visitors.
- Explore the full range of hazards and risks to which coastal communities may be exposed i.e. flooding by the sea, coastal erosion and coastal instability.
- To provide educational and interpretational opportunities that can communicate coastal change and build a high level of understanding within the local community.
- To raise awareness of long term sea level rise amongst politicians and elected Members.

One of the six CCATCH sites that have been identified is the community at Solent Breezes, on the stretch of largely undeveloped coast between Hook and Titchfield Haven (Figure 1-1).

Figure 1-1 Solent Breezes – the study area

A Local Engagement Group (LEG) has been set up at which includes approximately 10 members of the community. The LEG identified the need to develop coastal defence options for the stretch of coast fronting Solent Breezes so that they could better understand the costs and issues. This request for 'options development' work has been discussed with the East Solent Coastal Partnership whose advise was to align the options work with the forthcoming development of a Coastal Defence Strategy for this stretch of coast, which will avoid conflicting guidance. The Strategy will provide the most up-to date information relevant to Solent Breezes and it is important that the community engages with the

developing strategy. The LEG thought that the consideration of options for the Solent Breezes Coastline still provided a valid way forward for the CCATCH project at Solent Breezes, recognising that the work undertaken needed to be within the context of the emerging coastal defence strategy.

It is within this broader strategic setting that CH2M HILL was employed to provide expert coastal engineering advice to the community at Solent Breezes, specifically to provide technical advice and information to questions that the residents of Solent Breezes have in relation to the future management of coastal defences along the Solent Breezes frontage. This report presents answers and additional information in response to the following questions raised by the Solent Breezes residents at a workshop on 26th September 2013:

1. What are the costs of different options for future coastal defence provision along the Solent Breezes frontage and how long will different options last? (see Section 2)
2. What steps would need to be taken to implement different options, including licences and consents needed, and design and construction processes? (see Section 2)
3. What rights and responsibilities do the Solent Breezes residents have to provide their own coastal defences in the future? (see Section 3)
4. What potential sources of funding are available for coastal defence work that could be investigated further? (see Section 4)
5. How should land drainage issues along the frontage be investigated? (see Section 5)

2 Possible Options for Future Coastal Defence

This section presents a broad-level assessment of a number of possible options for future coastal defences along the Solent Breezes frontage. The following options have been assessed:

1. Do Nothing – how long will defence remain effective if no works are done? This will be based upon the findings of the Phase 1 defence assessment.
2. Maintain existing defences – what maintenance could be undertaken to extend the life of the existing defences in the immediate future? This will effect be based upon the cost estimates presented in the Phase 1 report.
3. Construct a rock revetment along the length of the site.*
4. Construct a new king-piled wall along the length of the site.*
5. Construct a new steel sheet piled wall along the length of the site.*
6. Construct a new concrete seawall along the length of the site.*

**for these options, it has been assumed that a new consistent defence will be constructed along the frontage, and as such will be based on the premise that the all current defences would need to be removed as a start point. In taking this assumption, we will indicate the potential cost of removing the existing defence material from site as 'waste' and where this cost may be reduced by recycling/re-using the material from existing defences in the construction of new defences.*

For each option the following details are provided in Sections 2.1 to 2.6:

- Brief concept discussion of the option and assumptions that have been made in this assessment.
- Key design issues and requirements.
- Assumptions about construction method.
- Outline of likely licences/consents that will be needed.
- Breakdown of estimated cost to implement option in terms of capital construction cost and ongoing maintenance costs (based on unit costs from industry guidance such as Environment Agency, 2010a and SPONS, 2013).
- Indication of expected design life of option.

2.1 Option 1 – Do Nothing

This option involves not investing any further effort into maintaining or replacing, the existing defences along the frontage as assessed in the defence condition assessment undertaken in September 2013 (CH2M HILL, 2013). This option is included to provide a baseline against which other options can be compared.

2.1.1 Key design issues and requirements

No design issues as option does not involve any design works.

Main issue will be removal of defences once they have failed for health and safety reasons.

2.1.2 Assumptions about construction method

Not applicable as option does not involve any construction activities.

2.1.3 Licence/consent requirements

Not applicable.

2.1.4 Estimated life of defence

Based upon the findings of the defence condition assessment (CH2M HILL, 2013), some defences have already failed along parts of the Solent Breezes frontage. Other defences without any further maintenance are estimated to have a residual life of between 1-20 years.

2.1.5 Estimated costs

No costs have been estimated for this option as it is assumed that no investment will be made in further defence maintenance.

However, there may still costs associated with the removal of defences once they have failed for health and safety reasons. The costs for this are estimated to be between £20,000 and £100,000, depending on how frequently such operations are required and the volume of material to be removed as waste each time.

2.2 Option 2 – Maintain Existing Defences

Under this option some initial work will be carried out along each section of the frontage (refer to Figure 2-1) to tidy the beach area and remove any health and safety hazards. Existing deteriorated or failed defences can cause difficulties to the protection of adjacent sections of the coastline by acting as a groyne structure and interrupting sediment movement along the coast.

The maintenance of the existing defences will maintain the situation of varying structures along the frontage, and will require multiple maintenance operations. With different structures in place along the frontage the defences may fail at different times, allowing erosion to affect properties within adjacent sections, despite failure of only a limited section.

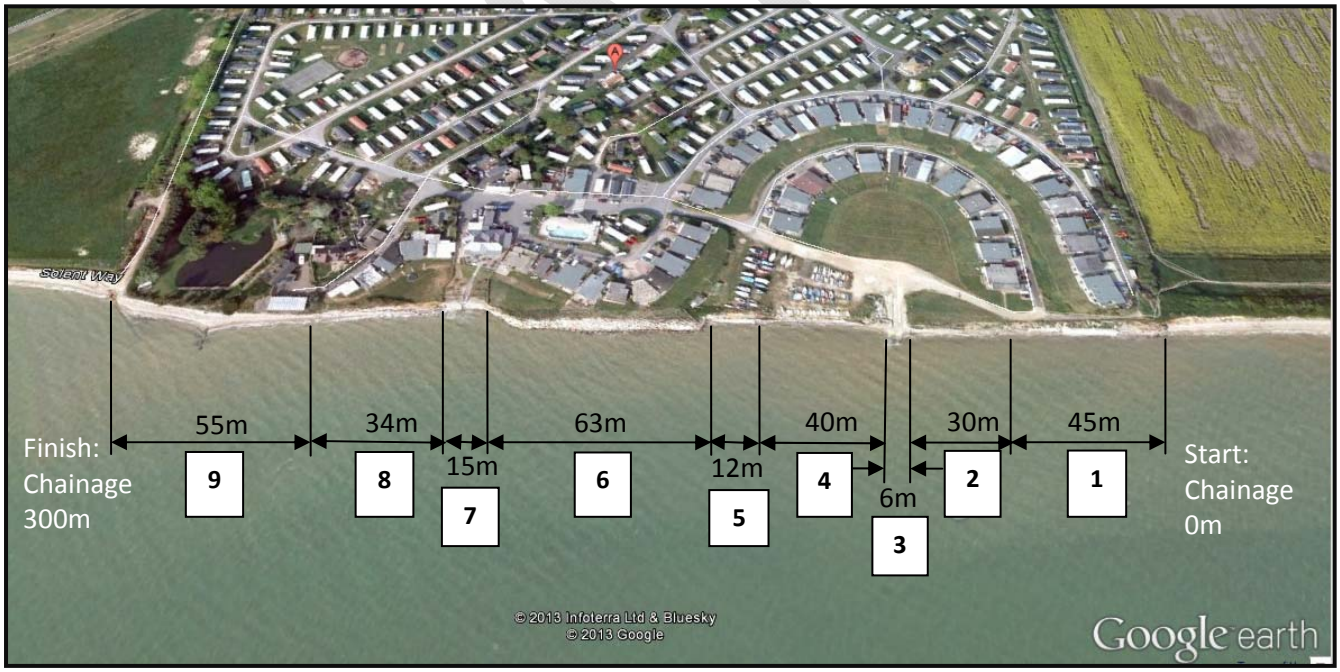


Figure 2-1 Solent Breezes defence lengths identified during the site visit of 12th September 2013 (image copyright: Google Earth)

2.2.1 Key design issues and requirements

The poor condition of some of the defences is visually unattractive, and presents a health and safety hazard for people accessing the beach area. Any work conducted along the frontage must address this issue, as well as improving the quality of beach amenity.

The removal of some material from failed defences and general waste along the shoreline will be carried out to ensure that the health and safety hazards for beach users are reduced. The removal of previous

defences will allow the beach material to develop in a more natural manner, and prevent adjacent coastal areas being deprived of beach sediment.

The different defences along the frontage offer inconsistent standards of protection against erosion, and offer different remaining life durations. The main consequence of these differences is that assets immediately protected by a defence in good condition may be susceptible to erosion originating from adjacent failed sections. For defences that have already experienced failure, a new section of gabion defences will be constructed with rock protection at the toe to prevent undermining. This new construction, combined with maintenance work and additional toe protection to other sections, will help to provide a more consistent defence approach along the coastline, and will help reduce the risk of erosion along the entire frontage.

2.2.2 Assumptions about construction method

It is assumed that proposed work to the defences will occur immediately to improve the condition, and create a more consistent defence line throughout the frontage. Where possible, material from the existing defences will be re-used to help reduce overall waste and cost.

All maintenance work will be conducted to minimise disruption to stakeholders and exploit any overlap in use of equipment and staff to reduce overall costs. The overall works will include:

1. General site clearance to remove any material that poses a health and safety hazard or will longshore transport
2. Construction of new gabion defences with rock toe protection in areas where existing defences have already failed (in the case of Section 1 this rock protection will need to extend such that it protects against the risk of outflanking by adjacent undefended cliffs)
3. Rock protection to the toe existing defences to prevent undermining and premature failure.

2.2.3 Licence/consent requirements

In order to implement this option, and with reference to Section 3, the following licences/consents are expected to be required:

- Planning permission (including Coast Protection Act consent) from Fareham Borough Council to construct new defences
- Marine Licence from the Marine Management Organisation
- Harbour Works Consent from ABP Southampton VTS.

As part of obtaining these licences/consents, there may be a need to undertake environmental assessments as identified in Section 3.9.

In addition, with regards waste legislation (refer to Section 3.10), it is assumed that the CL:AIRE code of practice for waste management (CL:AIRE, 2011) will be followed for the handling of all waste generated during construction to remove the requirement for an environmental permit or registered exemption.

2.2.4 Estimated life of defence

The estimated life of the defences varies along the frontage as each different defence section is characterised by a different potential remaining life. Further complicating the situation is the effect of failure of some defences on the remaining life of adjacent sections (both defended and undefended), which may accelerate coastal retreat and expose the remaining defences to more severe wave conditions. The retreat of some sections would expose other areas to outflanking, and may cause more rapid failure of outflanked sections than would otherwise be expected.

Assuming minimal maintenance work for each section of defence is conducted, the estimated residual life of the defences is likely to vary between 10 and 30 years. This will extend the protection offered to the frontage compared with Option 1 by about 10 years.

2.2.5 Estimated costs

The capital costs are estimated at between £125,000 and £200,000. This cost is highly dependent upon testing of the waste material that is to be removed from the site, and whether it is classified as hazardous or non-hazardous. The opportunity to re-use some of the material from the site during maintenance works will also have a high degree of influence upon the total costs.

Maintenance work will be necessary throughout the remaining life of this structure to replace damaged and corroded gabion steelwork. Regular monitoring of the defences, particularly post-storm, will allow the identification of any problems, and will allow for the repositioning of any displaced toe protection. The maintenance costs are estimated to be between £4,500 and £7,000 per year (or between £45,000 and £210,000 over the estimated 10 to 30 year life of defence provided by this option). Any substantial loss of the gabion fill material will dramatically increase the cost of maintenance work.

2.3 Option 3 – Rock Revetment

This option involves the removal of the existing defences along the entire frontage and the replacing it with construction of a new rock revetment to protect against the risk of erosion. The new structure will take advantage of the materials from existing defences where possible, with the recycling of suitable materials to reduce waste and cost implications.

2.3.1 Key design issues and requirements

It is important to provide sufficient protection to the toe of the rock revetment. If the toe section of the structure is not buried to a sufficient depth there is a risk that the structure may suffer from undermining which could lead to subsidence, slump, or failure.

The sloping nature of rock revetments will also create a larger footprint of the defence compared with the steeply sloping rock gabion defences that are presently in place along a number of sections of the frontage. This will require careful planning to ensure that sufficient space is maintained between the defence and the assets that it protects.

Particular attention will also need to be given in any design to the end detailing where the defended length abuts adjacent undefended cliffs to ensure protection against the risk of outflanking is provided.

Finally, the rock revetment structure will create a series of voids between individual defence units which can pose a health and safety concern for people accessing the shoreline. It is critical to ensure careful construction practices to minimise voids are implemented where possible, along with ensuring sufficient railings and signage is in place to warn of the potential danger. Regular monitoring of the defence will allow early identification of post-storm void development, which will allow maintenance work when necessary.

2.3.2 Assumptions about construction method

The removal of the existing defences along the frontage will create a potentially large volume of material that needs to be either recycled or removed. To minimise the cost associated with this work, efforts will be made to design out any waste generated during the removal of the existing defences (refer to Section 3.10).

A ground investigation will also need to be conducted to ensure that the proposed structure will be suitably located, and that there will not be substantial problems with scour and undermining close to the toe. The ground investigation works will also establish whether the foreshore contains any contaminants which might increase the cost for disposing of excavated material from this area.

2.3.3 Licence/consent requirements

In order to implement this option, and with reference to Section 3, the following licences/consents are expected to be required:

- Planning permission (including Coast Protection Act consent) from Fareham Borough Council to construct new defences

- Marine Licence from the Marine Management Organisation
- Harbour Works Consent from ABP Southampton VTS.

As part of obtaining these licences/consents, there may be a need to undertake environmental assessments as identified in Section 3.9.

In addition, with regards waste legislation (refer to Section 3.10), it is assumed that the CL:AIRE code of practice for waste management (CL:AIRE, 2011) will be followed for the handling of all waste generated during construction to remove the requirement for an environmental permit or registered exemption.

2.3.4 Estimated life of defence

Construction of a new defence will create a single estimated life along the entire frontage (compared to the variable defence life offered by Option 2). The rock revetment will be a largely robust defence, although extreme storm events may create a requirement for occasional maintenance work to reposition rock units displaced during large wave conditions. Assuming occasional maintenance to repair the structure after extreme storm events the estimated life of the defence will be 50 years.

2.3.5 Estimated costs

The capital costs to construct the new defence are estimated at between £625,000 and £1,450,000. The costs involved in the construction of rock revetments is highly variable depending upon the availability of the necessary rock armouring, and specific site conditions. If access to the site is problematic the costs associated with delivery and placement of the rock can be substantially higher than sites with less challenging locations.

Completion of a detailed design would allow estimation of a more precise cost to be developed with knowledge of specific durations and quantities informing the estimate.

Maintenance costs for a rock revetment options will be fairly limited. Annual monitoring will ensure that no significant problems with the defence are allowed to develop without prior warning, while occasional work to re-profile the rock revetment will ensure that a consistent level of protection is provided. It is expected that this cost will average between £2,500 and £4,000 per year (or between £125,000 and £200,000 over the estimated 50 year life of defence provided by this option).

2.4 Option 4 – King-piled Wall

This option involves the construction of a new king-piled wall similar to the structure that presently exists between the western chalets and the beach access steps. This wall will be constructed along the entire frontage by placing large steel I-columns at intervals with pre-cast concrete units positioned between the steel columns to create a continuous wall.

2.4.1 Key design issues and requirements

For effective operation of a king-pile wall, it is critical that it is able to withstand the forces that occur during a severe storm event. This is largely achieved by ensuring that the piling is to a sufficient depth. Additionally, sufficient burial of the new piling and wall components will help to avoid some of the undermining problems that can currently be seen in the existing section of king-piled wall defence.

When determining the pile toe depth it is crucial to consider the possible fluctuation in bed levels expected during the lifetime of the defence. Substantial lowering of the beach due to changes in the wave climate, or interruption of the longshore transport will affect the depth of burial and therefore the structural stability.

While the use of concrete railway sleepers is a potentially cheap option during the construction of a king-piled wall, there are many limitations for their use within the marine environment. The concrete used within the railway sleepers is not designed for exposure to seawater where the elevated sulphate levels may result in accelerated deterioration of the units. The relatively small unit size of railway sleepers also allows movement during impulsive wave action that can lead to additional damage and the

creation of gaps between units. Any gaps within the structure will allow wash out of the material from behind the structure and will likely accelerate failure of the structure as a whole.

In place of railway sleepers it will be important to ensure that the units between the steel pile units are capable of resisting the severe marine conditions more effectively. Generally larger concrete units will also be desirable to reduce movement under wave action. Burial of the new units below the existing beach level will also be critical to ensure that fill material behind the defence is not washed out.

A suitable toe protection will help to reduce the likelihood of scour at the toe of the king-piled wall and subsequent undermining of the defences. This may also help to dissipate wave energy and will lower the likelihood that concrete units will move during storm events.

In addition, particular attention will also need to be given in any design to the end detailing where the defended length abuts adjacent undefended cliffs to ensure protection against the risk of outflanking is provided.

2.4.2 Assumptions about construction method

The adoption of pre-cast concrete units formed off-site will help to reduce the operational site area at Solent Breezes. This will contribute to a reduced cost for site offices, security etc. This will also reduce the time required for construction operations with delivery and installation possible in a much shorter time period than would be possible with casting concrete units on-site.

Where possible the existing defences will be used in the construction of new defences. It may be possible to utilise the existing steel piles between western chalets and the beach access steps as part of the new defence along the entire frontage. The rock material within the existing gabions might be suitable as backfill behind the king-piled wall or as part of the toe defence, while larger rock armour units may also be suitable as toe protection.

2.4.3 Licence/consent requirements

In order to implement this option, and with reference to Section 3, the following licences/consents are expected to be required:

- Planning permission (including Coast Protection Act consent) from Fareham Borough Council to construct new defences
- Marine Licence from the Marine Management Organisation
- Harbour Works Consent from ABP Southampton VTS.

As part of obtaining these licences/consents, there may be a need to undertake environmental assessments as identified in Section 3.9.

In addition, with regards waste legislation (refer to Section 3.10), it is assumed that the CL:AIRE code of practice for waste management (CL:AIRE, 2011) will be followed for the handling of all waste generated during construction to remove the requirement for an environmental permit or registered exemption.

2.4.4 Estimated life of defence

The joints between individual concrete units may allow the development of spaces in the structure. Any spaces may allow the creation of voids behind the king-piled wall, which will increase the likelihood of damage to the structure as a whole and increase the likelihood of failure. Corrosion of the large king piles is also a concern for long-term stability of the structures. Despite treatments to steel components the highly corrosive environment of the swash zone will cause damage to the structure over time.

It is estimated that the life of a king-piled wall defence will be 30 years.

2.4.5 Estimated costs

The construction of king-piled structures along the coast has not historically been a widely considered defence approach in the UK. Therefore information on the construction of such defences is sparse. The existing section of king-piled wall was a reasonably cheap approach to defending the coast, due to the

shallow piling depth of the steel king piles, and the adoption of railway sleepers as the concrete units forming the wall. The development of a more robust approach will therefore be more expensive than the construction of the previous king-piled wall.

The capital costs to construct the new defence are estimated at between £400,000 and £700,000.

The costs associated with this option are highly dependent upon the ability to re-use material from existing defence within the new structures. A large amount of rock from the gabion defences might be deployed as backfill behind the king-piled wall or as part of the toe defence, while larger rock armour units may also be suitable as toe protection. However, if this is not possible the consequences for the cost of removing the material from the site may be significant.

Ground investigations may reveal that the intended piling operations are more complicated than initially expected, which would lead to a substantial increase in costs. Completion of a detailed design and ground investigation work would allow estimation of a more precise cost to be developed with knowledge of specific durations and quantities informing the estimate.

Maintenance costs for the king-piled wall are difficult to assess due to the uncertainty in the long-term performance of the structure in a marine environment. Annual monitoring will ensure that no significant problems with the defence are allowed to develop without prior warning, while occasional work to re-profile the rock toe will ensure that a consistent level of protection is provided. Occasional replacement of concrete units may be required. However, for the purpose of this broad-scale assessment it has been assumed maintenance costs will be similar to other options and as such will average between £2,500 and £4,000 per year (or between £75,000 and £120,000 over the estimated 30 year life of defence provided by this option).

2.5 Option 5 – Steel Sheet-piled Wall

This option involves the construction of a new continuous steel sheet-piled wall along the entire frontage. This defence will be similar to the defence at the beach access steps to the north-west of the current king-piled defences.

2.5.1 Key design issues and requirements

For effective operation of a sheet pile wall it is critical that it is able to withstand the forces that occur during a severe storm event. To ensure that the new wall is structurally sound it is vital to ensure that the toe of the piling is buried to a sufficient depth to avoid issue of scour and undermining that can occur at a vertical structure, and ensure that the likelihood of structural failure is reduced.

When determining the pile toe depth it is crucial to consider the possible fluctuation in bed levels expected during the lifetime of the defence. Substantial lowering of the beach due to changes in the wave climate, or interruption of the longshore transport will affect the depth of burial and therefore the structural stability.

To ensure that a sufficient life is achieved from the piled structure it is assumed that a corrosion resistant coating, such as black tar vinyl treatment, is applied to the steel piling before installation. This will initially prevent direct interaction between the steel surface and seawater and extend the life of the structure.

In addition, particular attention will also need to be given in any design to the end detailing where the defended length abuts adjacent undefended cliffs to ensure protection against the risk of outflanking is provided.

2.5.2 Assumptions about construction method

Re-use of large amounts of material from the existing defences as backfill will minimise the waste from clearing the existing defences. This backfill will be placed behind the structure, and combined with mass concrete pouring to produce a level surface behind the defence. Backfill of the sheet piling is critical for the structure as a whole to provide the necessary resistance to wave action without buckling.

2.5.3 Licence/consent requirements

In order to implement this option, and with reference to Section 3, the following licences/consents are expected to be required:

- Planning permission (including Coast Protection Act consent) from Fareham Borough Council to construct new defences
- Marine Licence from the Marine Management Organisation
- Harbour Works Consent from ABP Southampton VTS.

As part of obtaining these licences/consents, there may be a need to undertake environmental assessments as identified in Section 3.9.

In addition, with regards waste legislation (refer to Section 3.10), it is assumed that the CL:AIRE code of practice for waste management (CL:AIRE, 2011) will be followed for the handling of all waste generated during construction to remove the requirement for an environmental permit or registered exemption.

2.5.4 Estimated life of defence

The life of the defence is dependent upon the rate of corrosion experienced by the steel sheet piling. It is possible to treat the sheet piling to increase its resistance to corrosive forces, which will extend the life of the defence.

The abrasive action of sediment transport along the face of steel sheet piling can also damage the structure over time, and may be responsible for final failure of the structure. The expected level of abrasion that might occur is not clear at this time.

It is estimated that the life of a sheet-piled wall defence will be 50 years.

2.5.5 Estimated costs

Steel sheet piling commonly forms part of coastal defences, particularly in areas with lower levels of wave action, and areas with restriction on the width of the defences. A range of total costs for steel sheet piling projects are available within the

The capital costs to construct the new defence are estimated at between £300,000 and £700,000.

The ongoing maintenance costs for sheet-piled structures are not significant, with specific preventative measure taken prior to installation. If the corrosion of the structure is significant, it may be necessary to carry out considerable post-construction changes, such as welding additional sacrificial steelwork, or encasing the sheet-piled structure within concrete. These would have very sizable cost implications, but can be avoided with considered design.

Maintenance costs for a steel sheet-piled structure are estimated at between £1,000 and £2,000 per year (or between £50,000 and £100,000 over the estimated 50 year life of defence provided by this option), and are expected to cover the cost of an annual monitoring programme.

2.6 Option 6 – Concrete seawall

This option involves the construction of a new continuous concrete seawall along the entire frontage. This type of defence is often the primary defence structure in many areas with high asset value. The defence offers a robust structure against a wide range of wave conditions with a long life, and generally low maintenance costs.

2.6.1 Key design issues and requirements

It is critical to ensure that ground investigations are completed and well understood. Without sufficient seating for the concrete structure it is possible that subsidence and slump of the defence may occur due to the relatively high mass of the structure.

Depending on the specific deign a concrete seawall may create a larger footprint of the defence compared with the steeply sloping rock gabion defences that are in place across much of the existing

frontage. As with Option 3 (rock revetment) this will require careful planning to ensure that sufficient space is maintained between the defence and the assets that it protects.

In addition, particular attention will also need to be given in any design to the end detailing where the defended length abuts adjacent undefended cliffs to ensure protection against the risk of outflanking is provided.

2.6.2 Assumptions about construction method

Dimensions of reinforced concrete seawalls are often designed specifically for individual locations, taking account of the expected local wave conditions. Due to bespoke design it is assumed that the defences will be cast on site rather than adopting a pre-cast unit, with a consequent increase in the duration of the construction activities on site. While an increase in programme duration will increase the cost, there will be some savings in concrete and reinforcement costs, as well as the avoidance of difficulties in placement of large seawall units.

The removal of the existing defences along the frontage will create a potentially large volume of material that needs to be either recycled or removed. To minimise the cost associated with this work, efforts will need to be made to design out any waste generated during the removal of the existing defences (refer to Section 3.10).

2.6.3 Licence/consent requirements

In order to implement this option, and with reference to Section 3, the following licences/consents are expected to be required:

- Planning permission (including Coast Protection Act consent) from Fareham Borough Council to construct new defences
- Marine Licence from the Marine Management Organisation
- Harbour Works Consent from ABP Southampton VTS.

As part of obtaining these licences/consents, there may be a need to undertake environmental assessments as identified in Section 3.9.

In addition, with regards waste legislation (refer to Section 3.10), it is assumed that the CL:AIRE code of practice for waste management (CL:AIRE, 2011) will be followed for the handling of all waste generated during construction to remove the requirement for an environmental permit or registered exemption.

2.6.4 Estimated life of defence

The estimated life of a concrete seawall is higher than many other defence types considered in this report due to the robust nature of the material, and the adoption of a single monolithic structure. With suitable specification of the materials, a concrete structure can be expected to have a design life of 100 years.

2.6.5 Estimated costs

The construction cost of concrete seawalls is highly variable due to the variation in wave conditions for which they are used as the primary defence. The requirements for large amounts of reinforcement and substantial toe protection can dramatically increase the cost of concrete seawall defences, and this is determined by the wave conditions the structure will face, and the ground conditions in which the structure will be built.

The whole life costs are estimated at between £600,000 and £2,350,000. A more accurate estimate will be possible after greater understanding of the wave conditions the defences will experience are estimated, and detailed ground investigation works are completed.

Maintenance works to concrete seawalls will require regular monitoring to ensure that the structure is operating correctly, and to determine when minor repairs are required. Replacement of sealant between concrete units is periodically required to avoid more significant problems developing. It is expected that

the maintenance cost will average between £2,500 and £4,000 per year (or between £250,000 and £400,000 over the estimated 100 year life of defence provided by this option).

2.7 Summary

One of the most significant problems with the existing defence structures is a lack of protection at the toe of the defences, which has lead to undermining, damage, and failure of defences at different locations along the coastline. The premature gabion units is a consequence of undermining due to a lack of adequate toe protection, and the failure of the concrete and gabion defence between the concrete slipway and the western chalets is likely a consequence of undermining of the mass concrete toe.

Addressing the protection at the toe of the coastal defences is a critical consideration for each of the defence options proposed here. Adoption of rock protection along the frontage for Option 2 (do minimum) and Option 4 (king-piled wall) will ensure that scour is less likely, preventing subsidence and loss of material from behind the defences. For Option 3 (rock revetment), Option 5 (steel sheet-piled wall) and Option 6 (concrete seawall), it is critical to ensure that the toe of the defence will be buried to a sufficient depth that will prevent scour and undermining. Before it is possible to determine the depth of toe burial required it is essential that ground investigations are carried out to inform complete design of the structure.

It will also be necessary to determine the likelihood of contamination along the frontage. If soil or existing defence material is determined as waste the implications for disposing of the material change substantially (refer to Section 3.10).

A final concern for any potential scheme is caused by the protection of a discrete section of the coastline. Over the life of the defence it is possible for adjacent undefended sections of the coastline to retreat from their existing location which would lead to outflanking of the coastal defences, and allow erosion to occur. Therefore particular attention will need to be given in any design to the end detailing where the defended length abuts adjacent undefended cliffs to ensure protection against the risk of outflanking is provided.

By way of summary, Table 2-1 provides a summary of the six options described in Sections 2.1 to 2.6 in terms of estimated life, capital costs and maintenance costs per year of each option. It also presents annualised costs of each option to enable direct comparison in terms of total cost per year over the estimated life provided by each option (although in reality much of the costs, i.e. capital costs, will be incurred upfront).

Table 2-1 Estimated life, capital costs, maintenance costs and annualised costs of defence options

Option	Estimated life	Estimated capital cost	Estimated maintenance costs	Estimated annualised costs
1	0 – 10 years	£0k	£0k/yr	£0k/yr
2	10 – 30 years	£125k - £200k	£4.5k - £7k/yr	£17k - £27k/yr (for 10yrs); £11k - £14k/yr (for 30yrs)
3	50 years	£625k - £1,450k	£2.5k - £4k/yr	£15k - £33k/yr (for 50yrs)
4	30 years	£400k - £700k	£2.5k - £4k/yr	£16k - £27.5k/yr (for 30yrs)
5	50 years	£300k - £700k	£1k - £2k/yr	£7k - £16k/yr (for 50yrs)
6	100 years	£600k - £2,350k	£2.5k - £4k/yr	£8.5k - £27.5k/yr (for 100yrs)

3 Rights and Responsibilities

To help the residents of Solent Breezes understand their rights and responsibilities in regards of possibly providing their own coastal defences in the future, this section provides a summary of some of the key legislation that impacts upon the ability of land owners to undertake coastal defence works around the coast of England.

In addition, Fareham Borough Council has published a useful guide as to the roles and responsibilities of different bodies and the legislative requirements for undertaking coastal defence works. This information is available from Fareham Borough Council's website at http://www.fareham.gov.uk/leisure/parks_and_open_spaces/coastprotection.aspx.

3.1 Coast Protection Act 1949

The Coast Protection Act 1949 delegates power to local authorities (known as coast protection authorities under the Act) to install and maintain coastal protection works to prevent coastal erosion. This is a permissive power and not a statutory duty. As such there is no legal obligation on the coast protection authority to provide coastal protection measures to prevent coastal erosion. Instead the responsibility for managing and preventing coastal erosion resides with the landowner of area concerned.

The key part of the Act in relation to future coastal defence at Solent Breezes is found under Part 1 Section 16 of the Act. This states that the consent in writing of the coast protection authority in whose area coastal protection works is to be undertaken, other than work of maintenance or repair, is a legal requirement for any person carrying out such works. As such, any future coastal defence scheme at Solent Breezes will need consent under Part 1 Section 16 of the Act from Fareham Borough Council as the coast protection authority. This should be confirmed in discussion with the local planning authority (who are also the coast protection authority) prior to submitting a planning application (refer to Section 3.8).

Part 2 Section 34 of the Act contains provisions for ensuring safety of navigation where coastal protection could impact upon navigation. These Section 34 provisions have since been amended by those of the Marine and Coastal Access Act 2009, with marine licensing dealing with Section 34 consent being administered by the Marine Management Organisation. These provisions will form part of the Marine Licence application that may be needed for any future coastal defence scheme at Solent Breezes (refer to Section 3.5).

Further information about the Act is available online at http://www.legislation.gov.uk/ukpga/Geo6/12-13-14/74/contents.

NB: This act does not provide for local authorities to carry coastal flood defence works, which are provided for separately as part of the Land Drainage Act 1991 (see Section 3.3).

3.2 Food and Environmental Protection Act 1990

The Food and Environmental Protection Act 1990 governs the deposition of any materials in the sea, including construction of coastal structures (and burial at sea). This act was originally enacted in 1985, with Part two of the act (which relates to deposits in the sea) replacing the Dumping at Sea Act 1974, and was subsequently amended by the Environmental Protection Act 1990. The Act implemented both the London Dumping Convention and the Oslo Convention (now the OSPAR Convention) and requires licences to be obtained when carrying out marine works (Howarth, 1988).

The provisions of this Act to licence marine works have since been replaced by the marine licensing requirements of the Marine and Coastal Access Act 2009, with marine licensing being administered by the Marine Management Organisation (refer to Section 3.5).

3.3 Land Drainage Act 1991

The Land Drainage Act 1991 states the need for environmental assessment of any improvement works to drainage structures, and must therefore be considered when assessing coast protection options. Part two of the Act also provides for flood defence functions to be carried out by local authorities.

This Act will be of relevance if land drainage works are proposed as part of any future coastal defence scheme at Solent Breezes (refer also to Section 5).

Further information about the Act is available online at http://www.legislation.gov.uk/ukpga/1991/59/contents.

3.4 Water Resources Act 1991

This act (in conjunction with the Environment Act 1995 that established the Environment Agency) delegates responsibility for general supervision for all matters relating to flood defence, including sea and tidal flooding, to the Environment Agency.

In 2007, the Environment Agency assumed the Strategic Overview role for all matters at the coast, meaning the Environment Agency also now has oversight of coastal erosion risk management as well as coastal flooding matters.

The implication of this for future coastal defence at Solent Breezes is that the Environment Agency, in their role of development control, will need to be consulted to gain their consent to any planning application. This in part will include ensuring that proposals do not compromise the longer term strategic direction of coastal risk management policy set out in the Shoreline Management Plan (refer to Section 3.8.3).

3.5 Marine and Coastal Access Act 2009

The Marine and Coastal Access Act 2009 established the Marine Management Organisation (MMO) to oversee management and licensing of the marine environment. The Act contains a number of parts:

- Part 1 established the Marine Management Organisation, including defining its role and powers.
- Part 2 defines the UK Exclusive Economic Zone (EEZ).
- Part 3 provides the basis for implementation of Marine Planning, including establishment of the Marine Policy Statement and Marine Plans.
- Part 4 deals with Marine Licensing.
- Part 5 deals with Nature Conservation, including the establishment of a network of Marine Conservation Zones.
- Part 6 deals with Management of Inshore Fisheries, including establishment of Inshore Fisheries and Conservation Authorities (IFCAs) to replace Sea Fisheries Committees.
- Part 7 deals with Fisheries.
- Part 8 deals with Enforcement.
- Part 9 deals with coastal access, including placing a duty on Natural England to establish and maintain a national path around the coast of England (the English Coast Path).

Further information about the Act is available online at http://www.legislation.gov.uk/ukpga/2009/23/contents.

Of particular relevance to Solent Breezes are the Marine Planning and Marine Licensing aspects as both will need to be considered in developing any future coastal defence scheme:

- **Marine Planning:** The Marine and Coastal Access Act 2009 requires all public authorities taking authorisation or enforcement decisions that affect or might affect the UK marine area to do so in

accordance with the Marine Policy Statement (HM Government, 2011) unless relevant considerations indicate otherwise. It also requires that Marine Plans must be in conformity with any Marine Policy Statement in effect in the marine plan area, unless relevant considerations indicate otherwise. Once adopted Marine Plans will have the same effect on authorisation or enforcement decisions in the UK marine area as the Marine Policy Statement, including the requirements and conditions attached to authorisations and the enforcement action that will be taken to ensure compliance.

It should be noted that the Southern Marine Plan that covers the Solent area is currently being developed by the MMO. Further details on this can be found online at http://www.marinemanagement.org.uk/marineplanning/areas/south.htm.

- **Marine Licensing:** The marine licensing system introduced by the Act enables the MMO to fully consider the range of factors which can influence the marine environment, and if necessary ensure that any impacts are mitigated, as part of developments below MHWS. Licensable activities include construction works and deposits and the use of a vehicle, vessel, aircraft, marine structure or floating container to remove any substance or object from the sea bed within the UK marine licensing area. The MMO's aim is to ensure that regulation is proportionate to the risks, recognising also the economic, social and cultural value of marine activities such as diving and archaeology. In determining all marine licence applications the MMO must have regard to the following:
    - The need to protect the environment
    - The need to protect human health
    - The need to prevent interference with legitimate uses of the sea
    - Such other matters as we consider relevant.

  A Marine Licence will be needed where:
    - The construction, alteration or improvement of any works under or over any part of the seashore lying below the level of mean high water springs
    - The deposit of any object or materials below the level of mean high water springs
    - The removal of any object or materials from the seashore below the level of mean low water springs, such as dredging.

  Further details on licensable activities and exemptions are available online at http://www.marinemanagement.org.uk/licensing/marine/activities.htm.

3.6 Flood and Water Management Act 2010

The primary aim of the Flood and Water Management Act 2010 is to provide better, more sustainable management of the risks associated with flooding and coastal erosion risk. In this regards the Act defines requirements for National and Local Flood and Coastal Erosion Risk Management Strategies in England and Wales. These requirements include the need to consider the current and predicted impact of climate change on flood and coastal erosion risk management.

Further information about the Act is available online at http://www.legislation.gov.uk/ukpga/2010/29/contents.

3.7 Harbour Works Legislation

The following information is taken directly from the Associated British Ports (ABP) Southampton VTS website (http://www.southamptonvts.co.uk/Port_Information/Harbour_Authority/Harbour_Consents/):

> *"Associated British Ports (ABP) is the Statutory Harbour Authority, the Statutory Dock and Local Lighthouse Authority and Competent Harbour Authority for Southampton Water and the navigable parts of the River Test (below Redbridge Causeway) and River Itchen (below*

Woodmill), by virtue of the Southampton Harbour Acts 1863 to 1949, Harbours Act 1964, British Transport Docks Act 1966 and the Pilotage Act 1987.The carrying out of all works, including the erection of pontoons, bridges and other like structures, below Mean High Water Springs requires the prior written approval of the following authorities:-

1. *ABP for the purpose of Section 13 of the Southampton Harbour Act 1924, as amended by the Southampton Harbour Act 1939, Section 48 of the Southampton Harbour Act 1949 or Section 21 of the British Transport Docks Act 1966;*
2. *The Marine Management Organisation (MMO) for the purpose of Section 13 of the Southampton Harbour Act 1924 as amended by the Southampton Harbour Act 1939, or Section 21 of the British Transport Docks Act 1966 and Section 34 of the Coast Protection Act, 1949;*
3. *The MMO for the purposes of the Marine and Coastal Access Act 2009*
4. *The Environment Agency for the purposes of the Water Resources Act 1991.*
5. *The owners of the foreshore or seabed where the works are proposed. If the site of the works is on, under or over ABP or Crown owned foreshore and bed of river, the works will be subject to licence arrangements and the payment of such annual financial consideration as may be determined.*

These statutory procedures apply to all works (including dredging and depositing) below Mean High Water Springs. Applicants are required to satisfy themselves that they have approval of the owner of the land above High Water Mark both for construction and access before formally approaching ABP.

Applications for ABP consent will be considered by the Harbour Master Southampton. Any approval granted by ABP will be subject to certain conditions to protect its Conservancy and Navigation interests."

The implication of the above is that any future coastal defence works at Solent Breezes may require a Harbour Works Licence to be granted by ABP.

3.8 Planning Legislation

3.8.1 Acts of Parliament dealing with Planning

There are a number of Acts of Parliament that deal directly with planning. However, the key Act in relation to Solent Breezes is the Town and Country Planning Act, 1990. Planning permission for future coastal defences at Solent Breezes would be needed under this Act.

These various acts provide a statutory underpinning to Local Plans developed in line with the National Planning Policy Framework (refer to Section 3.8.2).

3.8.2 National Planning Policy Framework

The National Planning Policy Framework (NPPF) was published by the Department for Communities and Local Government (DCLG) in March 2012 (DCLG, 2012a & 2012b). The NPPF sets out the Government's planning policies for England. It must be taken into account in the preparation of local and neighbourhood plans, and is a material consideration in planning decisions.

Of particular relevance to the Solent Breezes area, Paragraph 106 of the NPPF states that Local Planning Authorities (LPAs) should reduce risk from coastal change by avoiding inappropriate development in vulnerable areas or adding to the impacts of physical change to the coast. In this regards, LPAs are encouraged by the NPPF to develop Coastal Change Management Areas (CCMAs) (see BOX 3-1). A CCMA is defined as *"an area identified in Local Plans as likely to be affected by coastal change (physical change to the shoreline through erosion, coastal landslip, permanent inundation or coastal accretion)"* (DCLG, 2012a).

Given this definition, CCMAs should potentially be defined where:

- Shoreline Management Plan policy is not to defend the coast (No Active Intervention);
- Shoreline Management Plan policy is to implement managed realignment of a section of coast; or
- Shoreline change will be significant over next 100 years; for example, if this will have an important impact on existing development or planned future land use (economically, socially or environmentally).

Within CCMAs (once they have been established) LPAs must assess planning applications against a number of key criteria before determining if development is appropriate (see BOX 3-2).

BOX 3-1
Paragraph 106 of the NPPF:
'They should identify as a CCMA any area likely to be affected by physical changes to the coast, and:

- be clear as to what development will be appropriate in such areas and in what circumstances; and
- make provision for development and infrastructure that needs to be relocated away from CCMAs.'

BOX 3-2
Paragraph 107 of the NPPF:
'When assessing applications, authorities should consider development in a CCMA appropriate where it is demonstrated that:

- It will be safe over its planned lifetime and will not have unacceptable impacts on coastal change;
- The character of the coast including designations is not compromised;
- The development provides wider sustainability benefits; and
- The development does not hinder the creation and maintenance of a continuous signed and managed route around the coast [as required by the Marine and Coastal Access Act, 2009]'

Paragraph 108 of the NPPF:
'LPAs should also ensure appropriate development in a CCMA is not impacted by coastal change by limiting the planned lifetime of the proposed development through temporary permission ; and restoration conditions where necessary to reduce the risk to people and the development.'

Given the Shoreline Management Plan policy for the area (refer to Section 3.8.3), the NPPF is clearly very relevant to Solent Breezes and any future planning application to construct new coastal defences will need to address the various tests defined in the NPPF. This is a very complex subject and depends upon the specifics of the scheme being proposed. As such it is recommended that discussions with the LPA are held before development of a scheme proposal to ensure that all local, specific requirements are addressed as part of the planning application.

3.8.3 Shoreline Management Plan policy

A Shoreline Management Plan (SMP) is a non-statutory planning document that forms part of the evidence used in developing Local Plans (see BOX 3-3). This is a requirement of the National Planning Policy Framework (refer to Section 3.8.2).

BOX 3-3
Paragraph 168 of the NPPF:
'Shoreline Management Plans should inform the evidence base for planning in coastal areas. The prediction of future impacts should include the longer term nature and inherent uncertainty of coastal processes (including coastal landslip), and take account of climate change.'

SMPs were first developed around the coast of England and Wales between 1996 and 2000. Second generation SMPs (SMP2s) were produced between 2006 and 2011 in line with Defra guidance published in March 2006 (Defra, 2006).

SMPs provide a large-scale assessment of the risks associated with coastal processes and present a policy framework to manage these risks to people and the developed, historic and natural environments in a sustainable manner. In general, there are four main types of policies defined by SMPs:

- **No Active Intervention (NAI);** the policy assumes that existing defences are no longer maintained and will fail over time, and that currently undefended areas will remain as such for the duration of the associated SMP epoch(s).
- **Hold the Line (HTL);** the policy maintains the level of protection provided by defences in their present location.
- **Managed Realignment (MR);** the policy allows the shoreline position to move backwards (or forwards), with intervention to control the extent and/or rate of movement.
- **Advance the Line (ATL);** the policy builds new defences on the seaward side of the existing defence to reclaim land.

The SMP policy is defined for each section of coast for three time-periods – short term (to 2025); medium term (2025 to 2055); and long term (2055 to 2105). The policy can change over time.

It is important to note that the adoption of an SMP policy does not guarantee funding for implementing the recommendations. It merely identifies where future flood and coastal erosion spending should be targeted if funding is available and more detailed studies demonstrate a robust case to provide defences following the requirements of the Environment Agency's *Flood and Coastal Erosion Risk Management Appraisal Guidance* (Environment Agency, 2010b). As such, although an area may have a policy of continued intervention and defence (e.g. Hold the Line), delivery of the policy will remain uncertain until more detailed studies are completed and funding support is committed from external parties (refer to Section 4).

The SMP2 policy for Solent Breezes is defined in the North Solent SMP2 (New Forest District Council, 2010) as being **No Active Intervention (with localised Hold the Line for cross-Solent infrastructure)**. This policy is for each of the three SMP2 time-periods. Within the policy statement detail however, it is stated that *"The short length of private defences at Solent Breezes may continue to be maintained through permissive development rights of private landowners"*. It is therefore possible under the SMP2 policy to seek to maintain coastal defences at Solent Breezes through permissive development rights granted under the Coast Protection Act 1949 (refer to Section 3.1), subject to planning permission and other licences/consents being granted by the relevant authorities. However, as the SMP2 policy is for No Active Intervention, there is no likelihood of accessing public funds through the Flood Defence Grant in Aid mechanism used to fund coastal defences around England on a prioritised basis. Any future coastal defence proposals would also need to demonstrate interactions with adjacent sections of coast where No Active Intervention will occur.

3.9 Environmental Legislation

The Solent Breezes frontage contains, or is in close proximity to, a number of international, European, national and local environmental designations, including:

- International designations
    - Ramsar site – Ramsar sites are designated under the Convention on Wetlands of International Importance, agreed in Ramsar, Iran, in 1971 (JNCC website (a)).
- European designations
    - Special Protection Area (SPA) – Special Protection Areas (SPAs) are strictly protected sites classified in accordance with Article 4 of the EC Birds Directive, which came into force in April 1979. They are classified for rare and vulnerable birds (as listed on Annex I of the Directive), and for regularly occurring migratory species. In the UK, the first SPAs were identified and classified in the early to mid 1980s (JNCC website (b)).

      The provisions of the Birds Directive are implemented through the Wildlife & Countryside Act 1981 (as amended), the Conservation (Natural Habitats, & c.) Regulations 2010 (as amended) (JNCC website (c)).
- National designations
    - Site of Special Scientific Interest (SSSI) – Originally notified under the National Parks and Access to the Countryside Act 1949, SSSIs have been re-notified under the Wildlife and Countryside Act 1981. Improved provisions for the protection and management of SSSIs were introduced by the Countryside and Rights of Way Act 2000 (in England and Wales) and the Nature Conservation (Scotland) Act 2004 (JNCC website (a)). SSSIs provide protection of the most significant sites for the conservation of wildlife (species & habitats) and/or geology (Natural England website).
- Local designations
    - Local Nature Reserve (LNR) – Under the National Parks and Access to the Countryside Act 1949, LNRs may be declared by local authorities after consultation with the relevant statutory nature conservation agency. LNRs are declared and managed for nature conservation, and provide opportunities for research and education, or simply enjoying and having contact with nature (JNCC website (a)).
    - Site of Importance for Nature Conservation (SINC) – Sites of importance for their scientific, educational and historical value as well as their visual qualities (Natural England website).

In relation to Solent Breezes, when developing a coastal defence scheme, it may be necessary to undertake an environmental assessment of proposals to determine if what, if any, impacts may result on the various designated features described above. The need to undertake such assessments will need to be discussed with the relevant competent authority in relation to some or all of the following:

- **Town and Country Planning (Environmental Impact Assessment) Regulations 2011**. Competent authority: Local Planning Authority. This may be required as part of a planning application.
- **Conservation (Natural Habitats, & c.) Regulations 2010.** Competent authority: Natural England. Also known as a Habitat Regulations Assessment, this may be required determine any potential impacts on the SPA to achieve consent to construct new coastal defences either in isolation or as part of a Marine Licence application.
- **Marine Work (Environmental Impact Assessment) Regulations 2007.** Competent authority: Marine Management Organisation. This may be required as part of a Marine Licence application.
- **The Water Environment (Water Framework Directive) (England and Wales) Regulations 2003**. Competent authority: Environment Agency. This may be required as part of a Marine Licence application.

3.10 Waste Legislation

There are presently two broad approaches that can be taken for the handling of waste created during construction activities. The more prolonged and involved route is the acquisition of an environmental permit, or the registration of a waste exemption. Successful application for either of these consents will allow construction activities to take place on the site as long as they adhere to specific restrictions.

The second approach to handling waste is to adhere to the code of practice outlined by CL:AIRE (2011), which if followed may allow the requirements for an environmental permit or registered exemption to be waived. However, **if the code of practice cannot be strictly followed an environmental permit or registered exemption may be necessary to ensure the Waste (England and Wales) Regulations 2011 are followed.**

Although legally the requirement for the appropriate handling of waste is the liability of the organisation responsible for the waste at the point of transfer, it is best practice to consider the handling of waste throughout the design stage of any work. Following the waste hierarchy outlined in the European Union Waste Framework Directive (EC, 2008) it is preferential to minimise the amount of waste produced by prioritising re-use of materials over recycling of materials to other areas. Both re-use and recycling are preferred to the disposal of material, which offers no environmental benefit. Following this waste hierarchy will not only help reduce the amount of material sent to landfill with associated costs, but will reduce the volume of material required in the construction of any new defences, further reducing costs.

Recycling of material is possible with utilisation of the CL:AIRE materials register, which aims to link holders of excess of material with organisations and projects that have a deficit of material. This allows a reduction in total waste across a larger geographical area, while potentially reducing costs across multiple projects.

In addition, WRAP (2012) also provides guidance for designing structures to minimise net waste created during construction. Specific advice is provided for the existing defences along the frontage as follows:

1. *Using pre-cast units rather than cast concrete in-situ – "*Assembling the pre-cast units on site and then moving them into place has the potential to significantly change operations on site, reducing the number of site activities and changing the construction process into one of a rapid assembly of parts that can provide many environmental, commercial and social benefits. Generally a better quality product can be produced by pre-cast techniques and the need for temporary works may be reduced."
2. *Recycling aggregates for concrete structures* – "At the moment recycled aggregate is restricted to replacing coarse aggregate (>4mm) which precludes the use of most secondary aggregates. It is likely that suitable recycled aggregate will be obtained from two main supply streams, either pre-consumer waste from concrete production (pre-cast or ready-mix concrete plants) or from demolition projects such as disused airfield structures, concrete framed or clad buildings." It is possible that some aggregate material may be obtained from the removal of existing defences.

1. *Recycling of steel elements* – "In general there is a highly developed market for steel recycling and about 40% of the steel produced in the world is from recycling. This means that steel purchased for construction is likely to have a high recycled content and also that steel scrap arising on site will have a market value. Steel can sometimes be reclaimed from site and put to direct use elsewhere without recycling." There are a large number of steel elements throughout the frontage, with the gabion cases along much of the frontage, steel sheet piling and steel posts within the king-piled structure. If these are in good condition it is possible that some of the material may be re-used within this site, or other projects that require the same structural elements. Where re-use is not possible the highly developed steel recycling industry will offer an outlet for the waste.
2. *Re-use of demolition material as fill – "*Material from the demolition of existing structures can be processed on site to provide recycled aggregates that can be used in the new construction. Recycled aggregates can be used in unbound applications such as drainage, pipe bedding, general fill, capping, and sub-base." General material from the demolition of existing structures

can be managed on-site and used in the new construction project as unbound material such as general fill.

3. *Re-use of the rock and gabion fill material* – The rock armour at the base of the king-piled wall to protect the toe of the structure can potentially be re-used within the new rock revetment (Option 3) or as backfill and/or toe protection in other options. The same is true of the smaller rock items within the rock gabions.
4. *Remediation work for contaminated soils* – "Land is considered to be contaminated if it contains elevated concentrations of potentially harmful substances. Many brown-field sites contain contaminated soils, which require treatment before the site can be developed. A range of remediation technologies are available, either on site or at adjacent 'hub' sites; these include; soil washing, biodegradation of organic contaminants, thermal desorption, soil vapour extraction for volatile organics and petroleum, chemical methods, or stabilisation with cementitious agents to form HBMs and prevent migration of contaminants. Treatment of groundwater may also be required. These treatments will generally be cheaper than disposal of large volumes of hazardous waste to landfill."

Adoption of the techniques described will allow the volume and cost of waste disposal of any project to be minimised.

4 Potential Sources of Funding

The way in which flood and coastal erosion risk management schemes are funded in England changed in April 2012. The previous system of funding, whereby only the highest priority schemes received 100% grant-in-aid from central government has been replaced by a new graduated funding system. Whilst some schemes will still be eligible for the full 100% grant-in-aid from central government, the new approach will allow more schemes to be delivered with a lower percentage grant-in-aid contribution from central government, with the shortfall in funding to be made up from other funding sources – this is referred to as 'Partnership Funding' (Defra, 2011a; Defra, 2011b; and Environment Agency 2012).

This partnership funding approach will allow schemes that would have historically been deferred, due to failure to meet the 100% grant-in-aid qualifying criteria, to proceed earlier than would be expected if they were solely dependent on receiving central government funding.

This change in approach reflects the fact that flood and coastal erosion risk management schemes provide multiple benefits to communities, not just protection against flood and erosion risks. For example, a defence may reduce risks to transport and services infrastructure that is critical to an area's economy and development potential. A defence may also provide public space or, where a beach is recharged, an important tourism and recreational resource.

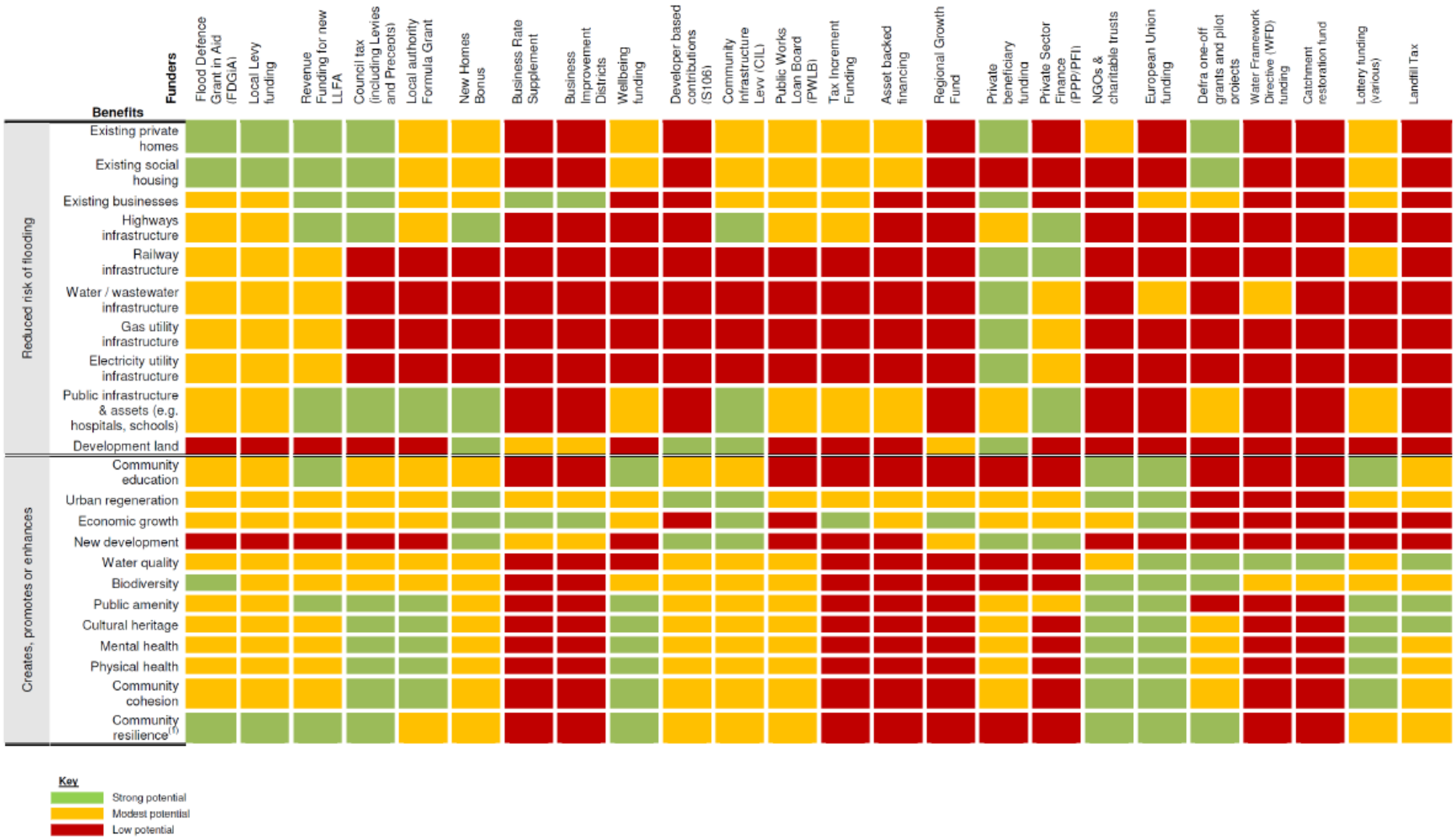
The different, multiple beneficiaries from flood and coastal erosion risk management funded schemes presents the potential to access the various funding sources that are used by those beneficiaries, and this may be one way of achieving partnership funding. However, as noted in Section 3.8.3, because the SMP2 policy for this area is for No Active Intervention over the next 100 years, there is no likelihood of accessing public funds through the Flood Defence Grant in Aid (FDGiA) mechanism and as such, any partnership funding contribution from this source is likely to be nil. Any future coastal defence scheme at Solent Breezes would therefore need to be 100% funded from non-FDGiA sources. Given this, the following are potential partnership funding routes that could be explored as an alternatives to FDGiA to deliver future coastal erosion risk management along the Solent Breezes frontage (from McNally, Johns and Pygott, 2012; Department of Communities and Local Government, 2012c):

- Private investment (e.g. developer/landowner pays)
- Water company investment
- Community Infrastructure Levy
- Section 106 Agreements (Town & Country Planning Act, 1990)
- Council Tax
- Public Works Loan Board
- Business Rate Supplements
- Business Improvement Districts
- Asset Backed Securities
- General Drainage Charge/Special Drainage Charge
- Local Authority fees and charges
- Trusts
- Regional Growth Fund
- Business Rate Retention
- Tax Increment Finance
- Local Government Bonds

- Coastal Communities Fund.

Many of these would need to co-operation and involvement of local government (e.g. council tax; business rates; community infrastructure levy) or other organisations and discussions would need to be held to establish a funding partnership. The Environment Agency has published the *Principles for implementing flood and coastal resilience funding partnerships* that could be used to help guide such discussions (Environment Agency, 2012).

To help identify exactly which potential sources of funding could be available, a useful starting point would be to develop a matrix of beneficiaries and funders. Figure 4-1 provides an example of such a matrix that could be used as a basis for developing a similar matrix that is specific to the local circumstances at Solent Breezes.



Note: This matrix is intended as an initial guide to help direct fundraising efforts. If project- or area- specific knowledge suggests a funding source may have greater or lesser potential than is suggested by this matrix then such evidence should take precedence.

(1) "Refers to 'soft' measures which improve a community's ability to respond and recover effectively; for example community flood plans, flood wardens, etc. Structural resilience measures such as individual property protection are included in reduced flood risk to existing homes

Figure 4-1 Initial guide to identifying potential sources of funding.

5 Investigating Land Drainage

In order to investigate land drainage in the area of Solent Breezes, a staged approach would be expected to be taken along the lines of the following:

1. Initial desk-study review of available data such as aerial photography, LiDAR and previous investigations (if available) to identify target areas for geophysical investigation in the next stage.
2. Undertake geophysical investigations using electromagnetic ground conductivity in target areas identified in Stage 1.
3. Data processing and analysis of geophysical data to identify preferential drainage pathways and reporting.

CH2M HILL has recently used this approach to investigate similar issues at Barton-on-Sea which has very similar geology to Solent Breezes, with the geophysical investigation element undertaken by TerraDat (UK) Ltd. Based upon this experience, the cost to investigate land drainage in the Solent Breezes area is estimated to range between £4,000-£15,000 depending upon the extent of investigations identified in Stage 1.

References

- Associated British Ports (ABP) Southampton VTS website. *Consents Required for Works in the Harbour Area*. Internet site: http://www.southamptonvts.co.uk/Port_Information/Harbour_Authority/Harbour_Consents/. Date accessed: 9th October 2013.
- CH2M HILL, 2013. Solent Breezes Coastal Defence Assessment. Hampshire County Council. 24th September 2013.
- Contaminated Land: Applications in Real Environments (CL:AIRE), 2011. *The Definition of Waste: Development Industry Code of Practice*. March 2011. Available online: http://www.claire.co.uk/. Date accessed: 9th October 2013.
- EC, 2008. *Council Regulation (EC) 2008/98 of 19th November 2008 on waste and repealing certain Directives [2008] OJ L312/3*.
- Department for Communities & Local Government (DCLG), 2012a. *National Planning Policy Framework*. March 2012.
- Department for Communities & Local Government (DCLG), 2012b. *Technical Guidance to the National Planning Policy Framework*. March 2012.
- Department for Communities & Local Government (DCLG), 2012c. *Coastal Communities Fund: Prospectus*. February 2012.
- Defra, 2011a. *Flood and Coastal Resilience Partnership Funding: Defra policy statement on an outcome-focused, partnership approach to funding flood and coastal erosion risk management*. May 2011.
- Defra, 2011b. *Partnership Pays: An introduction to the future funding and management of flood and coastal erosion management projects for Local Authorities and Internal Drainage Boards*.
- Defra, 2006. *Shoreline Management Plan Review Guidance (Volumes 1 and 2)*. March 2006.
- Environment Agency, 2006. *Condition Assessment Manual (CAM)*. October 2006.
- Environment Agency, 2010a. *Flood Risk Management Estimating Guide, Update 2010*.
- Environment Agency, 2010b. *Flood and Coastal Erosion Risk Management Appraisal Guidance*.
- Environment Agency, 2012. *Principles for implementing flood and coastal resilience funding partnerships.*
- Fareham Borough Council website. *Coastal Protection*. Internet site: http://www.fareham.gov.uk/leisure/parks_and_open_spaces/coastprotection.aspx. Date accessed: 9th October 2013.
- HM Government, 1949. *Coast Protection Act 1949*. Available online: http://www.legislation.gov.uk/ukpga/Geo6/12-13-14/74/contents. Date accessed: 9th October 2013.
- HM Government, 1985. *Food and Environmental Protection Act 1985*. Available online: http://www.legislation.gov.uk/ukpga/1985/48/contents. Date accessed: 9th October 2013.
- HM Government, 1991a. *Land Drainage Act 1991*. Available online: http://www.legislation.gov.uk/ukpga/1991/59/contents. Date accessed: 9th October 2013.
- HM Government, 1991b. *Water Resources Act 1991*. Available online: http://www.legislation.gov.uk/ukpga/1991/57/contents. Date accessed: 9th October 2013.
- HM Government, 1995. *Environment Act 1995*. Available online: http://www.legislation.gov.uk/ukpga/1995/25/contents. Date accessed: 9th October 2013.

- HM Government, 2009. *Marine and Coastal Access Act 2009*. Available online: http://www.legislation.gov.uk/ukpga/2009/23/contents. Date accessed: 9th October 2013.
- HM Government, 2010. *Flood and Water Management Act 2010*. Available online: http://www.legislation.gov.uk/ukpga/2010/29/contents. Date accessed: 9th October 2013.
- HM Government, 2011. *UK Marine Policy Statement*. March, 2011.
- Howarth, W., 1988. *Water Pollution Law*. Shaw and Sons Limited.
- Joint Nature Conservation Committee (JNCC) website (a). *Protected sites designations directory*. Internet site: http://jncc.defra.gov.uk/page-1527. Date accessed: 9th October 2013.
- Joint Nature Conservation Committee (JNCC) website (b). *Special Protection Areas (SPAs)*. Internet site: http://jncc.defra.gov.uk/page-162. Date accessed: 9th October 2013.
- Joint Nature Conservation Committee (JNCC) website (c). *Directive 2009/147/EC on the conservation of wild birds (codified version)*. Internet site: http://jncc.defra.gov.uk/page-1373. Date accessed: 9th October 2013.
- Marine Management Organisation website (a). *South Marine Plan Areas*. Internet site: http://www.marinemanagement.org.uk/marineplanning/areas/south.htm. Date accessed: 9th October 2013.
- Marine Management Organisation website (b). *Licensable Activities and Exemptions*. Internet site: http://www.marinemanagement.org.uk/licensing/marine/activities.htm. Date accessed: 9th October 2013.
- McNally, C., Johns, D. and Pygott, K., 2012. *Partnership Funding for Flood Risk Management*. Environment Agency Toolbox Talk, 19th January 2012.
- Natural England website. *Designations*. Internet site: http://www.naturalengland.org.uk/ourwork/conservation/designations/. Date accessed: 9th October 2013.
- New Forest District Council, 2010. *North Solent (Selsey Bill to Hurst Spit) Shoreline Management Plan Review (SMP2)*. December, 2010.
- SPONS (2013). *Civil Engineering and Highways Works Price Book. 23rd Edition*. Taylor & Francis.
- Waste & Resources Action Programme (WRAP), 2012. *Designing out Waste: A design team guide for civil engineers. Part 2: Technical Solutions*. Available online: http://www.ice.org.uk/Information-resources/Document-Library/Designing-out-waste--A-design-team-guide-for-c-%281%29. Date accessed: 9th October 2013.

Figure 1: Solent Breezes – the study area

A Local Engagement Group (LEG) has been set up at which includes approximately 10 members of the community. The LEG identified the need to develop coastal defence options for the stretch of coast fronting Solent Breezes so that they could better understand the costs and issues. This request for 'options development' work has been discussed with the East Solent Coastal Partnership whose advise was to align the options work with the forthcoming development of a Coastal Defence Strategy for this stretch of coast, which will avoid conflicting guidance. The Strategy will provide the most up-to date information relevant to Solent Breezes and it is important that the community engages with the developing strategy. The LEG thought that the consideration of options for the Solent Breezes Coastline still provided a valid way forward for the CCATCH project at Solent Breezes, recognising that the work undertaken needed to be within the context of the emerging coastal defence strategy.

It is within this broader strategic setting that CH2M HILL was employed to provide expert coastal engineering advice to the community at Solent Breezes, specifically to:

Assess the condition and residual life of the various defence assets along the Solent Breezes frontage;
Identify outline options for maintenance of the defences for the next 1-20 years; and
Help the community to explore the potential options so that they (the community) can better understand the coastal defence options open to them as private landowners on a 'no active intervention coastline'.

This report presents the findings of a condition assessment undertaken by CH2M HILL coastal engineers on a site visit on 12th September 2013, and outlines potential options for future maintenance of defences along the study area.

2 Defence Condition Assessment

The Solent Breezes frontage is approximately 300m in length and comprises a range of defence types and construction methods implemented over a period of several decades. A site visit was undertaken on 12th September 2013 to conduct a visual assessment of the existing defences along Solent Breezes frontage. The site visit identified nine succinct defence lengths which are indicated in Figure 2. There are two concrete outfalls at the north-western end of the frontage extent which are outside of this condition assessment.

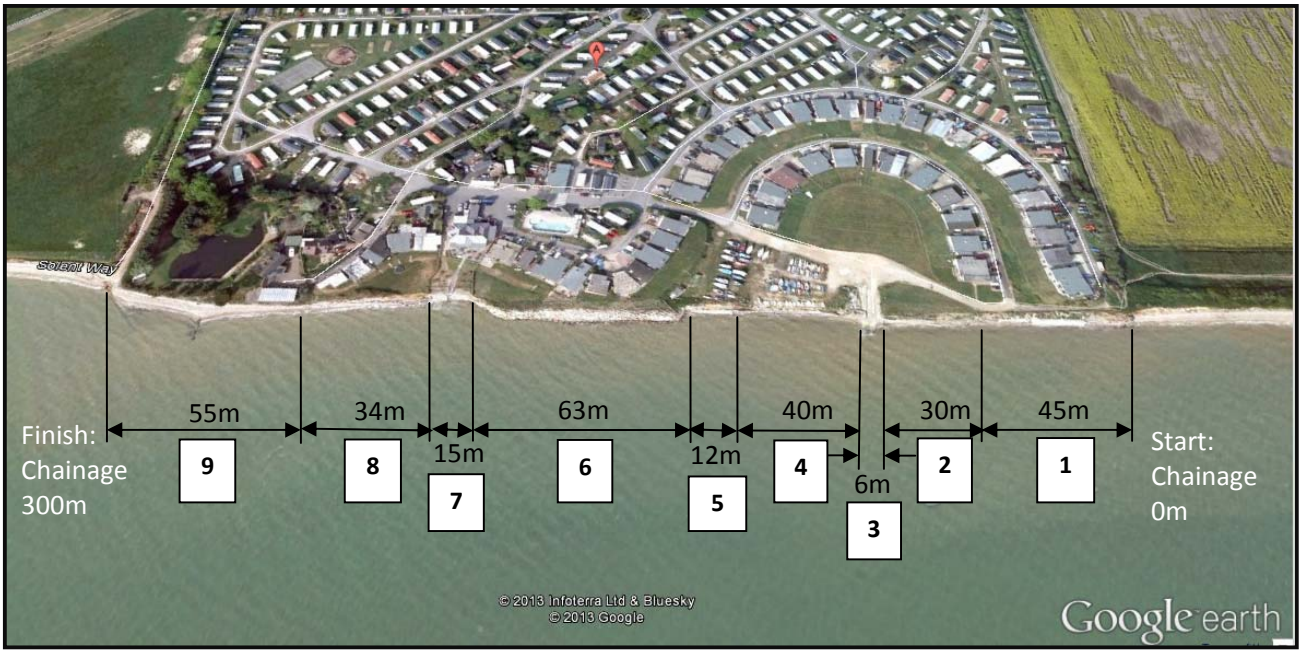


Figure 2: Solent Breezes defence lengths identified during the site visit (image copyright: Google Earth)

2.1 Condition Assessment Methodology

The visual assessment was undertaken in accordance with the Environment Agency's Condition Assessment Manual (CAM). The CAM provides a set of visual indicators in order to assess the integrity and performance of a structure and includes the visible surface defects as well as the asset's surroundings. The indicators allow a condition grade to be determined, of which there are five, ranging from 'very good' to 'very poor'. For each structure type there is a set of visual indicators based on the specific failure mechanisms for the structure and these are outlined in proceeding sections. As a generic approach, the condition grades are based on the descriptions shown in Table 1 below (Environment Agency, 2006).

Table 1: General condition grades for structures in accordance with the CAM

Grade	Rating	Description
1	Very Good	Cosmetic defects that will have no effect on performance
2	Good	Minor defects that will not reduce the overall performance of the asset
3	Fair	Defects that could reduce the performance of the asset
4	Poor	Defects that would significantly reduce the performance of the asset
5	Very Poor	Severe defects resulting in complete performance failure

Each of the defence lengths identified in Figure 2 have been appraised in accordance with the CAM. The results are presented in the following sections. In some sections, potential options have been identified to maintain the life of the existing defence where appropriate over the next 1-20 years, in accordance with the SMP policy.

2.2 Defence Length 1 – Eastern extent of Solent Breezes

Chainage: 0 – 45m (refer to Figure 2)

Description: Defence Length 1 is characterised by historical failed defences comprising of gabions, concrete piling and cliff stabilisation netting. Fly tipping may have occurred in this area and there are remains of various failed defences.

Figure 3: general arrangement of Defence Length 1, including a detailed image of waste

Condition Description: The gabions are showing substantial loss of stone, failure of wire mesh, washout and movement of units, misalignment, crest reduction and are beyond economic repair. Whilst the concrete piles are intact they are no longer serving a defence function as the gabion units they once stabilised have failed. The cliff stabilisation netting is torn and disconnected, no longer serving any defensive function.

Condition Grade: 5 - Very Poor, severe defects resulting in complete performance failure

General Comments: This frontage length has considerable waste materials such as concrete blocks, wire mesh, old damaged geotextile, cliff netting and concrete piling. The waste is unsightly and a health and safety and environmental concern. The failed defences appear to be acting as a barrier to alongshore sediment transport and a headland is developing at the south-eastern end of the frontage. Site clearance in this location may promote some north-westwards movement of local beach material, although the amounts are uncertain given the sediment transport drift divide that is understood to be present in this area.

Maintenance and Defence Options:

Option 1: Site clearance and construction of a rock toe - Site clearance will facilitate a clear and consistent frontage length on which to build upon. The defence line would also be brought back to the foot of the cliff as opposed to the foot of the existing failed defences. A rock toe will provide protection to the foot of the cliffs from erosion and reduce cliff recession.

Option 2: Construction of a king pile wall – site clearance could be minimised by providing a king pile wall consisting of steel piles and concrete railway sleepers, similar to those in defence length 6 (later discussed). The piled wall will provide a wave and erosion protection at the foot of the cliffs and suitable waste materials (such as concrete blocks and rock) can be placed behind the wall.

Option 3: Extend the adjacent gabion wall with mass concrete toe (Defence Length 2)

2.3 Defence Length 2 – Eastern chalets to concrete slipway

Chainage: 45m – 75m (refer to Figure 2)

Description: Defence Length 2 consists of an approximately 3 – 4m high gabion wall with an approximately 1m high mass concrete toe wall.

Figure.4: general arrangement of Defence Length 2, including detailed images of undercutting, damage and corrosion

Condition Description: The gabion wall is showing good rock packing with no noticeable loss of stone for the majority of units. There are no signs of settlement or bulging. The wire mesh is showing signs of corrosion and the mass concrete toe wall has evidence of undercutting. At chainage 45m (adjacent to Defence Length 1) where the gabion wall begins, there is increased cliff erosion and a unit has failed (see Figure 4).

Condition Grade: 3 – Fair, defects that could reduce the performance of the asset

Maintenance and Defence Options:

Option 1: Sheet pile with mass concrete backfill or rock armour toe protection – the undercutting of the mass concrete toe wall threatens the overall stability of the gabion wall structure and without protection, may lead to failure (See Defence Length 4).

Option 2: Rock armouring to the gabion wall/cliff interface at chainage 45m – exposure in this region may give rise to progressive failure of the gabion wall, a unit has already failed during a short time frame. Rock armour will protect the edge of the gabion wall and reduce cliff erosion at this location, providing a graduation between the soft cliffs and the hard defence structure.

Option 3: Replacement of gabion wall wire mesh – the structure is showing visible corrosion of the wire mesh and in time this will lead to damaged units, a loss of stone fill and the beginning of gradual collapse in the form of crest reduction and bulging.

All of the above measures would lead to an improved life span of this defence and given its recent installation and the defects identified; consideration of all or a combination thereof is advised.

2.4 Defence Length 3 – Concrete slipway

Chainage: 75m – 81m (refer to Figure 2)

Description: Defence Length 3 is a concrete slipway with ancillary gabion units providing edge protection to the back shore. Whilst the structures function is for beach access for boats and the local public, the structure is providing a defensive function through erosion protection.

Figure 5: general arrangement of Defence Length 3, including detailed images of undercutting and gabion damage

Condition Description: The structure is showing signs of localised spalling, lengthy cracking and some movement (particularly at the edges). There are signs of localised undermining around the slipways edges and slumping. The gabions are showing some signs of settlement and distortion with reasonable packing and small loss of stone. There is a unit which has failed (shown in Figure 5) and mild corrosion of the gabion mesh is evident.

Condition Grade: 3 – Fair, defects that could reduce the performance of the asset

General Comments: The access slope from the slipway to the western frontage appears to have been removed or damaged. This would have provided some defence to the gabion units behind which are becoming damaged as well as safe access. Sheet piles have been used at the immediate toe of the slipway to counter scour and undermining.

Maintenance and Defence Options:

Option 1: Sheet piling and mass concrete backfill to edges of slipway - this will help to protect the edges of the slipway which over time will continue to be undermined, leading to further cracking and spalling.

Option 2: Repair to gabion units – where entire units have been lost these should be replaced as it introduces an area of structural weakness which could rapidly develop and lead to progressive failure if not corrected.

Option 3: Replacement of gabion wall wire mesh – the structure is showing visible corrosion of the wire mesh and in time this will lead to damaged units, a loss of stone fill and the beginning of gradual collapse.

All of the above measures would lead to an improved life span of this defence.

2.5 Defence Length 4 – Concrete slipway to western chalets

Chainage: 81m – 121m (refer to Figure 2)

Description: Defence Length 4 consists of an approximately 4m high gabion wall with an approximately 1m high mass concrete toe wall.

Figure 5: general arrangement of Defence Length 4, including detailed images of undercutting and large toe wall cracks

Condition Description: The gabion wall appears to have suffered an overturning failure which is thought to be the cause of undermining to the mass concrete toe wall. The gabion wall should have been built to stand free of the toe wall, it is uncertain as to whether the structural arrangement of the gabion units is sufficient for stability during the long term. The toe wall is exhibiting large tension cracks and undermining (see Figure 5 above). The wire mesh is showing signs of corrosion but the stone packing is good and most of the gabion units are intact.

Condition Grade: 4 – Poor, defects that would significantly reduce the performance of the asset

General Comments: The gabion wall is exhibiting instability and is considered a health and safety concern. In addition, a large storm may result in complete failure and loss of the existing structural components, reducing or preventing re-use of the existing structure.

Maintenance and Defence Options:

Option 1: Salvage gabion units and re-construct gabion and toe wall – most of the gabion units are intact and could be re-used to construct a gabion wall with greater stability. A new toe wall will protect the bottom gabion units from corrosion and wave attack. The new toe wall should extend sufficiently below bed level to provide contingency for future scour.

Option 2: Gabions used for repairs to other defence lengths and a continuation of the king pile wall – the gabion units could be salvaged to repair/defend other areas and defence length 6 extended to the slipway.

Option 3: Replacement of gabion wall wire mesh – the structure is showing visible corrosion of the wire mesh and in time this will lead to damaged units, a loss of stone fill and the beginning of gradual collapse.

A combination of options should be considered. This defence needs repairs to fulfil its function in the immediate future and will require continued maintenance to wire mesh on an ongoing basis.

2.6 Defence Length 5 – Gabion and mass concrete toe wall to king pile wall

Chainage: 121m – 133m (refer to Figure 2)

Description: Defence Length 4 consists of an approximately 4m high gabion wall with a rock revetment formed from concrete blocks. The structure is forming a connection between Defence Lengths 4 and 6.

Figure 6: general arrangement of Defence Length 5, including images of protruding bars and broken gabions

Condition Description: The gabion wall has broken units with complete loss of stone fill along the toe where the structure is regularly subjected to the tide. Scour and undermining at the toe has begun and whilst the structure is not showing signs of crest settlement, the structure will rapidly deteriorate over the short term. The gabion wall thickness is severely reduced and the wire mesh is corroded. Structural movement is anticipated to follow. The concrete block revetment has some displaced units from the core structure but appears stable.

Condition Grade: 2 – Poor, defects that would significantly reduce the performance of the asset

General Comments: Steel reinforcement bars were witnessed protruding from the ground and are a health and safety and environmental concern. These would ideally be removed or at least cut back so as to reduce the hazard present. The concrete units which have become displaced would be usefully placed back into the revetment structure.

Maintenance and Defence Options:

Option 1: Replace gabion units at the toe and provide a mass concrete toe wall – the existing gabion wall could be maintained and additional units placed at the toe to replace those broken. A mass concrete toe wall (such as Defence Length 4) would help to protect the wall from corrosion and wave attack at the toe of the structure.

Option 2: Gabions used for repairs to other defence lengths and a continuation of the king pile wall – the gabion units could be salvaged to repair/defend other areas and defence length 6 extended to the slipway.

Option 3: Replacement of gabion wall wire mesh – the structure will over time develop corrosion to the wire mesh and this will lead to damaged units, a loss of stone fill and the beginning of gradual collapse.

A combination of options should be considered. This defence needs repairs to fulfil its function in the immediate future and will require continued maintenance to wire mesh on an ongoing basis.

2.7 Defence Length 6 – western chalets to beach access steps

Chainage: 133m – 199m (refer to Figure 2)

Description: Defence Length 6 is a propped king pile wall consisting of steel I-columns used for props and piles with sheet piles used to support the lower end of the prop and concrete railway sleepers placed between the column flanges to form the wall. Rock armour has been placed at the toe of the wall in a discrete section of the overall defence length. The wall has been backfilled with concrete blocks and rock.

Figure 7: general arrangement of Defence Length 6, including images of corrosion and rock armoured toe

Condition Description: The wall has good alignment with minor slump and heave and minor lateral movement. There is evidence of localised scour (see Figure 7) and a minor loss of backfill in locations. There is extensive corrosion visible but no holes were present, suggesting a minor loss of material thickness. Nearly all railway sleepers remain intact with exception to a few (as shown in Figure 7). There are gaps developing between sleepers, allowing water ingress and backfill to be washed out.

Condition Grade: 3 – Fair, defects that could reduce the performance of the asset

Maintenance and Defence Options:

Option 1: Place additional sleepers – in areas there are gaps developing which would ideally be closed and additional sleepers placed to form a full height wall. This will reduce loss of backfill.

Option 2: Rock armour toe protection – this will reduce scour at the toe of the structure and reduce further loss of backfill

Option 3: Monitoring of the wall and ad hoc repairs – in some areas there are not props and loss of backfill has begun, as well as scour. A monitoring program will help to identify if there are any local damage/failures which could be repaired before further damage results. Repairs could be providing further props, welding plates where corrosion has created holes, replacing concrete sleepers and moving displaced rock armour back to the toe of the wall.

All of the above measures would lead to an improved life span of this defence. Monitoring is essential in maintaining this defence which appears to be functioning well.

2.8 Defence Length 7 – beach access steps

Chainage: 199m – 214m (refer to Figure 2)

Description: Defence Length 7 consists of a sheet pile wall with pinned railways sleepers forming the structures crest. Behind lies a series of gabions which have been capped with a mass concrete pour. The structure supports a set of steel and timber access steps. The structures western extent (chainage 214m) has had a continuation of the mass concrete pour to form a concrete apron to protect the edge of the defence length.

Figure 8: general arrangement of Defence Length 7, including images of mass concrete pours and gabions

Condition Description: There is extensive corrosion throughout the sheet pile wall. The timber railway sleepers are cracked in places but in general are in reasonable condition. There are no signs of localised scour, slump or heave and the wall is not deformed. The wall has minor vertical and lateral movement. The concrete placed behind the wall is of pour quality and it is uncertain as to how long it will last.

Condition Grade: 3 – Fair, defects that could reduce the performance of the asset

General Comments: In the longer term the structure would benefit from a more formalised end condition on the western extent (Chainage 214m) to prevent the structure weakening due to corrosion, localised erosion (increasing outflanking) and wave attack. The existing mass concrete looks of low quality and will erode, leading to a loss of protection at the structures' western end. Also, a more suitably placed fence would improve health and safety measures in this location. The timber steps appeared to be in poor condition and their structural integrity and safety is uncertain.

Maintenance and Defence Options:

Option 1: Rock armour end protection – the western end would benefit from some rock armour protection to prevent erosion and wave attack, reducing the likelihood of a weakness in the structure developing that could lead to progressive collapse.

Option 2: Fencing improvements – the existing fencing is in poor condition and is positioned randomly due to the ad hoc arrangement of the defence lengths end. Replacing this fencing is advised for health and safety given the location is a point of access.

Option 3: Replacing timber steps – timber steps should be replaced to enable safe access in the long term to the beach, the current steps appear to be in poor condition.

2.9 Defence Length 8 – beach access steps to most western chalet

Chainage: 214m – 248m (refer to Figure 2)

Description: Defence Length 8 consists of a steel wire fence with gabion units placed in front.

Figure 9: general arrangements of Defence Length 8

Condition Description: The gabions are showing substantial loss of stone, failure of wire mesh, washout and movement of units, misalignment, crest reduction and are beyond economic repair.

Condition Grade: 5 – Very Poor, severe defects resulting in complete performance failure

General Comments: This frontage length has a considerable amount of wire mesh from broken gabion units. This is unsightly and a health and safety and environmental concern. The beach levels in this location healthier and local material is visible on the foreshore. The fencing appears to be in reasonable condition.

Maintenance and Defence Options:

Option 1: Site clearance and construction of a rock toe - site clearance will facilitate a clear and consistent frontage length on which to build upon. The defence line would also be brought back to the foot of the fencing as opposed to the foot of the existing failed defences. A rock toe will provide protection to the foot of the cliffs from erosion and reduce cliff recession.

Option 2: Beach re-cycling – an alternative defence could be to re-cycle beach material from Defence Length 9 to this section to bolster the natural protection provided by the beach in this area.

Option 3: Timber revetment – this could be installed along the defence length in front of the fencing. These will help reduce wave action and erosion and have a design life that is in accordance with the short term SMP policy of 1 – 20 years.

In this location the frontage is considered undefended and a defence measure is advised as well as removing the existing waste to reduce risk of outflanking to adjacent currently defended frontages.

2.10 Defence Length 9 – western chalet to eastern extent of frontage

Chainage: 248m – 303m (refer to Figure 2)

Description: Defence Length 9 consists of an approximately 2.5m high gabion wall. This wall is protecting a chalet immediately above.

Figure 10: general arrangement of Defence Length 9, including detailed images of mass concrete pours and gabions

Condition Description: The baskets are fully intact and secure with no evidence of undermining or toe scour. Minor bulging is visible at the eastern end of the defence length. There is visible corrosion, however, there is evidence that gabion wires have been replaced (See Figure 10). The baskets are well packed and are at maximum density with small distortions of baskets and alignment, minor crest settlement.

Condition Grade: 2 – Good, Minor defects that will not reduce the overall performance of the asset

General Comments: This defence length has healthier beach levels compared with other defence lengths, likely as result of the neighbouring outfalls which are behaving as large onshore groynes, trapping beach material in this area and preventing its further north-westwards transport along the shoreline. The defence has a poor eastern end condition (chainage 248m) which appears to be resulting in the start of structural defects.

Maintenance and Defence Options:

Option 1: Improvements to eastern end of defence length – replacement of damaged gabions and/or additional units placed at this location to prevent further damage which could lead to progressive failure and outflanking.

Option 2: Replacement of gabion wall wire mesh – the structure will over time develop corrosion to the wire mesh and this will lead to damaged units, a loss of stone fill and the beginning of gradual collapse.

3 Maintenance Options Summary

The defence condition assessment has provided an insight into the existing defence measures. The defence defects and potential options for managing these defences over the next 1-20 years have been identified. This section summarises the options identified for each defence length and provides outline costs as well as a priority weighting. The priority weighting is based on the following criteria:

- High – measures advised to be undertaken within the next year
- Medium – measures advised to be undertaken in the next 1 – 5 years
- Low – measures advised to be undertaken in the next 5 – 20 years
- N/A – As and when appropriate to be guided by ongoing monitoring

Costs for each option have been developed using SPONS construction cost indices (SPONS, 2013), CH2M Hill past project data and costs provided by a local resident from recent experience of implementing works along parts of the frontage between 2005 and 2013. These costs are to only be used as a broad-level guideline; they may not represent the true cost of the various proposed construction activities which may attract additional costs associated with, for example, licensing and consenting of any works.

Table 2 presents this summary.

Defence Length	Defence/Maintenance Option	Priority	Estimated Cost range (£k)	Comment
1	Site clearance and rock armour toe	Medium	25 – 39	Site clearance has high cost due to nature of waste to be disposed of. Rock armour may become displaced and would benefit from monitoring and maintenance.
	Construction of a king pile wall	Medium	45 - 58	Waste materials could be left behind wall and additional backfill placed.
	Gabion wall with mass concrete toe	Medium	30 - 50	This includes a toe wall to extend below beach level for scour allowance, reducing undermining risk observed in Defence Lengths 2 and 4.
2	Sheet pile with mass concrete backfill toe protection	High	6 – 10	Considered high priority as Defence Length 4 appears to have failed as a result of undermining (which this measure aims to prevent).
	Rock armour toe protection	High	5 – 8	Potentially a lower cost solution to that proposed above but less robust. Units will become displaced leading to local exposure (unless maintained).
	Rock armouring to the gabion wall/cliff interface	High	2 – 3.5	This will help reduce the possibility of progressive failure of the defence and reduce local cliff erosion. Rock may be displaced in long term.
	Replacement of gabion wall wire mesh	N/A	2 – 3	This cost reflects one replacement. This may be required every 5 years. Gabion wire should be monitored for corrosion and damage.
3	Sheet piling and mass concrete backfill to edges of slipway	Medium	4 - 7k	This item is not considered a high priority as it is not a critical defence. Repair is important in medium term for access reasons.
	Repair to gabion units	High	1.5 – 3	This will help reduce the possibility of progressive failure of the defence. Without works the defence could last less than 5 years.
	Replacement of gabion wall wire mesh	N/A	1 – 1.5	This cost reflects one replacement. This may be required every 5 years. Gabion wire should be monitored for corrosion and damage.
4	Salvage gabion units and re-construct gabion and toe wall	High	20 – 32	This cost is based on a new wall being built from existing gabions and a new toe wall being constructed. Available materials have been assumed but are uncertain.
	Gabions used for repairs to other defence lengths and a continuation of the king pile wall	High	40 – 52	Option leads to a saving on gabion repairs (estimated £8.5k saving on material). This could be used in other areas to perform repairs, reducing estimated costs.
	Replacement of gabion wall wire mesh	N/A	2.5 – 4	This cost reflects one replacement. This may be required every 5 years. Gabion wire should be monitored for corrosion and damage.
5	Replace gabion units at the toe and provide a mass concrete toe wall	High	5.5 - 9	This will help reduce the possibility of progressive failure of the defence. Without works the defence could last less than 5 years.

Defence Length	Defence/Maintenance Option	Priority	Estimated Cost range (£k)	Comment
	Gabions used for repairs to other defence lengths and a continuation of the king pile wall	High	16 - 26	Option leads to a saving on gabion repairs (estimated £1.5k saving on material). This could be used in other areas to perform repairs, reducing stated costs.
	Replacement of gabion wall wire mesh	N/A	0.8 – 1.2	This cost reflects one replacement. This may be required every 5 years. Gabion wire should be monitored for corrosion and damage.
6	Place additional sleepers	Medium	7 - 11	Additional sleepers will bring the defence to full height in all areas and repair areas where gaps are developing.
	Rock armour toe protection	Medium	18 - 29	Whilst the scour and undermining at present is minimal, this poses the greatest risk to the long term stability of the defence. As such, further protection measures are advised.
	Monitoring of the wall and ad hoc repairs	N/A	N/A	Ad hoc repairs are advised such as placing additional props and plate welding corrosion holes. Costs will need evaluating as and when and be informed by monitoring.
7	Rock armour end protection	Medium	3 – 4.5	This will help prevent outflanking of the defence.
	Fencing improvements	Low	1.5 – 2.5	Cost is variable as uncertain ground conditions for the fence instalment.
	Replacing timber steps	Medium	0.3 – 0.6	Beneficial for safe beach access at low cost.
8	Site clearance and construction of a rock toe	Medium	23 - 37	Site clearance required to facilitate rock armour installation. High cost due to nature of waste to be disposed of. Rock armour may become displaced and would benefit from monitoring and maintenance.
	Beach re-cycling	Medium	10 - 16	This option has uncertainty as the frequency at which re-cycling of beach material would be required is hard to determine; it may be entirely removed in a single storm or it may remain in place for a long period. This may be required on more than one occasion.
	Construction of timber revetment	Medium	14 – 23	Uncertainty as to how well the timber will survive under wave conditions without a wave climate study to assess design wave conditions.
9	Improvements to eastern end of defence length	Medium	2 – 3.5	A few additional gabion units will help prevent progressive failure.
	Replacement of gabion wall wire mesh	Medium	3.5 - 6	This cost reflects one replacement. This may be required every 5 years. Gabion wire should be monitored for corrosion and damage.

4 Conclusions and Recommendations

4.1 Conclusions

The following conclusions are drawn from findings of the defence assessment presented in Sections 2 and 3:

- The defences are showing particular vulnerability at edges where one defence length meets another. Collaboration with neighbouring defence owners is advised for long term stability to agree on end conditions of defences.
- Undermining and scour are causing high risks of structural failure to the existing defences. Further defences/maintenance work should incorporate mitigation measures and allowance for scour.
- Where beach levels are lower and gabion walls are regularly exposed at the toe, a toe wall is necessary to reduce the rate of corrosion of the gabion wire. The lack of such a feature at present is leading to short defence lifecycles.
- There is a vast amount of waste from previous defences which is an environmental and health and safety concern.
- High loading from boats and vehicles is not advised above Defence Lengths 2 and 4 which are considered a health and safety concern due to their height and overall stability.
- The frontage would benefit from local collaboration to develop a consistent approach to future defence measures.

4.2 Recommendations

The following recommendations are advised:

- High priority works to be actioned as soon as practicable to minimise the immediate risk of defence failure.
- A consistent monitoring programme would assist in identifying defence defects and inform future maintenance needs in a timely manner. This should be developed and implemented by local defence asset owners.

References

- Environment Agency, 2006. Condition Assessment Manual (CAM), October 2006

- SPONS (2013). *Civil Engineering and Highways Works Price Book. 23rd Edition*. Taylor & Francis.

Solent Breezes: The current situation

This brief report has been produced as a summation of the process to date. It has been written on behalf of all the parties involved in the process, as requested at the community workshop on the 23rd January 2014, to help people identify their own route forward.

Progress to date

Part of the EU funded Coastal Communities 2150 project, led by the Environment Agency Local delivery is via the CCATCH project, run by Hampshire County Council which has the following purpose. *"CCATCH - the Solent' will raise awareness and understanding amongst five Solent communities of coastal change and in particular sea level rise. It will help communities understand the process of coastal change to enable adaptation and increase resilience."*

A meeting held in April 2013 agreed the following aims & objectives for CCATCH @ Solent Breezes:

Aim: The whole community of Solent Breezes to be aware of implications of coastal change and be able to manage adaptation as the shoreline erodes.

Objectives

- To raise awareness of the current risks to different sectors of the community.
- To help the community understand the future options available to them in respect to protecting their properties from coastal erosion
- To explore the financial, legal and practical implications of those options to help identify a preferred option(s) and the actions required for implementation.
- To encourage partnership working among landowners.

A subsequent meeting held in July 2013 agreed to adopt a 'joint fact finding' approach to exploring the future options for the community. The CCATCH project hired a consultant to firstly undertake a conditions assessment of the existing sea defences and then to work with the community to research and develop options for their consideration.

A brief for the retained consultant was agreed with the community and a resulting report was discussed at a workshop held in November 2013.

A final workshop was held in January 2014 with the intention of agreeing the first steps in a more cooperative approach to the defence of the coastline at Solent Breezes.

The CCATCH project only runs until the end of February 2014 so any further discussions need to be initiated by the different landowning interests on the site. This summary report sets out the situation at the end of the CCATCH project.

Current approach to coastal defence

- Nine Chalet owners invest in coastal defence in front of their own properties and have a small working pot of money for maintenance and eventual replacement.
- Park Holidays spends significant funds (which they have offered to quantify) on maintaining the defences in front of their landownership and other parts of the site.
- No other owners contribute to defences (these include the other chalet owners, Hampshire County Council).
- Both the CCATCH project and Park Holidays have commissioned studies and estimates of proposed works on current and future coastal defence options and both are prepared to make these available to aid future discussion.

Rights & Responsibility

- All land owners retain their rights & responsibilities as owners of land and property.
- The current circumstances place the responsibility for maintaining the defences in a safe condition on the person or persons who constructed the current features. That responsibility is taken on by any one doing any new works.
- Therefore the decision to invest remains the prerogative of the individual owners, accept where there is a requirement, identified by the Borough Council to undertake work on safety grounds.
- This means any investment in coastal defence should be voluntary (accept where legal responsibility dictates otherwise) unless all of the property owner’s sign up to some form of funding mechanism such as requiring their property to pay a set and ongoing fee towards the maintenance of sea defences.

Three possible future options for the management of coastal defences at Solent Breezes

- Individual responsibility, coordinated action: Different people take responsibility for the defence of different sections of coast with an underlying plan that's followed by all. This would require co-ordination to ensure works take place in a compatible way and compatible timings. This therefore also needs funding to be available from all involved when required.

- One landowning group (Chalet owners or Park Holidays) take responsibility for the defence of the coast. A restricted (only to be spent on coastal defence) fund is then set up to which other parties contribute and some form of legal agreement is made regarding ongoing duty to maintain the defences in a safe condition.
- Set up a new independent body for management (and responsibility) of the coastal defences. This would need a sustainable income such as money invested in by chalet owners/ company/ others. It could also generate fundraising activities and direct commercial income (e.g. letting moorings/ landing fee). Such a body would also need some form of legal arrangement to cover the ongoing duty of care which all the landowners involved would have to be party to.

Insurance & external financial support

- Coastal Erosion is not an insurable risk.
- The only government provided financial support to property owners is a payment of a maximum of £6000 to help with the demolition and removal of properties that are in danger of collapse

Possible next steps

There is not complete agreement yet on the best approach to joint working but the emerging first step seems to be;

1. Chalet owners establish a representative body and communication system for working with the company and other interested parties
2. The company & chalet owners establish regular meetings.
3. Chalet owners to start a working fund, supported by voluntary contributions based on a scale related to distance from the coast.
4. The company and the chalet owners work towards agreeing an approach to maintaining coastal defence

The conversation about coastal defence has not always been easy as there are many competing interests and some historical animosity between various parties. It is hoped that the CCATCH engagement process has made a start in improving the relationship between parties and identifying common ground. If we have learnt two things they are:

- coastal defences affect all the properties to varying degrees and as such are not the responsibility of any one landowner, large or small
- the importance of keeping the conversation going and focussed on future options rather than past problems.

Mike King
Steve Evison
February 2014