



**Cell 1 Regional Coastal Monitoring Programme
Lynemouth Bay Post Storm Walkover Inspection
Survey 2023**

Northumberland County Council

Lynemouth Bay Post Storm Walkover Inspection Surveys 2023

Contents Amendment Record

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Preamble

The Cell 1 Regional Coastal Monitoring Programme covers approximately 300km of the north east coastline, from the Scottish Border (just south of St. Abb's Head) to Flamborough Head in East Yorkshire. This coastline is often referred to as 'Coastal Sediment Cell 1' in England and Wales (**Figure 1**). Within this frontage, the coastal landforms vary considerably, comprising low-lying tidal flats with fringing salt marshes, hard rock cliffs that are mantled with glacial sediment to varying thicknesses, softer rock cliffs and extensive landslide complexes.

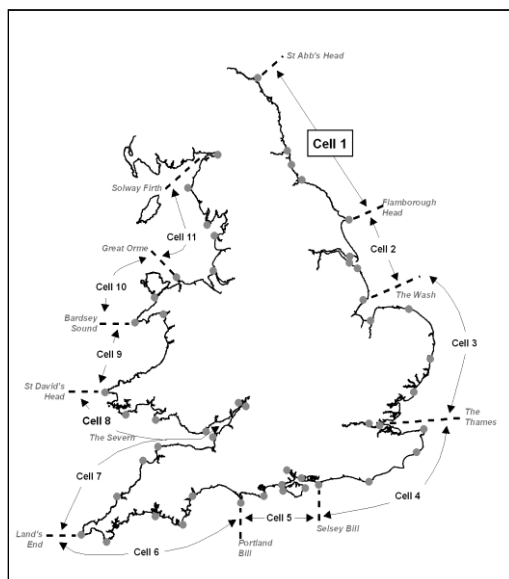


Figure 1 Sediment Cells in England and Wales

The programme commenced in its present guise in September 2008¹ and is managed by North Yorkshire Council on behalf of the North East Coastal Observatory. It is funded by the Environment Agency, working in partnership with the following organisations:



¹ Prior to 2008, coastal monitoring was undertaken on a consistent basis across Northumberland and North Tyneside as part of the (then) Northumbrian Coastal Authorities Group's monitoring programme which commenced in 2002, whilst several authorities between the River Tyne and Flamborough Head undertook their own local monitoring programmes.

Royal HaskoningDHV has been appointed to provide Analytical Services in relation to the present phase of the Cell 1 Regional Coastal Monitoring Programme, between 2016 - 2027.

The main elements of the Cell 1 Regional Coastal Monitoring Programme involve:

- beach profile surveys
- topographic surveys
- cliff top recession surveys
- real-time wave data collection
- bathymetric and seabed characterisation surveys
- aerial photography
- LiDAR Surveys
- walk-over cliff and coastal defence asset surveys.

During late October / early November 2023, the UK was subject to a period of stormy weather where three named storms occurred within a 4-week period (Figure 2). To assess the impact of these storms on the coastline, a series of targeted **Post Storm Walkover Inspections** were undertaken as part of the Cell 1 Regional Coastal Monitoring Programme. The report presents the Post Storm Walkover Inspection surveys undertaken in Lynemouth Bay.

Name	Date named	Date of impact on UK and/or Ireland and/or Netherlands
Agnes	25 September 2023	27 - 28 September 2023
Babet	16 October 2023	18 - 21 October 2023
Ciarán	29 October 2023	1 - 2 November 2023
Debi	12 November 2023	

Figure 2 UK Named storms 2023 ([UK Storm Centre - Met Office](#))

1. Introduction

1.1 Study Area

This report presents the Post Storm Walkover Inspection for Lynemouth Bay.

1.2 Methodology

The post storm walkover inspection for Lynemouth Bay was carried out on the 16th November. The weather experienced during the inspections was generally clear and fine with no access or visibility problems caused by adverse weather.

The frontage has been split into a number of 'asset lengths' (**Appendix A**), as defined in the National Flood and Coastal Defence Database (NFCDD) that was established by the Environment Agency.

The walkover inspections cover both built defence assets and natural defence assets such as cliffs, slopes and dunes. All assets were visually inspected, photographed and graded based on their condition and an estimate made of their residual life.

For built assets the grading classification was undertaken in accordance with the Condition Assessment Manual (EA, 2012), with estimates made of the urgency of any necessary repairs. An extract of the grading classification for built assets is presented in **Table 1-1**. For ease of reference the built asset photographs presented in this report have also been bordered with the colours key indicated below.

Grade	Rating	Description
1	Very Good	'As built' condition or cosmetic defects that have no effect on performance.
2	Good	Minor defects that will not reduce overall performance of the asset.
3	Fair	Defects that could reduce overall performance of the asset.
4	Poor	Defects that would significantly reduce overall performance of the asset.
5	Very Poor	Severe defects resulting in overall performance failure of the asset.

Table 1-1: Condition assessment grading for man-made assets.

In addition to the above grading classification, for natural assets such as cliffs and slopes the same five-point activity scale used in previous walkover inspections within Cell 1 was used. This grading classification is presented in **Table 1-2**. For ease of reference the natural asset photographs presented in this report have also been bordered with the colours key indicated below.

Grade	Class	Description
1	Dormant	Features with no interaction with marine processes.
2	Inactive	Features with no visible evidence of erosion or landsliding activity.

3	Locally active	Features with localised evidence of small erosion or landsliding activity.
4	Partly active	Features with widespread evidence of small erosion or landsliding activity or areas of intense erosion or landsliding.
5	Totally active	Features with large-scale or intense erosion or landsliding.

Table 1-2: Condition assessment grading used for natural assets (cliffs/ slopes).

This report provides an overview of the findings from the walkover inspections, summarising each locality in general but also specifically identifying individual assets in ‘poor’ or ‘very poor’ condition. It is anticipated that this summary will help identify areas for maintenance or capital investment. Full details of the inspection of each asset are provided in **Appendix B**.

In addition to this report, full details of the inspection and a selection of appropriate photographs have been entered into the SANDS (Shoreline and Nearshore Database System) database and provided along with this report with SANDS viewer software. Additionally, all data from the obsolete Northumbrian Coastal Group MS Access database previously used for Northumberland coastal defence inspections from 2002 to 2010 has been imported to the SANDS database and a new asset data display form “Northumberland Sea Defence” has been created in SANDS to allow easy viewing of the data.

3. Condition Assessment

3.1 Snab Point to Beacon Point (MU 19)

This management unit is approximately 2.5km in length and extends from Snab Point in the north to Beacon Point in the south. This frontage includes 8 coastal defence assets, comprising a mix of vegetated soft cliffs, colliery spoil beaches /cliffs, and man-made defences around the Lynemouth Power Station.

The northern section of Lynemouth Bay is encased within a rocky and sandy foreshore bay topped with a rocky cliff and protected in the north by Snab Point, transitioning southwards into a low rock cliff base overlain with softer material (/3301C02). The soft material is covered by considerable vegetation.

It appears this section of the frontage has been less affected by the recent storms, although some localised rock falls were observed at the base of the cliff. Clinging was also observed in the localised deposits of finer beach material, likely caused by the drawdown of material during stormy conditions.



Rocky cliff extending from Snab Point (/3301C02)



Localised rock falls in harder cliffs to the north. Clinging in the finer beach material in foreground (/3301C02)

Progressing southwards, the colliery spoil has formed a small cliff above the natural sandy beach, and in front of a densely vegetated sand dune, of approximately 1m height at around the highwater mark (/3401C01). The spoil has been subject to continuous erosion both through marine processes and surface water runoff. It is clear the recent storms have accelerated this erosion, retreating the seaward face and exposing more refuse. At the southern extents, the spoil platform has all but been eroded, resulting in the erosion of the toe of the dunes previously sheltered by the spoil.



Eroding colliery spoil platform (/3401C01)



Accelerated erosion at surface water run off locations (/3401C01)



Plastic refuse exposed during recent storms (/3401C01)



Erosion of the dunes previously protected by colliery spoil (/3401C01)

The southern end of asset (/3401C01) also appears to have experienced accelerated erosion as a result of the recent stormy weather. Slumping is evident within the softer sand material mantled on the colliery spoil platform. Large swathes of this material are also deposited across the foreshore. The informal beach access adjacent to Lyneburn Cottages travellers' site is now inaccessible due to erosion. There is less refuse in the cliffs in this area.



Accelerated erosion of the softer sand mantled on the colliery spoil platform (/3401C01)



Accelerated erosion of the softer sand mantled on the colliery spoil platform (/3401C01)



Concrete slab displaced due to recent erosion (/3401C01)



Beach access path, adjacent to Lyneburn Cottages travellers' site, inaccessible due to erosion (/3401C01)

The next section (/3401C05), shoreline fronting Lynn Hill, from the centre of Lynemouth Bay to the River Lyne, is less well protected by the rapidly receding (or in places absent) spoil beach. The man-made (spoil) cliffs are actively eroding, releasing spoil and significant volumes of refuse to the foreshore. The cliff appears to have retreated notably since the previous survey; it is thought in part due to the recent stormy weather. The cliffs in this section had previously been benched (mitigation to prevent sand martins nesting) ahead of mobilisation for the upcoming remediation works in 2024. The cliffs have retreated such that this benching is no longer present in places.



Erosion of backing man-made cliffs, releasing colliery spoil and refuse to the foreshore (/3401C05)

Erosion of backing man-made cliffs, releasing colliery spoil and refuse to the foreshore (/3401C05)



Erosion of backing man-made cliffs, releasing colliery spoil and refuse to the foreshore (/3401C05)

Erosion of backing man-made cliffs, releasing colliery spoil and refuse to the foreshore (/3401C05)

This erosion is also evident along the south bank of the river Lyne and, albeit less frequently, along the open coast south of the River Lyne to the Power Station (3401C06). At the mouth of the river Lyne, there is notable storm deposits present.



Erosion of backing man-made cliffs at the mouth of the river Lyne (/3401C06)



Storm deposits at the mouth of the river Lyne (/3401C06)



River Lyne to the Power Station (/3401C06)



River Lyne to the Power Station (/3401C06)

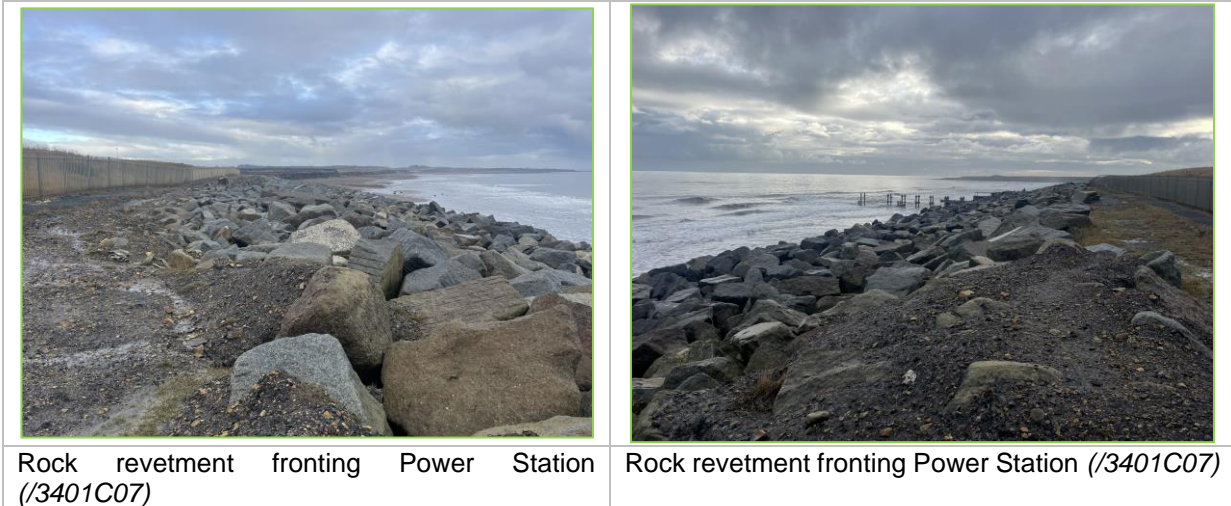
The large rock armour berm revetment constructed in front of the Power Station in 1995 (/3401C08) and subsequently extended around the coal stocking yard in 2005 (/3401C07) remains in good condition. Rock armour is angular and well packed with no displaced stones or movement at the toe. Minor erosion was observed behind the crest. No visible damage was observed as a result of the recent storms however a significant volume of storm deposits was noted within the outfall channel,



North Rock Revetment end and outfall channel (/3401C07)



Significant volumes of storm deposits within outfall channel (/3401C07)



At the southern end of the revetment (/3401C03), rapid erosion of the spoil beach was previously observed over the 2017/18 winter, exposing the buried tie-in of the revetment and initially causing some concern. However, the tie-in extends some distance landward (currently largely remaining buried). Although, as discussed further below, the shoreline parallel section of spoil cliffs appears to have retreated since the previous survey, the section of cliffs at the rock armour tie in appears to have undergone less change.



Between the Power Station and Beacon Point the shoreline again comprises colliery spoil. Further erosion of the high spoil cliff in the north has occurred since August 2022, with the tension cracks observed on the cliff top in that survey having now failed. The retreating cliff top is now beginning to impede on the England Coast Path, with a local realignment required in the near future.

The central and southern sections of this southern bay are quite stable with lower sandy cliffs tapering to a low cobble and boulder berm fronting colliery spoil and wide backing natural dunes. It is apparent the recent storms overtopped the colliery platform, with significant erosion observed along the crest and rear of the platform. Vast volumes of storm deposits were also noted on the colliery spoil including both seaweed and household wastes. The setback rear dune systems appear to have been largely unaffected by the recent storms.



Eroding cliff to the north in August 2022. Tension cracks visible along the cliff top (3501/C01)



Eroding cliff to the north in November 2023 (3501/C01)



Eroding cliff to the north starting to impede the England Coast Path (3501/C01)



Water accumulation between the spoil's berm and the rear soft natural dunes (3501/C01)



Recent overtopping damage to colliery spoil platform (3501/C01)



Significant storm deposits along colliery spoil platform (3501/C01)

4. Problems Encountered and Uncertainty in Analysis

All assets were inspected at suitable stages of the tide and in good weather conditions. Therefore, there were no major problems encountered during the inspections.

5. Conclusions and Recommended Actions

Further to the visual inspection of all NFCDD assets, specific conclusions and recommendations for individual assets are given in **Appendix B**.

In lieu of a decision for a suitable replacement for the NFCDD database, all condition assessment data and selected photographs have been uploaded to a SANDS (Shoreline and Nearshore Database System). This includes all data and photographs from the previous inspections since 2002 that were previously held on four separate MS Access Databases that had become obsolete. In order to facilitate easy comparison of new inspections to previous data for each asset a new asset data display form “Northumberland Sea Defence” has been created in SANDS.

In a broader sense, it is recommended that the ongoing inspection regime and retrospective waste ‘clear-up’ operations by Northumberland County Council are continued and become increased in frequency to immediately post storms. This will help reduce the build-up of eroded waste on the beaches and ultimately the volume of this released waste that becomes washed to sea.

Some of the waste visible within the eroding spoil cliffs is outside of the ‘work areas’ that will be addressed by the 2024 capital waste management scheme in parts of Lynemouth Bay. Given this, it is recommended that Northumberland County Council considers how this may be addressed, both from a practical perspective and from a public perception perspective. The planned capital scheme cannot simply be extended to these additional areas because that would require time-consuming revisions to the existing Planning Permission and Deposit for Recovery Environmental Permit and incur additional capital costs. One option may be to engage the Council’s existing inspection and ‘clear up’ team or alternatively a social enterprise, such as The Skill Mill, to clear-up wastes that are visible on the beach and in the cliff face and dispose of them off-site in accordance with the waste hierarchy. This would also require careful health and safety consideration, but if suitable arrangements can be made this could become part of a longer-term partnership for ongoing management of the site.

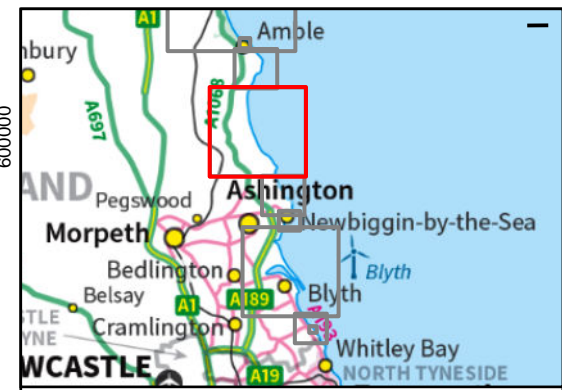
Some areas of the site where mitigation works have previously been undertaken to prevent sand martins from nesting in the cliffs ahead of the capital works have eroded so much in the interim that the benching of the sand layer is no longer visible. It is recommended that these areas are inspected by the Contractor’s site team to ensure they remain confident that the works can proceed without adverse effect upon those sand martins that will be returning to this part of the Northumberland coastline in spring 2024.

There is one part of the site, on the north bank of the river Lyne near to the open coast, where a stand of Japanese Knotweed has been recorded for some time. In recent years this has been treated *in situ* to limit its growth and it is intended that this is removed as part of the capital works early in 2024. The storms have caused erosion of the river bank in the vicinity of the Japanese Knotweed and some of this species may already have become eroded and lost to sea.

Appendices

Appendix A

Asset Location Maps



Legend

- Coastal Asset location
- NFCDD Asset Number

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 Hybrid Reference Layer: Esri UK, Esri, HERE, Garmin, METI/NASA, USGS
 World Imagery: Maxar, Microsoft
 OS Open Rasters: Contains OS data © Crown Copyright and database right 2020

Client:	Project:
North East Coastal Group	Cell 1 Regional Coastal Monitoring Programme

Title:

Figure 1 - Map 17

COASTAL ASSET LOCATIONS

Northumberland County Council Frontage

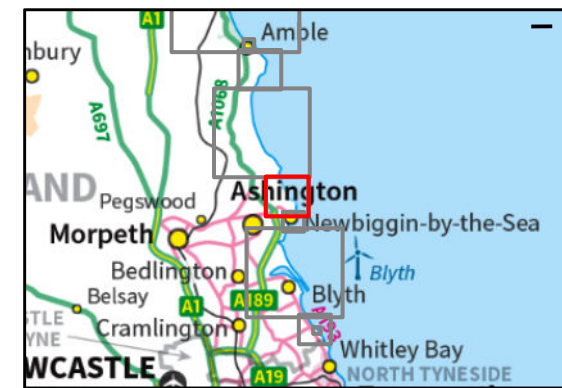
Report:

Asset Inspection Report

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
0	n/a	TC	NJC	A4	1:45,000

Co-ordinate system: British National Grid





Legend

- Coastal Asset location
- NFCDD Asset Number

© HaskoningDHV UK Ltd.
 World Imagery: Maxar, Microsoft
 Hybrid Reference Layer: Esri UK, Esri, HERE, Garmin, INCREMENT P, METI/NASA, USGS
 OS Open Rasters: Contains OS data © Crown Copyright and database right 2020

Client:	Project:
North East Coastal Group	Cell 1 Regional Coastal Monitoring Programme

Title:
Figure 1 - Map 18
COASTAL ASSET LOCATIONS
Northumberland County Council Frontage

Report:
 Asset Inspection Report

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
0	n/a	TC	NJC	A4	1:20,000

Co-ordinate system: British National Grid



Appendix B

Asset Condition & Recommendations

Asset Name	Description/comment	Type/desc	Start	End	Sort by N	Length	Inspection Date	Inspector	Comments	Overall Condition	Residual Life	Recommendations	Urgency
121AA901A3301C02	Low rock cliff with rocky and sandy foreshore forming a bay which is sheltered by Snab point.	Cliff - Headagee	NZ30059211	NZ30229142	592110	508.3	45246	Royal HaskoningDHV	Rocky cliff transitioning southwards to a low rock cliff topped with soft vegetated material. Some localised rock falls observed in harders cliffs to the north. Cliffing to finer beach material likely due to recent stormy conditions.	3	>20	Monitor erosion.	no repairs
121AA901A3401C01	Low vegetated soft cliff with rocky toe at back of beach comprising of colliery waste.	Cliff - Lynemouth	NZ30059211	NZ30379105	592110	1108.4	45246	Royal HaskoningDHV	Sandy beach backed by a dune with a low colliery cliff in between. All elements sheltered at north by rock outcrops and exposed to erosion to the south, with the sand dune transitioning to a cliff with localised slumps. Refuse can be widely spotted in the colliery low cliff. It is clear recent storms have accelerated erosion along the frontage, retreating the seaward face (of the spoil) and exposing more refuse. The informal beach access adjacent to Lyneburn Cottages travellers' site is now inaccessible due to erosion.	5	>20	Capital waste management scheme planned for 2024. Some of the waste visible within the eroding spoil cliffs (exposed during recent storms) is outside of the 'work areas' that will be addressed by the 2024 capital waste management scheme in parts of Lynemouth Bay. Given this, it is recommended that Northumberland County Council considers how this may be addressed, both from a practical perspective and from a public perception perspective.	no repairs
121AA901A3401C05	Man-made cliff of tipped colliery waste. Beach comprised of colliery waste.	Cliff - Lynemouth	NZ30379105	NZ30509080	591050	283.8	45246	Royal HaskoningDHV	Plenty of discarded refuse exposed by the rapid erosion of the spoil cliff on top of the sandy beach. The cliff appears to have retreated notably since the previous survey; it is thought in part due to the recent stormy weather. The cliffs in this section had previously been benched (mitigation to prevent sand martins nesting) ahead of mobilisation for the upcoming remediation works in 2024. The cliffs have retreated such that this benching is no longer present in places.	5	>20	Capital waste management scheme planned for 2024. Some of the waste visible within the eroding spoil cliffs (exposed during recent storms) is outside of the 'work areas' that will be addressed by the 2024 capital waste management scheme in parts of Lynemouth Bay. Given this, it is recommended that Northumberland County Council considers how this may be addressed, both from a practical perspective and from a public perception perspective.	routine
121AA901A3401C06	Man-made cliff of tipped colliery waste. Tipping now ceased due to due to closure of mine. Due to extension of Power Station revetment (def.34/00/2) the area of colliery waste embankment is now reduced to area north of the Power Station drainage outfall.	Cliff (man-made)	NZ30509080	NZ30679050	590800	340.2	45246	Royal HaskoningDHV	Rapid erosion of spoil cliff with sandy foreshore full of cobbles from spoil.	4	>20	Control public access to crest. Consider environmental issues.	no repairs
121AA901A3401C07	Rock revetment. Original revetment constructed in 1995 was extended by April 2006 to encompass the coal stocking yard area adjacent to the Power Station.	Revetment - Lynemouth Power Station	NZ30679050	NZ30779031	590500	216.6	45246	Royal HaskoningDHV	Rock revetment with a berm, rocks armour angular and well packed. No visible damage from recent storms although significant volume of storm deposits observed within outfall channel.	2	>20	None.	no repairs
121AA901A3401C08	Power Station fronted by informal pathway below coastal slope. Seaward side of the pathway is protected by rock armour.	Embankment - Lyne Sands	NZ30779031	NZ30919006	590310	258	45246	Royal HaskoningDHV	Rock revetment with a berm, rocks armour angular and well packed. Outfall pipe failed but outfall structure through the revetment in good condition. At the southern end, the spoil cliffs have been progressively eroding exposing previously buried lengths of rock armour. Despite notable erosion elsewhere this section does not appear to have eroded significant during recent storms.	3	11-20	Address outflanking at south end.	routine
121AA901A3401C03	Rock revetment currently buried by colliery spoil.	Revetment - Lynemouth Power Station				90	Not inspected. Buried.	n/a	The colliery spoil is in active erosion process, hence forming a cliff. Where rock revetment rocks are exposed these protect the toe of the colliery cliff.	n/a	n/a	n/a	n/a
121AA901A3401C04	Tie-in embankment currently buried by colliery spoil.	Embankment - Lynemouth Power Station				80	Not inspected. Buried.	n/a	The colliery spoil is covering entirely the tie-in embankment. The flood defence level and erosion protection of the embankment are improved by the presence of the spoil	n/a	n/a	n/a	n/a
121AA901A3501C01	Vegetated dune fronted by sand, shingle and colliery waste beach with some cliffing in the beach profile.	Coastal Slope - Lyne Sands	NZ30919006	NZ31248955	590060	606.7	45246	Royal HaskoningDHV	Vegetated dune stable with some signs of cliffing to the south end. Shingle and colliery beach profile enclosing some water in form of the sand dunes. Overtopping damage to colliery spoil noted from recent storms with vast storms deposits also present. Further erosion of the high spoil cliff in the north is now beginning to impede on the England Coast Path.	4	11 - 20	Monitor erosion and outflanking at north end (including proximity to England Coast Path).	routine