Haycock & Jay Associates Ltd

CONSULTANT ECOLOGISTS

Lebberston Cliff

Maritime Cliff and Slope Vegetation Survey

Submitted to:

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July 2013 NEY019

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1.0 SUMMARY AND INTRODUCTION

1.1 Haycock and Jay Associates Ltd was commissioned in June 2013 to undertake NVC Survey of Lebberston Cliff, Scarborough.

1.2 NVC survey was carried out on 17th June 2013. Parts of the survey area could not be accessed due to the steepness and instability of the slopes, and remote survey techniques were used such as viewing from a safe distance with binoculars, use of Aerial Photography and satellite images.

1.3 For each community a description is recorded followed by a species list for that community, and quadrat data gathered during the survey where appropriate. The extent of each vegetation community is mapped on Figure 1 and tabulated below. A full species list for all plants encountered during the survey of the site is recorded at Appendix 1.

1.4 Where communities were encountered in intimate mosaic, these areas have been recorded on Figure 1 as 'Mosaic' along with a label indicating which communities are present. Each mosaic is also labelled with a letter from A to Q. The percentage of each community in each labelled mosaic area is recorded in Appendix 2.

1.5 NVC Communities present in the survey area;

NVC Community	**Area (Ha)**
CG2c *Festuca ovina – Helictotrichon pratense* grassland; *Holcus lanatus – Trifolium repens* sub-community	1.36
MC8f *Festuca rubra – Armeria maritima* grassland; *Anthyllis vulneraria* sub-community	1.99
MG1b *Arrhenatherum elatius* grassland; *Urtica dioica* sub-community	1.83
MG5b *Cynosurus cristatus – Centaurea nigra* grassland *Galium verum* sub community	2.28
M22b *Juncus subnodulosus – Cirsium palustre* fen-meadow *Briza media – Trifolium spp* sub community	0.25
MG11b *Festuca rubra – Agrostis stolonifera – Potentilla anserina* grassland, *Atriplex prostrata* sub-community	1.62
MG12a – *Festuca arundinacea* grassland *Lolium perenne – Holcus lanatus* sub-community	0.04
OV25 *Urtica dioica – Cirsium arvense* community	0.15
OV26 *Epilobium hirsutum* community	0.18
OV27 *Chamerion angustifolium* community	0.02
Bracken (U20a *Pteridium aquilinum – Galium saxatile* community *Anthoxanthum odoratum* sub-community)	0.41
Continuous scrub	0.15

NVC Community	Area (Ha)
Bare ground	0.47

1.6 MC4 *Brassica oleracea* maritime cliff-ledge community may have been present on the hard cliffs where sea birds nest on High Red Cliff, however, it was not possible to get close enough to confirm species growing here due to breeding birds present and the precipitous nature of the approach.

2.0 METHODOLOGY

2.1 National Vegetation Classification Survey

2.1.1 NVC survey was undertaken on 17th June 2013 by Gordon Haycock BSc (Hons), MCIEEM, CEnv, The method used for this survey followed the approach for National Vegetation Classification (NVC) survey as described by Rodwell et al (1992) and Rodwell (2006). This allows the vegetation communities identified to be classified in accordance with the accounts published in British Plant Communities (Rodwell et al 1991 et seq).

2.1.2 An initial walkover survey was undertaken across the site to determine variation in the vegetation over the whole site and delimit homogenous stands.

2.1.3 For each homogenous stand of vegetation identified, up to ten vegetation samples were taken by laying out a 2 x 2m quadrat to record the abundance and frequency of all species of flora present. The number of quadrats taken for each homogenous stand was dependent on the extent of the stand, and the variation within it. Small stands of homogenous vegetation had fewer quadrat samples than large stands where the flora was more variable.

2.1.4 Within each quadrat/sample, all species of vascular plant and bryophytes (mosses and liverworts) were identified and for each species the percentage cover of the quadrat was estimated. In addition, a full species list for each community was made including species not featuring in the quadrats, and an indication of abundance throughout the community recorded using the DAFOR scale. Each species was classified as either Dominant, Abundant, Frequent, Occasional or Rare for the community.

2.1.5 The figure for percentage cover for each species in each quadrat was recorded as a DOMIN value. DOMIN values are as follows;

Cover (%)	**DOMIN**
91 -100	10
76-90	9
51-75	8
34-50	7
26-33	6
11-25	5
4-10	4
<4 with many individuals	3
<4 with several individuals	2
<4 with few individuals	1

2.1.6 Following field survey and for the purposes of assigning a community in the NVC, the frequency of each species in each homogenous stand was calculated where:

I = 1-20% of quadrats
II = 21-40%
III = 41-60%
IV = 61-80%
V = 81-100%

2.1.7 Finally, the NVC community type was determined by comparing the results of the field survey, using both keys and the experience of the field surveyors, with the published accounts and floristic tables given in British Plant Communities (Rodwell et al 1991 et seq).

2.1.8 The community description provides a discussion of how the floristic features compare to the standard vegetation community descriptions and highlights the unique character of vegetation communities at this site.

2.2 Limitations

2.2.1 Access to steep and/or loose areas of cliff face were not carried out during these surveys due to the risk to Health and Safety posed. However, where safe access was possible steep cliff faces were viewed from the top/bottom.

3.0 NVC COMMUNITY DESCRIPTIONS

3.1 Rationale for Community Descriptions

3.1.1 The National Vegetation Classification (NVC) sets out to represent identifiable communities at various points in the phyto-sociological continuum. In the introduction to Maritime Cliff Communities (Rodwell 2000), it is stated that eastern, and in particular soft cliffs, were not extensively sampled, and this vegetation is not comprehensively characterised at present. Indeed sampling from the Yorkshire east coast appears not to have taken place at all. Consequently the communities encountered do not generally accord with those described in Rodwell.

3.1.2 Recognising this, the communities represented in this Section are described in terms of analogous communities appearing in the NVC literature. These are the headings and labels given to the community, but practitioners must remain aware that whilst those NVC codes have been assigned, the communities we are dealing with differ in important ways from those described in Rodwell. This is particularly important when considering the mapped information.

3.1.3 An example would be MC8f *Festuca rubra – Armeria maritima* maritime grassland *Anthyllis vulneraria* sub-community. Whilst the grassland recorded clearly has most affinity with this NVC community, *Armeria maritima* was not recorded. Consequently the label on the map has the power to mislead unless considered in conjunction with the community descriptions in this report.

3.1.4 Community descriptions are offered below for each sub-community encountered based on quadrat data collected.

3.2 Community; CG2c *Festuca ovina – Helictotrichon pratense* grassland; *Holcus lanatus – Trifolium repens* sub-community

3.2.1 Whilst neither sheep's fescue nor meadow oat-grass were recorded during the survey, community constants are well represented including quaking grass, glaucous sedge, mouse-ear hawkweed, rough hawkbit, fairy flax, bird's-foot trefoil and ribwort plantain. Sheep's fescue is replaced throughout by red fescue.

3.2.2 The replacement of sheep's fescue by red fescue, and the relative abundance of Yorkshire fog accompanied by creeping bent, yellow oat-grass and a range of calcicolous bryophytes indicate that this community is best described in terms of its affinity with CG2c *Holcus lanatus – Trifolium repens* sub-community. The local abundance of false brome is also indicative of this sub-community.

3.2.3 Maritime species are represented by sea plantain, and the proximity and exposure to the sea indicate that this should be regarded as para-maritime grassland with some affinity to grassland on magnesian limestone outcrops on the Durham Coast.

3.2.4 CG2c occurs in abundance on exposed, steep, free-draining slopes below north and east facing hard cliffs where the substrate is largely stable (Photograph 3). These stands are considered to be of high nature conservation value as the sward is flower-rich with common milkwort, lady's bedstraw, kidney vetch, devil's-bit scabious and common twayblade. Of note is the occurrence of early purple orchid which is more reminiscent of northern calcareous grasslands. There is also sporadic abundance of bryophytes reflecting the aspect of these cliffs.

3.2.5 CG2c is also represented in actively eroding areas (e.g. Mosaics E and P) where it occurs in intimate mosaic with other grassland types. A dynamic grassland community occurs at TA0805984150 where calcareous grassland, neutral grassland and newly forming maritime communities alternate due to incremental slippage (Photograph 4).

3.2.6 Considerable areas of species-rich CG2c were recorded at Lebberston Cliff, and the community appears to be in a stable state with no imminent threats.

3.2.7 The following species were recorded in CG2c during this study;

Species	Common name	DAFOR
Festuca rubra	Red fescue	A / LD
Lotus corniculatus	Bird's-foot trefoil	A / LD
Leontodon hispidus	Rough hawkbit	A
Agrostis stolonifera	Creeping bent	LA
Brachypodium sylvaticum	False brome	LA
Rhytidiadelphus triquetrus	Big shaggy-moss	LA
Scleropodium purum	Neat feather-moss	LA
Carex flacca	Glaucous sedge	F / LA
Centaurea nigra	Black knapweed	F
Dactylis glomerata	Cock's foot	F
Dactylorhiza fuchsii	Common spotted orchid	F
Heracleum sphondylium	Common hogweed	F
Holcus lanatus	Yorkshire fog	F
Plantago media	Hoary plantain	F
Primula veris	Cowslip	F
Trifolium pratense	Red clover	F
Tussilago farfara	Colt's foot	F
Anthyllis vulneraria	Kidney vetch	LF
Briza media	Quaking grass	LF
Carlina vulgaris	Carline thistle	LF
Ctenidium molluscum	Comb moss	LF
Hypochaeris radicata	Cat's-ear	LF
Homalothecium lutescens	Yellow feather-moss	LF
Pilosella officinarum	Mouse-ear hawkweed	LF
Plantago maritima	Sea plantain	LF
Listera ovata	Common twayblade	LF
Campylium stellatum	Yellow starry feather-moss	LF
Anthoxanthum odoratum	Sweet vernal-grass	O / LF
Calliergonella cuspidata	Pointed spear-moss	vLF
Ononis repens	Common restharrow	vLF
Helictotrichon pubescens	Rough oat-grass	vLF
Agrimonia eupatoria	Agrimony	O
Dactylorhiza praetermissa	Southern marsh orchid	O
Equisetum arvense	Field horsetail	O
Bellis perennis	Daisy	O
Linum catharticum	Fairy flax	O
Ononis repens	Common restharrow	O
Orchis mascula	Early purple orchid	O
Plantago lanceolata	Ribwort plantain	O
Rubus fruticosus	Bramble	O
Succisa pratensis	Devil's-bit scabious	O
Trisetum flavescens	Yellow oat-grass	O
Campanula rotundifolia	Harebell	R
Cerastium fontanum	Common mouse-ear	R
Deschampsia cespitosa	Tufted hair-grass	R
Galium verum	Lady's bedstraw	R
Polygala vulgaris	Common milkwort	R

Species	Common name	DAFOR
Senecio erucifolius	Hoary ragwort	R
Senecio jacobaea	Common ragwort	R
Viola reichenbachiana	Early dog-violet	R
Leontodon autumnalis	Autumn hawkbit	R

3.2.8 The following quadrat data was recorded for CG2c;

Species	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Freq	Abun-dance
Quadrat location - OS Grid TA	08017 84142	08016 84143	08058 84152	08067 84148	08317 84227	08391 84150	08407 83902	07476 84035	07864 84068	07879 84073	07936 84077		
Sward height (cm)	25	20	15	15	20	15	20	12	15	12	15		
Festuca rubra	7	8	7	5	4	4	5	4	7	7	4	V	(4-8)
Lotus corniculatus	4	4	4	3	7		5	4	3	4		V	(3-7)
Carex flacca	2	3	2	2	4	3	3	8		3	2	V	(2-8)
Leontodon hispidus			2	2	3	2	3	3	2	3	2	V	(2-3)
Centaurea nigra	3		1	3	2	3	2	2	2	2	3	V	(1-3)
Brachypodium sylvaticum	3	2	4	3		4			3	3		IV	(2-4)
Plantago lanceolata	2	1		2	1			3	3	3	2	IV	(1-3)
Plantago media	2	1	1				2	2		3	2	IV	(1-3)
Scleropodium purum	5	3							3	5	3	III	(3-5)
Dactylis glomerata	2	3	2	2		2	2					III	(2-3)
Carlina vulgaris			2	2		1			2	1	1	III	(1-2)
Heracleum sphondylium	2			1	1				1		1	III	(1-2)
Primula veris	1			2				1	2		1	III	(1-2)
Trifolium pratense		2			1	2		1		2		III	(1-2)
Tussilago farfara			2	1	2	1			2		2	III	(1-2)
Dactylorhiza fuchsii				1	1		2			1		II	(1-2)
Holcus lanatus	2	1			2						2	II	(1-2)
Rhytidiadelphus triquetrus	6								5	6	5	II	(5-6)
Agrostis stolonifera					4	4					6	II	(4-6)
Ctenidium molluscum		4	4					4			4	II	(4_)
Homalothecium lutescens				5	4						3	II	(3-5)
Briza media	4		3	3								II	(3-4)
Linum catharticum			2			3	3					II	(2-3)
Pilosella officinarum			2	3						3		II	(2-3)
Plantago maritima		1	4					3		1		II	(1-4)
Succisa pratensis	2	2		1						1		II	(1-2)
Calliergonella cuspidata										4		I	(4_)
Anthoxanthum odoratum				4		2						I	(2-4)
Trisetum flavescens							2					I	(2_)
Rubus fruticosus									1			I	(1_)
Senecio erucifolius				1								I	(1_)
Helictotrichon pubescens				5								I	(5_)
Campylium stellatum								4				I	(4_)
Anthyllis vulneraria						2					3	I	(2-3)
Polygala vulgaris			3	2								I	(2-3)
Cerastium fontanum							2					I	(2_)
Galium verum				2								I	(2_)
Hypochaeris radicata									2			I	(2_)
Leontodon autumnalis									2			I	(2_)
Orchis mascula	2	2										I	(2_)
Listera ovata										2		I	(2_)
Equisetum arvense						2	1					I	(1-2)

Species	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Freq	Abun-dance
Campanula rotundifolia				1								I	(1_)
Bellis perennis		1										I	(1_)
Dactylorhiza praetermissa							1					I	(1_)
Ononis repens				1								I	(1_)
Deschampsia cespitosa						1						I	(1_)
Senecio jacobaea									1			I	(1_)

3.3 Community: MC8f *Festuca rubra – Armeria maritima* grassland; *Anthyllis vulneraria* sub-community

3.3.1 A maritime cliff grassland community, MC8f is found on soft cliffs where slopes are partially stabilised and is the natural succession from MG11 colonisation grassland, consequently creeping bent can form a significant part of the graminoid element. Dominated by red fescue, the sub-community preferential kidney vetch was recorded, often in abundance, at this site. Colt's-foot and creeping bent are not dominant in this community, however, the latter can appear to have significant coverage in late summer. Southern marsh orchid was preferential in this community as were other soft cliff colonising species such as hay rattle.

3.3.2 In common with the MC8 recorded by Milliken and Pendry (2002), no thrift was recorded during these surveys, suggesting that on further analysis this community may well be recognised as a distinct community of Yorkshire's east coast.

3.3.3 On Lebberston Cliff this maritime grassland community supports a suite of calcicoles including hoary plantain, carline thistle, cowslip, mouse-ear hawkweed and false brome as well as calcicolous bryophytes such as yellow feather-moss, variable crisp-moss and comb moss. It is likely that some stands of MC8f have been derived from CG2 grassland as turfs move down-slope into situations more exposed to salt spray, the incremental movement allowing gaps for kidney vetch and sea plantain to colonise.

3.3.4 This community can form quite a dense sward of red fescue with little bare ground over time, and appears to stabilise even very steep soft slopes allowing the bryophyte flora to flourish. Where flushing is apparent, there is a transition community featuring MC8f constants mingling with grass-of-Parnassus and glaucous sedge.

3.3.5 The community often forms as a sere in succession following erosion of soft cliff, however, it was also encountered below hard north-facing cliffs forming large stands on steep slopes (Photograph 2). In this case eroding turves from higher up the slope supporting either MG5 or CG2 are 'passing through' creating a mosaic of maritime and para-maritime grassland.

3.3.6 Due to its open character this community forms a niche for 'soft cliff species', ie those species capable of sustainably colonising bare ground as it forms on the soft cliff slope. Soft cliff species are not dependent on input from vegetation communities at the top of the cliff, and consequently are less under threat from simplification of vegetation communities adjacent to the cliff due to agricultural intensification.

3.3.7 The following species were recorded in MC8f;

Species	Common name	DAFOR
Festuca rubra	Red fescue	D
Leontodon hispidus	Rough hawkbit	A
Anthyllis vulneraria	Kidney vetch	F / LA
Agrostis stolonifera	Creeping bent	F
Centaurea nigra	Black knapweed	F
Plantago lanceolata	Ribwort plantain	F
Tussilago farfara	Colt's foot	F
Homalothecium lutescens	Yellow feather-moss	LF
Pilosella officinarum	Mouse-ear hawkweed	LF
Plantago maritima	Sea plantain	LF
Plantago media	Hoary plantain	LF
Scleropodium purum	Neath feather-moss	LF
Calliergon cuspidata	Pointed spear-moss	vLF
Carex flacca	Glaucous sedge	O
Carlina vulgaris	Carline thistle	O
Dactylis glomerata	Cock's-foot	O
Dactylorhiza praetermissa	Southern marsh orchid	O
Equisetum arvense	Field horsetail	O
Holcus lanatus	Yorkshire fog	O
Leontodon autumnalis	Autumn hawkbit	O
Lotus corniculatus	Bird's foot trefoil	O
Rhytidiadelphus triquetrus	Big shaggy-moss	O
Trifolium pratense	Red clover	O
Trichostomum brachydontium	Variable crisp-moss	O
Brachypodium sylvaticum	False brome	R
Pedicularis sylvatica	Lousewort	R
Ctenidium molluscum	Comb moss	R
Heracleum sphondylium	Hogweed	R
Lathyrus pratensis	Meadow vetchling	R
Primula veris	Cowslip	R
Rhinanthus minor	Hay rattle	R
Rubus fruticosus agg.	Bramble	R

3.3.8 The following quadrat data was recorded for MC8f;

Species	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Frequency	Abundance
Quadrat location - OS Grid TA	07427 84054	07970 84089	08015 84102	08152 84137	08392 83987	07635 84020	07847 84058	07839 84042		
Sward height (cm)	10	7	5	12	20	10	14	15		
Festuca rubra	7	4	4	6	6	5	8	8	V	(4-8)
Leontodon hispidus	2	3	3		2	4	4	3	V	(2-4)
Anthyllis vulneraria	4	3	1	5	4	1	5	4	V	(1-5)
Centaurea nigra	2	2	3		1	1	2	3	V	(1-3)
Agrostis stolonifera	3	4	3	4	4	5			IV	(3-5)
Pilosella officinarum	3	3	3					3	III	(3_)
Plantago lanceolata				1	2	3	3		III	(1-3)
Tussilago farfara				2	1	2	2		III	(1-2)
Homalothecium lutescens						4	3		II	(3-4)
Lotus corniculatus							3	4	II	(3-4)
Plantago maritima	4			3					II	(3-4)
Scleropodium purum						3	4	4	II	(3-4)
Holcus lanatus							2	4	II	(2-4)
Rhytidiadelphus triquetrus						2		4	II	(2-4)
Plantago media	2	3	3						II	(2-3)
Trichostomum brachydontium			3	2					II	(2-3)
Carex flacca	2		2						II	(2_)
Carlina vulgaris		2	2						II	(2_)
Leontodon autumnalis							2	2	II	(2_)
Trifolium pratense	1			2	3				II	(1-3)
Dactylis glomerata					2			1	II	(1-2)
Dactylorhiza praetermissa			2		1			1	II	(1-2)
Equisetum arvense				1	2				II	(1-2)
Rhinanthus minor		2		1					II	(1-2)
Rubus fruticosus agg.								1	I	(1_)
Calliergonella cuspidata						7			I	(7_)
Ctenidium molluscum							3		I	(3_)
Lathyrus pratensis					3				I	(3_)
Primula veris		3							I	(3_)
Brachypodium sylvaticum			2						I	(2_)
Pedicularis sylvatica					2				I	(2_)
Heracleum sphondylium					1				I	(1_)

3.4 Community: MG1b *Arrhenatherum elatius* grassland; *Urtica dioica* sub-community

3.4.1 This community is dominated by coarse grasses including false oat-grass and cock's foot, however, red fescue is locally prominent. There is much evidence of eutrophication throughout, probably as a result of fertiliser drift from adjacent farmland (or via nutrient rich run-off), and the community is characterised by locally abundant common nettle and creeping thistle. This combination of species is consistent with the description for MG1b in Rodwell 1992.

3.4.2 Stands of MG1 at this site are unmanaged, with neither grazing nor cutting, and a tussocky sward usually develops.

3.4.3 The community develops throughout the site on the fertile, moisture retentive clay soils, predominantly on the cliff top where maritime influence is minimal. MG1b also occurs sporadically in sheltered locations where spray deposition is limited on soft cliff slope.

3.4.4 Scattered scrub often accompanies MG1b and can be viewed as seral succession to continuous scrub and ultimately woodland.

3.4.5 In fields abutting Red Cliff Point a broad strip of unmanaged grassland has been created at the cliff top which is now dominated by MG1.

3.4.6 The following species were recorded in MG1b grassland;

Species	Common name	DAFOR
Arrhenatherum elatius	False oat-grass	D
Urtica dioica	Common nettle	F / LD
Festuca rubra	Red fescue	F / LA
Anthriscus sylvestris	Cow parsley	F
Dactylis glomerata	Cock's foot	F
Heracleum sphondylium	Common hogweed	F
Holcus lanatus	Yorkshire fog	F
Rumex acetosa	Common sorrel	F
Centaurea nigra	Black knapweed	LF
Galium aparine	Goose grass	LF
Ranunculus repens	Creeping buttercup	LF
Cirsium arvense	Creeping thistle	O
Cirsium vulgare	Spear thistle	O
Potentilla reptans	Creeping cinquefoil	O
Taraxacum officinale agg	Dandelion	O
Tussilago farfara	Colt's foot	O

Species	Common name	DAFOR
Deschampsia cespitosa	Tufted hair-grass	R

3.5 Community: MG5b *Cynosurus cristatus – Centaurea nigra* grassland *Galium verum* sub community

3.5.1 This community is distributed throughout the site on both the cliff top (in limited areas) and developing on the soft cliff as para-maritime grassland, in particular where soils have stabilised for some time and are well-drained. A degree of exposure to salt spray appears to be tolerated, and the community dominates much stabilised soft-cliff eastern half of the survey area on clayey soils. Where active erosion is occurring, MG5b occurs in mosaic with MG11 (e.g. Mosaics B, F, I and M).

3.5.2 Community constants for MG5 are well represented with common bent, sweet vernal grass, black knapweed, , red fescue, Yorkshire fog, bird's-foot trefoil and ribwort plantain. White clover is also present sporadically.

3.5.3 Whilst dominated by red fescue and , false oat-grass is also present locally, although usually represented by poorly grown individuals. Characteristically in these mesotrophic grasslands of soft cliffs in Yorkshire, false brome is often a prominent component of the sward.

3.5.4 Creeping bent is preferential in small quantities locally, reflecting the mobile nature of the substrate on which this community sometimes occurs, creeping bent colonising cracks and crevices. Where erosion becomes more marked a mosaic of MG5b and MG11b emerges (e.g. Mosaic F illustrated in Photograph 6).

3.5.5 Forbs are represented by consistent appearance of lady's bedstraw, ribwort plantain, black knapweed, rough hawkbit and hoary plantain indicating influence of base-rich sub-soils. This character is further exemplified with the appearance of bird's-foot trefoil, yellow feather-moss and common twayblade (e.g. at TA0811284130 and TA0797584088). Additionally yellow oat-grass, creeping bent, and yarrow are preferential suggesting strong affinity with MG5b *Galium verum* sub-community.

3.5.6 Ruderal species common on soft cliffs at this site include field horse-tail and colt's-foot. These are prominent where disturbance due to erosion is marked. These opportunities for colonisation may well form a focus for invasive non-native species in the future.

3.5.7 In the medium to long term, persistence of species-rich MG5b on the soft cliff resource on Low Red Cliff is dependent on maintenance of species-rich MG5 grassland at the top of the eroding slope. Management of cliff top grasslands to reduce dominance of coarse grasses and promote species-rich sward are recommended. This includes creation of wide buffer strips (to reduce eutrophication) and grazing. Re-seeding with locally sourced wildflower seed or strewing of green hay

from local species rich grasslands should also be considered; however, reduction in soil fertility would be key to success.

3.5.8 The following species were recorded in MG5b grassland;

Species	Common name	DAFOR
Festuca rubra	Red fescue	A
Achillea millefolium	Yarrow	F
Centaurea nigra	Black knapweed	F
Dactylis glomerata	Cock's foot	F
Equisetum arvense	Field horsetail	F
Galium verum	Lady's bedstraw	F
Heracleum sphondylium	Common hogweed	F
Plantago lanceolata	Ribwort plantain	F
Plantago media	Hoary plantain	F
Tussilago farfara	Colt's foot	F
Arrhenatherum elatius	False oat grass	LF
Kindbergia praelonga	Common feather-moss	LF
Leontodon hispidus	Rough hawkbit	O / LF
Homalothecium lutescens	Yellow feather-moss	vLF
Agrimonia eupatoria	Agrimony	O
Agrostis capillaris	Common bent	O
Agrostis stolonifera	Creeping bent	O
Anthyllis vulneraria	Kidney vetch	O
Anthoxanthum odoratum	Sweet vernal grass	O
Brachypodium sylvaticum	False brome	O
Brachythecium rutabulum	Rough-stalked feather-moss	O
Cerastium fontanum	Common mouse-ear	O
Cirsium arvense	Creeping thistle	O
Cirsium palustre	Marsh thistle	O
Dactylorhiza fuchsii	Common spotted orchid	O
Festuca arundinacea	Tall fescue	O
Holcus lanatus	Yorkshire fog	O
Hypnum lacunosum	Great plait-moss	O
Lathyrus pratensis	Meadow vetchling	O
Lotus corniculatus	Bird's foot trefoil	O
Scleropodium purum	Neat feather-moss	O
Rhinanthus minor	Hay rattle	O
Rumex acetosa	Common sorrel	O
Senecio erucifolius	Hoary ragwort	O
Trisetum flavescens	Yellow oat-grass	O
Veronica chamaedrys	Germander speedwell	O
Vicia sepium	Bush vetch	O
Myosotis arvensis	Field forget-me-not	O
Primula veris	Cowslip	O
Tragopogon pratensis agg.	Goat's-beard	O
Briza media	Quaking grass	O
Listera ovata	Common twayblade	O
Lophocolea bidentata	Bifid crestwort	O
Orchis mascula	Early-purple orchid	O

Species	Common name	DAFOR
Ononis repens	Common restharrow	R
Potentilla erecta	Tormentil	R
Potentilla reptans	Creeping cinquefoil	R
Senecio jacobaea	Common ragwort	R
Serratula tinctoria	Saw-wort	R
Trifolium repens	White clover	R
Vicia cracca	Bush vetch	R
Bromus hordeaceus	Soft brome	R
Rumex crispus	Curled dock	R
Ranunculus acris	Meadow buttercup	R
Pedicularis sylvatica	Common lousewort	R
Sonchus asper	Prickly sowthistle	R

3.5.9 The following quadrat data was recorded for MG5b grassland;

Species	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Frequency	Abundance
Quadrat location - OS Grid TA	07946 84072	07470 84028	07840 84045	07888 84078	08121 84126	08152 84153	08361 84146		
Sward height (cm)	25	20	30	25	30	20	25		
Festuca rubra	8	7	5	7	9	7	8	V	(5-9)
Heracleum sphondylium	5	4	3	4	2	1	3	V	(1-5)
Centaurea nigra	1	3	3	4	2	2		V	(1-4)
Plantago lanceolata	3	3	3	3	1	2		V	(1-3)
Dactylis glomerata		3	2		2	2	3	IV	(2-3)
Galium verum	2	2		2		2	3	IV	(2-3)
Kindbergia praelonga	7	4		4				III	(4-7)
Arrhenatherum elatius		2	6	3				III	(2-6)
Tussilago farfara		3	4		2	2		III	(2-4)
Achillea millefolium	3	2		3			2	III	(2-3)
Equisetum arvense		2			2	2	2	III	(2_)
Plantago media	2	2		2		2		III	(2_)
Leontodon hispidus	2				1	3	1	III	(1-3)
Cirsium palustre			2	2	2	1		III	(1-2)
Lathyrus pratensis	2	3						II	(2-3)
Scleropodium purum	4			4				II	(4_)
Lotus corniculatus		3				4		II	(3-4)
Homalothecium lutescens	3						4	II	(3-4)
Lophocolea bidentata	3	3						II	(3_)
Holcus lanatus				2			3	II	(2-3)
Cirsium arvense		2			2			II	(2_)
Trisetum flavescens				1			4	II	(1-4)
Senecio erucifolius			1	2				II	(1-2)
Dactylorhiza fuchsii						1	1	II	(1_)
Anthoxanthum odoratum						3		I	(3_)
Brachypodium sylvaticum					2			I	(2_)
Brachythecium rutabulum		2						I	(2_)
Orchis mascula							2	I	(2_)
Festuca arundinacea					2			I	(2_)
Listera ovata					2			I	(2_)
Ranunculus acris					2			I	(2_)
Ononis repens					1			I	(1_)
Primula veris				1				I	(1_)
Pedicularis sylvatica							1	I	(1_)
Senecio jacobaea			1					I	(1_)
Vicia cracca							1	I	(1_)
Sonchus asper				1				I	(1_)
Tragopogon pratensis agg.					1			I	(1_)

3.6 Community: M22 *Juncus subnodulosus – Cirsium palustre* fen-meadow *Briza media – Trifolium sp* sub community

3.6.1 Whilst clearly not fen meadow, the suite of species encountered in this community appear to have most affinity with M22, although generally dominated by soft rush or hard rush rather than blunt-flowered rush. Community constants marsh thistle, Yorkshire fog and pointed spear-moss are present. The generally base rich substrate promotes the growth of grass-of-Parnassus, quaking grass, carnation sedge and devil's-bit scabious. With hard rush preferential and the combination of associates listed, it is considered that the community has most affinity with M22b.

3.6.2 Of particular note is the occurrence of Common cotton-grass and marsh valerian in a substantial M22 wetland at TA0822884179 (Photograph 1).

3.6.3 Calcicolous and wetland bryophytes are well represented where the sward is more open with variable crisp-moss, endive pellia and river feather-moss in evidence.

3.6.4 M22b forms typically on poorly drained, clay soils. On soft cliff slopes hard and compact rush occur as dominants, in various places accompanied by Yorkshire fog and enlivened by ruderal species typical of the soft slopes, including common fleabane, colt's-foot and field horsetail.

3.6.5 This rather variable community is characteristic of soft cliffs on Yorkshire's east coast, and is worthy of conservation effort and further study.

3.6.6 The community is threatened by eutrophication of incoming water from arable land which promotes exuberant growth of great willowherb and / or common nettle and replacement of M22 by OV25 and OV26.

3.6.7 The following species were recorded in M22b;

Species	Common name	DAFOR
Juncus effusus	Soft rush	LD
Equisetum arvense	Field horsetail	A / LD
Calliergonella cuspidata	Pointed spear-moss	A
Carex flacca	Glaucous sedge	A
Pulicaria dysenterica	Common fleabane	A
Pellia endiviifolia	Endive pellia	LA
Pedicularis sylvatica	Lousewort	LA
Brachythecium rivulare	River feather-moss	F
Cirsium palustre	Marsh thistle	F
Tussilago farfara	Colt's foot	F
Epilobium hirsutum	Great willowherb	LF
Rumex obtusifolius	Broad-leaved dock	LF
Juncus inflexus	Hard rush	O / LF

Species	Common name	DAFOR
Triglochin palustre	Marsh arrowgrass	vLF
Holcus lanatus	Yorkshire fog	O
Juncus articulatus	Jointed rush	O
Parnassia palustris	Grass-of-Parnassus	O
Typha latifolia	Common bulrush	O
Heracleum sphondylium	Hogweed	O
Cirsium vulgare	Spear thistle	O
Urtica dioica	Common nettle	O
Ranunculus repens	Creeping buttercup	O
Persicaria amphibia	Amphibious bistort	O
Briza media	Quaking grass	O
Trichostomum brachydontium	Variable crisp-moss	O
Agrostis stolonifera	Creeping bent	R
Carex panicea	Carnation sedge	R
Centaurea nigra	Black knapweed	R
Geranium robertianum	Herb robert	R
Valeriana dioica	Marsh valerian	R
Eriophorum angustifolium	Common cotton-grass	R
Succisa pratensis	Devil's-bit scabious	R

3.7 Community: MG11b *Festuca rubra – Agrostis stolonifera – Potentilla anserina* grassland, *Atriplex prostrata* sub-community

3.7.1 The community present on eroding cliffs of this survey area has affinities with MG11 as described in Rodwell (1992), however, whilst the floristics are similar, the habitat is quite different. MG11 generally forms on areas of poorly vegetated mud, inundated occasionally by brackish water. Here the community is forming on bare mud, and the maritime influence comes from salt spray rather than direct inundation.

3.7.2 Although invariably present, red fescue is less abundant in MG11 on this site than the description in Rodwell suggests, which is likely due to the derivation of the community reflecting the instability of the substrate. The community present is considered to have most affinity with MG11b *Atriplex prostrata* sub-community, however, maritime species are rarely prominent.

3.7.3 MG11 is widespread throughout the site where soft cliffs occur, particularly where active erosion is taking place exposing large areas of bare soil and subsoil (e.g. Photographs 4 and 5). At a distance, areas with this community can look like bare ground. On closer inspection a thinly distributed grassland community is apparent, with creeping bent straggling across the surface colonising bare ground. This grass is frequently joined by colt's-foot which can be abundant in some stands, both species colonising vegetatively.

3.7.4 The following species were recorded in MG11b;

Species	Common name	DAFOR
Agrostis stolonifera	Creeping bent grass	A
Tussilago farfara	Colt's foot	F
Equisetum arvense	Field horsetail	O / vLF
Festuca rubra	Red fescue	O
Senecio erucifolius	Hoary ragwort	O
Rhinanthus minor	Yellow rattle	O
Anthyllis vulneraria	Kidney vetch	O
Plantago lanceolata	Ribwort plantain	O
Cirsium arvense	Creeping thistle	O
Lathyrus pratensis	Meadow vetchling	O
Taraxacum officinale agg	Dandelion	R
Cirsium palustre	Marsh thistle	R

3.8 Community: MG12a – *Festuca arundinacea* grassland *Lolium perenne – Holcus lanatus* sub-community

3.8.1 This para-maritime grassland community develops on moist but free-draining soils on coastal soft cliffs, and is characteristic of the Yorkshire coast. However, in the survey area very little was recorded.

3.8.2 In the one stand recorded, the community is dominated by tussocks of tall fescue, a community constant for MG12, with false oat-grass. Yorkshire fog is also present. Forbs are represented by marsh thistle and hoary ragwort, with common lousewort. This combination of associates is consistent with MG12a *Lolium perenne – Holcus lanatus* sub-community.

3.8.3 Ruderal species are present, with field horsetail prominent.

3.8.4 The following species were recorded in MG12a;

Species	Common name	DAFOR
Festuca arundinacea	Tall fescue	D
Cirsium palustre	Marsh thistle	F
Dactylis glomerata	Cock's foot	F
Equisetum arvense	Field horsetail	F
Pedicularis sylvatica	Common lousewort	F
Holcus lanatus	Yorkshire fog	O
Arrhenatherum elatius	False oat-grass	O
Cirsium arvense	Creeping thistle	O
Heracleum sphondylium	Hogweed	O
Juncus inflexus	Hard rush	O
Senecio erucifolius	Hoary ragwort	O

3.9 Open Habitat Communities: OV25 *Urtica dioica – Cirsium arvense* community, OV26 *Epilobium hirsutum* community and OV27 *Chamerion angustifolium* community

3.9.1 Dominated by great willowherb, OV26 forms often in species-poor stands, where moist but well-aerated soils occur in the soft cliff matrix and on watercourses. Stands on the soft cliff occur on a slight slope and in areas that accumulate freshwater run-off. The community often abuts M22 mire. Hard rush and common nettle may accompany this species, but few other associates are common.

3.9.2 Common nettle is usually overwhelmingly dominant in OV25 which has a restricted distribution on Lebberston Cliff. One large stand was recorded where it appears eutrophication has occurred possibly due to land drains exposed on the cliff slope.

3.9.3 OV25 was also recorded on the cliff top where eutrophication has occurred due to fertiliser drift.

3.9.4 Rose-bay willowherb is scarce in the study area, however, stands dominated by this species were encountered on the cliff top, probably associated with tipped material.

3.9.5 The following species were recorded in OV26;

Species	Common name	DAFOR
Epilobium hirsutum	Great willowherb	D
Equisetum arvense	Field horsetail	F / LA
Juncus inflexus	Hard rush	A
Urtica dioica	Common nettle	F
Dactylis glomerata		F
Pulicaria dysenterica	Common fleabane	F
Cirsium palustre	Marsh thistle	F
Cirsium arvense	Creeping thistle	F
Rubus fruticosus agg	Bramble	O
Galium palustre	Marsh bedstraw	R

3.10 Community: Bracken and Scrub

3.10.1 Scrub was recorded where it occurs. Scrub consists mainly of blackthorn (W22) with hawthorn (W21) and European gorse (W23) also present in limited areas.

3.10.2 Bracken occupies much of the low ground below High Red Cliff forming a substantial area on deep, well drained soils. Blackthorn is also present here, and it is likely that the area will become continuous scrub over time.

3.10.3 Gorse and blackthorn are apparent in the east of the site where soft cliffs overlook Gristhorpe Sands. Here scrub threatens species-rich calcareous grassland. However, the dynamic nature of erosion processes here suggest that grassland loss due to scrub encroachment is unlikely to be a major threat in the long term.

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FIGURE

FIGURE 1
NVC SURVEY

APPENDICES

APPENDIX 1

FULL SPECIES LIST

APPENDIX 2

NVC VEGETATION MOSAICS

APPENDIX 3

PHOTOGRAPHS