



Haycock & Jay Associates Ltd

CONSULTANT ECOLOGISTS

**Cayton, Cornelian and South Bays
Site of Special Scientific Interest**

**Condition Monitoring of the Vegetated Sea
Cliff Feature**

VOLUME 1: REPORT

Submitted to:

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1.0 SUMMARY

1.1 Survey and findings

- 1.2 Haycock and Jay Associates Ltd was commissioned to undertake survey and assessment on behalf of Natural England in order to inform Condition Monitoring of Cayton Bay SSSI. The resulting assessment using the National Vegetation Classification (NVC) survey and standard habitat assessment protocol, meeting the standard set by JNCC in Common Standards Monitoring guidance for Maritime Cliff and Slope, will provide the Natural England Project Officer with robust and verifiable data to inform condition assessment of the SSSI Units studied.
- 1.3 The surveys were undertaken in the weeks beginning 23rd August and 6th September 2010, and on 29th September 2010. The surveys included mapping NVC habitats on the vegetated areas and Phase 1 Habitat Survey of unvegetated areas of Units 1, 2 and 4 of the SSSI. Target notes were made of habitat features too small to map, anthropogenic influences on the site and other findings of relevance. Photographs were taken of key habitat types and processes taking place on the site. Parts of Unit 4 could not be accessed due to the steepness and instability of the slopes.
- 1.4 A large number of vegetation communities were recorded, mainly comprising a range of neutral, calcareous and acid grasslands, native broadleaved woodland including wet woodland and native scrub communities. Small areas of mire, swamp, salt marsh and strandline communities, acid heath and ruderals were also encountered. A complex interplay of factors were found to be influencing both the grassland and woodland vegetation communities on the site. These include soils and underlying geology, aspect and slope and drainage. The major influence is the dynamic nature of the soft cliffs which are slipping and eroding both at slow and fast pace in different parts of the site. The degree of maritime influence was found to small, though present on some more exposed slopes.
- 1.5 On the seaward side of the site, the base of both the soft and hard cliffs were found to be subject to rapid erosion due to wave action along most of the length of the site, with the tide reaching the base of the cliffs between half and high tide. Apart from the northern end of Unit 4, which is bounded by a concrete sea wall, only limited sections of sea protection are present. While sand predominates on the beach of Unit 2, wave cut platform with rocks and boulders are characteristic of the remainder of the intertidal zone, with large areas vegetated with brown algal beds, particularly towards the low tide mark.

1.6 The main anthropogenic factor affecting the site is considered to be invasive non-native plants, derived from garden waste. Though these do not currently dominate most parts of the site, a cultivated ox-eye daisy variety is predominant in an area of slope towards the southern end of Unit 2. Other species including montbretia, buddlea, cotoneaster and shrub honeysuckle are found scattered through the site. Other more minor impacts include informal paths through parts of the site, though none are heavily used; and the presence of fire sites within the woodland, at the back of the beach and beside the cliff top path, associated with them evidence of damage to living trees, presumably for firewood; The use of dead wood can also be assumed.

1.7 Assessment of the survey methodology

1.7.1 The survey methodology was found to be sound and the level of detail and sampling frequency considered commensurate with that required to accurately record the vegetation communities present. The aerial photographs were invaluable for indicating the extent of some communities.

1.7.2 For the vegetated soft cliff areas, due to the dynamic nature of the soils, future survey should aim to record the extent of vegetation communities with the characteristics of those recorded on this occasion rather than attempt to record the same communities in the same places. An exception to this may be woodland, however, even here wet woodland is dynamic and forms in response to minor slumps and depressions.

1.7.3 The Maritime NVC acknowledges under-sampling of soft cliffs in Yorkshire; consequently although the communities recorded can be described in terms of their affinities with analogous NVC communities, there is clearly a body of work to be undertaken in order to adequately describe the communities in definitive terms for soft cliffs of the east coast. This would be an excellent topic for a botany PhD.

1.8 Recommendations for future survey

1.8.1 Regular re-survey the site every three years to ensure changes in this highly dynamic system are detected and can be managed in good time.

1.8.2 It is important that future surveyors have access to the full report with community descriptions, as the NVC codes on their own would prove misleading (see limitation 9.1.4, above).

- 1.8.3 As erosion is dynamic, future transects should aim to match the vegetation sequences identified, rather than adhere rigidly to the points at which transects were undertaken on this occasion.

1.9 Management recommendations

- 1.9.1 For favourable condition to be met, it is recommended that the extent of each community should be broadly maintained.
- 1.9.2 It is recommended that invasive non-native plant species are controlled, and where feasible, eradicated.
- 1.9.3 Cliff top habitat should be monitored carefully with a programme of managed retreat ahead of actual erosion to allow the vegetation to take on characteristics of the current cliff top prior to the vegetation joining the eroding soft cliff melee. In order to achieve this it is recommended that the SSSI boundary be reviewed to ensure at least 30m from the cliff top is taken out of arable or intensive pastoral management, and allowed to form grassland and scrub. This unmanaged grassland and scrub will then form the basis of the slope vegetation rather than a uniform, intensively managed grassland sward or arable soils with high nutrient content and little vegetation.

2.0 INTRODUCTION

- 2.1 Haycock and Jay Associates Ltd was commissioned to undertake survey and assessment on behalf of Natural England in order to inform Condition Monitoring of Cayton Bay SSSI. The resulting assessment using the National Vegetation Classification (NVC) survey and standard habitat assessment protocol meeting the standard set by JNCC in Common Standards Monitoring guidance for Maritime Cliff and Slope will provide the Natural England Project Officer with robust and verifiable data to inform condition assessment of the SSSI Units studied.
- 2.2 No previous equivalent surveys have been conducted, and these surveys will provide a baseline for future monitoring.
- 2.3 The surveys were undertaken on 23rd, 24th, 25th and 26th August and 7th, 8th and 29th September 2010.

3.0 METHODOLOGY

- 3.1 The attributes for assessment set out in the JNCC CSM Guidance for Maritime Cliff and Slope are extent, geomorphological naturalness and vegetation structure, along with monitoring of indicators of local distinctiveness. Surveys and assessment were undertaken to ensure targets for the relevant attributes are thoroughly assessed in 5 stages (as outlined in the tender document); these are detailed below.

Stage 1

- 3.2 This was performed across Units 1, 2 and 4. Recent aerial photographs provided by Natural England were reviewed to assess the boundaries between habitat types on site. An estimation of extent was made for habitats on the maritime cliff and slope feature and also the littoral rock/sediment. This were then be used as a base map for ground truthing on site. Available geological information for the intertidal areas was found on the MAGIC web site; no geological information on the remainder of the site was supplied to determine the boundaries between the hard and soft cliff areas; this was subsequently validated against the vegetation on site.

Stage 2

- 3.3 The boundaries between the hard and soft cliff areas were mapped. Each polygon was then sub-divided to delineate the habitat definitions for hard or soft

cliffs. Vegetation sequences were mapped where possible. On cliff tops, vegetation change due to spray gradients was recorded with reference to the influence of edaphic factors, soil variation and stock grazing. The vegetation types on the cliff slopes associated with different geologies, soil variability and successional stage were described. Where gradation was developed these sequences have been highlighted, even if they did not lie within the SSSI boundary.

- 3.4 Land use factors and amenity use were recorded in target notes with information taken from evidence on the ground. Aspect, slope and soil variables were recorded as target notes where relevant, along with features such as flushes, stream outflows, pools/ salt pans, old embankments, shingle/sand ridges, rock armour and other coastal protection.

Stage 3

- 3.4.1 Sub-habitats were mapped using Phase 1 habitat and MNCR biotope codes for unvegetated ground. For vegetated ground, surveys were to NVC standards, but with some modification for very active soft cliffs where complex early succession mosaics occur in very close proximity. The field methodology outlined in Rodwell et al (2000) was followed, and the relevant chapters of the NVC provided the framework for most of the community definitions. A decision on the mapping effort for very dynamic systems was made on a site-by-site basis. Where community dynamics are key to the attribute being assessed survey effort was intensified as necessary.
- 3.4.2 The National Vegetation Classification (NVC) sets out to represent identifiable communities at various points in the phytosociological 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 consequently 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.
- 3.4.3 Recognising this, the communities represented 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.

Stage 4

- 3.5 Sufficient quadrats were recorded as appropriate for each community/sub-community, with a minimum of 5 being taken for the site. Sampling intensity reflected community complexity and extent, with particular emphasis on restricted communities of high conservation interest and where significant changes in land management were apparent.
- 3.6 Each quadrat sample was numbered and the location marked on the vegetation map, noted using a site name, GPS location, and documented on a standard NVC recording form/ in an Excel spreadsheet. A suitable quadrat size was used for each NVC survey, with 2x2m quadrats used except for woodland canopy where 50x50m quadrat size was employed. Following the standard methodology, cover abundance within quadrats of every taxon of vascular plant, bryophyte, lichen was recorded using the Domin scale, along with detail of layered communities where these occur. A complete list of vascular plant species encountered in each vegetation community was listed and assigned a measure of frequency/cover using the DAFOR scale. Scarce and rare plants encountered were target noted along with an indication of their abundance.

Stage 5

- 3.7 A transect based study was undertaken, assessing the zonation patterns typical of the site. In order to facilitate re-visiting of these transects to assess change over time, the position of each transect was recorded using GPS.
- 3.8 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).
- 3.9 An initial walkover survey was undertaken across the site to determine variation in the vegetation over the whole site and delimit homogenous stands.
- 3.10 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. Where the sward was short and species densely packed, a 1m x 1m quadrat was used. 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.

3.11 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.

3.12 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

3.13 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%

3.14 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).

- 3.15 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.

Limitations

- 3.16 Whilst much of the cliff resource could be accessed in Units 1 and 2, the nature of the substrate, extreme steepness and the presence of a substantial drop down to the sea made access of some areas in Unit 4 inaccessible. Where views into inaccessible parts were possible, this has been used to map vegetation. Where no view point could be found and no reliable description of vegetation made, then these areas have been recorded as Inaccessible.

4.0 NVC SURVEY RESULTS – SITE DESCRIPTION

- 4.1 Cayton, Cornelian and South Bays SSSI is situated on the east coast of North Yorkshire centred on National Grid Reference TA 065855. The site forms part of the soft cliff complex of the east coast of Yorkshire and is geologically diverse. In summary, there are a series of faults bringing argillaceous Upper Jurassic rocks to the surface, overlain with more resistant sandstones. These in turn are capped by a thick layer of variable glacial deposits comprising till inter-bedded with lenses of gravels and sands (Carey et al 2004). Two major landslide systems have been identified at Cayton Bay, however, the system is complex and unpredictable.
- 4.2 The cliffs are important for their assemblage of invertebrates, and the early vegetation which develops in these unstable habitats is a critical resource for invertebrates providing both pollen and nectar for solitary bees and wasps, and important food for weevils and other phytophagous insects (Howe 2003). Wetlands and flushes are also an important resource for a number of invertebrate species.
- 4.3 There is a complex inter-play of factors which have the potential to influence the development of vegetation communities at this site. The geomorphology of the coast is characterised by shallow scarps, benches and occasional back-tilted blocks creating a varied series of aspects and slopes. The aspect and degree of slope will affect the degree of insolation vegetation receives and the ability of the substrate to accept and retain moisture.
- 4.4 Soils reflect the geology and over-lying sediments and whilst glacial till appears to be circum-neutral to slightly basic in character, where sand and gravel forms the substrate or sandstones outcrop lenses of acidic soils are created, in particular where slopes have stabilised and leaching has taken place. These factors must then be considered with respect to the degree of exposure to maritime influences, both the degree to which salt spray influences the vegetation and the ability of the sea to ameliorate extreme temperature events.
- 4.5 While the east coast does not have a strong maritime influence, with prevailing winds tending to blow offshore, it was noted that exposure to strong winds, in particular through the winter, are a critical factor affecting plant communities at this site. It was apparent that exposure to winds from the north-east created a stronger maritime influence, with slopes facing south being most protected. Consequently aspect influenced vegetation markedly, with different communities observed to be thriving on two aspects of the same eroded spur on a number of occasions.

- 4.6 Flushes were found to be a feature of the site associated with seepages of groundwater. These seepages were often the focus of instability leading to a complex of vegetation forming; however, there were a number of examples where slopes are more stable and springs with associated flushes are well developed, with the flora reflecting the base-rich nature of the groundwater. There is a degree of overland flow from these flushes, which then accumulates on benches or against back tilted blocks, allowing wetlands to form.
- 4.7 To further complicate the picture, the cliffs are subject to erosion both from below (by the sea) and above (by direct precipitation and groundwater seepage). It should be noted that where erosion of the upper cliff has exposed land drains formerly in fields, these continue to discharge water and become the focus of erosion and wetland vegetation.
- 4.8 Unit 2 presented cliffs where active erosion both from below and above are a major force, and consequently substrates are more dynamic with frequent small slippages and slumps. Groundwater springs are present with associated flushes and wetlands.
- 4.9 In Unit 1 soils have clearly been stable for some time and woodland has developed. There is, however, evidence of recent slippage and catastrophic land slips, and clearly rotational slippage has been a feature of past erosion on this slope. Trunks of mature trees show the characteristic basal curve indicating slow soil creep over extended periods. Erosion is also taking place at the base of the cliff with signs of wet woodland being affected, in particular in the northern part of the Unit. The influence of field run-off was evident in the northern half of Unit 1.
- 4.10 Unit 4 presents a rather different cliff structure as the base of the cliffs are composed of relatively slow weathering sandstone. Consequently glacial till held above this is substantially subject only to erosion from above (i.e. precipitation and groundwater seepage). This has led to a form of slope which is inherently stable for longer periods, but with less frequent, catastrophic erosion events. Vegetation community development reflects this, and this cliff system has well-developed, bryophyte-rich calcareous springs and flushes.
- 4.11 Vegetation within the SSSI is largely unmanaged, although light grazing by cattle takes place in stabilised southern parts of Unit 1.
- 4.12 Unfortunately cliffs tend to attract garden waste, and there were a number of instances of garden waste disposal encountered during the survey (see Target Notes). This tipping of waste has the potential to introduce invasive non-native

species which have the ability to colonise and out-compete native species in the dynamic cliff slope environment where opportunities for colonisation are regular and widespread. Species present as the result of tipping included *Montbretia*, *Buddleia davidii* and a garden cultivar of ox-eye daisy, the latter dominating a considerable area in Unit 2.

- 4.13 Whilst active erosion on this coast is not a new phenomenon, it did appear that the limited stands of salt marsh community which exist are in danger of being squeezed into non-existence in the near future. Strandline communities featuring *Atriplex prostrata* and saltmarsh with *Elytrigia atherica* (SM24) were both recorded in small quantity in places which appeared precarious with no sign of inland colonisation. It is possible that this is a dynamic process, but indications from aerial photographs were that the areas occupied by SM24 appears to have reduced considerably.

5.0 COMMUNITY DESCRIPTIONS

5.1 Rationale for Community Descriptions

- 5.1.1 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 consequently 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.
- 5.1.2 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.
- 5.1.3 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 future conservation officers unless it is considered in conjunction with the community descriptions in this report.

5.2 Ecological processes and community development

- 5.2.1 Section 4 presents an overview of physical processes at the site through an ecologists eyes, elucidating a number of the more important factors likely to be affecting the nature of phyto-sociological relationships on this site.
- 5.2.2 This section sets out to give an overview of how these factors create the conditions for the variety of vegetation communities observed on the site, and is designed to give context to the subsequent descriptions.
- 5.2.3 In such dynamic situations, it must be accepted that the plant communities present are often derived due to geomorphological processes tempered by a suite of other physical factors, with communities representing opportunistic associations of plants dependent on the proximity of vegetative propagules,

seed sources and random events (including anthropogenic factors). Consequently communities are not readily described and pigeon-holed, and that it is the physical processes allowing the ecological opportunity for these communities to form which is key. The species present in each community will continue to depend on seed sources and vegetative propagules, and these will also need to be monitored and maintained.

- 5.2.4 Erosion was observed to be happening in two guises, catastrophic slope failure and incremental erosion. These two processes were happening in conjunction with each other and formed a continuum which geomorphologists could no doubt describe with more clarity. These are dealt with below based on observations during the survey. Clearly more in depth study would allow a more coherent picture to evolve.

Catastrophic slope failure

- 5.2.5 Catastrophic slope failure leads to mass movement of substrate and slumping. This creates large areas of nutrient and humus poor sub-soil usually with a bench of clayey, more fertile soils at the base. This contrast is increased as the 'bench' soils have the debris of the vegetation extant prior to slumping within it. This will rot rapidly and further increase the nutrient status of the soil. Colonisation of bare ground commences immediately in a number of ways, but dominated by vegetative reproduction from existing plants, and by seed. Clearly the former will be influenced by the vegetative structures capable of propagation remaining from the extant vegetation and the latter by the abundance of seed locally and time of year.
- 5.2.6 Observations during the surveys indicated that vegetative reproduction was the most important factor on the sub-soil slopes, favouring *Agrostis stolonifera* in particular, but also *Tussilago farfara* and *Pulicaria dysenterica* where these species are present, and deep rooted perennials such as *Equisetum arvense*. The latter was not as prevalent in these early successional communities, although the roots were often evident along with a few poorly grown specimens; it is considered likely that the low nutrient status of the soil was a factor in this. Larger plants would also survive as occasionals from the previous turf, with clumps of *Festuca rubra* and *Plantago lanceolata* often distributed sparsely within this community. Where these survived they would continue to grow, though growth was often poor. Seeding into this matrix was common, although only *Anthyllis vulneraria* was consistently present. Other species could be prominent depending on seed sources locally. Where maritime influences were high (i.e. north-east facing and proximal to the sea), *Plantago maritima* was present. The steepness of slope and poor substrate

makes establishment by seed challenging as seed is easily washed away, and the subsoil tends to be clayey and hostile to the establishment of young plants.

- 5.2.7 In contrast, the slumped material is nutrient rich, with abundant vegetative structures and seed germination opportunities. These areas showed rapid colonisation by deep rooted perennials extant in the former vegetation or growing through from the vegetation covered by the slump, such as *Equisetum arvense* and *Cirsium arvense*. It was notable that species not tolerant of maritime conditions which were prevalent in the cliff top communities (for example *Arrhenatherum elatius*) were absent or poorly grown where slumping carried their root stocks seaward. This appeared to allow species which are present but not prominent on the cliff top (e.g. *Festuca arundinacea*) to gain prominence. Once established the latter appears highly effective in maintaining prominence in the soft cliff community, with tussocks surviving and re-establishing in subsequent slippage events. In addition, seeds germinated readily, and these areas were typically characterised by well grown tall ruderal vegetation.
- 5.2.8 These large scale slumps appeared to favour the creation of more defined groundwater springs, and bryophyte-rich spring head communities rapidly develop along with associated flush vegetation beneath, often picked out at the time of the survey by a *Parnassia palustris*. As the slope levels out there is frequently a community with *Juncus articulatus* and *Triglochin palustre* (both species are good colonisers from fragments), which typically feeds wetland zones dammed behind slumped material. Dammed wetlands are variously colonised with the resultant dominant species probably determined largely by chance. Consequently perched wetland dominated by *Eupatorium cannabinum*, *Epilobium hirsutum*, *Filipendula ulmaria*, *Typha latifolia* and *Phragmites australis* were all recorded.
- 5.2.9 Catastrophic slippage events appeared to favour establishment by invasive non-native species, often deposited at the cliff top by local gardeners.
- 5.2.10 This mode of erosion and colonisation was observed preferentially in Units 2 and 4, however, was also present in Unit 1 in particular on the upper slopes. In woodland the colonisation processes differed due to the proximity of colonising species but the processes were considered to be analogous.

Incremental erosion

- 5.2.11 Incremental erosion appears to be driven by rotational slippage, probably powered by removal of sediments at the base of soft cliffs. Blocks of vegetation at the top of the cliff fall off at regular intervals and proceed down moderate slopes over time towards the sea.
- 5.2.12 Vegetation on the cliff top is typically unmanaged grassland forming a dense sward with no bare ground apparent. The soil is held together by an intimate mat of roots, consequently, as incremental erosion takes place, blocks of intact vegetation move down slope as a unit allowing the species in the sward to continue to grow. Thus the effect (usually on less steep slopes) is of a series of blocks moving down slope over sub-soil. The sub-soil is apparent between blocks and has its own vegetation forming an intimate mosaic of cliff top grassland moving down-slope in steps with gaps of varying size between these blocks. The blocks were typically no more than 0.6m wide and 1.2 to 2.0m wide, however, occasionally large blocks of intact vegetation had clearly migrated some distance downslope.
- 5.2.13 As blocks of generally mesotrophic grasslands approach the sea, maritime influences become more marked with a number of species (notably *Arrhenatherum elatius*) becoming scarcer, and other species colonising the space made available. This process is considered to have contributed to an increase in *Festuca rubra*, *Centaurea nigra*, *Lotus corniculatus* and, initially *Holcus lanatus*. However, whilst this was observed as a general process during this survey, it would certainly bear further investigation.
- 5.2.14 Gaps between travelling turves consist of poorly drained sub-soil, and was generally colonised initially by *Tussilago farfara*, *Agrostis stolonifera*, *Equisetum arvense* and locally by *Pulicaria dysenterica*. Due to the poor drainage in the gaps, these species are quickly joined by *Juncus effusus* and *J. inflexus* creating an intimate mosaic of often species-rich cliff-top grassland with narrow veins of rush pasture. Depending on stability and drainage, gaps may also be also colonised over time by species in the turves themselves. In the initial phases, however, *Rhinanthus minor* and a number of other annual species were observed to be taking advantage of these gaps in the early part of this succession. This occurred preferentially on the upper slopes where turves were recently detached and travelling down-slope from the cliff top.
- 5.2.15 Where well developed, gaps between turves were often narrow (approximately 0.1 to 0.3m) and orientated at right angles to the sea. This created humid enclaves protected from maritime influence between turves

which, if persistent, were often colonised by a lush bryophyte flora taking advantage of the sheltered conditions and growing on the sides of turves.

5.2.16 The vegetation communities are further complicated where turves and blocks of vegetation are moving down-slope over a groundwater spring on the sub-soil slope. This leads to an intimate mosaic consisting of the cliff-top turves moving down-slope and changing due to maritime influences. The vegetation community colonises the sub-soil at various stages of succession, and base-rich spring water percolating in the gaps between the turves allows flush vegetation to thrive (such as *Carex panacea*, *Parnassia palustris* and associated bryophytes), giving way to *Juncus* sp and *Triglochin palustre* being replaced in slacks by wetland flora characterised by tall herb species. Quite a heady botanical mix!

5.2.17 Incremental erosion was recorded throughout, however, it was well-developed in the north of Unit 1 and parts of Unit 2.

5.2.18 In Unit 4 the presence of sandstone forming a substantial cliff at the base appeared to increase the likelihood of stabilised, steep slopes which periodically fail rather than incremental erosion through rotational slippage, however, examples of incremental erosion do also occur here.

5.3 Summary of Communities mapped

5.3.1 The NVC communities encountered, along with the areas they cover are given in Table 1 below. Table 2 gives the types and areas of Phase 1 habitat for non-vegetated ground which were mapped (buildings are excluded).

5.3.2 The total vegetated area mapped is 71.4ha, while the total area of non-vegetated ground (including brown and green algal beds) mapped is 71.1ha. These figures include land which falls outside the SSSI boundary where the habitat is contiguous with that within the SSSI. Some areas were inaccessible and it was not possible to assign an NVC community, these totalled 0.917ha.

5.3.3 The un-vegetated ground includes areas of vertical and near vertical cliff and slope for which the plan area cannot give a true representation of surface areas present. Where represented as a linear feature along the shoreline, the area of maritime hard and soft cliff areas were therefore calculated as having a nominal width of 3m.

5.3.4 Table 1: NVC Communities present on Cayton, Cornelian and South Bays SSSI

NVC Code	NVC Community	Area (Ha)
MG1	<i>Arrhenatherum elatius</i> community	2.628
MG1e	<i>Arrhenatherum elatius</i> grassland; <i>Centaurea nigra</i> sub-community	0.054
MG5	<i>Cynosurus cristatus</i> – <i>Centaurea nigra</i> grassland	2.466
MG5a	<i>Cynosurus cristatus</i> – <i>Centaurea nigra</i> grassland <i>Lathyrus pratensis</i> sub community	0.143
MG9	<i>Holcus lanatus</i> – <i>Deschampsia cespitosa</i> grassland	0.401
MG9c	<i>Holcus lanatus</i> – <i>Deschampsia cespitosa</i> grassland <i>Arrhenatherum elatius</i> sub community	1.113
MG10b	<i>Holcus lanatus</i> – <i>Juncus effusus</i> rush-pasture <i>Juncus inflexus</i> sub community	0.224
MG6	<i>Lolium perenne</i> – <i>Cynosurus cristatus</i> grassland	0.258
MG11	<i>Festuca rubra</i> – <i>Agrostis stolonifera</i> – <i>Potentilla anserina</i> grassland	1.722
MG11b	<i>Festuca rubra</i> – <i>Agrostis stolonifera</i> – <i>Potentilla anserina</i> grassland, <i>Atriplex prostrata</i> sub-community	0.494
MG12	<i>Festuca arundinacea</i> grassland	0.103
MG12a	<i>Festuca arundinacea</i> grassland <i>Lolium perenne</i> – <i>Holcus lanatus</i> sub-community	1.757
MG13a	<i>Agrostis stolonifera</i> – <i>Alopecurus geniculatus</i> grassland	0.075
OV25	<i>Urtica dioica</i> – <i>Cirsium arvense</i> community	0.198
OV26	<i>Epilobium hirsutum</i> community	0.085
OV27	<i>Chamerion angustifolium</i> community	0.097
U4b	<i>Festuca ovina</i> – <i>Agrostis capillaris</i> – <i>Galium saxatile</i> grassland; <i>Holcus lanatus</i> – <i>Trifolium repens</i> sub-community	0.234
U2	<i>Deschampsia flexuosa</i> grassland	0.002
H12a	<i>Calluna vulgaris</i> – <i>Vaccinium myrtillus</i> heath, <i>Calluna vulgaris</i> sub-community	0.048
CG7	<i>Festuca ovina</i> – <i>Pilosella officinarum</i> – <i>Thymus praecox</i> / <i>pugleoides</i> grassland	0.158
M38	<i>Palustriella commutata</i> – <i>Carex nigra</i> spring	0.004
M10	<i>Carex dioica</i> – <i>Pinguicula vulgaris</i> mire	0.114
M10b	<i>Carex dioica</i> – <i>Pinguicula vulgaris</i> mire; <i>Briza media</i> – <i>Primula farinosa</i> sub-community	0.168
S12b	<i>Typha latifolia</i> swamp; <i>Mentha aquatica</i> sub-community	0.089
S4	<i>Phragmites australis</i> swamp	0.520
S14	<i>Sparganium erectum</i> swamp	0.001
S20a	<i>Schoenoplectus tabernaemontani</i> swamp	0.556
S21a	<i>Bolboschoenus maritimus</i> swamp	0.001
S26 / S12b mosaic	<i>Phragmites australis</i> – <i>Urtica dioica</i> swamp	0.055
MC9	<i>Festuca rubra</i> – <i>Holcus lanatus</i> maritime grassland	0.799

NVC Code	NVC Community	Area (Ha)
MC9a	<i>Festuca rubra</i> – <i>Holcus lanatus</i> maritime grassland; <i>Plantago maritima</i> sub-community	0.450
MC9c	<i>Festuca rubra</i> – <i>Holcus lanatus</i> maritime grassland; <i>Achillea millefolium</i> sub-community	1.113
MC8f	<i>Festuca rubra</i> – <i>Armeria maritima</i> grassland; <i>Anthyllis vulneraria</i> sub-community	1.387
SD2	<i>Honkenya peploides</i> – <i>Cakile maritima</i> strandline community	0.002
SM24	<i>Elytrigia atherica</i> salt-marsh community	0.550
SM28	<i>Elytrigia repens</i> salt-marsh community	0.002
W7a	<i>Alnus glutinosa</i> – <i>Fraxinus excelsior</i> – <i>Lysimachia nemorum</i> woodland; <i>Urtica dioica</i> sub-community	1.460
W7c	<i>Deschampsia cespitosa</i> sub-community	1.360
W8e	<i>Fraxinus excelsior</i> – <i>Acer campestre</i> – <i>Mercurialis perennis</i> woodland; <i>Geranium robertianum</i> sub- community	20.541
W10e	<i>Quercus robur</i> – <i>Pteridium aquilinum</i> – <i>Rubus fruticosus</i> woodland; <i>Acer pseudoplatanus</i> - <i>Oxalis acetosella</i> sub-community	8.762
W21a and W21b	<i>Crataegus monogyna</i> - <i>Hedera helix</i> scrub, <i>Urtica dioica</i> sub-community and <i>Mercurialis perennis</i> sub- communities	4.385
W21b	<i>Crataegus monogyna</i> – <i>Hedera helix</i> scrub: <i>Mercurialis perennis</i> sub-community	
W22	<i>Prunus spinosa</i> – <i>Rubus fruticosus</i> agg. scrub	2.273
W23a	<i>Ulex europaeus</i> – <i>Rubus fruticosus</i> scrub; <i>Anthoxanthum odoratum</i> sub-community	2.500
W24	<i>Rubus fruticosus</i> – <i>Holcus lanatus</i> community	0.480
SD18b	<i>Hippophae rhamnoides</i> dune scrub <i>Urtica dioica</i> – <i>Arrhenatherum elatius</i> sub-community	0.390
U20a	<i>Pteridium aquilinum</i> – <i>Galium saxatile</i> community, <i>Anthoxanthum odoratum</i> sub-community	0.556
Grassland mosaics	Including MC8f, M10b, MG9, MG9a, MG9c MG11b and bare ground	10.534
S26 / S12b mosaic		0.056
Total		71.366

Table 2: Summary of Phase 1 habitats and areas (excluding buildings)

Phase 1 habitat code	Phase 1 Habitat	Area (Ha)
G1	Standing water	0.012
H1.1	Intertidal mud/sand	} 42.356
H1.2	Intertidal shingles/cobbles	
H1.3	Intertidal boulders/rocks (including wave cut platform)	6.278
H1.(1-2).2	Intertidal green algal beds	0.002
H1.(1-3).3	Intertidal brown algal beds	19.447
H8.1	Maritime hard cliff	1.433
H8.2	Maritime soft cliff	1.563
I1.1.2	Inland cliff - basic	0.045
J4	Bare ground	0.102
Total		71.136

5.4 Community Descriptions

5.5 Community: **MG1e** *Arrhenatherum elatius* grassland; *Centaurea nigra* sub-community

5.5.1 This community is dominated by coarse grasses including false oat-grass and cock's foot, with tall fescue and red fescue both prominent. Various large dicotyledons such as hogweed, creeping thistle and black knapweed are prominent throughout. Where disturbance is apparent colt's foot and field horsetail are present, and where shading occurs hedge woundwort, wood avens and red campion appear. As a relatively species-rich sub-community, it is possible that the community has developed from MG5 grassland which has been unmanaged since the intensification of agriculture, and a move to arable cropping.

5.5.2 Stands of MG1 at this site are unmanaged, with neither grazing nor cutting, and a tussocky sward usually develops. Where fertility levels are increased, in particular adjacent to arable fields where drift of fertiliser takes place, creeping thistle and occasionally common nettle become prominent.

5.5.3 The community develops throughout the site on the fertile, moisture retentive clay soils, predominantly on the cliff top where maritime influence is minimal. MG1e is also prevalent in sheltered locations throughout the site where spray deposition is limited on the soft cliff slope.

5.5.4 Bryophytes are represented by common feather-moss, rough-stalked feather-moss and bifid crestwort. These species are common and widespread, but indicate humid conditions at ground level.

5.5.5 This community appears to be the precursor to communities recorded on soft cliff slopes throughout much of the SSSI. When stands are exposed to increased maritime influence through erosion, false oat-grass competes poorly, and appears to be replaced by red fescue and black knapweed where stands are exposed and dry, whereas in wetter areas where water from groundwater springs accumulate, tall fescue replaces false-oat grass as dominant forming large tussocks.

**5.6 Community: MG5a *Cynosurus cristatus* – *Centaurea nigra* grassland
Lathyrus pratensis sub community**

5.6.1 This community is distributed throughout the SSSI on both the cliff top (in limited areas) and developing on the soft cliff, 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 has a widespread distribution on clayey soils.

5.6.2 Whilst dominated by red fescue and Yorkshire fog, false oat-grass is also present, 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. Creeping bent is preferential in small quantities throughout, which reflects the mobile nature of much of the substrate on which this community occurs, creeping bent colonising cracks and crevices. Common ragwort also takes advantage of the opportunities for colonisation caused by creeping erosion, and in the north part of Unit 1, yellow rattle is common colonising similar erosion cracks.

5.6.3 Forbs are represented by an abundance of ribwort plantain, black knapweed and common sorrel. Some stands of this grassland are stable and well-established, for example in the northern part of Cayton Bay. Here the sward is species-rich, with pignut, devil's-bit scabious and lady's bedstraw preferential, and the influence of base-rich sub-soils is occasionally apparent, with the appearance of hoary plantain and agrimony.

5.6.4 Where the substrate is wetter, at the base of slumps and where groundwater issues and in association with small flushes, the community is often enriched by grass of Parnassus. Ruderal species common on soft cliffs at this site include common fleabane, 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.

- 5.6.5 In the stabilised Cayton Bay stands, there are areas with damper soils and the community tends to be less species-rich, with Yorkshire fog and false oat-grass becoming more prominent. Where large boulders occur, drier lenses on thinner soils allow eluviation and common bent and devil's bit scabious increase in frequency.
- 5.6.6 Bryophytes are not prominent in this community, however, springy turf-moss and neat turf-moss both occur where conditions allow. Where soils are damp, pointed spear-moss can form a loose carpet.
- 5.6.7 Large areas in Unit 4 have been recorded as this community type, however, these examples are associated with incremental erosion and tend to be species poor and mobile.
- 5.6.8 Maritime species are absent in this community.

**5.7 Community: MG9b *Holcus lanatus* – *Deschampsia cespitosa* grassland
Arrhenatherum elatius sub community**

- 5.7.1 This community is distributed on damp, circum-neutral soils in the stabilised grasslands in the south part of Unit 1. Yorkshire fog dominates, whilst tufted hair-grass is occasional to locally frequent.
- 5.7.2 Where nutrient enrichment has occurred common nettle and creeping thistle are preferential. Clustered and broad-leaved dock also occur with hogweed.
- 5.7.3 This grassland is not considered to be of high nature conservation value, but does represent a part of the grassland mosaic occupying damp hollows and linear hollows created through rotational slippage parallel to the shore.

**5.8 Community: MG10b *Holcus lanatus* – *Juncus effusus* rush-pasture
Juncus inflexus sub community**

- 5.8.1 Occurring patchily on the eroding soft cliff, this community often forms a transition from M10 flushes to surrounding grassland, or from S12 and S4 swamp to MG12 grassland. This community forms typically on poorly drained, clay soils. On the soft cliff slopes soft, hard and compact rush all occur as dominants, in various places accompanied by Yorkshire fog and enlivened by

ruderal species typical of the soft slopes, including common fleabane, creeping bent and field horsetail.

5.8.2 Marsh thistle occurs in damper spots, with red clover, meadow vetchling and ribwort plantain picking out drier areas. Bryophytes are represented in more mature stands by a lush carpet of pointed spear-moss and river feather-moss.

5.8.3 A transition community with marsh arrow-grass, jointed rush, grass of Parnassus and carnation sedge occurs where the community abuts base-rich M10 flushes.

5.9 Community: MG6 *Lolium perenne* – *Cynosurus cristatus* grassland

5.9.1 This community occurs on the periphery of the site where agricultural improvement has taken place and where the coastal footpath has favoured perennial rye-grass which can withstand trampling.

5.9.2 A grassland of low ecological value.

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

5.10.1 The community present on the eroding soft cliffs of this SSSI 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, but the maritime influence comes from salt spray rather than direct inundation. Red fescue is less abundant in this community in the SSSI than the description in Rodwell suggests, which is likely to be due to the derivation of the community at this site reflecting the instability of the substrate. The community present is considered to have most affinity with the *Atriplex prostrata* sub-community, however, maritime species are never prominent.

5.10.2 This community is widespread throughout the SSSI, particularly where active erosion is taking place exposing large areas of bare soil and subsoil. 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 extremely abundant in some stands, both species colonising from vegetative propagules.

5.10.3 These species are joined by kidney vetch which is a constant in this community in this SSSI. Kidney vetch colonises by seed, however, surprisingly few other species are able to establish in the short term, although a number of species are thinly distributed throughout, for example, sea plantain and rough hawkbit.

5.10.4 The only other species present are generally survivors from the eroded sward, thus tussocks of red fescue, ribwort plantain and black knapweed are present. Poorly grown creeping thistle is sometimes present, but this species never develops into large patches.

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

5.11.1 This community is characteristic of moist but free-draining soils in coastal soft cliffs, and is characteristic of the Yorkshire coast. At this SSSI, the community is dominated by tussocks of tall fescue with abundant red fescue and glaucous sedge. In places cock's-foot can be prominent rivalling tall fescue in abundance. Forbs are represented by black knapweed and meadow vetchling, with ribwort plantain and hogweed often present.

5.11.2 Where incremental erosion is taking place, the community is often characterised by an over-whelming abundance of common fleabane growing in the gaps between turves, which gives the community a yellow hue when this species is in flower. Other ruderal species are present, and field horsetail can also be prominent, being replaced by marsh horsetail and meadowsweet in wetter stands. These wetter stands have a good cover of bryophytes with bifid crestwort and river feather-moss.

5.11.3 Ruderal species are usually present in this community as there is opportunity for colonisation as the community forms. As it matures, ruderal species such as common fleabane, colt's foot and field horsetail become less important, and a sward dominated by grasses forms. This early phase allows ruderal species to flourish, and can also allow invasive non-native species to dominate where these have been introduced. Consequently, in the south part of Unit 2 there is a considerable area of slope dominated by a garden variety of ox-eye daisy, presumably introduced from local gardens.

5.11.4 This community also has a transition to M10 flushes, and grass of Parnassus and carnation sedge appear interleaved with the MG12 elements.

5.11.5 This community is well represented in the SSSI, and it should be regarded as characteristic of soft cliffs in Yorkshire. MG12a is the least maritime of the sub-communities, which reflects the low maritime influence at this site, even on apparently exposed slopes.

5.11.6 Where well established, agrimony and nodding thistle are preferential (for example on Knipe Point). In damp stands meadowsweet can be abundant, and where this community forms as a result of eroding areas of W8 woodland, false brome can persist from the woodland herb layer and be co-dominant with tall fescue.

5.11.7 This rather variable community is not adequately described in Rodwell 1992, and further work to elucidate sub-communities based on the Yorkshire coast examples is necessary.

5.12 Community: MG13a – *Agrostis stolonifera* – *Alopecurus geniculatus* grassland

5.12.1 This grassland community has developed in a small number of wet areas where drainage is impeded by clayey soils and slumping. These areas are waterlogged periodically due to a small amount of overland flow, but predominantly form direct rainfall. The community occurs in stabilised slopes in the grasslands in the south part of Unit 1.

5.12.2 The community is dominated by plicate sweet-grass in the wettest areas, with creeping bent dominating in slightly drier zones on the periphery. Marsh foxtail is sparsely distributed throughout. Hairy sedge, redshank and marsh bedstraw are all present in this community.

5.12.3 This community is extremely vulnerable to becoming shaded out where it occurs in small stands, and encroachment by scrub should be monitored carefully.

5.13 Open habitat communities: OV25 *Urtica dioica* – *Cirsium arvense* community; OV26 *Epilobium hirsutum* community and OV27 *Chamerion angustifolium* community

5.13.1 These three communities develop where suitable conditions and a seed source allow. OV27 is preferential to Unit 4, and it is likely that rose-bay willowherb originated in Scarborough surviving in urban habitats such as railway embankments, brownfield sites and waste land before making the jump to maritime communities. It is likely that this community will increase,

although at present it appears to be preferential in less maritime situations (on the cliff top).

5.13.2 OV26 forms, often in species-poor stands, where moist but well-aerated soils occur in the soft cliff matrix. Thus stands are usually on a slight slope in areas that accumulate freshwater run-off. The community often abuts MG10 rush-pasture or S12 reedmace swamp. Meadowsweet and common nettle often accompany this species, and few other associates are common.

5.13.3 OV25 has a restricted distribution occurring in fertile, well-drained soils. Stands were recorded in the stabilised grasslands in the south of Unit 1 in places where stock tend to come together. Thus OV25 occurs around drinking troughs, and in the lee of scrub where livestock shelter from on-shore winds.

5.13.4 OV25 was also recorded on the cliff top where eutrophication has occurred due to fertiliser drift, and very occasionally on the soft cliff where eutrophication was apparent.

5.14 Community: U4b *Festuca ovina* – *Agrostis capillaris* – *Galium saxatile* grassland; *Holcus lanatus* – *Trifolium repens* sub-community

5.14.1 This community has a restricted distribution at this SSSI, and was only recorded in eluviated, thin soils in the south part of Unit 1, and similar thin soils associated with acidic sandstone outcrops in Unit 4.

5.14.2 A species-poor community dominated by common bent, where red fescue, creeping bent and Yorkshire fog are also constants. Neat feather-moss is also a constant, taking advantage of the rather poorly grown grassland species characteristic of this community. Forbs are represented by common sorrel and ribwort plantain, with harebell and yarrow preferential. In Unit 1 the community picks out exposed ridges occasionally associated with rock outcrops. The sward in these situations is tightly packed and low growing often with much neat feather-moss.

5.14.3 Whilst generally considered a grassland community of the upland fringe, the character of the grassland and species present demonstrates clear affinities with U4 grassland which is widespread in the nearby North York Moors.

5.14.4 No maritime species were recorded in this community, and maritime influence is not considered to be a factor in its establishment.

5.15 Community: U2 *Deschampsia flexuosa* grassland

5.15.1 A small stand of this grassland community was encountered in Unit 4 associated with a heather dominated community on thin acidic soils. Comprising wavy hair-grass with red fescue and common bent, forbs are represented by tormentil, common sorrel, harebell, devil's bit scabious and a thatch of springy turf-moss. The community is thus relatively species poor, however, lowland acid grassland is a UK Biodiversity Action Plan Priority habitat, and consequently this community should be conserved where it occurs.

5.15.2 It may be more widespread in Unit 4 in the inaccessible parts of the cliff. Its presence depends on acidic sandstone outcrops.

5.16 Community: H12a *Calluna vulgaris* – *Vaccinium myrtillus* heath, *Calluna vulgaris* sub-community

5.16.1 This heathland is restricted to Unit 4, occurring sporadically in association with acidic sandstone outcrops. In the north of the Unit, acidic soils are often in small pockets, occasionally in close association with base-rich sub-soils and flushes. Further south in unit 4 outcropping sandstones form ridges on the eroding cliff and larger stands of this community occur.

5.16.2 The heath is dominated by ling heather, although bell heather also occurs in small amounts. Calcifuge bryophytes form a ground layer under the heather with heath plait-moss, heath star-moss, neat feather-moss and dwarf swan-neck moss. Where the ling heather is well grown, great wood-rush and broom fork-moss are also present.

5.17 Community: CG7 *Festuca ovina* – *Pilosella officinarum* – *Thymus praecox* / *pugleoides* grassland

5.17.1 This community occurs sporadically throughout the SSSI and is associated with base-rich exposures, (Photograph 28, Appendix 6). Occurring on skeletal soils often with much bare ground, the community has developed on steep, free-draining sites. Whilst it is here categorised as CG7, a community with which it has clear affinities, it does not easily fit into any of the sub-communities.

5.17.2 As this community is associated with slippage zones exposing base-rich sub-soil, it is found in an intimate mosaic with mesotrophic grassland in the southern part of Unit 1. More extensive examples were recorded on the

maritime cliff slopes themselves where the influence of salt spray was limited by aspect or the presence of Knipe Point.

5.17.3 Whist wild thyme was not recorded, other community constants were present including mouse-ear hawkweed and rough hawkbit. Bryophytes are well represented with neat feather-moss and pointed spear-moss forming tight mats. Drifts of common tamarisk-moss and big shaggy moss also occur along with comb-moss in large but sporadic patches.

5.17.4 It is considered that this is a community of high conservation value which should be monitored closely at this SSSI. It is vulnerable to loss through natural succession, and grazing in the south part of Unit 1 has an important role to play in controlling scrub and ensuring that small, bare patches of sub-soil are exposed regularly.

5.17.5 The short sward characteristic of CG7 was not in evidence as false brome is the dominant grass in this community at this SSSI. The community has considerable affinities with that recorded by Milliken and Pendry (2002) at Flamborough Head, although wild thyme was not recorded, although it is present in the SSSI in suitable cliff crevices. These practitioners recognised a community with affinities to CG7, but dominated by false brome and it is likely that this community is characteristic of the Yorkshire coast which was significantly under-sampled during the formulation of the National Vegetation Classification series.

5.18 Community: M38 *Palustriella commutata* – *Carex nigra* spring and M10b *Carex dioica* – *Pinguicula vulgaris* mire; *Briza media* – *Primula farinosa* sub-community

5.18.1 There are a number of base-rich springs and seepages throughout the soft cliff resource which have vegetation analogous to that present in M38 springs, patches (Target Notes 11, 13, 14, 15, 21 and 88, Appendix 4; Photograph 11, Appendix 6). Whilst not previously recorded in coastal situations, it is considered that this is due to a lack of sampling on the east coast of Yorkshire rather than an absence of occurrence.

5.18.2 Where M38 springs are present in areas which have been stable for some time, curled hook-moss forms well-developed patches. Tufa was noted forming at a number of these locations.

5.18.3 These springs and seepages then give rise to M10 flushes characterised by small sedges predominantly carnation sedge with a smaller contribution from

glaucous sedge. Grass of Parnassus is a community constant in our community, and the presence of this species along with other sub-community preferentials such as marsh arrowgrass, glaucous sedge and Yorkshire fog, suggest most affinity with M10b.

5.18.4 These springs and flushes are of high conservation value and would benefit from frequent monitoring.

5.19 Community: S12b *Typha latifolia* swamp; *Mentha aquatica* sub-community and S4 *Phragmites australis* swamp

5.19.1 Where major slumps have taken place water often accumulates behind ridges created by rotational slippage. These perched wetlands are then rapidly colonised by wetland species with high dispersal capabilities (wind borne seed). Common reedmace was the most widespread dominant, with common reed forming stands in a handful of locations appearing to favour the north of the SSSI.

5.19.2 Where the community is well developed water mint, hemlock water dropwort, false fox sedge and great willowherb were recorded, the latter often in abundance. Hemp agrimony and meadowsweet can both form significant stands, and hard rush is preferential on the periphery of these wetlands.

5.19.3 Bryophytes form a well developed ground layer with pointed spear-moss abundant in most of these wetlands.

5.20 Brackish Pool Community: S14 *Sparganium erectum* swamp; S20a *Schoenoplectus tabernaemontani* swamp; S21a *Bolboschoenus maritimus* swamp; and S26 *Phragmites australis* – *Urtica dioica* swamp

5.20.1 The brackish pool appears to have suffered in recent years with the sea recently breaching a small sea defence associated with the World War 2 pill boxes.

5.20.2 At present four communities are present with S14 dominated by branched bur-reed and furthest from the maritime influence. Stands of grey clubrush occur sporadically, with lesser water parsnip preferential to this community. Sea clubrush is preferential where inundation is more frequent, along with a stand of common reed, shot through with hedge bindweed in drier parts.

5.20.3 The common reed swamp is continuous with the W7 woodland behind, and as the shading influence of alder increases, common reed becomes more

open in character allowing pendulous sedge, greater willowherb, hard rush, meadowsweet and hemp agrimony to gain prominence.

5.20.4 Where soils are disturbed and erosion is active, creeping bent straggles over bare substrate with silverweed, colt's-foot, common fleabane, marsh arrow-grass and field horsetail.

5.20.5 This feature represents the only station for these salt-marsh communities in the SSSI, and it appears that the feature may be removed over the coming years if erosion continues at the current rate.

5.21 Community: MC9a *Festuca rubra* – *Holcus lanatus* maritime grassland; *Plantago maritima* sub-community and MC9c *Achillea millefolium* sub-community

5.21.1 A maritime cliff community of more sheltered location, MC9 is found on soft cliffs generally on deeper soils and shallower slopes than MC8. Red fescue and Yorkshire fog are co-dominant with forbs reflecting the deeper, more water retentive soils such as black knapweed, hogweed and ribwort plantain.

5.21.2 Sea plantain is frequent in this community, particularly in more maritime stands which have thus been classified as MC9a. Where maritime influence is less marked, yarrow and lady's bedstraw tend to increase in abundance, and communities have more affinity with MC9c. A number of stands are species poor or have a preponderance of ruderal species due to ongoing erosion activity. In these cases it has not been possible to assign a sub-community with any certainty.

5.21.3 In both communities, elements indicating base enrichment were recorded, with cowslip, hoary plantain, small scabious, and salad burnet all preferential in MC9 at low levels.

5.21.4 Where this community has developed on particularly stable slopes with deep soils, the sward becomes more tussocky with upright brome appearing, accompanied by salad burnet, cowslip, hoary plantain, yellow feather-moss, false brome and lady's bedstraw. The community has some affinity with CG3, but the maritime influence is still clear with sea plantain consistent throughout.

5.21.5 Where incremental erosion is active, ruderal species (common fleabane and field horsetail) take hold in the gaps between turves, and can mask this community at a distance.

5.21.6 This community is distributed on the soft cliffs throughout the SSSI, often contrasting with MC8f on spurs, the former on the sheltered, south facing aspect and the latter on the exposed, north-east facing aspects.

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

5.22.1 A maritime cliff community, MC8f is found on soft cliffs where slopes have stabilised and is the natural succession from MG11 colonisation grassland, (Photograph 4). Dominated by red fescue, community constants recorded at this site are kidney vetch, rough hawkbit, creeping bent, colt's foot and red clover. 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.

5.22.2 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.

5.22.3 Bird's foot trefoil, black knapweed and ribwort plantain are less frequent constants, giving the community the air of MG5 in some cases, however, the abundance of kidney vetch gives the community an altogether different character. It is likely that some stands of MC8f have been derived from MG5 grassland as turves move down-slope into situations more exposed to salt spray, the movement allowing gaps for kidney vetch and sea plantain to colonise.

5.22.4 This community forms quite a dense sward of red fescue with little bare ground over time, and appears to stabilise even very steep soft slopes. Where flushing is apparent, there is a transition community featuring MC8f constants mingling with grass of Parnassus and common sedge.

5.22.5 Bryophytes do not usually form a large component of this community, however, it was noted that on east-facing slopes there was a tendency for a species-poor variant of MC8f to form accompanied by a bed of neat feather-moss and common feather-moss.

5.22.6 Wild carrot is a feature of this community, and affinities with MC11 were considered. However, the description of MC11 in Rodwell (2000) appears limited to communities in the south-west of England and Wales featuring

Daucus carota ssp *gummifer* which was not recorded in the SSSI during this survey (in spite of considerable effort!).

5.23 Salt-marsh and Strandline Communities: SD2 *Honkenya peploides* – *Cakile maritima* strandline community, SM24 *Elytrigia atherica* salt-marsh community and SM28 *Elytrigia repens* salt-marsh community

5.23.1 The strand-line community, SD2 is represented by species poor associations in the few places where a strandline exists in front of the cliffs. Here spear-leaved orache and Babington's orache is joined by sparsely distributed sea rocket, silverweed and groundsel. Population levels are low where this community occurs.

5.23.2 Both of the saltmarsh communities were recorded during the surveys, the two being differentiated by the dominance of either sea couch (SM24) or common couch (SM28). The latter has an extremely limited distribution at present.

5.23.3 This community is defined by the dominance of sea couch and is widespread in upper zone of salt marshes in England occurring in low lying areas which are periodically inundated with sea water. The sward in the SSSI is dominated by sea couch, with creeping bent, silverweed and creeping cinquefoil also common.

5.23.4 Due to the nature of active erosion in the SSSI, stands of SM24 were rather limited and the community may well be lost to the SSSI in the near future if current erosion patterns in Cayton Bay persist.

5.24 Community: W7a *Alnus glutinosa* – *Fraxinus excelsior* – *Lysimachia nemorum* woodland; *Urtica dioica* sub-community and W7c *Deschampsia cespitosa* sub-community

5.24.1 Wet woodland is extensive in this SSSI and has formed in places where groundwater issues and collects behind slumped areas of soft cliff and exposure to salt spray is limited, (Photograph 56, Appendix 6). These pockets of wet woodland tend to be more eutrophic with locally frequent common nettle and opposite-leaved golden saxifrage in evidence. The canopy has more willow, with grey, goat and osier willows all well represented. These wet woodlands flood during times of high precipitation, and have most affinity with W7a.

5.24.2 In Cayton Bay this woodland is more mature. Trees up-slope of the wet woodland are gradually slumping into the wetland and dying creating a good resource of recumbent deadwood.

5.24.3 Water from these slump-dammed pools then makes its way down to the shore in a lattice of streams. This creates a generally wet area with dry lenses allowing stands akin to W7c to develop. Alder dominates the canopy, with ash and sycamore present on drier lenses. The understory reflects this with young alder and sycamore, augmented by epicormic growth in both cases. The groundflora features meadowsweet, common dog violet, tufted hair-grass and an abundance of ferns including lady fern, male fern, and scaly male fern.

5.24.4 Once again, base enrichment is evident, with common striated feather-moss, false brome, herb-Robert and hart's tongue fern all well represented. Pendulous sedge is locally dominant reducing species-richness where it occurs. It is possible that this species is on the increase, and could impair the quality of the woodland ground flora over time.

5.24.5 W7c woodland is being actively eroded in Cayton and Cornelian Bays, with alder dying on the seaward side and slowly being dragged onto the beach. In places this does provide sufficient stability for spear-leaved orache to grow.

5.25 Community: W8e *Fraxinus excelsior* – *Acer campestre* – *Mercurialis perennis* woodland; *Geranium robertianum* sub-community

5.25.1 The majority of the woodland recorded has a mixed canopy of ash, wych elm and sycamore with an understory featuring these species (the wych elm often re-growing after suffering with Dutch elm disease) and hawthorn. Horse chestnut are also frequent, (Photograph 46, Appendix 6).

5.25.2 Where wych elm have succumbed to Dutch elm disease, they appear to be being replaced by ash. However, in portions of the SSSI the loss of wych elm may have promoted slippage of wet ground and slumping. Tree boles indicate the continuing down-slope movement of the substrate in all steep parts of the woodland.

5.25.3 Groundflora is well-shaded with bare ground apparent, in particular where slopes are steep, however, hart's tongue fern is abundant on these slopes along with an abundance of false brome, wood avens, and herb-Robert. Damp hollows feature common nettle, opposite-leaved golden saxifrage, common feather-moss and meadowsweet, often with blackthorn or hawthorn thickets.

5.25.4 Calcicolous bryophytes are well represented with yellow feather-moss, hart's-tongue thyme-moss, endive pellia and fox-tail feather-moss. The abundance of yellow feather-moss, hart's tongue fern and herb Robert, considered with the occurrence of foxtail feather-moss indicates the *Geranium robertianum* sub-community.

5.25.5 Where W8e occurs in close proximity to the shore, in particular in South and Cornelian Bays, trees are stunted and weather-beaten, creating a low canopy, ultimately going down to ground level. Woodland ground flora persists right to the edge of the woodland protected by the canopy. However, where erosion exposes the ground flora, or trees are removed by erosion, woodland species dependent on higher humidity and shade are rapidly out-competed by grassland species. This grassland often features false brome which persists in the sward, being joined by red fescue or tall fescue depending on the proximity of seed sources.

5.26 Community: W10e *Quercus robur* – *Pteridium aquilinum* – *Rubus fruticosus* woodland; *Acer pseudoplatanus* - *Oxalis acetosella* sub-community

5.26.1 Forming over relatively level, moisture retentive clays, and this woodland type is prevalent in Cayton Bay. The canopy is dominated by sycamore, with an understory dominated by sycamore and hawthorn, with some holly.

5.26.2 The ground flora has developed on mesotrophic clays with bramble, broad buckler fern, enchanters' nightshade and hairy-brome very much in evidence. Bryophytes are abundant with swan's-neck thyme-moss, common feather-moss and Catherine's moss represented.

5.26.3 The woodland appears to have most affinity with the *Acer pseudoplatanus* – *Oxalis acetosella* sub-community based on the abundance of species preferential to this community including broad-buckler fern, lady fern, common feather-moss, and swan's-neck thyme-moss.

5.26.4 The woodland features occasional clearings with grassland species and ruderal species such as lesser burdock, Yorkshire fog, creeping buttercup and greater plantain. Wych elm loss due to Dutch elm disease is apparent, creating dense shade under a wealth of regenerating sycamore saplings. The dead wych elm tend to be upright in this woodland and represent a valuable standing deadwood resource.

5.27 Bracken and Scrub Communities

W21b *Crataegus monogyna* – *Hedera helix* scrub: *Mercurialis perennis* sub-community and W21a *Hedera helix* – *Urtica dioica* sub-community

- 5.27.1 This scrub is well developed in the SSSI, in particular in Cayton Bay, Unit 1, (Photograph 38, Appendix 6). In mature stands ground flora dependent on the ameliorating influence of the hawthorn canopy is well developed, with an abundance of ferns including hart's-tongue fern, male fern, lady fern and scaly male fern.
- 5.27.2 Base enrichment is apparent in some stands with yellow feather-moss and dog's mercury indicating an affinity with the *Mercurialis perennis* sub-community. Where calcareous rock outcrops in Unit 1, big shaggy-moss occurs in drifts, and primrose is abundant. W21b occurs preferentially on steep slopes where bedrock outcrops.
- 5.27.3 Generally, dense stands of hawthorn scrub have little ground flora. That which is present appears to be derived from grassland communities, with red campion, creeping bent, Yorkshire fog, creeping buttercup and broad-leaved dock all preferential in this W21a community. At present most hawthorn scrub encountered is W21a.
- 5.27.4 It is likely that the spread of W21a is compromising the extent of species-rich grassland in this area.

W22 *Prunus spinosa* – *Rubus fruticosus* agg. scrub

- 5.27.5 Scrub is a widespread feature in the SSSI with dense stands of wind sculpted blackthorn often present as a precursor to woodland and especially prevalent in Unit 4 and exposed ridges and cliff tops throughout. Ground flora in this community is sparse.

W23a *Ulex europaeus* – *Rubus fruticosus* scrub; *Anthoxanthum odoratum* sub-community

- 5.27.6 Gorse is an important feature of the SSSI accounting for a good deal of the scrub encountered. Where this is invading grassland, in particular in Unit 1 at Cayton Bay, this species has the potential to decrease the area of species rich grassland in stabilised communities.

5.27.7 Elsewhere the presence of large stands of gorse (in particular Unit 4) are considered unlikely to be a threat to species rich grassland as erosion here is continuing apace and regularly creating open areas. Gorse scrub in this situation tends to be open with grassland species persisting as a herb layer.

W24 *Rubus fruticosus* – *Holcus lanatus* community.

5.27.8 Generally occurring in sheltered locations of the SSSI, stands of bramble are thinly distributed throughout the site. This scrub community has the potential to compromise species-rich grassland on stabilised slopes in Cayton Bay (Unit 1). In other areas bramble scrub is considered to be at acceptable levels and benign.

SD18b *Hippophae rhamnoides* dune scrub *Urtica dioica* – *Arrhenatherum elatius* sub-community

5.27.9 Scrub dominated by sea buckthorn was widespread as thickets in Cornelian and South Bays. This species has the ability to invade and replace species-rich grassland, and its extent should be monitored carefully.

U20a *Pteridium aquilinum* – *Galium saxatile* community, *Anthoxanthum odoratum* sub-community

5.27.10 This community occurs in large stands in the north part of Unit 1. Otherwise the species is relatively thinly distributed and preferential in sheltered spots.

5.27.11 At present, bracken encroachment is not thought to be invading grasslands of high conservation value.

6.0 TRANSECTS

6.1.1 Transect locations were selected at points in the cliff profile where the series of vegetation communities associated with erosion processes at work on the cliff were apparent and clearly defined, whether it be incremental or catastrophic erosion. Other considerations were slopes which were safe to access whilst still demonstrating the steep and often erratic nature of the eroding substrate.

6.1.2 Due to the complex and dynamic distribution of the vegetation communities on the site, only three transects were recorded. These are detailed overleaf, and their locations are shown on Figure 4.

Transect 1

6.1.3 Transect 1 (Unit 2) extends down the soft boulder clay slope from the top of the slope adjacent to the cliff top footpath, down to the shoreline. It passes through a range of grassland types typical of the non wooded parts of the site. (Photograph 14, Appendix 6).

NVC community	Width (m)	Northing	Easting	Notes
MG1		507124	484183	
MC9c	2	507129	484185	
MG11	1	507128	484185	
MC8f		507139	484193	
MC9a		507145	484195	
MC8f		507149	484197	
M38		507149	484197	Within MC8f and M10 boundary
M10		507152	484201	
MG12a		507179	484236	
S12d		507188	484251	
MC9	1	507189	484250	

Transect 2

6.1.4 Transect 2 (Unit 1) extends from a narrow strip of strandline vegetation at the back of the beach, and up a steep and mobile boulder clay slope with occasional scrub to the cliff top path. Beyond the path the vegetation is dominated by impenetrable hawthorn and blackthorn scrub, and the transect ends here.

NVC community	Width (m)	Northing	Easting	Notes
SD2	1			Strandline community
MG11		506369	484845	
MG5	2	506366	484849	
MG11	1	506366	484847	
MG5	6	506359	484843	
W24		506355	484841	
MC8f		506335	484837	
W24	1	506334	484836	
MG6	2	506333	484837	
MG1	1	506333	484835	
W23	4	Inaccessible		
W21		Inaccessible		

Transect 3

6.1.5 Transect 3 (Unit 1) crosses the grassland maritime cliff community (MG9a) typical of more sheltered locations, where deeper more water retentive soils are present. In damper spots this is replaced by *Holcus lanatus* – *Juncus effusus* rush pasture (MG10). In more free draining areas *Festuca arundinacea* grassland (MG12) is present.

NVC community	Width (m)	Northing	Easting
MC9a	5m		
MC9a		505890	486320
MG12		505877	486323
MG10		505865	486330
Skeletal MC9a		505853	486335
MG10		505843	486328
MG12		505838	486332
W22		505828	486335

7.0 UNVEGETATED GROUND – RESULTS AND DISCUSSION

7.1 Shore habitats

7.1.1 The cliffs of Cayton and Cornelian Bays are composed predominantly of glacial till, with small sections of hard or semi-hard cliffs (sandstone and some shale), while the cliffs of South Bay are entirely hard/semi-hard predominantly sandstone. All are eroding actively due to wave action, as well as down-slope slippage. Apart from at the northern end of South Bay where the beach is backed by a continuous sea wall, only short sections of the cliffs have been protected from erosion.

7.1.2 The beach at Cayton and Cornelian Bays are predominantly sand. Intertidal and sub-littoral wave cut platform is extensive around Osgodby Point and White Nab and the length of South Bay, providing extensive rockpools, while much is vegetated by brown seaweeds.

7.1.3 It is notable that no littoral lichens were found anywhere within the survey area.

Cayton Bay

7.1.4 At Cayton Bay to the south-east of the pumping station the intertidal zone is predominantly sand, with some deposited shingle, pebbles and cobbles. The

cliffs are mainly soft boulder clay, with hard cliffs taking over at the southern end, mainly beyond the site boundary. Considerable erosion of the soft and hard cliffs is occurring, both from slippage and from wave action towards high tide when the sea reaches the basal portion of the cliffs. A cliff-top pill box has collapsed down the cliff slope. Two further pill boxes are now on the sand, with the cliff base eroding behind them.

- 7.1.5 At the pumping station, the back of the beach is protected by concrete armouring which appears to be in good condition, however, the boulder clay is eroding out behind the south-eastern end.
- 7.1.6 To the north-western of the pumping station the un-vegetated cliffs are predominantly hard or semi-hard (sandstones) with large boulders, rocks and smaller grade stony material at the base of the cliffs. About half way to the end of the beach from the pumping station large boulders are replaced by a bank of cobbles and pebbles 1-2m wide and about 0.5m high. This is apparently providing some protection from erosion by wave action to the base of the cliff.
- 7.1.7 The intertidal zone is predominantly sand, with boulder beds/wave cut platform towards (and beyond) the low tide mark. These are partly vegetated with brown seaweeds, and creating rockpools at low tide.
- 7.1.8 To towards the northern end of the beach, an area of boulder clay is exposed at the back of the beach. Here there also a number of tree stumps, indicating severe erosion of the wooded slope behind the beach.
- 7.1.9 The intertidal zone at northern end of the beach is characterised by a wave cut platform with boulders from erosion of the hard cliffs of Osgodby Point. This extends right round the point. A pill box is present on the north side of the platform.
- 7.1.10 Cornelian Bay
- 7.1.11 The intertidal zone at the southern half of Cornelian Bay is predominantly sand, with the beach backed by boulder clay. The top of the beach is well below high tide level and these low cliffs are eroding rapidly, and towards high tide the sea is visibly brown due to suspended eroded material.
- 7.1.12 About two-thirds of the way up the beach a sandstone outcrop extends from the low cliff slope at the back of the beach out to the low tide line. A wave cut platform and associated boulders are present, from here to White Nab point,

but these are mainly below the low tide mark and in Unit 3 of the SSSI, which is not included in this survey. The cliff slope is composed of a mixture of boulder clay, shales and sandstones, with a rock ledge exposed at the base of the cliff in places. As elsewhere, this section of cliff slope is actively eroding along much of its length.

7.1.13 A short section of the low semi-hard cliff slope has been protected by stepped rock armouring associated with the outflow of the Yorkshire Water waste water pumping station just outside the site boundary. This appears recently installed and is intact.

7.1.14 At the northern end of Cornelian Bay the wave cut platform extends up the beach and round the end of White Nab.

7.1.15 South Bay

7.1.16 The cliffs and shore of South Bay are relatively uniform. High, steep semi-hard cliffs bound the beach; these are actively eroding, with rocks, boulders and smaller grade materials accumulated at the base. Apart from a narrow strip of sand and shingle in places, the intertidal zone is composed of a wave cut platform which extends out beyond the low tide mark. The seaward portion has extensive areas of rock pool and much is vegetated with brown seaweeds; these are replaced by green seaweeds higher up the beach, though these are much less extensive or prolific.

7.1.17 Near the northern end of the beach the high hard cliffs have eroded to form a small number of slot-shaped caves and a narrow rock arch.

7.1.18 At the southern end of South Cliff a grassy mound and slipway is protected from erosion by large rock armouring. This appears recent and is intact. Sea walls extend all the way along South Cliff, these are in various states of condition and in places are being repaired.

7.1.19 The intertidal zone at South Cliff is predominantly composed of sand with wave cut platform exposed in places, particularly towards the southern end. A comparison with the aerial photographs provided (dated autumn 2009) indicates that some areas of platform are now more covered with sand, while in other areas more platform is exposed. This is likely to be very dynamic and change after storms.

7.1.20 It is notable that no littoral lichens were found anywhere within the survey area.

8.0 HUMAN INFLUENCES ON THE SSSI CONDITION

8.1 Introductions of non-native plants

- 8.1.1 A number of non-native plants, some of which are invasive and are on the Wildlife and Countryside Act 1981 Schedule 9 list of harmful invaders, were found on the site. These are recorded as Target Notes. Plants found in the wooded areas include herbaceous montbretia and fringe cup, and shrubs cotoneaster and shrub honeysuckle. Cultivated ox-eye was dominant on part of the soft cliff slope towards the southern end of Cayton Bay, garden waste had been tipped over the top of the cliff from the footpath above here (Target Note 9) and is the likely source for this plant.
- 8.1.2 Below a stand of mature introduced and native conifers near the Yorkshire Water waste water pumping station on the eastern edge of Unit 1 a number of introduced conifers have become established on the eroding boulder clay slope, as well as montbretia and shrub honeysuckle.
- 8.1.3 The influence of the establishment of garden escapes is considered possibly to be the most harmful anthropomorphic impact on the condition of the site in the long term, and perhaps the most difficult to rectify.

8.2 Footpaths

- 8.2.1 A cliff top path extends the length of the site from the South Bay car park. Despite it being part of the popular Cleveland Way, the path is in good condition and the impact on the adjacent vegetation is generally restricted to less than 0.5m either side of the main path. In some places, side paths lead to cliff top view points, though these are short and again limited in their impact. The path is used by dog walkers and dog mess is likely to be resulting in nutrient enrichment adjacent to the path.
- 8.2.2 Informal paths are found on some of the grassy areas at the back of Cayton Bay, where trampling has influenced small areas of the vegetation, and initiated some erosion. These areas are target noted. Informal paths as well as public rights of way are also present within the woodland at Cayton and Tenants Cliffs, though these are generally narrow and their impact on the condition of the site is considered to be limited.

8.3 Fire sites

8.3.1 A number of fire sites were found, including on the edge of the grassland at the back of Cayton Bay (Unit 1 and 2), within the Cayton Cliffs woodland (Unit 1) and near to the cliff top not far from the South Bay car park (Unit 4). Most have associated litter, including cans and bottles. The fire sites have a considerable localised impact on the vegetation in which they are found, with bare ground at the site itself and trampling in the vicinity. In addition, it is considered highly likely that fuel for the fires includes lying and standing deadwood, and there is also evidence that smaller live trees have been used.

9.0 COMMENTS ON SURVEY METHODOLOGY AND RECOMMENDATIONS FOR FUTURE SURVEY

9.1 Comments on survey methodology

9.1.1 The survey methodology was sound and the level of detail and sampling frequency is considered commensurate with that required to accurately record the vegetation communities present. The aerial photographs were invaluable for indicating the extent of some communities, and were also useful for directing and organising the survey.

9.1.2 For the soft cliff areas, future survey should aim to record vegetation communities with the characteristics of those recorded on this occasion rather than attempt to record the same communities in the same places, due to the dynamic nature of the soils. An exception to this may be woodland, however, even here wet woodland is dynamic and forms in response to minor slumps and depressions.

Limitations

9.1.3 Access, in particular in Unit 4, presents problems and some areas could not be safely accessed. Future survey could allow for an abseil set-up to allow botanists access to steep, exposed and rapidly eroding areas where these occur at height. Survey is safer after a dry spell when the exposed clay and sub-soil is dry allowing a better footing.

9.1.4 The Maritime NVC acknowledges under-sampling of soft cliffs in Yorkshire; consequently although the communities recorded can be described in terms of their affinities with analogous NVC communities, there is clearly a body of

work to be undertaken in order to adequately describe the communities in definitive terms for soft cliffs of the east coast. This would be an excellent topic for a botany PhD.

9.2 Recommendations for future survey

- 9.2.1 Regular re-survey the site every three years to ensure changes in this highly dynamic system are detected and can be managed in good time.
- 9.2.2 It is important that future surveyors have access to the full report with community descriptions, as the NVC codes on their own would prove misleading (see limitation 9.1.4, above).
- 9.2.3 As erosion is dynamic, future transects should aim to match the vegetation sequences identified, rather than adhere rigidly to the points at which transects were undertaken on this occasion.

9.3 Management recommendations

- 9.3.1 For favourable condition to be met, it is recommended that the extent of each community should be broadly maintained.
- 9.3.2 It is recommended that invasive non-native plant species are controlled, and where feasible, eradicated.
- 9.3.3 Cliff top habitat should be monitored carefully with a programme of managed retreat ahead of actual erosion to allow the vegetation to take on characteristics of the current cliff top prior to the vegetation joining the eroding soft cliff melee. In order to achieve this it is recommended that the SSSI boundary be reviewed to ensure at least 30m from the cliff top is taken out of arable or intensive pastoral management, and allowed to form grassland and scrub. This unmanaged grassland and scrub will then form the basis of the slope vegetation rather than a uniform, intensively managed grassland sward or arable soils with high nutrient content and little vegetation.

10.0 BIBLIOGRAPHY

Atherton I, Bosanquet S and Lawley M (2010) *Mosses and Liverworts of Britain and Ireland; a Field Guide*. British Bryological Society.

Carey J, Fish P and Moore R (2004) *Landslide Geomorphology of Cayton Bay, North Yorkshire*. Yorkshire Geological Society Circular 519 Proceedings of the Joint Meeting with Hull Geological Society; Glacial Landforms

Howe M (2003) Coastal soft cliffs and their importance for invertebrates. *British Wildlife* Vol 14 No. 5 pp323-332

Milliken W and Pendry C (2002) *Maritime cliff vegetation of Flamborough Head* Survey undertaken for English Nature.

Poland J and Clement E (2009) *The Vegetative Key to the British Flora* BSBI

Porley R and Hodgetts N (2005) *Mosses and Liverworts*. Collins, London

Rodwell JS (Ed) 1991. *British Plant Communities Volume 1. Woodlands and scrub*. Cambridge University Press, Cambridge

Rodwell, J. S. (Ed). 1991. *British Plant Communities Volume 2: Mires and heaths*. Cambridge University Press, Cambridge.

Rodwell, J. S. (Ed). 1992. *British Plant Communities Volume 3: Grasslands and montane communities*. Cambridge University Press, Cambridge.

Rodwell JS (2006) *National Vegetation Classification: User's Handbook* JNCC

Rose F (1989) *Colour identification guide to the grasses, sedges and rushes of the British Isles and north-western Europe*. Viking Press

Rose F (2006) *The Wild Flower Key* Penguin

Stace, C. (2010) *New Flora of the British Isles*. Third Ed. Cambridge University Press, Cambridge

Watson EV (1981) *British Mosses and Liverworts* Third Ed. Cambridge University Press, Cambridge.

FIGURE A

Overview of map sheets

FIGURE 1

**Vegetated sea cliff National Vegetation Classification
communities**

FIGURE 2

Phase 1 Habitat Survey (non-vegetated areas)

FIGURE 3

National Vegetation Classification quadrat locations

FIGURE 4

Vegetation community transect locations

FIGURE 5

Target note locations

FIGURE 6
Photograph locations

APPENDIX 1

PLANT SPECIES LISTS

SPECIES LIST: TREES AND SHRUBS

Notable non-native plants in bold

Species	Common name
<i>Acer campestre</i>	Field maple
<i>Acer pseudoplatanus</i>	Sycamore
<i>Alnus glutinosa</i>	Alder
<i>Betula pubescens</i>	Downy birch
<i>Calluna vulgaris</i>	Ling heather
Cotoneaster var	Cotoneaster
<i>Crataegus monogyna</i>	Hawthorn
<i>Erica cinerea</i>	Bell heather
<i>Fagus sylvatica</i>	Beech
<i>Fraxinus excelsior</i>	Ash
<i>Hippophae rhamnoides</i>	Sea buckthorn
<i>Ilex aquifolium</i>	Holly
Ligustrum vulgare	Wild privet (possible garden escape)
Lonicera nitida var.	Shrub honeysuckle
<i>Prunus spinosa</i>	Blackthorn
<i>Quercus robur</i>	Pedunculate oak
<i>Rosa canina</i>	Dog rose
<i>Rubus fruticosus agg.</i>	Bramble
<i>Salix alba</i>	White willow
<i>Salix caprea</i>	Goat willow
<i>Salix cinerea</i>	Grey willow
<i>Salix viminalis</i>	Osier
<i>Sambucus nigra</i>	Elder
<i>Ulex europaeus</i>	Gorse
<i>Ulmus glabra</i>	Wych elm

SPECIES LIST: FORBS

Notable non-native species in bold

Species	Common name
<i>Achillea millefolium</i>	Yarrow
<i>Achillea ptarmica</i>	Sneezewort
<i>Agrimonia eupatoria</i>	Agrimony
<i>Anthriscus sylvestris</i>	Cow parsley
<i>Anthyllis vulneraria</i>	Kidney vetch
<i>Atriplex glabriuscula</i>	Babington's orache
<i>Atriplex prostrata</i>	Spear-leaved orache
<i>Bellis perennis</i>	Daisy
<i>Berula erecta</i>	Lesser water-parsnip
<i>Blackstonia perfoliata</i>	Yellow wort
<i>Cakile maritima</i>	Sea rocket
<i>Calystegia sepium</i>	Hedge bindweed
<i>Campanula rotundifolia</i>	Harebell
<i>Carduus nutans</i>	Musk thistle
<i>Carlina vulgaris</i>	Carline thistle
<i>Centaurea nigra</i>	Black knapweed
<i>Cerastium fontanum</i>	Common mouse-ear
<i>Chamerion angustifolium</i>	Rosebay willowherb
<i>Chrysanthemum maximum</i>	Cultivated ox-eye daisy
<i>Chrysosplenium oppositifolium</i>	Opposite leaved golden saxifrage
<i>Circea lutetiana</i>	Enchanter's nightshade
<i>Cirsium palustre</i>	Marsh thistle
<i>Cirsium arvense</i>	Creeping thistle
<i>Cirsium palustre</i>	Marsh thistle
<i>Cirsium vulgare</i>	Spear thistle
<i>Conopodium majus</i>	Pignut
<i>Crocsmia var</i>	Montbretia
<i>Dactylohrhiza fuchsii</i>	Common spotted orchid
<i>Dactylohrhiza praetermissa</i>	Southern marsh-orchid
<i>Daucus carota</i>	Wild carrot
<i>Epilobium hirsutum</i>	Greater willowherb
<i>Epilobium hirsutum</i>	Greater willowherb
<i>Epilobium montanum</i>	Broad-leaved willowherb
<i>Epilobium parviflorum</i>	Hoary plantain
<i>Eupatorium cannabinum</i>	Hemp-agrimony
<i>Filipendula ulmaria</i>	Meadowsweet
<i>Filipendula vulgaris</i>	Dropwort
<i>Galeopsis tetrahit</i>	Common hemp-nettle
<i>Galium verum</i>	Lady's bedstraw
<i>Geranium robertianum</i>	Herb Robert
<i>Geum rivale</i>	Water avens
<i>Geum urbanum</i>	Wood avens
<i>Glaux maritima</i>	Sea-milkwort
<i>Heracleum sphondylium</i>	Hogweed

Notable non-native species in bold

Species	Common name
<i>Honckenia peploides</i>	Sea sandwort
<i>Hypericum calycinum</i>	Rose of Sharon
<i>Hypericum maculatum</i>	Imperforate St. John's-wort
<i>Hypericum tetapterum</i>	Square-stalked St John's-wort
<i>Iris pseudacorus</i>	Yellow flag iris
<i>Lamium album</i>	White dead-nettle
<i>Lathyrus pratensis</i>	Meadow vetchling
<i>Leontodon autumnalis</i>	Autumn hawkbit
<i>Leontodon hispidus</i>	Rough hawkbit
<i>Linum catharticum</i>	Fairy flax
<i>Lonicera periclymenum</i>	Honeysuckle
<i>Lotus corniculatus</i>	Bird's-foot trefoil
<i>Lysimachia vulgaris</i>	Yellow loosestrife
<i>Mentha aquatica</i>	Water mint
<i>Myosotis scorpioides</i>	Water forget-me-not
<i>Oenanthe crocata</i>	Hemlock water-dropwort
<i>Ononis repens</i>	Restharrow
<i>Parnassia palustris</i>	Grass of Parnassus
<i>Pilosella officinarum</i>	Mouse-ear hawkweed
<i>Plantago lanceolata</i>	Ribwort plantain
<i>Plantago major</i>	Greater plantain
<i>Plantago maritima</i>	Sea plantain
<i>Polygonum persicaria</i>	Redshank
<i>Potentilla anserina</i>	Silverweed
<i>Potentilla erecta</i>	Tormentil
<i>Potentilla reptans</i>	Creeping cinquefoil
<i>Primula veris</i>	Cowslip
<i>Primula vulgaris</i>	Primrose
<i>Pulicaria dysentrica</i>	Common fleabane
<i>Ranunculus ficaria</i>	Lesser celandine
<i>Ranunculus repens</i>	Creeping buttercup
<i>Rhinanthus minor</i>	Hay rattle
<i>Rhinanthus minor</i>	Yellow rattle
<i>Rumex acetosa</i>	Common sorrel
<i>Rumex conglomeratus</i>	Clustered dock
<i>Rumex obtusifolius</i>	Broad-leaved dock
<i>Rumex sanguineus</i>	Wood dock
<i>Sanguisorba minor</i>	Salad burnet
<i>Scabiosa columbaria</i>	Small scabious
<i>Senecio erucifolius</i>	Hoary ragwort
<i>Senecio jacobaea</i>	Common ragwort
<i>Silene dioica</i>	Red campion
<i>Solidago virgaurea</i>	Goldenrod
<i>Sonchus arvensis</i>	Perennial sow-thistle
<i>Sonchus asper</i>	Prickly sow-thistle

Notable non-native species in bold

Species	Common name
<i>Sonchus oleraceus</i>	Smooth sow-thistle
<i>Stachys sylvatica</i>	Hedge woundwort
<i>Stellaria graminea</i>	Lesser stitchwort
<i>Stellaria holostea</i>	Greater stitchwort
<i>Succisa pratensis</i>	Devil's-bit scabious
<i>Symphytum officinale</i>	Comfrey
<i>Tamus communis</i>	Black bryony
<i>Taraxacum officinale</i>	Dandelion
<i>Tellima grandiflora</i>	Fringe-cup
<i>Tragopogon pratensis</i>	Goat's-beard
<i>Trifolium pratense</i>	Red clover
<i>Trifolium repens</i>	White clover
<i>Triglochin palustris</i>	Marsh arrowgrass
<i>Tussilago farfara</i>	Colt's-foot
<i>Urtica dioica</i>	Common nettle
<i>Veronica beccabunga</i>	Brooklime
<i>Veronica chamaedrys</i>	Germander speedwell
<i>Vicia cracca</i>	Tufted vetch
<i>Vicia sepium</i>	Bush vetch
<i>Viola riviniana</i>	Common dog violet

SPECIES LIST: GRASSES, SEDGES, CLUBRUSH, RUSH, WOODRUSH AND HORSETAILS

Species	Common name
<i>Agrostis capillaris</i>	Common bent
<i>Anthoxanthum odoratum</i>	Sweet vernal grass
<i>Arrhenatherum elatius</i>	False oat-grass
<i>Brachypodium sylvaticum</i>	False-brome
<i>Briza media</i>	Quaking grass
<i>Bromopsis ramosa</i>	Hairy brome
<i>Bromus erectus</i>	Upright brome
<i>Bulboschoenus maritimus</i>	Sea clubrush
<i>Carex flacca</i>	Glaucous sedge
<i>Carex hirta</i>	Hairy sedge
<i>Carex otrubae</i>	False fox-sedge
<i>Carex panacea</i>	Carnation sedge
<i>Carex pendula</i>	Pendulous sedge
<i>Dactylis glomerata</i>	Cock's-foot
<i>Deschampsia flexuosa</i>	Wavy hair-grass
<i>Deschampsia cespitosa</i>	Tufted hair-grass
<i>Elytrigia atherica</i>	Sea couch
<i>Elytrigia repens</i>	Common couch
<i>Equisetum palustris</i>	Marsh horsetail
<i>Festuca arundinacea</i>	Tall fescue
<i>Festuca ovina</i>	Sheep's fescue
<i>Festuca rubra</i>	Red fescue
<i>Glyceria notata</i>	Plicate sweet-grass
<i>Helictotrichon pubescens</i>	Downy oat-grass
<i>Holcus lanatus</i>	Yorkshire fog
<i>Juncus articulatus</i>	Jointed rush
<i>Juncus articulatus</i>	Jointed rush
<i>Juncus conglomeratus</i>	Compact rush
<i>Juncus effusus</i>	Soft rush
<i>Juncus inflexus</i>	Hard rush
<i>Lolium perenne</i>	Perennial rye-grass
<i>Luzula sylvatica</i>	Great woodrush
<i>Phleum pratense</i>	Meadow foxtail
<i>Phragmites australis</i>	Common reed
<i>Poa annua</i>	Annual meadow-grass
<i>Schoenoplectus tabernaemontani</i>	Grey clubrush
<i>Typha latifolia</i>	Reedmace

SPECIES LIST: FERNS

Species	Common name
<i>Asplenium scolopendrium</i>	Harts-tongue fern
<i>Dryopteris affinis</i> agg.	Scaly male fern
<i>Dryopteris dilatata</i>	Broad buckler fern
<i>Dryopteris filix-mas</i>	Male fern
<i>Dryopteris dilatata</i>	Broad buckler fern
<i>Polystichum aculeatum</i>	Hard shield-fern

SPECIES LIST: BRYOPHYTES

Species	Common name
<i>Atrichum undulatum</i>	Catherine's moss
<i>Brachythecium rivulare</i>	River feather-moss
<i>Brachythecium rutabulum</i>	Rough-stalked feather-moss
<i>Calliergonella cuspidata</i>	Pointed spear-moss
<i>Campylopus introflexus</i>	Heath star-moss
<i>Campylopus pyriformis</i>	Dwarf swan-neck moss
<i>Ctenidium molluscum</i>	Comb-moss
<i>Dicranum scoparium</i>	Broom fork-moss
<i>Eurhynchium striatum</i>	Common striated feather-moss
<i>Fissidens dubius</i>	Rock pocket-moss
<i>Fissidens sp.</i>	Pocket moss
<i>Fissidens taxifolius</i>	Common pocket-moss
<i>Homalothecium lutescens</i>	Yellow feather-moss
<i>Hypnum cupressiforme</i>	Cypress-leaved plait-moss
<i>Hypnum jutlandicum</i>	Heath plait-moss
<i>Hypnum lacunosum</i>	Great plait-moss
<i>Kindbergia praelonga</i>	Common feather-moss
<i>Lophocolea bidentata</i>	Bifid crestwort
<i>Mnium hornum</i>	Swan's-neck thyme-moss
<i>Neckera complanata</i>	Flat neckera
<i>Palustriella commutata</i>	Curled hook-moss
<i>Pellia endiviifolia</i>	Endive pellia (liverwort)
<i>Plagiomnium undulatum</i>	Hart's-tongue thyme-moss
<i>Pseudoscleropodium purum</i>	Neat feather-moss
<i>Rhizomnium punctatum</i>	Dotted thyme-moss
<i>Rhytidiadelphus squarrosus</i>	Springy turf-moss
<i>Rhytidiadelphus triquetrus</i>	Big shaggy-moss
<i>Riccardia sp.</i>	
<i>Thamnobryum alopecurum</i>	Fox-tail feather-moss
<i>Thuidium tamariscinum</i>	Tamarisk moss

APPENDIX 2

QUADRAT SUMMARY

Surveyor name	Site Name	Site code	Quadrat Number	Quadrat field number	NVC community	Date of survey	Slope	Aspect	Photo - graphic record	Eastings	Northings
Gordon Haycock	Cayton Bay SSSI	1004165	1	MC9a: 1	MC9a	26/08/2010	45	30	Photo 16	507433	484036
Gordon Haycock	Cayton Bay SSSI	1004165	2	MG11b: 2	MG11b	26/08/2010	55	40		507428	484041
Gordon Haycock	Cayton Bay SSSI	1004165	3	MC8f: 1	MC8f	25/08/2010	45	20		507392	484100
Gordon Haycock	Cayton Bay SSSI	1004165	4	MC8f: 2	MC8f	25/08/2010	45	30		507332	484142
Gordon Haycock	Cayton Bay SSSI	1004165	5	MG11b: 3	MG11b	26/08/2010	40	40		507184	484159
Gordon Haycock	Cayton Bay SSSI	1004165	6	MG12a: 4	MG12a	25/08/2010	20	50		507187	484194
Gordon Haycock	Cayton Bay SSSI	1004165	7	M10b: 2	M10b	25/08/2010	45	50		507152	484197
Gordon Haycock	Cayton Bay SSSI	1004165	8	SM24: 1	SM24	26/08/2010	0	-		507234	484210
Gordon Haycock	Cayton Bay SSSI	1004165	9	MG12a: 2	MG12a	26/08/2010	25	20		507198	484210
Gordon Haycock	Cayton Bay SSSI	1004165	10	MG12a: 1	MG12a	26/08/2010	10	40		507173	484211
Gordon Haycock	Cayton Bay SSSI	1004165	11	MG1e: 1	MG1e	25/08/2010	20	40		507062	484271
Gordon Haycock	Cayton Bay SSSI	1004165	12	M10b: 1	M10b	25/08/2010	30	340		507112	484218
Gordon Haycock	Cayton Bay SSSI	1004165	13	MC9c: 3	MC9c	26/08/2010	15	10		507219	484191

Surveyor name	Site Name	Site code	Quadrat Number	Quadrat field number	NVC community	Date of survey	Slope	Aspect	Photo - graphic record	Eastings	Northings
Gordon Haycock	Cayton Bay SSSI	1004165	14	MG12a: 5	MG12a	25/08/2010	45	10		507088	484231
Gordon Haycock	Cayton Bay SSSI	1004165	15	MG12a: 3	MG12a	26/08/2010	15	20		507178	484232
Gordon Haycock	Cayton Bay SSSI	1004165	16	MC8f: 3	MC8f	25/08/2010	15	50		507049	484272
Gordon Haycock	Cayton Bay SSSI	1004165	17	S12b: 2	S12b	25/08/2010	0	-		507190	484243
Gordon Haycock	Cayton Bay SSSI	1004165	18	S12b: 1	S12b	25/08/2010	0	-		507116	484248
Gordon Haycock	Cayton Bay SSSI	1004165	19	MC9c: 1	MC9c	25/08/2010	25	140		507140	484262
Gordon Haycock	Cayton Bay SSSI	1004165	20	MC9c: 2	MC9c	25/08/2010	0	-		507100	484271
Gordon Haycock	Cayton Bay SSSI	1004165	21	MC9a: 2	MC9a	26/08/2010	5	60		506977	484279
Gordon Haycock	Cayton Bay SSSI	1004165	22	MG1e: 2	MG1e	25/08/2010	35	20		507031	484308
Gordon Haycock	Cayton Bay SSSI	1004165	23	MG11b: 1	MG11b	25/08/2010	5	0		507045	484295
Gordon Haycock	Cayton Bay SSSI	1004165	24	MG11b: 4	MG11b	26/08/2010	45	70		506849	484342
Gordon Haycock	Cayton Bay SSSI	1004165	25	MC8f: 4	MC8f	26/08/2010	15	340		506795	484403
Gordon Haycock	Cayton Bay SSSI	1004165	26	MG5a: 1	MG5a	27/08/2010	30	50		506489	484529

Surveyor name	Site Name	Site code	Quadrat Number	Quadrat field number	NVC community	Date of survey	Slope	Aspect	Photo - graphic record	Eastings	Northings
Gordon Haycock	Cayton Bay SSSI	1004165	27	CG7: 1	CG7	27/08/2010	40	0		506471	484546
Gordon Haycock	Cayton Bay SSSI	1004165	28	U4b: 1	U4b	27/08/2010	0	-		506530	484554
Gordon Haycock	Cayton Bay SSSI	1004165	29	MG5a: 3	MG5a	27/08/2010	30	50		506531	484571
Gordon Haycock	Cayton Bay SSSI	1004165	30	MG5a: 2	MG5a	27/08/2010	15	20		506470	484585
Gordon Haycock	Cayton Bay SSSI	1004165	31	MC9a: 3	MC9a	26/08/2010	10	60		506577	484596
Gordon Haycock	Cayton Bay SSSI	1004165	32	W21: 1	W21	27/08/2010	25	200	Photo 35	506497	484607
Gordon Haycock	Cayton Bay SSSI	1004165	33	W21: 2	W21	27/08/2010				506350	484609
Gordon Haycock	Cayton Bay SSSI	1004165	34	U4b: 2	U4b	27/08/2010	10	350		506484	484641
Gordon Haycock	Cayton Bay SSSI	1004165	35	MC8f: 5	MC8f	27/08/2010	20	45		506530	484637
Gordon Haycock	Cayton Bay SSSI	1004165	36	MG5a: 4	MG5a	27/08/2010	10	40		506441	484666
Gordon Haycock	Cayton Bay SSSI	1004165	37	U4b: 3	U4b	27/08/2010	20	10		506377	484733
Gordon Haycock	Cayton Bay SSSI	1004165	38	MG5a: 5	MG5a	27/08/2010	5	10		506317	484788
Gordon Haycock	Cayton Bay SSSI	1004165	39	MC8f: 6	MC8f	27/08/2010	10/85/30	70		506379	484820

Surveyor name	Site Name	Site code	Quadrat Number	Quadrat field number	NVC community	Date of survey	Slope	Aspect	Photo - graphic record	Eastings	Northings
Gordon Haycock	Cayton Bay SSSI	1004165	40	W8e: 1	W8e	07/09/2010			Photo 53	506090	484860
Gordon Haycock	Cayton Bay SSSI	1004165	41	CG7: 3	CG7	27/08/2010	60	70		506325	484868
Gordon Haycock	Cayton Bay SSSI	1004165	42	W10e: 1	W10e	07/09/2010				506189	484900
Gordon Haycock	Cayton Bay SSSI	1004165	43	CG7: 2	CG7	27/08/2010	45	80		506327	484901
Gordon Haycock	Cayton Bay SSSI	1004165	44	W10e: 2	W10e	07/09/2010				506181	484981
Gordon Haycock	Cayton Bay SSSI	1004165	45	W8e: 2	W8e	07/09/2010				506058	485019
Gordon Haycock	Cayton Bay SSSI	1004165	46	W7a: 1	W7a	07/09/2010	30	100		506275	485102
Gordon Haycock	Cayton Bay SSSI	1004165	47	W8e: 3	W8e	07/09/2010				506003	485108
Gordon Haycock	Cayton Bay SSSI	1004165	48	W7a: 2	W7a	07/09/2010	10	130	Photo 56	506266	485137
Gordon Haycock	Cayton Bay SSSI	1004165	49	W7a: 3	W7a	07/09/2010	10	80		506282	485177
Gordon Haycock	Cayton Bay SSSI	1004165	50	W7a: 4	W7a	07/09/2010	0	-		506270	485246
Gordon Haycock	Cayton Bay SSSI	1004165	51	W8e: 4	W8e	07/09/2010	10	20		506231	485359
Gordon Haycock	Cayton Bay SSSI	1004165	52	MG12a: 6	MG12a	26/08/2010	30	90		506452	485388

Surveyor name	Site Name	Site code	Quadrat Number	Quadrat field number	NVC community	Date of survey	Slope	Aspect	Photo - graphic record	Eastings	Northings
Gordon Haycock	Cayton Bay SSSI	1004165	53	MC9c: 4	MC9c	07/09/2010	10	120		506504	485429
Gordon Haycock	Cayton Bay SSSI	1004165	54	W8e: 5	W8e	07/09/2010	15	80	Photo 63	506229	485572
Gordon Haycock	Cayton Bay SSSI	1004165	55	W8e: 6	W8e	07/09/2010	45	150		506090	485595
Gordon Haycock	Cayton Bay SSSI	1004165	56	W7a: 5	W7a	07/09/2010	5	100		506182	485654
Gordon Haycock	Cayton Bay SSSI	1004165	57	M10b: 3	M10b	08/09/2010	40	50		505758	486037
Gordon Haycock	Cayton Bay SSSI	1004165	58	MG5a: 6	MG5a	08/09/2010	10	70	Photo 75	505799	486062
Gordon Haycock	Cayton Bay SSSI	1004165	59	MG12a: 7	MG12a	08/09/2010	20	30		505848	486278
Gordon Haycock	Cayton Bay SSSI	1004165	60	W8e: 7	W8e	07/09/2010				505026	486790

APPENDIX 3
DAFOR TABLES

Community MG1e

Species	Common name	DAFOR and comments
<i>Achillea millefolium</i>	Yarrow	O
<i>Achillea ptarmica</i>	Sneezewort	R
<i>Agrimonia eupatoria</i>	Agrimony	R
<i>Agrostis stolonifera</i>	Creeping bent	O
<i>Arrhenatherum elatius</i>	False oat-grass	A
<i>Brachythecium rutabulum</i>	Rough-stalked feather-moss	O
<i>Centaurea nigra</i>	Black knapweed	LA
<i>Cirsium arvense</i>	Creeping thistle	LF
<i>Dactylis glomerata</i>	Cock's foot	F
<i>Deschampsia cespitosa</i>	Tufted hair-grass	O
<i>Equisetum arvense</i>	Field horsetail	LD
<i>Festuca arundinacea</i>	Tall fescue	F
<i>Festuca ovina</i>	Sheep's fescue	F
<i>Festuca rubra</i>	Red fescue	F
<i>Heracleum sphondylium</i>	Hogweed	O
<i>Holcus lanatus</i>	Yorkshire fog	F
<i>Kindbergia praelonga</i>	Common feather-moss	LF
<i>Lamium album</i>	White dead-nettle	R
<i>Lathyrus pratensis</i>	Meadow vetchling	O
<i>Lophocolea bidentata</i>	Bifid crestwort	O
<i>Plantago lanceolata</i>	Ribwort plantain	O
<i>Potentilla anserina</i>	Silverweed	R
<i>Potentilla reptans</i>	Creeping cinquefoil	LF
<i>Pulicaria dysenterica</i>	Common fleabane	LD
<i>Ranunculus repens</i>	Creeping buttercup	LF
<i>Rhinanthus minor</i>	Yellow rattle	R
<i>Rubus fruticosus</i> agg	Bramble	R
<i>Rumex acetosa</i>	Common sorrel	O
<i>Sonchus oleraceus</i>	Smooth sow-thistle	O
<i>Tragopogon pratensis</i>	Goat's-beard	R
<i>Trifolium pratense</i>	Red clover	O
<i>Tussilago farfara</i>	Colt's-foot	O

Community MG5a

Species	Common name	DAFOR and comments
<i>Achillea millefolium</i>	Yarrow	F
<i>Agrimonia eupatoria</i>	Agrimony	R
<i>Agrostis capillaris</i>	Common bent	LF
<i>Agrostis stolonifera</i>	Creeping bent	LF
<i>Anthoxanthum odoratum</i>	Sweet vernal grass	O
<i>Arrhenatherum elatius</i>	False oat-grass	LF
<i>Brachypodium sylvaticum</i>	False-brome	O
<i>Brachythecium rutabulum</i>	Rough-stalked feather-moss	R
<i>Calliergonella cuspidata</i>	Pointed spear-moss	LF
<i>Carex flacca</i>	Glaucous sedge	O
<i>Centaurea nigra</i>	Black knapweed	F
<i>Cerastium fontanum</i>	Common mouse-ear	O
<i>Cirsium arvense</i>	Creeping thistle	F
<i>Cirsium palustre</i>	Marsh thistle	R
<i>Cirsium vulgare</i>	Spear thistle	R
<i>Conopodium majus</i>	Pignut	F
<i>Crataegus monogyna</i> (seedling)	Hawthorn	R
<i>Dactylis glomerata</i>	Cock's-foot	F
<i>Dactylohriza fuchsii</i>	Common spotted orchid	R
<i>Deschampsia cespitosa</i>	Tufted hair-grass	O
<i>Equisetum arvense</i>	Field horsetail	O / LF
<i>Festuca arundinacea</i>	Tall fescue	O
<i>Festuca rubra</i>	Red fescue	D
<i>Filipendula ulmaria</i>	Meadowsweet	O
<i>Fissidens taxifolius</i>	Common pocket-moss	R
<i>Galium verum</i>	Lady's bedstraw	LF
<i>Heracleum sphondylium</i>	Hogweed	O
<i>Holcus lanatus</i>	Yorkshire fog	A
<i>Lathyrus pratensis</i>	Meadow vetchling	O
<i>Leontodon hispidus</i>	Rough hawkbit	O
<i>Lotus corniculatus</i>	Bird's-foot trefoil	F
<i>Plantago lanceolata</i>	Ribwort plantain	F
<i>Plantago media</i>	Hoary plantain	R
<i>Potentilla erecta</i>	Tormentil	R
<i>Sanguisorba minor</i>	Salad burnet	LF
<i>Prunella vulgaris</i>	Self-heal	O
<i>Ranunculus repens</i>	Creeping buttercup	O
<i>Rhinanthus minor</i>	Yellow rattle	R / LF
<i>Rhytidiadelphus squarrosus</i>	Springy turf-moss	LF
<i>Rubus fruticosus</i> agg.	Bramble	R
<i>Rumex acetosa</i>	Common sorrel	A
<i>Pseudoscleropodium purum</i>	Neat feather-moss	R
<i>Senecio jacobaea</i>	Ragwort	O
<i>Succisa pratensis</i>	Devil's-bit scabious	LF
<i>Tragopogon pratensis</i>	Goat's-beard	R
<i>Trifolium pratense</i>	Red clover	F
<i>Tussilago farfara</i>	Colt's-foot	LF
<i>Vicia cracca</i>	Tufted vetch	O
<i>Viola riviniana</i>	Common dog violet	O

Community MG9

Species	Common name	DAFOR and comments
<i>Carex hirta</i>	Hairy sedge	R
<i>Cirsium arvense</i>	Creeping thistle	LA
<i>Deschampsia caespitosa</i>	Tufted hair-grass	O / LF
<i>Heracleum sphondylium</i>	Hogweed	O
<i>Holcus lanatus</i>	Yorkshire fog	D
<i>Phleum pratense</i>	Meadow foxtail	R
<i>Ranunculus repens</i>	Creeping buttercup	A
<i>Rumex conglomeratus</i>	Clustered dock	O
<i>Rumex obtusifolius</i>	Broad-leaved dock	O
<i>Stellaria holostea</i>	Greater stitchwort	R
<i>Urtica dioica</i>	Common nettle	LA

Community MG10

Species	Common name	DAFOR and comments
<i>Agrostis stolonifera</i>	Creeping bent	F
<i>Brachythecium rivulare</i>	River feather-moss	LF
<i>Calliergonella cuspidata</i>	Pointed spear-moss	F
<i>Carex flacca</i>	Glaucous sedge	F
<i>Carex panicea</i>	Carnation sedge	O
<i>Cirsium palustre</i>	Marsh thistle	F
<i>Dactylohriza praetermissa</i>	Southern marsh orchid	O
<i>Epilobium hirsutum</i>	Greater willowherb	F
<i>Equisetum arvense</i>	Field horsetail	LA
<i>Holcus lanatus</i>	Yorkshire fog	A
<i>Juncus articulatus</i>	Jointed rush	LF
<i>Juncus effusus</i>	Soft rush	LF
<i>Juncus inflexus</i>	Hard rush	LA
<i>Juncus conglomeratus</i>	Compact rush	LA
<i>Lathyrus pratensis</i>	Meadow vetchling	F
<i>Parnassia palustris</i>	Grass of Parnassus	O
<i>Plantago lanceolata</i>	Ribwort plantain	F
<i>Pulicaria dysenterica</i>	Common fleabane	LF
<i>Ranunculus repens</i>	Creeping buttercup	A
<i>Trifolium arvense</i>	Red clover	F
<i>Trifolium pratense</i>	Red clover	O
<i>Tussilago farfara</i>	Colt's-foot	O
<i>Epilobium parviflorum</i>	Hoary plantain	O
<i>Glyceria notata</i>	Plicate sweet-grass	O

Community MG11b

Species	Common name	DAFOR and comments
<i>Agrostis stolonifera</i>	Creeping bent	A
<i>Anthyllis vulneraria</i>	Kidney vetch	F
<i>Arrhenatherum elatius</i>	False oat-grass	R
<i>Carex panicea</i>	Carnation sedge	O
<i>Centaurea nigra</i>	Black knapweed	R
<i>Cirsium arvense</i>	Creeping thistle	R
<i>Dactylis glomerata</i>	Cock's-foot	R
<i>Equisetum arvense</i>	Field horsetail	R
<i>Eupatorium cannabinum</i>	Hemp agrimony	R
<i>Festuca rubra</i>	Red fescue	F
<i>Lathyrus pratensis</i>	Meadow vetchling	R
<i>Leontodon hispidus</i>	Rough hawkbit	O
<i>Lotus corniculatus</i>	Bird's-foot trefoil	O
<i>Plantago lanceolata</i>	Ribwort plantain	O
<i>Plantago maritima</i>	Sea plantain	R
<i>Plantago media</i>	Hoary plantain	R
<i>Pulicaria dysenterica</i>	Common fleabane	R
<i>Rhinanthus minor</i>	Yellow rattle	R
<i>Senecio erucifolius</i>	Hoary ragwort	R
<i>Taraxacum officinale</i>	Dandelion	R
<i>Tussilago farfara</i>	Colt's-foot	F

Community MG12a

Species	Common name	DAFOR and comments
<i>Achillea millefolium</i>	Yarrow	O
<i>Agrimonia eupatoria</i>	Agrimony	R
<i>Agrostis stolonifera</i>	Creeping bent	O
<i>Anthyllis vulneraria</i>	Kidney vetch	O
<i>Arrhenatherum elatius</i>	False oat-grass	O
<i>Brachythecium rivulare</i>	River feather-moss	F
<i>Brachythecium rutabulum</i>	Rough-stalked feather-moss	LA
<i>Calliergonella cuspidata</i>	Pointed spear-moss	A
<i>Carex flacca</i>	Glaucous sedge	F
<i>Centaurea nigra</i>	Black knapweed	F
<i>Chrysanthemum maximum</i>	Cultivated ox-eye daisy	LD
<i>Cirsium arvense</i>	Creeping thistle	F
<i>Cirsium palustre</i>	Marsh thistle	O
<i>Dactylis glomerata</i>	Cock's-foot	F / LA
<i>Dactylorhiza praetermissa</i>	Southern marsh orchid	O
<i>Daucus carota</i>	Wild carrot	O
<i>Deschampsia cespitosa</i>	Tufted hair-grass	O
<i>Elytrigia repens</i>	Common couch	O
<i>Epilobium hirsutum</i>	Greater willowherb	LF
<i>Equisetum arvense</i>	Field horsetail	A
<i>Equisetum palustris</i>	Marsh horsetail	LA
<i>Festuca arundinacea</i>	Tall fescue	LF
<i>Festuca rubra</i>	Red fescue	A
<i>Filipendula ulmaria</i>	Meadowsweet	LA
<i>Heracleum sphondylium</i>	Hogweed	F
<i>Holcus lanatus</i>	Yorkshire fog	F
<i>Juncus conglomeratus</i>	Compact rush	O
<i>Juncus inflexus</i>	Hard rush	O
<i>Kindbergia praelonga</i>	Common feather-moss	LF
<i>Lathyrus pratensis</i>	Meadow vetchling	F
<i>Leontodon hispidus</i>	Rough hawkbit	F
<i>Lophocolea bidentata</i>	Bifid crestwort	A
<i>Lotus corniculatus</i>	Bird's-foot trefoil	LF
<i>Parnassia palustris</i>	Grass of Parnassus	O
<i>Plantago lanceolata</i>	Ribwort plantain	A
<i>Plantago maritima</i>	Sea plantain	O
<i>Potentilla reptans</i>	Creeping cinquefoil	LF
<i>Prunella vulgaris</i>	Selfheal	O
<i>Pulicaria dysenterica</i>	Common fleabane	LD/A
<i>Rubus fruticosus</i> agg.	Bramble	O
<i>Rumex acetosa</i>	Common sorrel	R
<i>Senecio jacobaea</i>	Common ragwort	O
<i>Sonchus arvensis</i>	Perennial sow-thistle	O
<i>Trifolium pratense</i>	Red clover	O
<i>Triglochin palustre</i>	Marsh arrow-grass	LA
<i>Tussilago farfara</i>	Colt's-foot	F
<i>Urtica dioica</i>	Common nettle	R
<i>Vicia sepium</i>	Bush vetch	O

Community MG13

Species	Common name	DAFOR and comments
<i>Agrostis stolonifera</i>	Creeping bent	A
<i>Alopecurus geniculatus</i>	Marsh foxtail	O
<i>Callitriche stagnalis</i>	Common water-starwort	O
<i>Caltha palustris</i>	Marsh marigold	O
<i>Carex hirta</i>	Hairy sedge	LF
<i>Cerastium fontanum</i>	Common mouse-ear	R
<i>Cirsium arvense</i>	Creeping thistle	R
<i>Deschampsia cespitosa</i>	Tufted hair-grass	R
<i>Galium palustre</i>	Common marsh-bedstraw	R
<i>Glyceria notata</i>	Plicate sweet-grass	D
<i>Holcus lanatus</i>	Yorkshire fog	A
<i>Juncus articulatus</i>	Jointed rush	R
<i>Lathyrus pratensis</i>	Meadow vetchling	O
<i>Polygonum persicaria</i>	Redshank	LF
<i>Potentilla anserina</i>	Silverweed	R
<i>Potentilla reptans</i>	Creeping cinquefoil	R
<i>Ranunculus repens</i>	Creeping buttercup	A
<i>Rumex obtusifolius</i>	Broad-leaved dock	O
<i>Urtica dioica</i>	Common nettle	R

Community U4b

Species	Common name	DAFOR and comments
<i>Achillea millefolium</i>	Yarrow	F
<i>Agrostis capillaris</i>	Common bent	D
<i>Agrostis stolonifera</i>	Creeping bent	F
<i>Campanula rotundifolia</i>	Harebell	F
<i>Centaurea nigra</i>	Black knapweed	F
<i>Cerastium fontanum</i>	Common mouse-ear	O
<i>Cirsium arvense</i>	Creeping thistle	R
<i>Cirsium palustre</i>	Marsh thistle	R
<i>Conopodium majus</i>	Pignut	O
<i>Dactylis glomerata</i>	Cock's-foot	F
<i>Deschampsia cespitosa</i>	Tufted hair-grass	R
<i>Equisetum arvense</i>	Field horsetail	R
<i>Festuca rubra</i>	Red fescue	F
<i>Filipendula vulgaris</i>	Dropwort	O
<i>Heracleum sphondylium</i>	Hogweed	O
<i>Holcus lanatus</i>	Yorkshire fog	F
<i>Leontodon autumnalis</i>	Autumn hawkbit	F
<i>Leontodon hispidus</i>	Rough hawkbit	LF
<i>Plantago lanceolata</i>	Ribwort plantain	F
<i>Potentilla erecta</i>	Tormentil	F
<i>Potentilla reptans</i>	Creeping cinquefoil	R
<i>Pseudoscleropodium purum</i>	Neat feather-moss	LA
<i>Rhytidiadelphus squarrosus</i>	Springy turf-moss	A
<i>Rumex acetosa</i>	Common sorrel	F
<i>Stellaria graminea</i>	Lesser stitchwort	O
<i>Succisa pratensis</i>	Devil's-bit scabious	LF
<i>Trifolium pratense</i>	Red clover	F
<i>Viola riviniana</i>	Common dog's violet	LF

Community U2

Species	Common name	DAFOR and comments
<i>Agrostis capillaris</i>	Common bent	A
<i>Campanula rotundifolia</i>	Harebell	F
<i>Dactylis glomerata</i>	Cock's-foot	F
<i>Deschampsia flexuosa</i>	Wavy hairgrass	D
<i>Potentilla erecta</i>	Tormentil	F
<i>Rumex acetosa</i>	Common sorrel	F
<i>Succisa pratensis</i>	Devil's bit scabious	R

Community H12

Species	Common name	DAFOR and comments
<i>Deschampia flexuosa</i>	Wavy hair-grass	LF
<i>Erica cinerea</i>	Bell heather	LF
<i>Dicranum scoparium</i>	Broom fork-moss	O
<i>Dryopteris dilatata</i>	Broad buckler fern	O
<i>Luzula sylvatica</i>	Great woodrush	LF
<i>Calluna vulgaris</i>	Ling heather	D
<i>Campylopus introflexus</i>	Heath star-moss	O
<i>Campylopus pyriformis</i>	Dwarf swan-neck moss	O
<i>Festuca rubra</i>	Red fescue	F
<i>Hypnum jutlandicum</i>	Heath plait-moss	A
<i>Potentilla erecta</i>	Tormentil	F
<i>Pseudoscleropodium purum</i>	Neat feather-moss	F

Community CG7

Species	Common name	DAFOR and comments
<i>Achillea millefolium</i>	Yarrow	O
<i>Agrimonia eupatoria</i>	Agrimony	R
<i>Agrostis stolonifera</i>	Creeping bent	F
<i>Anthoxanthum odoratum</i>	Sweet vernal grass	O
<i>Anthyllis vulneraria</i>	Kidney vetch	F
<i>Arrhenatherum elatius</i>	False oat-grass	O
<i>Bellis perennis</i>	Daisy	R
<i>Blackstonia perfoliata</i>	Yellow-wort	O
<i>Brachypodium sylvaticum</i>	False-brome	F
<i>Briza media</i>	Quaking grass	O
<i>Calliergonella cuspidata</i>	Pointed spear-moss	A
<i>Campanula rotundifolia</i>	Harebell	O
<i>Carex flacca</i>	Glaucous sedge	O
<i>Carex panicea</i>	Carnation sedge	O
<i>Carlina vulgaris</i>	Carlina thistle	LF
<i>Centaurea nigra</i>	Black knapweed	F
<i>Cirsium arvense</i>	Creeping thistle	O
<i>Ctenidium molluscum</i>	Comb-moss	LA
<i>Dactylis glomerata</i>	Cock's-foot	F
<i>Daucus carota</i>	Wild carrot	LF
<i>Equisetum arvense</i>	Field horsetail	O
<i>Festuca arundinacea</i>	Tall fescue	O
<i>Festuca ovina</i>	Sheep's fescue	LF
<i>Festuca rubra</i>	Red fescue	F
<i>Filipendula ulmaria</i>	Meadowsweet	O
<i>Fissidens dubius</i>	Rock pocket-moss	vLF
<i>Galium verum</i>	Lady's bedstraw	F
<i>Helictotrichon pubescens</i>	Downy oat-grass	R
<i>Heracleum sphondylium</i>	Hogweed	R
<i>Holcus lanatus</i>	Yorkshire fog	O
<i>Lathyrus pratensis</i>	Meadow vetchling	R
<i>Leontodon hispidus</i>	Rough hawkbit	F
<i>Linum catharticum</i>	Fairy flax	F
<i>Lotus corniculatus</i>	Bird's-foot trefoil	F
<i>Ononis repens</i>	Restharrow	LF
<i>Pilosella officinarum</i>	Mouse-ear hawkweed	A
<i>Plantago lanceolata</i>	Ribwort plantain	F
<i>Plantago media</i>	Hoary plantain	A
<i>Potentilla erecta</i>	Tormentil	R
<i>Primula veris</i>	Cowslip	O
<i>Prunella vulgaris</i>	Self-heal	O
<i>Pseudoscleropodium purum</i>	Neat fetaher-moss	F
<i>Pulicaria dysentrica</i>	Common fleabane	LF
<i>Rhinanthus minor</i>	Hay rattle	R
<i>Rhytidiadelphus triquetrus</i>	Big shaggy-moss	LA
<i>Sanguisorba minor</i>	Salad burnet	LF
<i>Scabiosa columbaria</i>	Small scabious	O
<i>Succisa pratensis</i>	Devil's-bit scabious	O
<i>Thuidium tamariscinum</i>	Tamarisk moss	vLA
<i>Trifolium palustre</i>	Red clover	O
<i>Triglochin palustris</i>	Marsh arrow-grass	LF
<i>Tussilago farfara</i>	Colt's-foot	O

Community M38

Species	Common name	DAFOR and comments
<i>Carex panicea</i>	Carnation sedge	A
<i>Ctenidium molluscum</i>	Comb-moss	F
Heptatic mat		A
<i>Homothecium lutescens</i>	Yellow feather-moss	O
<i>Hypnum lacunosum</i>	Great plait-moss	LF
<i>Palustriella commutata</i>	Curled hook-moss	LA

Community M10b

Species	Common name	DAFOR and comments
<i>Agrostis stolonifera</i>	Creeping bent	R
<i>Anthyllis vulneraria</i>	Kidney vetch	R
<i>Blackstonia perfoliata</i>	Yellow wort	O
<i>Brachythecium rivulare</i>	River feather-moss	LA
<i>Calliergonella cuspidata</i>	Pointed spear-moss	LA
<i>Carex flacca</i>	Carnation sedge	F
<i>Carex panicea</i>	Carnation sedge	A
<i>Cirsium palustre</i>	Marsh thistle	O
<i>Dactylis glomerata</i>	Cock's-foot	F
<i>Dactylohrhiza praetermissa</i>	Southern marsh-orchid	O
<i>Equisetum arvense</i>	Field horsetail	LF/O
<i>Festuca rubra</i>	Red fescue	F
Hepatic mat		A / LD
<i>Holcus lanatus</i>	Yorkshire fog	O
<i>Homothecium lutescens</i>	Yellow feather-moss	O
<i>Juncus articulatus</i>	Jointed rush	F
<i>Juncus inflexus</i>	Hard rush	R
<i>Leontodon hispidus</i>	Rough hawkbit	F
<i>Linum catharticum</i>	Fairy flax	O
<i>Parnassia palustris</i>	Grass of Parnassus	F
<i>Plantago lanceolata</i>	Ribwort plantain	O
<i>Plantago maritima</i>	Sea plantain	O
<i>Pulicaria dysenterica</i>	Common fleabane	O
<i>Taraxacum officinale</i> agg.	Dandelion	R
<i>Trifolium repens</i>	White clover	R
<i>Triglochin palustris</i>	Marsh arrowgrass	F
<i>Tussilago farfara</i>	Colt's-foot	O
<i>Hypnum lacunosum</i>	Great plait-moss	LF
<i>Lophocolea bidentata</i>	Bifid crestwort	O

Community S12b

Species	Common name	DAFOR and comments
<i>Brachythecium rutabulum</i>	Rough-stalked feather-moss	F
<i>Calliergonella cuspidata</i>	Pointed spear-moss	A
<i>Carex otrubae</i>	False fox-sedge	R
<i>Centaurea nigra</i>	Black knapweed	O
<i>Cirsium palustre</i>	Marsh thistle	F
<i>Epilobium hirsutum</i>	Greater willowherb	LD
<i>Equisetum palustris</i>	Marsh horsetail	A
<i>Eupatorium cannabinum</i>	Hemp-agrimony	O
<i>Festuca arundinacea</i>	Tall fescue	O
<i>Filipendula ulmaria</i>	Meadowsweet	LA
<i>Heracleum sphondylium</i>	Hogweed	F
<i>Holcus lanatus</i>	Yorkshire fog	F
<i>Hypericum tetapterum</i>	Square-stalked St John's-wort	R
<i>Iris pseudacorus</i>	Yellow flag iris	O
<i>Juncus inflexus</i>	Hard rush	LF
<i>Mentha aquatica</i>	Water mint	A
<i>Oenanthe crocata</i>	Hemlock water-dropwort	R
<i>Pulicaria dysenterica</i>	Common fleabane	O
<i>Typha latifolia</i>	Reedmace	D
<i>Vicia sepium</i>	Bush vetch	O

BRACKISH POOL COMMUNITY

Species	Common name	DAFOR and comments
CANOPY		
<i>Alnus glutinosa</i>	Alder	F
<i>Salix alba</i>	White willow	R
<i>Salix caprea</i>	Goat willow	R
HERB LAYER		
<i>Agrostis stolonifera</i>	Creeping bent	LA
<i>Berula erecta</i>	Lesser water-parsnip	LF
<i>Bulboschoenus maritimus</i>	Sea clubrush	LF
<i>Calystegia sepium</i>	Hedge bindweed	R
<i>Carex pendula</i>	Pendulous sedge	F
<i>Epilobium hirsutum</i>	Greater willowherb	LF
<i>Equisetum arvense</i>	Field horsetail	O
<i>Eupatorium cannabinum</i>	Hemp-agrimony	LA
<i>Filipendula ulmaria</i>	Meadowsweet	R
<i>Juncus inflexus</i>	Hard rush	O
<i>Phragmites australis</i>	Common reed	D
<i>Potentilla anserina</i>	Silverweed	R
<i>Pulicaria dysenterica</i>	Common fleabane	O
<i>Schoenoplectus tabernaemontani</i>	Grey clubrush	LF
<i>Triglochin palustris</i>	Marsh arrowgrass	O
<i>Tussilago farfara</i>	Colt's-foot	R

Community MC9

Species	Common name	DAFOR and comments
<i>Achillea millefolium</i>	Yarrow	F
<i>Agrimonia eupatoria</i>	Agrimony	O
<i>Agrostis stolonifera</i>	Creeping bent	F
<i>Anthyllis vulneraria</i>	Kidney vetch	O
<i>Brachypodium sylvaticum</i>	False-brome	LF
<i>Brachythecium rutabulum</i>	Rough-stalked feather-moss	LF
<i>Briza media</i>	Quaking grass	R
<i>Bromus erectus</i>	Upright brome	LF
<i>Calliergonella cuspidata</i>	Pointed spear-moss	LF
<i>Campanula rotundifolia</i>	Harebell	R
<i>Carduus nutans</i>	Musk thistle	R
<i>Carex flacca</i>	Glaucous sedge	F
<i>Centaurea nigra</i>	Black knapweed	A
<i>Cerastium fontanum</i>	Common mouse-ear	O
<i>Cirsium arvense</i>	Creeping thistle	LF
<i>Dactylis glomerata</i>	Cock's foot	F
<i>Dactylohrhiza praetermissa</i>	Southern marsh orchid	O
<i>Daucus carota</i>	Wild carrot	O
<i>Equisetum arvense</i>	Field horsetail	LA
<i>Equisetum palustris</i>	Marsh horsetail	O
<i>Festuca arundinacea</i>	Tall fescue	O
<i>Festuca rubra</i>	Red fescue	D
<i>Filipendula vulgaris</i>	Dropwort	O
<i>Galium verum</i>	Lady's bedstraw	F
<i>Heracleum sphondylium</i>	Hogweed	F
<i>Holcus lanatus</i>	Yorkshire fog	A
<i>Homothecium lutescens</i>	Yellow feather-moss	R
<i>Hypnum lacunosum</i>	Great plait-moss	LF
<i>Kindbergia praelonga</i>	Common feather-moss	A
<i>Lathyrus pratensis</i>	Meadow vetchling	O
<i>Leontodon hispidus</i>	Rough hawkbit	A
<i>Linum catharticum</i>	Fairy flax	O
<i>Lotus corniculatus</i>	Bird's foot trefoil	F
<i>Ononis repens</i>	Restharrow	LA
<i>Plantago lanceolata</i>	Ribwort plantain	A
<i>Plantago major</i>	Greater plantain	O
<i>Plantago maritima</i>	Sea plantain	F
<i>Plantago media</i>	Hoary plantain	LA
<i>Potentilla reptans</i>	Creeping cinquefoil	F
<i>Primula veris</i>	Cowslip	LF
<i>Prunella vulgaris</i>	Self-heal	F
<i>Pseudoscleropodium purum</i>	Neat feather-moss	A
<i>Pulicaria dysenterica</i>	Common fleabane	LF
<i>Rhinanthus minor</i>	Hay rattle	LF
<i>Rhytidiadelphus triquetrus</i>	Big shaggy-moss	LA
<i>Rumex acetosa</i>	Common sorrel	O
<i>Sanguisorba minor</i>	Salad burnet	LF
<i>Scabiosa columbaria</i>	Small scabious	LF
<i>Solidago virgaurea</i>	Goldenrod	LA
<i>Succisa pratensis</i>	Devil's-bit scabious	LA
<i>Thuidium tamariscinum</i>	Tamarisk moss	R
<i>Tragopogon pratensis</i>	Goat's-beard	O
<i>Trifolium pratense</i>	Red clover	A
<i>Tussilago farfara</i>	Colt's-foot	F
<i>Vicia cracca</i>	Tufted vetch	R
<i>Viola sp</i>	Violet	LF

Community MC8f

Species	Common name	DAFOR and comments
<i>Agromonia eupatoria</i>	Agrimony	O
<i>Agrostis stolonifera</i>	Creeping bent	F
<i>Anthyllis vulneraria</i>	Kidney vetch	A
<i>Arrhenatherum elatius</i>	False oat-grass	R
<i>Brachypodium sylvaticum</i>	False-brome	O
<i>Brachythecium rutabulum</i>	Rough-stalked feather-moss	R
<i>Calliergonella cuspidata</i>	Pointed spear-moss	LF
<i>Carex flacca</i>	Glaucous sedge	LF
<i>Carex panicea</i>	Carnation sedge	O
<i>Centaurea nigra</i>	Black knapweed	O
<i>Cerastium fontanum</i>	Common mouse-ear	R
<i>Cirsium arvense</i>	Creeping thistle	R
<i>Dactylis glomerata</i>	Cock's-foot	O
<i>Dactylohrhiza praetermissa</i>	Southern marsh orchid	LF
<i>Daucus carota</i>	Wild carrot	R
<i>Equisetum arvense</i>	Field horsetail	LA
<i>Equisetum arvense</i>	Field horsetail	F / LA
<i>Festuca rubra</i>	Red fescue	D
<i>Fissidens taxifolius</i>	Common pocket-moss	O
<i>Heracleum sphondylium</i>	Hogweed	O
<i>Holcus lanatus</i>	Yorkshire fog	O
<i>Kindbergia praelonga</i>	Common feather-moss	O
<i>Lathyrus pratensis</i>	Meadow vetchling	R
<i>Leontodon hispidus</i>	Rough hawkbit	F
<i>Linum catharticum</i>	Fairy flax	O
<i>Lolium perenne</i>	Perennial rye-grass	R
<i>Lotus corniculatus</i>	Bird's-foot trefoil	F
<i>Ononis repens</i>	Restharrow	LF
<i>Plantago lanceolata</i>	Ribwort plantain	O
<i>Plantago major</i>	Greater plantain	R
<i>Plantago maritima</i>	Sea plantain	F
<i>Plantago media</i>	Hoary plantain	LF
<i>Potentilla reptans</i>	Creeping cinquefoil	O
<i>Prunella vulgaris</i>	Selfheal	R
<i>Pulicaria dysenterica</i>	Common fleabane	O/LF
<i>Rhinanthus minor</i>	Hay rattle	O
<i>Pseudoscleropodium purum</i>	Neat feather-moss	LA
<i>Senecio jacobaea</i>	Common ragwort	R
<i>Sonchus asper</i>	Prickly sow-thistle	R
<i>Succisa pratensis</i>	Devi's-bit scabious	R
<i>Taraxacum officinale</i> agg.	Dandelion	O
<i>Trifolium pratense</i>	Red clover	A
<i>Tussilago farfara</i>	Colt's-foot	F
<i>Vicia cracca</i>	Tufted vetch	O
<i>Vicia sepium</i>	Bush vetch	O
<i>Viola riviniana</i>	Common dog-violet	R

Community SD2

Species	Common name	DAFOR and comments
<i>Agrostis stolonifera</i>	Creeping bent	F
<i>Atriplex glabriuscula</i>	Babington's orache	R
<i>Atriplex prostrata</i>	Spear-leaved orache	F
<i>Cakile maritima</i>	Sea rocket	O
<i>Glaux maritima</i>	Sea-milkwort	LF
<i>Plantago maritima</i>	Hoary plantain	R
<i>Triglochin palustris</i>	Marsh arrow-grass	LF

Community SM24

Species	Common name	DAFOR and comments
<i>Agrostis stolonifera</i>	Creeping bent	F
<i>Atriplex prostrata</i>	Spear-leaved orache	O
<i>Dactylis glomerata</i>	Cock's-foot	R
<i>Elytrigia atherica</i>	Sea couch	D
<i>Festuca arundinacea</i>	Tall fescue	O
<i>Heracleum sphondylium</i>	Hogweed	R
<i>Honkenya peploides</i>	Sea sandwort	R
<i>Plantago lanceolata</i>	Ribwort plantain	R
<i>Potentilla anserina</i>	Silverweed	A
<i>Potentilla reptans</i>	Creeping cinquefoil	O
<i>Rumex obtusifolius</i>	Broad-leaved dock	R
<i>Senecio jacobaea</i>	Common ragwort	R
<i>Tussilago farfara</i>	Colt's-foot	F

W7a

Species	Common name	DAFOR and comments
CANOPY		
<i>Salix viminalis</i>	Osier	LA
<i>Salix capraea</i>	Goat willow	LA
<i>Betula pubescens</i>	Downy birch	O
<i>Salix cinerea</i>	Grey willow	O
<i>Salix alba</i>	White willow	R
<i>Alnus glutinosa</i>	Alder	O
SHRUB LAYER		
<i>Rosa canina</i>	Dog rose	O
<i>Acer pseudoplatanus</i>	Sycamore	O
<i>Betula pubescens</i>	Downy birch	R
<i>Hippophae rhamnoides</i>	Sea buckthorn	LA
<i>Lonicera nitida</i>	Shrub honeysuckle	O
HERB LAYER		
<i>Agrostis stolonifera</i>	Creeping bent	F
<i>Anthriscus sylvestris</i>	Cowparsley	O
<i>Asplenium scolopendrium</i>	Harts-tongue fern	LF
<i>Athyrium filix-femina</i>	Lady fern	LA
<i>Brachypodium sylvaticum</i>	False-brome	LF
<i>Brachythecium rivulare</i>	River feather-moss	A
<i>Brachythecium rutabulum</i>	Rough-stalked feather-moss	A
<i>Carex panicea</i>	Carnation sedge	LF
<i>Carex pendula</i>	Pendulous sedge	F/LD
<i>Centaurea nigra</i>	Black knapweed	O
<i>Chrysanthemum maximum</i>	Cultivated ox-eye daisy	O
<i>Chrysosplenium oppositifolium</i>	Opposite leaved golden saxifrage	LA
<i>Circea lutetiana</i>	Enchanter's nightshade	LF
<i>Cirsium palustre</i>	Marsh thistle	F
<i>Conocephalum conicum</i>	Scented liverwort	O
<i>Crataegus monogyna</i> (seedling)	Hawthorn	O
<i>Crococsmia</i>	Montbretia	O
<i>Dactylohrhiza praetermissa</i>	Southern marsh orchid	R
<i>Deschampsia cespitosa</i>	Tufted hair-grass	F
<i>Dryopteris affinis</i>	Scaly male fern	O
<i>Dryopteris filix-mas</i>	Male fern	LF
<i>Dryopteris dilatata</i>	Broad buckler fern	O
<i>Equisetum arvense</i>	Field horsetail	LF
<i>Eupatorium cannabinum</i>	Hemp agrimony	O
<i>Eurhynchium striatum</i>	Common striated feather-moss	A
<i>Festuca rubra</i>	Red fescue	LF
<i>Filipendula ulmaria</i>	Meadowsweet	O
<i>Geum rivale</i>	Water avens	A
<i>Geum urbanum</i>	Wood avens	O
<i>Holcus lanatus</i>	Yorkshire fog	LA
<i>Juncus effusus</i>	Soft rush	O
<i>Juncus inflexus</i>	Hard rush	O
<i>Kindbergia praelonga</i>	Common feather-moss	LF
<i>Lysimachia vulgaris</i>	Yellow loosestrife	O
<i>Myosotis scorpioides</i>	Water forget-me-not	LF
<i>Parnassia palustris</i>	Grass of Parnassus	LF
<i>Pellia endivifolia</i>	Endive peltia	A
<i>Plagiomnium undulatum</i>	Hart's-tongue thyme-moss	A
<i>Pulicaria dysenterica</i>	Common fleabane	LF
<i>Ranunculus ficaria</i>	Lesser celandine	F
<i>Ranunculus repens</i>	Creeping buttercup	A
<i>Rhizomnium punctatum</i>	Dotted thyme-moss	LF
<i>Rubus fruticosus</i> agg.	Bramble	F
<i>Rumex sanguineus</i>	Wood dock	O
<i>Senecio jacobaea</i>	Common ragwort	R
<i>Silene dioica</i>	Red campion	F
<i>Stachys sylvatica</i>	Hedge woundwort	O
<i>Symphytum officinale</i>	Comfrey	O
<i>Thamnobryum alopecurum</i>	Fox-tail feather-moss	O
<i>Tussilago farfara</i>	Colt's-foot	LF
<i>Urtica dioica</i>	Common nettle	LD
<i>Veronica beccabunga</i>	Brooklime	O
<i>Viola riviniana</i>	Common dog violet	F

Community W7c

Species	Common name	DAFOR and comments
CANOPY		
<i>Alnus glutinosa</i>	Alder	D
<i>Fraxinus excelsior</i>	Ash	A
<i>Acer pseudoplatanus</i>	Sycamore	F
<i>Ulmus glabra</i>	Wych elm	R
SHRUB LAYER		
<i>Rosa canina</i>	Dog rose	R
<i>Alnus glutinosa</i>	Alder	A
<i>Fraxinus excelsior</i>	Ash	F
<i>Acer pseudoplatanus</i>	Sycamore	F
<i>Ligustrum vulgare</i>	Wild privet	LF
HERB LAYER		
<i>Acer pseudoplatanus</i> (seedling)	Sycamore	R
<i>Alnus glutinosa</i> seedling	Alder seedling	LF
<i>Asplenium scolopendrium</i>	Harts-tongue fern	O
<i>Athyrium filix-femina</i>	Lady fern	O
<i>Brachypodium sylvaticum</i>	False-brome	D
<i>Brachythecium rutabulum</i>	Rough-stalked feather-moss	LF
<i>Calliergonella cuspidata</i>	Pointed spear-moss	O
<i>Carex pendula</i>	Pendulous sedge	LD
<i>Circaea lutetiana</i>	Enchanter's nightshade	R
<i>Cirsium palustre</i>	Marsh thistle	O
<i>Conocephalum conicum</i>	Scented liverwort	R
<i>Crataegus monogyna</i> (seedling)	Hawthorn	R
<i>Dactylorhiza fuchsii</i>	Common spotted orchid	R
<i>Deschampsia cespitosa</i>	Tufted hair-grass	F
<i>Dryopteris filix-femina</i>	Lady fern	A
<i>Dryopteris filix-mas</i>	Male fern	F
<i>Dryopteris affinis</i> agg.	Scaly male fern	R
<i>Epilobium hirsutum</i>	Greater willowherb	R
<i>Equisetum arvense</i>	Field horsetail	O
<i>Eupatorium cannabinum</i>	Hemp agrimony	O
<i>Eurhynchium striatum</i>	Common striated feather-moss	A
<i>Festuca rubra</i>	Red fescue	R
<i>Filipendula ulmaria</i>	Meadowsweet	A
<i>Fissidens</i> sp		R
<i>Fraxinus excelsior</i> (seedling)	Ash seedling	O
<i>Fraxinus excelsior</i> seedling	Ash seedling	O
<i>Geranium robertianum</i>	Herb Robert	F
<i>Geum rivale</i>	Water avens	O
<i>Geum urbanum</i>	Wood avens	F
<i>Hedera helix</i>	Ivy	O
<i>Hypericum maculatum</i>	Imperforate St. John's-wort	R
<i>Iris pseudacorus</i>	Yellow flag iris	R
<i>Kindbergia praelonga</i>	Common feather-moss	A
<i>Polystichum aculeatum</i>	Hard shield-fern	R
<i>Primula vulgaris</i>	Primrose	O
<i>Prunella vulgaris</i>	Selfheal	R
<i>Pulicaria dysenterica</i>	Common fleabane	R
<i>Ranunculus repens</i>	Creeping buttercup	O
<i>Riccardia</i> sp		R
<i>Rubus fruticosus</i> agg.	Bramble	F
<i>Rumex sanguineus</i>	Wood dock	R
<i>Silene dioica</i>	Red campion	O
<i>Taraxacum officinale</i> agg	Dandelion	O
<i>Tussilago farfara</i>	Colt's-foot	LF
<i>Viola riviniana</i>	Common dog violet	A

Community W8

Species	Common name	DAFOR and comments
CANOPY		
<i>Acer pseudoplatanus</i>	Sycamore	A
<i>Aesculus hippocastanum</i>	Horse-chestnut	O
<i>Crataegus monogyna</i>	Hawthorn	R
<i>Fagus sylvatica</i>	Beech	O
<i>Fraxinus excelsior</i>	Ash	A
<i>Quercus robur</i>	Pedunculate oak	R
<i>Salix caprea</i>	Goat willow	R
<i>Ulmus glabra</i>	Wych elm	O
SHRUB LAYER		
<i>Acer pseudoplatanus</i>	Sycamore	F
<i>Crataegus monogyna</i>	Hawthorn	F
<i>Fraxinus excelsior</i>	Ash	O
<i>Ilex aquifolium</i>	Holly	O
<i>Prunus spinosa</i>	Blackthorn	R
<i>Sambucus nigra</i>	Elder	O
<i>Ulmus glabra</i>	Wych elm	O
HERB LAYER		
<i>Agrostis stolonifera</i>	Creeping bent	O
<i>Anthriscus sylvestris</i>	Cow parsley	R
<i>Anthyllus vulneraria</i>	Kidney vetch	O
<i>Arrhenatherum elatius</i>	False oat-grass	O
<i>Asplenium scolopendrium</i>	Harts-tongue fern	A
<i>Atrichum undulatum</i>	Catherine's moss	LF
<i>Brachypodium sylvaticum</i>	False-brome	F
<i>Brachythecium rivulare</i>	River feather-moss	F
<i>Brachythecium rutabulum</i>	Rough-stalked feather-moss	F
<i>Bromopsis ramosa</i>	Hairy brome	LF
<i>Calliergonella cuspidata</i>	Pointed spear-moss	A
<i>Carex flacca</i>	Glaucous sedge	F
<i>Centaurea nigra</i>	Black knapweed	F
<i>Chamerion angustifolium</i>	Rosebay willowherb	O
<i>Chrysanthemum maximum</i>	Cultivated ox-eye daisy	LD
<i>Chyso-splenium oppositifolium</i>	Opposite leaved golden saxifrage	LA
<i>Circaea lutetiana</i>	Enchanters' nightshade	F
<i>Cirsium palustre</i>	Marsh thistle	O
<i>Dactylis glomerata</i>	Cock's-foot	F / LA
<i>Deschampsia cespitosa</i>	Tufted hair-grass	O
<i>Dryopteris affinis</i> agg.	Scaly male fern	O
<i>Dryopteris dilatata</i>	Broad buckler fern	F
<i>Dryopteris filix-mas</i>	Male fern	F
<i>Epilobium montanum</i>	Broad-leaved willowherb	O
<i>Equisetum arvense</i>	Field horsetail	A
<i>Equisetum palustris</i>	Marsh horsetail	LA
<i>Eurhynchium striatum</i>	Common striated feather-moss	O
<i>Festuca arundinacea</i>	Tall fescue	LF
<i>Filipendula ulmaria</i>	Meadowsweet	LA
<i>Fissidens</i> sp.		F
<i>Fraxinus excelsior seedling</i>	Ash seedling	F
<i>Geranium robertianum</i>	Herb Robert	A
<i>Geum rivale</i>	Water avens	F
<i>Geum urbanum</i>	Wood avens	LF
<i>Heracleum sphondylium</i>	Hogweed	F
<i>Hypericum calycinum</i>	Rose of Sharon	R
<i>Holcus lanatus</i>	Yorkshire fog	F
<i>Hypnum cupressiforme</i>	Cypress-leaved plait-moss	A
<i>Ilex aquifolium seedling</i>	Holly seedling	O
<i>Juncus inflexus</i>	Hard rush	O
<i>Kindbergia praelonga</i>	Common feather-moss	O
<i>Lonicera periclymenum</i>	Honeysuckle	O
<i>Lophocolea bidentata</i>	Bifid crestwort	A
<i>Mnium hornum</i>	Swan's-neck thyme-moss	LA
<i>Pellia endivifolia</i>	Endive peltia	LA
<i>Plagiommium undulatum</i>	Hart's-tongue thyme-moss	A
<i>Poa annua</i>	Annual meadow-grass	O
<i>Primula veris</i>	Cowslip	O
<i>Prunella vulgaris</i>	Selfheal	O
<i>Pulicaria dysenterica</i>	Common fleabane	LD/A
<i>Ranunculus repens</i>	Creeping buttercup	LF
<i>Rubus fruticosus</i> agg.	Bramble	O
<i>Rumex obtusifolius</i>	Broad-leaved dock	O
<i>Rumex sanguineus</i>	Wood dock	O
<i>Silene dioica</i>	Red campion	F
<i>Stachys sylvatica</i>	Hedge woundwort	LF
<i>Tamus communis</i>	Black bryony	O
<i>Taraxacum officinale</i> agg.	Dandelion	O
<i>Tellima grandiflora</i>	Fringe-cup	F
<i>Thamnobryum alopecurum</i>	Fox-tail feather-moss	R
<i>Thuidium tamariscinum</i>	Tamarisk moss	O
<i>Tussilago farfara</i>	Colt's-foot	F
<i>Urtica dioica</i>	Common nettle	LA
<i>Veronica chamaedrys</i>	Germander speedwell	O
<i>Viola riviniana</i>	Common dog-violet	F

Community W10		
Species	Common name	DAFOR and comments
CANOPY		
<i>Acer pseudoplatanus</i>	Sycamore	D
<i>Aesculus hippocastanum</i>	Horse-chestnut	O
<i>Fagus sylvatica</i>	Beech	O
<i>Fraxinus excelsior</i>	Ash	F
<i>Ulmus glabra</i>	Wych elm	F
SHRUB LAYER		
<i>Acer pseudoplatanus</i>	Sycamore	O
<i>Acer campestre</i>	Field maple	R
<i>Crataegus monogyna</i>	Hawthorn	F
<i>Ilex aquifolium</i>	Holly	O
HERB LAYER		
<i>Acer pseudoplatanus</i>	Sycamore (seedling)	F
<i>Athyrium filix-femina</i>	Lady fern	LA
<i>Atrichum undulatum</i>	Catherine's moss	F
<i>Bromopsis ramosa</i>	Hairy brome	F
<i>Carex pendula</i>	Pendulous sedge	LA
<i>Chrysosplenium oppositifolium</i>	Opposite leaved golden saxifrage	LA
<i>Circaea lutetiana</i>	Enchanters' nightshade	O
<i>Crataegus monogyna</i> seedling	Hawthorn seedling	O
<i>Dactylis glomerata</i>	Cock's-foot	LF
<i>Dryopteris affinis</i>	Scaly male fern	F
<i>Dryopteris dilatata</i>	Broad buckler fern	A
<i>Dryopteris filix-mas</i>	Male fern	A
<i>Festuca rubra</i>	Red fescue	LF
<i>Fraxinus excelsior</i> (seedling)	Ash	O
<i>Galeopsis tetrahit</i>	Common hemp-nettle	O
<i>Geranium robertianum</i>	Herb Robert	F
<i>Geum urbanum</i>	Wood avens	F
<i>Holcus lanatus</i>	Yorkshire fog	LF
<i>Kindbergia praelonga</i>	Common feather-moss	A
<i>Mnium hornum</i>	Swan's-neck thyme-moss	LA
<i>Pellia endiviifolia</i>	Endive pellia	R
<i>Plagiomnium undulatum</i>	Hart's-tongue thyme-moss	O
<i>Rubus fruticosus</i> agg.	Bramble	A
<i>Rumex sanguineus</i>	Wood dock	F
<i>Sambucus nigra</i> seedling	Elder	O
<i>Silene dioica</i>	Red campion	F
<i>Stachys sylvatica</i>	Hedge woundwort	F
<i>Taraxacum officinale</i> agg.	Dandelion	O
<i>Thamnobryum alopecurum</i>	Fox-tail feather-moss	R
<i>Ulex europaeus</i>	Gorse	R
<i>Urtica dioica</i>	Common nettle	LF
<i>Viola riviniana</i>	Common dog violet	F

Inland basic cliff ledge community

Target Note 46

Species	Common name	DAFOR and comments
<i>Asplenium scolopendrium</i>	Hart's-tongue fern	A
<i>Brachypodium sylvaticum</i>	False brome	A
<i>Eurhynchium striatum</i>	Common striated feather-moss	F
<i>Festuca rubra</i>	Red fescue	F
<i>Homalothecium lutescens</i>	Yellow feather-moss	O
<i>Leontodon hispidus</i>	Rough hawkbit	F
<i>Neckera complanata</i>	Flat neckera	LF
<i>Plantago media</i>	Hoary plantain	F
<i>Primula vulgaris</i>	Primrose	O
<i>Viola riviniana</i>	Common dog violet	O

APPENDIX 4 TARGET NOTES

Target Note Number	Target_note	Eastings	Northings
1	Slippage: Landslip with eroding face up to cliff top path (Cleveland Way)	507379	484043
2	Significant calcareous influence on exposed, stabilised clayey sub soil with <i>Ctenidium molluscum</i> , <i>Homalothecium lutescens</i> , <i>Tortella tortuosa</i> , <i>Plantago media</i> and <i>Ononis repens</i> .	507421	484045
3	Slippage: Landslip with eroding face up to cliff top path (Cleveland Way)	507357	484064
4	Path: Cliff top - Cleveland Way. 2m wide, mown.	507347	484070
5	Slippage: very active here with rills. Photo 5.	507396	484096
6	Slippage: Landslip with eroding face up to cliff top path (Cleveland Way)	507291	484113
7	Concrete building: pill box on cliff top, part collapsed down cliff.	507268	484129
8	Outflow: Field drain leading to cliff top.	507198	484143
9	Garden waste: tipped from cliff top path down cliff, above large area of garden ox-eye daisy. Photo 7.	507164	484149
10	Slippage: large recent landslip with broken remains of pill box on slope.	507319	484151
11	Calcareous flush NVC Community M38, slippage here. Photo 8.	507186	484163
12	Neutral flush: with glaucous sedge (<i>Carex flacca</i>), soft rush (<i>Juncus effusus</i>), arrowgrass (<i>Triglochin maritima</i>).	507186	484178
13	Calcareous flush - NVC Community M38; tufa forming though poorly developed.	507197	484180
14	Calcareous spring head with NVC Community M38 (tufa forming)	507138	484193
15	Calcareous spring head with NVC Community M38 (tufa forming)	507149	484197
16	Invasive non-native: introduced ox-eye daisy, probably garden escape from tipped waste on cliff top. Photo 2.	507226	484199
17	Tufa-forming calcareous flush with bryophyte community.	507150	484201
18	Introduced plant: London pride (<i>Saxifraga x urbanum</i>).	507205	484210
19	Fire sites: with litter at back of shore.	507208	484232
20	Path: through grassy slope at base of cliff.	507208	484232

Target Note Number	Target_note	Eastings	Northings
21	Tufa-forming calcareous flush with bryophyte community. NVC Community M38. Photo 11.	507082	484235
22	Sand martin nest holes in use.	507068	484238
23	Introduced plant: Elephant's ear (<i>Bergenia var</i>), patch 2x2m on recent slippage area.	507007	484240
24	Stream: in small, deeply incised valley from cliff top path to shore. Vegetation included meadowsweet (<i>Filipendula ulmaria</i>).	506962	484249
25	Seepage: out of boulder clay face onto beach.	507187	484253
26	Path: concrete path to beach from car park, 70cm wide, with grass trampled 0.5-1m each side. Dog mess. Photo 15.	506997	484290
27	Slippage: good example of slippage of mature grassland community, with pioneer community where slippage recent.	507070	484296
28	Fire site: at base of slope, with flattened grassy vegetation. Photo 18.	507073	484308
29	Outflow pipe: armoured with gabion baskets. Photo 19.	507004	484320
30	Armouring: metal steps to beach with gabion baskets breaking up. Photo 20.	507012	484322
31	Sea buckthorn (<i>Hippophae rhamnoides</i>): dense patch 15m x 5m.	506872	484340
32	Spring/flush: at base of slope. Pool in eroded boulder clay at top of beach. Photo 21.	506949	484344
33	Landslip: large.	506815	484387
34	Path: 1m wide trampled grass. Not eroded.	506526	484476
35	Path: earth; not badly trampled or eroded.	506588	484519
36	Paths: Informal paths along slope.	506466	484519
37	Outflow: over armouring onto beach, from pumping station. Photo 30.	506688	484522
38	Flush with carnation sedge, colt's-foot, meadowsweet, hard rush, marsh thistle, <i>Lophocolea bidentata</i> , <i>Calliergonella cuspidata</i> , field horsetail, sheeps fescue, common fleabane, meadow vetchling, jointed rush, hoary willowherb	506444	484548

Target Note Number	Target_note	Eastings	Northings
39	Abundant creeping thistle (<i>Cirsium arvense</i>) within MG9b grassland adjacent to path, possibly seeded from adjacent grazed field just outside SSSI boundary.	506374	484560
40	Rabbit grazing: small patches of bare ground.	506490	484567
41	Damp area with plicate flote-grass (<i>Glyceria notata</i>), hairy sedge (<i>Carex hirsuta</i>), creeping bent (<i>Agrostis stolonifera</i>) and jointed rush (<i>Juncus articulatus</i>). NVC community MG13.	506553	484568
42	Rabbit grazing: small patches of bare ground.	506456	484574
43	Landslip: recent, adjacent to road. Photo 38.	506328	484581
44	Cattle trough, little evidence of trampling by stock, some nutrient enrichment.	506520	484591
45	Base-rich outcrop supporting calcicoles including <i>Euryhynchium striatum</i> , <i>Neckera complanata</i> , <i>Homalothecium lutescens</i> , with hart's-tongue fern, hoary plantain, rough hawkbit, false brome, common dog violet, primrose and sheep's fescue.	506306	484631
46	Rock fall into damp grassland/nettle bed. New rocks bare with broad buckler fern (<i>Dryopteris dilatata</i>), hart's-tongue fern (<i>Asplenium scolopendrium</i>), opposite-leaved golden saxifrage (<i>Chrysosplenium oppositifolium</i>), much <i>Thuidium tamariscinum</i> .	506330	484639
47	Cattle trough, little evidence of trampling by stock, tall ruderals adjacent, indicating some nutrient enrichment.	506479	484644
48	Cliff fall: Sandstone (hard cliff), unstable with blocks falling. Photo 37.	506505	484713
49	Cliff top path, 1m wide. Vegetation trampled, soil compacted but erosion insignificant. Photo 41.	506408	484753
50	Path: Up steep slope, minor erosion.	506385	484821
51	Thistle bed: creeping thistle (<i>Cirsium arvense</i>); likely to result from dunging and poaching of stock, though no evidence of recent presence of cattle, sheep or horses.	506321	484823

Target Note Number	Target_note	Eastings	Northings
52	Invasive non-native: Fringecup (<i>Tellima grandifolia</i>), possibly from tipped garden waste.	506090	484860
53	Path: Informal, down steep slope. Photo 40.	506353	484862
54	Rock outcrop (BAP habitat): within woodland. Photo 48.	506081	484863
55	Path: Public right of way to shore. 0.5-1m wide. Dog mess.	506063	484879
56	Fire sites: 2 large sites under trees. Litter. Live wood taken. Photo 51.	506219	484895
57	Path: Small informal path off main path to shore.	506182	484901
58	Fire site: in woodland. Minor damage to bark of a mature sycamore (<i>Acer pseudoplatanus</i>). Likely burning of dead wood.	506265	484957
59	Base of cliff protected by 1-2m wide pebble/cobble ridge. Photo 42, 50.	506305	484983
60	Seepage: out of soft cliff onto beach.	506310	484985
61	Path: Small informal path off main path to shore.	506255	485000
62	Steps up from beach, where base of boulder clay slope is eroding; start of path up slope. Photo 53.	506303	485014
63	Invasive non-native: Ornamental evergreen shrub, possibly shrub honeysuckle (<i>Lonicera nitida</i>).	506261	485087
64	Tutsan (<i>Hypericum androsaemum</i>), most likely a garden escape, though may be native and naturally present other escaped garden plants are present suggesting this may be also.	506275	485102
65	Permanent water body in woodland.	506136	485123
66	Brackish pool with shingle and sand bar. Strand-line community (SD2) with <i>Atriplex prostrata</i> and <i>Cakile maritima</i> . Wetland is a mosaic of communities probably reflecting the salinity of the water with a continuum from S21a through S20a to S4 and S14.	506313	485154
67	Path: Small path into woods from beach, up to main path.	506304	485166
68	Tree stumps on beach on boulder clay substrate. Evidence of considerable erosion of base of boulder clay slope. Photo 58.	506331	485170

Target Note Number	Target_note	Eastings	Northings
69	Slippage: large cracks, with bare soil and pioneer herbs.	506255	485171
70	Tree damage: several small trees cut, possibly for fire wood.	506282	485178
71	Stream: down through wood.	506215	485181
72	Stream: in small gully in wood with NVC Community W8e type groundflora.	506185	485195
73	Pools: in hollows created by slippages, no visible aquatic plants.	506153	485201
74	Fire site. Likely use of dead wood and live wood taken from nearby trees.	506274	485209
75	Invasive non-native: ornamental evergreen shrub, possibly Cotoneaster variety and privet.	506271	485248
76	Fire site: Large, with litter, bare ground. Damaged trees. Photo 61.	506311	485290
77	Invasive non-native: Tutsan (<i>Hypericum androsaemum</i>), most likely a garden escape.	506097	485301
78	Invasive non-native: Buddleia plant.	506089	485304
79	Small brick structure.	506081	485332
80	Invasive non-native: ornamental evergreen shrub, possibly shrub honeysuckle (<i>Lonicera nitida</i>). Also plastic garden waste tipped here.	506101	485360
81	Paths: in grass on point.	506505	485370
82	Garden compost bins and herbicide spray cans, just within SSSI boundary.	506111	485384
83	Privet: wild type but possibly garden escape, with young hawthorn, gorse and blackthorn in grassland.	506309	485399
84	Building rubble: including asbestos. Also cultivated daisy here.	506117	485446
85	Invasive non-natives: Montbretia and tutsan (garden escapes).	506137	485451
86	Invasive non-native: Fringecup (<i>Tellima grandifolia</i>), possibly from tipped garden waste.	506170	485474
87	Outflow: onto beach, down boulder clay slope.	506354	485498
88	Tufa spring (NVC Community M37) within W8e woodland.	506176	485526
89	Pool: with branched bur-reed (<i>Sparganium erectum</i>) within woodland - alder (<i>Alnus glutinosa</i>) and willow (<i>Salix spp.</i>) adjacent.	506290	485556
90	Fire site and damaged trees.	506260	485562

Target Note Number	Target_note	Eastings	Northings
91	Path: about 1m wide. Cleveland Way. Dog walkers.	505998	485610
92	Fire site. Likely use of dead wood and live wood taken from nearby trees.	506263	485656
93	Outflow streams: at base of boulder clay cliff. Also very active wave erosion on this part of the cliff. Photo 74.	506259	485670
94	<i>Atriplex prostrata</i> and <i>Atriplex glabriuscula</i> present in small amounts with <i>Glaux maritima</i> and <i>Triglochin palustris</i> on the top of small mud cliffs. Possibly in jeopardy due to lack of dry shingle beach and intense erosion.	506207	485809
95	Active slippage with bare mud. Photo 75. 76.	506093	485812
96	Invasive non-native: Cotoneaster - one plant below top of slope.	505775	485984
97	Trees planted in grassy area, including rowen (<i>Sorbus aucuparia</i>) and hazel (<i>Corylus avellana</i>).	505749	485987
98	Invasive non-native: semi-mature pine in grass slippage area, from small plantation on cliff top above.	505791	486040
99	Invasive non-native: cotoneaster in grass slippage area.	505788	486041
100	Invasive non-native: Montbretia and tutsan (<i>Hypericum androsaemum</i>); and semi-mature conifers on grass slippage area, from small plantation on cliff top. Also young sycamore, pine and hawthorn.	505779	486045
101	Sitka spruce and Scot's pine present, from slope above.	505813	486054
102	Landslip: very dynamic area with trees moved. Evidence of rabbits.	505826	486063
103	Japanese knotweed (<i>Fallopia japonica</i>) by stream.	505708	486098
104	Stepping stones across stream on track from Yorkshire Water waste water pumping station to shore.	505751	486144
105	Invasive non-native: fringe cup (<i>Tellima grandifolia</i>).	505728	486156
106	Track and drainage channel: track 1-3m wide tarmac. Drainage channel takes outflow from Yorkshire Water waste water pumping station to shore. Evidence of rabbits. Photo 86.	505768	486175

Target Note Number	Target note	Eastings	Northings
107	Freshwater seepage: down hard rock and earth cliff to shore.	505890	486222
108	Outflow pipe: from Yorkshire Water waste water pumping station. Protected by gabion wall which is being uncut at the base by wave action.	505893	486224
109	Non-native invasive: Buddleia, 1 small plant.	505829	486227
110	Outflow from Yorkshire Water waste water pumping station. Protected by stepped stone armouring. Photo 87.	505907	486229
111	Path: Through grass to shore.	505888	486266
112	Invasive non-native: garden privet, 1 plant near cliff top.	505791	486311
113	Fire site: With litter and worn grass.	505860	486363
114	Outflow pipe: exposed on cliff by erosion. Photo 98.	505662	486459
115	Path: 0.3-1m wide turf/earth. Dog mess.	505243	486482
116	Path: Joining Cleveland Way. Worn turf.	505287	486483
117	Path: Cleveland Way. Near SSSI boundary. Generally about 1m wide, surfaced from Scarborough to 505241 486513. Turf worn in parts but generally not over-widened. Short side paths to cliff top view points. Photo 89.	505180	486555
118	Small clearing with mattresses and dog mess.	505144	486574
119	Fire site: On cliff top near Cleveland Way. Dog mess, litter, worn grass. Photo 108.	505059	486702
120	Acid cliff with ling heather (<i>Calluna vulgaris</i>), tormentil, red fescue (<i>Festuca rubra</i>) intimately associated with <i>Scleropodium purum</i> moss.	505072	486756
121	Spring: good example of NVC community M38 spring with well developed hepatic mat.	505076	486762
122	Path: Short, to a cliff-top view. With dog mess and litter.	504976	486801
123	Track: About 4m wide, with dog mess, litter, benches.	504965	486805
124	Invasive non-native: two clumps of Montbretia.	504983	486889
125	Path: informal, off main track.	504967	486892
126	Fire sites: with worn grass. Photo 114.	504998	486952
127	Path: up steep grass slope. Photo 113.	504989	486973

APPENDIX 5

PHOTOGRAPH DETAILS

Site code	Polygon_ID	Photo	Bearing (degrees)	Target Note	Eastings	Northings
1004165	N/A	1004165 P1	320	Overview of Cayton Bay looking north-west, with unstable soft cliff in middle distance. NVC Community MG1 in foreground.	507487	484017
1004165	002-2	1004165 P2	10	Overview of maritime cliff/slope from cliff top footpath with NVC Communities MG2 with common fleabane and area of garden ox-eye daisy. Target Note 16.	507431	484031
1004165	002-2	1004165 P3	50	Quadrat 1, NVC Community MC9a.	507433	484036
1004165	004-2	1004165 P4	200	Close up of grassland, NVC Community MC8f.	507356	484124
1004165	Unit 2: N/A	1004165 P5	260	Overview of vegetated soft maritime cliffs/slope with slumping, unvegetated hard cliffs and beach.	507542	484141
1004165	Unit 2: N/A	1004165 P6	280	Overview of vegetated soft maritime cliffs with slumping and collapsed pill box on slope, and beach.	507542	484141
1004165	014-2	1004165 P7	320	Garden waste dumped at cliff top: source of non-native plant species. Cliff top path (Cleveland Way). Target Note 9.	507175	484146
1004165	014-2	1004165 P8	10	Fairly recent slippage crack with seepage, in soft maritime slope. Target Note 11.	507186	484163
1004165	Unit 2: Phase 1	1004165 P9	280	Large recent landslip of soft maritime cliffs/slope, with fallen pill box remains. NVC Community MC8f. Base of slope with wave erosion.	507364	484164
1004165	015-2	1004165 P10	350	Wave eroded base of maritime slope. Small fragment of NVC Community SM28 adjacent to shore, eroding away and apparently not being replaced by adjacent establishment.	507242	484173
1004165	014-2	1004165 P11	220	Tufa flush NVC Community M38 within Community MG12 with ruderals. Target Note 21.	507083	484233
1004165	014-2	1004165 P12	180	Tufa flush NVC Community M38. Target Note 21.	507083	484233
1004165	44-2	1004165 P13	120	Overview of vegetated slope, Unit 2.	507052	484237
1004165	Unit 2: 16	1004165 P14	230	Transect No.1 (Unit 2) from bottom of slope.	507191	484248

Site code	Polygon_ID	Photo	Bearing (degrees)	Target Note	Eastings	Northings
1004165	61-2	1004165 P15	10	Concrete path from surf shop car park down maritime slope to beach, with Community MC9a on right and Community MC9 on left side. Trampling and erosion each side of path. Target Note 26.	506986	484249
1004165	33-2	1004165 P16	120	NVC Community MC9 (foreground); S12b - with reedgrass (middle distance, centre; MG12 with common fleabane (yellow areas in distance) and areas invaded by garden ox-eye daisy (white areas in distance).	507149	484258
1004165	41-2	1004165 P17	110	Example of soil blocks moving down slope, with early stage of community establishment. NVC Communities MC9a and MG11b.	507061	484297
1004165	41-2	1004165 P18	120	Active wave erosion and fire site with erosion of vegetation from associated human activity at base of maritime slope. Target Note 28.	507068	484312
1004165	62-2	1004165 P19	280	Outflow pipe protected by gabion basket armouring; base of maritime slope with slumping and wave erosion. Target Note 29.	507009	484318
1004165	41-2	1004165 P20	290	Metal steps to beach at bottom of concrete path from surf shop car park. Gabion basket armouring failing. Target Note 30.	507020	484319
1004165	66-2	1004165 P21	50	Target note 32: spring at base of slope. Pool in eroded boulder clay at top of beach. NVC Community MG11 with <i>Agrostis stolonifera</i> first stage in colonisation of bare clay slippage slope.	506942	484337
1004165	77-2	1004165 P22	100	Wave erosion at base of maritime slope with boulder clay outcrop on beach. Foreground: NVC Community MC9; middle distance a patch of sea buckthorn.	506849	484342
1004165	Unit 2: Phase 1	1004165 P23	120	Slumping vegetated maritime slope with base of slope wave eroding.	507050	484350
1004165	Unit 2: Phase 1	1004165 P24	320	Overview of Cayton Bay looking north-west. Recent landslide with pioneer vegetation: NVC Community MG11.	506832	484449
1004165	Unit 2: Phase 1	1004165 P25	190	Soft maritime cliff/slope with recent landslide. Severe wave erosion at base of slope.	506832	484449
1004165	Unit 2: Phase 1	1004165 P26	250	Base of soft maritime slope eroding out behind concrete armouring at bottom of steps to beach, due to wave action.	506832	484449
1004165	Unit 2: Phase 1	1004165 P27	150	Overview of soft maritime slope, Unit 2, from beach.	506832	484449
1004165	Unit 1: 2	1004165 P28	340	Overview of Unit 1 vegetation on steep inland slope near western boundary. Slippage with an intimate mosaic of MG5 and CG7 grasslands, resulting from exposure of more calcareous sub-soil.	506545	484466

Site code	Polygon_ID	Photo	Bearing (degrees)	Target Note	Eastings	Northings
1004165	009-1	1004165 P29	60	W21 Quadrat 1 (hawthorn scrub)	506497	484607
1004165	Unit 2: Pahse 1	1004165 P30	180	Concrete and stone armouring below pumping station. Target Note 37.	506676	484614
1004165	Unit 2: Phase 1	1004165 P31	240	Overview of hard maritime cliffs (Unit 1) with large boulders at base, to north of pumping station. Concrete armouring below pumping station.	506676	484614
1004165	Unit 2: Phase 1	1004165 P32	290	Overview of hard maritime cliffs (Unit 1) with large boulders at base, to north of pumping station.	506676	484614
1004165	039-1	1004165 P33	330	Woodland, NVC Communities W8e and W10e, with recent landslip at bungalows on Knipe Point Drive in distance.	506286	484618
1004165	039-1	1004165 P34	350	Overview of Unit 1 from near western boundary.	506286	484618
1004165	Unit 1: 19	1004165 P35	330	Overview of Unit 1 vegetation looking north-west, including NVC Communities MG5 grasslands (foreground) and U4 (middle distance), U20a (tall ruderals round stock drinking trough) and scrub.	506492	484624
1004165	Unit 1: 23	1004165 P36	160	Overview of Cayton Bay looking south-west from cliff top. NVC Community MG5.	506520	484654
1004165	Unit 2: Phase 1	1004165 P37	220	Recent hard cliff collapse (Unit 1). Target Note 48.	506505	484713
1004165	Unit 1: 64	1004165 P38	200	Overview of hawthorn, blackthorn and bramble scrub communities with MG1 grassland in foreground. Recent landslip top of cliff next to road and hard cliff outcrop in distance. Target Note 43.	506375	484724
1004165	Unit 1: 64	1004165 P39	210	Grassland NVC Community U4b (Quadrat U4b:3)	506379	484730
1004165	Unit 1: 28	1004165 P40	60	Target note 53: Informal path down steep slope from cliff top public footpath to beach. Erosion insignificant.	506353	484802
1004165	Unit 1: 28	1004165 P41	330	Target note 49: Cliff top footpath. Vegetation trampled but erosion insignificant.	506353	484802
1004165	Unit 2: Phase 1	1004165 P42	290	Pebble bank deposition protecting base of maritime slope from wave erosion. Soft maritime slope with slumping. Target Note 59.	506401	484816
1004165	Unit 2: Phase 1	1004165 P43	190	Eroding hard cliff behind shore with recent rock fall.	506418	484824
1004165	028-1	1004165 P44	150	Steep soft maritime cliff (Unit 1). Overview of Cayton Bay (Unit 2) showing cobble bank at base of cliff.	506330	484837

Site code	Polygon_ID	Photo	Bearing (degrees)	Target Note	Eastings	Northings
1004165	028-1	1004165 P45	160	Overview of north end of Cayton Bay from cliff top.	506330	484837
1004165	111-1	1004165 P46	200	Woodland NVC Community W8e (Quadrat W8e: 1).	506110	484847
1004165	Unit 2: Phase 1	1004165 P47	0	Overview of north end of Cayton Bay from cliff top showing wooded maritime slopes of Unit 1 and Unit 2.	506394	484855
1004165	111-1	1004165 P48	190	Rock outcrop within NVC Community W8e woodland. Target Note 54. Harts-tongue fern in foreground.	506091	484857
1004165	028-1	1004165 P49	120	Steep soft maritime cliff, CG7 NVC Community - false-brome (<i>Brachypodium sylvaticum</i>) rich, (Unit 1). Overview of Cayton Bay (Unit 2).	506307	484883
1004165	310-1	1004165 P50	140	Pebble bank deposition protecting base of maritime slope from wave erosion. Target Note 59.	506348	484884
1004165	110-1	1004165 P51	300	Fire site and tree damage, Target Note 56.	506219	484895
1004165	110-1	1004165 P52	190	Example of trees leaning down slope due to land slippage.	506182	484901
1004165	Unit 1: Phase 1	1004165 P53	260	Wave erosion at base of maritime slope with boulder clay outcrop on beach. Bottom of path to beach eroding. Woodland behind, NVC Community W7. Target Note 62.	506306	485013
1004165	Unit 1: Phase 1	1004165 P54	340	Base of soft maritime slope slumping, with severe wave erosion.	506306	485013
1004165	Unit 1: Phase 1	1004165 P55	200	Base of maritime cliff/slope, Unit 1, showing extent of erosion and cobbles and rocks on shore.	506306	485013
1004165	116-1	1004165 P56	210	Wet woodland W7a (Quadrat 2)	506266	485133
1004165	116-1	1004165 P57	340	Overview to east from ridge with NVC Communities W8e and MG12a.	506282	485177
1004165	Unit 1: Phase 1	1004165 P58	110	Watercourse outflow across beach with bed of formerly eroded soft slope, remaining tree stumps. Target Note 68.	506308	485179
1004165	Unit 1: Phase 1	1004165 P59	20	Brackish pool at back of beach (NVC Communities S21a, S20a, S4 and S14 at edge of wet woodland (NVC Community W7c). Strandline community SD2 in foreground. Target Note 66.	506308	485179
1004165	119-1	1004165 P60	260	Recent landslip at bungalows on Knipe Point Drive, with grassland NVC Community MG1e with ruderals.	506015	485250

Site code	Polygon_ID	Photo	Bearing (degrees)	Target Note	Eastings	Northings
1004165	111-1	1004165 P61	179	Fire site with associated vegetation erosion. Likely use of dead wood and live wood taken from nearby trees. Target Note 76.	506311	485290
1004165	124-1	1004165 P62	310	Recent landslip at bungalows on Knipe Point Drive, with willow woodland in middle distance, NVC Community W7a.	506109	485396
1004165	125-1	1004165 P63	10	Small areas of bare ground caused by rabbit activity.	506045	485409
1004165	142-1	1004165 P64	140	Wave cut platform with loose boulders, at Osgodby Point.	506510	485425
1004165	135-1	1004165 P65	70	Overview of Osgodby Point, predominantly eroding hard cliff promontory with wave cut platform at base with large boulders. Actively slipping soft cliff slope. Grassland NVC Community above pill box: MC9, with exposed north-easterly aspect.	506373	485430
1004165	125-1	1004165 P66	120	Recent landslip at bungalows on Knipe Point Drive.	506023	485435
1004165	Unit 1: Phase 1	1004165 P67	300	Overview of Cornelian Bay with wave eroding base of soft maritime slope base.	506460	485447
1004165	Unit 1: Phase 1	1004165 P68	280	Overview of vegetated soft maritime cliff/slope at back of Cornelian Bay with and area of sea buckthorn NVC Community SD18b. Wave eroding slope base.	506460	485447
1004165	Unit 1: Phase 1	1004165 P69	200	Severe erosion of soft maritime cliffs at back of Cornelian Bay.	506460	485447
1004165	N/A	1004165 P70	200	Cliff - eroding boulder clay/slippage behind Osgodby Point.	506455	485493
1004165	N/A	1004165 P71	230	Overview of Unit 1 shoreline - Cornelian Bay.	506455	485493
1004165	111-1	1004165 P72	250	Woodland NVC Community W8e (Quadrat W8e:5).	506229	485572
1004165	111-1	1004165 P73	80	NVC Community W8e.	506019	485617
1004165	N/A	1004165 P74	230	Severe wave erosion at woodland, NVC Community W8e. Target Note 93.	506292	485678
1004165	312-1	1004165 P75	160	Large recent landslip with bare mud starting to colonise: NVC Community MG11. Target Note 95.	506060	485832
1004165	312-1	1004165 P76	100	Large recent landslip with bare mud starting to colonise: NVC Community MG11. Target Note 95.	506060	485832

Site code	Polygon_ID	Photo	Bearing (degrees)	Target Note	Eastings	Northings
1004165	N/A	1004165 P77	320	Overview of shoreline towards northern end of Unit 1.	506167	485845
1004165	N/A	1004165 P78	230	Recent landslip. Sandstone outcrop at back of shore, overlain with eroding boulder clay with pioneer vegetation communities.	506167	485845
1004165	207-1	1004165 P79	0	Overview of lower slope of Unit 1.	505896	485910
1004165	218-1	1004165 P80	310	NVC Community MG5a (Quadrat MG5a:6).	505799	486062
1004165	208-1	1004165 P81	30	Landslip with solifluction, Unit 1.	505826	486063
1004165	N/A	1004165 P82	270	Extensive landslip from shore. Wave erosion at base of slope, Unit 1.	505933	486082
1004165	N/A	1004165 P83	250	Soft and hard maritime cliffs with landslip, rock fall and wave erosion, Unit 1.	505933	486082
1004165	N/A	1004165 P84	230	Sparsely vegetated hard and semi-hard (shale) cliffs, Unit 1.	505933	486082
1004165	N/A	1004165 P85	310	Overview of northern end of Unit 1 from shore.	505933	486082
1004165	246-1	1004165 P86	40	Metalled track from Yorkshire Water waste water pumping station to shore, Target Note106.	505768	486175
1004165	Unit 1: Phase 1	1004165 P87	310	Plastic outflow pipe with gabion basket armouring, Target Note 110.	505907	486229
1004165	274-1	1004165 P88	20	Grassland NVC Community U20a and MG5, with W22 (blackthorn scrub).	505776	486252
1004165	274-1	1004165 P89	350	Cliff top footpath (Cleveland Way) with minor erosion. Target Note 117.	505776	486252
1004165	286-1	1004165 P90	70	Perched wetland, NVC Community S4 on slope behind White Nab.	505864	486284
1004165	284-1	1004165 P91	150	Overview of Cornelian Bay from cliff top to north, showing sea reaching and eroding boulder clay slope around high tide.	505778	486289
1004165	N/A	1004165 P92	110	Stepped rock armouring to pipeline from Yorkshire Water waste water pumping station. Target Note 97.	505923	486294

Site code	Polygon_ID	Photo	Bearing (degrees)	Target Note	Eastings	Northings
1004165	001-4	1004165 P93	100	Grassland NVC Communities MG5 and MC9c, with scrub W23 on steep slope, from cliff top.	505739	486334
1004165		1004165 P94	30	Overview overview of eroding and vegetated slopes, South Bay, Unit 4, from cliff top.	505739	486334
1004165	002-4	1004165 P95	40	Overview of White Nab point, with cliff top erosion.	505741	486338
1004165	N/A	1004165 P96	90	Overview of eroding and vegetated slopes, Unit 4 from cliff top.	505571	486380
1004165	Unit 4: Phase 1	1004165 P97	280	Wave cut platform, Unit 4.	505849	486445
1004165	N/A	1004165 P98	250	Erosing hard cliffs with boulder clay above, with plastic drainage pipe exposed by erosion, shore near southern end of South Bay. Target Note 114.	505657	486466
1004165	073-4	1004165 P99	100	Overview of Unit 4 with eroding slopes, from cliff top.	505336	486469
1004165	073-4	1004165 P100	310	Overview of vegetated slopes, Unit 4, from cliff top.	505336	486469
1004165	Unit 4: Phase 1	1004165 P101	260	Cliff failure and rock fall onto beach, Unit 4.	505481	486522
1004165	Unit 4: Phase 1	1004165 P102	60	Rock outcrop - wave cut platform with algal beds, Unit 4.	505481	486522
1004165	Unit 4: Phase 1	1004165 P103	300	Cliff and shore overview, with wave cut platform and eroding semi-hard cliffs.	505469	486523
1004165	N/A	1004165 P104	90	South Bay eroding cliffs.	505453	486542
1004165	Unit 4: Phase 1	1004165 P105	120	South Bay shore with slipway and rock armouring in the distance.	505453	486542
1004165	Unit 4: Phase 1	1004165 P106	340	South Bay eroding hard cliffs and shore, with shingle, wave cut platform and brown algal beds.	505357	486603
1004165	Unit 4: Phase 1	1004165 P107	80	Large recent cliff collapse onto shore, South Bay.	505244	486696
1004165	040-4	1004165 P108	10	Cliff top fire site, Target Note 119.	505058	486702
1004165	Unit 4: Phase 1	1004165 P109	280	Caves and rock arches in sandstone cliff near slipway, South Bay.	505074	486879

Site code	Polygon_ID	Photo	Bearing (degrees)	Target Note	Eastings	Northings
1004165	Unit 4: Phase 1	1004165 P110	290	Slipway and rock armouring, South Bay.	505056	486901
1004165	Unit 4: Phase 1	1004165 P111	120	Rock outcrops/green and brown algal beds	505011	487014
1004165	Unit 4: Phase 1	1004165 P112	150	Cliff and shore overview	505011	487014
1004165	184-4	1004165 P113	250	NVC Community MC8f with path worn into turf up slope. Target Note 127.	504985	487022
1004165	N/A	1004165 P114	310	NVC Community MC8f with path worn into turf. Target Note 126.	505000	487055
1004165	N/A	1004165 P115	340	Rock outcrops/green and brown algal beds	504938	487068
1004165	N/A	1004165 P116	360	Rock outcrops/green and brown algal beds	504938	487068
1004165	Unit 4: Phase 1	1004165 P117	340	Rock outcrops/green and brown algal beds	504589	487620

APPENDIX 6
SELECTED PHOTOGRAPHS

SELECTED PHOTOGRAPHS

The photograph numbers given correspond to those on the full photograph resource (provided electronically).



Photograph 1
Overview of Cayton Bay looking north-west, with unstable soft cliff in middle distance. NVC Community MG1 in foreground.



Photograph 4
Close up of grassland, NVC Community MC8f.



Photograph 11
Tufa flush NVC Community M38
within Community MG12 with
ruderals. Target Note 21.



Photograph 17
Example of soil blocks moving
down slope, with early stage of
community establishment. NVC
Communities MC9a and MG11b.



Photograph 25
Soft maritime cliff/slope with
recent landslide. Severe wave
erosion at base of slope.



Photograph 28
Overview of Unit 1 vegetation on
steep inland slope near western
boundary. Slippage with an
intimate mosaic of MG5 and CG7
grasslands, resulting from
exposure of more calcareous sub-
soil.



Photograph 38
Overview of hawthorn,
blackthorn and bramble scrub
communities with MG1 grassland
in foreground. Recent landslip
top of cliff next to road and hard
cliff outcrop in distance. Target
Note 43.



Photograph 46
Woodland NVC Community W8e
(Quadrat W8e: 1).



Photograph 56
Wet woodland W7a (Quadrat 2)



Photograph 71
Overview of Unit 1 shoreline -
Cornelian Bay.



Photograph 81
Landslip with solifluction,
Unit 1.



Photograph 106
South Bay eroding hard
cliffs and shore, with
shingle, wave cut
platform and brown algal