



THE NATIONAL TRUST

CONSERVATION DIRECTORATE

NATURE CONSERVATION EVALUATION

Whitehaven Coast
Cumbria

Draft for comment-January 2007

2006 Survey

This report is a brief appraisal of the nature conservation aspects of the property. It should not be regarded as exhaustive or definitive. It may subsequently be altered as further information becomes available or as a result of natural or management-induced change.

The report is designed to emphasise the habitats and features of particular interest on the property and to discuss options for their conservation management. It is not a management plan. When a management plan is prepared or revised by National Trust regional staff the suggestions given here will be considered, along with all the other aspects of property management.

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National Trust Nature Conservation Evaluation

Whitehaven Coast, Cumbria

Including: Part of St Bees Head SSSI
Saltom Bay GCR Site

Date of survey: 11th – 14th July 2006

Time spent on vegetation survey: 2.5 days

Surveyor(s): R. Allen

Time spent on zoological survey: 2.5 days

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Report compiled: January 2006

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Report despatched:

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MAP I – LOCATION

MAP II – SUMMARY

**MAP III – KEY MANAGEMENT
CONSIDERATIONS**

1 SUMMARY

The Whitehaven Coast project area covers approximately 209 ha. Much of the property has been affected by industrialisation with mining and other spoil covering large areas, most of which is vegetated often with rank, ungrazed grasslands. The coastal section contains good quality maritime cliff and slope habitats mostly lying within the St Bees Head SSSI whilst other areas are under arable production and permanent pasture.

The Barrowmouth area is registered common although grazing has ceased and the habitat is becoming dominated by bracken and scrub. A Geological Conservation Review site is located here. The remains of a former alabaster and gypsum mine are a Scheduled Monument as is the Saltom Pit and Haig Colliery. The industrial archaeology at the site is of at least national if not international importance.

With the closure of the Rhodia chemical plant, the opportunity has arisen to develop the area as a site of recreation for the people of Whitehaven and beyond. To enable this to happen the Whitehaven Coast Project has been set up which includes the Land Restoration Trust (who will own the coastal fringe area), the National Trust and numerous other organisations with an interest in the area. This culminated in May 2006 with a Workshop hosted by the National Trust, to discuss the future development and management of the area.

The key features of nature conservation interest are:

- Extensive areas of cliffs and coastal slopes conforming to the maritime cliffs and slopes UK BAP¹ Priority Habitat;
 - Habitats contained within this section include mosaics of maritime grassland and maritime heath along with bare and sparsely vegetated ground and seepage lines;
 - Breeding birds include the Amber-listed² fulmar and kestrel;
 - Good invertebrate potential with locally distributed species present including the grayling *Hipparchia semele* butterfly.
- An area of vegetated spoil to the west of the Rhodia plant which includes maritime grassland, grass heath and disturbed bare ground habitats, and a range of invertebrates including localised species.
- Arable fields with margins conforming to the cereal field margins UK BAP Priority Habitat;
 - Fields support the Red Data Book³-Vulnerable corn spurrey *Spergula arvensis* and breeding birds including Red-listed yellowhammer and UK BAP Priority skylark.

¹ UK Biodiversity Action Plan (BAP) priority habitats and species have an action plan for their rescue and conservation published on behalf of the UK Biodiversity Group. They have been selected because they are internationally important, rapidly declining or nationally rare. Action plans for habitats and species known to occur on the property are listed in Appendix 1 and can be found at www.ukbap.org.uk. Note that only a selection of the species that meet the selection criteria are included in the UK BAP.

² Red list bird species are those that are Globally Threatened according to IUCN criteria; those whose population or range has declined rapidly in recent years; and those that have declined historically and not shown a substantial recent recovery. Amber list bird species are those with an unfavourable conservation status in Europe; those whose population or range has declined moderately in recent years; those whose population has declined historically but made a substantial recent recovery; rare breeders; and those with internationally important or localised populations.

³ Red Data Book plants are those which have been assessed as falling within one of the IUCN categories of threatened species. The categories are Extinct, Extinct in the Wild, Critically Endangered, Endangered, Vulnerable, Near Threatened and Data Deficient.

- Sandstone quarries with vegetation including locally distributed wood vetch, localised invertebrates and the Amber-listed barn owl.
- Barrowmouth, an area of abandoned common becoming dominated by bracken and scrub;
 - The steep slopes and cliffs in the Barrowmouth area support rich maritime heath, rock crevice and scrub edge communities;
 - This area supports localised invertebrates including species at the extreme northern edge of their range and has good potential once grazing is restored.
- Areas of rank grassland supporting localised invertebrates including gatekeeper butterfly towards the northern extent of its range and the UK BAP Priority reed bunting.
- Other breeding birds on the property include Red-listed starling and house sparrow, UK BAP Priority song thrush and linnet along with Amber-listed dunnock, stonechat, meadow pipit, willow warbler and swallow.
- An area of damp derelict land east of the Rhodia plant, supporting large numbers of northern marsh and hybrid orchids along with pyramidal orchid.
- Reported populations of reptiles such as adder and common lizard.

Key management considerations

- Natural processes such as land slippage, slumpage and maritime influence is likely to maintain some of the most valuable coastal habitats.
- Revert most of the arable land to low/zero input permanent pasture or hay meadow;
 - some arable on the landward side may be retained for arable plant and bird interest under a low or zero input system based around spring-sown cereals with winter stubbles with unsown margins;
- Extensive grazing based around low stocking rates of hardy cattle and/or ponies should be restored to the Barrowmouth area;
 - Some small scale scrub clearance may be necessary in order to allow free movement of stock;
 - Alabaster mine (a Scheduled Monument) may need excavating and recording before being lost to coastal erosion, survey and possible mitigation for adders may be needed.
- Amenity grasslands at northern end of the site are probably best managed under a zero/low input hay meadow regime with a late summer hay cut (no earlier than end of July).
 - Remove all arisings in order to reduce fertility and promote increased species diversity.

2 BACKGROUND

2.1 Information sources

This report is based mainly on field survey carried out in July 2006, supplemented where appropriate by:

- information in the central Conservation Directorate files;
-

- information provided by regional staff.

A full list of sources is given in the references section at the end of the report.

Additional information about the nature conservation interests of the site may be held by bodies including Natural England, the County Wildlife Trust and local Biological Records Centre and/or by local naturalists.

2.2 Geology, topography & soils

The Whitehaven Coast area ranges from sea level to approximately 130 m OD, and consists of steep slopes to vertical cliffs with a generally gently sloping hinterland.

The majority of the northern and mid-section of the site are underlain by Whitehaven sandstones and coal measures from the Carboniferous Period. Fault lines exist to the north-west of Kells.

The southern section around Barrowmouth Bay is underlain by St Bees sandstone, St Bees shales incorporating gypsum (which was mined in late 19th and early 20th C) and thin sections of Magnesian Limestone and Brockram⁴. This forms the best exposure of Marine Permian strata in Cumbria and has been designated as a GCR site⁵ and is one of the reasons for the designation of the St Bees Head SSSI.

The majority of the features mentioned above are present at the surface and drift deposits appear to be limited to areas of boulder clay which are mapped by the British Geological Survey. Mining spoil covers fairly extensive areas of the site and a large spoil mound (incorporating asbestos) stretches across the northern end of Barrowmouth Common.

Soils are largely unmapped in the northern and mid-sections of the site. The Soil Survey of England and Wales (1983) maps soils over much of the surrounding area as belonging to the Eardiston 1 Association, this is a typical brown earth which is well drained with the possibility of water erosion during periods of heavy rainfall. Much of the land in the northern and mid-sections are likely to consist of mining spoil. Areas where this is exposed appear to be acidic as indicated by dwarf shrub heath and some areas are devoid of vegetation, this could be due to elevated amounts of salt or iron sulphide.

2.3 Land Use History

The following is drawn largely from an Archaeological Statement of Importance produced by David Cranstone.

The earliest evidence that exists relates to the ownership of this area and much of the surrounding land by St Bees Priory in medieval times. The Priory had coal mines and coal-fired saltworks close to or within the current study area. Landscape features

⁴ Thick layers of angular material formed during desert storms and flash floods.

⁵ Geological Conservation Review (GCR) Sites have been selected by the JNCC and its predecessor bodies to show the key scientific elements of the earth heritage of Britain. Each site is of at least national importance and therefore merits SSSI designation.

associated with ‘ancient countryside’⁶ are still to be found in the southern part of the site where land was farmed by the Priory. These are in contrast to the ‘planned countryside’⁷ features that were laid out by the industrialist Lord Lonsdale in the north of the study area.

The most important land use in the area was the development of industrial coal mining which has had a profound impact on the landscape. Chimney stacks, winding engines and other built structures are prominent landscape features as are the remains of incline railways. The dumping of mining spoil has and will continue to have a profound effect on the vegetation of the area and the landscape as a whole.

Mining of alabaster and gypsum took place intermittently at Barrowmouth from at least 1794 until 1908. The site of the mine is a Scheduled Monument as are other features associated with coal mining such as Saltom Pit and the Haig Colliery.

The Marchon chemical works was established on site during World War II to avoid bombing during the blitz. The site grew rapidly and in 1955 a mine exploiting anhydrite for use in the production of sulphuric acid was established, mining continued until 1973. Sulphuric and phosphoric acids along with cement and surfactants were produced on a large scale on the site until operations were wound down rapidly at the turn of the millennium.

Current land use is largely recreational and this is expected to continue in the future, activities range from dog-walking to paragliding. Anti-social activities such as dog-fouling, fly tipping and motorbike scrambling have been recent problems that will hopefully be addressed.

3 JONATHAN SWIFT HOUSE/SOUTH BEACH SECTION

3.1 Amenity areas

The northern end of the site borders Whitehaven harbour and is mainly used for amenity purposes. It contains car parks, a miners’ memorial, various buildings and areas of closely mown amenity grassland with park benches and ornamental shrub beds.

Management considerations

- No change in management is necessary for this area although restricting the use of fertilisers and other agri-chemicals in the grassland and removing any cuttings may promote a more flower-rich sward.

⁶ Ancient landscape defined by Rackham (1986) as containing features such as small irregularly shaped fields that have evolved over time.

⁷ Planned countryside defined by Rackham (1986) as containing features such as large rectilinear fields that appeared suddenly after the enclosure acts.

3.2 South Beach

The roads and car parks in this area provide access to South Beach, only the eastern edge of which is included in the project area boundary. The beach consists mainly of shingle with areas of coarse sand and boulders. It is backed by rapidly eroding soft cliffs largely composed of colliery spoil and the remains of old sea defences.

To the south the beach merges into a rocky shore (outside of the project area) with large boulders and shallow rock pools. This area supports a rich growth of seaweeds, with approximately 50% total cover.

Adverse weather conditions at the time of survey meant that the invertebrate fauna was not sampled effectively. It is possible that the fauna is uninteresting although one or two coastal specialist species could conceivably be present.

3.3 Unmanaged grassland and paddocks

Most of the area surrounding Jonathan Swift House consists of tall unmanaged grassland dominated by false oat-grass *Arrhenatherum elatius* with Yorkshire fog *Holcus lanatus*, cock's-foot *Dactylis glomerata*, common bent *Agrostis capillaris* and tall herbs such as hogweed *Heracleum sphondylium* and broad-leaved dock *Rumex obtusifolius*. Remnants of shorter, slightly richer grassland also survive in places including occasional sweet vernal-grass *Anthoxanthum odoratum*, black knapweed *Centaurea nigra*, yarrow *Achillea millefolium*, ribwort plantain *Plantago lanceolata* and common sorrel *Rumex acetosa*.

Two small paddocks on the eastern edge of this area (NX 968181) are separated by a 5 m deep bramble *Rubus fruticosus* and nettle *Urtica dioica* dominated walled gully. These paddocks contained short tussocky grassland, with evidence of recent cattle grazing at the time of the survey. The sward here is dominated by perennial rye-grass *Lolium perenne* and Yorkshire fog, with a limited range of common herbs including ribwort plantain, common sorrel, common cat's-ear *Hypochoeris radicata* and occasional black knapweed.

All of the grassland in this area is graded G3⁸ and of the NVC⁹ MG1 *Arrhenatherum elatius* type in the unmanaged areas with MG6 *Lolium perenne* – *Cynosurus cristatus* grassland in the grazed paddocks. Both of these communities are very common and widespread throughout the lowlands of Britain.

Invertebrates in this area appeared to be restricted to common and widespread species such as common carder *Bombus pascuorum* and red-tailed *B. ruderarius* bumblebees, the day-flying six-spot burnet moth *Zygaena filipendulae*, the knapweed associated picture-winged fly *Urophora jaceana* and the meadow brown butterfly *Maniola jurtina*.

⁸ Enclosed grasslands are graded on a G1 to G4 scale where G1 is a herb- and species-rich sward and G4 is agriculturally improved, species-poor grassland. Although of low botanical interest, where long established, G4 grasslands could be of interest for fungi, other soil biota or for their soil type.

⁹ The National Vegetation Classification (NVC) classifies British natural and semi-natural plant communities, and also agriculturally improved grasslands (Rodwell 1991, 1992, 1995 & 2000).

Management considerations

- All the areas of grassland should be managed under a zero or minimal input regime.
- Continue cattle grazing where it already occurs, ideally hardy stock of traditional breeds should be used.
- The use of avermectin based products should be avoided due to the adverse affects on invertebrates that rely on dung. Dung invertebrates are an important food resource for bats and birds.
- Ideally cattle and or pony grazing should be extended across the other areas of grassland although this may be difficult in such close proximity to the urban area.
- In the absence of grazing the grassland should be treated as hay meadow with a cut occurring no earlier than the end of July, preferably later.
- All arisings should be removed from site after cutting and drying. This should reduce the fertility of the grasslands further and promote an increased species diversity within the sward.

3.4 Gulley at GR 967182

The steep sides of a 5 m deep gulley at NX 967182 (site of a former incline railway) have been colonised by dense heather *Calluna vulgaris* bushes with occasional bramble and broad buckler fern *Dryopteris dilatata*. A specimen of royal fern *Osmunda regalis* was also found here, which has a restricted distribution in Britain (although the specimen here is probably a garden escape). A clump of the non-native invasive Japanese knotweed *Fallopia japonica* was situated at the southern end of the slope.

The bottom of the gulley supports a relatively herb-rich grassland/ruderal community including red fescue *Festuca rubra*, Yorkshire fog, colt's-foot *Tussilago farfara*, bird's-foot trefoil *Lotus corniculatus*, black knapweed and rosebay willowherb *Chamerion angustifolium*.

Breeding birds in this area included the Red-list and UK BAP Priority song thrush.

Invertebrates were again restricted to common and widespread species such as common carder *Bombus pascuorum* and white-tailed *B. lucorum* bumblebees, ringlet *Aphantopus hyperantus* and meadow brown *Maniola jurtina* butterflies. Areas of bare ground could be utilised by warmth-loving or burrowing invertebrates such as mining bees, and possibly support localised or scarce species.

Management considerations

- Attempts should be made to eradicate Japanese knotweed. Cutting followed by stem injection with a suitable herbicide, (off label permission required) will give the best chance of eradication.
- Bramble should not be allowed to colonise the area at the expense of other habitats.
- Periodic (annual or biennial) cutting and removal of grass in the valley bottom and sides may prevent colonisation by coarse grasses and scrub.

4 THE HAIG SECTION

This section includes all the land between the Rhodia plant in the south and Jonathan Swift House in the north (approximately NX 962161 – NX 967181).

This area was heavily shaped by coal mining between the 17th and 20th Centuries and large areas are covered by a thick layer of colliery waste. Many of the industrial remains in this area (Saltom Pit in particular) are of outstanding historical and archaeological importance. The site of the Haig Colliery is now a mining museum and part of the area has also been redeveloped as an enterprise park. The site of a derelict fuel depot, consisting of a large concrete platform with piles of rubble is also present at NX 965173.

4.1 Coastal slopes and cliffs

The coastal slopes are steep and unstable, with extensive slumped areas exposing bare rock and colliery spoil. In some places, particularly north of Saltom Pit, attempts have been made in the past to shore-up the cliffs with brickwork. The area around Saltom Pit also contains more recent dumped material including large pieces of metal and at least one burnt out car. Large sections have been fenced off, with warning signs to deter entry by the public.

The vegetation of the cliffs is very variable in cover and composition, consisting of mosaics of maritime grassland, heath, bracken and slumped bare ground. Many areas are only sparsely vegetated. The grassland component of this vegetation consists of abundant red fescue, Yorkshire fog and common bent. A wide variety of herb species are also present, including frequent to locally abundant thrift *Armeria maritima*, bird's-foot trefoil, ribwort plantain and wood sage *Teucrium scorodonia*. Other species present include tormentil *Potentilla erecta*, black knapweed, kidney vetch *Anthyllis vulneraria*, harebell *Campanula rotundifolia*, sea campion *Silene maritima*, bladder campion *Silene vulgaris*, sea plantain *Plantago maritima*, sheep's-bit *Jasione montana*, red clover *Trifolium pratense*, meadow vetchling *Lathyrus pratensis*, common cat's-ear, common centaury *Centaureum erythraea*, silverweed *Potentilla anserina* and colt's-foot. Several specimens of common spotted orchid *Dactylorhiza fuchsii* and northern marsh orchid *Dactylorhiza purpurella* were also found during the survey.

The heathland component of this vegetation consists mainly of patches of heather with occasional bell heather *Erica cinerea*. In most areas the heather occurs at relatively low frequency (less than 20% cover overall). Areas where heather is dominant are relatively limited in extent and mainly restricted to the northern end of this area (e.g. at NX 965179).

Areas of seepage are also present in places, marked by lines of soft rush *Juncus effusus* with occasional meadowsweet *Filipendula ulmaria*, hemp agrimony *Eupatorium cannabinum*, great horsetail *Equisetum telmateia* and field horsetail *Equisetum arvense*. Those emerging from the arable fields at the southern end of this area are dominated by nettles, a sign of nutrient enrichment. Salt deposits are also present along some of the seepage lines, these are likely to have crystallised from run off filtering through mining spoil.

Patches of scrub are also a feature of this vegetation, including patches of low wind-pruned blackthorn *Prunus spinosa*, grey willow *Salix cinerea*, burnet rose *Rosa pimpinellifolia* and creeping bramble. Shade-tolerant herb species associated the scrub include foxglove *Digitalis purpurea* and the non-native montbretia *Tritonia x crocosmiflora*.

The shoreline adjacent to Saltom Pit consists of shingle and rock, backed by an eroding soft cliff of colliery shale.

The vegetation along this section of coast does not neatly fit into a single NVC community. The grassland component shows closest affinity with the NVC MC8 *Festuca rubra* – *Armeria maritima* community, grading into MC9 *Festuca rubra* – *Holcus lanatus* maritime grassland on the upper slopes. The heathland component shows closest affinity with the H10 *Calluna vulgaris* – *Erica cinerea* community. The MC8 and MC9 communities are common around the cliffed coastline of Britain, while the H10 community occurs mainly in the more oceanic parts of western Britain.

Maritime cliff and slopes is a Priority Habitat in the UK BAP.

Weather conditions at the time of survey were less than ideal for surveying the invertebrate fauna of this habitat. The range of microhabitats and plant species encountered do suggest that scarce or rare species could be present, especially important could be sparsely vegetated or bare ground and seepage lines.

Invertebrates recorded included the locally distributed grayling butterfly *Hipparchia semele* along with more common species such as ringlet and latticed heath *Semiothisa clathrata*, (a day flying moth). The locally distributed wasp fly *Sicus ferrugineus* was found, this species is a parasite in the nests of various species of bumblebee. Another scavenger in the nests of bumblebees is the bumblebee mimic hoverfly *Volucella bombylans* which was encountered regularly in sheltered areas.

The Amber-listed kestrel was seen and may breed on the cliffs.

Management considerations

- Many of the valuable coastal habitats will need little or no intervention and should be maintained by natural processes such as land-slippage/slumping and the maritime influence.
- Large dumped items should be removed and disposed of properly. Efforts made to prevent the reoccurrence of such events.
- Seepage lines and other habitats seem to be suffering from nutrient run off from the arable fields above. Reverting those areas to low or zero input permanent pasture or hay meadow will help alleviate these problems.
- The fuel depot should be restored to grassland.

4.2 Cliff-top exclosures

A small area of grassland between the cliff-top and the amenity grassland (GR 966179) has been fenced-off to form two small exclosures. This area supports a sparse grass heath community of red fescue, common bent and Yorkshire fog with areas of bare

ground. This area is particularly herb-rich, including occasional to frequent common cat's-ear, sea plantain, red clover, hairy tare *Vicia hirsuta*, silverweed, black knapweed, bird's-foot trefoil, ribwort plantain, sheep's-bit and patches of heather. A single plant of pyramidal orchid *Anacamptis pyramidalis* was also found in this area. Pyramidal orchid is very rare in Cumbria, but probably increasing on the west coast (Halliday, 1997).

Invertebrates appeared to be limited to common and widespread species such as the rove beetle *Ocypus olens*, the picture-winged fly *Urophora jaceana* and the shaggy mining bee *Lasioglossum villosulum*, the latter species is of southern distribution and is decidedly more scarce in the north.

Management considerations

- From an ecological perspective the enclosures serve no purpose and could be removed.

4.3 Amenity grassland

Most of the flat ground surrounding the Haig Museum is managed as amenity grassland. It contains a sports field and the area is heavily used by dog walkers. This area is normally closely mown (J. Barlow, pers. comm.), but at the time of the survey the sward had been left to grow to approximately 30 cm high. Only the areas mown at the time of the survey are coded as amenity grassland on the habitat map.

The substrate in this area appears to be colliery spoil with only a thin layer of soil (sections through the substrate are visible in places on the edge of this area).

The grass sward in this area is relatively open and contains a high proportion of fine-leaved grasses. The most abundant species are red fescue, common bent and Yorkshire fog, with frequent perennial rye-grass and occasional cock's-foot and timothy *Phleum pratense*. White clover *Trifolium repens* is the only abundant herb species, with others restricted to occasional common cat's-ear, ragwort *Senecio jacobaea*, ribwort plantain, common mouse-ear *Cerastium fontanum*, creeping buttercup *Ranunculus repens* and curled dock *Rumex crispus*.

Of particular note here is the presence of small patches of bird's-foot trefoil and more rarely, black knapweed and meadow vetchling. A few heather plants were also found at the base of a slope at the extreme northern end (NX 967180). These species are characteristic components of grassland on low nutrient soils and may be a sign that the area is in the early stages of developing into a more herb-rich grassland community. Due to the nature of the substrate here it is likely that nutrients within the soil will quickly be leached out, allowing these species to spread. Additional species may also be able to colonise from the herb-rich grassland on the adjacent cliff-tops.

The common and widespread blackening waxcap *Hygrocybe conica* was found here, growing in areas along with the springy turf moss *Rhytidiadelphus squarrosus* at approximately NX 968179. Good quality waxcap grasslands are most often associated with this moss in short grazed or mown grasslands in the UK. There is a good possibility that other waxcaps or grassland fungi may be present in the autumn and a slim chance that scarce or rare species could be present.

This vegetation does not easily fit into the NVC classification, but is probably an example of MG6 *Lolium perenne* – *Cynosurus cristatus* grassland with maritime influences. It is graded G3 overall.

Areas of more herb-rich grassland supported a reasonable invertebrate fauna including the bees and wasps including the potter wasp *Ancistrocerus gazella* (which nests in broken plant stems), the mining bee *Colletes daviesanus* and the blue mason bee *Osmia coerulescens*. All of the above species are classified as being common although it is likely that they are much less frequent in the north than in the south of England. Other invertebrates included meadow brown and painted lady butterflies *Cynthia cardui*, the snipe fly *Rhagio tringarius* and the tufted vetch *Vicia cracca* associated weevil *Eutrichapion viciae*.

The Amber-listed meadow pipit and swallow were recorded and may breed nearby.

Management considerations

- Some of these areas of amenity grassland appear to be slowly reverting to a more herb-rich sward in places.
- There should be no inputs of fertilisers or other agri-chemicals on these areas.
- The grassland should be treated as hay meadow with a cut occurring no earlier than the end of July, preferably later.
- All arisings should be removed from site after cutting and drying. This should reduce the fertility of the grasslands further and promote an increased species diversity within the sward.
- The small triangular area of grassland at approximately NX 968179 could be cut more regularly as it may have some value for grassland fungi, this should be investigated by further survey.

4.4 Scrub bordering museum and enterprise park

A belt of scrub has been planted along the south-eastern edge of the museum/enterprise park area, surrounded by a fence. This is dominated by a mixture of sea buckthorn *Hippophae rhamnoides* (not native at this location) and goat willow *Salix caprea* with blackthorn, hawthorn *Crataegus monogyna*, whitebeam *Sorbus* sp., gorse *Ulex europaeus*, dog rose *Rosa canina* and bramble.

More open areas within the scrub also support a relatively herb-rich damp grassland community of red fescue, crested dog's-tail *Cynosurus cristatus* and Yorkshire fog with silverweed, ribwort plantain, meadow vetchling, great willowherb *Epilobium hirsutum* and field horsetail.

The scrub is likely to be of only general interest for invertebrates. Breeding birds of conservation concern included the Red-listed house sparrow and the Amber-listed willow warbler.

Management considerations

- No urgent management requirements.

- Occasional coppicing of shrubs may help to maintain the herb-rich damp grassland.

4.5 The enclosed grassland

The block of land to the south of the Haig Museum is divided into a series of fields.

Two of the fields (NX 967173 and 965171) appear to have been unmanaged for many years, supporting a tall, rank grassland community in the early stages of invasion by bramble scrub. The southern field also contains the derelict remains of several old corrugated iron sheds. Both of these fields are dominated by false oat-grass, with Yorkshire fog, cock's-foot and a range of tall herb species including rosebay willowherb, nettles and ragwort. Wet areas within these fields also support patches of common reedmace *Typha latifolium*, great willowherb and goat willow, with occasional wild angelica *Angelica sylvestris* and the non-native dotted loosestrife *Lysimachia punctata*. The non-native invasive Japanese knotweed is also present in places.

Breeding birds in this section included the Red-list and UK BAP Priority reed bunting and linnet, the Amber-listed meadow pipit along with common species such as whitethroat and sedge warbler.

Invertebrates included the locally distributed robber fly *Dioctria rufipes* which is decidedly scarce in the north of its range, the gatekeeper *Pyronia tithonus* butterfly was seen in this area this species is close to the extreme northern end of its range in this location. The blunt-tailed digger wasp *Crossocerus dimidiatus* was found, this species has a more north-westerly distribution and nests in rotten wood including old fenceposts and preys on flies.

The field at NX 966172 was grazed by 2 ponies at the time of the survey, with a small stable on the western edge. The sward here is dominated by a mixture of Yorkshire fog, common bent and meadow foxtail *Alopecurus pratensis*, with occasional sweet vernal-grass, crested dog's-tail and cock's-foot. Herbs in the main part of the field are restricted to a few common species including creeping buttercup, ribwort plantain and common sorrel. The main feature of interest here is a narrow belt of marshy grassland along the southern edge. This area supports a range of typical wet grassland rush, grass and herb species including soft rush, toad rush *Juncus bufonius*, floating sweet-grass *Glyceria fluitans*, great willowherb, bog stitchwort *Stellaria alsine* and a small number of northern marsh orchids.

Invertebrates were restricted to common and widespread species such as yellow dung fly *Scathophagus stercorarius* and the rove beetle *Stenus pallitarsis*.

The field at NX 964170 has been fenced off at the northern end and was heavily grazed by a donkey and a pony at the time of the survey. The remainder of the field was ungrazed, with a dense mattressy sward of red fescue, with frequent Yorkshire fog and common bent. Although largely grass-dominated this field retains a few small patches of relatively herb-rich grassland including bird's-foot trefoil, ribwort plantain and red clover. Some areas of exposed mining spoil at the southern end of the field had been colonised at the edges by heather indicating acidic conditions possibly caused by Iron sulphide. A vigorous plant of common sorrel devoid of pigment in one area may be

surviving only due to tolerance of extreme amounts of Iron sulphide or other dissolved metals.

Invertebrates in this section included the shaggy mining bee *Lasioglossum villosulum* which although common is decidedly more scarce this far north. Other species included good numbers of common green grasshopper *Omocestus viridulus* and the hoverfly *Melanostoma mellinum* and *Sphaerophoria scripta*.

Breeding birds appeared to be restricted to the Amber-listed meadow pipit.

A field at the southern end of this area (between the arable land and the Rhodia plant at NX 965163) had recently been cut for hay at the time of the survey.

The unmanaged grassland in this area falls within the NVC MG1 *Arrhenatherum elatius* community, in the early stages of succession to W24 *Rubus fruticosus* – *Holcus lanatus* underscrub. The grazed areas are of the MG6 *Lolium perenne* – *Cynosurus cristatus* type. In common with most other enclosed grassland at the site it is graded G3.

Management considerations

- The ideal management would be for these areas to be extensively grazed by hardy cattle and/or ponies under a zero or minimal input regime. The proposed grazing unit from Barrowmouth could be extended up to this point.
- The use of avermectin based products should be avoided due to the adverse effects on invertebrates that rely on dung. Dung invertebrates are an important food resource for bats and birds.
- In the absence of grazing a minimal/zero input hay regime would be the second best option. A late-summer (no earlier than the end of July) hay cut followed by removal of all arisings may help to reduce fertility and promote a more species rich sward.
- The current practice of pony and donkey grazing should be allowed to continue in the short term providing there is no increase in the stocking rate. These sort of animals would not be suitable for the type of grazing regime outlined above.

4.6 The arable fields

The southern end of the Haig section consists of a large block of arable land, divided into 3 fields by low grassy banks. These fields contained a crop of barley at the time of the survey, sown up to the edges. No arable plant interest was apparent at the time of the survey, with non-crop plants restricted to occasional very common species such as annual meadow-grass *Poa annua*, couch *Elymus repens*, Yorkshire fog, cleavers *Galium aparine* and creeping thistle. Damp patches within the fields, too wet to support a crop, have been colonised by toad rush.

An uncultivated bank on the eastern edge of the northern field (NX 964168) supports a very poor tall grassland/ruderal vegetation dominated by a mixture of false oat-grass and nettles. This bank appears to be used as a place to dump grass clippings and other garden waste from the adjacent houses.

Invertebrates were restricted to the common and widespread species such as the ground beetle *Harpalus aeneus*.

Management considerations

- Ideally, arable production in this area should cease as nutrient run-off is likely to be adversely effecting the undercliff habitats below.
- The best option would be to incorporate these fields into an extensive grazing unit along with the Barrowmouth area and grazed with hardy cattle and/or ponies.
- The fields should be allowed to revegetate naturally, if reseeding is deemed to be necessary then the seed should be locally sourced, preferably from on site.
- In the absence of grazing a minimal/zero input hay regime would be the second best option. A late-summer (no earlier than the end of July) hay cut followed by removal of all arisings may help to reduce fertility and promote a more species rich sward.
- The tipping of garden waste should be discouraged as this is likely to lead to the growth of nutrient tolerant species such as nettles and may lead to non-native plants becoming established.

4.7 The sunken lane and banks

The Haig site and the Rhodia Plant are linked by a surfaced lane, sunken at the southern end, which is bordered by walls and earth banks. This is the site of the Croft Incline, a former railway handling output from the collieries. The earth banks (particularly in the sunken section) support a herb-rich red fescue/false oat-grass sward with black knapweed, bird's-foot trefoil, mouse-ear hawkweed *Hieracium pilosella*, meadow vetchling, yarrow, harebell, black medick *Medicago lupulina* and occasional garden escapes. Occasional maritime species including sea plantain and common scurvygrass *Cochlearia officinalis* are also present in places.

This vegetation shows close affinities with the maritime grassland communities present on the coastal slopes.

Only common and widespread invertebrates were found at the time of survey including the cat's-ear associated picture-winged fly *Tephritis vespertina* and Gwynne's mining bee *Andrena bicolor*. It is possible that localised or scarce species could be associated with the maritime flora or warm bare ground.

Local residents report seeing common lizards *Lacerta vivipara* in this area especially towards the northern end, (David Cranstone, pers. comm.).

Management considerations

- No urgent management necessary. Walls should be repaired where necessary and vegetation may need to be cut occasionally to keep footpath clear.

5 SPOIL WEST OF THE RHODIA PLANT

The area to the west of the Rhodia Plant (NX 960160, bordered by Barrowmouth to the south and arable fields to the north) is covered by a thick layer of dumped material. This is very variable in composition, consisting of a mixture of shale, brick waste and

cement, ash, asbestos tiles and large rocks. Structures such as concrete platforms and tracks are also present. The thickness of this material is evident on the western edge, where a steep bank marks the boundary with the natural land surface at Barrowmouth.

The ground surface throughout this area is hummocky and slopes towards the sea. It is also heavily disturbed in places by vehicles (mainly motorbikes).

The vegetation in this area is also very variable. Some areas support a dense, matresy sward of red fescue, while the more open areas (particularly those disturbed by motorbikes) support a rich mosaic of short vegetation and bare ground. A large number of plant species were recorded in this area including early hair-grass *Aira praecox*, black knapweed, ribwort plantain, yarrow, red clover, hop trefoil *Trifolium campestre*, black medick, dyer's greenweed *Genista tinctoria*, bird's-foot trefoil, mouse-ear hawkweed, common centaury, harebell, bladder campion and occasional orchids (probably northern marsh orchid). This vegetation is also heathy in places, with small patches of heather (and rarely, bell heather) throughout. Towards the sea this vegetation becomes increasingly maritime in character, containing occasional to locally frequent kidney vetch, sheep's-bit, sea plantain and thrift.

This type of habitat is often rich in early-flowering annual plants, however many of these die off by early summer and would not have been visible at the time of the current survey.

Lower plants (particularly mosses) are also a prominent feature of this vegetation. Spoil heaps, particularly those contaminated with heavy metals, often support a specialised lower plant flora.

The vegetation in this area does not easily fit into the NVC classification, but includes elements of a range of maritime grassland, heathland and open ground communities.

The invertebrate fauna of this area appeared to be particularly rich with localised species such as the hoverfly *Chrysotoxum arcuatum* occurring. This species has a northern and western distribution and the larvae feed on root aphids associated with ants nests. Other localised species include the small beetle *Micrambe villosus* which was swept from dyer's greenweed and the grayling butterfly. Day flying moths included latticed heath and narrow-bordered five spot burnet *Zygaena lonicerae*. The shieldbug *Dolycoris baccarum* was found; this species is of south-eastern distribution and is restricted to dry coastal grasslands in the northern part of its range. Other species of more southern distribution include the beetle *Lagria hirta*, the locally distributed spider-hunting wasp *Anoplius nigerrimus* and the ragwort associated picture-winged fly *Sphenella marginata*. This area has good potential to support other scarce or localised species and the reintroduction of grazing is likely to increase this potential.

Breeding birds include the Red-listed and UK BAP Priority song thrush and linnet along with Amber-listed dunnock, meadow pipit and stonechat.

Management considerations

- Motorbike scrambling should be strongly discouraged.

- The best option would be to incorporate this area into an extensive grazing unit along with Barrowmouth and graze with hardy cattle and/or ponies under a zero input regime.

6 BARROWMOUTH

In contrast to the area further north Barrowmouth (NX 957156) has not been so severely affected by industrial development (although the area was mined for gypsum in the 19th Century) and is much more natural in character. It consists of a wide coastal slope (extending 200 m inland) backed by cliffs, some of which have been quarried in the past.

6.1 The coastal slopes

The coastal slopes in this section are mainly dominated by dense bracken *Pteridium aquilinum* with patches of rosebay willowherb and scrub including blackthorn, hawthorn, grey willow, bramble and honeysuckle *Lonicera periclymenum*.

Slightly more open areas support a rank grassland/tall herb community of false oat-grass and cock's-foot with hogweed, cleavers and foxglove. Patches of heather are also present throughout this area, being most extensive on the numerous rocky knolls which rise above the bracken.

The ground flora beneath the bracken was not surveyed in detail due to the density of the vegetation. However species such as black knapweed, meadow vetchling and common vetch *Vicia sativa* are present on the patch edges and may also occur elsewhere where the bracken is less dense.

In common with most other areas of the site this area contains elements of several NVC communities. These include W25 *Pteridium aquilinum* – *Rubus fruticosus* underscrub, MG1 *Arrhenatherum elatius* grassland, H10 *Calluna vulgaris* – *Erica cinerea* heath, MC8 *Festuca rubra* – *Armeria maritime* and MC9 *Festuca rubra* – *Holcus lanatus* maritime grassland.

Maritime cliff and slopes is a Priority Habitat in the UK BAP.

The invertebrate fauna of this area was not extensively surveyed although the fauna is likely to share some of the species mentioned in the next section, the common and widespread soldierfly *Chloromyia formosa* was particularly frequent. A return to a more open grazed grassland should increase the diversity and value of the invertebrate fauna.

Breeding birds included Red-list and UK BAP Priority linnet and common species such as whitethroat. Local residents report the former alabaster mine to be 'swarming' with adders *Vipera beris*, (David cranstone, pers. comm..).

Management considerations

- This area should be returned to an extensive grazing regime, the grazing unit should preferably extend across the mining spoil and ideally at least as far as the Haig fuel depot.
- Hardy cattle and/or ponies are the ideal grazing animals for this site. Goats could be introduced to deal with scrub but may be difficult to manage in such a situation, sheep are unsuitable as they are likely to selectively nibble off flowerheads. Selecting the correct animals for this situation is crucial to the success of the grazing regime.
- Some small scale scrub control may be necessary where it forms a barrier to free stock movement.
- Locating water sources or mineral licks (if used) may help to persuade stock to move across the whole site and to penetrate dense bracken stands. Ideally drinking troughs should be moved around the site in order to control trampling.
- Winter feeding should not take place in this area. If necessary, this could take place on pasture of a lower conservation value such as restored arable fields if these form part of the grazing unit.

6.2 The cliffs

The inland edge of Barrowmouth is marked by very steep vegetated slopes with areas of vertical bare rock.

The vegetation throughout this area is mainly dominated by heather with abundant bracken and patches of bell heather and great wood-rush *Luzula sylvatica*. Scrub is also abundant, consisting mainly of grey willow with occasional to locally frequent gorse, blackthorn, bramble, honeysuckle and rarely, hazel *Corylus avellana*. Other species growing amongst this vegetation include red campion *Silene dioica*, rosebay willowherb, wood sage, soft shield fern *Polystichum setiferum*, lady fern *athyrium filix-femina* and hard fern *Blechnum spicant*. Of particular note here is the presence of wood vetch *Vicia sylvatica*, which is most abundant on the scrub edge at the base of the cliffs. Wood vetch has a very scattered distribution in Britain and is rare in Cumbria, with this section of coast being its main stronghold in the county (Halliday, 1997).

Small fragments of herb-rich maritime grassland are also present throughout this area, mainly on the edges of the rock outcrops. These include red fescue, black knapweed, harebell, wild thyme *Thymus praecox*, bird's-foot trefoil, tormentil, devil's-bit scabious *Succisa pratensis* and a range of bryophytes.

K. Hearn (2005) also recorded golden-rod *Solidago virgaurea* and orpine *Sedum telephium* on the cliffs, and sea spleenwort *Asplenium marinum* in rock crevices. Sea spleenwort requires a frost-free environment and in Britain it is mainly restricted to the west coast.

H10 *Calluna vulgaris* – *Erica cinerea* heath is the dominant NVC community in this area, with elements of various scrub, tall herb and maritime grassland communities. This vegetation is included in the UK BAP maritime cliff and slopes Priority Habitat.

The dark-bush cricket *Pholidoptera griseoptera* was recorded; this is a common species in the south-east of England but is very localised north of the Severn to Wash line and is towards the extreme northern end of its range at this location with only a couple of more northerly outposts in southern Scotland. The locally distributed sawfly *Zaraea fasciata* was found nectaring on hogweed in this area, this species has larvae which feed on honeysuckle. Hummingbird hawk-moth *Macroglossum stellatarum* was also seen in this area, this species is an annual immigrant in varying numbers to the British Isles from the continent.

Management considerations

- Stock should be grazed right up to the cliff edge from Barrowmouth on the seaward side, see the above section for details.

7 THE BIRKHAMS QUARRY SECTION

This section includes the narrow coastal strip, cliffs and quarries to the south east of Barrowmouth. It also includes a block of arable fields on the flat ground above the cliffs.

7.1 The coastal slopes and cliffs

The coastal cliffs and slopes in this section are much narrower than at Barrowmouth and are inaccessible. The vegetation (as viewed through binoculars) appears to consist mainly of maritime grassland with patches of heathland, bracken and occasional gorse scrub. The grassland component of this vegetation is dominated by red fescue with frequent Yorkshire fog and sweet vernal-grass. Herbs include large patches of bird's-foot trefoil with locally frequent harebell, sheep's-bit, common cat's-ear and tormentil. The heathland component consists of patches of heather with occasional bell heather.

The only accessible area is the narrow belt of grassland between the cliff-top and the arable fields. This area supports a rich maritime grass heath community with patches of heather a sward of red fescue, false oat-grass, common bent, sweet vernal-grass and great wood-rush. This community is amongst the richest of any encountered at the site during the current survey, including occasional to locally abundant bird's-foot trefoil, common cat's-ear, dyer's greenweed *Genista tinctoria*, wild thyme, devil's-bit scabious, harebell, burnet saxifrage *Pimpinella saxifraga* and sea plantain.

The NVC communities here are similar to those found in the Barrowmouth section.

The invertebrate fauna is likely to be similar to previous sections. The common and widespread solitary wasp *Ectemnius continuus* was seen, this species nests in rotten wood or hollow plant stems and provisions its larvae with flies. The locally distributed robberfly *Dioctria rufipes* was recorded along with other common and widespread species such as the hoverfly *Sericomyia silentis* and the larvae of drinker *Euthrix potatoria* moth.

Breeding birds on the cliffs included approximately twenty pairs of the Amber-listed fulmar, other seabirds may breed on the cliffs here.

Management considerations

- Management options are severely limited due to the nature of the terrain.
- The best option may be to revert the coastal arable fields to pasture and graze them extensively with hardy cattle and/or ponies allowing grazing up to the cliff edge.

7.2 Birkhams Quarry and Aikbank Quarry

Birkhams Quarry (NX 955154) is cut into the cliffs above Barrowmouth and was active until very recently, with large blocks of cut sandstone still present and evidence of recent activity by heavy machinery.

The quarry is in the very early stages of colonisation by vegetation, consisting mainly of bare rock with occasional common cat's-ear, ragwort, foxglove, harebell, wood sage, red clover, colt's-foot, bramble and gorse. Some of the rock ledges have also been colonised by patches of heather.

Aikbank Quarry (NX 959155) has been disused for a much longer period, with a much higher vegetation cover. The quarry floor supports a rank grassland/tall herb community dominated by false oat-grass with patches of rosebay willowherb, bracken, bramble and occasional heather. The seaward slope of the quarry is dominated by heather with occasional bracken, rosebay willowherb and wood sage, grading into the cliff vegetation above Barrowmouth (see section 6.2).

Invertebrates included one of the ruby-tailed wasp *Chrysis*, most likely to be one of the species which is a parasite of potter wasps in the genus *Ancistrocerus*. Other invertebrates included grayling and gatekeeper butterflies the latter at the northern edge of its range.

A barn owl (Amber-list) was disturbed from a crack in the quarry face, it is likely that this species will breed here and hunt in rough grassland nearby.

Management considerations

- Little management necessary, periodic scrub clearance may help to maintain a diverse range of plant and animal species.

7.3 The arable fields and banks

The Project Area includes a block of 4 arable fields adjacent to the cliff-top. At the time of the survey three of these contained a crop of wheat, with oats in the remaining field.

These fields supported a range of common arable plants including frequent to abundant annual meadow-grass, knotgrass *Polygonum aviculare*, common couch and chickweed *Stellaria media*. Other species recorded included common fumitory *Fumaria officinalis*, wild oat *Avena fatua*, common hemp-nettle *Galeopsis tetrahit*, shepherd's purse *Capsella bursa-pastoris*, field pansy *Viola arvensis*, redshank *Polygonum persicaria*, pineappleweed *Matricaria matricarioides*, sun spurge *Euphorbia helioscopia*, scarlet pimpernel *Anagalis arvensis* and wall speedwell *Veronica arvensis*.

Two of the fields (NX 953153 & NX 951152) also contained corn spurrey *Spergularia arvensis*, which was locally abundant along the coastal edge. Although relatively widespread, corn spurrey has suffered one of the most serious declines of any British plant and is listed on the current Red Data Book in the Vulnerable category.

A small pond marked on the Ordnance Survey map (NX 953152) has since been filled in. The site of the pond is still visible as a circle of damp uncropped ground dominated by redshank with frequent marsh foxtail *Alopecurus geniculatus*, knotgrass and pineappleweed.

The field boundaries in this area consist of stone and earth banks approximately 1.5 m high. These banks support a diverse range of vegetation types, ranging from short herb-rich grassland to rank grassland and scrub. The grassy sections support a sward of red fescue and false oat-grass with patches of sweet vernal-grass and common bent. Herbs include patches of meadow vetchling, black knapweed, common cat's-ear, tufted vetch, common vetch and wood sage, with occasional harebell, burnet saxifrage and sheep's-bit. The scrubby sections are dominated by gorse or a mixture of gorse and bramble.

Cereal field margins such as this, which contain arable plants of conservation importance, are a Priority Habitat in the UK BAP.

Birds of conservation concern included the Red-listed yellowhammer which will breed in nearby hedges and scrub and the Red-list and UK BAP priority skylark which will nest in thin or bare areas within the crop.

Invertebrates were few but did include the larvae of the locally distributed chamomile shark *Cucullia chamomillae* moth which was feeding on scentless mayweed.

Management considerations

- Some arable production should be maintained in order to preserve populations of arable plants and farmland birds. Ideally, the fields on the landward side should be farmed as arable and the coastal fields returned to pasture.
- A minimal/zero input arable system based around spring sown cereals with unsown margins and weedy winter stubbles retained would provide the maximum wildlife benefit.
- Revert coastal field to pasture and graze extensively with hardy cattle and/or ponies under a zero input regime.

8 LAND EAST OF THE RHODIA PLANT

The project area includes a block of land to the east of Wilson Pit Road.

8.1 The derelict industrial land

The northern half of this block consists of derelict industrial land including car parks, works buildings and large expanses of unmanaged grassland. The area is crossed by numerous unofficial paths.

The grassland in this area is dominated by a tall sward of false oat-grass and Yorkshire fog, with a limited range of herb species typical of disturbed ground. These include abundant creeping buttercup with locally frequent white clover, rosebay willowherb, hogweed, ragwort and curled dock. Damp areas are also present in places, including occasional soft rush, compact rush *Juncus conglomeratus*, meadowsweet, silverweed, great willowherb and meadow vetchling.

The richest area of derelict land is associated with a rectangular block of ground on the eastern side of the works at NX 971156. This area supports a damp grassland community of red fescue and Yorkshire fog with dandelion *Taraxacum officinale*, white clover, rosebay willowherb, colt's-foot, hop trefoil and other species typical of disturbed ground. Patches of slightly wetter ground within this area are very rich, supporting patches of common spike-rush *Eleocharis palustris*, oval sedge *Carex ovalis* and field horsetail with cuckooflower *Cardamine pratensis* and marsh willowherb *Epilobium palustre*. These wet areas also contain large colonies of orchids, with several hundred flower spikes present at the time of the survey. These appear to be a mixture of northern marsh orchids and hybrids (probably northern marsh orchid x common spotted orchid). Pyramidal orchid was also found in this area.

Most of the vegetation in this area falls within the NVC MG1 *Arrhenatherum elatius* grassland community. This type of grassland is typical of ungrazed road verges, industrial sites and neglected agricultural land throughout Britain.

A pair of the Amber-listed stonechat were seen here with a brood of fledged young. Other breeding birds include the Red-listed and UK BAP Priority linnet and Amber-listed meadow pipit.

Invertebrates included the day flying moths latticed heath and narrow-bordered five spot burnet. The invertebrate fauna could not be effectively sampled unfortunately due to heavy rain at the time of survey.

Management considerations

- The ideal management would be for these areas to be extensively grazed by hardy cattle and/or ponies under a zero or minimal input regime.
- The use of avermectin based products should be avoided due to the adverse effects on invertebrates that rely on dung. Dung invertebrates are an important food resource for bats and birds.
- In the absence of grazing a minimal/zero input hay regime would be the second best option. A late-summer (no earlier than the end of July) hay cut followed by removal of all arisings may help to reduce fertility and promote a more species rich sward.
- The uneven nature of the terrain in this area may mean that machinery would be difficult to operate and some small scale landscaping may be necessary in order to facilitate this.

8.2 The agricultural land

The southern half of this block is agricultural land. The area east of the works (NX 971155) is a re-seeded ley dominated by perennial rye-grass with frequent white clover. The southern end (separated from the ley by a grassy bank) contained a crop of oats at the time of the survey. No arable plant interest was evident, with weeds restricted to a few very common species such as annual meadow-grass, creeping bent, black-grass *Alopecurus myosuroides* and redshank.

The main interest in this area is associated with a small stream valley which marks the southern edge of the site (NX 974152). The stream itself is bordered by a dense belt of young to semi-mature sycamore *Acer pseudoplatanus*, ash *Fraxinus excelsior* and hawthorn. The ground flora is dominated by dense bramble with nettles, wood avens *Geum urbanum* and occasional climbing honeysuckle.

The Red-listed and UK BAP Priority song thrush was recorded singing from this area and is likely to breed.

The area between the stream and the arable field to the north consists of a belt of damp tall grassland/herb vegetation with false oat-grass, hogweed, creeping thistle, meadow vetchling, great willowherb and field horsetail. This grassland is gradually being invaded by bramble scrub from the edges. A much richer wet grassland community (including wild angelica, meadow vetchling and black knapweed with scattered willow scrub) is present at the eastern end of the stream corridor, but this appears to be outside of the Project area.

The Red-listed linnet and Amber-listed dunnock were recorded in the scrub here and are likely to breed. The invertebrate fauna of this area was not effectively sampled due to heavy rain at the time of survey.

Management considerations

- The best option would be to revert this area to pasture and graze extensively with cattle and/or ponies under a minimal/zero input regime along with the above section.
- In the absence of grazing a minimal/zero input hay regime would be the second best option. A late-summer (no earlier than the end of July) hay cut followed by removal of all arisings may help to reduce fertility and promote a more species rich sward.
- Alternatively, arable could be retained and spring cereals grown under a minimal/zero input regime. If this option is followed then buffer zones should be installed alongside water bodies.

9 LAND SOUTH-WEST OF THE RHODIA PLANT

The Project Area includes a block of four fields beyond the western/south-western edge of the Rhodia security fence.

The fields immediately adjacent to the fence are agriculturally improved meadows (graded G4). These had recently been cut at the time of the survey, but bales still present in the field appeared to consist mainly of perennial rye-grass with occasional meadow foxtail. Herbs in uncut areas on the field margins were restricted to white clover with occasional common sorrel and ribwort plantain.

The northern field in this area contains a steep bank (NX 962159) leading down to the spoil area west of the Rhodia Plant (see section 5). This supports an unimproved (graded G2) tall grassland community of false oat-grass, Yorkshire fog and common bent. This grassland is very herb-rich including abundant ribwort plantain with frequent black knapweed, meadow vetchling, common sorrel and hogweed. Hawthorn scrub is also frequent.

The two fields at NX 962155 contained a maize crop at the time of the survey. The fields were weedy in places, but only very common species were present including annual meadow-grass, field horsetail, shepherd's purse, scentless mayweed *Tripleurospermum inodorum*, fat hen *Chenopodium album*, knotgrass and sun spurge.

The field boundaries in this area consist of earth and stone banks supporting a scrubby grassland community of false oat-grass, bramble, bracken, nettles, cleavers and occasional gorse. The slightly richer sections also include occasional wood sage, foxglove, tufted vetch, black knapweed, tormentil and harebell.

The Amber-listed meadow pipit was seen here and may breed. The invertebrate fauna appeared to be uninteresting with only very common and widespread species recorded.

Management considerations

- The area could be reverted to permanent pasture, this would probably be best achieved when the Rhodia site is reintegrated into the management unit, and links to the grazing unit at Barrowmouth made.
- Arable production could continue up to this point. A switch to a minimal/zero input regime based on spring sown cereals with weedy winter stubbles retained would be more beneficial than the current situation.
- Areas currently cut for silage should be managed as minimal/zero input hay meadow with a late summer (no earlier than late July) hay cut and all arisings removed. This should help to reduce the fertility of the sward and allow a greater species diversity.

10 THE RHODIA CHEMICAL PLANT

The Rhodia chemical plant site was inaccessible at the time of the survey, being surrounded by a high security fence. However it was clearly visible from the adjacent land and consisted mainly of concrete platforms, piles of rubble, standing buildings in the process of demolition and areas of rank grassland. The landfill site at the southern end has been capped and seeded. Some of the steep north facing banks at the southern edge of the site appeared to support fairly good quality grassland with abundant black knapweed and red clover.

Management considerations

- Once demolition/decontamination is complete the management of this site should be integrated with the rest of the project area.
- Extensive grazing linking the fields to the south-west and the Barrowmouth area would be the best option.

11 THE SHORE AND MARINE HABITATS

The project Area only extends to the base of cliffs, however the shore and marine habitats beyond this are also of nature conservation and geological importance. These habitats were not examined in detail during the current survey, but a preliminary assessment was made by K. Hearn (2005) and is summarised below:

The main features include a well-developed wave-cut platform with dramatic horizontal bedding features, areas of tumbled rock talus, huge boulders and other beach features. The marine interest of this section is not fully known and may have been affected by chronic pollution from the chemical plant. However, the potential for biodiversity in the intertidal habitats is likely to be good – if not so already. Further offshore the waters are likely to be of value as fish nursery grounds, and the whole coast is of interest for cetaceans.

Management considerations

- Ensure that land is managed in a way that reduces the possibility of pollution entering the marine environment.

PRIORITIES FOR FURTHER SURVEY¹⁰

Recommended baseline return survey cycle

- 15 years

Specialist Surveys

- Survey of annual vascular plants in spring (bare ground habitats are often rich in these species, but they would not have been visible at the time of the current survey).
- Survey of bryophytes and lichens (derelict industrial sites and coastal rocks often support a range of specialised species).
- Survey for small blue butterfly, populations of the foodplant (kidney vetch) are present on the site and it is possible that a small population could be present.
- Survey for adders may be necessary on the site of the alabaster mines at Barrowmouth. Large numbers have been reported by local residents, (David Cranstone pers. comm.) and mitigation may be necessary if the site needs to be excavated.
- The value of the site for grassland fungi should be investigated at the appropriate time of year.

MONITORING RECOMMENDATIONS

- The effects of grazing should be monitored when it is introduced. This could involve informal methods such as visual estimates of cover or random transects. More formal methods such as establishing fixed vegetation transects or quadrats would be more time consuming. Fixed point photography may also be worthwhile.
- The success or otherwise of Japanese knotweed control should be monitored.

¹⁰ The requirements for further survey outlined here are needed before a more detailed management appraisal of the property can be devised. The Conservation Directorate's Office may be able to suggest suitable surveyors. Results of these surveys may affect the management suggestions given in this report. Other surveys may also be valuable in increasing the biological database of the property. Routine monitoring requirements are not included.

MAP IV – VEGETATION & BIOLOGICAL FEATURES

MAP V – BASE MAP

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Other Sources of Information

JNCC: plant status information from website (www.jncc.gov.uk).

National Trust: Jeremy Barlow (Whitehaven Coast Project Manager), John Hooson (Regional Nature Conservation Adviser, North-west region), Katherine Hearn (Adviser on Nature Conservation) – general site information.

David Cranstone, (Cranstone Consultants)-archaeological information and selected biological records.

UK Biodiversity website: www.ukbap.org.uk.

APPENDIX 2: UK BAP HABITAT ACTION PLANS

Biodiversity Action Plans for Priority Habitats and Species relevant to the property can be viewed on the UK Biodiversity website: www.ukbap.org.uk. Often these provide links to local biodiversity action plans also.

Priority Habitats

Maritime cliff and slopes
Cereal field margins

Priority Species

Skylark
Song thrush
Linnet
Reed bunting