



URN: 22-093

Subject: Scratby Damaged Gabions, Options and Recommendations

Report to: Environment Committee, Tuesday 13th September 2022

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SUBJECT MATTER

Following a north-easterly storm event which occurred on the evening of the 31st March 2022, a significant lowering of beach levels were seen at locations along the Great Yarmouth Borough Council's coastal frontage. This resulted in the exposure of the base of a section of the Scratby gabion structure, at its north-western extremity on the boundary between Scratby and Hemsby. A length of approximately 100 metres of the gabion structure was left damaged, including a pedestrian beach access through the defence. The area was fenced and signed to warn of danger alongside implementation of monitoring of the crest of the damaged gabion structure. This monitoring has shown no further seaward movement of the gabion structure since the initial damage. Consent has been received from the Environment Agency under Section 5 (6) of the Coast Protection Act, 1949, of the need to commence emergency works, although this does not secure funds required to complete works. Due to complex issues relating to this damage, consulting engineers were instructed by Coastal Partnership East to produce a high-level assessment of options for the damaged Scratby gabion structure. Such options are placed within the context of the SMP6 Kelling to Lowestoft Ness Shoreline Management Plan, Policy Unit 6.14, Winterton-on-Sea (South of Beach Road) to Scratby, in order to support recommendations on management of this structure going forwards.

RECOMMENDATION

That Committee :

1. Notes the work completed to date on the monitoring, analysis of longer-term changes in beach levels and production of high-level engineering options for the damaged Scratby gabion structure.
2. Supports the completion of a further formal public safety risk assessment and if identified associated small-scale works, to enhance on-site health and safety provision for the damaged Scratby gabion structure owned by Great Yarmouth Borough Council. These actions to be funded through the use of existing Great Yarmouth Borough Council coastal protection budgets.
3. Supports the commission of an initial detailed engineering investigation of the structural stability of the damaged Scratby gabions, to further inform the understanding of the stability and health and safety risks of the damaged structure. Outcomes of the initial detailed engineering investigation to be used to inform the subsequent selection of an engineering option for the damaged Scratby gabion structure and identify further design work as required. These actions to be funded in the first instance through the use of existing Great Yarmouth Borough Council coastal protection budgets, prior to wider funding by Great Yarmouth Borough Council.

1. Introduction

In 2015 Great Yarmouth Borough Council in partnership with Scratby and California Environmental Group led the construction of 877 metres of a gabion basket coast protection structure, protecting the north-western extent of Scratby village. These assets are owned by Great Yarmouth Borough Council. The cost of this scheme was £600,000, based upon a 20-year design life. The work on the scheme was completed after a ten-year campaign to install coastal defences to protect the Scratby cliffs. Extending the nearby rock revetment structure from the south-east at central Scratby to the north-west was too expensive and would not have attracted sufficient Grant in Aid from the Environment Agency. In the end the cheaper gabion scheme was selected. Of the overall £600,000 cost of construction, £330,000 was funded from Grant in Aid from the Environment Agency, £91,000 from the Regional Flood and Coast Committee, £101,000 from the Pathfinder Project, £69,000 from Great Yarmouth Borough Council and £2,000 from the Scratby and California Environmental Group.

In 2018 significant damage was done to the north-western section of the gabion structure as a result of the storm conditions in late winter/early Spring known as the ‘Beast from the East’, resulting in a further investment of £420,000 to repair this storm damage. Figure 1 shows the damage to the gabion structure in 2018.



Figure 1 Previous damage to Scratby Gabions following the Spring 2018 ‘Beast from the East’

On the evening of 31st March and 1st April 2022, storm conditions led to significant beach lowering along the north-western extremity of the Scratby gabions. The base of the gabion structure was exposed by the lowered beach, causing collapse of the gabion structure in the immediate vicinity of the pedestrian beach access and a forward rotation of the gabion structure immediately to the north-west of this access. Figure 2 shows the location of the gabion structure which was damaged in the storm event of the evening of 31st March and 1st April 2022, with Table 1 summarising the timeline for construction work/activities and storm events/damage along the Scratby gabions frontage between 2015 and 2022. Figure 3 shows changes along this length of coast before and after the storm event of 31st March and 1st April 2022. These include a significant drop in beach levels, loss of the gabion

structure in the immediate vicinity of the pedestrian beach access and forward rotation of the longer gabion structure. Figure 4 gives additional views of the forward rotation of the Scratby gabion structure.



Figure 2 Location of damaged Scratby Gabions following the storm event of the evening of 31st March and 1st April 2022

Year	Storm Event/Damage	Construction Works/Activities	Cost
2015		Construction of 877 metres of gabion coast protection structure	£600,000
2018	Damage to approximately 100 metres of the north-western section of gabions due to storm activity	Re-construction of north-western section of gabions.	£420,000
2022	Damage to approximately 100 metres of the north-western section of gabions due to storm activity	Fencing, warning signs and regular monitoring of movement of the crest of the gabion structure.	

Table 1 Timeline for construction work/activities and storm events/damage along the Scratby gabions frontage.



Figure 3 Lowering of beach levels and subsequent damage to Scratby gabion structure, March 2022 to April 2022



4th May 2022



4th May 2022

Figure 4 Forward rotation of the Scratby gabion structure, following the storm event of the evening of 31st March and 1st April 2022.

Since the damage to the gabion structure following the storm event of the evening of 31st March and 1st April 2022, the area behind the gabions has been fenced to restrict public access and warning signs have been placed on site. Regular monitoring has been completed by the Coastal Partnership East team, with measurements being taken from fixed points located on wooden posts to the rear of the line of damaged gabions to the crest of the gabion structure. The process of taking measurements from the fixed monitoring points is shown in Figure 5. This monitoring has shown no movement of the crest of the damage gabions.



Figure 5 Monitoring of damaged Scratby gabions

The Environment Agency have giving consent under Section 5(6) of the Coast Protection Act 1949 for emergency works. This is separate to any approval for funding of emergency works, with discussions suggesting that if funding was forthcoming it may be limited. Due to the complex issues relating to the damage to the Scratby gabion structure, consulting engineers were instructed by Coastal Partnership East to produce a high-level engineering assessment of options for the damaged structure.

2. Longer Term changes in beach levels at site of Scratby damaged Gabions

Figure 6 shows survey data for a beach profile cross section location at the northern extremity of California Avenue, Scratby, provided by the Environment Agency through the Anglian Coastal Monitoring Programme. This is in the immediate vicinity of the damaged Scratby gabions. The 2021 survey shows that the beach is lower and narrower than that

surveyed at this same location in 2011. This survey data also shows the beach height at this same location being lower in the 2018 survey compared to the 2015 survey, with 2015 being the year of initial construction of the gabions and 2018 being the year of reconstruction of the damaged gabions following the 'Beast From The East' storm. Lowering of beach levels increases the instability and potential for wave impacts to the Scratby gabion structure. Higher beach levels provide more support to the Scratby gabion structure. It must be emphasised that significant lowering/building up of the beach can take place over a period of a few weeks following a storm event.



Figure 6 Anglian Coastal Monitoring Programme Beach Level Data, 2011, 2015, 2018 and 2021, for transect HW433 in the immediate vicinity of the Scratby damaged gabions

Figure 7 provides photographic evidence of the lowering in beach levels in front of the gabion structure at the site of the Scratby damaged gabions, which have occurred between 2016/2019 and 2022. Figure 8 shows recent beach levels, to the immediate north-west and south-east of the site of the damaged Scratby gabions. These photographs show the presence of a relatively shallower and narrower beach and exposure of the gabion structure at the north-western extremity of the damaged Scratby gabion structure, with a relatively higher and wider beach to the south-east with the gabion structure being buried beneath sand deposits in the upper beach.



Beach Access, 2016



Beach Access, 10th June 2022



Rear of Northern Structure, 27th August 2019



Rear of Northern Structure, 10th June 2022

Figure 7 Longer term changes in beach height at the site of the Scratby damaged gabions



North-West of Damaged Gabions
19th May 2022



South-East of Damaged Gabions
21st June 2022

Figure 8 Recent beach levels to the immediate north-west and the south-east of the site of the Scratby damaged gabions

3. Shoreline Management Plan (SMP) Policy for the Scratby Gabion Frontage

The Scratby gabion frontage sits within the Policy Unit 6.14, Winterton-on-Sea (South of Beach Road) to Scratby, forming part of SMP6 Shoreline Management Plan stretching from Kelling Hard to Lowestoft Ness. Policy Unit 6.14 includes Winterton-on-Sea, Hemsby and Scratby. This Shoreline Management Plan was adopted in August 2012. Future coastal management decisions for the Scratby frontage, included those related to the damaged Scratby gabions, are driven by the adopted SMP policy for Winterton-on-Sea (South of Beach Road) to Scratby. The adopted Shoreline Management Plan policy for the Scratby gabion frontage is detailed in Table 2.

Policy Unit 6.14, Winterton-on-Sea (South of Beach Road) to Scratby: From present day (by 2025)

Not intervening at all could lead to a loss of residential properties at Scratby, where the policy was previously to hold the line. Therefore if it is physically possible, and funding is available, the line will continue to be held at Scratby in the short term to allow for social mitigation measures to be implemented. There will also be some localised dune management measures put in place as the dunes provide a natural defence, albeit subject to occasional breaching. The overall policy will therefore be managed realignment. Measures will need to be identified and implemented to help minimise the impact of this policy option on the lives of individuals and communities from the short term through to the long term. If holding the line at Scratby is not physically or financially viable then minor works (for example local placement of areas of rock, beach replenishment etc) may be undertaken here and at other selected areas, to slow the rate of coastal erosion, but not with a view to protecting the coast into the medium or long term. As and when a suitable package of social, economic and planning measures is identified, maintenance and minor repair of defences will cease, and the coastline will be allowed to continue its natural regression. Nature conservation requirements would be fulfilled by this policy option.

Policy Unit 6.14, Winterton-on-Sea (South of Beach Road) to Scratby: Medium-term (by 2055)

No change from the above policy option of managed realignment, but only to allow minimal intervention, and the removal of defence ruins. This may result in loss of seafront assets in Newport and Scratby.

Policy Unit 6.14, Winterton-on-Sea (South of Beach Road) to Scratby: Long-term (by 2105)

No change from the above policy option of managed realignment, but only to allow minimal intervention. Beaches and dunes are likely to move landward, which may result in loss of seafront assets in Newport and Scratby. However, it might be expected that these features would be sustained as a result of adopting the long-term policy options for frontages further north within the SMP shoreline.

Table 2 Adopted Shoreline Management Plan policy for the Policy Unit containing the Scratby gabion frontage.

4. Possible Engineering Options

An engineering options report has been produced by consulting engineers. These engineering options can be grouped into four themes:

- Do Nothing

- Do Minimum/Make Safe
- Remove and Replace Existing Gabions
- Replace with an Alternative Structure

A further option of monitoring with enhanced on-site health and safety provision could also be considered.

Replace with an alternative structure includes a long list of coastal defence approaches which may be considered as desirable but are unlikely to be achievable, because they are not policy compliant, unlikely to gain the necessary consents or be affordable. Photographs of these types of coastal defence options are shown in Appendix A for illustrative purposes.

The commission of an initial detailed engineering investigation of the structural stability of the damaged Scratby gabions, would further inform the understanding of the stability and health and safety risks of the damaged structure. Outcomes of the initial detailed engineering investigation could be used to inform the subsequent selection of an engineering option for the damaged Scratby gabion structure and identify further design work as required.

A summary of estimates of costings of these options are included in Table 3. These are based upon an estimated capital cost of construction per linear metre, applied to the 100 metre frontage of the damaged Scratby gabions. These estimates are high level and are not based upon design input, meaning that these costs could vary significantly.

	Option	Estimated Cost
1	Do Nothing	£0
2	Do Minimum/Make Safe	£550,000
3	Remove and Replace Existing Gabions	£725,000
4	Replace with an Alternative Structure:	
4a	Post and Rail Wave Break	£764,000
4b	Sand Filled Geo-Tubes	£984,000
4c	Dune/Cliff Recharge	£1,056,000
4d	Beach Recharge Scheme	£1,098,000
4e	Onshore Rock Armour Overlaying Existing Gabions	£1,132,000
4f	Sheet Pile Wall with Gabions	£1,268,000
4g	Concrete Revetment Mat with Gabions	£1,394,000
4h	Offshore Rock Armour	£1,793,000
A further option of monitoring with enhanced on-site health and safety provision could also be considered.		

Table 3 Long list of remedial/coastal protection approaches for the damaged Scratby gabions including cost estimates

Each of the long list options have been subjected to an initial feasibility appraisal through the Coastal Partnership East engineers in combination with the wider Coastal Partnership East team. This was based upon four factors. Technical, being the appropriateness of the coastal defence when applied to the relative short length of coast in the vicinity of the Scratby damaged gabions. Economic, being based upon the relative cost of each of the coastal defence options. Environmental, being the relative impact of the coastal defence option upon the environment. Social, being the relative acceptance of the coastal defence option by the local community. The outcome of this initial feasibility appraisal is shown in Table 4. Do Minimum/Make Safe and Onshore Rock Armour Overlaying Existing Gabions are indicated to be the more favourable options. A further option of monitoring with enhanced on-site health and safety provision could also be considered.

Option	Estimated Cost	Technical	Economic	Environmental	Social
Do Nothing	£0				
Do Minimum/Make Safe	£550,000				
Remove and Replace Existing Gabions	£725,000				
Post and Rail Wave Break	£764,000				
Sand Filled Geo-Tubes	£984,000				
Onshore Rock Armour Overlaying Existing Gabions	£1,132,000				
Sheet Pile Wall with Gabions	£1,268,000				
Concrete Revetment Mat with Gabions	£1,394,000				
Offshore Rock Armour	£1,793,000				

Colour Code Key:	More Favourable	Neither More/Less Favourable	Less Favourable
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Table 4 Initial feasibility appraisal for the long list of remedial/coastal protection approaches for the damaged Scratby gabions

5. Financial Implications

It is likely that intervention to repair the damaged Scratby gabion structure will require significant funding. Great Yarmouth Borough Council's coastal protection repair and maintenance budget would not meet the required levels of funds and Great Yarmouth Borough Council's coastal protection reserve budget does not retain sufficient funds to meet these costs.

It is indicated that the Environment Agency emergency repair grant may only be available for lower levels of funding in the order of tens of thousands of pounds and this would not meet the estimated

costs for the options included in the engineering consultants report. Additional funds would need to be identified by Great Yarmouth Borough Council, should these options be taken forward.

6. Risk Implications

Risk Implications

Risks	Mitigating Actions
Collapse of the damaged gabions at Scratby.	The completion of a further formal public safety risk assessment and if identified associated small-scale works, to enhance on-site health and safety provision to be completed through use of existing budgets.
Future coastal defence works at the site of the Scratby damaged gabions being at risk of collapse.	The commission of an initial detailed engineering investigation of the structural stability of the damaged Scratby gabions, to further inform the understanding of the stability and health and safety risks of the damaged structure. Outcomes of the initial detailed engineering investigation to be used to inform the subsequent selection of an engineering option for the damaged Scratby gabion structure and identify further design work as required.

7. Conclusions

A section of north-western extremity of the Scratby gabions is in a damaged state, due to the impact of the storm event of the evening of 31st March and 1st April 2022. Ideally engineering works are required to repair the damaged structure or make the structure safe and to prevent further damage of neighbouring sections of the defence. All of these would require further costed engineering investigations. Based on the initial investigations, it is unlikely that replacement of the structure is feasible due to constraints details in the report.

It is likely that any intervention to repair the damaged gabion structure will require significant funding. Great Yarmouth Borough Council's coastal protection maintenance budget or coast protection reserve does not meet the required levels of funds.

The completion of a further formal public safety risk assessment and if identified associated small-scale works are required, to enhance on-site health and safety provision for the damaged Scratby gabion structure owned by Great Yarmouth Borough Council.

The commission of an initial detailed engineering investigation of the structural stability of the damaged Scratby gabions is required, to further inform the understanding of the stability and health and safety risks of the damaged structure. Outcomes of the initial detailed engineering investigation are to be used to inform the subsequent selection of an engineering option for the damaged Scratby gabion structure and identify further design work as required.

3. Background Papers

Areas of consideration: e.g. does this report raise any of the following issues and if so how have these been considered/mitigated against?

Area for consideration	Comment
Monitoring Officer Consultation:	Yes ELT
Section 151 Officer Consultation:	Yes ELT
Existing Council Policies:	
Financial Implications (including VAT and tax):	Included.
Legal Implications (including human rights):	
Risk Implications:	Included.
Equality Issues/EQIA assessment:	Not applicable.
Crime & Disorder:	Not applicable.
Every Child Matters:	Not applicable.