Thorpeness Coastal Management Consultation Report

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Working with you to explore how we manage the coastline at Thorpeness, now and for the future

This report is an iteration within the consultation process of coastal management decision-making at Thorpeness.

Left: Complete exposure of existing defenses below Thorpeness House; cliff erosion to the north; and the Ness itself on the far right of the photo.

Contents

Above: Thorpeness mixed sand and gravel beach, looking North on a calm day. The water levels of recent neap and spring high tides are visible by the strand lines atop the gravel berms. Picture by Sarah Lucy Brown

Acronyms, Terms and Abbreviations

CPE	Coastal Partnership East
EA	Environment Agency
FDGiA	Defra Flood defence grant in aid
HTL	Hold The Line
NAI	No Active Intervention
MR	Managed Realignment
MML	Mott MacDonald Ltd
MTF	Marine Technical Forum
RHDHV	Royal Haskoning DHV
RSPB	Royal Society for the Protection of Birds
SCDC	Suffolk Coastal District Council
SMP	Shoreline Management Plan
SSP	Steel sheet piling
TANP	Thorpeness and Aldringham Neighbourhood Plan
TCFG	Thorpeness Coastal Futures Group
TCSG	Thorpeness Community Steering Group

Report Structure

Section 1 constitutes the introduction to this document and describes the consultation process.
Section 2 offers the background to the site. It outlines the environmental factors and coastal processes that provide the challenges and opportunities here.
Section 3 looks at the state of existing defences and forecasts future deterioration of defences.
Section 4 is a review of the Shoreline Management Plan (SMP7) and details the 2013 alterations.
Section 5 describes the Strategic Direction and implications for Thorpeness, Cost and details the Future Management Options. There are currently two options; the first being 'Intervention' and the second is 'Realignment'.
Section 6 outlines the costs and funding procedure.
offers a discussion of the progress that has been made since the last consultation, and what happens next, including any key dates.
Section 7 is an outline of the future management options, offered by MML report 2010. The two broad options are for 'Intervention' or 'Managed Realignment'.
Section 8 covers any other issues that need consideration or could impact any works.
Section 9 Concludes the report with a timeline of coastal management at Thorpeness.

Appendices	
1	Drawings of existing defences.
2	Defence deterioration forecast.
3	Erosion Maps Slow.
4	Erosion Maps Fast.
5	Triggers for defence removal.
6	Valuation of erosion damages - discounted.
7	Works options costs - discounted.
8	Grant calculations.
9	References.
10	Proposed rock slope profiles.

Supporting Documents	Source
SMP 7 2010	SMP7 website
SMP 3C 1988	SMP7 website
RHDHV Process Study 2010	Appendix 9
RHDHV Statement of Principle note to NE 2010	Appendix 9
RHDHV PAR 2010	Appendix 9
TOAL post December 2013 surge impact report.	Appendix 9
RHDHV Site Inspection (bag damage) report 2013	Appendix 9
A. Hawes works options report 2014	Appendix 9
SCDC Local Project Group works cost estimates.	Appendix 9
Mott MacDonald (MML) Coastal Process study 2015	CPE website
MML Works Options study 2016	CPE website
Glennerster Consulting Advice Note.	Appendix 9

1. Introduction

This report is the most recent development in the consultation process. The document helps to record how we work with you to manage changes to the coast at Thorpeness.

It follows on from the 'Thorpeness Coastal Protection Options Report v4'. The latter report identified the community aspiration to provide protection of property north of the Headlands to year 2060 is to be achieved. A potential conflict between erosion management works and conservation factors at Thorpeness exists. The concern remains that these environmental considerations constrain the methods available for erosion management. This may affect the delivery of the suggested SMP7 policy. The report addressed the process for, and consequences of, shoreline realignment as a short to medium term management approach. This is recognised as a potential outcome of the erosion pressure, given the environmental constraints on intervention, and available funding.

The objective herein is to provide guidance on how the amended SMP (2013) policy will be applied over the frontage for which SCDC has management powers.

The report will review the options to maintain, renew or improve the existing defence works.

It will also consider longer term retention, removal, replacement or realignment of defences which will be critical steps in achieving compliance with SMP guidance on sustainability in the context of the prevailing environmental, economic and social conditions.

The content of the report is subject to public consultation, ensuring it reflects the aspirations and demographic of the village. The intention is to engage members of the community to ensure this report is clear, easily understood and shows progression.

Consultation Process:

Coastal Partnership East, acting on behalf of Suffolk Coastal District Council, organises and oversees the consultation procedure, in conjunction with the Thorpeness Coastal Futures Group and other stakeholders including Environment Agency, Natural England, Suffolk County Council and the Area Outstanding Natural Beauty (AONB) team.

Communication channels

To achieve an **inclusive** consultation, communication channels targeted permanent residents and second home owners, whilst also considering the impacts upon tourists and developers.

Suggested communication channels included:

Face-to-face

- Involving the Thorpeness Futures Group to promote the consultation and encourage feedback
- Presentation(s) to the Parish Council
- Drop in events for the community (to include evenings and weekend to widen the attendance)

Digital media

- Parish Council website
- East Suffolk website
- Coastal partnership East website

Social media

- Coastal Partnership East Twitter feed
- East Suffolk Twitter feed

Traditional media

- East Anglian Daily Times article
- Advertisement in The Times to help inform second home owners
- Local newsletters/magazines?

Local information

- Information on notice boards and in halls and cafes
- Leaflet drop to residents

This iterative process is necessary to ensure the right management decisions are made, both for the community and coastline. Each iteration should reduce uncertainty and increase clarity of the challenges, issues and options that Thorpeness presents.

The process is designed to give the community a voice, and lead to erosion management decisions that are:

- ✓ **Socially conscious**
- ✓ **Economically viable**
- ✓ **Technically apt**
- ✓ **Environmentally sound**

Community Engagement Approach

A stakeholder mapping exercise was carried out at an initial community advisory group meeting to inform next steps and ensure key people are involved in the process.

Consultation with the community liaison group November 11th 2018; the previous iteration of this report provided the basis for the meeting. key stakeholders now known as the **Thorpeness Community Steering Group** (TCSG). For the consultation to be meaningful participants needed to know what they *can* influence and what *cannot* be changed (due to environmental, economic and technical constraints).

Outcome of 11/09/18 meeting: a fund raising process could commence and Richard Bennett offered to lead the trust or charitable fund on behalf of the community.

Stakeholder feedback from the last TCGS meeting was incorporated in to this revised version of the document; Thorpeness Coastal Management Consultation Report.

The upcoming consultation will review the Thorpeness Coastal Management Consultation Report on 6th March 2019 at Thorpeness Golf Club. The Community Steering Group will review the suggested approach, revise and agree a timescale for the consultation that best fits the community.

The output of this meeting will inform the next revision of the document, which will be appropriate, fit for purpose and ready for public consultation from mid-March 2019.

To ensure the topic continues to be present and part of the community narrative it was felt that a community reviews on a 5-yearly basis would be helpful.

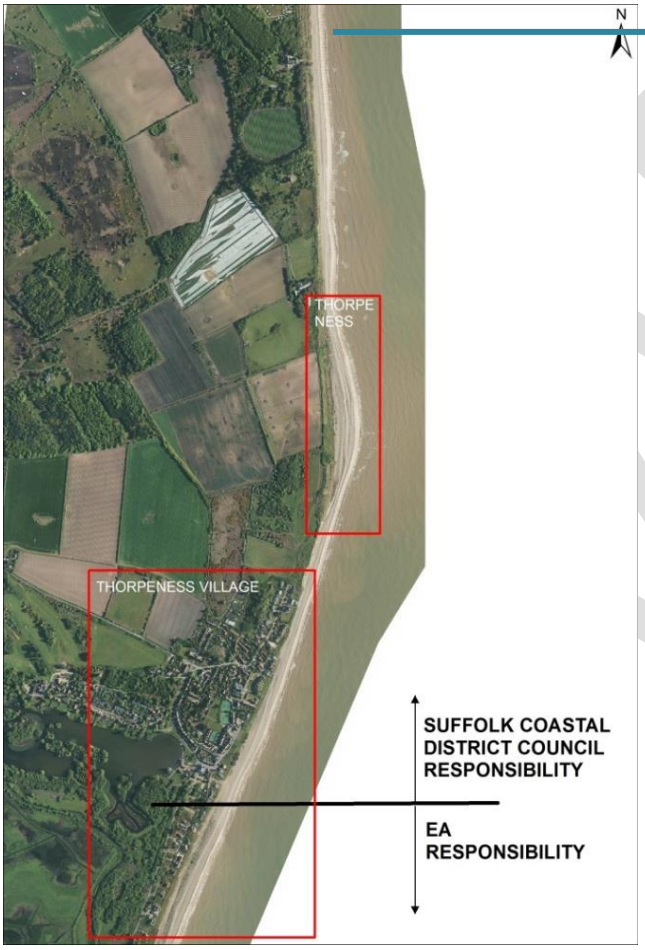
2. Background

Thorpeness

Thorpeness is located on the Suffolk Coast north of Aldeburgh. The coastline forms a significant part of the appeal of the village to residents and tourists. Several large properties of significant value comprise the village's coastal margin.

Coastal Responsibility

Suffolk Coastal District Council (SCDC) has powers under the Coast Protection Act 1949 to manage erosion risk over the northern part of Thorpeness village's coastal frontage. The Environment Agency (EA) has powers to manage flood risk over the low-lying southern end.



Aerial Image showing coastal responsibility at Thorpeness and the surrounding area.

Aerial oblique looking North showing Thorpeness Village and the Thorpe Ness promontory.

Coastal Processes

The Thorpeness coastline between the Ness and the Mere has long-term average erosion rates that are relatively low and the shoreline is relatively stable compared to other parts of Suffolk's coastline. The general trend is for periods of stability to be interrupted by spikes in erosion rates.

The stability is provided by the influence of a geologically robust crag outcrop located north of the village upon which sits the shingle promontory Thorpe Ness. In recent years there has been localised erosion focused on the northern part of the village.

The reasons for variation in erosion pressure are not well understood and may be related to changes in offshore sea-bed level . Over the past century there has also been erosion pressure at the south end of the frontage and a failure of the shingle bank which flooded the village and surrounding area. To the south of the village as far as the Thorpeness sluice there has been a recent trend of erosion leading to retreat of the shoreline and lowering of the single bank. To the south of Thorpeness since ~2015 there is evidence of a bay developing from the southern part of the village frontage to the Thorpeness sluice. This change has reduced the crest level of the shingle flood bank which increases flood risk to the land behind. Both EA and RSPB are monitoring this change.

(Sea Level Rise assumed rates: 0.06m to year 2025; 0.34m to year 2055; 1m to year 2105)

Location	Base Rate (m/yr)	Notes	100yr. Erosion range (m)
Thorpe Ness	0.1	Influenced by nearshore feature.	10 to 30
Thorpeness	0.1	Influenced by exposure of the headland to the north.	10 to 30
Thorpeness Haven	0	Still affected by sea level rise.	10 to 20

Left: Erosion rates, estimated by the SMP, include climate change effects.

The 2005 Halcrow Coastal Strategy predicted a long-term erosion rate of 0.4m / yr. The 2011 EA Shoreline monitoring report identified average net historic rates of shoreline change (not cliff top) of +/- 0.1m / yr at north Thorpeness and 0.8m / yr erosion at south Thorpeness.

Key Assumptions:

- The shoreline comprises a sand platform with a mobile shingle / sand mix covering.
- The Ness crag outcrop forms a control point that provides long term stability to shorelines.
- The Ness influence on wave and tide action can create high, short lived erosion pressure to the south, believed to be linked to seabed levels.
- The nearshore seabed to south of the ness is prone to significant changes in form and level.
- The shoreline over the southern flank of the Ness is prone to significant changes in width and level.
- The long-term trend is for low annual-average coastline retreat.
- Net alongshore drift rates are low and southward
- Gross alongshore drift rates vary and can be significant.
- Wind with a dominant Southerly component tends to build beaches at Thorpeness.
- Wind with a dominant North or East component tends to scour beaches.

A study by RHDHV concluded that high erosion pressure is very localised and recurrent at 30-year intervals. The erosion foci, linked to random meteorological conditions, move erratically along the northern village frontage. The erosion is caused by episodic, abnormal weather events i.e storms and surges, but also by chronic factors associated with the local environmental conditions that lead to a significant change over time. These chronic factors are slow-acting, persistent processes that become magnified during storm or surge events. Evidence suggests that since 2010 the frequency and severity of erosion spikes has increased, presumably under the influence of climate change, but as yet there is no thorough explanation for this. It has been observed that the beaches tend to recover following an erosion event. The recovery period tends to be more rapid after short lived storm events than in response to more sustained erosion associated with changes in nearshore seabed and sandbank features.

Coastal Defence

In 1976 a Gabion (stone filled mesh box) slope protection was built to the east of North End Avenue. For the following five years, beach material was dozed up over the gabion face. In spring 2010, severe local erosion damaged the thirty four year old gabion defence.

*The **above** photo, taken in 2002 before the placement of geobags, shows the northern extent of gabion defence works. The gabions are covered with beach material however a cliff exists at the base of the slope due to erosion and lowering of beach levels. Note the active erosion of the cliff face to the north and the Pill Box located atop the cliff, which is now on the beach.*

Left: This photo from 2010, illustrates the almost complete exposure of the 1976 gabion defence slope. Serious cliff erosion to the north and beach level lowering to the south can also be seen.

In response to this damage, SCDC strategically placed ~2750 geotextile bags over the northern Thorpeness village frontage in a two-phased approach completed in 2012. Drawings of the phase 1 and 2 defences are in Appendix 1. A `Phase1' Geobag wall covering ~120m was built in 2010/11 to south of the 1976 works. The Phase 2 works included patch repairs works to the gabion cages, a Geobag bank was built at the toe of the gabion slope, and a short spur groyne/breakwater at the northern end. The latter was to manage the risk of outflanking of the defence via retreat of the adjacent undefended cliff. The defence type selected was deliberately soft and 'designed to fail' to avoid creating a hard promontory that would impede sediment conveyance. A hard point would also compromise conservation interests and the strategic objective to allow natural long-term evolution of the beach. Essentially they function as a buried backstop that can become exposed by destructive conditions and decreasing beach levels on an infrequent and ephemeral basis. This exposure of the geotextile bags was always anticipated to increase over time with regard to a potential increase in the frequency and severity of future erosion pressure, and sea level rise. The more seaward position of the Phase 2 geobag slope makes it more likely to be exposed, and to suffer damage, than the Phase 1 slope.

The 2010-12 works were designed to offer a limited level of protection within an affordable budget. They were delivered under a legal agreement which limited the Council's liability on defence life and maintenance. The 2010/12 works cost ~ £730k and were funded by Defra grant in aid (FDGiA) and private contributions of ~ £130k mostly from the residents of NEA.

The business case for the 2010 - 2012 works anticipated the soft defences would prevent retreat of the cliff top behind for 50 years until 2060. It included provision for annual maintenance and some mid-life repairs. Use of them in this environment was innovative and untried. Between Old Holmes road footpath and The Mere to the south has a relatively wide beach generally with a smaller range of variability than the northern part, as such there are no defences over the frontage.

Storm Damage

The current defences have suffered significant damage, the northern most part, since 2012. In December **2013** the North sea surge event damaged the upper level geobags and gabions, which eroded property behind and to south of the phase 1 defences over a frontage of ~40m. The clustering of weather events in 2013 was extreme and beyond what could have been forecast from analysis of monitoring data gathered over the previous 20 years. They caused the equivalent of an estimated 10 years of damage to the phase 2 geobag defence and lower gabion slope above that which could have been anticipated under pre-2010 exposure conditions.

Considering the exceptionally high-water levels combined with modest wave action, there would have been significant erosion over the Tinkers End frontage, potentially with property damage had the bag defences *not* been in place.

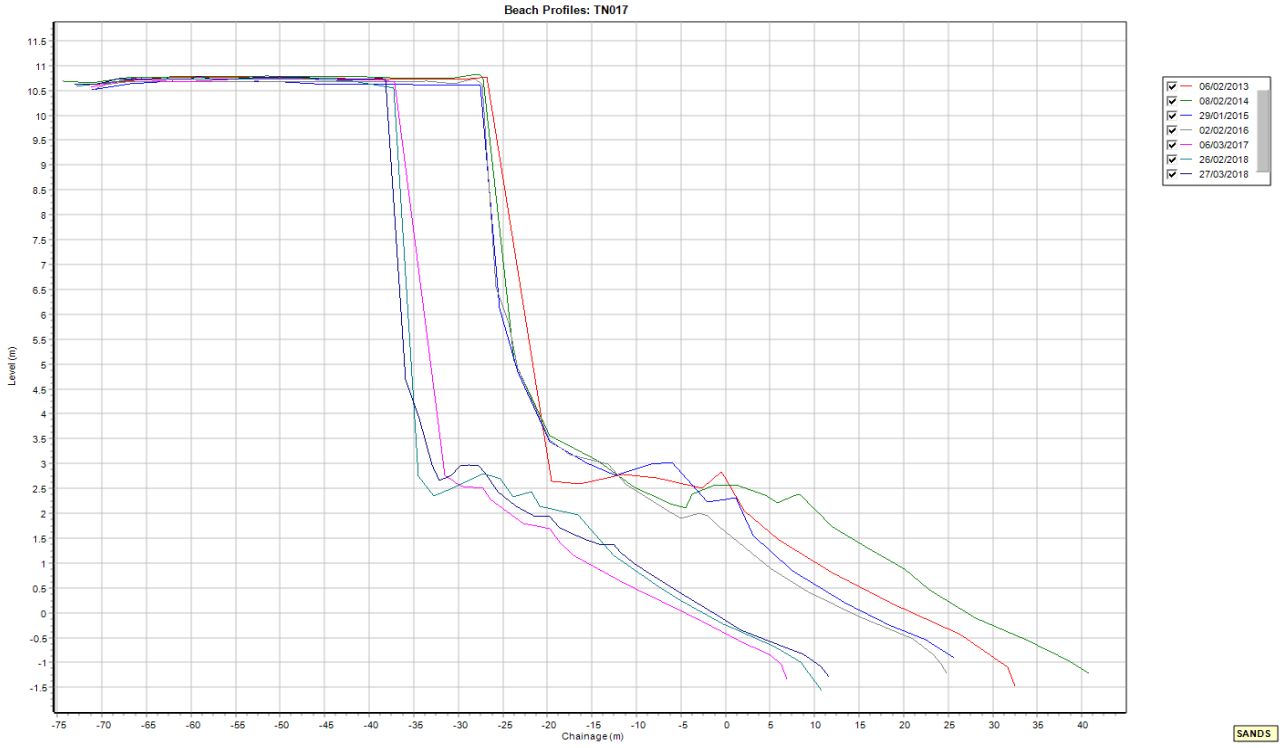
Right: This photo shows full exposure of the phase 2 geobags during a period of sustained low beach levels in 2013. Patch repairs to the damaged face of lower bags can be seen. Some bags in rows 5 and 6 from top were severely abraded and partially emptied of fill. The gabion repairs above the bags are intact.

Above: The phase 1 geobag defence exposed by erosion in 2013.

Below: Phase 2 geobag defence exposed by erosion in 2013 with the 1976 gabion slope behind.

Above: Photos show exposure of the phase 1 bag slope and erosion of the beach to the south caused by the October 2013 storm.

In **2015/16** the shoreline over the southern flank of the Ness to north of the village, reduced in width during a period of sustained southerly-dominated winds. This coincided with accretion at the north flank of the Ness. The Ness south-flank erosion exposed the cliffs there to erosion and retreat, most significantly in December 2016 and January 2017. This step-in erosion is shown in the figure below. The beach over the village frontage was relatively stable and full during this time.



Cliff profiles to north of Thorpeness between 2013 and 2018 showing ~10m of cliff retreat over the winter of 2016/17. For more on this see Wave RADAR interim report #3.

Geotextile placed in 2012 was exposed over the northern part of the phase 2 defence in June **2018.** In September 2018 geotextile placed in 1976 below the gabion slope was also exposed. By autumn 2018 the condition of the geobag defence and seaward parts of the breakwater at the northern end were 'very poor', with an estimated 70% of the bags either damaged or displaced and its design function perceptively impaired. Significant damage is also evident to geobags and gabions on the adjoining linear defence to the south.

Left: Breakwater damage. June 2018.

Right: Cliff erosion behind the breakwater. October 2018.

Geotextile Bags under scrutiny

- When geobags are exposed within the range of tidal action they are prone to 2 types of damage:
  1) Fabric is worn by the abrasive action of beach material moved by waves and currents. This leads to holing, usually over a stone within the bag fill, which spreads allowing fill to escape. The empty or part-filled bag then loses interlock and is plucked out of the slope.
  2) Wave action can distort, or pluck out, an intact bag.
- The use of shingle as opposed to sand fill may have accelerated the bag holing process (shingle fill was approved by the geobag supplier).
- Empty and part-filled bags have been found as far afield as Dunwich and Slaughden.
- The overall stability of the bag slope that is derived from being an interlocking structure reduces as bags are lost, hence the rate of deterioration increases with each additional exposure.
- The loss of geobags leads to settlement and collapse of the gabion slope defence above them.
- Efforts were made to patch holes in 2013 using manufacturer-recommended techniques but this was deemed not effective and was abandoned.
- Inserting new bags into voids left by failed bags and covering the damaged bag face with a more durable geotextile has been ruled out as not practical.
- An increase in the extent of damage over the northern part of the defence during early 2018 has required bag and gabion debris removal and tidying works.

3. What Next?

Approach to managing coastal change

Management actions are largely driven by an understanding of geomorphic trends. The nature and frequency of events which cause damage to defences, are linked to random meteorological conditions. The MML Coastal Processes report (2014) did not find substantive evidence to explain the ostensible increase of high-pressure erosion events between 2010 and 2013. Further monitoring and analysis was recommended, and the Wave RADAR study was conceived. The objective is to investigate the complex interactions between seabed variability and shoreline change. Realistically, significant gaps will remain in our capability to forecast coastal evolution.

Ongoing monitoring of actual change is essential to review and update this report.

Events that have the power to do geomorphic work cannot be predicted with certainty but are expected to increase under the influence of climate change. It is therefore necessary to accept and manage this uncertainty when making strategic decisions. This is done by considering and preparing for a range of potential scenarios.

Longevity of defences

The critical point of geobag defence deterioration is assumed to be failure of the geotextile membrane on the bag undersides. This leads to loss of retained beach or cliff material from above and behind the bags, which ultimately creates opportunity for settlement and collapse of the gabion slope. Failure of the geobag foundation will condemn the gabion defence to collapse inwards. Therefore, gabion maintenance is viable only up to the time of substantial geobag failure.

Over the phase 2 frontage, the break-up of gabions will be followed by erosion of the cliff slope and then retreat of the cliff top line. This will ultimately lead to the loss of property thereon. The deterioration time will depend on the foci, frequency and severity of erosion events. The majority of existing defences have enough resilience to endure a number of erosion events, dependent upon the aforementioned variables.

It is likely that clustered events and prolonged exposure, as seen in spring 2010, spring 2013 and spring/summer 2018, will cause significant damage to the already exposed geobags. The impact of short duration, high energy events, such as those in October 2013 and spring 2013 will become more damaging as the defence condition deteriorates.

Longevity could be extended further with post-event management such as repair of gabion damage, and possibly reactive beach recycling; conditional upon a local donor site being available.

Maintenance and repair

It is currently possible to patch-repair the majority of original gabions. The exception being the northern end where damage is already extensive. Repair work consists of tying new layers of mesh to existing (c1976) mesh. The feasibility of this method reduces as the original mesh corrodes over time.

Maintenance and repair of the geobags by the manufacturer's recommended method has proven ineffective. Other potential damage-slowing interventions have been considered and ruled out as not being practical i.e. inserting new bags into voids left by failed bags and covering the damaged bag face with a more durable geotextile.

Geobag maintenance is therefore unviable and no minimal maintenance regime exists. It is apparent that bag maintenance alone would not extend the design life for the defence to meet the design target of 2060 on which the 2010 scheme business case was based.

Defence removal

The current SMP policy for Thorpeness is underpinned by the objective for management to not significantly obstruct the free movement of beach material across the frontage (SMP7 PDZ4:18). This issue is also discussed in the RHDHV 2010 report to Natural England (NE) `Principles for design and beach management - Thorpeness Erosion Response Works' (In Appendix 9).

In order to prevent potential negative impacts on nature conservation features it is essential that the defences at Thorpeness do not interfere with long term coastal process.

A significant negative impact is assessed as likely to occur if the works form part of the active beach face.

The challenge for future works planning becomes how to define what is the condition when an obstruction to the continuation of natural coastal process by a defence crosses a threshold of significance and when might this occur.

Given the potential for variation in sediment movement volume and direction in the locality, the measurement, evaluation and management of this issue will be a critical element of ongoing monitoring and management planning.

This report assumes that a structure fails the test of sustainability, on grounds of sediment movement interference, when the annual average MHWS contour is in contact with the main structure face- not only the north end breakwater structure.

Subject to feedback from consultees, other criteria for defence removal may be set e.g. the time at which the defence becomes permanently exposed to view, or when the exposed defence permanently prevents safe alongshore pedestrian access at High Tide.

Left: The picture below illustrates the potential long-term beach profile condition under which the phase 2 bag defences will be deemed to have failed a test of environmental sustainability. This is a preliminary position and may change over time.

Table 1 Indicative date of defence removal to avoid sediment transport interruption.

EA transect reference.	Property	Fast Erosion. Defence Removal date	Slow Erosion. Defence Removal date
TN021	No.22	2040	2065
TN023	Cheney's	2040	2070
S038	Stella Maris	2050	2080
Nominal		**2045**	**2070**

The forecast

Predicted defence deterioration under two erosion scenarios is presented in Appendix 2. These scenarios represent credible estimates of Fast and Slow erosion rates.

The forecast….

- Takes account of beach behaviour since 2010.
- Assumes maintenance of gabions and reactive beach management is done.
- Acknowledges that life extending works to the geobag slope are not possible.
- Anticipates that a number of local erosion events combine over time to produce an even distribution of pressure over the frontage.

The following limitations should be recognised.

- The forecast does not represent the highest or lowest possible rates of change.
- It is probable that the rate of deterioration over each frontage will be uneven, i.e. some parts of the phase 2 frontage will fail before others.
- Combinations of Fast / Slow change scenarios may occur.

The **Slow scenario** mirrors the SMP forecast in terms of total retreat distance to 2100.

The **Fast scenario** assumes constant erosion pressure & offers a total retreat distance of double the Slow scenario Up to 2100.

Under both scenarios the existing defences are predicted to fail.

Erosion of the cliff top will lead to property loss…

by 2050 under Slow Scenario **by 2035 under Fast Scenario**

If erosion pressure is to be managed to delay property loss until *after* 2060 **it will be necessary to invest to sustain and replace existing defences** by an amount significantly above the sums predicted by the 2010 business case.

Public funding can facilitate future defence management to an extent, however **a significant funding gap remains**.

Credible Fast erosion Scenario

Presumes erosion pressure is constant and increasing.

It differs from the Slow scenario in that there is no 20-year respite period.

There are regular high erosion pressure events between Old Homes Road and the Ness.

The extent of erosion loss per event, i.e. m of incursion, increases over time.

The net long term shoreline retreat rate of 0.5m / year is twice the SMP7 upper range prediction.

Key outputs:

- Over the defended frontages cliff retreat begins between 2030 and 2035.
- Property loss behind defences begins by year 2035.
- Johnnygate (building) is at risk from ~2045.
- The Headlands and other buildings to the south are at risk from ~2060.
- the adjacent defences of The phase 2 North End breakwater will continue to deteriorate after a complete fail in 2020.
- The absence of a control structure here will also increase erosion pressure on the adjacent cliffs which have benefited from shelter by the breakwater.

Under the Fast Erosion scenario, the criteria for defence removal is potentially met before the defence life target set by the 2010 PAR upon which is based the community aspiration for property protection. In recognition of the highly subjective nature of this and any future assessment of this issue, calculations in this report regarding future defence management have assumed a defence removal date of not before 2060 to align with the 2010 PAR life forecast.

Credible Slow erosion scenario

Presumes ~10 years of high erosion pressure, followed by 20 years of relative stability, in a repeated cycle.

Within the 10 years of high erosion pressure there are several major beach lowering events that bring frequent high erosion pressure to the existing line of defence to the frontage north of Old Homes Road.

The extent of erosion loss per event, i.e. m of incursion, increases over time.

During the 20-year stable period the active beach range moves seaward away from the defence / cliff line however there is occasional pressure from storms and surges.

Key outputs:

- Over the defended frontages defence deterioration allows cliff retreat to begin between 2045 and 2050 i.e. in the next (2nd) phase of high erosion pressure.
- Property loss behind defences has begun by ~2050.
- Johnnygate (building) is at risk in the 3rd phase of high erosion pressure from ~2080.
- The Headlands and other buildings to the south are at risk from~ 2110.
- The phase 2 North End breakwater will reduce until 2040. Under Fast Erosion the adjacent defences will continue to deteriorate.
- The absence of a control structure here will also increase erosion pressure on the adjacent cliffs which have probably benefited from shelter by the breakwater.

Cost of damages caused by erosion

Using data taken from the erosion risk maps in Appendices 3 and 4 the potential value of property losses from erosion are calculated on tables in Appendix 6 and are applied to the calculation of Grant in Aid funding in Appendix 8.
The conclusion of this process is that the Present Value Benefit likely to be available to inform decisions on public investment in future works over the Johnnygate to Red House frontage, is **~£4M** under both Fast and Slow scenarios.

4. Shoreline Management Plan

The Shoreline Management Plan (SMP) provides a medium to long term framework for erosion management. Changes can occur to both the physical dynamics of the coast and potential funding streams, over the lifetime of the SMP. We look to the SMP for a direction

The first SMP, published c.1998, advocated a Hold the Line (HTL) policy for Thorpeness as did a strategy dated c.2005.

In 2010 SMP7 adopted a policy for Thorpeness advocating acceptance of erosion moving toward adaptation with potential minimal `local' protection works as an interim control measure. The justification for this is the need to avoid Thorpeness village becoming a promontory with potential to interrupt the flow of sediment across the frontage and in recognition of additional challenges in protecting an easily erodible cliff.

The 2010 erosion event raised public awareness of erosion risk which, in tandem with the SMP `adaptation' policy, encouraged a self-help approach.

The Thorpeness Coastal Futures Group was formed in 2012 and working with SCDC updated the SMP policy that seeks to maintain the current shoreline alignment at existing defences for the remainder of epoch 1, and review extending this policy into epoch 2 from 2025.

The policy was re-assessed in 2013, as part of a strategy to ensure the high-level policies remain appropriate for Thorpeness. The alteration to the SMP for Thorpeness (2013) changed the policy from No Active Intervention (NAI) to Managed Realignment (MR). The policy amendment for the northern cliffed village frontage aligns with the 2010 objective to resist erosion until 2060; subject to conditions of affordability and sustainability.

The amended policy position was partly based upon a community view that property loss at North End Avenue (NEA) may blight the village and inhibit future investment.

Seafront property owners to the north of Old Homes Road beach access path have invested in private works to enhance the standard of protection to their land. Landowners to south of Old Homes Road footpath are considering private works if there is to be no public investment.

The **stakeholder objectives** for Thorpeness remain unadjusted and are outlined below.

Stakeholder objective unchanged	***No Active Intervention***			***Managed Realignment***		
To maintain in a sustainable manner Thorpeness as a viable coastal settlement and tourist destination recognising its cultural and heritage significance	***Fail***	***Neutral***	***Acceptable***	***Fail***	***Neutral***	***Acceptable***

SMP Revision

The revision reflects the episodic nature of change across the whole village frontage based on current evidence. At Thorpe Ness there would be slow erosion and this has the potential to allow further erosion to the south in front of the village, typically in episodic events with a reducing return period. Initial losses might be anticipated on the coastal frontage during and beyond the next 50 years with the potential for flooding in the lower areas of the village.

The table below compares the previous and revised SMP policy for Thorpeness and can be found at http://www.suffolksmp2.org.uk/policy2/index.php.

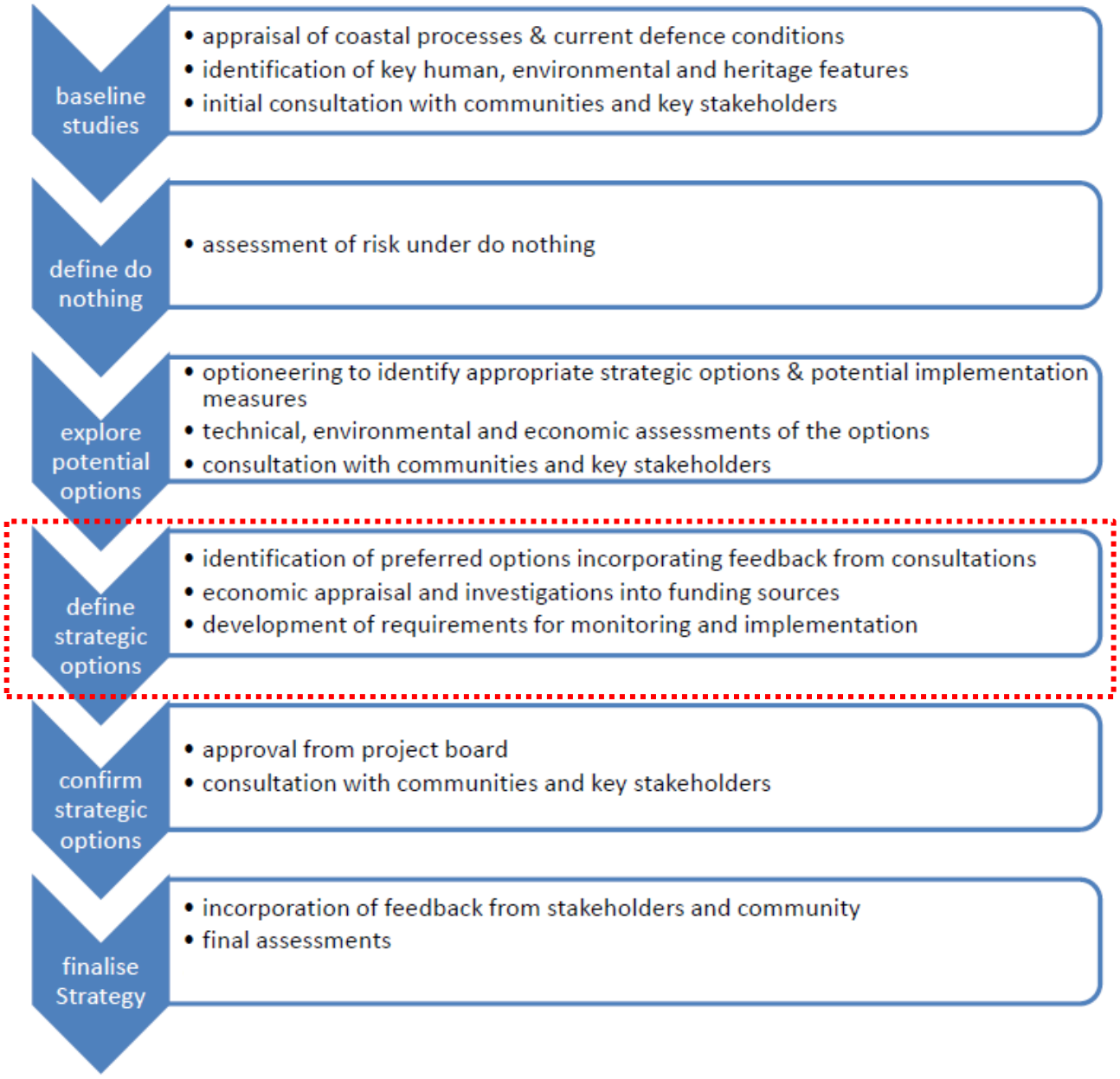
1st epoch until 2025	*2nd epoch 2025 - 2055*	*3rd epoch 2055 - 2105*
Previous Policy: MIN 13.3		
~~No Active Intervention~~	~~No Active Intervention~~	Managed Realignment
Revised Policy: MIN 13.3		
Managed Realignment with the current alignment maintained at existing defences, (see section A3)	Managed Realignment with review of maintaining the current alignment at existing defences, (see section A3)	Managed Realignment
Previous Policy: ALB 14.1		
~~No Active Intervention~~	~~No Active Intervention~~	~~No Active Intervention~~
Revised Policy: ALB 14.1		
Managed Realignment	Managed Realignment	Managed Realignment

Revised policy for the coastal management units MIN 13.3 and ALB 14.1

- In the light of new evidence since 2010 the revised policy recognises that intervention may be necessary to provide positive management of the shoreline position in response to episodic events within the 100 year framework of the SMP. It does not make or imply a commitment to measures which may be unaffordable, unsustainable or have adverse impacts.
- The revised policy assumes the DEFRA definition of Managed Realignment: allowing the shoreline to move backwards or forwards, with management to control or limit movement (such as reducing erosion or building new defences on the landward side of the original defences). This would not preclude the shoreline remaining in its current position if this is sustainable.
- The existing policy unit boundaries remain unchanged. There is no intention to actively manage the area north of the existing defences in front of North End Avenue which is still within the boundary of MIN 13.3. For the small area to the south of Haven House, Managed Realignment will align with the policy of the adjacent policy unity ALB 14.2 through all epochs and therefore remove any inconsistency or artificial boundary.
- The previous policy of No Active Intervention for MIN 13.3 and ALB14.1 did not preclude minor works resulting in ambiguity of interpretation.

5. Strategic Direction

The flow diagram summarises the key steps in strategic decision making. Our current position within this process is identified by the red dashed box.



6. Options for future management

6.a Intervention

This means pro-actively minimising coastal erosion.

The MML Works Options report recommendation is for control of erosion risk by large scale, proactive beach management.

The report notes that existing defences have a residual life which allows them to be effective into the future, subject to the frequency and severity of future erosion events. This gives time for further monitoring and analysis to produce a well-informed management approach.
The report identified six potentially viable options. These are listed in order of MML preference in the table below. Of the six initial options, four remain viable and are discussed herein.
At this stage, no viable solution has been dismissed and all would be considered, as long as they meet the essential environmental, technical, economic and social criteria.

£ Costs include design, contract procurement & site supervision and construction based on 2015 prices.
£ Costs do not include for maintenance or removal at life expiry.
£ Construction costs have increased by 8% since 2015. (ONS)

Option	Option Name	Length m.	Cost £k.
2	Beach recharge, monitoring and emergency planning	n/a	224
10c	Small, low level rock revetment with end transitions	366	1028
10b	Medium, Low level rock revetment with end transitions	391	1378
10a	Large rock revetment with end transitions	410	3887
9	Steel sheet pile wall with end transitions.	329	511
12	Artificial reef	n/a	3051

£ A requirement for repeat actions means five top up events have been allowed in the whole life maintenance cost.

? Reactive recycling is likely to be required to supplement any works option and to manage end scour effects, therefore there is a need to identify potential material donor sources and make allowance for this action in the maintenance plans for other options.

x Ruled out on grounds of cost and unfavourable environmental impact.

! There was a strong caution against using sheet piling.

x Ruled out on grounds of cost and unfavourable environmental impact.

The four remaining options for intervention (Option 2; Option 9; Option 10c & 10b) are detailed on the following pages.

Option 2: Beach Recharge

Aim: To create and maintain a protective beach width with enough volume to absorb losses from erosion events that will avoid exposure of the weakened defences to prolonged erosion pressure.

Proposal:

- ✓ **Frequent reactive recycling of beach material from local sources.**
- ✓ **A major proactive recycling to**
- ✓ **Ongoing maintenance and reactive refurbishment of damaged existing defences.**

monitoring

essential works

health & safety

funding

Requirements:

- ✓ Comprehensive and proactive monitoring and impact assessment process.
- ✓ Close involvement with adjacent beaches that could be a source of material.
- ✓ Agreements with partners and consenting organisations to allow prompt action.
- ✓ Deferred requirement for defence removal on grounds of interference with natural processes that will apply to other options.

High risk and uncertainty regarding:

- ? Timing and value of spending.
- ? Effectiveness and resilience of an enhanced beach.
- ? Long-term availability of local donor sites.

Funding:
Assume funding of £15k pa (10% of budget) over 30-year life = £450k
Funding gap is £700k for 1 large scale proactive recycling campaign and North End repair.
FDGiA of up to £250k may be available.

Key issues for review under consultation:

- ❖ Likelihood of partnership funding being available for whole life costs.
- ❖ Acceptance of cost and performance risk by potential funding partners.
- ❖ Willingness of those with an interest in neighbouring shorelines to allow use as donor sites.

Total cash cost: £1,150k (2015 base)

Cost split: R&M £170k, Small Project Works £480k. Large Projects £500k

Above: recycling work in late October 2013 to redistribute and restore beach levels at Tinkers End to Headlands. A major recycle scheme would involve > 5 x this volume of beach material.

Actions to 2025.

- Develop a Funding Plan.
- Develop an Emergency Response plan in event of catastrophic defence failure.
- Develop a Beach Management and Monitoring Plan including triggers for intervention and post-recycle evaluation.
- Reactive defence repair and beach recycling.
- Repair damaged defences at north transition.
- Make agreements with adjacent shoreline owners and consenting organisations to identify potential recycling donor sites, and terms for use.
- Continue to appraise public access to the foreshore area and restrict/permit accordingly.

Actions after 2025.

- Review viability of approach at 5-year intervals.
- Implement a major proactive beach recycle event after 2030.
- Reactive defence repair and beach recycle events become more frequent as shoreline retreats and erosion pressure increases.
- Defences abandoned and removed after 2050.

Option 9: Steel sheet pile wall

Proposal:
This option involves driving piles as a backstop, potentially placed on the line between geobags and gabions in phase 2 and behind geobags over phase 1. Installation in this fashion will involve the removal of some parts of the existing geobag / gabion defence. Assumed to be a single works package but may be phased. A similar approach is in place at Bawdsey Manor

monitoring

essential works

health & safety

funding

Requirements

- ✓ There is a presumption in previous reports against the use of piling for reasons that are in keeping with good coastal management practice
- ✓ Piling will probably perpetuate low and changeable beach levels when exposed to wave action. This will have a negative impact on along beach access. Piling is however relatively simple to install and remove and has potential to enable a secure pile-top level along-shore access route to be included.
- ✓ The position of the defence at the point of potential sediment flow blockage will be further landward than other options which may defer the requirement for defence removal on grounds of interference with natural processes.
- ✓ The appearance of exposed steel may be significant from a landscape / seascape impact perspective.
- ✓ Life-extending works will be required to the exposed gabion slope above the rock crest level.

Risk:

This option comes with a strong caution. If piles are driven at Thorpeness the height of exposure will increase over time as the shoreline retreats and the bags in front are lost.

There is uncertainty over the timing of intervention. The cost and performance of this approach is predictable with reasonable confidence.

Total cash cost: **£2,000k** (2015 base)
Cost split: R&M £260k, Small Project Works £480k. Large Projects £1,260k

The photo shows steel sheet piling below Bawdsey Manor which is currently exposed by ~ 3m.

Funding:
SCDC has capacity to fund R&M and contribute to Small Project Works. Assume funding of £15k pa (10% of budget) over 40-year life = £ 600k. Funding gap is £1,400k that includes North End repair, piling installation and removal.
FDGiA of up to £330k may be available.

Key issues for review under consultation:

- ❖ Likelihood of partnership funding being available for whole life costs.
- ❖ Potential impact on sediment transport.
- ❖ Impact of pile appearance when exposed.

Action to 2025.
Develop a viable Funding Plan.
Develop an Emergency Response plan in event of a catastrophic defence failure prior to pile installation.
Continue with reactive maintenance, repair damaged defences at north transition, and beach recycling.
Continue to appraise public access to the foreshore area and restrict/permit accordingly.

Actions after 2025.
Implement defence r&m with reactive beach recycling whilst bag/gabion defences remain viable.
Install piling prior to bag failure assumed ~2030. Extend protection to south of Old Homes Road ~ 2030.
Abandon beach management ~10 years after pile installation.
Remove piling and remaining bag/gabion defences on coastal process sustainability grounds after 2060.

Option 10c: Small rock revetment / Option 10b: Medium Rock revetment

Proposal:
Rock armour slopes are a tried and trusted method of providing a, flexible and robust toe defence. The MML proposal allows for ~30 tonnes of 3-6 tonne armour per linear metre of defence. This volume of rock has potential to provide protection to a crest level to ~2m above Mean sea level (MSL), i.e. to cover the geobag face; with a foundation level of 1m below MSL. The rock slope would be built in the space currently occupied by phase 2 geobags and potentially in front of the phase 1 geobags, assuming their condition was sound at time of works. This is preferable to placing the rock slope in front of the phase 2 geobag slope which will result in earlier exposure and impact on alongshore sediment movement. Illustrations of potential small rock slope profiles for use in the phase 1 and 2 frontages are shown in Appendix 10.

monitoring

essential works

health & safety

funding

Considerations:

- ✓ The appearance of increasing areas of exposed rock may be significant from a landscape / seascape impact perspective.
- ✓ A rock slope would present an increased safety hazard to beach users over that of existing structures.
- ✓ Extensive life-extending works will be required to the exposed gabion slope above the rock crest level.

Risk:

There is uncertainty over the timing of intervention, but the cost and performance of this approach are predictable with confidence.

Funding:

SCDC has capacity to fund R&M and contribute to Small Project Works. Assume funding of £15k pa (10% of budget) over 40-year life = £ 600k.
Funding gap 10.c is £1,850k 10.b is ~£2,400k that includes North End repair, rock slope installation and removal. FDGiA of up to £330k may be available.

Total cash cost: option 10.c: **£2,450k** 10.b: **£3,000k** with a funding gap of. (2015 base)
Cost split: R&M £250k, Small Project Works, £600k. Large Projects £1,600k

The Corton rock armour slope, shown left, has a unit mass of ~ 30tns/m – similar to MML option 10c. The average rock size is a 1.2m cube. It is shown with a low beach level. If used at Thorpeness less rock would be visible in the early years. Small rock pieces are shown above the beach armour rock, over the lower cliff, in the position occupied by gabions at Thorpeness.

Key issues for review under consultation:

- ❖ Likelihood of partnership funding being available for whole life costs.
- ❖ Potential impact on sediment movement.
- ❖ Impact of rock appearance when exposed.

Action to 2025:
Continue with reactive maintenance & repair, damaged defences at north transition, and beach recycling.
Develop a viable Funding Plan & an Emergency Response plan.
Continue to appraise public access to the foreshore area and restrict/permit accordingly.

Actions after 2025.
Implement defence R&M with reactive beach recycling whilst bag / gabion defences remain viable.
Install rock slope prior to bag failure assumed after 2030. Extend protection to south of Old Homes Road ~ 2030. Abandon beach management ~20 years after rock installation. Remove rocks and remaining bag and gabion defences on coastal process sustainability grounds after 2060.

North and South transitions

All the intervention options include the need for works at both the North and South ends of the existing gabion/geobag revetment.

All works are subject to review and confirmation as part of the consultation process.

An assessment of potential options for transitions is discussed below. Other approaches are possible and have not been ruled out.

North End transition

The North End work is currently assumed as a rock slope with gabion cliff protection above that wraps around the northern end to join with the set back cliff line. This is proposed to be built within 5 years as part of a reconstruction of the northern end of the phase 2 revetment.

Management of the northern transition from defence line to undefended cliff has potential to be a major ongoing challenge on many levels including resisting erosion, public access, landscape impact and integration with conservation objectives. The following options are available:

- **Rock slopes**

An allowance for works here is currently included in MML Works options 10b and 10c.

It assumes that the rock profile wraps around the existing geobag structure and joins with the cliff immediately behind.

- **Breakwater**

The original RHDHV design concept was for works at this point to minimise cliff retreat over a ~30m frontage to the north. RHDHV concluded that this was best achieved by a breakwater rather than armouring to the retired cliff line. If a breakwater is to be retained, then it should be made of resilient materials that are appropriate to its increasingly exposed location e.g. rock armour. If softer materials are used, then there will be a need to replace it at ~10-year intervals reducing overtime as erosion pressure increases.

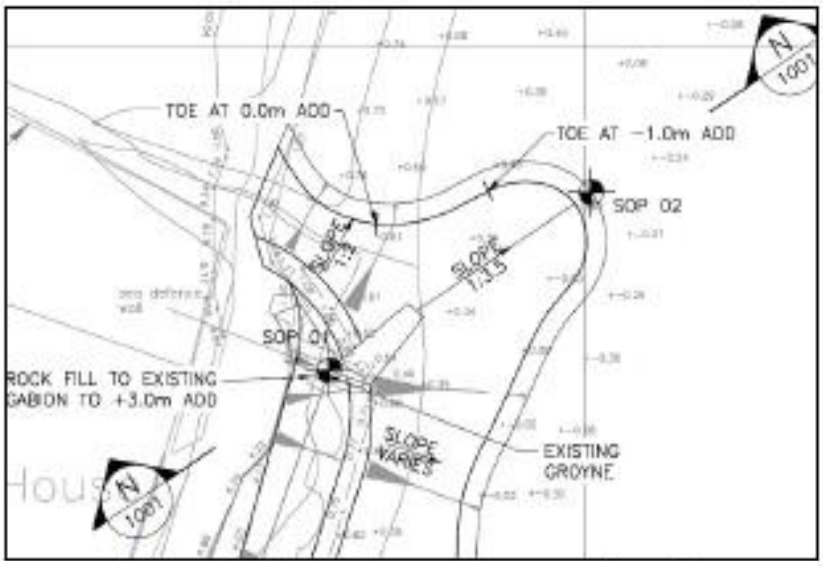


Image above shows RHDHV breakwater design 2010.

MML rock slope option plus rock groyne to north. An alternative proposition (recommended by consultant Mark Glennester) is to remove the bag breakwater, armour the cliff toe around the transition and add a small groyne ~30m northward, all in rock. This is an expansion of the MML suggestion.

- **Breakwater / Reef**

A nearshore reef structure to seaward of the transition that is designed to maximise shelter from damaging wave action, maximise the free flow of sediment behind / around and create safe public access via a dry lee side beach route located between bund and cliff, may be worth further exploration. Such a structure has disadvantages including a potential to immediately interfere with littoral drift and would not protect the cliff behind from damage in a storm.

- **Steel sheet piling (SSP)**

This option not considered to be appropriate at this location which is likely to be frequently exposed.

Red House additional cliff protection

A consideration here is the potential for further significant cliff retreat at the transition north face to prematurely erode cliff top land at Red House. The community view is that this is a weakness in the Standard of Protection afforded to Red House that should be addressed. To place the risk in context Red House is forecast to be lost in year 2050 under Slow erosion and 2035 under Fast. If this risk is to be managed then it will require cliff face armouring, potentially by use of gabions / mattresses placed onto fill over the lower cliff face. The foundation for any cliff face projection that may be added will require careful assessment. The recent high rate of deterioration of bag defences at the north end transition will probably require intervention by 2020 if defence failure is to be avoided. The design of these works should consider if / how to accommodate cliff slope protection on the northern face.

South End Transition

The South End works are an extension of the existing defence, by use of the Hawes **geotextile bags**, to be installed around year 2030. There is a further consideration here in that the phase1 bag defences stopped before the south end of the Tinker's End building leaving some contributors feeling short-changed. Extending the defences here to complete the Tinkers End frontage and also protect the Old Homes Rd access point is an action worthy of consideration.

The MML Works Options report proposes a **rock slope** extending the existing defence frontage to the south by ~25m that spans the Johnnygate frontage and just extends into Headlands. This would provide a very high level of protection that is potentially excessive in the context of both the current and foreseeable future level of risk.

Steel sheet piling (SSP) is also potentially appropriate here as a buried backstop defence.

A further alternative is use of the **Hawes geotextile tube** design that has been installed at Orford and Kessingland -as shown in the photo to the right (Photo courtesy of A. Hawes). This would provide a similar type and quality of backstop erosion protection

to the phase 1 geobags. The local project team that explored potential works options in 2014 considered and rejected their use to replace failed areas of geobags over the phase 2 frontage.

However, their performance at a site of similar exposure (Orford Lighthouse), including their ability to be repaired and added to, makes them worthy of consideration as a medium-term solution in areas of low or intermittent exposure such as the south end transitions or the phase 1 frontage and as a limited life measure to patch isolated areas of major geobag failure in high pressure areas.

6.b Managed Realignment

Managed Realignment includes the setting back of a defended coastline to a landward position, thereby allowing natural processes to operate on the shoreline, with potential benefits to adjacent frontages.

The SMP policy for the northern village frontage, as amended in 2013, is for Managed Realignment (MR) with conditions to maximise the life of protection (see section 3).

It is theoretically possible that a defence could be built at a cliff toe on a set back alignment if, in the future, a stable embayment situation is reached. However, over the northern cliffed parts of Thorpeness it is unlikely that a sustainable set back defence line could be established to landward of the current defence line without significant loss of land and property.

What does Managed Realignment mean for Thorpeness?

At this site long-term MR, following abandonment of the present defence line, should be regarded as the removal of an existing defence to allow the shoreline to evolve at a natural pace with a consequence of property loss.

Why must Managed Realignment be considered as an option?

There exists a need for removal of defences to avoid the foreseeable obstruction to alongshore sediment movement in future. The TCSG suggested that there would be rebuff from the community regarding realignment of the coast to allow sediment in to the system. Erosion forecasts assume that after failure of the current and / or improved defences, erosion will advance landward beyond 2100. After this, a viable setback defence line will not be found. This is due to the width of the coastline, which is squeezed by property behind it, with no room available for natural roll back.

The report findings are that intervention to resist erosion may be viable for a limited time subject to an assessment of environmental impacts and affordability. If it proves unviable to sustain existing or build new defences, then defence degradation and consequent erosion will cause loss of property earlier than shown on the erosion forecast maps. (See `With Existing Defences' found in Appendices 3 and 4).

Weighing up the benefits and disbenefits of Managed Realignment

Realignment of a defence on an eroding coastline has potential for……

✓ **A more resilient shoreline to seaward of a setback defence.**	! **Property devaluation.**
✓ **Improved public along-beach access. opportunity but with some constraints.**	! **Property to be unmortgageable.**
✓ **Improved landscape appeal.**	! **Blight of village potentially brought forward.**
✓ **Removal of interference with natural coastal processes.**	! **Risk to local business investment potentially brought forward.**
✓ **Defence costs to be avoided.**	! **Reduced time for planning and delivery of community adaptation.**

7. Costs & Funding

Any works undertaken to implement a strategy rely on availability of funds.

There are 3 categories of cost to be considered for coastal management work:

£ **Minor repairs and maintenance actions.**

When expressed as an annual average over ~ 40 years is £4k – £6k. These costs are similar to those forecast in the 2010 PAR (£4k pa). SCDC will fund this part.

£ **Small projects each of value <£100k, e.g. beach recycling and/or gabion repair.**

For Slow erosion this comprises ~£50k spend blocks at 7-10 yr intervals. For Fast erosion it is ~£70k at 5-8 yr intervals. When expressed as an annual average over ~20 to 40 years is £12k to £16k. For the purposes of this high-level funding assessment it should be assumed that SCDC will fund works to maintain and manage defences at an average annual rate of £15k pa, which is ~ 10% of SCDC's current annual revenue budget of £150k. A potential exception to this rule may be the North End works that are shown in the above options as required soon.

£ **Large projects i.e. >£100k.**

Spending of this value in any of the above approaches to management is rare. These costs will require local Partnership Funding (PF) potentially including SCDC revenue and / or Reserve budgets plus local community contributions. It comprises major works including:

A. Rebuild defences or a major re-nourish / recycle to sustain protection.

B. Improve / extend the end transitions.

C. Remove defences at life expiry.

Capital, Maintenance and Decommissioning Costs

Spreadsheets in Appendix 7 show assessments of cash and Present Value whole life costs for approaches to management under Fast and Slow erosion scenarios. The purpose is to give an indication of the order of costs associated with various approaches.

Capital costs

Such prices are taken from a variety of sources including the MML Works Option study which uses mainstream contractor & consultant input at framework rates with allowance for risk, and also from the RHDHV 2010 studies, adjusted for inflation.

The key assumptions are:

- £ **Annual maintenance and potentially part replacement of the gabion / geobag upper slope is included, the value of which increases as time passes.**
- £ **The occasional reactive and limited recycling of beach material is allowed both to preserve public amenity and access and also to maximise the life of defences.**
- £ **Defence repair costs are allowed as occasional storm repair responses.**
- £ **Work to improve the northern transition is included by year 2025 in all options bar Do Minimum.**
- £ **Defence reconstruction is included prior to life expiry.**
- £ **Defence removal costs are included at end of life.**

The cash costs for maintenance given in the 2010 Project report were £4k per annum over 50 years plus £25k at year 25 (i.e. in the next period of high erosion pressure), for a major repair after a significant exposure event giving a total cash cost of ~£225k. To this should be added £90k for removal at life expiry giving a current total commitment for SCDC of ~£315k.

Estimated costs within this options report are based upon a response to the erosion scenarios described herein. Actual erosion patterns may differ, and costs change. Costs shown are therefore helpful to compare different approaches but should not be taken as a high confidence prediction of future spending.

The lowest option cost in the current assessment is the Fast Erosion Do Minimum approach that has a cash cost of £437k.

The 'Do Minimum' option does not deliver the 2010 PAR objective for life of protection to 2060 however it is retained as a lowest cost benchmark option.

Flood Defence Grant in Aid (GiA)

The funding from central government for managing flood and erosion risk in England is known as 'Flood Defence Grant in Aid' or 'FDGiA'. The amount of Flood Defence Grant in Aid available for a particular scheme takes into account the number of households protected, the estimated value of damages being prevented and the other benefits a particular project would deliver, such as environmental improvements. It is probable that a GiA sum of ~ £325k (2017 base) will be available as a contribution to item A (in 16.3 above) and potentially to item B, subject to timing. It is highly unlikely item C will attract GiA. Details of how GiA has been calculated are given in Appendix 8.

Necessary Contributions

Until recently central Government would provide 100% public funding for schemes, but only those schemes which were determined to provide the best economic benefits received this funding. Other schemes that still had a positive benefit to cost ratio, but fell below the thresholds that budgets could cover, received no funding. A change to the funding rules means that partial funding is now available, where schemes with external contributions and which demonstrably deliver wider outcomes are looked on more favourably: this is referred to as Partnership Funding. Other sources of funding are potentially available including:

- Levy allocated by the Regional Flood Coast Committee (RFCC).
- Community Infrastructure Levy (CIL).
- Funds from Enabling Development.
- Other - to be identified during consultation.

It will be necessary to undertake a review of the viability of all potential funding sources to ensure that expectations that inform future management decisions are realistic.

8. Other Issues

Private Works

It is understood that landowners may wish to promote and build privately funded works if they perceive a high risk to their assets which is not managed to their satisfaction by public or jointly funded works. An example of this is the gabion wall at Tinkers End.

Landowners who are considering privately funded works should discuss their proposals with Council staff at the earliest time. Any work that is defined as being for the purpose of resisting coastal erosion will certainly require the consent of the Council under the Coast Protection Act 1949 and will also probably planning approval. In taking a view on any proposal the Council will consult the SMP and also this Plan.

Management of the coastline adjacent to Thorpeness

An outline of Coastal Management within the wider TANP boundary and in relation to neighbouring locations, is described herein. It was felt that it was important to look at the whole picture, It was noted that discussions and options would form part of the public consultation.

Coastal area	Authority	Policy	Status and Action
S. of Sizewell to Thorpe Ness (MIN13.2)	SCDC	NAI	Stable vegetated backshore & reposed cliff On-going monitoring, no planned intervention Active liaison with EdF* on SZC coastal impact.
Thorpe Ness to Red House (MIN13.3)	SCDC	NAI	Erosion / accretion and unstable cliffs at southern part Private landowner measures for public safety No justification for intervention
Red House to Benthills (ALB14.1)	SCDC	MR	See main section of report
Benthills to S. of Haven House (ALB14.1)	EA*	MR	Long term trend of shoreline stability. On-going monitoring of shingle bank and flood risk. No planned intervention. Potential for reactive management of localised breach to avoid village flooding. Monitor surge overtopping towards sluice in line with SMP expectations for Aldeburgh Road.
Slaughden (ALB14.3 &4)	EA*, CE*, SCDC *Subject to comment by EA & RSPB.*		Liaison to assess possible impact of shingle engine on Thorpeness Coastline

Management of risk from actions beyond TANP boundaries

Sizewell C – the proposed building of a nuclear power station on the Sizewell frontage is currently under consultation stage 3 and following this will be an application for a development consent order.

The ongoing dialogue between EDF and organisations with coastal management interests includes processes to identify and mitigate potential negative impacts on the Thorpeness frontage arising from the `C' development. The Marine Technical Forum (MTF) is developing a Monitoring and Mitigation Plan to provide protection for the interests of the community, SCDC and stakeholders.

Beach access & Public Safety

Existing defences tend to suffer significant damage whenever exposed to an active eroding beach and are difficult to repair to a standard that allows safe public passage over them. After an assessment of the risk and consideration of options for response, the Council's view is that when adjacent beach levels are low and beach walkers are forced onto the defences at some states of tide, public access over the defences poses an unacceptable risk that cannot be reduced and so must be controlled by hazard warning signs and diversions.

Member of the public walking on defences at high tide 2018

At times of low beach levels, the Council has erected notices to advise beach users to not walk on the beach below North End Avenue owing to exposed hazardous defences, and to divert inland. Signs to this effect are in place at Old Homes Road and on the Ness beach. This work was delivered in consultation with and with agreement from parties including SCC Rights of Way team and landowners.

When beach levels are high and along beach access can be achieved at all states of tide without crossing over defences, the restrictions will not apply. Management of this issue will be affected by potential future works to the defence structures and so must be kept under review.

Further study

A 'Wave RADAR' study led by Bournemouth University and supported by MML, began in 2015 and is due to be completed in early 2019. Preliminary interim reports have been produced and have been considered in this report. The findings of the final reports will be assessed and may require an update of the Report. Interim reports are available on the CPE website.

The Sizewell C project has included a marine study known as BEEMS the reports from which have underpinned decision making on all marine elements of the Sizewell scheme design. These reports will probably remain commercially protected until submission of the Development Consent Order (DCO) expected in 2020. When made public they will provide a wealth of information. Some data from these reports have been made available to SCDC and considered in previous reports.

Monitoring and Reporting

Recent studies and this report identify major uncertainties in forecasting future coastal change.
In order to inform future management decisions, it will be necessary to set up a process for the gathering and interpretation of monitoring data and for findings to be shared with the community on a regular basis (frequency tbc).

A scope for this will developed as part of the Council's wider Shoreline Monitoring programme in liaison with partners EA and NE who have an interest in adjacent frontages.
The scope will consider how to define criteria for the measurement and analysis of both environmental change and defence condition. These data will then inform the timing and design of interventions linked to defence management including maintenance and renewal and also sustainability assessments that are required to trigger removal, as discussed in report part 7. Management actions involving beach recycling will also require proactive monitoring and impact / benefit assessment.
It is now evident that coastal erosion pressure will degrade parts of existing defences that are exposed

9. Conclusion

to erosion pressure for an extended period. It is likely that all of the current defence will require replacement or strengthening if the policy objective and community aspiration is to be achieved.

This report identifies potential works, with associated costs and environmental impacts, as a basis for consultation to test the viability of potential approaches to management.

The report also discusses the consequences of realignment which will be the outcome if the aspiration to resist erosion pressure is found to be unviable.

Feedback from the previous consultation process has allowed this report to be produced with higher confidence of deliverability.

Community Aspiration: "to provide protection of property north of the Headlands to 2060".

Next Steps

There are several key uncertainties identified in the report that should be reduced following initial consultation with key stakeholders including:

- Is there a realistic possibility of funding for the potential stream of works required to resist erosion pressure, including decommissioning at life expiry?

- To what extent will the need to avoid significant interference by defence works with natural coastal processes constrain the design and management of works and what conditions will apply regarding impact assessment and removal?

After the next phase of consultation, with both the local steering group and wider public, the next iteration of this report will have even higher confidence outcomes and can then inform the TANP. An Implementation Plan is to be prepared after the next consultation feedback.

The key to the right helps to interpret the diagram on the following page which outlines the major steps in the coastal management history of Thorpeness.

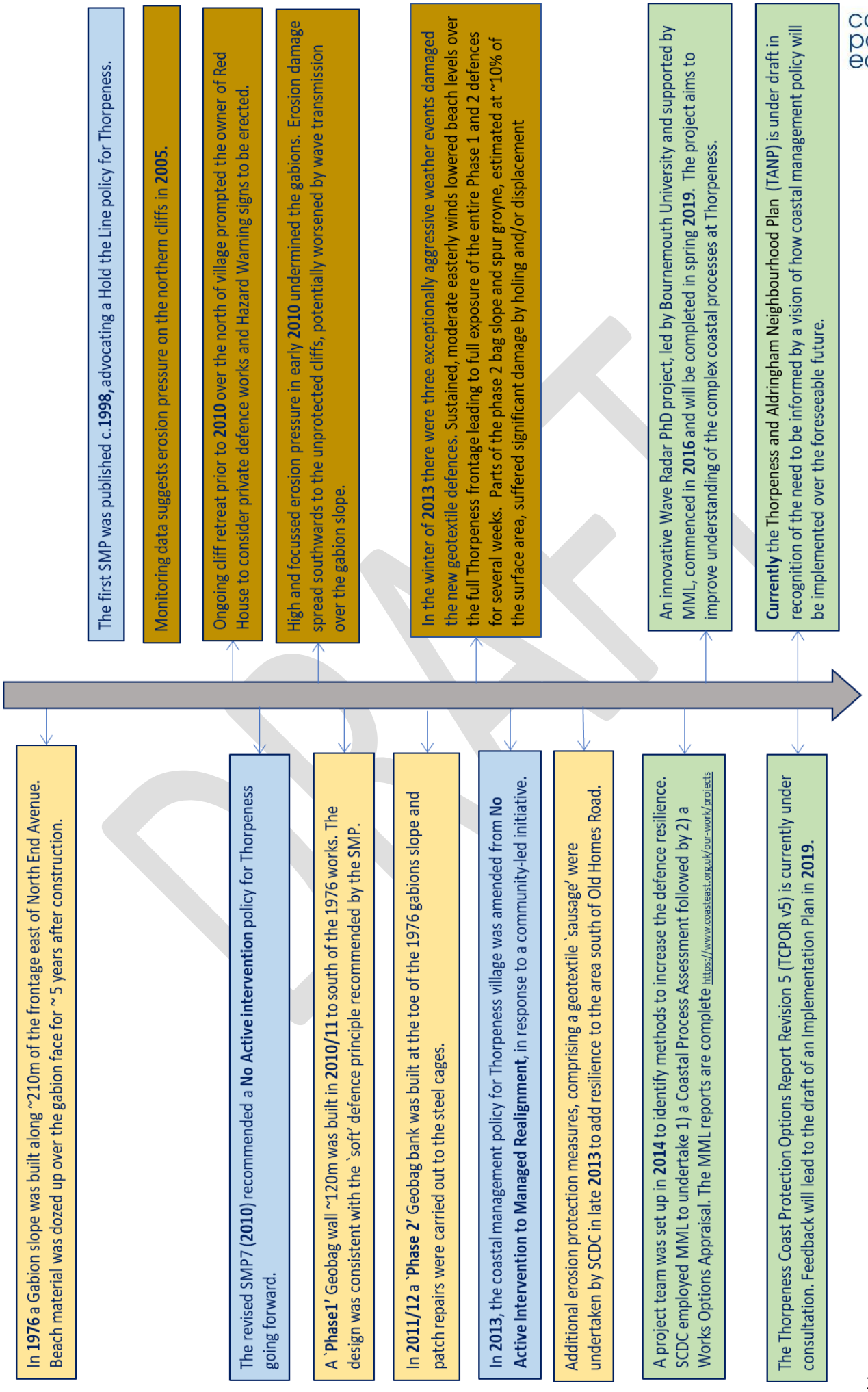
Key

Action associated with the Shoreline Management Plan

Erosion events and related actions.

Actions related to strategic decision making and local knowledge acquisition.

Actions to implement the coastal management plan through construction, repair and maintenance.


The first SMP was published c.**1998**, advocating a Hold the Line policy for Thorpeness.
Monitoring data suggests erosion pressure on the northern cliffs in **2005**.
Ongoing cliff retreat prior to **2010** over the north of village prompted the owner of Red House to consider private defence works and Hazard Warning signs to be erected.
High and focussed erosion pressure in early **2010** undermined the gabions. Erosion damage spread southwards to the unprotected cliffs, potentially worsened by wave transmission over the gabion slope.
In the winter of **2013** there were three exceptionally aggressive weather events damaged the new geotextile defences. Sustained, moderate easterly winds lowered beach levels over the full Thorpeness frontage leading to full exposure of the entire Phase 1 and 2 defences for several weeks. Parts of the phase 2 bag slope and spur groyne, estimated at ~10% of the surface area, suffered significant damage by holing and/or displacement
An innovative Wave Radar PhD project, led by Bournemouth University and supported by MML, commenced in **2016** and will be completed in spring **2019**. The project aims to improve understanding of the complex coastal processes at Thorpeness.
Currently the Thorpeness and Aldringham Neighbourhood Plan (TANP) is under draft in recognition of the need to be informed by a vision of how coastal management policy will be implemented over the foreseeable future.
In **1976** a Gabion slope was built along ~210m of the frontage east of North End Avenue. Beach material was dozed up over the gabion face for ~ 5 years after construction.
The revised SMP7 (**2010**) recommended a **No Active intervention** policy for Thorpeness going forward.
A `**Phase1'** Geobag wall ~120m was built in **2010/11** to south of the 1976 works. The design was consistent with the `soft' defence principle recommended by the SMP.
In **2011/12** a `**Phase 2'** Geobag bank was built at the toe of the 1976 gabions slope and patch repairs were carried out to the steel cages.
In **2013**, the coastal management policy for Thorpeness village was amended from **No Active Intervention to Managed Realignment**, in response to a community-led initiative.
Additional erosion protection measures, comprising a geotextile `sausage' were undertaken by SCDC in late **2013** to add resilience to the area south of Old Homes Road.
A project team was set up in **2014** to identify methods to increase the defence resilience. SCDC employed MML to undertake 1) a Coastal Process Assessment followed by 2) a Works Options Appraisal. The MML reports are complete https://www.coasteast.org.uk/our-work/projects
The Thorpeness Coast Protection Options Report Revision 5 (TCPOR v5) is currently under consultation. Feedback will lead to the draft of an Implementation Plan in **2019**.