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Strategic Coastal Monitoring Staithes to Scarborough

Cliff Condition Survey Volume 1 Text & Figures



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Cliff Condition Survey

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STRATEGIC COASTAL MONITORING STAITHES TO SCARBOROUGH

Cliff Condition Survey

CONTENTS

VOLUME 1 TEXT & FIGURES

	Page
1. INTRODUCTION	1
1.1 Shoreline Management Plan Monitoring Recommendations	1
1.2 Cliff Inspections: Terms of Reference	2
1.3 Deliverables	3
2. METHODS	4
3. FINDINGS	8
3.1 Cliff Units	8
3.2 Geology	9
3.3 Recession Rates	12
3.4 Cliff Condition	14
3.5 Hotspots	14
3.6 Habitats	19
3.7 Risks	20
4. RECOMMENDATIONS	25

REFERENCES

LIST OF TABLES

Table 1.	Classification of Cliff Types
Table 2.	Classification of Vegetated Sea Cliff Communities (from Mitchley and Malloch, 1991)
Table 3.	Cliff Condition Survey Classes
Table 4.	Frequency of Different Cliff Types
Table 5.	Geological Section: North Yorkshire Coast (Source: Rawson & Wright 2000)
Table 6.	Published Cliff Recession Rates (From Agar, 1960)
Table 7.	Summary of Cliff Top Recession Data
Table 8.	A Summary of the Relative Frequency of Different Cliff Condition Classes
Table 9.	Hotspot List: Lengths of Intense Current Recession Activity.
Table 10.	A Summary of the Frequency of Different Sea Cliff Vegetation Communities

Table 11.	Predicted Habitat Gains and Losses
Table 12.	Economic Risk Categories
Table 13.	Personal Risk Categories
Table 14.	The Unprotected Cliffline: “ at – risk “ register

LIST OF FIGURES

Figure No. 1	Cliff Types (From Lee & Clark 2002)
Figure No. 2	Pie Charts of the Relative Frequency of Different Cliff Types on the Unprotected and Protected Clifflines
Figure No. 3	Relative Frequency of Cliff Condition Classes
Figure No. 4	Distribution of Cliff Condition Classes Along the Cliffline
Figure No. 5	Economic Risk Profile Along the Cliffline Between Staithes and Scarborough
Figure No. 6	Personal Risk Profile Along the Cliffline Between Staithes and Scarborough

APPENDICES

A1	Inventory of Cliff Units
A2	Recession Rates
A3	Landslide Database
A4	Condition Classification
A5	Unprotected Maritime Cliff and Slope Habitats

1. INTRODUCTION

1.1 Shoreline Management Plan Monitoring Recommendations

The Huntcliffe to Flamborough Head Shoreline Management Plan (covering the whole of Sub-cell 1d; Mouchel, 1997) noted that limited monitoring of coastal recession took place on the frontage at the time of the plan preparation. That document recommended that a more systematic and co-ordinated programme of monitoring is undertaken for the coastline. This would include a number of surveys covering the whole coast with other monitoring focusing on key areas.

The following monitoring activities were recommended (Volume 1 Section 13.3):

1. *Annual photogrammetrically controlled and analysed colour aerial survey of the coastline*; the purpose of this survey would be to record cliff recession and to provide coarse information on beach changes. The survey would also allow for superficial monitoring of major cliff movements and unstable slopes and will provide a basis for ecological habitat monitoring.
2. *5-yearly Bathymetric Survey*; this should extend and be compatible with the work of British Geological Survey and should particularly be focused on the nearshore area. The survey should include the sampling and identification of sea bed sediments across the whole area, extending seaward to the 20m CD contour.
3. *Offshore Wave Climate*; the long term deployment of one or two directional waverider buoy(s) was recommended, to be located in exposed deepwater locations such that results are applicable to the whole coastline of the area.
4. *Wind Records*; a digital wind recording station should be established and maintained at a suitable exposed coastal location.
5. *Water Levels* - a Class 1 gauge should be established at an appropriate location on the frontage, either at Whitby or Scarborough. Such a gauge will provide important and focused information, particularly in relation to sea level rise and isostatic effects on this coast.
6. *Beach Profile Surveys* - Manual beach profile surveys extending to the low water mark should be recorded for the main beaches of the area including Skinningrove, Staithes, Runswick Bay, Sandsend, Whitby, Robin Hood's Bay. Scarborough North, Scarborough South, Cayton Bay and Filey. Profiles should be taken on a six-monthly basis and suitably data-based. Profile centres to be approximately 100m.
7. *Defence Condition Surveys* – the current programme of condition inspections should be continued on an annual basis. The results of these inspections should be systematically data-based and stored to a common format.
8. *Cliff Top Erosion Monitoring* - monitoring of cliff top recession should be extended to cover all the areas of potential property loss and where Retreat the Existing Defence Line is the recommended policy.

9. *Visual Observation* - An annual monitoring inspection by walking the whole coastline is was recommended. This should be designed to focus on the other issues associated with coastal change including loss of amenities through erosion, undercutting of cliffs, indications of potential cliff instability etc. It is also desirable to instigate a more structured programme of visual monitoring of the shoreline.

In the year 2001, Scarborough Borough Council (SBC) received approval from the Department for Environment, Food and Rural Affairs (DEFRA) for Year 1 of a 5 year strategic monitoring programme. The Council sought costed proposals for providing professional services for implementation of the following aspects of the monitoring programme:

- Wave ride-buoys;
- Wind recording;
- Water level gauge;
- Condition surveys;
- Cliff inspection.

This report describes the results of the work undertaken by High Point Rendel during the period January to April 2002, with regard to *cliff inspections*. Other aspects of the monitoring programme are documented elsewhere (see Scarborough Strategic Coastal Monitoring (Staithes to Scarborough: Defence Condition Survey Volume 1 & 2).

1.2 Cliff Inspections: Terms of Reference

The terms of reference for the cliff inspections was defined by SBC as follows:

“Carry out an annual inspection of undefended coastal cliffs using an experienced geomorphologist for all coastal cliffs between Staithes and Scarborough encompassing SMP coastal management units 4 to 22 inclusive. Prepare a written report on the condition of the cliffs and potential risk to cliff top assets (including paths) and natural habitats for inclusion in Scarborough Borough Council’s annual coastal report. The report should include photographs and typical cliff profiles as considered necessary” (SBC letter CJM/jh/19/7/31/TLH00026; 9.11.2001).

This brief was subsequently amended as follows:

“Initially the cliff inspection report will be referenced in Keyshore with the intention to fully incorporate the reports into the database. Therefore to assist with future indexing all cliff behaviour units must be referenced to the relevant SMP management unit. Individual field reference numbers as referred to in the Whitby and Scarborough Strategies should be maintained” (SBC letter CJM/EM/TLE02395 19/7/31; 11.1.2002).

The proposals submitted by High Point Rendel made the following suggestions that were acceptable to SBC:

- *The need to develop an overall framework to address the cliff condition and strategic monitoring requirements for both undefended and protected clifflines.* Although the main

focus of the work would be on the undefended coast, a systematic review would be presented for all the cliffs between Scarborough and Staithes, inclusive.

- *The need to develop a database of historical recession rates to guide judgements about levels of risk.* A modest allowance was made to consider overall recession rates in order to rank the severity of risk to the cliff top assets, based on a review of historic topographic maps.

1.3 Deliverables

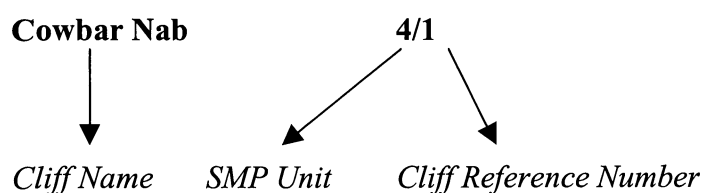
The results of the cliff inspection work are presented as:

1. A written report (this document) outlining the methods used and the principal findings of the condition survey of the coastal cliffs between Staithes and South Bay in Scarborough, a distance of approximately 55km's. A series of Appendices include a baseline description (including photographs) of each cliff unit, plus the 2002 cliff inspection sheet (suitable for incorporation into Keyshore);
2. A series of 1:10,000 scale map sheets showing the distribution and nature of each cliff unit.

2 METHODS

The work has involved the following tasks:

- Desk-study review of available geological maps (British Geological Survey Sheet 35 and 44 Whitby and Scalby - 1: 63,360 scale; Sheet 34 Guisborough – 1:50,000 scale) and memoirs (e.g. Kent 1980; Rawson and Wright 2000), historical records of landslide activity (e.g. Money 1979; Jones and Lee 1994) and the various Strategy Studies and Engineers Reports relevant to the cliffline;
- Definition and characterisation of cliff behaviour units of variable length and of similar character (CBU's or cliff units; Lee and Clark 2002), based on an interpretation of 1:4,000 scale colour vertical aerial photographs (SBC 6.10.99). Each cliff unit was assigned a unique name and reference number, incorporating the relevant SMP



management unit number and a cliff reference number:

Table 1 summarises the range of distinct cliff types which were recognised on the basis of surface form and the presence of coastal defences (U = Unprotected; P = Protected; see Figure 1).

Table 1 Classification of Cliff Types

Cliff Type	Description
U1	Actively Retreating Rockcliff
U2	Actively Retreating Till-capped Rockcliff
U3	Unstable Rock Slope Complex
U4	Actively Retreating Composite Cliff
U5	Actively Retreating Till Cliff
U6	Unstable Undercliff
U7	Unstable Till Slope
P1	Protected Rockcliff
P2	Protected Rock Slope Complex
P3	Protected Composite Cliff
P4	Protected Pre-existing Rock Slope Landslide
P5	Protected Pre-existing Till Landslide
P6	Protected Till Slope
Q	Quarry
AW	Alum Workings

Note: see Figure 1 for an indication of typical cliff profiles associated with different

cliff types.

- Compilation of 1:10,000 scale Cliff Unit maps, presenting the nature and distribution of cliff units;
- Measurement of historical cliff top and cliff foot recession rates for most cliff units (in some units there are no common reference points on successive map editions), from comparison of their position on successive topographic map editions;
- Identification of cliff top and cliff foot assets at risk from recession and coastal landsliding, from the aerial photographs and an appreciation of historical recession rates;
- Walk-over survey of the entire cliffline between Staithes and Scarborough (SMP management units 4 to 22 inclusive) to verify the desk-based assessments of cliff behaviour and risk and develop a baseline against which future cliff behaviour can be compared;
- Establishing a photographic record of various cliff details for each cliff unit;
- Establishing a *baseline database* of landslide features, with particular emphasis on cliff top conditions;
- Preliminary classification of cliff habitats in terms of the National Vegetation Classification types (Table 2) and their potential vulnerability to continued cliff recession and coastal landsliding;
- Completing a specially designed cliff inspection proforma for each cliff unit, incorporating relevant information for inclusion within the Keyshore system;
- Assessment of cliff condition using a classification system developed specifically for this study, based on the frequency of active and part-active slides along the cliff top (Table 3);
- Identification of HOTSPOTS i.e. current areas of intense active cliff recession and coastal landsliding which may pose a threat to assets or public safety;
- Compilation of an “*at risk*” register to identify properties that will be vulnerable to continued cliff recession and coastal landsliding over the next 50+ years;
- Developing a series of recommendations for future cliff inspections and monitoring.

The condition assessment is based on current observations and desk study information and no allowance has been made for possible changes in activity/stability as a result of climate change.

Figure 1 Cliff types (from Lee and Clark 2002)

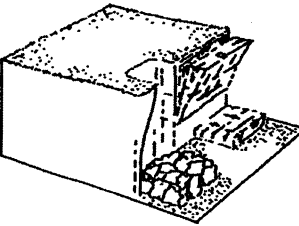
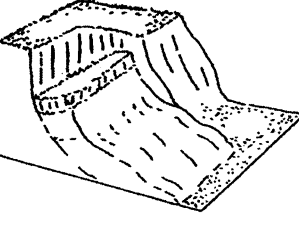
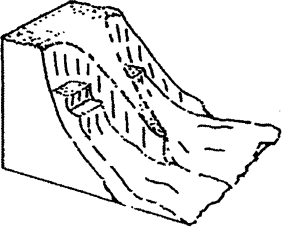
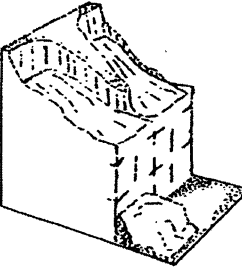
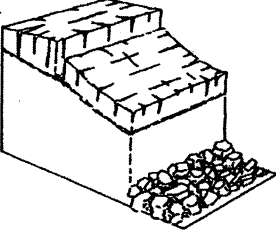
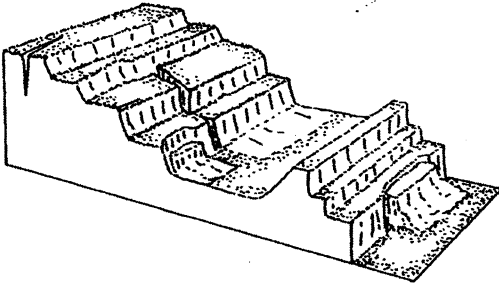
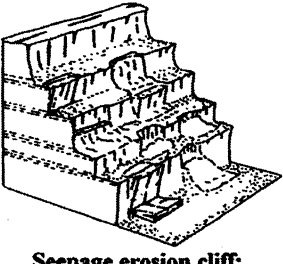
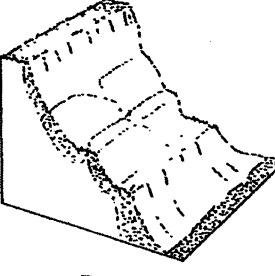
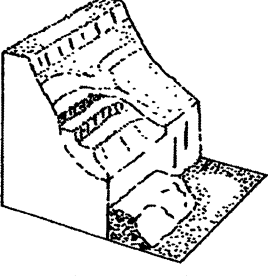
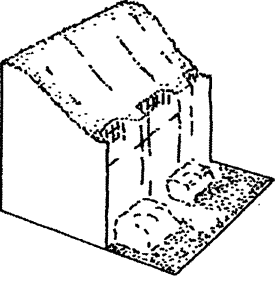
SIMPLE CLIFFS	 <p>Topples and falls</p>	 <p>Rotational landslide</p>	 <p>Mudslide</p>
COMPOSITE CLIFFS	 <p>Rotational landslide in glacial till over hard rock</p>	 <p>Block slide in hard rock over a thin clay layer</p>	
COMPLEX CLIFFS	 <p>Deep-seated landslide with failure at more than one level</p>		 <p>Seepage erosion cliff: alternating sand and clay</p>
RELICT CLIFFS	 <p>Dormant</p>	 <p>Reactivated</p>	 <p>"Slope-Over-Wall"</p>

Table 2 Classification of Vegetated Sea Cliff Communities (from Mitchley and Malloch, 1991)

Sea Cliff Community	Description
Maritime crevice and ledge (MC1-5)	Open and fragmentary vegetation of crevices and ledges is composed largely of herbaceous maritime species rooted in soils accumulated in rock clefts.
Sea-bird vegetation (MC6-7)	Sea-bird roosting and nesting conditions suited for open, unstable and nutrient enriched habitats.
Maritime Grassland (MC8-12)	Suites of closed swards in which <i>Festuca rubra</i> is usually abundant
Maritime Heath (H7)	Sub-shrub species, often elongated bushes.
Maritime Scrub (W22-23)	Marginal communities, often only achieving sub-community status.
Maritime Woodland	Areas of mature deciduous woodland.

Table 3 Cliff Condition Survey Classes

Condition Class	Description
10	Retreating cliffline affected by widespread active landslide features, including Hotspots of intense erosion activity.
9	Retreating cliffline with numerous active, relatively small-scale (>20 failures/km) or common large-scale landslide features affecting the cliff top, including extensive Hotspots of intense erosion activity.
8	Retreating cliffline with common active, relatively small-scale (10-20 failures/km) or occasional large-scale landslide features affecting the cliff top, including localised Hotspots of intense erosion activity.
7	Retreating cliffline with occasional active, relatively small-scale (5-10 failures/km) landslide features affecting the cliff top.
6	Retreating cliffline with rare active, relatively small-scale (<5 failures/km) landslide features affecting the cliff top.
5	Historical and relict landslide complexes and Undercliffs affected by active seacliff retreat and occasional small-scale landslide activity on the rear cliff, including localised Hotspots of intense erosion activity.
4	Historical and relict landslide complexes and Undercliffs affected by active seacliff retreat and rare small-scale landslide activity on the rear cliff.
3	Protected cliffline affected by occasional (5-10 failures/km) small-scale rock fall or landslide activity, with potential for rare large-scale slope movements.
2	Protected cliffline affected by occasional (5-10 failures/km) small-scale rock fall or landslide activity.
1	Protected cliffline with no visible evidence of rock fall or landslide activity

3 FINDINGS

3.1 Cliff Units

Table 4 and Figure 2 present the relative frequency of different cliff types along the coastline between Staithes and Scarborough. The table reveals that the dominant unprotected cliff type are rockcliffs, particularly Actively Retreating Rockcliffs (U1) and Actively Retreating Till-capped Rockcliffs (U2) with significant numbers of other rock cliff types, including large Undercliffs (U6) and Unstable Rock Slope Complexes (U3). Significant lengths of unprotected till cliffs tend to be limited to Whitby Golf Course, the centre of Robin Hoods Bay and at Scalby Sands.

In contrast, the protected cliffline tends to be dominated by till cliffs – either as Till Cliffs (P6), Pre-existing Till Landslides (P7) and Composite Cliffs (P3).

Table A.1 presents the classification of each of the 95 cliff units into cliff types.

Table 4 Frequency of different cliff types

Defence State	Cliff Type	Number of Cliffs
Unprotected	U1 Actively Retreating Rockcliff	20
	U2 Actively Retreating Till-capped Rockcliff	10
	U3 Unstable Rock Slope Landslide Complex	5
	U4 Actively Retreating Composite Cliff	9
	U5 Actively Retreating Till Cliff	4
	U6 Unstable Undercliff	7
	U7 Unstable Till Slope	2
Protected	P1 Rockcliff	5
	P2 Rock Slope Complex	1
	P3 Composite Cliff (Intact Slope)	4
	P4 Pre-existing Rock Slope Landslide	2
	P5 Pre-existing Till Landslide	7
	P6 Till Cliff	12
	Area of Quarrying*	0
	Alum Workings	7
	TOTAL	95

* Note some cliff units have localised areas of quarrying

3.2 Geology

Table 5 summarises the main geological units encountered along the cliffline. Much of the cliffline is developed in Jurassic shales and sandstones laid down between 136-172 million years ago. Two distinctive stratigraphic groups have been recognised:

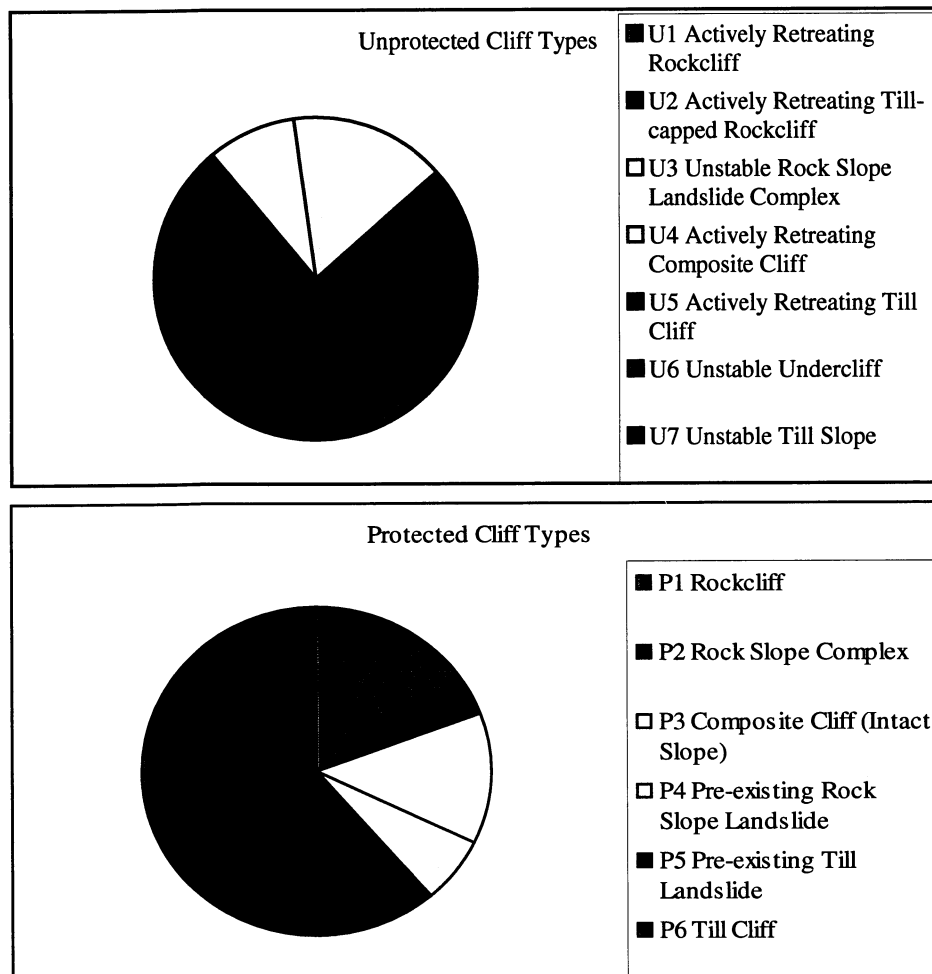
- The Lower Jurassic “Lias Group” deposited in a warm tropical sea. The deposits include the weak silty shales of Robin Hoods Bay (the Redcar Mudstone Formation), the sandstones of the Staithes Formation, the oolitic ironstones of the Cleveland Formation and the mudrocks and Jet Rock of the Whitby Mudstone Formation. These rocks dominate the clifflines north of Ravenscar and tend to give rise to sub-vertical rock cliffs, although large rock slope landslides do occur, as at Twixt Hill (cliff unit 6/3), Wrack Hill (6/7), Catbeck Hill (6/2), Seaveybog Hill (6/7) and Tellgreen Hill (6/10);
- The Middle Jurassic “Ravenscar Group” deposited in a vast river delta system. The deposits include the shallow marine Dogger Formation, an iron-rich sandstone, and a series of prograding deltaic sandstones and mudrocks of the Saltwick, Eller Beck, Cloughton, Scarborough, and Scalby Formations. These rocks can be found on the coast south of Ravenscar (although the Dogger and Saltwick Formations occur on the upper cliff sections south of Staithes and east of Whitby) where they give rise to either sub-vertical rockcliffs or broad Undercliffs comprising a series of lithologically controlled benches and scar slopes (e.g. The Coomb 18/1, Fox Hill 18/2, Common Cliff 18/3 and Little Cliff 19/3).

At Castle Hill, Scarborough faulting has brought Middle and Upper Jurassic rocks onto the cliffline, including the Osgodby Formation sandstones and the Oxford Clay along with a series of oolitic limestone and sandstone/grit beds of the Oxfordian substage.

Late Devensian age (around 18,000 years ago) glacial tills have been emplaced across much of the landscape. These tills include stiff silty sandy clays, sands and gravels and laminated stiff silty clays. They can be found either as a thin till-cap to many cliffs or represent a significant proportion of the cliff profile (i.e. composite cliffs such as Randy Bell End 7/4 and Whitestones Cliff 8/1 in Runswick Bay; Old Lance Cliff 15/4 and Ground Wyke Cliff 16/2 in Robin Hoods Bay). In places the till has completely infilled pre-glacial valleys and now the whole cliff profile is developed in these weak materials (e.g. Spa Chalet Cliff and Prince of Wales Cliff, Scarborough 22/1 and 22/3, and the Whitby Golf Course Cliffs 10/1 and 10/2).

Table A.1 provides a summary of the geology of each of the cliff units.

Figure 2 Pie charts of the relative frequency of different cliff types on the unprotected and protected clifflines.



Based on number of CBU's of a similar type as a proportion of total number of CBU's.

3.3 Recession Rates

Agar (1960) presented a limited amount of cliff recession data for the cliffline between Ravenscar and Staithes, for the period 1862 to 1960. His results are summarised in Table 6 which indicates that:

- Cliff recession rates were generally greater on the till cliffs than the rockcliffs;
- Rates of cliff foot recession were significantly higher than for the cliff top (5m/100 years compared with 2m/100 years);
- There was no recorded cliff top recession for many of the rockcliff units (e.g. Penny Steel 4/3, Port Mulgrave 6/3, Saltwick and Black Nabs 13/2 and 13/5);
- There was no recorded cliff top recession for some of the glacial till cliffs in Robin Hoods Bay (e.g. Tinker's Stone 17/4).

Table 6 Published Cliff Recession Rates (from Agar, 1960)

SMP Unit	Cliff Reference Number	Cliff Name	Cliff Type	Cliff Foot (m/100 years)	Cliff Top (m/100 years)
4	3	Penny Steel	U1	10.8	0
6	3	Port Mulgrave Cliffs	P1	10.8	0
6	8	Cauldron Cliff	U1	10.18	0
10	2	Whitby Golf Course (E)	U5	27.0	27.0
11	4	The Nabs	U1/P1	3.1	0
12	2	Abbey Cliff	U1 (now P1)	19.7	19.7
13	2	Saltwick Nab	AW	3.8	0
13	5	Black Nab	AW	11.4	0
16	1	Dungeon Hole Cliff	U4	24	50
17	4	Tinker's Stone	U4	16.5	0
17	7	Low Peak Cliff	U2	4.8	0

Additional and updated recession rates were determined from comparison of common reference points on Ordnance Survey maps of different dates. Historical maps were inspected at the British Museum Map Library.

Survey lines for each cliff unit were determined by an obvious feature or boundary present on

all of the editions of the OS maps. A straight line was drawn from the feature or boundary to the cliff foot. The co-ordinates of both the point of origin or feature and the point that the survey line met the cliff foot were recorded. The distance from origin to foot was then measured to the nearest meter using a scale ruler and recorded together with the distance from the cliff top.

The survey lines were established on the 1890s maps and then transferred onto subsequent map editions. Measurements along the survey lines were made to establish the cumulative land loss between the different dates.

Table A.2 presents the results of this analysis; a summary is presented in Table 7 which reveals:

- The majority of rockcliffs appear to have retreated by less than 1m over the last 100 years or so, with most of the other rockcliffs retreating by less than 10m. The highest rockcliff recession rates have been recorded for Overdale Wyke 8/12 (11m), Green Swan Cliffs 6/1 (12m) and Catbeck Hill 8/2 (18m), with all rockcliffs ranging from negligible to low retreat rates.
- Recession rates on the till cliffs range from negligible (e.g. Stoupe Beck Cliffs 17/5, 1m) to moderate (e.g. Whitby Golf Course 10/2, 20-23m).
- The maximum recorded recession rate is 23m/100 years (Whitby Golf Course 10/2).
- There appears to be a significant difference in the rates of cliff foot and top recession, suggesting that many cliff profiles have been steepening over the last 100 years (i.e. the foot is retreating faster than the top).
- Construction of the coastal defences has prevented further recession on the defended coastline, although it has not eliminated the potential for small to large-scale failures (eg. South Bay, Scarborough).

Table 7 Summary of Cliff Top Recession Data (expressed as metres per 100 years)

Class Range (m/100 years)	Category	Cliff Top: Number of Till Cliffs (U4, U5 and U7)	Cliff Top: Number of Rockcliffs (U1, U2, U3, U6)	Cliff Top Total	Cliff Foot Total
0-1	Negligible	3	24	27	19
1-10	Very Low	4	12	16	27
10-25	Low	5	3	8	9
25 – 50	Moderate	2	0	2	2
50 – 100	Intense	0	0	0	0
100- 150	Severe	0	0	0	0
> 150	Very Severe	0	0	0	0

3.4 Cliff Condition

The baseline cliff survey concentrated on recording evidence of current and past landslide activity, with particular emphasis given to cliff top features (time and access constraints restricted the attention that could be given to cliff faces and the cliff foot). The results have been compiled as a landslide database (Table A.3) and generally highlight 4 principal types of behaviour on the unprotected cliffline:

1. *progressive slow degradation and long-term destabilisation* of relict landslide systems and Undercliffs, as a result of marine erosion of the seacliffs. This involves landslide activity on the coastal slopes but generally limited cliff top instability. Examples include the Seaveybog Hill 8/7, Coomb 18/1, Common Cliff 18/3 and Little Cliff 19/3.
2. *episodic large-scale landslide activity* involving the entire cliff profile, generating major rockslope or till-slope failures, as at Twixt Hill 6/2, Wrack Hill 6/7, Catbeck Hill 8/2 and Tell green Hill 8/10.
3. *episodic cliff profile retreat* involving distinct phases of instability and cliff top degradation (through rock and debris falls, debris slides and elongate mudslides), followed by periods of apparent “stability” during which the debris aprons, talus ramps and slide embayments become vegetated. Examples include Jet Wyke Cliffs 5/1, Bulmer Steel Cliffs 15/3, Hundale Cliffs 19/6 and Horse Back Cliff 19/7.
4. *active cliff profile retreat* involving widespread slope instability and almost continuous cliff top degradation through rock and debris falls, debris slides and elongate mudslides., such as at Whitestones Cliff 8/1, Old Lance Cliff 15/4, Tinker’s Stone 17/4, Stoupe Beck Cliffs 17/5 and Cowlam Cliffs 19/9.

The number of active and part-active landslides per kilometre length of each cliff unit was used as a measure of the current cliff condition, along with the potential for large scale instability (see Table 3 which presents 10 cliff condition classes). The landslide database was used to classify each cliff unit in terms of the current condition. The results are presented in Table A.4 and summarised in Table 8 and Figure 3. In view of the nature and variability of the protected and unprotected cliffs it was not considered appropriate to use a condition assessment scale of 1 to 5 similar to that used to categorise the condition of the coastal defences.

Figure 4 presents a long section along the cliffline highlighting the variation of condition between Staithes and Scarborough.

3.5 Hotspots

Table 9 highlights what can be regarded as HOTSPOTS along the unprotected cliffline i.e. areas of intense current recession activity that stand out from the behaviour of similar adjacent cliff units.

Table 8 A Summary of the Relative Frequency of Different Cliff Condition Classes

Defence Status	Condition Class	Description	Number of Cliffs
Protected	1	Retreating cliffline affected by widespread active landslide features, including Hotspots of intense erosion activity.	7
	2	Retreating cliffline with numerous active, relatively small-scale (>20/km) or common large-scale landslide features affecting the cliff top, including extensive Hotspots of intense erosion activity.	8
	3	Retreating cliffline with common active, relatively small-scale (10-20/km) or occasional large-scale landslide features affecting the cliff top, including localised Hotspots of intense erosion activity.	16
Unprotected	4	Retreating cliffline with occasional active, relatively small-scale (5-10/km) landslide features affecting the cliff top.	7
	5	Retreating cliffline with rare active, relatively small-scale (<5/km) landslide features affecting the cliff top.	4
	6	Historical and relict landslide complexes and Undercliffs affected by active seacliff retreat and occasional small-scale landslide activity on the rear cliff, including localised Hotspots of intense erosion activity.	4
	7	Historical and relict landslide complexes and Undercliffs affected by active seacliff retreat and rare small-scale landslide activity on the rear cliff.	15
	8	Protected cliffline affected by occasional (5-10/km) small-scale rock fall or landslide activity, with potential for rare large-scale slope movements.	20
	9	Protected cliffline affected by occasional (5-10/km) small-scale rock fall or landslide activity.	12
	10	Protected cliffline with no visible evidence of rock fall or landslide activity	2

Figure 3 Relative frequency of cliff condition classes

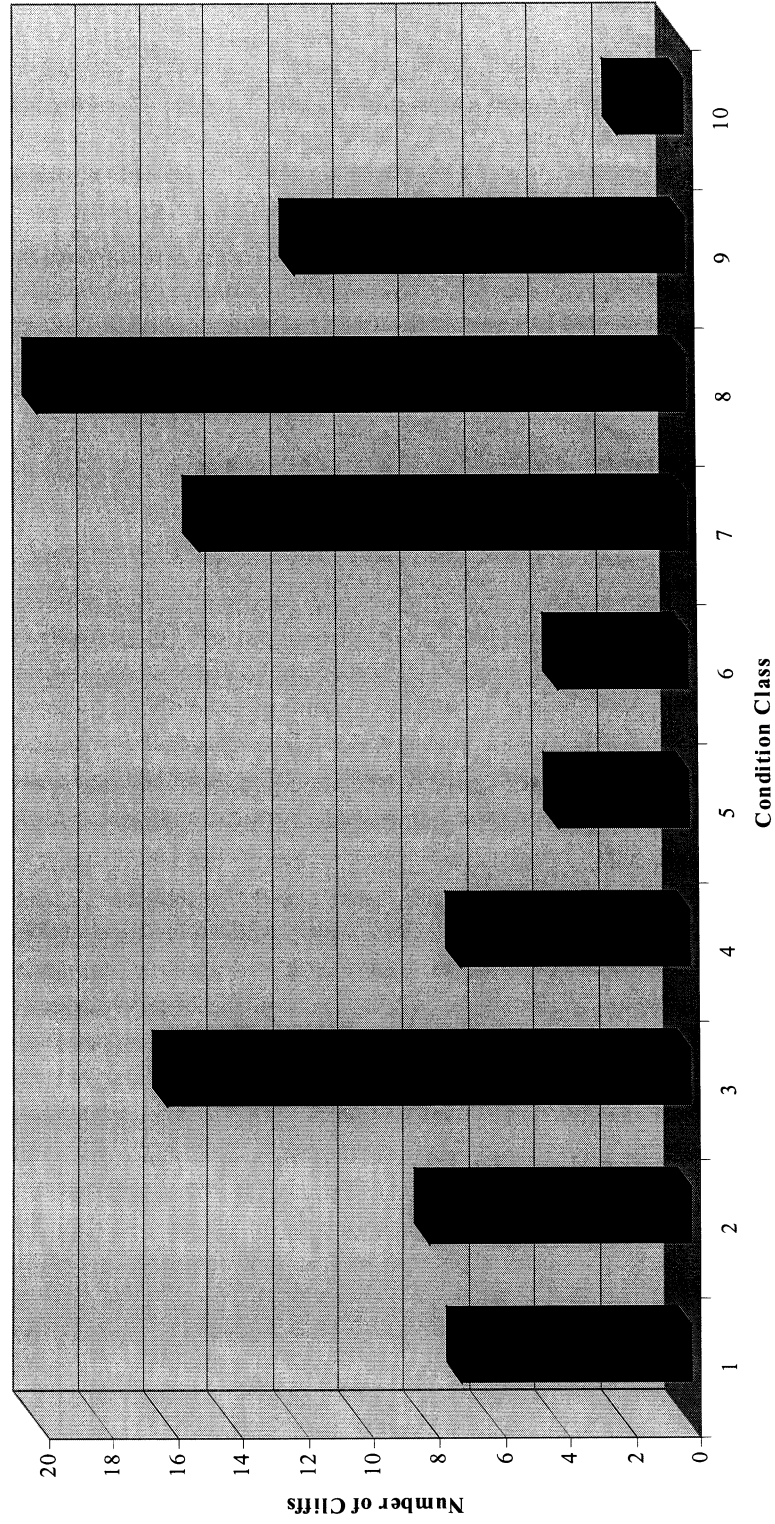


Figure 4 Distribution of Cliff Condition Classes Along the Cliffline

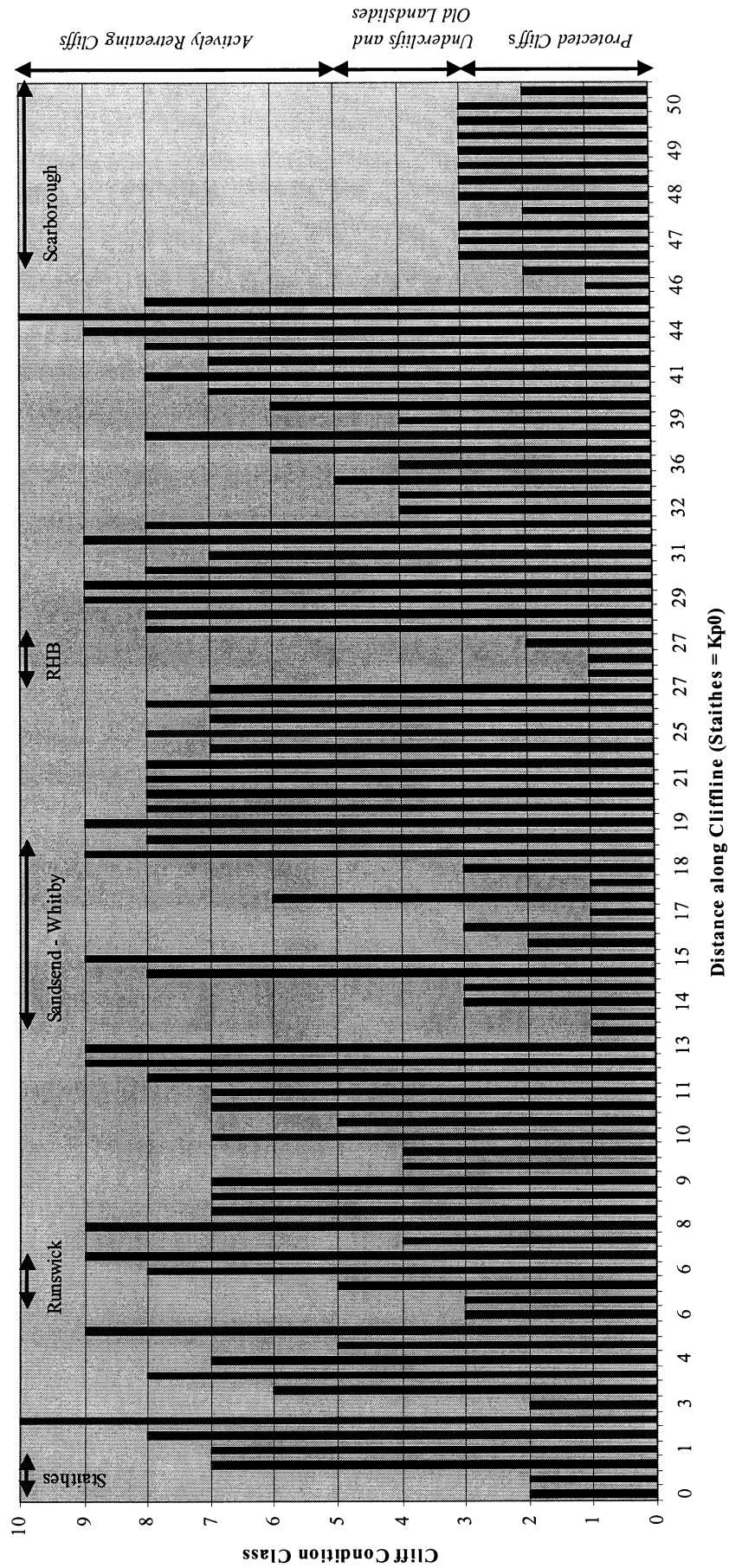


Table 9 Hotspot List: lengths of intense current recession activity.

Management Unit	Cliff Reference Number	Cliff Name	Cliff Type	Grid Reference			Approx. Length (km)
				Grid Square	Start	End	
6	2	Twixt Hill	U3	NZ	79663 17888	79597 17983	0.1
	5	Wrack Cliffs	U2	NZ	80794 16770	80751 16880	0.1
7	3	Dother Pits	U7	NZ	81098 15785	81061 15832	0.05
8	1	Whitestones Cliff	U4	NZ	82233 15392	82157 15339	0.2
				NZ	81842 15322	81659 15334	0.4
	3	Kettleness Sand	U3	NZ	83079 15741	83025 15714	0.1
	10	Tellgreen Hill	U3	NZ	84803 14571	84756 14602	0.15
	13	Stonecliff End	AW	NZ	85543 14077	85533 14102	0.05
	15	Sandsend Cliff	AW	NZ	85941 12962	85880 13125	0.15
9	3	Sandsend Road (W)	P6	NZ	86620 12420	86822 12320	0.4
10	2	Golf Course (W)	U5	NZ	87741 11986	88109 11934	0.4
13	1	East Cliff	U2	NZ	91105 11218	90765 11269	0.65
	3	Saltwick Hole Cliff	U4	NZ	91614 10723	91559 10780	0.1
	6	Whitestone Point	U1	NZ	92825 10173	92773 10264	0.15
15	2	Far Jeticks	U1	NZ	95086 07270	95073 07299	0.2
	4	Old Lance Cliff	U4	NZ	95544 05789	95648 05850	0.25
	2	Cowfield Hill Cliff	U5	NZ	95213 04556	95227 04635	0.15
17	3	Farsyde Cliff	U4	NZ	95356 04191	95209 04557	0.4
	4	Tinkers Stone	U4	NZ	95688 03704	95668 03731	0.05
	5	Stoupe Beck Cliffs	U5	NZ	96101 03133	95775 03483	0.3
	6	Millers Nab	U4	NZ	97050 02401	96992 02441	0.1
	8	Wine Haven W	U2	NZ	97703 02117	97572 02209	0.25
18	3	Common Cliff	U6	SE	99690 99935	99710 99873	0.1
19	9	Cowlam Cliffs	U2	TA	02919 92232	02907 92119	0.15
				TA	03127 91472	03326 91227	0.25
	10	Scalby Cliff	U7	TA	03336 91194	03473 91127	0.15
					TOTAL		5.35

3.6 Habitats

Table A.5 identifies the principal vegetated sea cliff communities identified along the cliffline, using the National Vegetation Classification system presented in Table 2. The results are summarised in Table 10. Note that the mature woodland and shrub habitats are generally associated with the relict landslide systems or Undercliffs (e.g. Seaveybog Hill 8/7, the Coomb 18/1 and Common Cliff 18/3).

Table 10 A Summary of the Frequency of Different Sea Cliff Vegetation Communities

Vegetation Class	Number of Cliffs
Maritime Crevice and Ledge	16
Maritime Grassland	63
Maritime Heath	0
Maritime Scrub	38
Mature Woodland	12

Note: individual cliff units may contain more than 1 vegetation community

On most eroding cliffs there will be no long-term net loss of cliff face habitats i.e. the cliff profile may retreat, but over time the area of vegetated sea cliff or bird habitat will remain constant. However, there will be a net loss of cliff top habitat (e.g. cliff top grassland etc.) equivalent to the cumulative recession over 50 years, unless an unmanaged cliff top fringe between the agricultural land and the cliff edge is retained.

Where episodic large-scale landslide activity occurs, there will be a tendency for gradual progressive habitat changes through natural succession as the cliff proceeds through phases of activity and relative stability.

However, where relict landslide systems and Undercliffs are experiencing *progressive slow degradation and long-term destabilisation*, there will inevitably be a long-term net loss of what are nationally important mature woodland and maritime scrub habitats (e.g. Common Cliff 18/3 and Little Cliff 19/3).

Table 11 Predicted Habitat Gains and Losses

Habitat Change Category	Number of Cliffs
Habitat Retreat: No Net Loss	50
Progressive Habitat Change	13
Habitat Erosion and Degradation: Net Loss	16

Note: (see Table A.5 for details of sites)

3.7 Risks

The coastline between Staithes and Scarborough comprises an extensive length of undeveloped agricultural land, separated by a network of large towns (Scarborough and Whitby) and villages (Ravenscar, Robin Hoods Bay, Sandsend, Kettleness, Runswick, Port Mulgrave and Staithes). Most of these communities are protected from the effects of coastal erosion by coast protection works. A nationally important long distance path, the Cleveland Way, follows the cliff top for much of this length of coast. The path is used by an estimated 300,000 visitors a year who contribute over £1million to the local economy.

Risk is generally expressed as the product of the likelihood of a hazard and its consequences (e.g. Royal Society 1992; DETR 2000; MAFF 2000). Thus, for a coastal landslide:

$$\text{Risk} = \text{Prob. (Landslide event)} \times \text{Damages}$$

It follows that a 50% chance of a fall from an unprotected cliff causing £1000 worth of footpath damage has the same “risk” as a 0.1% chance of a landslide movement on a protected slope causing losses of £0.5M i.e. both have mathematical expectation values of £500.

Adopting a mathematical expression of risk allows comparison between different sources of risk (i.e. on the protected and unprotected cliffline). Table 12 presents the *economic risk* categories have been used for assessing the “do nothing” losses associated with cliff recession and coastal landsliding on both the protected and unprotected cliffs:

Table 12 Economic Risk Categories

Category	Economic Risk (PV “do nothing” losses)	Number of Cliffs
1	< £10K	57
2	£10K to £100K	9
3	£100K to £1M	7
4	£1M to £10M	8
5	> £10M	14

PV losses have been compiled from the relevant Strategy Study documents (Runswick Bay, Whitby, Robin Hoods Bay and Holbeck-Scalby Mills). For other lengths of cliffline, judgements have been made about the value of the assets at risk and their timing of loss; the PV losses are estimated as follows (in accordance with FCDPAG3):

$$\text{PV losses} = \sum \text{Losses (Year } t) \times \text{Discount Factor (Year } t).$$

The Cleveland Way is particularly vulnerable to the effects of cliff recession and coastal landsliding. The cost of maintenance is around £75,000/year, the equivalent of £650/km. The economic benefits of the path are estimated to be around £5650/km (Cleveland Way Project, 2002). However, we have assumed that in most places the Cleveland Way can be relocated

inland following agreement with the landowner, and that the full losses associated with a “do nothing” scenario (i.e. loss of tourism and amenity value) are not relevant. In some cases however, landowners may be compensated for loss of land.

Historical evidence suggests that the risk of personal injury or death as a result of cliff recession or coastal landsliding is *very low*. However, it clearly varies along the cliffline with the nature of the instability (e.g. major rockfalls compared with slow creeping till slides) and the accessibility of the cliff.

The following classification (Table 13) has been used to make judgements about the expected degree of personal risk (as a direct result of cliff recession or landsliding) along different coastal sections. Using such a scale allows rational judgements to be made about the relative significance of cliff-related risks compared to other risks.

Both the estimated economic and personal risk for each cliff unit is presented in Table A.6. A summary of these results is presented in Tables 11 and 12. These tables reveal that for much of the unprotected cliffline the level of both economic and personal risk are towards the lower end of the scales used. The economic risk profile along the cliffline (Figure 5) is clearly dominated by the residual risk associated with the protected sections of Scarborough, Robin Hoods Bay, Whitby, Runswick and Staithes (defences can only reduce, not eliminate risk).

Table 13 Personal Risk Categories

Class	Description	Estimated annual probability of an adverse effect	Number of Cliffs
0.	Negligible	< 1 in 1M	2
1	Minimal	1 in 100K to 1 in 1M	72
2	Very Low	1 in 10K to 1 in 100K	15
3	Low	1 in 1K to 1 in 10K	6
4	Moderate	1 in 100 to 1 in 1K	0
5	High	> 1 in 100	0

Source: On the State of Public Health: the Annual Report of the Chief Medical Officer of the Department of Health for the Year 1995.

The personal risk profile (Figure 6) highlights the minimal/negligible risks directly associated with cliff recession and landsliding, with the exceptions of those sites where the public has access to beaches or shorelines beneath rockcliffs prone to falls and topples (e.g. Cowbar Nab and Staithes Cliff, Abbey Cliff, Whitby, Clarence Gardens to Castle Cliff, Scarborough). Elsewhere, the lack of access to the foreshore is significant in reducing the level of risk.

It should be noted, however, there are a number of locations where current assets will be vulnerable to continued cliff recession and coastal landsliding over the next 50+ years. These sites are identified in Table 14.

Table 14 The Unprotected Cliffline: “at-risk” register

Estim. Year of Loss	SMP Unit	Cliff Ref. Number	Cliff Name	Asset	Grid Reference	
					Grid Square	Start End
0-10	7	3	Dother Pits	Beach cottage	NZ	81098 15785 81061 15832
	17	5	Stoupe Beck Cliffs	Road and Stoupe Beck Farm	NZ	95900 03300 95813 03419
10-25	10	1	Golf Course (W)	A174 Sandsend Road	NZ	87300 12000 87200 12100
	13	2	Saltwick Nab	Whitby Holiday Park: sewerage treatment tanks	NZ	91333 11076 91329 11099
	16	1	Dungeon Hole Cliff	Cliff top properties in Robin Hoods Bay	NZ	95300 05400 95350 05650
25-50	13	3	Saltwick Hole Cliff	Whitby Holiday Park: access road and static caravans	NZ	91614 10723 91559 10780
	18	1	The Coombe	Hotel walls and gardens: Ravenscar	NZ	98050 01925 98175 01850
	19	6	Hundale Cliffs	Creek Point Coastguard Lookout	TA	02930 94000
>50	6	3	Port Mulgrave Cliffs	Far Rosedale buildings and access road	NZ	75988 17573 79602 17739
	8	3	Kettleness Sand Cliff	Farm buildings and cottage	NZ	83100 15650 82900 15525
	13	6	Whitestone Point	Whitby High Light and Fog Signal Station	NZ	92900 10100 92700 10300
	17	3	Farsyde Cliff	Farsyde House	NZ	95050 04400
	18	2	Fox Cliff	Cliff House	NZ	98400 01580
	18	3	Common Cliff	Coastguard Lookout	NZ	99200 00900
	18	3	Common Cliff	Blea Wyke Lodge	NZ	98900 00990
	19	9	Cowlam Cliffs	Water Treatment Facilities	NZ	02919 92232 02907 92119

Note: Estimated losses based on current climatic conditions, no allowance for climate change.

Figure 5 Economic risk profile along the cliffline between Staithes and Scarborough (see Table 12 for description of classes)

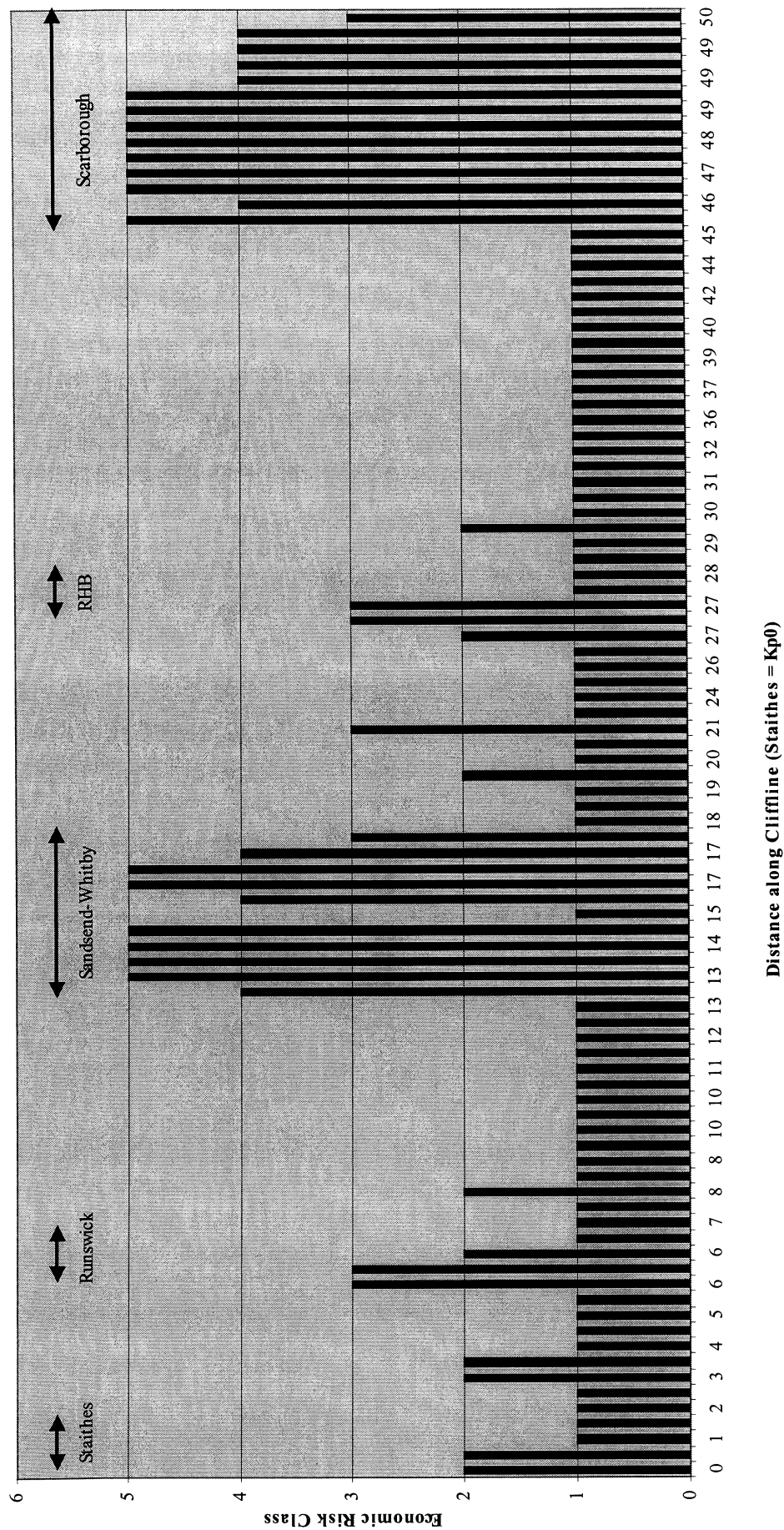
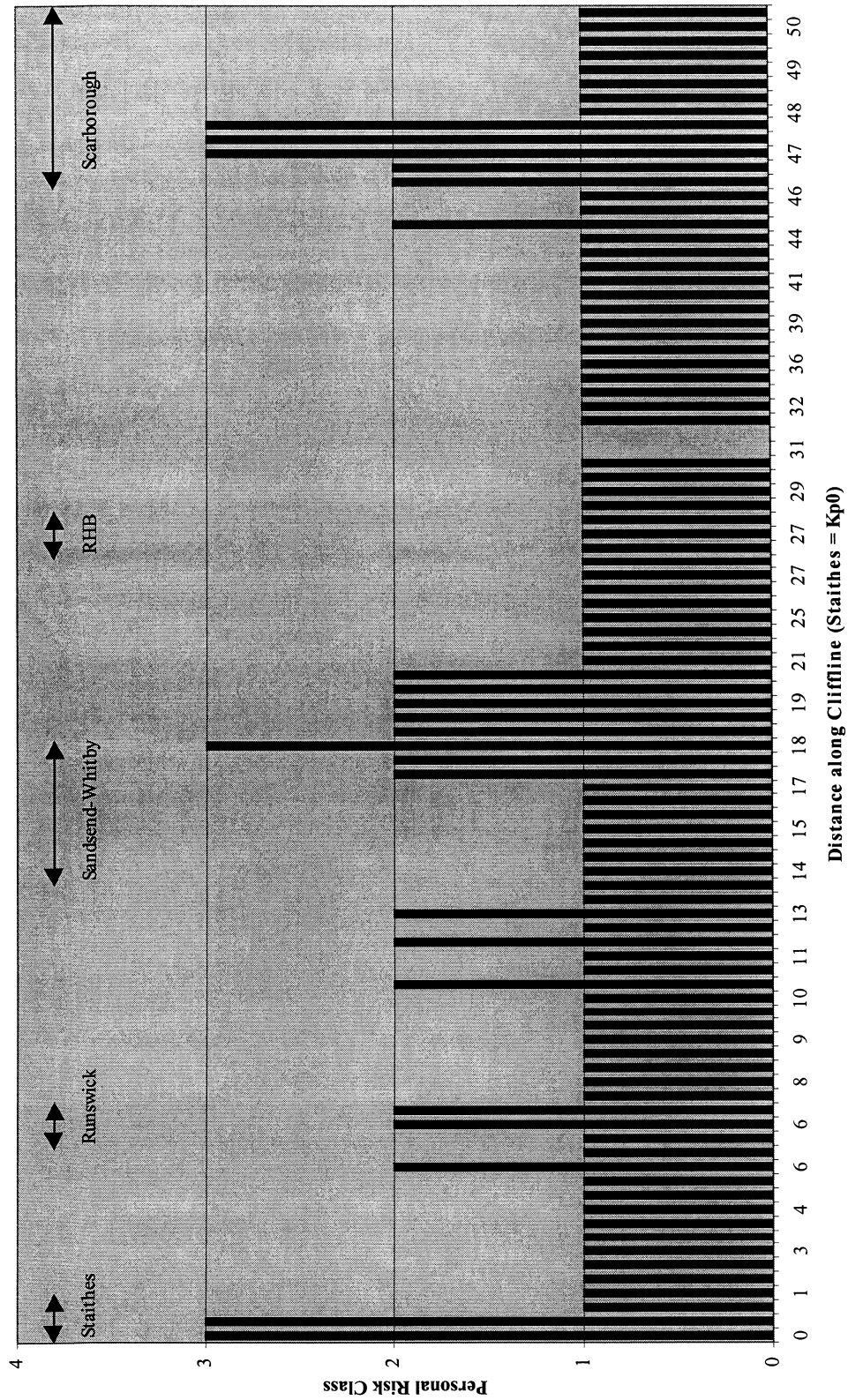


Figure 6 Personal risk profile along the cliffline between Staithes and Scarborough (see Table 13 for description of classes)



4 RECOMMENDATIONS

In accordance with the SMP strategic monitoring recommendations, this report has described the work undertaken to establish baseline conditions for year 2002 regarding a variety of aspects of cliff behaviour, including:

- Historical recession rates;
- Cliff condition;
- HOTSPOTS;
- Preliminary economic and personal risk levels;
- Unprotected assets at risk.

This information should form the basis for an ongoing programme of strategic monitoring in future years i.e. a baseline against which any significant changes in behaviour can be judged.

It is recommended, therefore, that:

1. A further monitoring inspection be carried out in a years time (i.e. spring 2003) to establish whether conditions are changing from the 2002 baseline, especially in terms of the cliff condition class for each cliff unit, the HOTSPOTS and the “at risk” register.

Cliff inspection proformas should be filled in for each cliff unit and stored in the Keyshore system.

Formal procedures should be established for measuring the distance between assets on the “at risk” register and the cliff edge.

After the 2003 inspection there should be a review of the effectiveness of the approach as a means of strategic monitoring cliff conditions, including the frequency of subsequent inspections and measurements. The effectiveness of the approach should also be reviewed after subsequent inspections.

Although vertical aerial photographs can provide an excellent record of cliff top position at a particular time, the cliff face is often in shadow or obscured. As a result, such photographs may reveal little about the landslide processes operating on the cliff face or slope. In order to address this issue, it is recommended that:

2. a set of oblique aerial photographs of the cliffline should be undertaken prior to the spring 2003 cliff inspection to help identify sites of recent and active recession. This set of photographs would also act as a baseline against which future oblique photographs could be checked.

Accurate and up-to-date information on cliff recession is needed to support decision-making. Knowledge of recession rates allows the level of risk to coastal assets to be assessed, underpins the identification of SMP policy options and enables these policy options to be kept under review. Measurement of recession rates can also be important in monitoring the

performance and effectiveness of coastal defence schemes and their impact on the recession of neighbouring cliffs.

3. an aerial photographic survey is undertaken prior to the spring 2003 cliff inspection, to enable measurements of cumulative cliff loss to be made for the period 1999-2003 (the baseline photography was flown in 1999).
4. consideration be given to establishing a limited number of erosion posts to accurately record cliff top recession at representative sites, on an annual basis.

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APPENDIX 1

INVENTORY OF CLIFF UNITS

APPENDIX 2

RECESSION RATES

APPENDIX 3

LANDSLIDE DATABASE

Table A.3 Strategic Coastal Monitoring - Scarborough to Staithes: Landslide Database

 Hotspot Area

Activity State Codes:
A - Active
P - Part active, part vegetated
V - Vegetated
E - Area of Surface Erosion
G - Gully
Q - Quarried Area
S - Stabilised landslide

Management Unit	Cliff Reference Number	Cliff Name	Grid Reference			Landslide type	Activity State	Cliff Length	Number of Active and Part Active Slides/Falls	Active and Part-active Slides & Falls/km
			Grid Square	Start	End					
4	1	Cowbar Nab	NZ	78150 18975	78300 19000	Rock and debris fall scars along cliff length	A	0.25	1	4
4	2	Staithes Cliffs	NZ	78436 18797		High-angled debris slide on cliff face	A	0.25	3	12
			NZ	78431 18799		High-angled debris slide on cliff face	A			
			NZ	78409 18777		High-angled debris slide on cliff face	A			
4	3	Penny Steel	NZ	78740 18950	78500 18800	Rock and debris fall scars along cliff length	A	0.25	1	4
5	1	Jet Wyke Cliffs	NZ	79263 18630	79228 18610	Area of surface erosion on west side of headland	E	0.65	6	9
			NZ	79209 18612		Active gully erosion at edge of field	G			
			NZ	79195 18618	79164 18621	Rock and debris fall scars along cliff length	A			
			NZ	79164 18021	79091 18607	Rock and debris fall scars along cliff length	A			
			NZ	79080 18611		Gully head with active debris slides on side-slopes	G			
			NZ	79076 18618		Debris slide embayment (5m wide)	V			
			NZ	79041 18640		Debris slide embayment (10m wide)	V			
			NZ	79027 18644	79012 18651	Debris slide embayment	P			
			NZ	78974 18665		Debris slide embayment (10m wide)	V			
			NZ	78952 18673		Active gully erosion at edge of field	G			
			NZ	78920 18691		Gully erosion and debris slides at field boundary - note discharging plastic pipes.	G			
			NZ	78898 18714		Debris slide embayment (10m wide)	V			
			NZ	78888 18719		Debris slide embayment (5m wide)	P			
			NZ	78873 18725		Debris slide embayment (10m wide)	P			
			NZ	78867 18726	78845 18737	Debris slide embayment	V			
			NZ	78842 18737		Debris slide embayment (5m wide)	V			
			NZ	78836 18744		Debris slide embayment (5m wide)	V			
			NZ	78828 18751		Debris slide embayment (10m wide)	V			
			NZ	78826 18758	78815 18768	Debris slide embayment	V			
			NZ	78815 18768	78809 18784	Debris slide embayment	V			
			NZ	78809 18784	78791 18811	Debris slide embayment	V			
			NZ	78780 18814		Debris slide embayment (10m wide)	V			
			NZ	78775 18824	78760 18843	Debris slide embayment - note dumped concrete at slide head	P			
			NZ	78751 18849		Debris slide embayment (15m wide) - dumped concrete and building waste	V			
			NZ	78745 18855	78735 18861	Debris slide embayment	V			
6	1	Green Swan Cliffs	NZ	79543 18015		Debris slide embayment (30 m wide)	V	0.9	9	10
			NZ	79538 18018		Debris slide embayment (25 m wide)	V			
			NZ	79525 18025	79488 18033	Debris slide embayment - encroaching onto Cleveland Way	P			
			NZ	79483 18034	79451 18044	Debris slide embayment - encroaching onto Cleveland Way	P			
			NZ	79451 18044	79439 18050	Debris slide embayment	V			
			NZ	79414 18048	79389 18065	Debris slide embayment	A			
			NZ	79384 18062	79340 18105	Debris slide embayment	V			
			NZ	79340 18112		Debris slide embayment (10m wide)	P			

Management Unit	Cliff Reference Number	Cliff Name	Grid Reference			Landslide type	Activity State	Cliff Length	Number of Active and Part Active Slides/Falls	Active and Part-active Slides & Falls/km
			Grid Square	Start	End					
			NZ	79336 18120		Debris slide embayment (15m wide)	V			
			NZ	79337 18133	79324 18139	Debris slide embayment	P			
			NZ	79321 18139	79305 18168	Degraded rotational slide and debris slide system in till.	V			
			NZ	79305 18168	79294 18192	Debris slide embayment on upper cliff section - till	V			
			NZ	79274 18207	79245 18278	Debris slide embayment on upper cliff section - till	V			
			NZ	79244 18283	79220 18376	Large rockfall and rockslide complex. Rear cliff degrading through rockfalls	P			
			NZ	79227 18422	79238 18449	Debris slide embayment	P			
			NZ	79238 18449	79254 18497	Debris slide embayment	A			
			NZ	79253 18507	79297 18638	Rock and debris fall scars along cliff length	A			
6	2	Twixt Hill	NZ	79734 17817	79663 17888	Shallow debris slide	V	0.3	2	7
			NZ	79663 17888	79648 17933	Large recent rockfall and rockslide complex. Large foreshore boulder and debris apron	A			
			NZ	79648 17933	79597 17983	Large rockslide embayment	P			
			NZ	79597 17983	79556 18026	Large vegetated rockfall/rockslide embayment - possible worked area	V			
6	3	Port Mulgrave Cliffs	NZ	79592 17707	79602 17739	Debris slide on rear cliff of slope complex - road within 5m; Far Rosedale within 15m	V	0.2	0	0
			NZ	79612 17749	79623 17761	Debris slide on rear cliff of slope complex	V			
			NZ	79647 17802	79687 17834	Debris slide on rear cliff of slope complex	V			
6	4	Rosedale Wyke Cliff	NZ	79832 17388	79789 17394	Debris slide at front of upper slope bench	V	0.55	1	2
			NZ	79742 17258	79727 17273	Debris slide on rear cliff of slope complex	V			
			NZ	79726 17277	79690 17334	Area of shallow inactive debris slides on rear cliff	V			
			NZ	79640 17384	79622 17413	Debris slide on rear cliff of slope complex	V			
			NZ	79611 17448	79604 17472	Debris slide on rear cliff of slope complex	V			
			NZ	75988 17573		Debris slide on rear cliff of slope complex - road affected by slide, now slight realignment	P			
			NZ	79589 17607	79592 17653	Debris slide on rear cliff of slope complex - road within 2m	V			
			NZ	79592 17663	79591 17684	Debris slide on rear cliff of slope complex - road within 10m	V			
6	5	Rosedale Cliff	NZ	80144 17160	80116 17166	Debris slide embayment in till	P	0.3	5	17
			NZ	80106 17165		Elongate debris slide embayment (10m wide)	V			
			NZ	80081 17160		Elongate gully with unstable side slopes (debris slides) encroaching onto Cleveland Way	G			
			NZ	80076 17170	80065 17172	Elongate debris slide embayment - till	A			
			NZ	80065 17172	80016 17198	High-angled rotational failures, with active degradation of rear cliff	P			
			NZ	80016 17198	79997 17202	High-angled mudslide in till	P			
			NZ	79997 17202	79954 17218	High-angled mudslide in till	V			
			NZ	79954 17218	79920 17240	High-angled rotational failures, in till	P			
			NZ	79720 17240	79881 17278	High-angled rotational failure and shallow debris slides, in till	V			
			NZ	79881 17278	79866 17286	High-angled rotational failure and shallow debris slides, in till	V			
6	6	Lingrow Cliffs	NZ	80714 17020		Debris slide embayment (10m wide)	V	0.6	3	5
			NZ	80697 17036		Debris slide and rockfall embayment (30m wide)	V			
			NZ	80660 17065	80631 17074	Debris fall and rock fall scars off rear cliff	A			
			NZ	80588 17074		Debris slide embayment (20m wide)	V			
			NZ	80576 17078		Debris slide embayment (25m wide)	V			
			NZ	80564 17081	80535 17092	Large rock fall and rockslide scar. Note extensive boulder apron at the cliff foot	V			
			NZ	80528 17095		Debris slide embayment (10m wide)	V			
			NZ	80509 17106		Debris slide embayment (20m wide)	V			
			NZ	80459 17123	80439 17129	Rock fall scar. Note wooden fence at the head	P			
			NZ	80369 17139	80319 17116	Rock fall and rock slide embayment	V			
			NZ	80287 17116	80187 17129	Rock fall and rock slide embayment	P			
6	7	Wrack Hills	NZ	81054 16447	81044 16467	Debris fall and rock fall scars off rear cliff	V	0.7	3	4
			NZ	80995 16505	80950 16532	Former quarried area	Q			
			NZ	80885 16563	80871 16583	Rotational/debris slide off rear cliff of slope complex	V			
			NZ	80863 16585	80856 16597	Debris slide off rear cliff	V			

Management Unit	Cliff Reference Number	Cliff Name	Grid Reference			Landslide type	Activity State	Cliff Length	Number of Active and Part Active Slides/Falls	Active and Part-active Slides & Falls/km
			Grid Square	Start	End					
			NZ	80853 16595	80850 16613	Debris slides and rotational failures off the rear cliff	V			
			NZ	80850 16613	80829 16657	Debris slides and rotational failures off the rear cliff	V			
			NZ	80850 16686	80845 16706	Debris slide embayment	P			
			NZ	80834 16738		Debris slide within Undercliff complex (100m wide)	V			
			NZ	80794 16770	80789 16794	Elongate mudslide/debris slide, degradation of the rear cliff	A			
			NZ	80785 16799		Debris slide embayment (25m wide)	V			
			NZ	80780 16815	80768 16828	Rotational/debris slide off rear cliff of slope complex	V			
			NZ	80768 16828	80755 16831	Debris slide - note slide has resulted in loss of fence, encroaching onto Cleveland Way	A			
			NZ	80759 16857	80751 16880	Debris slide/mudslide embayment, note settlement of Cleveland Way crossing slide head	P			
6	8	Cauldron Cliff	NZ	81060 16332	81069 16359	Rock fall and debris fall scars - note large rock fall apron at the cliff foot	A	0.2	3	15
			NZ	81072 16388	81071 16408	Rock fall and debris fall scars	A			
			NZ	81069 16418	81061 16430	Rock fall and debris fall scars - note tension cracks to rear	A			
7	1	Runswick Cliffs						0.4	0	0
7	2	Netterdale Beck						0.2	0	0
7	3	Dother Pits	NZ	81098 15785	81061 15832	Rotational slide in till on lower part of unstable slope - note beach hut at risk	A	0.25	1	4
7	4	Randy Bell End	NZ	81550 15440	81388 15501	Large rotational slide and mudslides in till; rockfalls off the mudrock seacliff	A	0.25	1	4
8	1	Whitestones Cliff	NZ	82233 15392	82202 15354	Debris slide embayment in till	A	0.85	9	11
			NZ	82197 15342	82157 15339	Rotational failures and debris slides in till	P			
			NZ	82137 15304		Mudslide in till (20m wide) - Cleveland way crosses at head; extends upslope to railway	A			
			NZ	82119 15323	82044 15314	Rotational failures - up to 10m of vertical settlement of landslide blocks	V			
			NZ	82044 15314	82005 15308	Debris slide embayment in till	P			
			NZ	81994 15305		Debris slide embayment (10m wide) - in till	V			
			NZ	81976 15301		Debris slide embayment (10m wide) - in till	V			
			NZ	81936 15306		Debris slide embayment (20m wide) - in till	V			
			NZ	81915 15311		Debris slide embayment (10m wide) - in till	V			
			NZ	81896 15317		Debris slide gully (20m wide) and debris fall scar	V			
			NZ	81842 15322		Debris slide embayment (25m wide) - in till	P			
			NZ	81789 15319		Debris slide embayment (25m wide) - in till	P			
			NZ	81765 15325	81724 15329	Mudslide embayment in till	P			
			NZ	81724 15329	81679 15340	Mudslide embayment in till	P			
			NZ	81674 15334	81659 15334	Debris slide embayment - in till	P			
8	2	Catbeck Hill	NZ	82809 15631	82787 15625	Gully with shallow debris slides on steep side-slopes	G	0.5	2	4
			NZ	82630 15644		Debris slide embayment (25m wide); degradation of rear cliff	V			
			NZ	82604 15627		Rock fall scar (10m wide)	V			
			NZ	82580 15617		Rock fall scar (10m wide)	V			
			NZ	82515 15588		Rock fall scar (10m wide)	V			
			NZ	82496 15582		Rock fall scar (10m wide)	V			
			NZ	82452 15553	82428 15533	Rock fall scar	A			
			NZ	82413 15519		Rock fall scar (30m wide)	A			
8	3	Kettleness Sand	NZ	83079 15741	83025 15714	High-angled rock slide and rock fall complex, with marginally stable convex slopes above	A	0.25	3	12
			NZ	83017 15700		Gully with shallow debris slides on steep side-slopes	A			
			NZ	82992 15697	82939 15679	Rock slide complex, with degradation of the rear cliff; 25m to farm yard boundary	V			
			NZ	82928 15673	82899 15665	Rock slide scar degrading with rock fall along the rear cliff	V			
			NZ	82895 15659	82920 15585	Quarried flank of incised valley	Q			
			NZ	82920 15585	82838 15613	Rock fall scars along valley side	P			
8	4	Kettleness Farm	NZ	83247 15759		Debris slide embayment on rear cliff (10m wide)	V	0.2	1	5
			NZ	83209 15753	83181 15750	Rock fall scars and debris slide on rear cliff	V			
			NZ	83149 15735	83081 15740	Rock fall scar	P			
8	5	Kettle Ness	NZ	83543 15825		Debris slide embayment (25m wide)	V	0.4	2	5

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			Grid Square	Start	End					
			NZ	83453 15836		Rock fall scar (10m wide)	A			
			NZ	83385 15827	83343 15820	Rock fall and debris slide scars along this length of rear cliff	P			
			NZ	83318 15811	83288 15794	Debris slide embayment	V			
			NZ	83284 15792		Rock fall scar (10m wide)	V			
8	6	Lucky Dogs Point	NZ	83876 15351		Debris slide embayment (5m wide)	A	0.7	5	7
			NZ	83865 15379		Debris slide embayment (5m wide)	V			
			NZ	83860 15389		Debris slide embayment (5m wide) in small gully head	V			
			NZ	83856 15404		Debris slide embayment (5m wide)	A			
			NZ	83869 15520		Debris slide embayment (15m wide)	V			
			NZ	83837 15548		Small gully onto upper cliff section - shallow debris slides on steep side-slopes	G			
			NZ	83805 15644		Small gully feature - wooden fence at head	G			
			NZ	83792 15691	83787 15713	Rock fall scars along this cliff section	A			
			NZ	83779 15749	83772 15771	Rock fall scars along this cliff section	P			
			NZ	83742 15805		Gully head (10m wide) with active debris slides on side-slopes	G			
			NZ	83735 15810		Debris slide embayment (5m wide)	V			
			NZ	83708 15818	83627 15868	Rock fall scars along this cliff section	P			
			NZ	83627 15868		Debris slide embayment (10m wide)	V			
8	7	Seavybog Hill	NZ	84298 14854		Rock fall scar (10m wide)	P	0.7	3	4
			NZ	84269 14851		Rock fall scar (20m wide)	P			
			NZ	84215 14857	84202 14862	Rock fall scar	V			
			NZ	83963 15132		Rock fall scar (25m wide) - wooden fence to rear of scar	V			
			NZ	83950 15135		Debris slide embayment (10m wide) - note fence loss at slide head	A			
			NZ	83918 15238		Gully head with active debris slides on side-slopes	G			
8	8	Ovalgate Cliff	NZ	84477 14719		Rock fall scar (20m wide)	P	0.3	2	7
			NZ	84378 14789		Gully with shallow debris slides on steep side-slopes	G			
			NZ	84378 14830		Rock fall scars	P			
8	9	Loop Wyke Cliff	NZ	84725 14605		Debris slide embayment (10m wide) by small slot gully	V	0.15	1	7
			NZ	84637 14620	84623 14619	Debris slide embayment on upper cliff section - note active debris slides along small drainage line	P			
			NZ	84581 14640		Debris slide embayment (20m wide) on upper cliff edge	V			
			NZ	84564 14651		Debris slide embayment (10m wide)	V			
			NZ	84549 14658		Debris slide embayment (10m wide)	V			
8	10	Tellgreen Hill	NZ	85041 14581		Rock fall scar (5m wide)	A	0.3	3	10
			NZ	85013 14574	84979 14544	Rock fall scars off rear cliff	A			
			NZ	84920 14526	84869 14530	Large rotational slide block, with around 10m vertical settlement	V			
			NZ	84849 14542		Debris slide embayment (10m wide), degradation of rear cliff	V			
			NZ	84832 14560		Debris slide embayment (10m wide)	V			
			NZ	84803 14571	84756 14602	Length of tension cracks behind landslide debris slide; degradation of rear cliff	P			
8	11	Keldhowe Cliff	NZ	85336 14585		Debris slide embayment (10m wide)	V	0.35	2	6
			NZ	85322 14583		Debris slide embayment (10m wide)	V			
			NZ	85316 14580	85304 14582	Debris slide embayment above rock sea cliff	A			
			NZ	85298 14583		Debris slide embayment (10m wide)	V			
			NZ	85278 14588		Debris slide embayment (25m wide)	V			
			NZ	85259 14593		Debris slide embayment (10m wide)	V			
			NZ	85246 14596		Debris slide embayment (10m wide)	V			
			NZ	85224 14592		Debris slide embayment (15m wide)	V			
			NZ	85182 14596		Rock fall scar (5m wide)	V			
			NZ	85157 14594	85133 14600	Broad debris slide embayment in till on upper cliff section - possibly quarried to the west	P			
			NZ	85131 14585		Debris slide embayment (10m wide)	V			
			NZ	85087 14584		Debris slide embayment (10m wide)	V			

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8	12	Overdale Wyke	NZ	85501 14300		Rock fall scar (10m wide)	V	0.35	2	6
			NZ	85482 14328		Rock fall scar (15m wide)	P			
			NZ	85445 14382	85414 14436	Rock fall and debris fall scars	A			
			NZ	85388 14500	85384 14531	Debris slide embayment on upper cliff section	V			
8	13	Stonecliff End	NZ	85543 14077	85533 14102	Large active gully head with debris slides in weathered shales. Wooden fence to rear of slides.	A	0.35	1	3
8	14	Sandsend Ness	NZ	85955 13529	85947 13558	Rock fall scars along seacliff	A	0.75	13	17
			NZ	85932 15568		Area of shallow debris slides in weathered shales	A			
			NZ	85968 13601	85989 13637	Rock fall scars along seacliff - note small arch	A			
			NZ	85989 13637	86013 13795	Rock fall and debris fall scars along seacliff	A			
			NZ	86013 13795	85968 13862	Rock fall and debris fall scars along seacliff	A			
			NZ	85968 13862	85934 13858	High-angled debris slide in weathered shales above seacliff	A			
			NZ	85920 13859	85896 13868	High-angled debris slide in weathered shales above seacliff	A			
			NZ	85896 13868	85760 13913	Rock fall and debris fall scars along seacliff	A			
			NZ	85760 13913	85735 13943	High-angled debris slide in weathered shales above seacliff at cove head	A			
			NZ	85735 13943	85718 13946	Rock fall and debris fall scars along seacliff	A			
			NZ	85719 13946	85694 13938	High-angled debris slide in weathered shales above seacliff at cove head	P			
			NZ	85694 13938	85668 13962	High-angled debris slide in weathered shales above seacliff at cove head	V			
			NZ	85668 13962	85639 14008	Debris slide, part stabilised by retaining wall above seacliff	V			
			NZ	85619 14062		High-angled debris slide (10m wide) in weathered shales above seacliff	V			
			NZ	85615 14063	85596 14083	High-angled debris slide in weathered shales above seacliff	P			
			NZ	85596 14083	85573 14089	High-angled debris slide in weathered shales above seacliff	P			
8	15	Sandsend Cliff	NZ	85941 12962	85919 13001	Debris slide behind abandoned defences, affecting old platforms. Cleveland way diverted	A	0.6	9	15
			NZ	85890 13067	85886 13078	Debris slide, around 1.5m settlement at slide head where Cleveland way crosses	P			
			NZ	85881 13097	85878 13109	Debris slide above seacliff - note fencing at head	A			
			NZ	85878 13109	85880 13125	Debris slide above seacliff	A			
			NZ	85880 13153	85895 13189	Length of high-angled debris slides and rock fall/debris fall scars	A			
			NZ	85895 13189	85923 13237	Rock fall and debris fall scars in weathered shales along this section	A			
			NZ	85923 13237	85921 13373	Rock fall and debris fall scars in weathered shales along this section	A			
			NZ	85921 13373	85905 13417	Debris slides in weathered shales	P			
			NZ	85906 13426		Elongate debris slide (10m wide) in gully - wooden fence at head	A			
9	1	Sandsend Car Park						0.15		0
9	2	Teapot Hill						0.3		0
9	3	Sandsend Road (W)	NZ	86620 12420	86654 12405	Large high-angled mudslide/rotational failure system in till, on road cutting. Debris lobe extended onto road.	A	0.35	4	11
			NZ	86673 12394	86702 12380	Large high-angled mudslide/rotational failure system in till; extensive plastic pipe drainage.	A			
			NZ	86705 12380	86764 12348	Unstable till cutting with active creep and shallow planar slides, above road.	P			
			NZ	86764 12348	86822 12320	Area of high-angled mudsliding/rotational failures in till. Extensive plastic pipe drains.	A			
9	4	Sandsend Road (E)	NZ	86952 12252	87000 12219	Area of high-angled mudsliding/rotational failures in till, adjacent to stabilised slope.	V	0.25	2	8
			NZ	87000 12219	87034 12191	Area of high-angled mudsliding/rotational failures in till.	P			
			NZ	87034 12191	87074 12152	Area of high-angled mudsliding/rotational failures in till.	P			
10	1	Whitby Golf Course (W)	NZ	87202 12130	87342 12083	Elongate failure scar of rotational failure and debris slide units in till - mid slope extent of active instability.	P	0.6	5	8
			NZ	87330 12048	87320 12074	Recent debris slide off rear cliff of former railway cutting - note large debris lobe extending to abandoned line.	A			
			NZ	87345 12057		Debris slide on abandoned railway cutting, 20m wide.	P			
			NZ	87388 12043	87397 12031	Debris slide on abandoned railway cutting.	A			
			NZ	87681 11966	87716 11971	Mudslide system in gully head, encroaching towards former railway line (now a track)	A			
10	2	Whitby Golf Course (E)	NZ	87741 11986	87776 11994	High-angled mudslide/rotational failure in till	A	0.4	17	43
			NZ	87776 11994	87800 11975	High-angled mudslide/rotational failure in till - note large tension cracks and 0.5m settlement to the rear.	A			
			NZ	87800 11975	87833 11964	High-angled mudslide/rotational failure in till, including areas of mudflow	A			
			NZ	87835 11975	87855 11976	High-angled mudslide/rotational failure in till	A			
			NZ	87855 11976	87878 11970	High-angled mudslide/rotational failure in till - note 2m elongate settlement along rear cliff	A			

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			NZ	87887 11964	87903 11955	High-angled mudslide/rotational failure in till - note recent golf course land loss	A			
			NZ	87903 11956	87920 11947	High-angled mudslide/rotational failure in till	A			
			NZ	87920 11947	87931 11948	High-angled mudslide/rotational failure in till	A			
			NZ	87931 11948	97943 11959	High-angled mudslide/rotational failure in till	A			
			NZ	87943 11959	87949 11960	High-angled mudslide/rotational failure in till	A			
			NZ	87949 11960	87967 11951	High-angled mudslide/rotational failure in till	A			
			NZ	87967 11951	87981 11951	High-angled mudslide/rotational failure in till	A			
			NZ	87981 11951	88014 11954	High-angled mudslide/rotational failure in till - note recent land loss: blocks of detached turf at slide crest.	A			
			NZ	88026 11950		Elongate debris slide embayment in till, 5m wide.	A			
			NZ	88032 11959	88042 11954	High-angled mudslide in till	P			
			NZ	88042 11954	88080 11944	High-angled mudslide/rotational failure in till, encroaching within 2m of 7th tee. Settlement at slide head.	A			
			NZ	88080 11944	88109 11934	High-angled mudslide/rotational failure in till	A			
11	1	West Cliff (W)	NZ	88572 11835	88600 11825	Area of localised shallow slope failures in till, on stabilised slope.	P	0.7	2	3
			NZ	88632 11817		Area of localised shallow slope failures in till, on stabilised slope.	P			
11	2	Metropole Cliffs	NZ	89014 11600		Area of localised shallow slope failures in till, on stabilised slope.	P	0.8	3	4
			NZ	89058 11575	89078 11576	Stabilised debris slide behind chalets on till slope	S			
			NZ	89115 11586	89160 11526	Area of shallow debris slides behind chalets	P			
			NZ	89259 11516		High-angled debris slide on mid-slope face, 15m wide, with runout beyond slide limit	A			
11	3	Spa Cliff						0.25	0	0
11	4	The Nabs	NZ	89609 11500		High-angled debris slide in till, encroaching towards wall by Spa access road	A	0.25	1	4
12	1	Haggerlythe	NZ	90135 11422		Small planar debris slide in fill immediately above rock armour, 5m wide 4m head to toe.	A	0.2	1	5
12	2	Abbey Cliff	NZ	90456 11396		Debris fall scar, 5m wide, affecting cliff top fence	A	0.3	2	7
			NZ	90435 11412	90423 11409	Debris fall scar, affecting cliff top fence	A			
13	1	East Cliff	NZ	91266 11152	91235 11144	Series of rock fall and debris fall scars	A	0.9	41	46
			NZ	91235 11144	91189 11161	Series of rock fall and debris fall scars	A			
			NZ	91185 11166	91175 11171	Debris slide embayment	V			
			NZ	91169 11174	91160 11170	Debris fall scar, encroaching onto Cleveland Way	A			
			NZ	91146 11188		Debris fall scar, 5m wide	V			
			NZ	91134 11195		Debris fall scar, 5m wide	V			
			NZ	91123 11202	91112 11212	Debris slide embayment	P			
			NZ	91105 11218	91086 11239	Debris falls cars in till - Cleveland Way recently diverted	A			
			NZ	91086 11239	91077 11239	Debris slide embayment	A			
			NZ	91066 11237		Debris slide embayment, 5m wide	A			
			NZ	91036 11226		Elongate debris slide embayment, 10m wide	P			
			NZ	91025 11220	91016 11216	Debris slide embayment	P			
			NZ	91016 11216	90997 11214	Series of debris slide embayments	A			
			NZ	90998 11215	90980 11216	Elongate debris slide embayment - note dumped farm waste at head. Cleveland Way diverted	A			
			NZ	90980 11216	90962 11222	Debris fall scars in till	A			
			NZ	90960 11225	90950 11227	Debris slide embayment	P			
			NZ	90950 11227	90932 11245	Debris slide embayment	A			
			NZ	90929 11252		Debris slide embayment, 10m wide	P			
			NZ	90925 11258		Elongate mudslide embayment, 10m wide - Cleveland Way diverted around slide head.	A			
			NZ	90918 11264	90907 11268	Debris slide embayment	P			
			NZ	90903 11273	90898 11279	Debris slide embayment	P			
			NZ	90896 11281		Debris slide embayment, 5m wide	P			
			NZ	90892 11284	90872 11292	Rotational failure embayment, Cleveland Way diverted around slide head.	A			
			NZ	90871 11293	90859 11297	Debris slide embayment - Cleveland Way diverted around slide head	A			
			NZ	90850 11298	90834 11293	Debris slide embayment	P			
			NZ	90816 11285	90805 11276	Debris slide embayment	P			

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			NZ	90793 11275		Debris slide embayment, 5m wide	P			
			NZ	90778 11272	90765 11269	Debris slide embayment	P			
			NZ	90757 11270	90743 11270	Debris slide embayment - Cleveland Way diverted around slide head. Note dumped farm waste at slide head.	A			
			NZ	90743 11270	90726 11276	Debris slide embayment	P			
			NZ	90721 11278		Debris slide embayment - Cleveland Way diverted around slide head, 10m wide	A			
			NZ	90712 11279	90700 11280	Debris slide embayment	P			
			NZ	90695 11282		Debris slide embayment, 10m wide	P			
			NZ	90687 11286	90673 11290	Debris slide embayment	P			
			NZ	90669 11292		Small drainage gully - note part filled with rubble.	G			
			NZ	90664 11295	90654 11304	Debris slide embayment	P			
			NZ	90651 11308		Debris slide embayment, 5m wide	P			
			NZ	90645 11313	90637 11319	Debris slide embayment, encroaching onto Cleveland Way	A			
			NZ	90627 11322		Debris slide embayment, 2m wide	P			
			NZ	90613 11326	90603 11330	Debris slide embayment	P			
			NZ	90593 11332	90561 11341	Debris slide embayment	P			
			NZ	90547 11352	90535 11357	Debris slide embayment	P			
			NZ	90527 11360		Debris slide embayment, 15m wide	A			
			NZ	90510 11366	90492 11370	Debris slide embayment	A			
			NZ	90482 11378		Debris slide embayment, 5m wide - encroaching onto Cleveland Way	P			
13	2	Saltwick Nab	NZ	91521 10923	91505 10971	Series of rock fall and debris fall scars	P	0.4	5	13
			NZ	91505 10971	91503 10982	Debris slide embayment	V			
			NZ	91500 10994	91497 11005	Debris slide embayment	V			
			NZ	91465 11039	91456 11040	Debris slide embayment	V			
			NZ	91429 11047		Debris slide embayment, 5m wide	V			
			NZ	91392 11058		Rock fall and debris fall scar, 2m wide - affecting fence line	A			
			NZ	91333 11076	91329 11099	Debris slide within gully head affecting footpath to Saltwick Nab - sewerage tanks within 12m of slide head	A			
			NZ	91325 11103	91317 11132	Series of rock fall and debris fall scars above path to Saltwick Nab	A			
			NZ	91317 11132	91307 11167	Series of rock fall and debris fall scars.	A			
13	3	Saltwick Hole Cliffs	NZ	91614 10723	91600 10720	Elongate mudslide embayment part-filled with builders rubble	A	0.2	4	20
			NZ	91600 10722	91590 10726	Elongate mudslide embayment - links with previous mudslide head	P			
			NZ	91586 10730	91559 10780	Large rotational failure/mudslide embayment in till - links to previous slide heads to form large embayment	P			
			NZ	91559 10780	91549 10785	Debris slide embayment	V			
			NZ	91549 10785	91530 10808	Series of small rear cliff debris slide embayments feeding large elongate mudslide system on mid-upper slopes	P			
			NZ	91530 10808	91508 10855	Series of small rear cliff debris slide embayments feeding large elongate mudslide system on mid-upper slopes	V			
13	4	Saltwick Cliffs	NZ	92035 10638	92011 10648	Series of rock fall and debris fall scars	A	0.45	8	18
			NZ	92003 10653	91964 10655	Series of rock fall and debris fall scars	A			
			NZ	91960 10657	91951 10658	Series of rock fall and debris fall scars in upper till unit	A			
			NZ	91931 10663	91921 10665	Series of rock fall and debris fall scars	A			
			NZ	91915 10667	91904 10668	Series of rock fall and debris fall scars	A			
			NZ	91897 10668	91886 10670	Series of rock fall and debris fall scars	A			
			NZ	91870 10672	91860 10671	Series of rock fall and debris fall scars	V			
			NZ	91860 10671	91843 10671	Series of rock fall and debris fall scars	P			
			NZ	91816 10664	91776 10649	Possible quarried section of upper cliff	Q			
			NZ	91772 10646		Debris slide in gully, 5m wide - note dumped building rubble	P			
			NZ	91753 10651	91742 10655	Rock fall scar, possible quarried face	Q			
			NZ	91698 10685	91684 10697	Rock fall scar, possible quarried face	Q			
			NZ	91661 10715	91644 10725	Rock fall scar, possible quarried face	V			
13	5	Black Nab	NZ	92250 10590	92244 10589	Bare rock face - rock fall scars	A	0.25	4	16
			NZ	92242 10588		Rock fall and debris fall scars, 5m wide	V			

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			Grid Square	Start	End					
			NZ	92238 10585	92211 10578	Series of rock fall and debris fall scars	V			
			NZ	92211 10578	92204 10580	Debris slide embayment in till	A			
			NZ	92204 10580	92179 10583	Worked area of cliff top	Q			
			NZ	92164 10588		Rock fall and debris fall scars, 5m wide	V			
			NZ	92158 10592	92148 10591	Debris slide embayment in till	A			
			NZ	92142 10595		Debris slide embayment, 5m wide	V			
			NZ	92145 10597		Debris slide embayment in till, 10m wide	V			
			NZ	92114 10604		Debris slide embayment, 5m wide	V			
			NZ	92075 10618	92066 10620	Debris slide embayment	V			
			NZ	92050 10627	92040 10635	Debris slide embayment	P			
13	6	Whitestone Point	NZ	93054 09899	93019 09952	Length of rock fall scars	P	1.1	12	11
			NZ	92977 10011		Debris slide embayment (20m wide)	V			
			NZ	92967 10022		Debris slide embayment (20m wide)	V			
			NZ	92942 10045	92925 10065	Rock falls scars	P			
			NZ	92925 10065	92849 10153	Rock fall scars along frontage of Whitby High Light	P			
			NZ	92825 10173	92797 10206	Rock fall scars	A			
			NZ	92796 10203	92773 10264	Large rock fall embayment - fenced at the head	A			
			NZ	92773 10264	92700 10280	Rock fall scars - note Fog Station wall within 12m of cliff edge	A			
			NZ	92659 10317	92633 10338	Rock fall scars	A			
			NZ	92631 10338	92615 10350	Debris slide at gully head, by stile	V			
			NZ	92615 10350	92572 10416	Possible quarried area	Q			
			NZ	92572 10416	92481 10478	Length of rock fall scars, encroaching onto Cleveland Way	A			
			NZ	92481 10478	92459 10494	Rock fall and debris fall scars - possible till cover	A			
			NZ	92459 10494	92339 10552	Rock fall scars	A			
			NZ	92333 10555		Rock fall scar (5m wide)	A			
			NZ	92333 10555	92258 10601	Rock fall scars	A			
14	1	Widdy Head	NZ	94060 08278		Debris slide (10m wide), evidence of minor settlement at slide head	A	1.9	19	10
			NZ	94046 08299		Debris slide embayment (10m wide)	V			
			NZ	94035 08325		Debris slide embayment (10m wide)	A			
			NZ	94019 08346		Debris slide embayment (10m wide)	V			
			NZ	93992 08373		Debris slide embayment (10m wide)	V			
			NZ	93980 08381		Debris slide embayment (10m wide)	V			
			NZ	93972 08387		Debris slide embayment (10m wide)	V			
			NZ	93963 08393		Debris slide embayment (10m wide)	V			
			NZ	93955 08399		Debris slide embayment (10m wide)	A			
			NZ	93937 08406		Debris slide embayment (10m wide)	V			
			NZ	93933 08409		Debris slide embayment (5m wide)	V			
			NZ	93926 08415		Debris slide embayment (5m wide)	V			
			NZ	93884 08442		Debris slide embayment (5m wide)	V			
			NZ	93819 08478	93765 08546	Series of shallow rotational failures and debris slides - possibly in till	V			
			NZ	93760 08576		Debris slide embayment (10m wide)	V			
			NZ	93756 08586		Debris slide embayment (10m wide)	V			
			NZ	93750 08591		Debris slide embayment (15m wide)	V			
			NZ	93729 08615		Debris slide embayment (15m wide)	V			
			NZ	93683 08636		Rock fall scar (15m wide)	V			
			NZ	93668 08639		Debris slide embayment (10m wide)	V			
			NZ	93658 08644		Debris slide embayment (10m wide)	V			
			NZ	93613 08665	93593 08679	Debris slide embayment (10m wide)	V			
			NZ	93584 08691		Debris slide embayment (10m wide)	V			

Management Unit	Cliff Reference Number	Cliff Name	Grid Reference			Landslide type	Activity State	Cliff Length	Number of Active and Part Active Slides/Falls	Active and Part-active Slides & Falls/km
			Grid Square	Start	End					
			NZ	93578 08703		Debris slide embayment (10m wide)	V			
			NZ	93570 08713	93557 08725	Rock fall scars along this cliff section	P			
			NZ	93555 08736		Rock fall scar (10m wide)	V			
			NZ	93552 08746		Rock fall scar (5m wide)	V			
			NZ	93549 08755		Debris fall and rock fall scars off rear cliff (10m wide)	A			
			NZ	93543 08768		Debris fall and rock fall scars off rear cliff (10m wide)	A			
			NZ	93529 08783		Debris slide embayment (10m wide)	A			
			NZ	93517 08792		Debris slide embayment (10m wide)	V			
			NZ	93510 08801		Debris slide embayment (5-10m wide)	V			
			NZ	93496 08813		Debris slide embayment (15m wide)	V			
			NZ	93474 08834		Gully head debris slide (15m wide)	V			
			NZ	93413 08966		Rock fall scar (10m wide)	A			
			NZ	93402 09000		Rock fall scar (10m wide)	A			
			NZ	93393 09018		Debris slide embayment (10m wide)	A			
			NZ	93389 09169		Debris slide embayment (5m wide) - elongate	A			
			NZ	93371 09185	93350 09214	Large elongate debris slide embayment; settlement at the head affects the Cleveland Way	P			
			NZ	93321 09262		Debris slide embayment (10m wide) - settlement at the head where Cleveland Way crosses	P			
			NZ	93287 09289		Debris slide embayment (10m wide) - elongate, Cleveland Way affected by settlement at the head	P			
			NZ	93263 09328	93252 09341	Debris slide embayment	P			
			NZ	93240 09364	93231 09385	Debris slide extending 15m back from cliff top	P			
			NZ	93224 09409		Debris slide embayment (10m wide) - elongate	V			
			NZ	93225 09456		Debris slide embayment (10m wide)	A			
			NZ	93168 09648	93154 09662	Debris slide and rock fall scars along this section	A			
			NZ	93116 09720		Rock fall scars (30m wide)	A			
			NZ	93083 09783		Rock fall scar (25m wide) - possible quarried face	V			
15	1	Pursglove Styel Cliffs	NZ	95054 07470	95037 07476	Debris slide at cliff top	P	1.4	11	8
			NZ	95036 07476	94986 07483	Narrow band of shallow debris slides (5m wide)	P			
			NZ	94962 07486		Debris slide embayment (10m wide)	V			
			NZ	94924 07490		Gully head	G			
			NZ	94908 07512		Debris slide embayment (5m wide)	V			
			NZ	94897 07528		Debris slide embayment (10m wide)	V			
			NZ	94840 07566		Gully head encroaching onto Cleveland Way	G			
			NZ	94669 07896		Rock fall scar (3m wide)	V			
			NZ	94659 07917	94641 07938	Large rockfall scar	V			
			NZ	94635 07957	94617 07973	Rock fall scar - note vegetated talus apron at the cliff foot	V			
			NZ	94604 07986	94586 08016	Rock fall scar - note vegetated talus apron at the cliff foot	V			
			NZ	94586 08016	94554 08027	Debris slide embayment at cliff crest	P			
			NZ	94545 08030		Debris slide embayment (5m wide)	A			
			NZ	94520 08042		Debris slide embayment (15m wide)	A			
			NZ	94507 08047		Debris slide embayment (10m wide)	A			
			NZ	94500 08052	94484 08062	Debris slide embayment - in till	P			
			NZ	94380 08108	94338 08175	Degrading rock face - rock falls	A			
			NZ	94321 08196		Debris slide embayment (5m wide)	V			
			NZ	94322 08201		Debris slide embayment (5m wide)	V			
			NZ	94320 08203	94290 08233	Series of shallow (5m wide) debris slide embayments	V			
			NZ	94271 08258		Debris slide embayment (15m wide)	A			
			NZ	94265 08264		Debris slide embayment (10m wide)	A			
			NZ	94237 08267	94224 08268	Debris slide embayment	A			
15	2	Far Jetticks	NZ	95272 07085		Debris slide embayment (10m wide)	P	0.6	9	15

Management Unit	Cliff Reference Number	Cliff Name	Grid Reference			Landslide type	Activity State	Cliff Length	Number of Active and Part Active Slides/Falls	Active and Part-active Slides & Falls/km
			Grid Square	Start	End					
			NZ	95272 07086	95218 07111	Rock fall and debris fall scars	A			
			NZ	95218 07111	95165 07160	Series of shallow debris slide embayments probably developed in argillaceous bedrock	P			
			NZ	95142 07181		Debris slide embayment (10m wide)	P			
			NZ	95135 07189		Debris slide embayment (10m wide)	P			
			NZ	95131 07193		Debris slide embayment (5m wide)	V			
			NZ	95130 07194	95119 07203	Debris slide embayment	A			
			NZ	95119 07203	95110 07219	Debris slide embayment	V			
			NZ	95099 07244	95086 07270	Debris slide embayment	V			
			NZ	95086 07270	95073 07299	Earth slide at cliff top; encroaching onto Cleveland Way at head	A			
			NZ	95071 07302	95047 07364	Relatively stable earth slide area	V			
			NZ	95052 07384		Debris slide embayment (15m wide)	P			
			NZ	95053 07398	95068 07430	Area of shallow mudrock debris slides on upper cliff. Cleveland Way diverted round slide head	A			
15	3	Bulmer Steel Cliffs	NZ	95688 05885	95705 05899	Debris slide embayment - in till	V	1.4	8	6
			NZ	95774 05974		Broad debris slide embayment (35m wide) in till on upper cliff section	V			
			NZ	95787 05984		Debris slide embayment (20m wide)	V			
			NZ	95799 05994		Debris slide embayment (15m wide) - in till	A			
			NZ	95833 06032	95853 06057	Debris slide embayment	P			
			NZ	95902 06132	95911 06145	Debris slide embayment	A			
			NZ	95930 06194		Debris slide embayment (10m wide)	V			
			NZ	95934 06224		Debris slide embayment (10m wide)	V			
			NZ	95941 06254		Debris slide embayment (10m wide)	P			
			NZ	95945 06312	95945 06330	Large debris slide embayment - fenced to rear of slide	P			
			NZ	95958 06435		Recent debris fall scar (5m wide)	A			
			NZ	95946 06519	95952 06626	Recent debris fall and rock fall scars (5m wide)	A			
			NZ	95938 06710	95925 06733	Debris slides in gully head	G			
			NZ	95877 06756		Debris slide embayment (10m wide)	V			
			NZ	95862 06763		Debris slide embayment (5m wide)	V			
			NZ	95843 06773		Debris slide embayment (5m wide)	V			
			NZ	95832 06779		Debris slide embayment (20m wide)	V			
			NZ	95812 06794		Debris slide embayment (20m wide)	V			
			NZ	95773 06813		Debris slide scar (30m wide) above bare rock slab - possible quarried area	Q			
			NZ	95754 06810		Debris slides on E flank of gully	G			
			NZ	95739 06821	95700 06849	Series of shallow debris slide embayments	V			
			NZ	95710 06849		Debris slide embayment (5m wide)	P			
			NZ	95685 06855	95658 06869	Debris slide embayment	V			
			NZ	95658 06869	95619 06919	Quarried area - slight rear cliff degradation	Q			
			NZ	95598 06933		Gully head, with relatively slack side slopes	G			
			NZ	95602 06957	95407 07010	Quarried area - slight rear cliff degradation	Q			
			NZ	95354 07024	95310 07049	Extensive area of cliff top surface erosion - possibly part of former quarried area	E			
			NZ	95290 07048		Debris slide embayment (10m wide) in possible quarried area within edge of stream valley	V			
15	4	Old Lance Cliff	NZ	95388 05688		Debris slide embayment (5m wide) - fence at slide head	A	0.4	5	13
			NZ	95435 05718		Debris slide embayment (5m wide) - fence at slide head	V			
			NZ	95457 05737	95495 05766	Series of broad debris slide embayments	V			
			NZ	95502 05769	95522 05764	Series of broad debris slide embayments	V			
			NZ	95544 05789	95574 05808	Debris slide embayment in till - fence at slide head, Cleveland Way diverted behind into field	A			
			NZ	95574 05806	95591 05822	Debris slide embayment in till	A			
			NZ	95614 05838	95627 05846	Debris slide embayment in till - recent cliff top loss of 5m	A			
			NZ	95640 05848	95648 05850	Debris slide embayment in till	A			
16	1	Dungeon Hole Cliffs	NZ	95330 05621		Debris slide embayment (20m wide) - properties at the crest	P	0.25	1	4

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			Grid Square	Start	End					
			NZ	95337 05636		Debris slide embayment (20m wide) - properties at the crest	V			
16	2	Ground Wyke Cliff						0.35	0	0
16	3	Town Cliff						0.1	0	0
17	1	Quarterdeck	NZ	95226 04633	95195 04685	Large mudslide and rotational failure complex - active rear scar degradation	A	0.15	2	13
			NZ	95191 04695		Debris slide embayment, feeding main slide unit	P			
			NZ	95192 04701	95257 04803	Part stabilised rotational failure complex, fronted by rock armour scheme	V			
			NZ	95257 04803	95300 04833	Degrading protected till slope - shallow debris slides and rotational failures behind Quarterdeck	V			
17	2	Cowfield Hill Cliff	NZ	95213 04556	95230 04621	Large rotational failure and mudslide complex	P	0.3	2	7
			NZ	95230 04621	95227 04635	Series of small rotational failures within broad embayment	P			
17	3	Farsyde Cliff	NZ	95356 04191	95339 04219	Broad rotational failure embayment, encroaching onto Cleveland Way	A	0.4	2	5
			NZ	95339 04219	95209 04557	Series of rotational failure embayments, NO ACCESS	A			
17	4	Tinker's Stone	NZ	95718 03611		Small gully head encroaching onto Cleveland Way	G	0.5	13	26
			NZ	95717 03622	95711 03637	Area of shallow debris slides	P			
			NZ	95711 03637	95705 03677	Debris slide and mudslide complex	P			
			NZ	95704 03684		Debris slide embayment (10m wide)	A			
			NZ	95698 03690		Debris slide embayment (10m wide)	A			
			NZ	95688 03704	95668 03731	Elongate mudslide embayment - drainage controlled by pipes, Cleveland Way diverted	A			
			NZ	95679 03735	95661 03755	Debris slide embayment	A			
			NZ	95661 03755	95644 03777	Rotational failures and mudslides in upper cliff section	A			
			NZ	95644 03777		Debris slide embayment (10m wide)	A			
			NZ	95637 03783	95620 03802	Debris slide embayment (10m wide)	A			
			NZ	95619 03800	95609 03815	Rotational failures and mudslides in upper cliff section	A			
			NZ	95609 03815	95583 03862	Rotational failures and mudslides in upper cliff section	A			
			NZ	95583 03862	95546 03923	Rotational failures and mudslides in upper cliff section	A			
			NZ	95546 03923	95538 03939	Elongate mudslide embayment	A			
			NZ	95529 03950		Debris slide embayment (20m wide)	V			
17	5	Stoupe Beck Cliffs	NZ	96101 03133	96028 03141	Large earth slide in till, encroaching above Cleveland Way	A	0.45	5	11
			NZ	96016 03150	95981 03170	Debris slide embayment; settlement at the head where Cleveland Way crosses slide	A			
			NZ	95971 03175		Debris slide embayment (25m wide)	P			
			NZ	95923 03260	95813 03419	Large rotational failure and mudslide complex; recent detached blocks, active rear cliff degradation	A			
			NZ	95811 03423	95775 03483	Mudslide embayment in till	A			
17	6	Miller's Nab	NZ	97050 02401	96992 02441	Large mudslide embayment	A	1.3	20	15
			NZ	96990 02457	96958 02500	Large debris slide embayment	V			
			NZ	96952 02506		Debris slide embayment (10m wide)	V			
			NZ	96947 02519	96926 02538	Debris slide embayment	V			
			NZ	96926 02538	96916 02540	Mudslide embayment in till	A			
			NZ	96916 02540	96875 02553	Mudslide embayment in till	A			
			NZ	96874 02551	96856 02559	Debris slide embayment	V			
			NZ	96843 02587		Debris slide embayment (15m wide)	V			
			NZ	96834 02593	96737 02637	Large debris slide embayment	V			
			NZ	96737 02637	96710 02651	Debris slide embayment	P			
			NZ	96702 02653		Debris slide embayment (15m wide)	V			
			NZ	96697 02656	96658 02676	Debris slide embayment	P			
			NZ	96658 02676	96628 02693	Mudslide embayment in till	P			
			NZ	96622 02700		Debris slide embayment (15m wide)	P			
			NZ	96611 02707	96580 02721	Mudslide embayment - encroaching onto Cleveland Way, head settlement of 0.5m	P			
			NZ	96577 02725	96538 02755	Debris slide embayment	P			
			NZ	96531 02760		Debris slide embayment (20m wide)	V			
			NZ	96524 02770	96504 02783	Debris slides on gully flanks	V			

Management Unit	Cliff Reference Number	Cliff Name	Grid Reference			Landslide type	Activity State	Cliff Length	Number of Active and Part Active Slides/Falls	Active and Part-active Slides & Falls/km
			Grid Square	Start	End					
			NZ	96503 02782		Debris slide embayment (10m wide)	P			
			NZ	96491 02791		Debris slide embayment (10m wide)	V			
			NZ	96471 02803		Debris slide embayment (10m wide)	P			
			NZ	96466 02811		Debris slide embayment (20m wide)	P			
			NZ	96466 02829		Debris slide embayment (20m wide)	P			
			NZ	96436 02845	96415 02866	Debris slide embayment	P			
			NZ	96405 02866	96383 02902	Debris slide embayment	V			
			NZ	96382 02902	96345 02945	Debris slide embayment	V			
			NZ	96341 02946		Debris slide embayment (10m wide)	A			
			NZ	96339 02944	96281 02975	Elongate mudslide; some settlement at the head where Cleveland Way crosses	P			
			NZ	96281 02975	96245 02045	Debris slide embayment	P			
			NZ	96228 03044		Debris slide embayment (15m wide)	V			
			NZ	96213 03064		Debris slide embayment (10m wide)	V			
			NZ	96208 03069	96156 03092	Debris slides in gully/stream head; settlement and tension cracks at the head	P			
			NZ	96155 03097	96137 03112	Debris slide embayment	P			
			NZ	96137 03112		Debris slide embayment (10m wide)	V			
			NZ	96131 03115	96105 03133	Shallow rotational failure by concrete shelter	A			
17	7	Low Peak Cliff	NZ	97215 02278		Debris slide embayment (20m wide)	A	0.3	1	3
			NZ	97195 02273		Debris slide embayment (10m wide)	V			
			NZ	97186 02279		Debris slide embayment (10m wide)	V			
			NZ	97171 02268		Debris slide embayment (10m wide)	V			
			NZ	97160 02268		Debris slide embayment (10m wide)	V			
			NZ	97146 02272		Debris slide embayment (15m wide)	V			
17	8	Wine Haven W	NZ	97750 02189	97735 02170	Large debris slide embayment	P	0.35	11	31
			NZ	97735 02170	97712 02138	Debris slide embayment feeding into main slide	A			
			NZ	97708 02127		Debris slide embayment (15m wide)	V			
			NZ	97703 02117		Debris slide embayment (10m wide) in gully channel	P			
			NZ	97689 02141		Debris slide embayment (10m wide)	A			
			NZ	97677 02142		Debris slide embayment	A			
			NZ	97658 02148	97642 02151	Debris slide embayment	A			
			NZ	97633 02157	97609 02184	Debris slide embayment	A			
			NZ	97609 02184	97599 02195	Debris slide embayment	A			
			NZ	97599 02195	97581 02209	Debris slide embayment	V			
			NZ	97572 02209		Debris slide embayment (20m wide)	A			
			NZ	97563 02216		Debris slide embayment (10m wide)	V			
			NZ	97551 02220		Debris slide embayment (10m wide)	V			
			NZ	97546 02218	97506 02228	Debris slide embayment	P			
			NZ	97494 02225	97400 02350	Debris slide embayment	P			
17	9	Wine Haven E	NZ	97955 02249	97769 02213	Large rockfall and rockslide scar in Redcar mudstones	A	0.2	1	5
18	1	The Coomb	NZ	97930 02115		Settled block behind rear cliff face, 20m length	V	0.7	1	1
			NZ	97968 02087		Settled block behind rear cliff face, 0.5m displacement	V			
			NZ	98184 01879		Rock fall scar at gate (5m wide)	P			
			NZ	98297 01820		Rock fall scar (5m wide)	V			
			NZ	98303 01814		Rock fall scar (5m wide)	V			
			NZ	98370 01790		Gully head drainage line	V			
18	2	Fox Cliff	NZ	98404 01698	98448 01611	Length of block settlement (5m max.) at rear of Undercliff	V	0.6	1	2
			NZ	98532 01470	98565 01405	Length of block settlement (5m max.) at rear of Undercliff	V			
			NZ	98632 01322		Debris slide embayment (10m wide)	A			
18	3	Common Cliff	NZ	98733 01321		Gully head	G	3	5	2

Management Unit	Cliff Reference Number	Cliff Name	Grid Reference			Landslide type	Activity State	Cliff Length	Number of Active and Part Active Slides/Falls	Active and Part-active Slides & Falls/km
			Grid Square	Start	End					
			NZ	98828 01050		Gully head	G			
			NZ	99058 00958		Gully head	G			
			NZ	99115 00907		Gully head	G			
			NZ	99170 00901		Debris slide scar (20m wide)	V			
			NZ	99211 00797		Gully head	G			
			NZ	99203 00765		Gully head	G			
			NZ	99217 00732		Localised settlement (0.5m) behind rear cliff, 10m length, 2m wide	V			
			NZ	99374 00471		Rock fall and rock slide embayment (15m wide)	V			
			NZ	99441 00399		Rock slide scar (20m wide)	V			
			NZ	99490 00365		Rock slide scar (35m wide)	V			
			NZ	99511 00348		Gully head	G			
			NZ	99531 00331		Rock slide scar (10m wide)	V			
			NZ	99539 00315		Debris slide scar on rear cliff (15m wide)	A			
			NZ	99546 00295		Debris slide scar (10m wide)	V			
			NZ	99600 00214		Debris slide scar (5m wide)	V			
			NZ	99620 00086		Gully head	G			
			NZ	99647 00045		Debris slide scar (10m wide)	V			
			SE	99690 99935	99697 99910	Debris slide embayment	A			
			SE	99697 99902		Debris slide embayment (8m wide)	A			
			SE	99710 99873		Debris slide embayment (10m wide)	A			
			SE	99783 99700		Debris slide scar (10m wide)	V			
			TA	00169 99085		Debris slide in active gully head, encroaching onto Cleveland Way	P			
			TA	00188 99060		Debris slide embayment (5m wide), encroaching onto Cleveland Way	A			
18	4	Rigg Hall Cliff	TA	00518 98708		Debris slide embayment (10m wide)	V	0.5	3	6
			TA	00566 98651		Debris slide embayment (5m wide)	V			
			TA	00640 98560		Debris slide embayment (5m wide) - in till	A			
			TA	00672 96524		Debris slide on upper cliff section (not cliff top), 25m wide	A			
			TA	00712 98460		Debris slide embayment (20m wide) - in till	P			
19	1	Herbert Hole Cliff	TA	00745 98416		Debris slide embayment (5m wide)	V	1.2	5	4
			TA	00776 98309		Debris slide embayment (10m wide)	V			
			TA	00795 98243		Possible old landslide scar (20m wide) or worked area	Q			
			TA	00823 98155		Gully head along drainage line	V			
			TA	00876 98019		Debris slide embayment (10m wide)	A			
			TA	00906 97917		Debris slide embayment (20m wide)	V			
			TA	00909 97882		Debris slide embayment (10m wide), encroaching onto Cleveland way	A			
			TA	00900 97852		Debris slide embayment (10m wide)	V			
			TA	00911 97717		Debris slide embayment (10m wide)	A			
			TA	00917 97678	00932 97639	Debris slide embayment with 2m high step	V			
			TA	00951 97616		Debris slide embayment (10m wide)	V			
			TA	00957 97601		Debris slide embayment (5m wide)	V			
			TA	00962 97584	01008 97530	Debris slide embayment, cascading over lithological bench	P			
			TA	01013 97499		Debris slide embayment (25m wide)	P			
			TA	01016 97432		Debris slide embayment (10m wide)	V			
			TA	01008 97365		Debris slide embayment (25m wide)	V			
19	2	Hayburn Wyke	TA	00961 97294	00941 97277	Large rotational/mudslide complex on west side of valley extending towards seacliff	A	0.25	3	12
			TA	00926 97270		Rotational failure (25m wide) with arcuate embayment	A			
			TA	00979 97130		Rock fall scar (10m wide)	V			
			TA	00981 97192		Debris slide above low seacliff (10-15m wide)	A			
	3	Little Cliff						1.4	0	0

Management Unit	Cliff Reference Number	Cliff Name	Grid Reference			Landslide type	Activity State	Cliff Length	Number of Active and Part Active Slides/Falls	Active and Part-active Slides & Falls/km
			Grid Square	Start	End					
19	4	Sycarham Wood Cliffs	TA	02013 95685		Debris slide (20m wide) in woodland	V	0.5	1	2
			TA	0200 95695	01995 95720	Debris slide in woodland	P			
19	5	Salt Pans Cliff	TA	01981 95112		Rock fall scar (5m wide) - fenced off area	A	0.45	3	7
			TA	02052 95429		Debris slide embayment (20m wide)	A			
			TA	02047 95511		Debris slide embayment (10m wide), settlement at the head - in till	P			
19	6	Hundale Cliffs	TA	02823 94080		Debris slide embayment (10m wide)	A	1.6	17	11
			TA	02804 94091	02753 94157	Debris slide embayment, encroaching onto Cleveland Way	A			
			TA	02746 94182		Debris slide embayment (5m wide)	V			
			TA	02743 94194		Debris slide embayment (5m wide)	V			
			TA	02740 94212		Debris slide embayment (5m wide)	V			
			TA	02722 94298		Debris slide embayment (5m wide)	V			
			TA	02716 94312		Debris slide embayment (5m wide)	V			
			TA	02729 94357		Debris slide embayment (5m wide)	V			
			TA	02728 94364		Debris slide embayment (5m wide)	V			
			TA	02716 94386	02704 94422	Debris slide embayment	V			
			TA	02696 94447		Debris slide embayment (5m wide)	V			
			TA	02692 94470		Debris slide embayment (5m wide)	V			
			TA	02693 94489		Debris slide embayment (10m wide), encroaching onto Cleveland way	A			
			TA	02688 94500		Debris slide embayment (10m wide), encroaching onto Cleveland way	P			
			TA	02679 94537		Debris slide embayment (5m wide), on site of seeping land drain	A			
			TA	02673 94565		Debris slide embayment (5m wide)	V			
			TA	02661 94587		Debris slide embayment (5m wide)	V			
			TA	02653 94619		Debris slide embayment (5m wide)	A			
			TA	02644 94627		Debris slide embayment (10m wide), encroaching onto Cleveland way - seeping land drain	A			
			TA	02641 94644		Debris slide embayment (5m wide)	V			
			TA	02631 94666		Debris slide embayment (5m wide)	V			
			TA	02615 94721		Debris slide embayment (25m wide) - note till up to 10m thick	A			
			TA	02604 94756		Debris slide embayment (5m wide)	A			
			TA	02595 94768		Debris slide embayment (5m wide)	V			
			TA	02572 94812		Debris slide embayment (5m wide)	P			
			TA	02410 94909		Debris slide embayment (5m wide)	A			
			TA	02399 94911		Debris slide embayment (5m wide)	A			
			TA	02382 94915		Debris slide embayment (15m wide) - in till	A			
			TA	02361 94905		Debris slides in steep-sided valley (Hun Dale)	A			
			TA	02330 94932		Debris slide embayment (10m wide) - attempt at stabilising slide with fencing at the head	V			
			TA	02315 94931		Debris slide embayment (5m wide)	P			
			TA	02295 94932		Debris slide embayment (5m wide)	P			
			TA	02237 94960		Debris slide embayment (5m wide)	V			
			TA	02191 94951		Debris slide embayment (5m wide) - attempt at stabilising with fencing	V			
			TA	02047 94920		Debris slide embayment (5m wide)	V			
			TA	02013 94923		Debris slide embayment (5m wide)	V			
			TA	02000 94925		Debris slide embayment (5m wide) - along drainage line	A			
			TA	01950 94975		Debris slide embayment (5m wide)	V			
19	7	Horse Back Cliff	TA	02811 93662	02834 93787	Debris slide embayment - minor loss of cliff top land	A	0.6	2	3
			TA	02839 93813		Debris slide embayment (5m wide) - confined to upper till cap	V			
			TA	02901 93929		Debris slide embayment (5m wide)	V			
			TA	02921 93980		Debris slide embayment (10m wide)	A			
			TA	02942 94018		Debris slide embayment (5m wide)	V			
19	8	Crook Ness Cliffs	TA	02700 93435	02699 93448	Large high-angled debris slide embayment - lost concrete blocks	A	0.75	13	17

Management Unit	Cliff Reference Number	Cliff Name	Grid Reference			Landslide type	Activity State	Cliff Length	Number of Active and Part Active Slides/Falls	Active and Part-active Slides & Falls/km
			Grid Square	Start	End					
			TA	02693 93398		Debris slide embayment (20m wide), active degradation of the rear cliff - in till	V			
			TA	02706 93366		Debris slide embayment (5m wide)	V			
			TA	02709 93349		Debris slide embayment (5m wide)	V			
			TA	02716 93327		Debris slide embayment (10m wide)	V			
			TA	02718 93315		Debris slide embayment (10m wide)	V			
			TA	02724 93302		Debris slide embayment (5m wide)	V			
			TA	02735 93274		Debris slide embayment (10m wide)	V			
			TA	02737 93266		Debris slide embayment (5m wide)	V			
			TA	02740 93265	02730 93210	Large rotational failure and debris slide in till and bedrock, above 5m high seacliff	P			
			TA	02727 93195		Debris slide embayment (5m wide) - feeding accumulation zone of main slide (previous)	V			
			TA	02736 93174		Debris slide embayment (5m wide)	V			
			TA	02741 93138		Gully head drainage line	G			
			TA	02700 93128		Gully head	G			
			TA	02714 93126		Debris slide on gully flanks	A			
			TA	02721 93119		Debris slide embayment (5m wide) into gully	P			
			TA	02731 93106		Debris slide embayment (5m wide)	V			
			TA	02750 93093		Debris slide embayment (5m wide) into gully	P			
			TA	02760 93083		Debris slide embayments (5m wide) - 2 principal sources	P			
			TA	02765 93057		Debris slide embayment (5m wide)	P			
			TA	02780 93036		Debris slide embayment (10m wide)	V			
			TA	02789 93011		Debris slide embayment (10m wide)	V			
			TA	02791 92996		Mudslide embayment (10m wide)	A			
			TA	02796 92984		Elongate mudslide embayment (10m wide) - extends to cliff foot	A			
			TA	02796 92974	02831 92922	Series of debris slide embayment - in till	P			
			TA	02845 92906		Debris slide embayment (20m wide)	P			
			TA	02859 92895		Debris slide embayment (10m wide)	V			
			TA	02867 92887		Debris slide embayment (10m wide)	V			
			TA	02882 92879		Debris slide embayment (10m wide)	P			
			TA	02890 92873		Debris slide embayment (10m wide)	V			
			TA	02899 92860		Debris slide embayment (10m wide)	V			
			TA	02903 92855		Debris slide embayment (10m wide)	P			
			TA	02912 92846		Debris slide embayment (10m wide)	V			
			TA	02915 92832		Debris slide embayment (15m wide)	V			
			TA	02931 92818		Debris slide embayment (10m wide)	V			
19	9	Cowlam Cliffs	TA	02933 92815		Debris slide embayment (10m wide) - in till	A	1.7	36	21
			TA	02918 92807		Debris slide embayment (10m wide)	A			
			TA	02909 92796		Debris slide embayment (10m wide)	A			
			TA	02878 92787		Debris slide embayment (10m wide) on heavily vegetated gully flank	V			
			TA	02867 92757		Debris slide embayment (10m wide)	A			
			TA	02867 92748		Debris slide embayment (10m wide)	V			
			TA	02870 92723		Debris slide embayment (10m wide)	V			
			TA	02875 92710		Debris slide embayment (10m wide)	P			
			TA	02857 92685		Debris slide embayment (20m wide)	P			
			TA	02849 92653		Debris slide embayment (5m wide)	V			
			TA	02847 92641		Debris slide embayment (10m wide)	V			
			TA	02844 92620		Elongate mudslide embayment (25m wide)	P			
			TA	02849 92599		Secondary head source to previous mudslide system	V			
			TA	02843 92583		Debris slide embayment (15m wide)	P			
			TA	02837 92566		Debris slide embayment (10m wide) - active lateral margins	P			
			TA	02837 92552		Debris slide embayment (10m wide), encroaching onto Cleveland Way	A			

Management Unit	Cliff Reference Number	Cliff Name	Grid Reference			Landslide type	Activity State	Cliff Length	Number of Active and Part Active Slides/Falls	Active and Part-active Slides & Falls/km
			Grid Square	Start	End					
			TA	02842 92526		Debris slide embayment (10m wide)	V			
			TA	02849 92523		Debris slide embayment (10m wide)	P			
			TA	02852 92515		Debris slide embayment (20m wide)	V			
			TA	02858 92499		Debris slide embayment (15m wide)	V			
			TA	02859 92479	02859 92455	Debris slide embayment - becoming active, with seepage	P			
			TA	02859 92455	02869 92424	Debris slide embayment (10m wide)	P			
			TA	02870 92417		Debris slide embayment (10m wide)	V			
			TA	02870 92405		Debris slide embayment (5m wide)	V			
			TA	02876 92387		Debris slide embayment (15m wide), encroaching onto Cleveland Way	P			
			TA	02882 92378		Debris slide embayment (10m wide)	V			
			TA	02891 92360		Debris slide embayment (15m wide)	V			
			TA	02887 92348	02909 92304	Large rotational failure, 50m wide in till	V			
			TA	02906 92300	02911 92259	Elongate mudslide system, with rotational failures at the head, 50m wide	V			
			TA	02914 92243		Debris slide embayment (30m wide)	A			
			TA	02919 92232	02927 92189	Large elongate debris slide embayment: encroaching onto Cleveland Way	A			
			TA	02933 92174	02907 92119	Large elongate mudslide and rotational failure system	P			
			TA	02913 92099	02932 92065	Mudslide and debris slide embayment	V			
			TA	02926 92060	02937 92021	Debris slide embayment (40m wide)	V			
			TA	02908 91982	02868 91927	Incised stream valley with debris slides on steep side-slopes	V			
			TA	02895 91926		Debris slide embayment (20m wide) on gully side-slopes	V			
			TA	02912 91932	02936 91935	Debris slide on incised gully flank	P			
			TA	02936 91935	02937 91918	Elongate mudslide system	A			
			TA	02935 91907		Debris slide embayment (10m wide)	V			
			TA	02938 91898	02945 91862	High-angled mudslide complex	V			
			TA	02945 91862	02943 91816	Mudslide embayment	V			
			TA	02965 91803	02973 91773	Debris slide embayment	P			
			TA	02973 91770		Debris slide embayment (15m wide)	V			
			TA	02973 91762	02982 91728	Debris slide embayment	P			
			TA	02982 91728	02964 91703	Debris slide embayment (30m wide) in N flank of incised valley	V			
			TA	02966 91647		Debris slide embayment (10-15m wide) in gully flank	V			
			TA	02974 91646	02996 91651	Debris slide on S side of gully	V			
			TA	02996 91651	03024 91627	Large rotational failure and debris slide embayment, active at the head	P			
			TA	03035 91629		Debris slide embayment (10m wide)	V			
			TA	03027 91622	03036 91606	Debris slide embayment	P			
			TA	03036 91606	03049 91591	Debris slide embayment	A			
			TA	03049 91591	03080 91575	Debris slide embayment	V			
			TA	03080 91575	03100 91540	Debris slide embayment	A			
			TA	03100 91540	03118 91503	Debris slide embayment	V			
			TA	03118 91504	03128 91482	Debris slide embayment	V			
			TA	03128 91470		Debris slide embayment (15m wide)	V			
			TA	03127 91472	03126 91426	Large mudslide complex, with small rotational failures off the rear cliff - encroaching onto Cleveland Way	A			
			TA	03126 91426	03140 91398	Elongate high-angled debris slide	V			
			TA	03140 91398	03159 91390	Debris slide embayment	V			
			TA	03159 91390	03164 91360	High angled mudslide system, part rotational at the head - encroaching onto Cleveland Way	A			
			TA	03164 91360	03179 91336	Mudslide and debris slide embayment (10m wide)	A			
			TA	03179 91336	03197 91324	Rotational failure and mudslide complex	P			
			TA	03195 91322	03215 91303	Mudslide and debris slide embayment	P			
			TA	03215 91303	03226 91288	Debris slide embayment, rear cliff degradation	P			
			TA	03226 91288	03247 91270	Debris slide embayment	A			
			TA	03247 91270	03271 91259	Debris slide embayment	A			

Management Unit	Cliff Reference Number	Cliff Name	Grid Reference			Landslide type	Activity State	Cliff Length	Number of Active and Part Active Slides/Falls	Active and Part-active Slides & Falls/km
			Grid Square	Start	End					
			TA	03271 91259	03284 91249	Debris slide embayment	A			
			TA	03284 91249	03296 91248	Debris slide and mudslide embayment	A			
			TA	03296 91248	03312 91236	Debris slide embayment	V			
			TA	03312 91236	03326 91227	Debris slide embayment	A			
			TA	03326 91227	03380 91209	Debris slide embayment	V			
19	10	Scalby Cliffs	TA	03336 91194	03473 91127	Rotational landslide complex, degrading through mudslides and small rotational slumps	A	0.15	1	7
19	11	Scalby Ness	TA	03471 91125	03501 91124	Rotational failure and debris slides in till above sandstone seacliff	A	0.4	7	18
			TA	03501 91124	03550 91129	Large active rotational slide	A			
			TA	03550 91129	03556 91137	Debris slide embayment above rock seacliff	V			
			TA	03558 91134	03563 91123	Debris slide embayment	P			
			TA	03566 91123		Elongate mudslide embayment (10m wide)	A			
			TA	03566 91124	03592 91118	Debris slide	A			
			TA	03592 91118	03639 91102	Rotational failure in tills above rock seacliff	V			
			TA	03639 91102	03648 91069	Rotational failure in tills above rock seacliff	V			
			TA	03648 91069	03642 91040	Debris slide embayment	V			
			TA	03642 91040	03600 90900	Large rotational failure and debris slide embayment	P			
			TA	03600 90900	03605 90857	Debris slide embayment	P			
20	1	Golf Course Cliffs	TA	03494 90972		Steep slope protected by gabion baskets, above railway line		0.5	0	0
20	2	North Cliff	TA	03622 89925		Steps damage by recent slide movement	A	0.4	2	5
			TA	03596 89949	03636 89896	Active rotational failure at rear slope of old slide area: buckled walls, dislocated steps etc., numerous cracks	A			
20	3	Peasholm Cliff	TA	03891 89569		Small debris slide on upper slope	A	0.25	4	16
			TA	03887 89553		Cracking in upper footpath	A			
			TA	03870 89569		Small debris slide on upper slope, beneath shelter W of Clifton Hotel	A			
			TA	03945 89518		Small debris slide, cracked paths etc., beneath Clifton Hotel - extensive footpath cracking	A			
20	4	Clarence Gardens	TA	03945 89480		Active cracking on cliff top in front of Clifton Hotel	A	0.9	8	9
			TA	03953 89460		Debris slide above café	A			
			TA	03960 89454		Debris slide above mid slope footpath; cracks on cliff top path	A			
			TA	03985 89379		Cliff top cracks	A			
			TA	04120 89250		Small debris slide on upper cliff section	P			
			TA	04233 89180		Stabilised debris slide in front of Blenheim Flats, on upper slopes	P			
			TA	04397 89119		Stabilised rear cliff failure - wire mesh cover - in front of Wharnccliffe	A			
			TA	04465 89099	04600 89131	Numerous rock fall scars	A			
21	1	The Holms	TA	04796 89160		Active cracking and slope failure beneath rear cliff	A	0.3	2	7
			TA	04821 89169		Active cracking of footpaths beneath blockwork retaining wall	A			
21	2	Castle Cliff	TA					0.8	0	0
22	1	Spa Chalet Cliff	TA	04410 88184		Debris slide above road - beneath Spa Bridge abutment	A	0.25	2	8
			TA	04433 88068		Debris slide on lower slopes	A			
22	2	Spa Cliff						0.2		0
22	3	Prince of Wales Cliff						0.15		0
22	4	South Cliff Gardens						0.2		0
22	5	Rose Gardens						0.15		0
22	6	South Bay Pool Cliff						0.2		0
22	7	Holbeck Gardens						0.2		0
22	8	Holbeck Cliff						0.15		0

APPENDIX 4
CONDITION CLASSIFICATION

Table A. 4 Strategic Coastal Monitoring - Scarborough to Staithes: Condition Classification

Management Unit	Cliff Reference Number	Cliff Name	Cumulative Length Along Cliffline (km)	Unprotected Cliffs						Protected Cliffs					Other Cliffs						
				U1 Actively Retreating Rockcliff	U2 Actively Retreating Till-capped Rockcliff	U3 Unstable Rock Slope Landslide Complex	U4 Actively Retreating Composite Cliff	U5 Actively Retreating Till Cliff	U6 Unstable Undercliff	U7 Unstable Till Slope	P1 Rockcliff	P2 Rock Slope Complex	P3 Composite Cliff (Inset Slope)	P4 Pre-existing Rock Slope Landslide	P5 Pre-existing Till Landslide	P6 Till Cliff	Area of Quarrying	Alum Workings			
4	1	Cowbar Nab	0.25																		
	2	Staithes Cliffs	0.5																		
	3	Penny Steel	0.75	◆														◆			
5	1	Jet Wyke Cliffs	1.4	◆																	
	1	Green Swan Cliffs	2.3	◆																	
	2	Twixt Hill	2.6			◆															
	3	Port Mulgrave Cliffs	2.8																		
	4	Rosedale Wyke Cliff	3.35	◆														◆			
	5	Rosedale Cliff	3.65		◆																
	6	Lingrow Cliffs	4.25	◆																	
	7	Wrack Hills	4.95			◆															
	8	Cauldron Cliff	5.15	◆																	
7	1	Runswick Cliffs	5.55															◆			
	2	Netterdale Beck	5.75															◆			
	3	Doher Pits	6																		
	4	Randy Bell End	6.25						◆												
	1	Whitestones Cliff	7.1						◆												
	2	Catbeck Hill	7.6			◆															
	3	Ketleness Sand	7.85			◆															
	4	Ketleness Farm	8.05																◆		
	5	Kettle Ness	8.45																◆		
	6	Lucky Dogs Point	9.15	◆																	
	7	Seaybrog Hill	9.85							◆											
	8	Ovalgate Cliff	10.15							◆											
	9	Loop Wyke Cliff	10.3	◆																	
	10	Tellgreen Hill	10.6			◆															
	11	Keldhowe Cliff	10.95																		
	12	Overdale Wyke	11.3	◆																	
	13	Stonecliff End	11.65																		
	14	Sandsend Ness	12.4																		
	15	Sandsend Cliff	13																		
	1	Sandsend Car Park	13.15															◆			
	2	Teapot Hill	13.45															◆			
	3	Sandsend Road (W)	13.8															◆			
	4	Sandsend Road (E)	14.05															◆			
	10	1	Whitby Golf Course (W)	14.65															◆		
	2	Whitby Golf Course (E)	15.05							◆											
	1	West Cliff (W)	15.75															◆			
	2	Metropole Cliffs	16.55																◆		
	3	Spa Cliff	16.8																		
	4	The Nabs	17.05	◆														◆			
	12	1	Haggerlythe	17.25															◆		
	2	Abbey Cliff	17.55															◆			
	1	East Cliff	18.45		◆																
	2	Saltwick Nab	18.85																◆		
	3	Saltwick Hole Cliff	19.05					◆													
	4	Saltwick Cliffs	19.5	◆																	
	5	Black Nab	19.75																◆		
	6	Whitstone Point	20.85	◆																	
	1	Widdy Head	22.75	◆																	
	14	1	Purglove Snye Cliffs	24.15	◆	◆															
	15	2	Far Jetticks	24.75	◆																
	3	Bulmer Steel Cliffs	26.15		◆														◆		
	4	Old Lance Cliff	26.55					◆													
16	1	Dungeon Hole Cliff	26.8					◆													
	2	Ground Wyke Cliff	27.15															◆			
	3	Town Cliff	27.25											◆							
	1	Quarterdeck	27.4																		
	2	Cowfield Hill Cliff	27.7					◆										◆			
	3	Farsyde Cliff	28.1					◆													
	4	Tinker's Stone	28.6					◆													
	5	Sloupe Beck Cliffs	29.05						◆												
	6	Miller's Nab	30.35						◆												
	7	Low Peak Cliff	30.65		◆																
	8	Wine Haven W	31		◆																
	9	Wine Haven E	31.2	◆																	
18	1	The Coomb	31.9						◆												
	2	Fox Cliff	32.5						◆												
	3	Common Cliff	35.5						◆												
	4	Rigg Hall Cliff	36							◆											
	1	Herbert Hole Cliff	37.2	◆																	
	2	Hayburn Wyke	37.45	◆																	
	3	Little Cliff	38.85							◆											
	4	Sycarham Wood Cliffs	39.35	◆																	
	5	Salt Pans Cliff	39.8	◆																	
	6	Hundale Cliffs	41.4		◆																
	7	Horse Back Cliff	42		◆																
	8	Crook Ness Cliffs	42.75		◆																
	9	Cowlam Cliffs	44.45		◆																
	10	Scalby Cliffs	44.6																		
	11	Scalby Ness	45						◆												
20	1	Golf Course Cliffs	45.5																◆		
	2	North Cliff	45.9															◆			
	3	Peasholm Cliff	46.15															◆			
	4	Clarence Gardens	47.05															◆			
	1	The Holms	47.35															◆			
	2	Castle Cliff	48.15																		
	1	Spa Chalet Cliff	48.4																◆		
	2	Spa Cliff	48.6															◆			
	3	Prince of Wales Cliff	48.75																◆		
	4	South Cliff Gardens	48.95																◆		
	5	Rose Gardens	49.1																◆		
	6	South Bay Pool Cliff	49.3																◆		
	7	Holbeck Gardens	49.5																◆		
	8	Holbeck Cliff	49.65																	◆	

APPENDIX 5

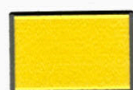
UNPROTECTED MARITIME CLIFF AND SLOPE HABITATS

Table A. 5 Strategic Coastal Monitoring - Scarborough to Staithes: Unprotected Maritime Cliff and Slope Habitats

Management Unit	Cliff Reference Number	Cliff Name	Maritime Cliff and Slope Habitat					Mode of Habitat Change		
			Maritime Crevices and Ledge	Maritime Grassland	Maritime Heath	Maritime Scrub	Mature Woodland	Habitat Retreat: No Net Loss	Progressive Habitat Change	Habitat Erosion and Degradation: Net Loss
4	3	Penny Steel	◆	◆				◆		
5	1	Jet Wyke Cliffs	◆					◆		
6	1	Green Swan Cliffs		◆				◆	◆	
	2	Twixt Hill		◆		◆		◆	◆	
	3	Port Mulgrave Cliffs		◆				◆	◆	
	4	Rosedale Wyke Cliff		◆		◆		◆	◆	
	5	Rosedale Cliff		◆		◆		◆	◆	
	6	Lingrow Cliffs		◆		◆		◆		
	7	Wrack Hills		◆		◆		◆	◆	
	8	Cauldron Cliff		◆				◆		
7	3	Dother Pits		◆			◆			◆
	4	Randy Bell End				◆		◆		
8	1	Whitestones Cliff		◆				◆		
	2	Catbeck Hill		◆		◆		◆	◆	
	3	Ketleness Sand		◆				◆		
	4	Ketleness Farm		◆				◆		
	5	Kettle Ness	◆	◆						◆
	6	Lucky Dogs Point	◆	◆				◆		
	7	Seavybog Hill		◆		◆	◆			◆
	8	Ovalgate Cliff		◆						
	9	Loop Wyke Cliff		◆				◆		
	10	Tellgreen Hill		◆		◆		◆	◆	
	11	Keldhowe Cliff	◆	◆				◆		
	12	Overdale Wyke	◆	◆				◆		
	13	Stonecliff End		◆		◆		◆	◆	
	14	Sandsend Ness		◆		◆				◆
	15	Sandsend Cliff		◆		◆	◆			◆
10	1	Whitby Golf Course (W)		◆				◆		
	2	Whitby Golf Course (E)		◆				◆		
12	2	Abbey Cliff	◆	◆				◆		
13	1	East Cliff	◆	◆				◆		
	2	Saltwick Nab	◆	◆				◆	◆	
	3	Saltwick Hole Cliff		◆					◆	
	4	Saltwick Cliffs	◆	◆				◆		
	5	Black Nab	◆	◆				◆		
	6	Whitestone Point	◆	◆				◆		
14	1	Widdy Head	◆	◆		◆		◆		
15	1	Pursglove Styx Cliffs	◆	◆				◆		
	2	Far Jetticks	◆	◆				◆		
	3	Bulmer Steel Cliffs	◆	◆				◆		
	4	Old Lance Cliff		◆		◆		◆		
16	1	Dungeon Hole Cliff		◆		◆				◆
17	2	Cowfield Hill Cliff		◆		◆		◆	◆	
	3	Farsyde Cliff		◆		◆		◆	◆	
	4	Tinker's Stone		◆		◆	◆	◆	◆	
	5	Stoupe Beck Cliffs		◆		◆	◆	◆		◆
	6	Miller's Nab		◆		◆		◆		
	7	Low Peak Cliff		◆		◆		◆		
	8	Wine Haven W		◆		◆		◆		
		Wine Haven E		◆		◆		◆		
	9	The Coomb		◆						◆
18	1	Fox Cliff		◆		◆	◆			◆
	2	Common Cliff		◆		◆	◆			◆
	3	Rigg Hall Cliff		◆		◆				◆
	4	Herbert Hole Cliff		◆		◆		◆		◆
19	1	Hayburn Wyke				◆	◆			◆
	2	Little Cliff		◆		◆	◆			◆
	3	Sycarham Wood Cliffs		◆		◆				
	4	Salt Pans Cliff		◆		◆		◆		
	5	Hundale Cliffs		◆		◆		◆		
	6	Horse Back Cliff		◆		◆		◆		
	7	Crook Ness Cliffs		◆		◆		◆		
	8	Cowlam Cliffs		◆		◆		◆		
	9	Scalby Cliffs		◆		◆		◆		
	10	Scalby Ness		◆		◆		◆		
	11			◆		◆		◆		

FIGURES

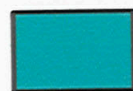
LEGEND



P1

CLIFF UNIT TYPE

Rockcliff



P2

Rock Slope Complex



P3

Composite Cliff



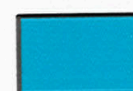
P4

Pre-existing Rock Slope Landslide



P5

Pre-existing Till Landslide



P6

Till Cliff



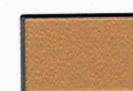
U1

Actively Retreating Rockcliff



U2

Actively Retreating Till-capped Rockcliff



U3

Unstable Rock Slope Landslide Complex



U4

Actively Retreating Composite Cliff



U5

Actively Retreating Till Cliff



U6

Unstable Undercliff



U7

Unstable Till Slope



AW

Alum Workings

Strategic Coastal Monitoring

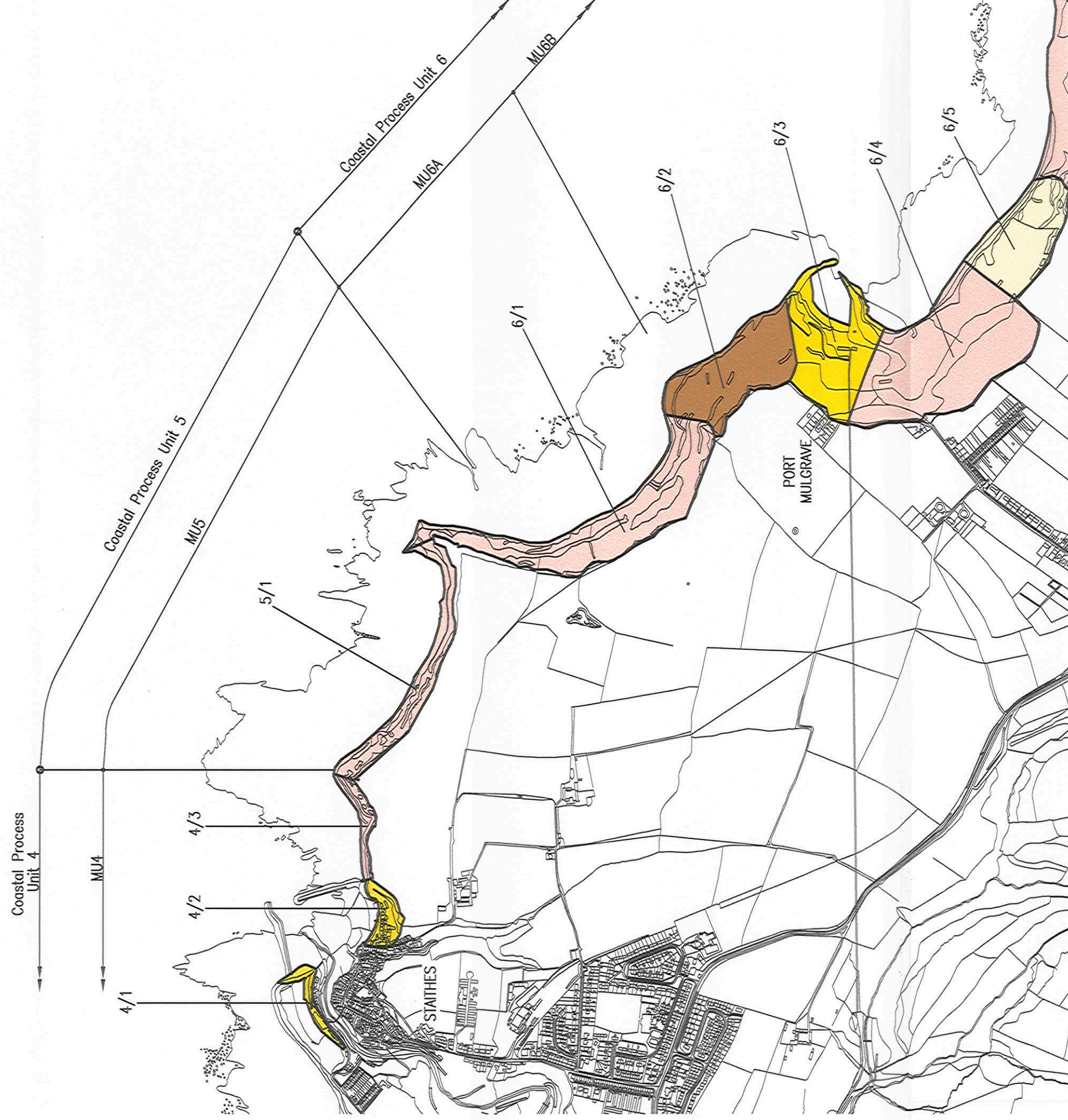
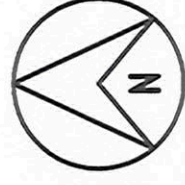
LEGEND

Figure No. 1

High-Point Rendel

Scale n/a

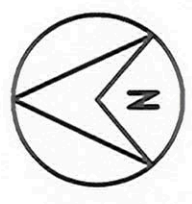
High-Point
Rendel



NOTE. For cliff unit types refer to Figure 1 – Legend.

Strategic Coastal Monitoring	
Cliff Units 4/1 to 6/5	
Staithes - Port Mulgrave	
Figure No. 2	High-Point Rendel
Scale 1:1000	High-Point Rendel





NOTE. For cliff unit types refer to Figure 1 – Legend.

Strategic Coastal Monitoring

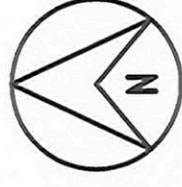
Cliff Units 6/6 to 8/1
Runswick Bay

Figure No. 3

High-Point Rendel

Scale 1:1000



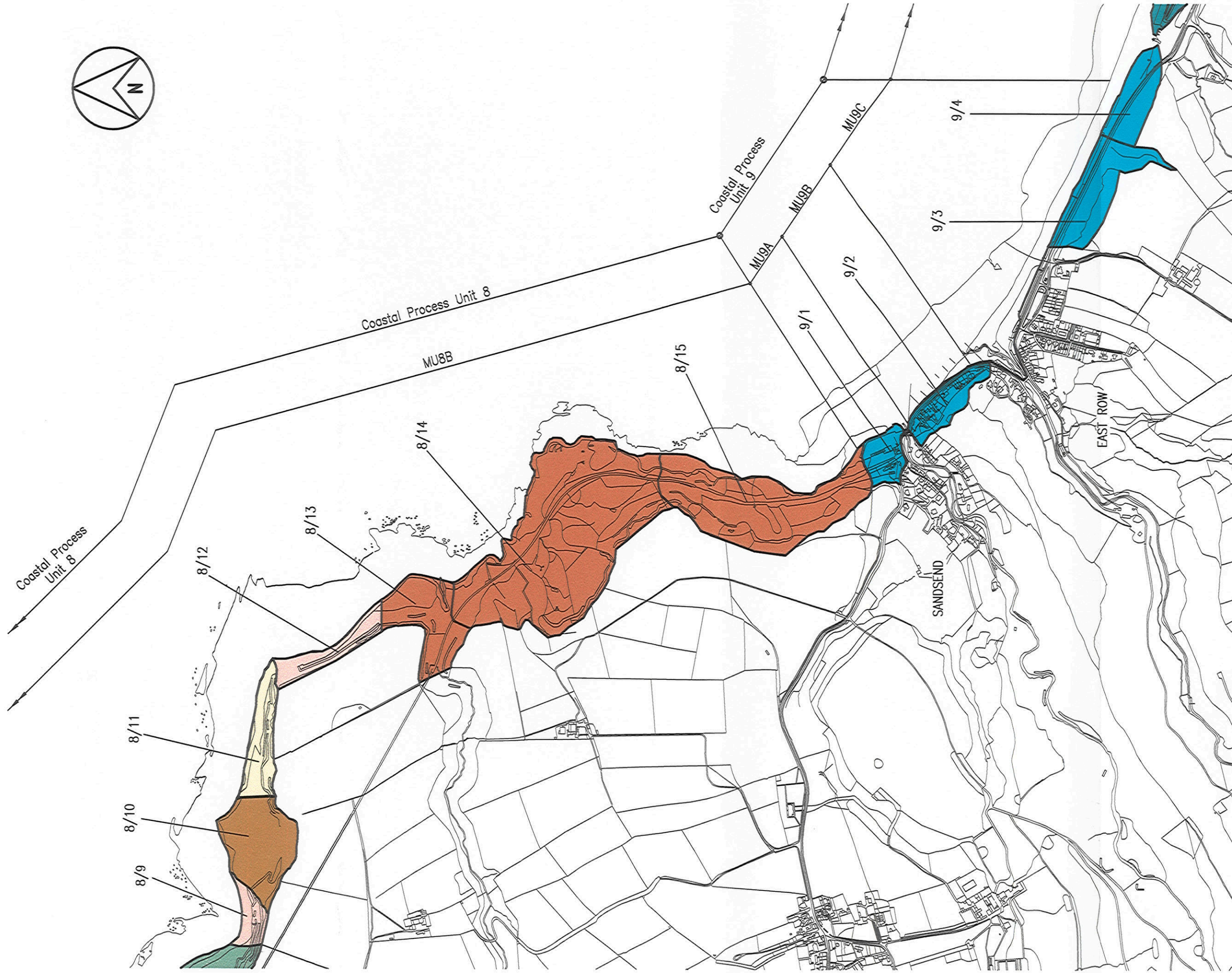


NOTE. For cliff unit types refer to Figure 1 – Legend.



ORIGINAL SCALE 1:1000

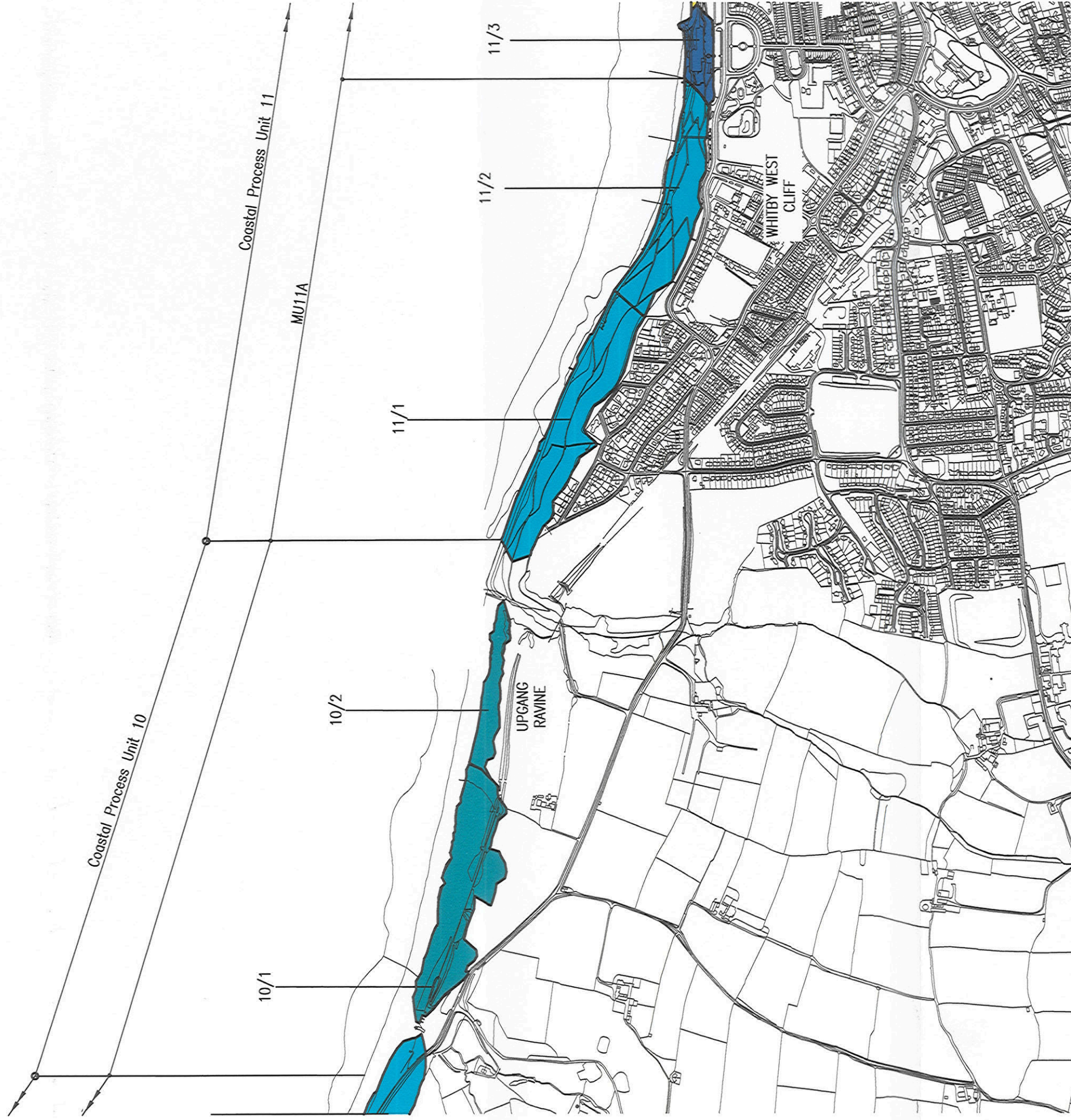
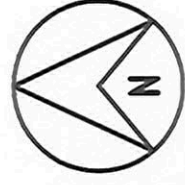
Strategic Coastal Monitoring		
Cliff Units 8/2 to 8/9 Kettleess		
Figure No. 4	High-Point Rendel	
Scale 1:1000		



NOTE. For cliff unit types refer to Figure 1 – Legend.



Strategic Coastal Monitoring	
Cliff Units 8/9 to 9/4 Kettleness - East Row	
Figure No. 5	High-Point Rendel
Scale 1:1000	High-Point Rendel

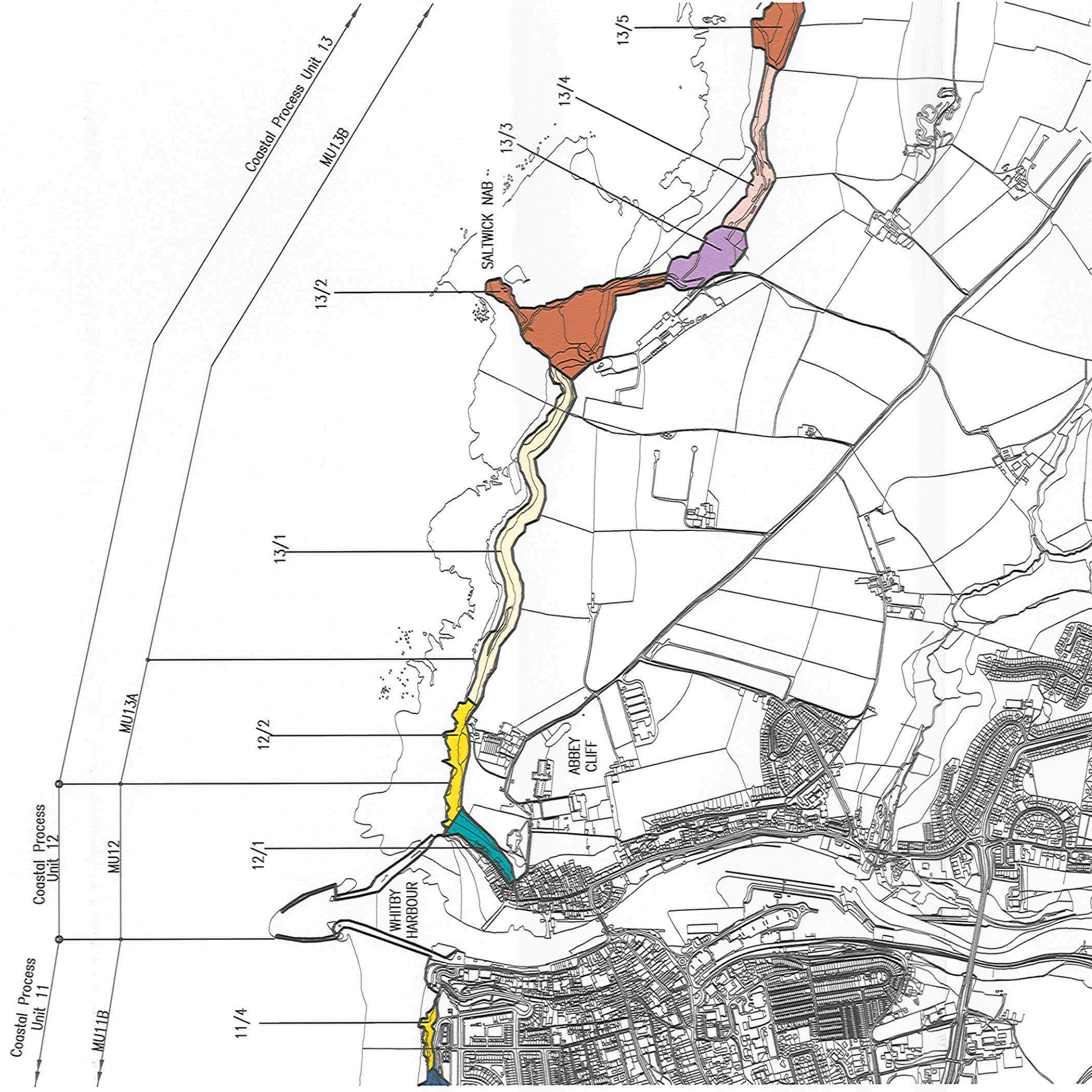
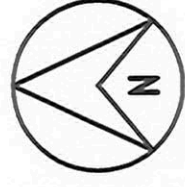


NOTE. For cliff unit types refer to Figure 1 – Legend.



Strategic Coastal Monitoring	
Cliff Units 10/1 to 11/3 West Cliff - Whitby	
Figure No. 6	High-Point Rendel
Scale 1:1000	



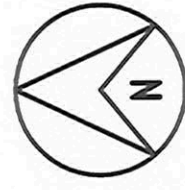


NOTE. For cliff unit types refer to Figure 1 – Legend.



ORIGINAL SCALE 1:1000

Strategic Coastal Monitoring	
Cliff Units 11/4 to 13/4	
Whitby - Saltwick	
Figure No. 7	High-Point Rendel
Scale 1:1000	High-Point Rendel

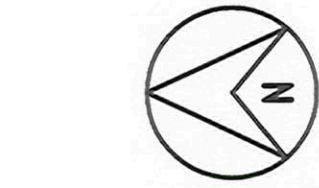


NOTE. For cliff unit types refer to Figure 1 – Legend.



ORIGINAL SCALE 1:1000

Strategic Coastal Monitoring	
Cliff Units 13/5 to 14/1	
Whitestone Point - Hawsker Bottoms	
Figure No. 8	High-Point Rendel
Scale 1:1000	High-Point Rendel



NOTE: For cliff unit types refer to Figure 1 – Legend.



ORIGINAL SCALE 1:1000

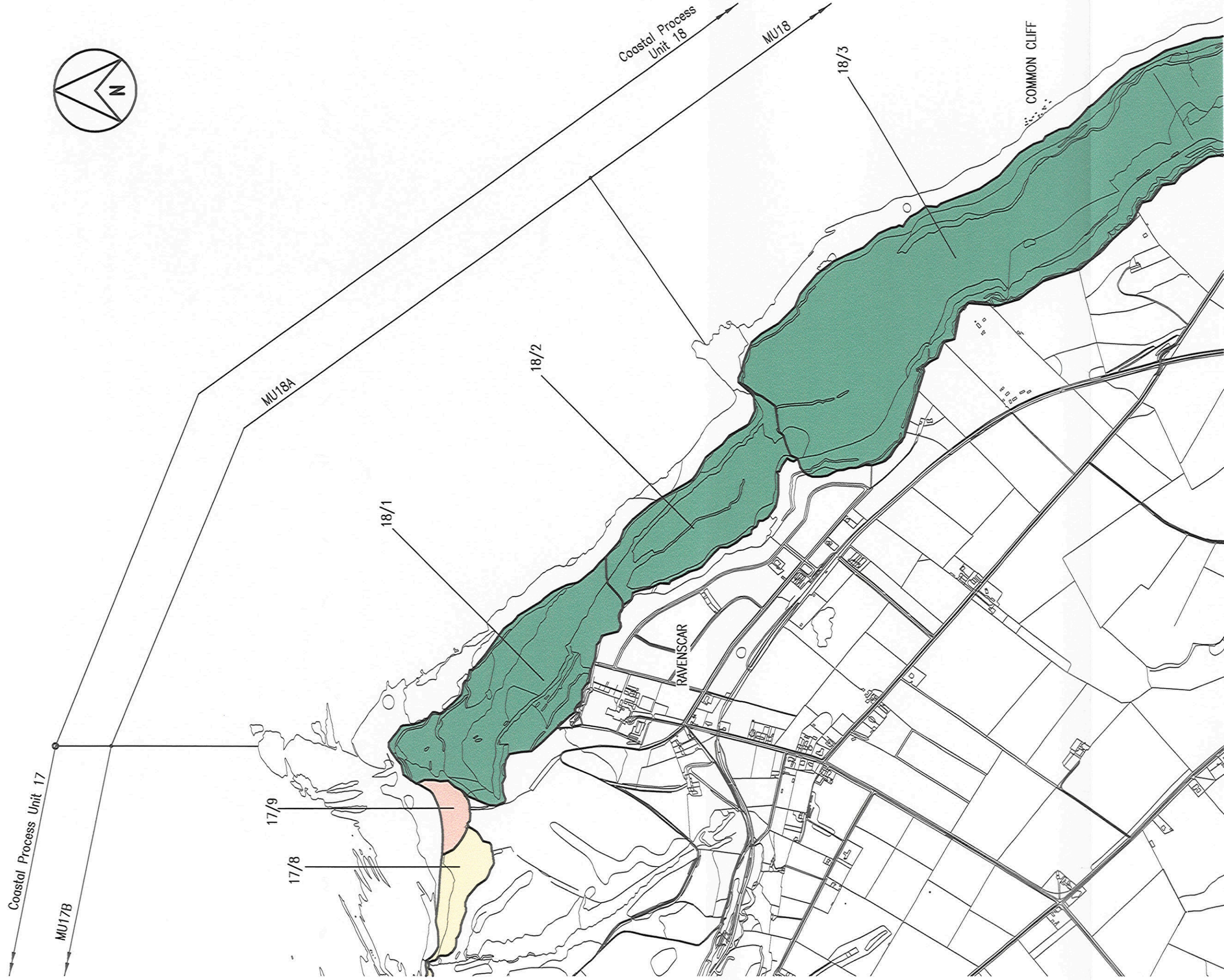
Strategic Coastal Monitoring	
Cliff Units 15/1 to 15/4	
White Stone Hole - Robin Hood's Bay	
Figure No. 9	High-Point Rendel
Scale 1:1000	



NOTE. For cliff unit types refer to Figure 1 – Legend.

Strategic Coastal Monitoring	
Cliff Units 16/1 to 17/7	
Robin Hood's Bay - Stoupe Beck Sands	
Figure No. 10	High-Point Rendel
Scale 1:1000	





NOTE. For cliff type units refer to Figure 1 – Legend.



ORIGINAL SCALE 1:1000

Strategic Coastal Monitoring	
Cliff Units 17/8 to 18/3 Ravenscar	
Figure No. 11	High-Point Rendel High-Point Rendel
Scale 1:1000	



NOTE. For cliff unit types refer to Figure 1 – Legend.

Strategic Coastal Monitoring	
Cliff Units 18/3 to 18/4	
Common Cliff	
Figure No. 12	High-Point Rendel
Scale 1:1000	High-Point Rendel





NOTE. For cliff unit types refer to Figure 1 – Legend.



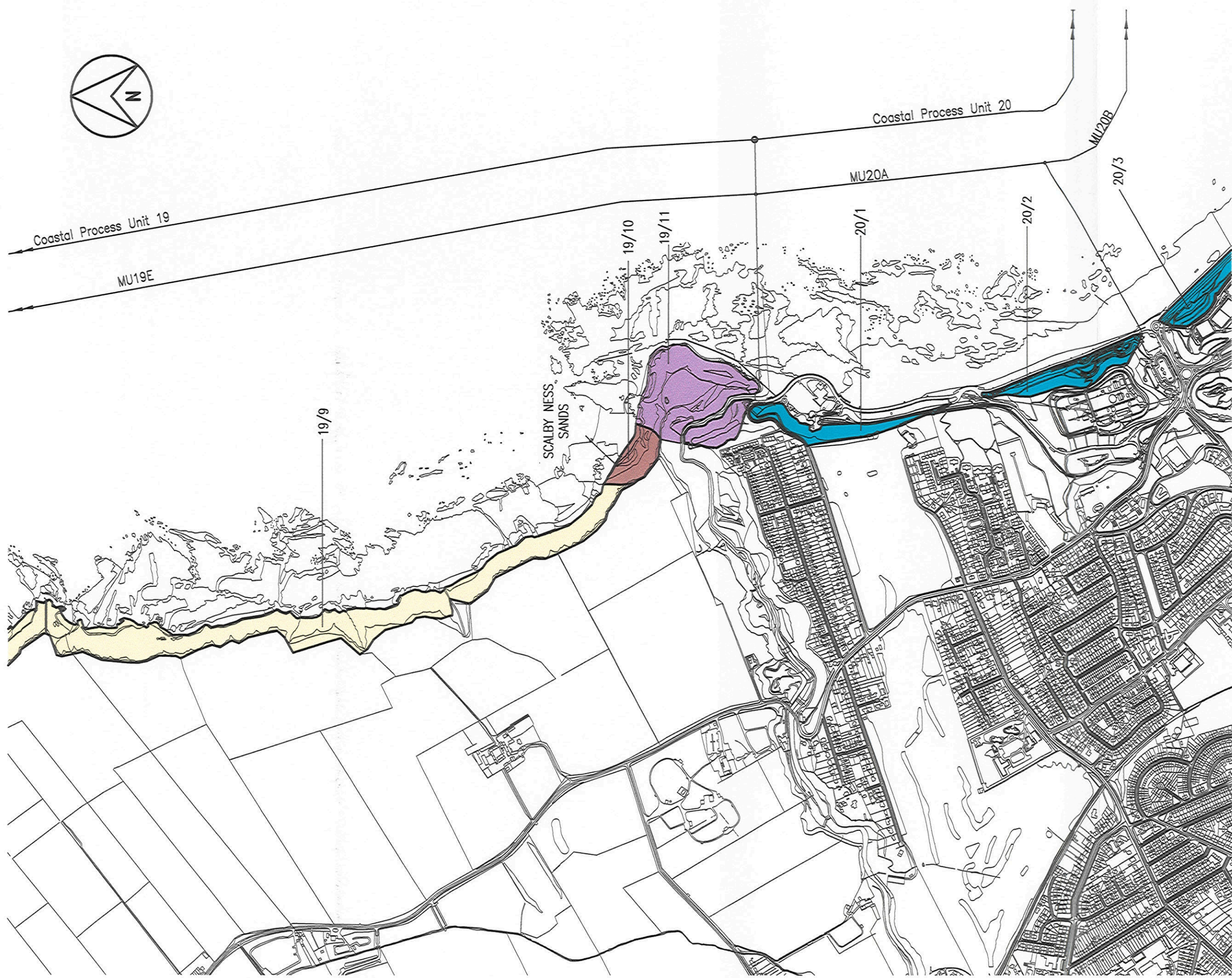
Strategic Coastal Monitoring		
Cliff Units 19/1 to 19/4 Hayburn Wyke		
Figure No. 13	High-Point Rendel	
Scale 1:1000	<div> <div></div> <div>High-Point Rendel</div> </div>	



NOTE. For cliff unit types refer to Figure 1 – Legend.

Strategic Coastal Monitoring	
Cliff Units 19/5 to 19/8	
Cloughton Wyke - Crook Ness	
Figure No. 14	High-Point Rendel
Scale 1:1000	High-Point Rendel





NOTE. For cliff unit types refer to Figure 1 – Legend.



Strategic Coastal Monitoring	
Cliff Units 19/9 to 20/2 Scalby Ness	
Figure No. 15	High-Point Rendel High-Point Rendel
Scale 1:1000	



NOTE. For cliff unit types refer to Figure 1 – Legend.



ORIGINAL SCALE 1:1000