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Subject: Hemsby Rock Berm Options and Recommendation

Report to: Executive Leadership Team 7 July 2021

Environment Committee 28 July 2021

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SUBJECT MATTER

This report provides an overview of progression of the next steps including the rock berm options that have been developed and the Environmental Statement that has been prepared, a summary of the public consultation undertaken and a discussion of which rock berm option is the most appropriate to take forward for planning and other consents. It also gives an overview of the next steps that need to be taken to move the scheme forward.

RECOMMENDATIONS

That Environment Committee :

1. The progress of this work is noted.
2. The rock berm outline design (Option 1) is taken forward to seek necessary consents and licences with flexibility to construct the shorter (Option 2) or lower (Option 4) structures. Funding for consents and licences is available as identified in section 12.1 totalling no more than £10,000 this being delegated to Head of Property and Asset Management and Section 151 Officer to authorise the following applications: planning consent, marine licence, coast protection notification, landowner consents.
3. To exclude from further consideration rock berm option 3 for the reasons identified in table 1 of the report.
4. A funding Strategy be developed and funding applications submitted to relevant sources to maximise the likelihood of a scheme proceeding.

1. INTRODUCTION/BACKGROUND

- 1.1. The coastline at Hemsby is eroding which has and will continue to have impacts on the lives of individuals and the community. Since the 2018 'Beast from the East' work has progressed in understanding the coastal process on the coast, consideration of short and long term coast protection options, initiating consideration with regard to rolling back or adapting assets at risk of erosion and continuing discussion with the community.
- 1.2. A report was presented to the November 2019 Environment Committee meeting outlining the coastal processes that have brought about the current situation, the project's objectives, how we will engage with the community and how we propose to move forward.
- 1.3. The objectives are:
 - Improve knowledge, understanding and awareness of coastal processes affecting the Winterton to Hemsby frontage.
 - Provide opportunities for the communities to participate in developing the way forward.
 - Investigate feasible coastal defence options (covers the criteria of effective, affordable and acceptable).
 - If a viable option is identified, seek an appropriate mechanism to deliver a scheme.
 - Explore alternative coastal management options and develop a coastal adaptation plan and projects suitable for the needs of each community.
 - Great Yarmouth Borough Council and relevant partners seek resources and funding to deliver the coastal adaptation plans.
- 1.4. The next steps as outlined in the November 2019 report were:
 1. Develop and submit environmental screening and scoping for preferred short term rock berm coast protection option.
 2. Develop outline designs and refined costs to support screening and scoping,
 3. Environmental Impact Assessment and funding development
 4. Procure and complete EIA, Habitat Regulations Assessment etc. for preferred short-term option
 5. Develop suite of short-term adaptation options for further consideration
 6. Investigate financing options for short term protection option and adaptation options
 7. Support the delivery of the Icarus project to assist with community understanding of coastal change and long-term adaption options.
- 1.5. This report provides an overview of progression of the next steps including the rock berm options that have been developed and the Environmental Statement that has been prepared, a summary of the public consultation undertaken and a discussion of which rock berm option is the most appropriate to take forward for planning and other consents. It also gives an overview of the next steps that need to be taken to move the scheme forward.
- 1.6. Whatever rock berm option is selected there remains a challenge to seek sufficient funding to construct a scheme.
- 1.7. For clarity rock berms will NOT prevent erosion entirely. Therefore under all options there is also a need for the community to adapt to coastal change. GYBC through CPE are progressing projects to seek to assist with identifying support for communities at risk of coastal change.

2. Short term protection - Rock berm concept

- 2.1. A rock berm is low level structure built from large armour stone, which limits erosion by protecting the base of the dune cliffs through breaking waves a short distance seaward of the dune face and reducing wave energy. This slows the rate of erosion and removal of loose sand behind, but during extreme storm events waves may still over wash it, which may result in erosion of the dune behind.
- 2.2. There is already a working example of a rock berm, at California, approximately a kilometre to the south of the southern boundary of the proposed scheme (Figure 1).

In summary, a rock berm:

- **will limit but not completely stop erosion**, but it prevents the ongoing day-to-day tidal and wave action regularly cutting away at the foot of the dune and reduces the impact of waves on the dune face during larger storms.
- **will not prevent beach lowering** but should not result in any increased erosion of the beach in front.
- has a lower elevation than a full height seawall or rock revetment but is a lower cost than a full protection option, such as a full height rock revetment, and has a lower environment impact.
- will not affect the changes in the beach or channel movements operating along this shoreline seaward of the berm, unlike beach control structures. It therefore has a lower environmental impact and costs considerably less than beach management options.
- will allow sand accumulation behind the berm, which will provide additional buffer during subsequent storms.



Figure 1 California rock berm

3. Design considerations

3.1. In developing the outline design of the berm, several key factors have been considered:

- A scheme design life of 20 years that can address changes in beach level and expected storm conditions over that period. The rock berm at California has provided the working concept for the Hemsby outline design but has been adapted to take account of local beach volatility, erosion rates, wave conditions and water levels.
- Maintaining safe access at Hemsby Gap for operation of Hemsby Lifeboat and for beach users.
- Determining the length of berm to achieve the optimal balance between the potential extent of protection and cost.
- Considering environmental impacts upon natural environmental features and implications for future planning consents necessary to progress a scheme.
- Considering construction approaches and in particular the transportation of materials to the site (via land or sea).
- Making beneficial use of the hexiblocks. 150 hexiblocks were installed at Hemsby in 2015 as part of a trial coastal defence scheme with a substantial proportion of the scheme cost raised by the Save Hemsby Coastline group. The community is keen for these to be reused in any future scheme and a number of options have been considered.

4. Rock berm options for Hemsby

On the basis of the design scope, an outline berm design has been developed. This has been based upon a berm extending along the Hemsby frontage from the gabions at Newport Cottages, covering both north and south of Hemsby Gap, and of a similar structure to the rock berm at California. This is referred to as the 'outline design'.

In addition to the outline design, variations have also been considered as part of looking to improve the economic case and eligibility for obtaining government flood and coastal defence funding, and also in response to feedback received from the community. These variations have considered both a change in length of the berm and reducing the rock volume (and therefore cost) of the berm.

1. For the outline design, a berm 1,330 m in length has been designed and costed.
2. A shorter length berm of 1,090 m has been considered to reduce construction costs.
3. The possibility of extending the berm to 1550m to 'Dolphin Gap' has also been considered, in response to feedback from the community.
4. A variation in berm profile and a modified toe has also been considered to reduce the volume of rock required and thus reduce costs.

The berm at California, has been used as a prototype for designing the berm, in terms of rock size and volume.

The details of the design basis are in Appendix 1

4.1. Outline Design

Option 1 Berm +3mOD, 1330m length

It comprises 3-6 tonne rock armour, underlain by smaller bedding rock and geotextile. The berm will have 1 to 3 seaward slope and crest elevation of +3.0 mOD, with an overall footprint of no more than 3 hectares (0.03km²). The rear of the berm would be located within 5 m of the base of the dunes.

Proposed location

The scheme is designed to reduce erosion over the frontage from Newport Road at the southern end of Hemsby, to the northern end of the overflow car park, incorporating the furthestmost chalets in the Marrams north of Hemsby Gap. (Figure 3)

The design berm length of 1,330 m includes a short extension of rock north and south of these points, to transition to the existing shoreline and minimise the risk of any future erosion at the ends reaching the assets being defended. At the southern end the berm will transition to the existing gabion wall defence at the northern end of Scratby. At the northern end, the rock section will gradually reduce over a distance of approximately 50 m but will remain aligned a few metres in front of the dune face.

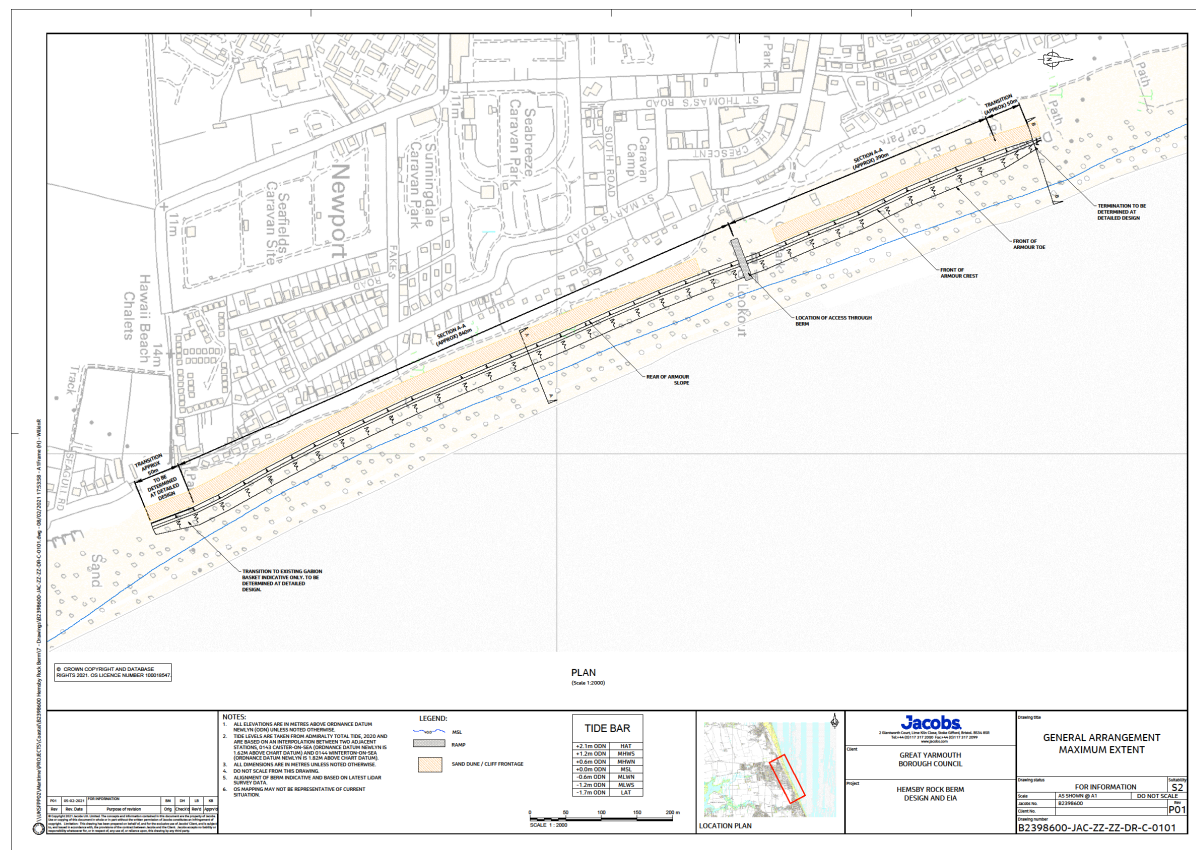


Figure 3 Outline design 1330m

4.2. Variations

Option 2 Shorter length berm: +3 mOD berm, 1,090 m length

To reduce scheme costs and improve the economic case for obtaining Government grant aid, one option is to reduce the length of the berm. To maximise the number of properties still protected, a length of 1,090 m has been determined, which would reduce the extent at the northern end by around 240 m and mean the berm would finish approximately 80 m north of the mini-roundabout at Hemsby Gap. The southern extent would remain the same. (Figure 4)

The berm profile would be the same as for the outline design, so that along the majority of the frontage, there would be no change in the level of protection from that provided by the outline design berm. However, the five northernmost chalets would remain subject to the same erosion potential as at present.

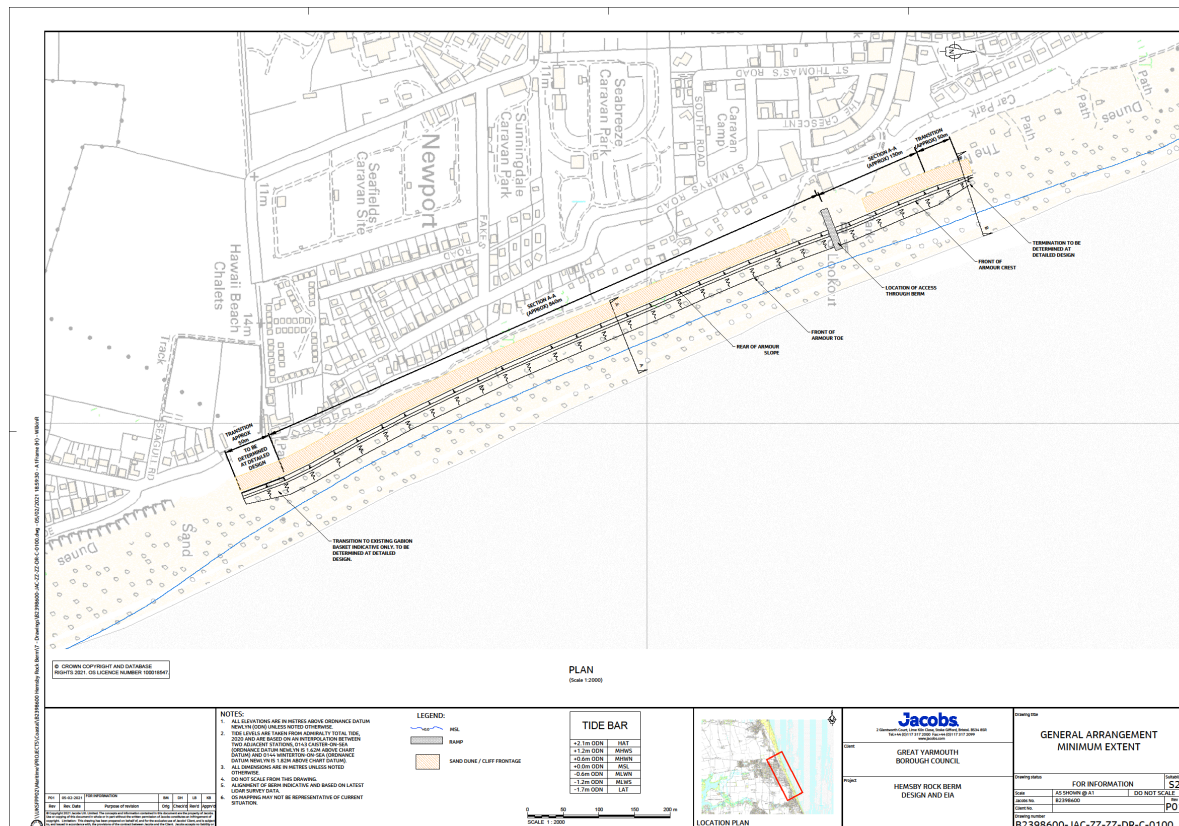


Figure 4 Rock berm 1090m length

Option 3 Extended length berm: +3 mOD berm, 1,550 m length

In response to feedback from the local community, a longer berm length has also been considered. A length of 1,550 m, extending to the informal access point through the dunes known as Dolphin Gap. This would protect a stretch of The Valley but there are no additional properties to be protected.

The berm profile would be the same as for the outline design, so there would be no change in the level of protection to properties and businesses from that provided by the outline design berm.

Option 4 Reduced berm (alternative profile): 1,090 m length

A modified berm profile has been evaluated (at a high level rather than as a fully developed outline design) to establish whether this would be viable to improve the potential eligibility for grant, and reducing the gap in funding to be found.

The principles of this structure are the same, in that it will reduce wave and storm impacts on the dune face, but it would involve less rock and a reduced construction effort, so would reduce overall costs.

This could be achieved through initially building a slightly narrower berm to a similar elevation but with a steeper profile. The berm would also not extend to the full toe depth as the outline design. As a consequence, this berm profile would be expected to naturally settle and adjust in form and level over time, in response to beach lowering during storms. The front face of the berm would gradually extend, meaning that the overall berm height would also lower over the 20 year scheme life. This is called 'dynamic reshaping'. (Figure 5)

As the aim of this design would be to reduce costs, this variation has been considered over the shorter length of 1,090m, although costs for the full 1,330m have also been estimated.

HEMSBY RESHAPING BERM

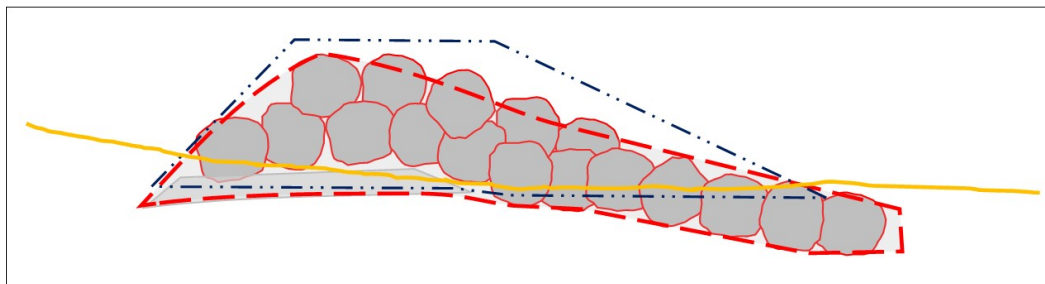


Figure 5 Reduced profiled berm

4.3. **Influence on erosion rates**

There are no standard industry methods available to assess how much influence a rock berm structure will have upon erosion rates. Therefore an adapted methodology has been developed, based upon formulae for calculating wave forces on walls.

Outline design

The calculations indicate that under regular conditions, when tidal levels are below HAT, the berm should eliminate most, if not all, erosion at the dune toe. Under storm conditions, the berm is expected to reduce the erosion by around 70% (compared to 'doing nothing'). To put this into context, if a storm results in 15 to 20 m erosion in an undefended situation, that should be reduced to around 5 to 6 m erosion by the outline design berm.

Reduced berm profile

This modified design would still minimise erosion during 'regular' conditions and would provide a reduction to the erosion extents during large storms. That reduction would be less than the outline design and using the same calculations as applied for the outline design berm, the reduction in erosion has been estimated to be around 50% (compare to 'doing nothing'), based upon an expectation of an adjusted berm elevation of +2.0 mOD.

4.4. **Construction**

The outline design berm and the reduced berm have different structures and designs. Therefore a choice needs to be made as to which design to construct as they cannot be interchanged. The reduced berm design cannot be added to at a later date to make it higher without full reconstruction although the length could be added to within consent approvals. (See Section 4.5)

4.5. **Phasing of works**

Phasing of the works could be considered, which may address some funding constraints as key sections could be prioritised and built first. If this was the case there will however be an impact on both the level of protection provided and on costs. The cost of phasing will total more than constructing in a single campaign. This is because the costs of mobilising and demobilising etc. will be incurred twice. There may also be some additional re-handling of materials required too. No additional government funding will be available, so any supplementary funding required would need to be sought locally.

4.6. **Maintenance**

The design and use of rock means there is unlikely to be maintenance required over the 20 years of the scheme, beyond the repositioning of any rocks displaced by storms. Maintenance to the timber ramp may be required towards the end of the scheme period but should be minimal as this structure should remain mostly buried.

4.7. **Decommissioning**

The long-term plan for the rock berm is yet to be determined as this forms part of the review of future adaptation measures. The use of rock means that repositioning of the berm (i.e. to a more landward position) or removal and re-use elsewhere are both feasible. Decommissioning plans and timing may need to form part of any consents. Dependent on the level of erosion over the 20 year period and monitoring of impacts it may be feasible to reapply for consent.

5. **Costs of rock berm options**

Cost estimates have been developed using established rates for different materials and methods, with input from a highly experienced marine works contractor. The summary is provided in Table 1 towards the end of the report.

The range in costs reflect the risk contingency allowance that needs to be included in any flood and coastal defence economic evaluation. A risk contingency of up to 30% has been applied to all costs, which takes account of unknowns such as: whether the beach levels will be high or low at construction time and the extent of excavation required; the potential for rock delivery rates to change (rock being the main cost component) and the potential for disruption during works such as due to exceptional weather.

Maintenance requirements are likely to be negligible, so no additional costs have been included. No costs for decommissioning or relocation of the rock have been included as this is would only take place beyond the present 20 year appraisal period for which funding calculations are being based. It is highly likely that if the berm was to be removed, the rock would be re-used for another scheme, in which case decommissioning costs would possibly be met by the new scheme.

5.1. **Partnership funding.**

Any flood and coastal erosion risk management project where the benefits are greater than the costs can qualify for funding from central government, known as 'Flood and Coastal Erosion Risk Management Grant in Aid' or 'FCERM GiA'.

The amount of GiA a project is eligible for depends on the 'benefits' it achieves, based upon a defined set of formulas. Information on costs and benefits is put into the Environment Agency's partnership funding calculator to work out how much FCERM GiA might be available (known as 'partnership funding') and how much extra money will need to be raised from partners through contributions.

An analysis has been undertaken to assess the benefits the outline design and variations could achieve, using guidance set out by the Environment Agency. The detail is presented in Appendix 2.

Using the partnership funding calculator (2020), the maximum amount of GiA available to a scheme at Hemsby has been calculated, which is based on the outcomes it should achieve over the 20 years of the scheme. The outcomes are based on the calculated damages and benefits of each scheme. The calculator also defines the minimum amount of alternative contributions that need to be obtained.

The Environment Agency will only allocate FCERM GiA towards the project if there is proof that this extra funding is secure and sufficient to deliver the whole life scheme.

The outputs from the partnership funding calculator demonstrate that the outline design and variations considered are all borderline or marginal in terms of their eligibility for GiA, due to their low benefit to cost ratios. The GiA funding for all variations would therefore be subject to contributions from other sources.

For the outline design, the eligibility of the scheme is sensitive to the risk allowance – 30% of the total is the recommended risk allowance for this stage of design, but risks and uncertainties would need to be reduced in order for it to become eligible. Both the shorter length berm and the reduced berm would reduce costs and although both would mean a reduced level of protection, the benefit to cost ratio would improve. This means that they are more likely to be eligible for funding. The reduced berm presents significant savings in terms of project cost, and whilst the maximum GiA available is less, the minimum funding to be sought is therefore also greatly reduced.

5.2. Other funding partners

Contributions that fill the funding gap will need to be sought. These may be through a range wide of groups and organisations, and could include: local contributions, landowner contributions, local authority contribution and other funding sources. Contributions will need to be secured before FCERM GiA will be allocated by the Environment Agency. In support of this, a separate economic appraisal is being commissioned which will identify the wider benefits that a scheme at Hemsby would achieve.

A key constraint around the timing of delivery of a rock berm option is dependent on how long it takes to raise sufficient funding to proceed. The more funding that is required is likely to increase the length of time it will take to raise the funds.

6. Benefits of a rock berm scheme

In determining ‘benefits’ for FCERM GiA, a comparison is made to a ‘do nothing’ baseline. This assumes that there is no investment in coastal defences, and in the case of Hemsby would mean that erosion of the dunes would continue unabated. The ‘do nothing’ baseline must cover the same period as the proposed scheme, which is 20 years. The calculated ‘benefits’ are the damages that are delayed or avoided by the scheme. (A summary is provided in Table 1)

Do nothing’ (baseline and current situation)

North of Hemsby Gap, chalets within the dunes are at high risk from erosion during the next major storm event and likely to be lost early within the next 20 years. Properties along The Glebe are not expected to be lost over the next 20 years. Over this period, erosion could potentially reach the overflow parking and hardstanding car park towards the end of the 20 year period.

At Hemsby Gap, the Lifeboat Station and business properties, public toilets and first aid posts and Mini Golf are at risk within 20 years.

South of Hemsby Gap, the next major storm would mean likely erosion of the road to The Marrams, meaning access to houses along The Marrams, together with some services to these houses would be lost. Those houses closest to the dune edge are also at high risk of loss during the next major storm.

Many of the houses along The Marrams could be lost within 20 years, with increasing risk to properties along St Mary's Road and Fakes Road, with some of these, namely those closest to the dune edge, potentially to be lost towards the end of the 20 year period.

(a) Outline design: +3 mOD berm, 1,330 m length

This structure should better defend the dunes from erosion during regular conditions and reduce erosion during extreme events by around 70% compared to 'do nothing'.

North of Hemsby Gap, the proximity of the chalets to the dune edge means that although the berm may provide protection to most of these during the first storm event, potentially they would still be lost over the 20 year scheme life. The overflow parking should remain protected. The hardstanding car park may be slightly affected at the end of the 20 year period.

At Hemsby Gap, the Lifeboat Station and business properties, public toilets and first aid posts and Mini Golf should remain protected during this period.

South of Hemsby Gap, there would still remain a high risk of the access road (and services to properties) becoming lost in the first major storm event, as the road is already extremely close to the dune edge. Therefore, there would be a need to relocate services and consider alternative access arrangements even with a berm in place. The remaining house on the seaward side of the road would potentially be lost, probably during the next storm event.

The berm will, however, delay the time until loss of other houses in The Marrams, with many of these likely to be protected for the 20 years. The highest risks remain at the southern end of the frontage, where houses are closest to the dune edge. Houses along St Mary's Road and Fakes Road are expected to be protected over the 20 years.

(b) Shorter length berm: +3 mOD berm, 1,090 m length

The situation would be as (a) for the frontage from Hemsby Gap, southwards.

North of Hemsby Gap the northernmost five chalets within the dunes would not be protected and would therefore remain at high risk from erosion during the next major storm event. Over the 20 year period, erosion could reach the overflow car park, but properties along The Glebe are not expected to be at risk. The Lifeboat Station & Hemsby Gap businesses, public toilets and first aid posts, Mini Golf would be protected.

(c) Extended length berm: +3 mOD berm, 1,550 m length

No additional properties or assets would be protected (compared to 'do nothing') compared to (a).

(d) Reduced berm (alternative profile): 1,090 m length

This structure should protect the dunes from erosion during regular conditions and reduce erosion during extreme events by around 50% compared to the 'do nothing'.

As for (b) north of Hemsby Gap the northernmost five chalets within the dunes would not be protected (assuming this shorter berm length) and would therefore remain at high risk from erosion during the next major storm event. Over the 20 year period, the overflow car park could be eroded, but it is unlikely that properties along Beach Road and The Glebe would be at risk. The Lifeboat Station & Hemsby Gap businesses, public toilets and first aid posts, Mini Golf would be protected.

Hemsby Gap and south, there would remain a risk of the access road (and services to properties) becoming lost in the first major storm event, as the road is already extremely close to the dune edge.

Therefore, as for the +3 mOD berm (a), there would be a need to relocate services and consider alternative access arrangements even with a berm in place. The hardstanding car park could also become at risk towards the end of the period.

The lower protection provided by this reduced berm means that more properties within The Marrams would be at risk of loss within the 20 years, although all but the remaining house on the seaward side of the road, are still unlikely to be lost during the first major storm. Risks are highest to those properties at the southern end of the frontage, due to their proximity to the dune edge and some of these could become at risk by the second storm event.

Properties within St Mary's Road are expected to be protected throughout the 20 year scheme life, but there will be an increasingly risk to some properties within Fakes Road, namely those closest to the dune edge, towards the end of this period.

Under all scenarios there is a need for the community to adapt to coastal change.

7. Access at Hemsby Gap

7.1. Access requirements

The main access to the beach is at Hemsby Gap and this needs to be maintained for both beach users and Hemsby Lifeboat, with the latter requiring access in all conditions.

There are a number of additional informal access routes to the beach, including down the cliff face approximately 50 m south of Newport Cottages and through a low point in the dunes, known as Dolphin Gap, north of Hemsby Gap. These accesses would not be affected by the scheme and have therefore not be considered further as part of the outline design.

7.2. Options for Hemsby gap access

A range of different access arrangements have been evaluated:

(1) Open gap through berm The access arrangement would remain the same as at current. This would, however, leave the beach area through the gap and areas of the adjacent dune exposed to wave attack and erosion.

(2) Piled ramp up-and-over the berm This would be very intrusive and expensive. The slope of the ramp would be too steep for safe public use, therefore additional public ramps and steps could be required. The need for piling presents additional challenges for environmental consenting, due to noise and vibration during construction.

(3) Access through overlapping berm The seaward-most stretch of berm would need to protrude much further offshore and would potentially affect beach sediment movement. This could both result in difficulties for public access to the beach north of Hemsby Gap, and possibly exacerbate beach lowering in the area in front of the Gap.

(4) New ramp through berm This would involve formalising the access point at Hemsby Gap, re-using Hexiblocks (these were installed at Hemsby in 2015 as part of a trial coastal defence scheme and the community is keen for these to be reused in any future scheme).

7.3. Proposed access solution

The proposed solution involves installation of a buried timber decked ramp, underlain by Hexiblocks, to provide a lower profile (rather than full opening) through the berm. This solution would be applicable to both the outline design and the variations considered. (Figure 6)

This solution will maintain an access arrangement very similar to the current situation, but should the beach level drop, the timber decked ramp would ensure access can be maintained. Being at a lower elevation, this ramp can also be constructed to a slope suitable for pedestrian access.

The underlying Hexiblocks would provide some stability to this ramp and limit further erosion beneath from storm waves. The toe of the berm is continued across the gap to provide some seaward protection and support to the Hexiblocks and ramps if exposed. The remaining Hexiblocks can be used around the dune foot either side of the access point, to provide some additional erosion protection from any wave run up through the gap in the berm. This would also prevent public access into the dunes themselves at this point, possibly allowing some dune recovery.

Although not included in the outline design costings, posts with removable flood boards could also be incorporated at the narrowest point of Hemsby Gap, if desired.

HEMSBY GAP ACCESS DETAIL

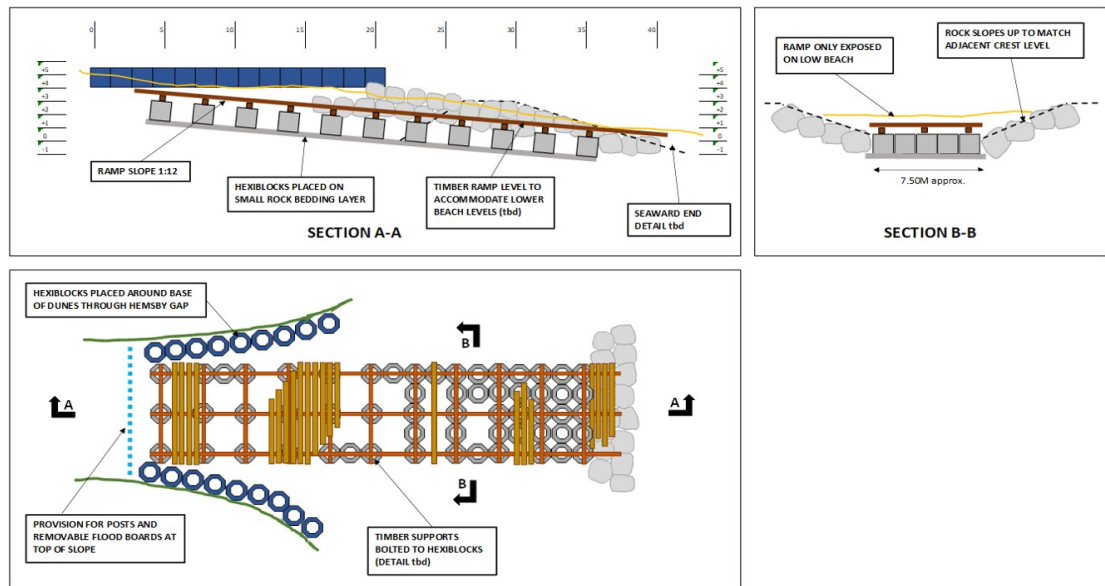


Figure 6 Hemsby Gap access solution

8. Consideration of flood risk

- 8.1. The risk to properties at Hemsby is from erosion, but concerns have been raised by the community regarding the risk of flooding through the low-lying area to the north of Hemsby Gap, known as The Valley. An appraisal of this risk has therefore been undertaken.
- 8.2. This concluded that there is no natural flood route through The Valley by which properties in Hemsby or Winterton would be affected by tidal flooding as The Valley forms a basin shape constrained by naturally rising land. Tidal flooding within The Valley could only occur during extreme surge events, and if the narrow ridge of dunes to seaward were to be breached or eroded. Due to the natural topography of the area, flooding would be limited to the centre of The Valley, with no properties affected. Any water in The Valley would seep away or dry out.

9. Environmental Impact Assessment.

The purpose of Environmental Statement is to present the statutory Environmental Impact Assessment (EIA) and provide an assessment of the predicted environmental effects relating to the construction and continuing presence of a rock berm along the foreshore. In line with the EIA Regulations, the assessment focuses on the effects that are considered 'likely to be significant'. Where adverse effects are identified mitigation measures have been recommended to either avoid or reduce the impacts. This is a requirement for consenting.

Screening and Scoping opinions were sought from Great Yarmouth Borough Council (GYBC) under the *Town and Country Planning (EIA) Regulations 2017*. The screening opinion from GYBC determined that the project should be screened in and that EIA would be required.

A Scoping Opinion was requested from the Marine Management Organisation (MMO), as required by The Marine Works (EIA) Regulations 2017 (as amended).

Scoping responses were received from Great Yarmouth Borough Council (GYBC) on 10 March 2020 and from the MMO on 12 January 2021. Both GYBC and the MMO incorporated responses from key consultees that were asked to provide their comments on the project. The responses received have guided the focus of the EIA.

On the basis of the design scope established by GYBC, for this outline design stage a berm 1,330 m in length has been designed, extending from around 50 m south of the Newport/Scratby boundary to around 440 m north of Hemsby Gap (as shown on Figure 2-1). As part of the precautionary approach to this appraisal, a *maximum* berm length of around 1,500 m has been assumed for assessing potential impacts, not extending more than 50 m south or 200m north to Dolphin Gap

The topics scoped into the EIA are

- Physical and coastal processes
- Community, health, recreation and amenity
- Biodiversity
- Water. This topic covers surface and groundwater quality, bathing waters and other water-related designations, and water use (i.e. abstractions and discharges).
- Landscape, seascape and visual amenity
- Historic Environment
- Traffic, transport and navigation. Further work has been carried out to determine the preferred option for transport of rock material to site. Concerns were raised in relation to large number of HGVs and the impact this could have on traffic and on the local community given the nature of the small local roads around Hemsby. To avoid this impact the proposal is for rock material to be delivered by sea and then transhipped from the delivery vessel to the beach by barge and offloaded onto the beach
The EIA therefore considers traffic only in relation to the delivery of construction plant and machinery to site. It also presents the baseline and assessment relating to navigation and transport of materials to site.

9.1. Results of the EIA

The assessment identified a key beneficial impact on the local community, local tourism economy and human health by reducing the risk to properties and people from coastal erosion for the 20 year scheme.

- The project would also have no significant impacts on the existing coastal habitats along the frontage.
- Some adverse impacts will be experienced during construction and/or on completion of the project.
- Most of the construction impacts can be adequately controlled through the application of standard and best practice measures which will be detailed and secured through a CEMP.
- Additional mitigation is required during construction to reduce impacts on the local community, on users of the amenity beach and on landscape and visual amenity receptors. The key mitigation is to avoid construction during the peak summer period, thereby reducing the magnitude of the impact. If the works can be timed outside the peak

- summer months there are no significant effects remaining during construction.
- There is a residual moderate adverse impact on visual receptors (people enjoying recreational activities on the beach) during operation associated with the introduction of a new extensive and intrusive feature on the beach.
- Although relatively low level, the rock berm would occupy beach space and be visible in all views other than those out to sea. However, it would be a similar construction to the defence at California, just to the south, and therefore would not be an uncharacteristic feature along this coastline.

9.2. **Habitat Regulations Assessment Screening Report.**

The Conservation of Habitats and Species Regulations 2017 (as amended) (the “Habitats Regulations”) provides the framework for the protection of wild fauna and flora and birds and for the designation of a network of protected areas for certain habitats and species of conservation importance.

This network of national sites comprises Special Protection Areas (SPAs) and Special Areas of Conservation (SACs). SACs are designated under the ‘Habitats Directive’ for supporting habitats or species listed on Annex I or II of the Directive. SPAs are designated under the ‘Birds Directive.’ European/national sites¹.

The Habitats Regulations require an assessment to be undertaken for plans and projects that are likely to have a significant effect, alone or in-combination with other plans and projects, on European/national sites. The information gathered will allow the relevant competent authority, to undertake a Stage One Screening for the Habitats Regulations Assessment (HRA) of the project. The Screening stage identifies the possibility of Likely Significant Effects (LSE) from a proposal occurring, directly or indirectly, to European site features with reference to the site’s conservation objectives. This stage must account for the potential for impacts arising from a source acting either in isolation (alone) or in-combination with the effects of other projects or plans. The Screening assessment then considers whether these impacts are likely to be significant. Where there is uncertainty, the precautionary principle applies; the protection of the site takes priority.

Where there is uncertainty in the design (i.e. due to the project being at outline design stage) a worst-case should be assessed. The Screening Report is therefore based on the maximum extent of the rock berm and the maximum footprint. It also assumes that the footprint may lie wholly within designated sites, although in reality it is likely that only part of the berm footprint would actually overlap with site boundaries.

The outcome of the Screening study informs the requirement for mitigation measures and the need for further assessment (Appropriate Assessment) at Stage two of the HRA process.

This Stage One (Screening) study considered the construction of a rock berm at Hemsby and how this might affect four European sites in the vicinity of the project, these sites being:

- Southern North Sea SAC;
- Greater Wash SPA;
- Great Yarmouth North Denes SPA; and
- Winterton-Horsey Dunes SAC.

The potential impacts assessed were;

- Physical disturbance
- Non-physical disturbance (noise and visual effects)
- Alteration of coastal processes and hydrodynamics
- Changes in water quality
- Changes in air quality
- Invasive and non-native species
- Physical interactions with species during construction
- In-combination effects

The Screening Report concludes that it is considered that there would be no Likely Significant Effect on any European designated sites.

10. **Public consultation on rock berm options**

Consultation has been held on the options available for the rock berm and the implications of each. Feedback on the proposals has been encouraged.

Presentations were made to the Executive Leadership Team, Great Yarmouth Borough Council's Environment Committee, the Hemsby Winterton Community Liaison Group, Save Hemsby Coastline, Hemsby Parish Council and Hemsby Neighbourhood Planning Group.

Public consultation focussing on the Hemsby community was held via a virtual village event that ran from 10 May to 18 June 2021.

Promoting this event was undertaken via a media briefing which resulted in articles in local papers, radio interviews and TV segments. It was also promoted via websites, social media, posters put up in the village and a leaflet drop to each Hemsby household in the fourth week of the consultation.

397 people visited the virtual village hall website and looked at several items. The majority of these people were from the Great Yarmouth area.

Forty three people left feedback. Six questions were received which were answered via email.

Of those that left feedback 62% lived in locations near the beach in Hemsby and 25% lived further inland in Hemsby. The others left no address or were from elsewhere.

Due to limited number of response it is not possible to say that there is a clear preference for any of the rock berm options (23% (10/43) for outline design, 28% (12/43) for reduced length berm and 30% (13/43) for extended length berm). However from the responses there were fewer people in favour of the reduced height and shorter length rock berm (18% or 8/43).

Ninety five percent of respondents indicated that they supported the access proposal at Hemsby Gap.

Sixty percent of comments were around the need for a rock berm, time is running out to protect properties and the condition of the dunes.

The summary of results is in Appendix 3.

11. **Rock berm option assessment.**

The technical, environmental, economic and level of risk to property factors as well as community feedback need to be considered to balance the pros and cons of each rock berm option. This is summarised in Table 1

The Hemsby Project Team has discussed all this information and provides the following assessment.

Hemsby has historically not been protected from erosion and under the Coastal Protection Act (1949) and Great Yarmouth Borough Council and wider Government has no duty to provide protection from erosion. A recently published Government Statement on FCERM does now identify that there is a need for communities to transition in response to climate and coastal change.

The Shoreline Management Plan policy for the Hemsby policy unit does allow for some short term protection where assets are at risk. Due to losses of properties at Hemsby and local concerns a short term protection scheme is appropriate to be considered alongside future longer term adaptation.

It is clear that the longer variation (Option 3) of the outline design provides no additional benefits, increases cost considerably along with the funding gap and increased environmental risk. Therefore it is recommended that this option is discounted.

All other options have the potential to improve the level of protection compared to the current baseline, all are potentially environmentally acceptable for the 20 year lifespan, although all have further funding gaps to be met.

None of the designs protects the 5 northern chalets or the house on the dune edge to the south through the whole 20 year period. There will only be some extra time bought by the outline design 1330m length berm (Option 1) for the 5 northern chalets before they succumb to erosion.

The overflow car park will be protected by Option 1 but will most likely be lost by the end of 20 years with either design with a shorter length in place.

Option 1 will cost £2M more to provide this additional protection to the northern chalets and overflow car park.

The Marrams access road and service infrastructure will need to be relocated regardless of which design is put in place. It is too close to the dune edge to be adequately protected by any scheme.

From the limited responses to the public consultation there is a preference locally away from the lower berm (Option 4). There is more support for the outline design of any length as it provides the higher level of protection across a wider frontage, however this has the highest funding gap and therefore is likely to take longer to deliver.

The shorter outline design variation (Option 2) and the lower and shorter berm variation (Option 4) have a reduced funding gap, with the latter being the most likely to be achievable, both provide protection but some properties remain at risk in the short term.

The reduced berm design is has been developed from less well established design concepts. It is known that it will provide a lower level of protection. There is a risk that it does not perform as expected. There is also the risk in choosing a design that allows multiple properties to be lost and others to also remain at high risk and how this choice may be perceived.

Based on community feedback and evaluation of the design options it is recommended that the outline design (Option 1) is taken forward for consenting whilst including flexibility that the shorter (Option 2) and/or lower (Option 4) variations could be constructed under the same consents. This will enable flexibility so that a decision can be made dependant on the level of funding attracted to the scheme.

It is clear that any of these options will be challenging to fund with timelines for gaining funds extending as the cost increases. There may be a need to re-evaluate the funding target/option as the funding strategy progresses.

Even if a rock berm is constructed, there is a need for Hemsby to adapt to coastal change. The village and individuals will need support in continuing to thrive on the changing coastline. This will be needed in the short term and in the longer term as climate change impacts develop further. A further report will be developed for the Environment Committee to consider as to how this may be achieved.

12. Next steps

12.1. Consenting

Once a decision has been made to proceed with consenting a rock berm option the following consents, licences and notifications will be necessary: There will be costs associated with these processes

Consent	Cost
Planning Application	£2028
Marine Licence	£5-7,000 (for submitting application. Additional costs to discharge conditions & monitor licence)
Coast protection notification	minimal
Landowner consent	Legal costs

The Marine Licence and Planning Application can be applied for under the Coastal Concordat, whereby the Planning Authority and the Marine Management Organisation agree which will be the primary point of contact for both consents.

12.2. Funding strategy and seeking funds

The construction of the short term rock berm scheme is not yet funded. Significant funding will need to be identified and secured.

An extensive funding strategy is required that both informs the final scale of the option and to secure the remaining public and private contributions to enable the scheme to be delivered.

Contributions will need to be sought and these may be through a range wide of groups and organisations, and could include: local contributions, landowner contributions, local authority contribution and other funding sources.

A primary funding source will be FCERM GiA and an Outline Business Case will need to be prepared and submitted to the Environment Agency.

Another source of funding will be seeking a contribution from Great Yarmouth Borough Council's capital fund. An allocation will need to be considered and a business case submitted.

Further to this CPE is currently undertaking a project to research and collate a number of key data sets and qualitative and anecdotal information that will expand the current benefits evidence base and directly inform the project funding strategy. This will include spatial analysis such as a benefits and beneficiary map that includes commercial and utility assets and the broader zone of influence that these support.

The purpose of this study is to identify benefits that are not traditionally captured by traditional economic analysis when calculating FCERM GiA, or those that are discounted from the analysis due to proportionality, but which are extremely important to the community or local economy. This will then support further funding bids from other sources.

Table 1 Summary for comparison of rock berm options

	OUTLINE DESIGN	VARIATIONS			FOR COMPARISON	
	Option 1 Berm +3m (1330m)	Option 2 Berm +3m reduced length (1090m)	Option 3 Berm +3m extended length (1550m)	Option 4 Reduced berm (1090m)	Full height protection	Do nothing
Northern extent	To end of overflow car park	Just north of 'Hemsby Gap'	Up to 'Dolphin Gap'	Just north of 'Hemsby Gap'	To end of overflow car park	n/a
Estimated cost (including 20-30% contingency)	£10 – 11 Million	£8 – 9 Million	Likely to be ~ £13 Million	£5 – 5.5 Million	£15+ Million	none
Potential government grant	~ £2 - 2.5 Million (but borderline eligibility)	~ £2 - 2.5 Million (but borderline eligibility)	Unlikely to get funding for extra length (no additional economic benefits)	~ £1.5 – 2 Million (but borderline eligibility)	Unlikely to get funding	n/a
Gap in funding (potentially can be raised but timelines will be different)	£8 - 9 Million (~5 year timeline)	£6 - 7 Million (~3-4 year timeline)	£10 - 11 Million (>5 years timeline)	£3 – 3.5 Million (~2-3 year timeline)	£15+ Million	n/a

Level of protection to properties	Erosion reduced by 70% Erosion in major storm should be reduced to around 5 to 6 m erosion	Erosion reduced by 70% Erosion in major storm should be reduced to around 5 to 6 m erosion	Erosion reduced by 70% Erosion in major storm should be reduced to around 5 to 6 m erosion	Erosion reduced by 50% Erosion in major storm should be reduced to around 7.5 to 10 m erosion	Erosion minimised	Erosion at existing rates Major storm (on average) results in 15 to 20 m erosion.
	Option 1 Berm +3m (1330m)	Option 2 Berm +3m reduced length (1090m)	Option 3 Berm +3m extended length (1550m)	Option 4 Reduced berm (1090m)	Full height protection	Do nothing
Properties at risk (differences in bold)	12 residential by year 20 <ul style="list-style-type: none"> Northern chalets lost within 20 years Both car parks protected. Lifeboat Station & Hemsby Gap businesses public toilets and first aid posts, Mini Golf protected. The Marrams access road likely to be lost during first major storm. Need to relocate services & access. House on dune edge likely to be lost in first major storm. Loss of other houses in The Marrams delayed, with many likely to be protected for 20 years. 	12 residential by year 20 <ul style="list-style-type: none"> Northern chalets at high risk in next major storm & likely to be lost early in 20 years. Overflow car park potentially lost at end of 20 years Lifeboat Station & Hemsby Gap businesses, public toilets and first aid posts, Mini Golf protected. The Marrams access road likely to be lost during first major storm. Need to relocate services & access. House on dune edge likely to be lost in first major storm. 	12 residential by year 20 <ul style="list-style-type: none"> No additional properties or assets would be protected compared to +3 1330 m berm Northern chalets lost within 20 years Both car parks protected. Lifeboat Station & Hemsby Gap businesses, public toilets and first aid posts, Mini Golf protected. The Marrams access road likely to be lost during first major storm. Need to relocate services & access. 	27 residential by year 20 <ul style="list-style-type: none"> Northern chalets at high risk in next major storm & likely to be lost early in 20 years. Overflow car park likely to be lost at end of 20 years Hardstand car park at risk at end of 20 years Lifeboat Station & Hemsby Gap businesses, public toilets and first aid posts, Mini Golf protected. The Marrams access road likely to be lost during first major storm. Need to relocate services & access. 	None	94 by year 20 (89 residential) <ul style="list-style-type: none"> Northern chalets at high risk in next major storm & likely to be lost early in 20 years. Both car parks potentially lost at end of 20 years Lifeboat Station & Hemsby Gap businesses public toilets and first aid posts, Mini Golf lost within 20 years The Marrams access road likely to be lost during first major storm. Need to relocate services & access Marrams properties close to

	<ul style="list-style-type: none"> Southern Marrams houses closest to the dune edge still at high risk. Houses along St Mary's Road and Fakes Road expected to be protected. 	<ul style="list-style-type: none"> Loss of other houses in The Marrams delayed, with many likely to be protected for 20 years. Southern Marrams houses closest to the dune edge still at high risk. Houses along St Mary's Road and Fakes Road expected to be protected. 	<ul style="list-style-type: none"> House on dune edge likely to be lost in first major storm. Loss of other houses in The Marrams delayed, with many likely to be protected for 20 years. Southern Marrams houses closest to the dune edge still at high risk. Houses along St Mary's Road and Fakes Road expected to be protected. 	<ul style="list-style-type: none"> House on dune edge likely to be lost in first major storm. More properties within The Marrams would be at risk of loss within 20 years, but unlikely to be lost during the first major storm. Southern Marrams houses closest to the dune edge at risk of loss in 2nd major storm event Increased risk to properties within Fakes Road, closest to dune edge, near the end of 20 years St Mary's Road properties expected to be protected 		<p>dune edge likely to be lost during first major storm</p> <ul style="list-style-type: none"> Many of the houses along The Marrams could be lost within 20 years Increasing risk to properties along St Mary's Road and Fakes Road Some along St Mary's Road and Fakes Road closest to edge could be lost within 20 years.
Natural environment	Acceptable	Acceptable	Could be challenged	Acceptable	Likely to be challenged	Natural change
Community consultation	23% respondents in favour (10/43).	28% respondents in favour (12/43).	30% respondents in favour (13/43). Others recognise that extra length is not needed for property protection.	18% respondents in favour (8/43)		

Meets design criteria	Yes	Yes	Yes	To a lesser degree as more properties left at risk.		
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13. FINANCIAL IMPLICATIONS

The construction of the short term rock berm scheme is not yet funded. Some funds may be available from Flood and Coastal Erosion Risk Management Partnership Funding (GiA), although significant funding will need to be identified and secured from a range of funding sources.

Funding of £75,000 was allocated from the Coastal Repairs and Maintenance Revenue budget to undertake the outline design and the EIA process. The majority of this has now been spent.

Funding of £75,000 has been secured from the Environment Agencies Pipeline Development Fund to pay for additional work towards developing the Business Case for Government funding. This has funded the development of the additional rock berm options.

There is remaining funds of £51,500. This will fund the charges applied to gaining consents and the development of the Outline Business Case for the GiA funding.

Funding for the Economic Assessment work is through RFCC Local Levy funds previously secured.

14. RISK IMPLICATIONS

Risks	Mitigating action
Weather event leads to loss of further assets/properties	☑ Open, honest and transparent communication which clearly sets out timeframes and objectives.
Raised expectations of what can be achieved.	<div>☑ Open, honest and transparent communication which clearly sets out what is in scope and what is out of scope for the project.</div> <ul style="list-style-type: none">• Project documentation approved by GYBC and shared with the Community Liaison Group.• Preparation of Communications Plan.
Stakeholders that are directly affected by the project are not sufficiently involved resulting in disagreement on the proposed actions.	Sufficient opportunities are offered to get involved with the project and stakeholders can see where their feedback has

	been considered;
Negative media and social media coverage	<ul style="list-style-type: none"> • Proactive engagement with the community and via social media where appropriate. • Media is informed of progress and communications are open, honest and transparent.
Timeframes may not meet community needs.	<ul style="list-style-type: none"> • Acknowledge risk levels & community feeling. • Open, honest and transparent communication about progress of the project
The rock berm and adaptation options are unaffordable	<ul style="list-style-type: none"> • Ensure that communications manage expectations as far as possible • Incorporate a check point in any fundraising to reassess affordability and whether the scheme can proceed.
Stakeholders not engaging in elements of the project.	On-going assessment and adjustment of communication plan and activities
Costs of materials are rising so current costings of the scheme may not be correct in the future when the scheme is built.	This will be a risk assigned to the contractor who tenders to construct the scheme. This will not be a client risk.
Reputation of Council is damaged if the scheme constructed does not protect properties as modelled.	Ensure that communications manage expectations as far as possible

15. CONCLUSIONS

Significant progress has been made against the agreed objectives in identifying and bringing forward a short term coastal management scheme for Hemsby. This has taken into account the complexities of the coastal processes, local needs such as lifeboat access, environmental sensitivities and the challenging economic/funding situation.

A short term rock berm option has been identified that is likely to be environmentally acceptable and will provide better protection for a number of homes, businesses and infrastructure currently at risk in the short term. There are variations to the design that

could be applied dependent on what levels of contributions could be found to meet the identified funding gap (assuming FCERM GiA is forthcoming).

The funding of the construction of the scheme still remains a significant challenge and there will need to be considerable work between CPE, GYBC and the local community to meet the funding need.

There are benefits in preparing a scheme so that it is 'shovel ready' as this may be able to take advantage of unexpected funding streams. As such it is prudent to seek the necessary consents for the scheme.

There will remain short and long term erosion risks at Hemsby, whether a rock berm is constructed or not, as there is in many other locations along the coast.

National Government policy has begun to recognise the need for communities to transition away from risk although how this will transpose into support is still in development.

CPE and GYBC are working to seek to develop mechanisms to support those affected by erosion and seeking funds to work in detail with the community of Hemsby. A future report will be submitted to the Environment Committee for further consideration.

16. BACKGROUND PAPERS

Listed for reference and can be provided on request

- Jacobs 2021 Hemsby Rock Berm Outline Design Non-technical summary report.
- Jacobs 2021 Hemsby Rock Berm Outline Design Technical Note: Outline design basis.
- Jacobs 2021 Hemsby rock berm outline design & EIA Technical note - appraisal of northern extent of berm
- Jacobs 2021 Hemsby rock berm outline design and EIA Technical note: Economic appraisal
- Jacobs 2021 Hemsby Rock Berm Outline Design Environmental Statement
- Jacobs 2021 Hemsby Rock Berm Outline Design Information to Inform Habitats Regulations Assessment Screening

Area for consideration	Comment
Monitoring Officer Consultation:	Included
Section 151 Officer Consultation:	Included
Existing Council Policies:	
Financial Implications:	Noted

Legal Implications (including human rights):	Noted
Risk Implications:	Noted
Equality Issues/EQIA assessment:	Noted
Crime & Disorder:	None
Every Child Matters:	

Appendix 1 Details of rock berm design basis

Basis of design

The berm at California, which has been successful in reducing cliff erosion, has been used as a prototype for designing the berm, in terms of rock size and volume.

However, at Hemsby, water levels are around 0.5 m higher than those at California. The beach at Hemsby is also lower and more volatile. Therefore to construct a berm of the same equivalent elevation (relative to still water level) would require a berm crest level of around +4.5 m OD. This would be a substantial structure, approximately half the height of the current dunes. It would cost a considerable amount, meaning it would be unlikely to attract any government ('partnership') funding and in reality, given the significant cost and level of residual erosion risk, a more feasible solution would be a full height rock revetment. However, this type of structure would not align to the policy of managed realignment set out in the Shoreline Management Plan and would have a greater environmental impact.

Therefore, a structure of a similar size and form to the one at California has been considered, accepting that this will provide a lesser degree of protection due to the difference in beach level and water level. Taking those differences into account, for the outline design a berm crest level of +3.0 mOD has been determined. This level of berm sits well above highest regular tidal levels, with the level of highest astronomic tides (HAT) being around +2.0 mOD. This means that waves will not reach the toe of the dunes during regular day-to-day conditions. It is also above all but the most extreme storm surge levels. This will therefore prevent waves from cutting away the sand at the base of the dunes and causing the over steepening of the face which is often associated with erosion. This height of berm should also allow sand from any dune erosion to accumulate behind, which will provide additional buffer of material; this buffer should also help reduce erosion during storms.

Water will still reach the dune face at times, as the level of the most extreme surges slightly exceeds the crest of the berm and large waves will overtop the berm from time to time. But critically, much of the power of those waves will be dissipated by the berm rather than on the dune face. The angle of the berm slope (1 in 3), combined with porosity of armour layer, is designed to absorb much of the wave energy and also minimises wave reflection off the structure, which could otherwise cause localised beach erosion. Consequently the berm, as designed, will greatly reduce the amount of erosion that will occur during those large storms.

The berm has also been designed to accommodate changes in beach level, which can be significant along this frontage (Jacobs, 2018). Based on beach monitoring over the past 20 to 30 years, it has been calculated that there could be up to 2 m beach lowering over the 20 year life of the scheme. To accommodate this, the toe of the berm has been set at around -1.0 mOD along the main section.

Influence on erosion rates

There are no standard industry methods available to assess how much influence a rock berm structure will have upon erosion rates. Therefore an adapted methodology has been developed, based upon formulae for calculating wave forces on walls.

The calculated wave force for the +3.0 mOD berm, has been compared to the wave forces calculated for two scenarios:

- 1) An unmanaged erosion scenario, based on no defences being present
- 2) A nominal erosion scenario, using observations on the performance of the California berm as a benchmark.

The reduction in erosion is then calculated, based on the assumption that it is equivalent to the percentage change in the wave force between these scenarios.

Outline design

The calculations indicate that under regular conditions, when tidal levels are below HAT, the berm should eliminate most, if not all, erosion at the dune toe. Under storm conditions, the berm is expected to reduce the erosion by around 70% (compared to 'doing nothing'). To put this into context, if a storm results in 15 to 20 m erosion in an undefended situation, that should be reduced to around 5 to 6 m erosion by the outline design berm.

Over time, the effectiveness of the berm may actually improve on this, as the structure is intended to also trap a sizeable proportion of the eroded sand behind it. Any erosion of the dunes will mean that waves will break further away from the dunes and there would be more sand between the wave break point and the retreated dune cliff line.

Reduced berm profile

This modified design would still minimise erosion during 'regular' conditions and would provide a reduction to the erosion extents during large storms. That reduction would be less than the outline design and using the same calculations as applied for the outline design berm, the reduction in erosion has been estimated to be around 50% (compare to 'doing nothing'), based upon an expectation of an adjusted berm elevation of +2.0 mOD.

Appendix 2 Partnership funding calculations

Any flood and coastal risk management project where the benefits are greater than the costs can qualify for funding from central government, known as 'Flood and Coastal Erosion Risk Management Grant in Aid' or 'FCERM GiA'.

The amount of GiA a project is eligible for depends on the 'benefits' it achieves, based upon a defined set of formulas. Information on costs and benefits is put into the Environment Agency's partnership funding calculator to work out how much FCERM GiA might be available (known as 'partnership funding') and how much extra money will need to be raised from partners through contributions.

An analysis has been undertaken to assess the benefits the outline design and variations could achieve, using guidance set out by the Environment Agency.

In applying the calculator, 'present values' must be used; present value is the concept that an amount of money today is worth more than that same amount in the future (due to inflation). This means that if a scheme protects a property that would be lost in the next couple of years under 'do nothing', this generates a greater 'benefit' value than protecting a property that would otherwise be lost in 20 years' time.

The partnership funding arrangements use deprivation categories as a means of distributing FCERM GiA, with higher payment tariffs applicable to households that fall within the most deprived areas. Based on the latest indices of deprivation (2019), Hemsby is within the most deprived 20% of areas in England.

For the economic appraisal, the property value at estimated time of loss is used to derive a benefit value. A nominal allowance is applied at the time of property loss, to recognise the mental health impacts of living with an erosion risk. The appraisal also determines values for non-residential assets such as the car parks, Lifeboat Station and business properties.

Partnership funding from the government is only available for those flood and erosion defence schemes that demonstrate a benefit to cost ratio greater than unity, i.e. the benefits should be higher than the costs. Where schemes which have a benefit to cost ratio above but close to one there remains a risk that they will not be eligible.

It is also important to note that the overall amount of FCERM GiA is limited and so the allocation of funding for any project is subject to availability at the time it is approved by the Environment Agency.

Using the partnership funding calculator (2020), the maximum amount of GiA available to a scheme at Hemsby has been calculated, which is based on the outcomes it should achieve over the 20 years of the scheme. This uses the benefits and costs presented in Table A2-1

Approach	Calculated damages	Calculated benefits
'Do nothing'	£ 12,300,000	none
(a) Outline design	£ 1,300,000	£ 11,000,000
(b) Shorter berm length	£ 1,500,000	£ 10,800,000
(c) Extended length berm	£ 1,300,000	£ 11,000,000
(d) Reduced berm (alternative profile)	£ 3,100,000	£ 9,200,000

Table A2-1 Estimated damages and benefits, used in assessing the potential for partnership

funding. (Values presented to nearest £100,000).

The calculator also defines the minimum amount of alternative contributions that need to be obtained.

The Environment Agency will only allocate FCERM GiA towards the project if there is proof that this extra funding is secure and sufficient to deliver the whole life scheme.

The outputs from the partnership funding calculator demonstrate that the outline design and variations considered are all borderline or marginal in terms of their eligibility for GiA, due to their low benefit to cost ratios. The GiA funding for all variations would therefore be subject to contributions from other sources.

For the outline design, the eligibility of the scheme is sensitive to the risk allowance – 30% is the recommended risk allowance for this stage of design, but risks and uncertainties would need to be reduced in order for it to become eligible. Both the shorter length berm and the reduced berm would reduce costs and although both would mean a reduced level of protection, the benefit to cost ratio would improve. This means that they are more likely to be eligible for funding. The reduced berm presents significant savings in terms of project cost, and whilst the maximum GiA available is less, the minimum funding to be sought is therefore also greatly reduced.

Appendix 3 Summary of public consultation comments



Consultation period 10 May to 18 June 2021

Number of people that accessed site 397

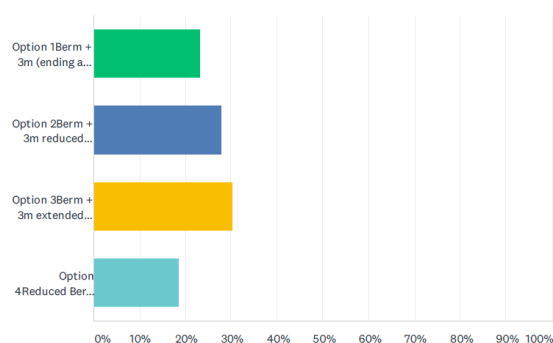
Number of people that completed feedback 43

Number of questions asked 6

Responses.

Q1 Rock berm options Reviewing the options and the variations set out in the virtual consultation room, please indicate your preferred choice below:

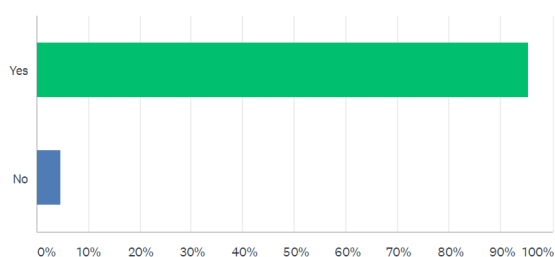
Answered: 43 Skipped: 2



ANSWER CHOICES	RESPONSES	
Option 1Berm + 3m (ending at overflow car park) estimated cost £10 to £11m	23.26%	10
Option 2Berm + 3m reduced length (ending north of Hemsby Gap) estimated cost £8 to £9m	27.91%	12
Option 3Berm + 3m extended length (up to Dolphin Gap) estimated cost greater than £13m	30.23%	13
Option 4Reduced Berm (ending just north of Hemsby Gap) estimated cost £5 to £5.5m	18.60%	8
TOTAL		43

Q3 Access at Hemsby Gap We have set out our proposed solution to access at Hemsby Gap. Are you in agreement with the proposal?

Answered: 44 Skipped: 1



ANSWER CHOICES	RESPONSES	
Yes	95.45%	42
No	4.55%	2
TOTAL		44

Q2 Environmental considerations. Doing the right thing for the environment is key to any option chosen and we have set out, as part of this consultation, what we will be taking into consideration. We are keen to hear from you about any concerns you might have or local knowledge about what you feel we should include.

Access points through the dunes are eroding the dunes by removing stabilising vegetation. These points are likely ingress points for storm surges and could be managed to reduce impact.

The protection of the dunes is paramount to the survival of Hemsby as a village

Something needs to be done ASAP, I am concern time is slipping away as quick as the coastline.
At this moment in time I think option 4 is the way forward. As any longer delay trying to raise funds would only make the job even harder as the erosion now seems to be year on year.
Stop people climbing the dunes. These people do not understand the damage they are causing. They have no consideration for the dunes or the resident's privacy who live amongst them. And that's including the wildlife. I personally have had abuse from people when I have asked them to get off the dunes and have had objects such as beer bottles etc... Thrown onto my roof which is very frightening to say the least. Something needs to be done ASAP..
Protection for the Hemsby coastline is vital to prevent a breakthrough of the sea to the broads. If this is not done then parts of the Coast line like Gt. Yarmouth will become islands.
To my knowledge the Hemsby acid sand environment is one of the rarest habitats in Europe and should be protected. which ever defence option can implemented first should be pursued .
Unless something is done quickly there is the possibility of environmental damage. We were lucky last time that very little was lost to the sea, and properties were left hanging over the edge, which allowed them to be dismantled, without too much debris falling into the sea. We may not be that lucky again, giving the possibility of huge damage being caused to marine life etc, and also impacting on our already beleaguered fishing industry.
I feel as much of the coast line should be protected as possible. There are sea defences at Waxham and sea Palling but Hemsby has been neglected for too long
Not disrupting or disturbing the seals and other wildlife.
Can you explain what the likely knock on effects will be for the properties which are unlikely to be protected if you choose a cheaper option, for example how will it affect the other parts of the beach? What changes to the shoreline can be expected where the beach is not going to be protected.
Just the SSSI in Winterton is a concern..
Delivery of rock from sea will help reduce environmental impact. Also consideration of using Cornish granite rather than importing from Norway will also reduce pollution as well as bringing a cost benefit. Cornish granite has recently been used successfully at Deal to construct rock groynes on the shingle beach.
As you know, the electricity supply to properties along The Marrams, and also the water supply, run along the dune side of the road and will 'go' before the properties themselves. The telegraph poles are in places very close to the edge now.
Although it does not directly concern this plan, the dunes between Hemsby, Winterton and beyond, are a very special area for nature and, as the threat increases, consideration to some protection there will become imperative.
From personal observations, I know that the beach level can be lowered by up to three metres in one tide then replenished and built up again during the next tide. Does the design of the berm take this into consideration? Also, there is a need to ensure that the local wildlife that regularly use the beach (Foxes, Muntjac Deer) still have access.
Newport Cottages are situated at the narrowest part of the beach and are part of a conservation area and should be protected at all cost due to their history. On the re-purposing of the hexagonal blocks the plan shows the rock berm falling short of the cottages potentially leaving them exposed where my understanding was the berm would at least join up with the Scratby gabions or slightly in front. My concerns based on this image is the cottages will lose what little protection they have
Beach access below the Newport Cottages. This used to be a public footpath.

Q3 Access at Hemsby Gap We have set out our proposed solution to access at Hemsby Gap. Are you in agreement with the proposal?

With the covid crisis and foreign travel likely to be problematic. Hemsby has an opportunity to attract tourists and inject funds into the local economy. . The design would give a good first impression when arriving at the beach which is looking very neglected at present. The rock berm would also enhance the beach by stabilising the dune hopefully allowing the vegetation to recover. To the south of the gap the dunes have debris which has been exposed by erosion including a old brick built soak away i walk the beach everyday i have witnessed children digging around this and climbing on top. if this were to fall it could kill. Hemsby has an opportunity to smarten up the beach attracting tourism and further investment which would benefit the surrounding area.
It is unclear which proposal you are backing. the over lapping groyne would appear to be the simplest and easiest to construct. This would provide adequate public access.
The main issue there is the lifeboat station and, if the crew are happy with their access, then it should be good enough for the rest of us.
However, sooner rather than later. Observation: Why was this not all started and carried through following the surge in 2013? If it had been carried out at the time, then the costs would have been substantially lower.
What ever is best for RNLI access
Excellent reuse of SHC blocks.

Q4 Funding the chosen rock berm option As set out in the consultation, funding any of the rock berm options will be challenging. You may have experience of, or thoughts about, potential funding sources. Please let us know your thoughts:

Richardson's and watlings need to be approached
Government should pay for it
I think all bodies listed should contribute and maybe local events community support as well as those listed.
Open to all ideas
Obviously the funding of this it's going to be difficult possibly some type of raffle so that not only the people that live in the village can contribute but the many people that visit the area
Government
Could you get local businesses to sponsor part the project . As was done when the old iron bridge leading to the railway station from North Quay was renovated in return a plaque was attached mentioning donors
Hemsby is unique because as well as being a home to many, it is also a thriving holiday resort, which can swell the number of people here 10 fold over the summer months. An industry that contributes £80 million pounds into the government's coffers each year. So it's unfair of the government to only allow a small number of residential properties at risk to be included in their calculations for funding, completely ignoring the risk of loss of local businesses, that also provide beds for holidaymakers to spend time and money in nearby Great Yarmouth. Yarmouth is already designated as a deprived area, and could not cope with the further loss of jobs, that would happen without the influx of Hemsby's holiday visitors. There is therefore compelling arguments for Hemsby to be considered differently re government funding. Far better to spend money supporting a thriving area to gain protection from erosion, then to instead spend it financially supporting families that have lost jobs due to the loss of our holiday industry.
National lottery funding
Lottery funding? For communities.....
The Waltling group,private businesses and Save Hemsby coastline charity opportunities
Partnership in construction and design with local companies who have a local interest is an opportunity which seems to have been disregarded.

Suggested quite a while back that the holiday site owners include in their booking forms (extremely easy to set up with all bookings now online) include a 'Charitable Donation' caveat at the bottom of their forms. Something along the lines of; Would you like to make a donation to the building of the rock berm to ensure that Hemsby has a future etc etc. If so please click the relevant box £5, £10, £15 or any other amount.
Maybe recoup some of the money we gain from selling the dredged sand.
Do away with the fireworks and use monies for rock berm

Other comments received
Preferred option 4 just to get it moving. With a view to carrying raising more funds to consolidate and protect the coastline further
I wish I'd had more time to read, digest, consider, comment, discuss and make a contribution. I've tried to download at the last minute and have no hope of actually reading anything by the end of 18/6/21 ie in 2 minutes. I'll try to do so and hope it stays open over the weekend. PLEASE COULD YOU EXTEND IT IF POSS TILL MONDAY. Ta
My concerns are that this is yet more hot air. We were promised back in 2013 by Brandon Lewis himself that we'd get protection. We're still waiting.
Some of the wording on the plans when zoomed in couldn't be read which was frustrating, a better resolution would have helped
Thank you for all your hard work to all involved in this.
Thank you for proccessing this project as swiftly as possible
As a resident likely to be affected by the ongoing erosion i am past caring about the format of meetings and am more concerned that some decision making would benefit everybody. No decision will please everybody but people are being paid for their expertise and are wringing their hands and asking for public opinion rather than making the decisions they are being paid to make.
Thank you for all your hard work and support in getting this project off the ground.. Amazing team..
Some of the reports used as a basis for the consultation appear to be quite old. Shame not much new research was used.
Talking and consultation is good, but we are rapidly running out of time. By your own estimates we could be one storm away from disaster. We need those defences ASAP, tomorrow could be to late, we need them today. So I implore you to act quickly from this point onwards.
I live in the marrams and have regular contact with visitors the one comment i hear regularly is how run down and dangerous the dunes are, they are also shocked that the houses on the marrams are being allowed to fall into the sea. this is our chance to remedy this.
Hemsby needs a rock berm to protect all the local residential properties and also holiday accommodation and to protect the local businesses that help support employment and the local economy in the area.
The rock beam at Scratby/California was expected to last for approximately 15 years but has been in place for around 30 years and remains as good as when it was first put there. There is more sand now on top of the rocks and also on the beach.
It was quite difficult to navigate the virtual consultation from an iPad.
The SMP coastal management plan was never feasible. I can remember thinking this over 20 years ago when studying the subject as part of a degree course. Mantras such as managed retreat were ridiculous and contradictory. Hard defences are scoffed at mainly I suspect because nobody wants to commit to doing the work and spending the money. Hard defences are part of the answer and stop people building on the vulnerable coastline.

Can you place even more signs to stop people from climbing the dunes and some signs to stop people urinating in the bushes opposite my home pleaseThe Marrams, Hemsby.
Well produced publication both informally and pleasantly displayed
Thank you for the survey and let's protect our village as best we can for as long as we can
I live at 75A The marrams adjacent to the overflow carpark. There isn't a single day i dont worry about this and feel the 5 chalets in our block deserve coverage as much as the south side .This is our home and we desperately want to remain here and are concerned for those behind us too . Some indication of next steps would be really useful. Thankyou
I am concerned about loss of the valley which is a wonderful walk through to Winterton and beyond.
Lived here for years never seen the sea reach the lacons Arms and never will
It was a bit tricky on my iPad , I know sometimes there are iPad compatibility problems so maybe that's why. Good for all the information to be available but I don't think you are to reach all of Hemsby in this way and maybe miss out on some very important opinions. But still good information!
Let's get this berm in place and protect this excellent village
I couldn't see the climate adaptation film anywhere