

Parc Calon Gwyrdd Ltd

Land at Rover Way, Cardiff

Ecology survey



August 2017

 **Sturgess
Ecology**

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Cover photographs:

Left: Motorcycle tracks in central part of site. Right: Plantation and scrub on northern slope.

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1. Introduction

Parc Calon Gwyrdd Ltd has commissioned Sturgess Ecology to undertake an ecological survey and assessment of land at Rover Way, Cardiff (approximate central grid reference ST217763). The ecology study is required in support of a planning application for substantial reprofiling the site to remove and remediate much of the contaminated material that currently underlies it, and construction of a 9MW Biomass power station, along with 130,000 sq.ft. of industrial accommodation.

The objectives for the survey were:

- To produce an ecological habitat plan with target note descriptions, based on standard extended phase 1 habitat survey methods.
- To produce a plant species list for the main habitat types, and record any fauna observations made during the survey.
- To assess the site's potential to support protected species, and make any necessary recommendations for further surveys to clarify any potential ecological constraints.
- To identify any features of significant value for nature conservation.
- To make recommendations for any valuable habitats or species to be taken into account during the project development, through retention or enhancement, or if this is not possible, by habitat mitigation or compensation.

The site is known locally as the Cardiff Frag Tip and it is largely underlain by tipped material from the nearby metal works. It was used for 'Fragmentation Waste', which was a varied mix of toxic industrial wastes including steelworks slag and non-metallic waste (e.g. carpet, plastic, etc. from cars being crushed and recycled by the steelworks), old conveyor belts and various other materials. The tip was capped and landscaped by Dwr Cymru Welsh Water in approximately 2001 as part of the development of the Cardiff East Waste Water Treatment Works. It was then re-landscaped in approximately 2008 for use as an off-road motorcycle course (Cardiff Motocross Centre MX and Minibike Track). The Wales Coastal Footpath runs along the seaward side of the tip.

The site lies adjacent to the Cardiff foreshore, which is part of the Severn Estuary. This is a statutory protected site, designated as a Special Protection Area (SPA), Special Area of Conservation (SAC), Ramsar site and Site of Special Scientific Interest (SSSI), mainly because of its value to estuarine waders and wildfowl.

Ecology surveys have been undertaken recently as part of a planning application for a wind turbine (Sturgess Ecology, 2014 & 2015). These studies have provided background information to the current survey, and data from the 2014 and 2015 reports has been included in the assessment section of this document.

Cardiff County Council's ecologist advised that the key ecological issues for development at this site would be the possible effects on overwintering and migratory birds using the Severn Estuary SPA and the range of potential pollution impacts on the estuary habitat through re-working of contaminated tip material. He advised that the open mix of brownfield habitats is likely to support a high diversity of flowering plants and invertebrates and should be evaluated to determine whether the UK Biodiversity Action Plan (UKBAP) habitat known as 'Open Mosaic Habitat on Previously Developed Land', is present, and whether the site would qualify as a wildlife site using the Post-industrial Land criteria of the Guidelines for the Selection of Wildlife Sites in South Wales. He also recommended that the ecology studies to accompany a planning application should take into account the plants, bees, nesting birds and any possible reptiles using the site.

2. Survey method

Desk study

Information on the statutory protected sites was obtained from the Natural Resources Wales (NRW) web-site. This search was limited to sites within 5km of the study area.

A South East Wales Biodiversity Records Centre (SEWBRc) was commissioned to provide data on protected and priority species and protected sites within a 500m radius of the wind turbine application on the site (Sturgess Ecology, 2014). This covered the whole of the current study area. The search yielded very few records from the site itself so was not repeated for the current study. However, the study has been able to take into account more recent observations that were gathered during surveys in 2015 for the new Anaerobic Digestion Plant at Cardiff WWTW, close to the south-west boundary (P.Sturgess, pers.obs.).

Site inspection

A site visit was undertaken on 1 August 2017. The weather during the survey was warm and sunny, but followed several days of showery weather. The timing of the survey is optimal for this type of survey because most species of plants are readily identifiable. However, early flowering species were sometimes only visible as dead seed heads, and it is possible that some of these may have been overlooked.

The survey was undertaken by a simple walk-over method, crossing the study area several times, to examine and map the various habitat types. Access was readily available, although the motorcycle track was being used at the time of the visit (apparently unofficially) and this made access to some of the central area difficult. Habitats were mapped by eye onto a survey plan, using a method based on phase 1 habitat mapping conventions (JNCC, 2010).

The fieldwork and assessment were undertaken by Dr Peter Sturgess CEnv MCIEEM, an experienced ecologist familiar with the types of habitats and species that would be expected to occur on this site. Dr Sturgess had previously surveyed the site and its surroundings in 1997 for Dwr Cymru Welsh Water, and provided ecological input to the landscaping scheme when the tip was reprofiled and capped. More recently he undertook the surveys of the site for the proposed wind turbine in 2014 and 2015.

3. Survey findings

Desk study

The Severn Estuary which lies immediately outside the site boundary is an important protected area, designated as SAC, SPA, Ramsar site and SSSI. The official boundary of the protected site (obtained as a GIS layer from NRW) is shown in Figure 1. The difference between the boundary and the current shoreline may be attributable to recent erosion at the base of the tip. Information on the protected site was obtained through the NRW and JNCC web-sites.

The SPA summary description from the JNCC web-site is as follows:

“The Severn Estuary is located between Wales and England in south-west Britain. It is a large estuary with extensive intertidal mud-flats and sand-flats, rocky platforms and islands. Saltmarsh fringes the coast backed by grazing marsh with freshwater ditches and occasional brackish ditches. The seabed is rock and gravel with sub-tidal

sandbanks. The estuary's classic funnel shape, unique in the UK, is a factor causing the Severn to have the second- highest tidal range in the world (after the Bay of Fundy in Canada). This tidal regime results in plant and animal communities typical of the extreme physical conditions of liquid mud and tide- swept sand and rock. The species-poor invertebrate community includes high densities of ragworms, lugworms and other invertebrates forming an important food source for passage and wintering waders. A further consequence of the large tidal range is an extensive intertidal zone, one of the largest in the UK. The site is of importance during the spring and autumn migration periods for waders moving up the west coast of Britain, as well as in winter for large numbers of waterbirds, especially swans, ducks and waders."

The SPA qualifying features include the following populations of European importance:

- Overwintering Bewick's Swans: 280 individuals, representing at least 4.0% of the wintering population in Great Britain (5 year peak mean 1991/2 - 1995/6).
- Overwintering Curlew: 3,903 individuals representing at least 1.1% of the wintering Europe - breeding population (5 year peak mean 1991/2 - 1995/6).
- Overwintering Dunlin: 44,624 individuals representing at least 3.2% of the wintering Northern Siberia/Europe/Western Africa population (5 year peak mean 1991/2 - 1995/6).
- Overwintering Pintail: 599 individuals representing at least 1.0% of the wintering North-western Europe population (5 year peak mean 1991/2 - 1995/6).
- Overwintering Redshank: 2,330 individuals representing at least 1.6% of the wintering Eastern Atlantic - wintering population (5 year peak mean 1991/2 - 1995/6).
- Overwintering Shelduck: 3,330 individuals representing at least 1.1% of the wintering North-western Europe population (5 year peak mean 1991/2 - 1995/6).
- Ringed Plover, on passage: 655 individuals representing at least 1.3% of the Europe/Northern Africa - wintering population (5 year peak mean 1991/2 - 1995/6).

The estuary also meets the SPA qualifying criterion of being a wetland of international importance which regularly supports at least 20,000 waterfowl, summarised as follows:

"Over winter, the area regularly supports 93,986 individual waterfowl (5 year peak mean 1991/2 - 1995/6) including: Gadwall, Shelduck, Pintail, Dunlin, Curlew, Redshank, Bewick's Swan, Wigeon, Lapwing, Teal, Mallard, Shoveler, Pochard, Tufted Duck, Grey Plover, White-fronted Goose and Whimbrel."

The Severn Estuary SAC selection features include the following:

- Estuaries
- Mudflats and sandflats not covered by seawater at low tide
- Atlantic salt meadows
- Sandbanks which are slightly covered by sea-water all the time
- Sea Lamprey
- River Lamprey
- Twaite Shad.

The Severn Estuary is designated as a Ramsar site under the International Convention on Wetlands of International Importance especially as Waterfowl Habitat. It should be noted that several of the qualifying criteria are the same as for the SPA and SAC. Qualifying features include the following:

- Immense tidal range, affecting the physical environment and biological communities present.
- Unusual estuarine communities, reduced species diversity and high productivity. The high tidal range leads to strong tidal streams and high turbidity, producing communities characteristic of the extreme physical conditions of liquid mud and tide swept sand and rock.

- Important for the run of migratory fish, including Salmon, Sea Trout, Sea Lamprey, River Lamprey, Allis Shad, Twaite Shad and Eel.
- The fish assemblage of the whole estuarine and river system is one of the most diverse in Britain, with over 110 species recorded.
- Regularly supporting internationally important populations (1% or more) of waterfowl species in winter, including Bewick's Swan, European White-fronted Goose, Dunlin, Redshank, Shelduck and Gadwall.
- Regularly supporting internationally important populations of Ringed Plover (spring/autumn), Eurasian Teal (winter), Northern Pintail (winter), Lesser Black-backed Gull (breeding).
- Important for migratory birds during passage periods in spring and autumn, including nationally important populations of Ringed Plover, Dunlin, Whimbrel and Redshank.
- Regularly supporting over 20,000 waterfowl in winter. (1988/89 to 1992/93 average peak count was 68,026 waterfowl: 17,502 wildfowl and 50,524 waders).
- Supports an assemblage of international importance - (1998/99-2002/2003 5 year peak mean was 70,919 waterfowl).
- Nationally important wintering populations of: Wigeon, Teal, Pintail, Pochard, Tufted Duck, Ringed Plover, Grey Plover, Curlew and Spotted Redshank. Also nationally important breeding population of Lesser Black-backed Gull.

There are five SSSIs within 5km of the site. The closest of these is the Severn Estuary. There is a high degree of overlap between the SSSI features and those already outlined above as part of the European site designations, so the SSSI is not discussed further here.

The Gwent Levels Rumney and Peterstone SSSI lies approximately 2.5km north-west of the site, east of the Rhymney estuary. This is one of six Gwent Levels SSSIs between Cardiff and Chepstow. The levels are made up of low-lying fields which are drained by an extensive network of drainage ditches. The nature conservation interest in the Gwent Levels is primarily associated with the ditches, which support a rich diversity of plants and invertebrates, many of which are nationally rare or notable. The hedgerows and flower-rich reed banks also provide valuable habitat for invertebrates.

The Rhymney Quarry, Rhymney River Section and Penylan Quarry SSSIs lie approximately 2.6km, 2.8km and 3.2km north of the site respectively. These are all designated for their geological importance. They are not discussed further in this document because there would clearly be no potential impact on them from the proposed development.

The closest Site of Importance for Nature Conservation (SINC) is Pengam Moors, which lies to the north-west. Its closest point is approximately 20m from the Parc Calon Gwyrdd site, on the north side of Rover Way. Pengam Moors SINC is described as artificial habitat with strong maritime influences and network of drainage channels, with the locally rare plants Sea Clover and Brackish Water Crowfoot. Beyond this, at approximately 500m from the site, the salt marsh habitat at the mouth of the River Rhymney is also a designated SINC. Neither SINC lies within the Parc Calon Gwyrdd site boundary.

Site inspection

The habitat survey plan is presented as Figure 1. Specific habitats within the study area are described by Target Notes TN1 to TN16, in Table 1 (these are indicated on Figure 1). Each note includes a brief description of the habitat, the main plant species present and any other features of significance. The habitat plan is based on a site survey plan but it should only be considered approximate because the habitat features have been plotted by eye. Also, some habitats which exist as complex mosaics have been simplified for the diagram. The interface between neutral grassland and sparse ephemeral vegetation is especially difficult to define in this case. The plan is shown on an aerial photograph background to give some additional context information on the surrounding habitats.

A list of the plant and animal species recorded during the survey is presented in Appendix 1. Several photographs are also included as Appendix 2, to provide a visual record of the site at the time of the survey.

Table 1. Habitat Survey Target Notes.

Target Note	Description
1	Ornamental shrub planting. The existing access road is bordered on either side by ornamental landscape planting, which also extends along the boundary of the water treatment works. The dominant species include Red-osier Dogwood, Laurustinus, David Viburnum, Guelder Rose, Broad-leaved Oleaster, Butterfly Bush, Grey Willow and Cherry Laurel, and Bramble is also present. Shrubby Cinquefoil, Entire-leaved Cotoneaster, Cistus and Escallonia are present in smaller quantity. Several planted trees include Italian Alder, Ash, Osier and Downy Birch. The planting forms a dense thicket and the ground flora is mostly quite sparse. The more open patches include Wild Parsnip, Nettle, Creeping Bent, Greater Periwinkle, Creeping Thistle, Soft Sow-thistle, Red Fescue, False Oat-grass, Wild Carrot, False Brome, Greater Willowherb and Creeping Buttercup. Broad-leaved Helleborine orchids were locally frequent, with over 100 flowering spikes present, mainly along the north side of the access road.
2	Access road margins. The edges of the road are fringed by sparse grassland and ruderal plants, with the vegetation grading towards taller grassland and scattered scrub at the boundary fences. The most frequent plant species include Creeping Bent, False Oat-grass, Bilbao Fleabane, Bird's-foot Trefoil, Ox-eye Daisy, Wild Carrot, Smooth Hawk's-beard, Yorkshire Fog, Ragwort, Perforate St.John's-wort, Bramble, Biting Stonecrop, Ribwort Plantain, Bristly Ox-tongue, Common Centaury. Small amounts of the locally notable species Yellow-wort and Hairy St.John's-wort are also present.
3	Motorcycle compound. A fenced compound bordered by tall palisade fencing, with a series of container units used for office space and storage by the Cardiff Motocross Centre. The compound is mostly devoid of vegetation and the containers do not have any potential as roosting sites for bats.
4	Standing water. A small linear ponded area, approximately 1m wide and 10m long between the slag piles of the adjacent site and the steep-sided bunds beside the access track. It is shaded by Butterfly Bush scrub with occasional Alder and Bramble. The water is fringed by Creeping Buttercup and Creeping Bent, with occasional Hoary Ragwort and Hedge Woundwort. The only aquatic plant noted was Common Duckweed. It seems likely that the water is not present all year.
5	Neutral grassland. A diverse, flower-rich sward sloping towards the estuary. The flora includes Red Fescue, Wild Carrot, Wild Parsnip, Common Knapweed, Ox-eye Daisy, Yellow-wort, Bird's-foot Trefoil, Common Centaury, Bristly Ox-tongue, Ribwort Plantain, Flax, Yorkshire Fog, Creeping Cinquefoil, Ragwort, Fern-grass, Yarrow, Common Bent, Selfheal, Black Medick, Lady's Bedstraw and Bulbous Buttercup. Pyramidal Orchid was noted in this area in 2014, but would have finished flowering before the current survey. The sward appears to be kept short by rabbit-grazing and the exposed coastal conditions.
6	Bare slag. A recently formed, steep-sided bank of slag, with virtually no vegetation other than sparse mosses and ruderals. A few plants near the margins of the

Target Note	Description
	recently formed area include Creeping Bent, Weld, Biting Stonecrop, Narrow-leaved Ragwort, Thyme-leaved Sandwort and Butterfly Bush seedlings.
7	<p>Neutral grassland. A diverse, flower-rich sward, similar to TN5 but sheltered by the dense scrub around it. The coastal footpath runs through the area. The most frequent species include Black Medick, Red Fescue, Ox-eye Daisy, Ribwort Plantain, Flax, Bilbao Fleabane, Common Vetch, Yorkshire Fog, Creeping Cinquefoil, Bird's-foot Trefoil, Perforate St.John's-wort, Yarrow, Wild Carrot, Wild Parsnip, Hairy Sedge, White Clover, Common Bent, Common Knapweed, Selfheal, Lady's Bedstraw and Curled Dock. A few plants of Yellow-wort and Spiked Sedge are present. The north-west side of the grassland merges into tall herbs and scrub as the gradient becomes a steep slope up to the motorcycling plateau. The slope is dominated by Butterfly Bush, Hoary Mustard, Wild Parsnip, Teasel, and Bramble. Japanese Knotweed and Tansy are present near the top of the bank. Bramble and Butterfly Bush scrub, with occasional Sea Buckthorn, appear to be encroaching into the grassland area.</p>
8	<p>Eroding shoreline. The margin of the tip is eroding along most of its length. Much of the former coastal protection of wire and concrete has washed away, so that slag and other waste materials are exposed to wave action. This habitat supports no significant flora. The remains of the plastic liner and protective fibre covering that once capped the waste have been exposed and left overhanging the tip edge in some places. This creates occasional sheltered cavities which could feasibly be used by Otters, although no sign of these was found. In other areas the liner materials have been burned and no longer overhang the eroding face.</p> <p>The upper part of the shoreline comprises a belt of shingle and large blocks of concrete. The shingle is mostly formed from pieces of slag, concrete and brick, with occasional inclusions of other materials including iron and apparently asbestos cement sheets. This area is generally devoid of vegetation although a few plants of Spear-leaved Orache, Sea Beet, Weld and Sea Couch are present in the north-eastern part, where the edge of the tip is still mostly secured by wire cages and concrete.</p> <p>The main part of the shoreline (beyond the site boundary) comprises intertidal mudflats. A belt of larger rocks between the upper edge of the mudflats and the steeper shingle belt is dominated by fucoid seaweeds, particularly Toothed Wrack, Bladder Wrack and Egg Wrack. This is part of the extensive estuarine habitat that makes up the Severn Estuary protected area. The only birds noted using the mudflats during the survey were small numbers of Black-headed Gull, Herring Gull and Lesser Black-backed Gull, and a few Redshank. Numbers of wading birds and wildfowl in this area are likely to be much higher during the winter. (These have been more fully documented in the 2015 bird survey report).</p>
9	<p>Neutral grassland. A flower-rich, relatively tall sward, locally dominated by Common Knapweed, Hoary Ragwort, Wild Carrot, Ox-eye Daisy, Lady's Bedstraw, Bird's-foot Trefoil, Yarrow and Creeping Cinquefoil, with associates including Ribwort Plantain, Creeping Buttercup, Red Clover and Yellow-wort. The lowest part of the slope does not appear to have been capped with topsoil and the slag and rubble is dominated by dense Butterfly Bush scrub, with frequent Blue</p>

Target Note	Description
	Fleabane, Bird's-foot trefoil, Autumn Hawk-bit and Red Clover. Bramble scrub and the adjacent planted trees are encroaching into the margins of the grassland. Notable species seen in this area during the 2014 survey included Great Lettuce and Pyramidal Orchid, but they were not re-found during the present study.
10	<p>Motorcycle track. A series of off-road motorcycling tracks on the central tip plateau. The tracks are mostly bare clay and stones or sparsely vegetated by ruderals and ephemerals. The grassy areas between the tracks support a mix of ruderal plants and developing grassland, with occasional patches of tall herbs. The most abundant plants in this area include Black Medick, Bilbao Fleabane, Bristly Ox-tongue, Colt's-foot, Creeping Cinquefoil, White Clover, Creeping Bent, Hoary Mustard, Ox-eye Daisy, Field Horsetail, Teasel, Yorkshire Fog, Ragwort, Squirreltail Fescue and young plants of Butterfly Bush. Less frequent associates include Yellow-wort, Water Bent, Perennial Rye-grass and Hop Trefoil.</p> <p>There are several areas of wetter ground, and these typically support Creeping Bent, Yorkshire Fog, Hard Rush, Toad Rush, Clustered Dock, False Fox-sedge, Hairy Sedge and occasional Pendulous Sedge and Grey Willow seedlings.</p> <p>The areas of developing neutral grassland support a grass-dominated closed sward that includes False Oat-grass, Yorkshire Fog, Creeping Bent, Common Bent, Common Bird's-foot Trefoil, Common Knapweed, Cock's-foot, Ribwort Plantain, Spiked Sedge, Bristly Ox-tongue and Ox-eye Daisy. A single seed-head of Bee Orchid was found during the survey, and it is feasible that more may have been evident earlier in the year. Butterfly Bush, Bramble, Goat Willow, Grey Willow, Dog Rose and Sea Buckthorn are present as scattered scrub, mainly towards the margins of the course. Occasional garden plants established here include Montbretia, Rosemary and Elephant's-ears. There are also several patches of Japanese Knotweed.</p> <p>The steep sides of the plateau are mostly dominated by tall ruderal herbs and Butterfly Bush scrub. Frequent species include Teasel, Bilbao Fleabane, Hoary Mustard, Rose-bay Willowherb, Tansy, Hoary Ragwort, Yorkshire Fog, Creeping Cinquefoil, Colt's-foot, Wild Parsnip, Couch, Curled Dock, and patchy Bramble.</p>
11	Neutral grassland. A diverse, flower-rich sward on an east facing slope. The Wales Coastal Footpath passes through this grass area, and there is a bench and interpretation board near the centre of the open area. The sward is similar to TN5 and TN7, and includes Common Bird's-foot Trefoil, Perforate St John's-wort, Red Fescue, Ox-eye Daisy, Ragwort, Lady's Bedstraw, Salad Burnet, Glaucous Sedge, Selfheal, Meadow Crane's-bill, Yellow-wort, Yorkshire Fog and Common Bent. Pyramidal Orchid and Grass Vetchling were noted here in the 2014 survey, and may feasibly still occur here. The ground includes a few more sparsely vegetated areas with exposed rocks and gravel.
12	Coastal scrub. A dense belt of scrub lies between the shore and the grassland habitats / footpath. The main scrub species include Bramble, Blackthorn, Sea Buckthorn and Hawthorn. There are smaller quantities of Gorse, Rowan, Ash, There is virtually no ground flora under most of the trees (partly due to heavy grazing by Rabbits), but some of the scrub margins support a diverse mix of grass and scattered scrub, especially on the seaward side. Species noted in the seaward

Target Note	Description
	scrub margin include Red Fescue, Creeping Thistle, Nettle, Wild Carrot, Bird's-foot Trefoil, Lady's Bedstraw, Teasel, Salad Burnet, Common Centaury, Hoary Ragwort, Meadow Vetchling and Bristly Ox-tongue.
13	Plantation and scrub. A belt of landscape planting extending along most of the north-west margin of the tip. The dominant tree species include White Poplar and Corsican Pine, with less frequent Hazel, Holm Oak, Dog Rose, Guelder Rose, Monterey Pine, Hawthorn, Ash and Buckthorn. Self-sown Butterfly Bush and Bramble are also present, especially in more open areas. The ground flora is varied, with much of it being heavily Rabbit-grazed and species-poor. Ground flora species include Yorkshire Fog, Cock's-foot, Nettle, Creeping Thistle, Wild Parsnip, Lady's Bedstraw, Smooth Tare, Cleavers, Creeping Cinquefoil, Common Figwort, Ragwort, Hoary Ragwort, Ox-eye Daisy, Hairy Sedge, Salad Burnet, Cut-leaved Crane's-bill and Hoary Willowherb. A small quantity of Japanese Knotweed was noted in the northern part. The plantation margins merging gradually into the adjacent grassland.
14	Shoreline and tall herbs. The northern shoreline comprises a wide belt of slag-based shingle and rubble. This merges gradually into disturbed ground with tall herbs and scattered scrub. This area appears to be subject to frequent fly-tipping and fires and occasional vehicle access. A dense stand of Dittander is present at the top of the shoreline. Other frequent plant species include Greater Willowherb, Butterfly Bush, Herb Robert and Black Medick. Associates on the disturbed ground further up the shore include Creeping Buttercup, Teasel, Fennel, Dog Rose, Autumn Hawkbit, Common Centaury, Scentless Mayweed, Clustered Dock, Hoary Willowherb, Redshank, Amphibious Bistort and Hoary Ragwort.
15	Disturbed ground and developing grassland. An area of flatter ground on the lower slopes of the tip. The area is subject to motorcycling activity with a similar flora to TN10, but some of the area does not appear to have been affected by the 2009 reprofiling and supports a denser grassland sward (similar to TN11). Frequent plant species in this area include Perforate St.John's-wort, Scentless Mayweed, Thyme-leaved Sandwort, Spear Thistle, Bilbao Fleabane, Creeping Cinquefoil, Common Centaury, Self-heal, Scarlet Pimpernel, False Oat-grass, Teasel, Curled Dock, Yorkshire Fog, Creeping Bent, Red Bartsia, Hairy Sedge, False Fox-sedge, Wild Parsnip, Silverweed, Common Vetch and Meadow Crane's-bill. Japanese Knotweed is locally abundant beside the boundary with Rover Way.
16	Scrub and sparse ephemeral vegetation. An area of low-lying ground with sparse ruderals and abundant mosses, that appears to have developed over a mix of old hard-standing or compacted stone chippings. The area is divided up by several blocks of dense Butterfly Bush scrub. Associated plant species include Bilbao Fleabane, Scarlet Pimpernel, Perforate St.John's-wort, Scentless Mayweed, Wild Strawberry, Ribwort Plantain, Common Centaury, Ragwort, Teasel, Rose-bay Willowherb, Hard Rush, Creeping Bent, Lady's Bedstraw, Petty Spurge and Dove's-foot Crane's-bill. The area appears to be subject to regular disturbance by motorcycling, but this is probably informal riding because it is beyond the main area of the motorcycle tracks.

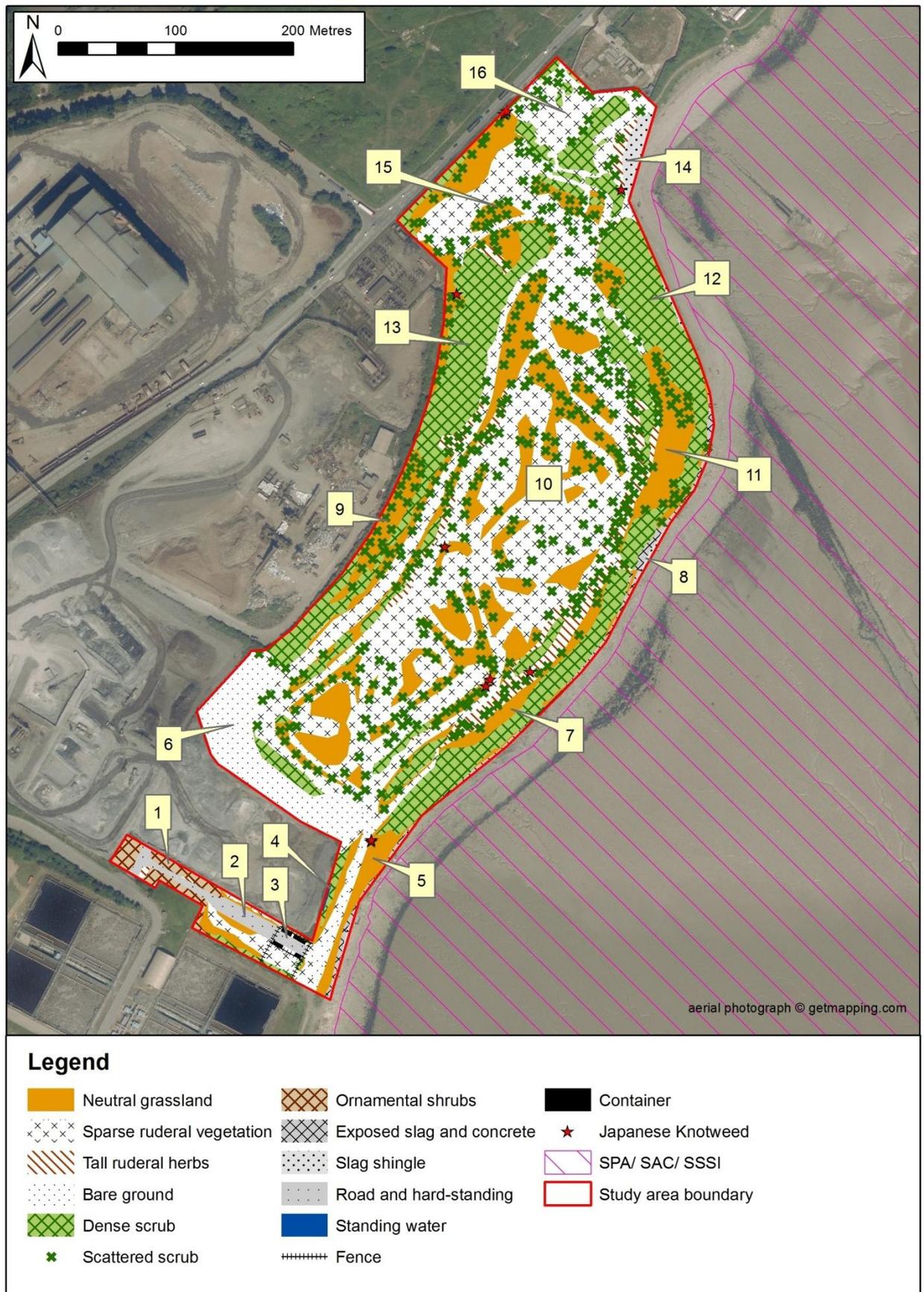


Figure 1. Habitat survey map

4. Assessment of nature conservation value

The following section assesses the nature conservation value of the habitats and species observed on the site during the survey. The main references for the evaluation process are the Wales Biodiversity Partnership criteria for selecting Wildlife Sites in Wales (2008), the UK Biodiversity Action Plan (UK Biodiversity Steering Group, 1995 and subsequent revisions) and the Cardiff Local Biodiversity Action Plan 2008 (LBAP). The potential occurrence of protected and other significant species is also considered. The various broad groups of plants and animals are evaluated separately, in approximate taxonomic order, and summarised at the end of the section.

Plants and habitats

The greatest botanical diversity and the greatest number of uncommon plants are generally found within the areas of neutral grassland habitat, particularly in the flower-rich patches in TN5, 7, 9, 10 and 15. Most of these grasslands have established on the re-engineered tip surface that was capped and sown with wildflower seed in 2001, although the patches within the central areas at TN10 were only reprofiled in 2009 and have developed more naturally, largely being colonised by wind-blown seed from the surrounding areas. A small remnant of the former frag tip that was not capped and reprofiled is still present near the steelworks fence at TN9, although this has mostly become over-shadowed by dense Butterfly Bush scrub.

The disturbed parts of the motorcycle track at TN10 are only patchily vegetated. The flora of these areas is mainly limited to common plant species, although there are a high proportion of ruderal plants that are likely to be of value to insects due to the density of flowers. The bare ground in these areas is also likely to be beneficial to certain insects, particularly solitary bees, and is a key component of the UK BAP habitat 'open mosaic habitat on previously disturbed land'.

The area of dense scrub and landscape planting mostly support a relatively limited range of tree and shrub species, and none are considered especially rare.

The shoreline supports very few plant species. There is no significant strandline vegetation, and the narrow belt of seaweed is of very limited diversity. None of the plant communities that are qualifying features of the SSSI or SAC occur within the study area. The largest area of the locally significant plant Dittander is present just above the shoreline at TN14.

A total of 194 species of vascular plants were observed within the study area during the recent survey. A further 10 species were recorded in 2014, but not refound in the 2017 survey. It is likely that most of these are still present at a low density, but were not recorded because they only occur at a low frequency, or had died back by August. Similarly, other plants only growing at a very low density might also have been overlooked by the recent survey.

None of the plant species recorded to date receive special protection under the Wildlife and Countryside Act or are listed in the Cardiff or UK BAP, or in the Environment (Wales) Act Section 7 list of species of principal importance for nature conservation. However, several of the plants are considered locally significant because they are uncommon in south Wales. The Wildlife Sites Guidelines lists Primary Species (PS) and Contributory Species (CS). The presence of one Primary Species or five or more Contributory Species is one of the qualifying criteria for a site of nature conservation significance in a county context.

In this case the following Primary and Secondary species have been recorded:

Dittander (PS) (2014 & 2017)
 Great Lettuce (PS) (in 2014, possibly still present at low density)
 Bee Orchid (CS) (in 2017)
 Buckthorn (CS) (In 2017 - in landscape planting)
 Grass Vetchling (CS) (in 2014, probably still present)
 Hairy St.John's-wort (in 2017)
 Meadow Crane's-bill (CS) (2014 & 2017)
 Pale Flax (CS) (in 2017)
 Pyramidal Orchid (CS) (in 2014, probably still present)
 Viper's Bugloss (CS) (2014 & 2017)
 Yellow-wort (CS) (2014 & 2017)

Given the number of Primary and Secondary species, the site meets the Wildlife Sites criteria for its flora.

In addition to Primary and Secondary species, a number of plants observed during the survey are listed in the Wildlife Sites Guidelines as habitat quality indicators of Open Mosaic Habitat on Previously Developed Land. One of the criteria for considering a site important in a county context is the presence of 20 or more such indicators. In this case a total of 49 indicators were recorded, as follows, so the site easily exceeds this criterion:

Bee Orchid	Grass Vetchling	Salad Burnet
Bird's-foot Trefoil	Great Lettuce	Sea Beet
Black Medick	Greater Mullein	Smooth Hawk's-beard
Bristly Ox-tongue	Hairy St.John's-wort	Spear-leaved Orache
Colt's-foot	Hoary Ragwort	Spiked Sedge
Common Centaury	Hop Trefoil	Square-stalked St.John's-wort
Common Figwort	Lady's Bedstraw	Squirreltail Fescue
Common Fleabane	Lesser Burdock	Tall Fescue
Common Knapweed	Meadow Crane's-bill	Teasel
Common Reed	Meadow Vetchling	Tufted Vetch
Common Sorrel	Ox-eye Daisy	Viper's Bugloss
Common Toadflax	Pendulous Sedge	Welted Thistle
Corn Mint	Perforate St.John's-wort	Wild Carrot
False Fox-sedge	Pyramidal Orchid	Wild Parsnip
Fat Hen	Red Bartsia	Yellow Rattle
Fern Grass	Red Clover	Yellow-wort
Glaucous Sedge	Rough Hawkbit	

In addition to these, Blue Fleabane and Compact Brome have a relatively restricted distribution in Cardiff and could also be considered indicators of this type of habitat. These were mostly restricted to the uncapped slag near to the steelworks fence.

The number of uncommon and indicator species confirms that the site meets the qualifying wildlife sites criteria based on its flora, and post-industrial habitat indicators. However, the

diversity is very variable within the study area, and most of the uncommon species are only present in small quantity. It is also noted that the Buckthorn was planted, and several of the other species were intentionally introduced by artificial wildflower seeding (most likely the Grass Vetchling, Meadow Crane's-bill and Pale Flax). Because of its recent origin the flora at this site should not be afforded the same degree of significance and protection as an ancient grassland site, as this habitat could be readily re-created in a few years, given a similar range of starting conditions and similar wildflower seed.

The definition of the UK BAP priority habitat Open Mosaic Habitats on Previously Developed Land (DEFRA 2010) require that each of the following criteria are met:

1. *The area of open mosaic habitat is at least 0.25ha in size.*
2. *Known history of disturbance at the site or evidence that soil has been removed or severely modified by previous use(s) of the site. Extraneous materials/substrates such as industrial spoil may have been added.*
3. *The site contains some vegetation. This will comprise early successional communities consisting mainly of stress-tolerant species (e.g. indicative of low nutrient status or drought). Early successional communities are composed of (a) annuals, or (b) mosses/liverworts, or (c) lichens, or (d) ruderals, or (e) inundation species, or (f) open grassland, or (g) flower-rich grassland, or (h) heathland.*
4. *The site contains unvegetated, loose bare substrate and pools may be present.*
5. *The site shows spatial variation, forming a mosaic of one or more of the early successional communities (a)–(h) above (criterion 3) plus bare substrate, within 0.25ha.*

It is clear that these criteria are met over the majority of the current study site. The qualifying habitat would include most of area that is used by motorcycles, which maintains the open conditions with bare ground and early successional plant communities (approximately 10ha of qualifying habitat). The densest scrub, tree planting areas and longer established grassland habitats near the periphery of the site do not support sufficient open ground to be included in the DEFRA criteria, although they do contribute to the overall mosaic of habitat diversity.

The few bryophyte species identified during the survey are very common ones that would be expected in grassland and disturbed ground. There were no signs to suggest that the site might support any uncommon moss or liverwort species, particularly given the relatively recent origin of the habitats.

Several plants of Japanese Knotweed were observed on the site. They were mostly small and near to the motorcycle tracks and Rover Way (and shown in Figure 1). It is possible that additional small Knotweed plants might have been overlooked. Other non-native invasive species listed on Schedule 9 of the Wildlife and Countryside Act included the shrubs Wall Cotoneaster and Entire-leaved Cotoneaster, which are both present in very small quantity. Sea Buckthorn is also present, and is not native in South Wales. This is not listed on Schedule 9, but it can develop into dense thickets and become problematic for management on some sites.

Invertebrates

A moderate number of butterflies and moths were observed during the habitat survey. These were mainly observed in the flower-rich grasslands at TN7, 9, 10 and 11.

A specialist survey of bees and wasps was undertaken during late July/ Early August 2017 (Olds, 2017). This confirmed the presence of 19 species of social and solitary bees and wasps, including the Brown Banded Carder Bee (*Bombus humilis*) which is listed as a Priority Species in the UK Biodiversity Action Plan and included in the Environment (Wales) Act Section 7 list of species of principal importance for nature conservation. The survey also recorded several other notable bees and other insects. These are summarised below:

Bees

- Brown-banded Carder-bee (*Bombus humilis*). UK BAP Priority and Environment (Wales) Act S7.
- Red-tailed Cuckoo Bee (*Bombus rupestris*). Nationally notable.
- Painted Nomad Bee (*Nomada fucata*) . Nationally notable.
- Chalk Yellow-face Bee (*Hylaeus dilatatus*). Locally significant.
- Spined Mason Bee (*Osmia spinulosa*). Locally significant.

Other insects

- Cinnabar Moth (*Tyria jacobaeae*):UK BAP and Environment (Wales) Act S7, for research purposes.
- Six-belted Clearwing (*Bembecia ichneumoniformis*). Nationally notable.
- Long-winged Conehead (*Conocephalus discolor*). (Wildlife Sites Guidelines SINC species).
- Adonis Ladybird (*Hippodamia variegata*). Locally significant.
- Cinnamon Bug (*Corizus hyoscamii*). Locally significant.
- Hornet Hoverfly (*Volucella zonaria*). Locally significant.

The peak flight period for many bee and wasp species is April to June, so it is likely that many other species are present that would not have been recorded by a survey in July/August.

The bee survey assessed the site as being of at least local importance, and likely to be of regional significance given the nature of the habitats and the presence of some scarce species. The mix of flower-rich grassland and areas of open ground, especially with sunny, south-facing banks provides ideal habitat for bees and wasps, as well as many other invertebrates.

Amphibians

No amphibians were observed during the survey or noted in the 2014 report. The only potential breeding sites for amphibians on the site are the shallow ditch at TN4 and some of the puddles in the motorcycle tracks. These transitory features could feasibly be used by Common Frogs or Smooth Newts, but the probability of the site supporting a significant amphibian population is considered very unlikely. The site is not directly connected to any good quality amphibian habitat although some species may be present using the nearby SINC at Pengam Moors to the north. It is unlikely to have been colonised by many amphibians since the tip was reprofiled in 2009.

Reptiles

No reptiles were observed during the habitat survey. However, the patchy mix of vegetation and bare ground, with a mix of different slopes and substrata appears potentially suitable for reptiles, especially since it is developing substantial areas of grassland habitat. The habitats appear most potentially suitable for Slow Worms. Grass Snakes might also be present, because they are a relatively mobile species likely to be present in the damp grassland nearby at Pengam Moors SINC. A reptile survey is scheduled for September 2017, so the findings are not available at the time of writing.

The 2014 habitat survey and data search did not reveal any reptile records but noted that this may reflect a lack of recording. The re-engineering of the tip in 2001 and 2009 would have involved clearance of virtually all of the vegetation and potential cover for reptiles while the work was carried out, and this lack of cover would have persisted for several years afterwards. Therefore there has only been a relatively short time for the habitats to develop and become colonised by reptiles. Given these limitations, the site would not be expected

to support a large population of any reptile species, and it would be possible to provide suitable mitigation for any that might be present (see Recommendations section).

Birds

The 2014 report listed a large number of bird records obtained through the desk study. The majority of these were recorded on the mudflats and foreshore but were provided on a 1km grid square basis. Many of the species have only been recorded once or on a small number of occasions. The list is presented below.

Arctic Skua	Green Sandpiper	Red Knot
Arctic Tern	Greenfinch	Red-breasted Merganser
Barn Owl	Greenland Wheatear	Red-legged Partridge
Barn Swallow	Grey Partridge	Redshank
Bar-tailed Godwit	Grey Plover	Ringed Plover
Black Redstart	Guillemot	Robin
Black Tern	Hedge Accentor	Rock Pipit
Blackbird	Herring Gull	Rook
Blackcap	House Martin	Sabine's Gull
Black-headed Gull	House Sparrow	Sanderling
Black-legged Kittiwake	Iceland Gull	Sandwich Tern
Black-tailed Godwit	Jack Snipe	Sedge Warbler
Blue Tit	Kestrel	Shelduck
Brambling	Lapwing	Short-eared Owl
Buzzard	Lesser Black-backed Gull	Shoveler
Chiffchaff	Little Egret	Sky Lark
Coal Tit	Little Gull	Snipe
Collared Dove	Little Plover	Song Thrush
Common Scoter	Little Stint	Sparrowhawk
Common Tern	Little Tern	Spotted Redshank
Cormorant	Long-tailed Tit	Starling
Cuckoo	Mallard	Swift
Curlew	Marsh Harrier	Teal
Curlew Sandpiper	Meadow Pipit	Tree Sparrow
Dunlin	Mediterranean Gull	Tufted Duck
Gadwall	Merlin	Turnstone
Garden Warbler	Mew Gull	Whimbrel
Garganey	Mistle Thrush	Whinchat
Glaucous Gull	Moorhen	White Wagtail
Goldeneye	Mute Swan	Whitethroat
Goldfinch	Northern Wheatear	Wigeon
Grasshopper Warbler	Oystercatcher	Willow Warbler
Great Black-backed Gull	Peregrine Falcon	Wood Sandpiper
Great Crested Grebe	Pied Wagtail	Wood Warbler
Great Skua	Pintail	Wryneck
Great Tit	Pochard	Yellow Wagtail
Greater Scaup	Quail	

The site's location is likely to be a key factor in the high number of bird species recorded, particularly as it provides habitat for terrestrial and coastal species, and because many bird species follow the coast during migration. These factors are also a key reason for the popularity of the seafront for bird watching.

The 2015 survey for the proposed wind turbine involved a series of 12 three hour vantage point bird surveys between October 2014 and March 2015. The main objective for the study was to observe the distribution and movements of the key species for which the Severn Estuary protected sites are designated. It also provided observations of bird species using the terrestrial habitats. The species observed during the study are summarised in Table 2 below. [In the table + indicates the habitats where they were recorded. (+) indicates where a species was only recorded flying over the tip.]

Table 2. Summary of birds observed during 2014-5 winter bird survey.

Species	Shore/ mudflats	Terrestrial habitat
Blackbird		+
Black-headed Gull	+	+
Blue-tit		+
Buzzard	(+)	+
Canada Goose	+	(+)
Carrion Crow	+	+
Chaffinch		+
Chiffchaff		+
Cormorant	+	(+)
Curlew	+	
Dunlin	+	
Dunnock		+
Feral Pigeon		+
Gadwall	+	
Goldfinch		+
Herring Gull	+	+
Kestrel		+
Lesser Black-backed Gull	+	+
Linnet		+
Long-tailed Tit		+
Magpie		+
Mallard	+	+
Meadow Pipit		+
Mute Swan	+	
Oystercatcher	+	
Peregrine	(+)	(+)
Pied Wagtail		+
Pintail	+	
Raven	+	+
Redshank	+	
Robin		+
Shelduck	+	
Shoveler	+	
Song Thrush		+
Sparrowhawk		+
Turnstone	+	
Wren		+

The waders and wildfowl for which the Severn Estuary protected site is designated all use the intertidal habitat, and their greatest numbers are seen during the winter. None of them use the tip as a roost site or breeding site and there do not appear to be any regularly used flight lines over the site.

The most frequently observed birds of prey using the site are Buzzard and Kestrel, which appear to favour the longer grass areas. The 2015 study also observed Sparrowhawk and Peregrine. Previous records of birds of prey nearby have also included Merlin, Marsh Harrier, Short-eared Owl and Barn Owl. These mainly refer to pre-2000 observations from the wider area rather than the site itself. Many past observations were of a pair of Barn Owls that bred in the steelworks during the 1980s.

Very few birds were observed in the scrub and ruderal vegetation, although the scrub is undoubtedly used by some species as a breeding habitat. The species seen in recent surveys that are most likely to breed within the study area include Blackbird, Dunnock, Linnet, Magpie, Robin, Song Thrush, Whitethroat and Wren. Of these, the most significant is Linnet, which is a Cardiff LBAP species. It is feasible that some ground nesting birds might use the area as a breeding site. A pair of Oystercatchers laid a clutch of eggs in similar open-ground habitat within the nearby water treatment works in 2015 (pers.obs.) although this was unsuccessful, probably due to predation by gulls. It is possible that the developing grassland habitat could provide nest sites for Skylark and Meadow Pipit. All wild birds and their nests are protected by the Wildlife and Countryside Act while nesting, therefore mitigation would be required to avoid any disturbance of nests (see Recommendations section).

Mammals

The site appears to support a large population of rabbits, especially in the areas of dense scrub. There was also evidence of Fox and several runs in long grass areas that were made by small mammals such as mice or voles.

There were no signs of protected species of mammals. There are no buildings, large trees or other structures suitable for roosting bats. Bats probably forage in the general area from time to time, especially following the sheltered scrub margins.

Otters are likely to pass along the coast from time to time, and where the wave protection has been eroded away from the front of the tip there is potential for them to use gaps behind the overhanging plastic sheeting as resting places. Otters could feasibly also use the dense scrub. However, no signs of Otters were noted during the recent habitat surveys or the previous data search.

It was not possible to search all of the dense scrub in detail during the habitat survey, but there were no signs of Badger activity at the scrub margins. The possibility of a sett being present is considered extremely low because of the limited depth of soil over the tip liner in this area, and the distance from any known Badger populations.

Summary assessment

The site support a varied mix of post-industrial grassland, ruderals, scrub and areas of tree planting that have developed since the early 2000s. Most of the area would qualify as the UK BAP priority habitat 'open mosaic habitat on previously developed ground'. There is a high diversity of flowering plants, including several locally uncommon species. The mix of habitats is at least locally important for invertebrates, which include the BAP priority species Brown-banded Carder Bee and several other locally significant species. These factors confirm that the site would meet the Wildlife Sites guidelines selection criteria, and should be considered significant in a county context. In addition, the site is likely to support a number of nesting birds, particularly in the scrub areas, and has potential to support reptiles.

One of the significant features of this site is that its current wildlife value has developed relatively quickly, following the previous re-engineering works and the formation of the motorcycling track. This suggests that a similar mix of habitats could be reinstated in this area following the proposed removal of contaminated material.

The nearby part of the Severn Estuary supports mud-flats which are used by significant numbers of wading birds and wildfowl during the winter. A study of birds during the winter of 2014 and 2015 showed that the key species of waders and wildfowl that use the protected estuary generally remain on the mudflats and do not fly over the former tip. The protected site lies outside the proposed development area so any impacts on it would be indirect ones arising from disturbance, or possible leaching of pollutants as the tip material are re-worked. Mitigation would therefore need to be put in place to minimise any possible impact on the estuary.

The nature conservation value of the main habitat features recorded during the survey are summarised in Table 3 below.

Table 3. Nature conservation value of main habitat features

Feature	Summary of nature conservation importance
Severn Estuary (SPA, SAC, Ramsar Site and SSSI).	Internationally important. The qualifying features of the protected sites most relevant to this part of the estuary are the birds, especially during winter and on migration. The protected site lies outside the proposed development area.
Motorcycling area (open ground and developing grassland).	The mix of bare ground and developing neutral grassland with a good number of locally significant and indicator species meets the qualifying criteria for the BAP priority habitat 'open mosaic habitat on previously developed ground', and the wildlife sites guidelines for post-industrial land, and is therefore considered significant in a county context. This habitat also meets the wildlife sites selection criteria for its flora and invertebrate fauna. The habitat has some potential for reptiles (which have not been confirmed to date) and nesting birds (which are mostly limited to common species).
Scrub and tree-planting areas	Mostly very dense and species-poor, with a heavily Rabbit-grazed ground flora. The more open areas support a more diverse ground flora, although these are becoming rapidly over-shaded as the tree canopy spreads and thickens. Likely to support common species of nesting birds, and with potential to support reptiles at sunny margins. This habitat is of local value for wildlife.

5. Ecological constraints and recommendations

This section is based on the preliminary design details available at the time of writing. It assumes that the majority of the current landform would be reprofiled and substantially lowered, but there would be no direct encroachment into the protected estuary habitat. The new development would include a biomass power station, industrial units and associated infrastructure, and a reduced area of new landscaping around the development. It assumes that the new landform has potential to accommodate a similar range of wildlife in the long term, with the design and management of the new landscaping prioritising habitat features with highest diversity and rarity so that there is no net loss of nature conservation value in the long term. A series of recommendations is made, to direct the development of appropriate mitigation during the detailed design process.

Severn Estuary SPA, SAC, Ramsar Site and SSSI

The Severn Estuary lies immediately adjacent to the site. This is a site of international value for nature conservation and its protected status is an important constraint to potential development. As a European Protected Site the proposed project would be subject to a Habitats Regulations Assessment (HRA), which would be carried out by Cardiff Council as part of the planning application process. The project would only be allowed to proceed if the HRA concludes that there would be no significant detrimental effect on the qualifying features of the protected site.

In this case the main potential for development-related impacts on the protected site would be as follows:

- Mobilisation of contaminants during removal of the fill material, which might enter the sensitive habitats of the estuary, either by leaching of soluble materials, or suspended particulate materials washed down by rain, or as wind-blown dust.
- Disturbance of overwintering and migratory birds by construction noise and vibration, and visual disturbance due to the presence of the people and machinery while the tip removal and new construction work is carried out.
- In the long term; contamination of sensitive habitats by emissions from the biomass power plant.

The issues related to potential contaminants will require an engineering solution to ensure that no harmful materials can enter the estuarine habitats. In the long term the removal of potentially harmful material from the eroding tip should be considered as beneficial to the estuary. Examination of the shoreline demonstrates that the tip is currently subject to erosion and tipped materials are already being washed into the estuary. The majority of the upper shore is composed of slag and other man-made waste and rubble, yet this does not appear to be affecting the numbers of birds at the current levels of erosion. The potential release of contaminants arising from reworking the tip will not be straightforward and it should be compared against the current situation. As mitigation, it would be appropriate to agree a set of monitoring criteria and working methods with NRW to find a solution where the construction works do not cause a significant increase above the current levels of ongoing contamination.

The potential for disturbance of estuary birds is clearly highest and most significant during the winter (October to March), and also at high tide when birds are not feeding out on the mudflats. There will inevitably be a requirement to undertake work at the seaward edge of the tip, so the primary approach to mitigating impacts would be to carry out this work during the summer (April to September), when there are relatively few birds using the estuary. If any works have to be carried out along the shoreline during the winter, working during low tide would cause the least potential disturbance to birds.

A strongly recommended approach to planning the project would be to carry out the works along the shore as the first phase of the development during the summer months, and use this as an opportunity to form a bund that will satisfy the sea-defence aspects of the project and enable works to continue inland of the bund through the winter. Consideration could be given to positioning temporary visual screening on top of the bund through the main construction phase.

To minimise the potential for disturbance to birds, the construction plan for the work should include a requirement that no construction personnel (or their vehicles) should access the foreshore unless it is an essential part of the works and they have authorisation from the site manager to do so.

The works will require a temporary re-routing of the Wales Coastal Footpath. It is recommended that a route is found that would pass inland of the works, rather than re-routing walkers along the shore.

The potential for impacts on the protected site due to emissions from the biomass power plant should be avoided by using a design that includes effective gas-flue cleaning technology. The emissions limits should be agreed by NRW.

Breeding birds

All wild bird nests, while they are being built or used, are protected under the Wildlife and Countryside Act 1981. Damage and disturbance to nests should therefore be avoided. In this case, there is suitable nesting habitat in the scrub and tall ruderal habitats, and potentially to a lesser extent in bare ground and grassland areas. It is recommended that

wherever scrub and tall ruderal habitat has to be removed, it should be cut back to ground level outside the bird nesting season, which is typically March to August inclusive.

If clearance work is expected to affect potential bird nesting habitat during the spring and summer it would be appropriate to take further advice from an ecologist and to carry out a bird survey immediately before the work commences to ensure that any nests are given appropriate protection, such as protecting a 10m buffer around the nest until the birds have finished using it. However, given the scale of the clearance required at this site, and the density of the scrub, it would clearly be best to programme the clearance works during the winter (between September and February).

Reptiles

All native British reptiles are protected under parts of the Wildlife and Countryside Act 1981, making it unlawful to kill, injure or trade in the animals. Where a project is likely to cause an impact on reptiles, reasonable measures would need to be taken to minimise the risk of killing or injuring them. Reptiles are included in the Cardiff LBAP. In this case it is uncertain whether there are any reptiles present, but there is potentially suitable habitat for them in several parts of the site. A reptile survey is scheduled for September to clarify whether or not any reptiles are actually present, and if so, to estimate the size of the population. If reptiles are present, the habitat would not be expected to support more than a small population, due to the compacted soil and the site's relatively recent re-engineering.

In this case the whole of the site would be affected by the proposed construction work, so the only option for mitigation would involve carrying out a translocation/ rescue operation before the construction work commences, and ensuring that suitable reptile habitat is designed into the final landscaping around the site in the long term. Translocation would require a suitable receptor site for any relocated animals, and should be carried out over at least several weeks at an appropriate time of year (usually spring or autumn). The details of any reptile translocation would need to be agreed with the local authority ecologist.

Mammals

The scrub and tall herb habitats are used by mammals such as Rabbits and Voles. All wild mammals receive protection under the Wild Mammals (Protection) Act 1996. This makes cruel ill-treatment of wild mammals an offence, so care should be taken to carry out site clearance work in such a way that allows mammals to escape unharmed and does not cause unnecessary suffering (for example, as would be caused by crushing them, or injuring them with cutting equipment). The measures described to safeguard reptiles and nesting birds would also limit the potential for harming small mammals.

There is limited potential for Otters to rest in the scrub and behind the overhanging plastic liner along the eroding shore. However, there was no sign of these being used by Otters at the time of the survey and the probability of there being a breeding holt or regular resting site seems very negligible. Therefore no specific mitigation for Otters is considered necessary.

Grassland flora and invertebrate habitat

The mix of habitats across most of the site are neither protected nor designated as a Site of Importance for Nature Conservation. However, they do qualify as the BAP priority habitat open mosaic habitat on previously developed land and meet the wildlife sites guidelines for post-industrial land, as well as for their flora. The site supports the BAP priority species Brown-banded Carder Bee and several other notable species, and is considered to be important for invertebrates in at least a local context. It is therefore recommended that for the purposes of this project the site should be regarded as though it were a designated SINC, and mitigation should be provided to ensure that the site can support a similar range of wildlife in the long term. In particular, that it should include a mix of flower-rich grassland with areas of open ground that are of high value for insects.

Given that the existing grassland have developed from a combination of hard-landscaping with nutrient poor sub-soil and wildflower seeding, it is recommended that a similar strategy should be adopted for the new landscaping.

The new landscaping will necessarily occupy a smaller area than the current area of vegetation (due to the presence of the new roads and buildings), therefore it should aim to maximise the potential value for wildlife by prioritising high value habitat. It should include less scrub and tree planting, and a higher proportion of species-rich grassland. Creating large areas of flower-rich grassland should be the main objective for the mitigation, because this will benefit the flora and invertebrates which are of primary importance at the site. The notable bee species need large areas of diverse grassland, and providing this habitat will benefit a wide range of other insects.

Existing areas of flower-rich grassland should be retained where possible. This is probably not practical for the central area where the main tip will be removed, but may be possible at some of the margins, (e.g. TN2, TN5, TN9 and TN15). Retaining grassland may allow certain species to persist within the margins and recolonise the main area once the new landscaping is establishing.

The possibility of re-using existing topsoil and wildflower seed from this site is not recommended due to the large amount of Butterfly Bush scrub that has developed, which could potentially smother the more desirable species. Instead, a new wildflower grass-seed mix should be used, that is free from potential problem species and can be carefully chosen to maximise the potential value for bee species, particularly the less common species including Brown-banded Carder Bee. Detailed recommendations for creating good habitat for bees are included in the invertebrate survey (Old, 2017) and should be followed as closely as possible. It is recommended that the seed mix contains the following species as a minimum:

- Common Bird's-foot Trefoil (*Lotus corniculatus*)
- Red Clover (*Trifolium pratense*)
- Common Fleabane (*Pulicaria dysenterica*)
- Knapweed (*Centaurea nigra*)
- Wild Carrot (*Daucus carota*)
- Yarrow (*Achillea millefolium*)
- Oxeye Daisy (*Leucanthemum vulgare*)
- Creeping Thistle (*Cirsium arvense*)
- Black Horehound (*Ballota nigra*)
- Red Bartsia (*Odontites verna*)
- White Dead-nettle (*Lamium album*)
- Kidney Vetch (*Anthyllis vulneraria*)
- Yellow composites such as Hawkbits (*Leontodon* spp.)

Ideally, other native plant species known to support a good range of pollinating insects would also be included, possibly including Teasel, Toadflax, Creeping Cinquefoil, Viper's Bugloss, Purple Loosestrife, Yarrow, Musk Mallow, Hemp Agrimony, Meadow Crane's-bill and Foxglove.

Some areas of scrub or hedgerow should be provided, but they should not be allowed to cover more than 15% of the total landscaped area. Any new trees and shrubs should be limited to native species. Spring flowering species such as Goat Willow, Blackthorn and Hawthorn are recommended as these are used by emerging bumblebee queens and a variety of spring-flying solitary bees. Other native species that could be considered in shrub planting areas could include Alder Buckthorn, Buckthorn, Bird Cherry, Broom, Common Whitebeam, Crab Apple, Dogwood, Guelder Rose, Holly, Spindle and Rowan. Many of

these native species produce berries that would be valuable to birds passing through the site in autumn. If used, hedges should be positioned carefully so that they do not cast shade of large areas of grassland habitat that would otherwise be valuable for bees or reptiles. (The ideal location for a hedge would be along the northern boundary, where it would not shade any valuable habitat.)

Tussocky grassland should be allowed to develop at the edges of the new scrub patches or along the sunny edges of hedges, to provide nesting and hibernation sites for Brown-banded Carder Bee and other bumblebee species. Such areas may also provide suitable habitat for reptiles in the longer term, and snail species that would be of value to the localised Spined Mason Bee and related species.

The new landform should try to provide a varied topography, ideally with plenty of south-facing banks to provide habitat for solitary bees and wasps, and also to benefit reptiles. Given the proposed reduction in area of the landform, creating a series of ridges and furrows could feasibly be one way to increase the surface area available for wildlife, creating a wide variety of small-scale niches.

The choice of substratum for the new landscaping will have a significant effect on the types of plants it will support, and the density of the vegetation. Ideally a low-nutrient sub-soil should be used as a substratum for any new seeding/ planting, rather than nutrient-rich topsoil. Using a mix of slag and subsoil would be a very good base for wildflower grassland because the vegetation development would be relatively slow, so grasses would not out-compete the wild-flowers, and patches of bare soil would remain open for longer. Using slag on its own is not recommended in this case because it would probably become colonised by Butterfly Bush seedlings very quickly. Designing a series of footpaths or rough cycle-ways through the new landscape could be a good way to maintain areas of open ground within the new grassland, particularly if the path is surfaced with crushed stone or slag, where insects might be able to burrow at the margins.

Consideration could be given to designing the new buildings with 'green roofs'. This would benefit a range of wildlife, but the location so close to the shore and water treatment works might mean that some form of gull deterrent is required as it could become a very attractive roost site.

Designing new wetland into the site would create a new habitat that would be of high value to a wide range of wildlife. It is therefore recommended that the new attenuation pond should be designed as a wildlife feature and not simply for its engineering function. An ecologist should be involved in developing the landscaping of any new pond to maximise its potential value for flora and fauna. Ideally the pond should have gently sloping sides and any new planting should be limited to native species that are known to be of value for insects. It should be maintained as a mostly open habitat, by periodic cutting back of bank vegetation and scrub. Fish should not be introduced because these would predate invertebrates and amphibian larvae.

In the long term, some form of grassland and scrub management will be required, to ensure that the range of habitats is maintained in an optimum condition for wildlife. The best form of management would be occasional grass cutting. Grass cuttings should generally be removed to piles at the site margins, to prevent a build up of nutrients in the soil and smother the patches of open ground. Piles of grass cuttings can be valuable habitats for insects, reptiles and small mammals, especially in sunny locations. A landscape management plan is strongly recommended, so that the vegetation cutting can be carried out systematically on a rotation basis, aiming to have some areas flowers available through the year, and leaving some areas uncut for insects to nest and overwinter in.

Invasive plants

Several patches of Japanese Knotweed are present (see Figure 1). There are also a few small plants of Wall Cotoneaster and Entire-leaved Cotoneaster. These plants are a non-native invasive species, listed in Schedule 9 of the Wildlife and Countryside Act 1981,

making it unlawful to plant them or otherwise cause them to spread in the wild. It is possible that other small plants of Knotweed or other invasive species might be present and a careful re-check is recommended prior to starting any site clearance.

In this case the most difficult species to deal with will be Japanese Knotweed, which can be easily spread by even small fragments of rhizome. Treatment by herbicide can sometimes take several years, so other options could be considered, possibly including physically removing it to another site for treatment, or deep burial within a root-proof membrane, or disposal at a licensed tip. A Knotweed specialist should be consulted for further advice.

Further survey

A reptile survey is scheduled for September, and this will help to inform any requirement for mitigation.

No additional survey of bees and wasps is considered necessary to inform the planning decision because the site has already been evaluated as being important for bees. However, a follow-up spring survey would enable a better base-line to be established. This optional survey should be carried out between April and June which is the key flight period for many species of solitary bees and wasps.

In the event that there is a delay of two or more years until commencement of construction, it would be advisable to re-survey the site. Any re-survey should confirm whether the current observations and recommendations remain valid, confirm whether any protected species have colonised the site, and take account of any possible changes in wildlife legislation.

In due course it will be necessary to carry out pre-construction surveys which will inform the detailed planning of the site clearance. The precise survey requirements will depend on the final design and timing of the proposed works, and should be agreed with the local authority ecologist. As a minimum they should include a final detailed check for non-native invasive plants, and checks for Otters, reptiles or other protected species that may potentially be passing through or colonising the site prior to construction. Any clearance that is scheduled between March and August inclusive should be preceded by a search for nesting birds.

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Appendix 1. Species list

This list presents the scientific and common names of the species observed within the survey area at Rover Way on 1 August 2017.

Species that were found in the early July 2014 survey but not re-found in 2017 are included in the species list, but in brackets. It is likely that most of these are still be present at a low density, and that they were not re-found because they had died back after flowering earlier in the year.

The list must not be regarded as exhaustive, and it is likely that further species would be identified if the site were surveyed at other times of the year, or searching for specific groups such as invertebrates.

The abbreviations used in the DAFOR column for vascular plants relate to a scale of frequency, where D = Dominant, A = Abundant, F = Frequent, O = Occasional and R = Rare. The prefix L = Local, is sometime used where a species was very localised (e.g. LF = Locally Frequent). A + is also used for lower plants and fauna records, to indicate that a species was present without any indication of frequency.

Scientific Name	Common Name	Frequency
VASCULAR PLANTS		
<i>Acer pseudoplatanus</i>	Sycamore	R
<i>Achillea millefolium</i>	Yarrow	O
<i>Agrostis capillaris</i>	Common Bent	O
<i>Agrostis stolonifera</i>	Creeping Bent	A
<i>Alchemilla mollis</i>	Ladies Mantle	R
<i>Alnus cordata</i>	Italian Alder	LO
<i>Alnus glutinosa</i>	Alder	R
<i>Anagallis arvensis</i>	Scarlet Pimpernel	F
<i>Arctium minus</i>	Lesser Burdock	R
<i>Arenaria serpyllifolia</i>	Thyme-leaved Sandwort	F
(<i>Anacamptis pyramidalis</i>)	(Pyramidal Orchid)	(R)
(<i>Anisantha madritensis</i>)	(Compact Brome)	(LR)
<i>Arrhenatherum elatius</i>	False Oat-grass	F
<i>Atriplex prostrata</i>	Spear-leaved Orache	R
<i>Bellis perennis</i>	Daisy	O
<i>Bergenia x schmidtii</i>	Hybrid Elephant's-ears	R
<i>Beta vulgaris</i>	Sea Beet	LR
<i>Betula pendula</i>	Silver Birch	R
<i>Betula pubescens</i>	Downy Birch	R
<i>Blackstonia perfoliata</i>	Yellow-wort	LO
<i>Brachypodium sylvaticum</i>	False Brome	O
<i>Brassica nigra</i>	Black Mustard	R
<i>Bromus hordeaceus</i>	Soft Brome	O
<i>Buddleia davidii</i>	Butterfly Bush	A
<i>Calystegia sepium</i>	Hedge Bindweed	O
<i>Calystegia silvatica</i>	Large Bindweed	R
<i>Carduus crispus</i>	Wetted Thistle	R
<i>Carex flacca</i>	Glaucous Sedge	LO
<i>Carex hirta</i>	Hairy Sedge	F
<i>Carex otrubae</i>	False Fox-sedge	O
<i>Carex pendula</i>	Pendulous Sedge	O
<i>Carex remota</i>	Remote Sedge	R

Scientific Name	Common Name	Frequency
<i>Carex spicata</i>	Spiked Sedge	R
<i>Catapodium rigidum</i>	Fern-grass	LO
<i>Centaurea nigra</i>	Common Knapweed	LA
<i>Centranthus ruber</i>	Red Valerian	O
<i>Cerastium fontanum</i>	Common Mouse-ear	R
<i>Cerastium glomeratum</i>	Sticky Mouse-ear	O
<i>Chamerion angustifolium</i>	Rose-Bay Willowherb	O
<i>Chenopodium album</i>	Fat Hen	R
<i>Cirsium arvense</i>	Creeping Thistle	R
<i>Cirsium vulgare</i>	Spear Thistle	O
<i>Cistus sp.</i>	Cistus	R
<i>Clematis vitalba</i>	Traveller's Joy	O
<i>Conyza bilbaoana</i>	Bilbao Fleabane	A
<i>Cornus sanguinea</i>	Dogwood	R
<i>Cornus sericea</i>	Red-osier Dogwood	R
<i>Coronopus didymus</i>	Lesser Swine-cress	R
<i>Corylus avellana</i>	Hazel	R
<i>Cotoneaster horizontalis</i>	Wall Cotoneaster	R
<i>Cotoneaster integrifolius</i>	Entire-leaved Cotoneaster	R
<i>Crataegus monogyna</i>	Hawthorn	LF
<i>Crepis capillaris</i>	Smooth Hawk's-beard	F
<i>Cymbalaria muralis</i>	Ivy-leaved Toadflax	R
<i>Cynosurus cristatus</i>	Crested Dog's-tail	O
<i>Cytisus scoparius</i>	Broom	R
<i>Dactylis glomerata</i>	Cock's-foot Grass	R
<i>Daucus carota</i>	Wild Carrot	O
<i>Dipsacus fullonum</i>	Teasel	F
<i>(Echium vulgare)</i>	(Viper's Bugloss)	(R)
<i>Elaeagnus macrophylla</i>	Broad-leaved Oleaster	LR
<i>(Elytrigia atherica)</i>	(Sea Couch)	(LR)
<i>Elytrigia repens</i>	Couch	O
<i>Epilobium ciliatum</i>	American Willowherb	F
<i>Epilobium hirsutum</i>	Greater Willowherb	O
<i>Epilobium montanum</i>	Broad-leaved Willowherb	F
<i>Epilobium parviflorum</i>	Hoary Willowherb	F
<i>Epipactis helleborine</i>	Broad-leaved Helleborine	LO
<i>Equisetum arvense</i>	Field Horsetail	O
<i>Erigeron acer</i>	Blue Fleabane	LO
<i>Escallonia sp.</i>	Escallonia	R
<i>Eupatorium cannabinum</i>	Hemp Agrimony	R
<i>Euphorbia helioscopia</i>	Sun Spurge	R
<i>Euphorbia peplus</i>	Petty Spurge	O
<i>Fallopia japonica</i>	Japanese Knotweed	R
<i>Festuca arundinacea</i>	Tall Fescue	R
<i>Festuca rubra</i>	Red Fescue	F
<i>Foeniculum vulgare</i>	Fennel	R
<i>Fragaria vesca</i>	Wild Strawberry	R
<i>Fraxinus excelsior</i>	Ash	R
<i>Galium aparine</i>	Cleavers	F
<i>Galium verum</i>	Lady's Bedstraw	LF
<i>Geranium dissectum</i>	Cut-leaved Crane's-bill	F
<i>Geranium molle</i>	Dove's-foot Crane's-bill	O

Scientific Name	Common Name	Frequency
<i>Geranium pratense</i>	Meadow Cranes-bill	R
<i>Geranium robertianum</i>	Herb Robert	R
<i>Glechoma hederacea</i>	Ground Ivy	LO
<i>Hippophae rhamnoides</i>	Sea Buckthorn	LO
<i>Hirschfeldia incana</i>	Hoary Mustard	LF
<i>Holcus lanatus</i>	Yorkshire Fog	F
<i>Hordeum murinum</i>	Wall Barley	R
<i>Hypericum hirsutum</i>	Hairy St.John's-wort	R
<i>Hypericum perforatum</i>	Perforate St.John's-wort	F
<i>Hypericum tetrapterum</i>	Square-stalked St.John's-wort	R
<i>Hypochaeris radicata</i>	Common Cat's-Ear	R
<i>Juncus bufonius</i>	Toad Rush	R
<i>Juncus effusus</i>	Soft Rush	O
<i>Juncus inflexus</i>	Hard Rush	O
(<i>Lactuca virosa</i>)	(Great Lettuce)	(LR)
(<i>Lathyrus nissolia</i>)	(Grass Vetchling)	(O)
<i>Lathyrus pratensis</i>	Meadow Vetchling	O
<i>Lemna minor</i>	Common Duckweed	LR
<i>Leontodon autumnalis</i>	Autumn Hawkbit	O
<i>Leontodon hispidus</i>	Rough Hawkbit	R
<i>Lepidium latifolium</i>	Dittander	R
<i>Leucanthemum vulgare</i>	Ox-eye Daisy	F
<i>Leycesteria formosa</i>	Himalayan Honeysuckle	R
<i>Linaria vulgaris</i>	Common Toadflax	R
<i>Linum cf bienne</i>	Pale Flax	O
<i>Lonicera pileata</i>	Box-leaved Honeysuckle	R
<i>Lotus corniculatus</i>	Common Bird's-foot Trefoil	LF
<i>Lysimachia nummularia</i>	Creeping Jenny	R
<i>Lythrum salicaria</i>	Purple Loosestrife	R
<i>Malus pumila</i>	Apple	R
(<i>Malva moschata</i>)	(Musk Mallow)	(LO)
<i>Malva sylvestris</i>	Common Mallow	R
<i>Medicago lupulina</i>	Black Medick	A
<i>Melilotus altissimus</i>	Tall Melilot	O
<i>Mentha arvensis</i>	Corn Mint	R
<i>Myosotis arvensis</i>	Field Forget-me-not	O
<i>Odontites vernus</i>	Red Bartsia	O
<i>Oenanthe crocata</i>	Hemlock Water-dropwort	R
<i>Oenothera biennis</i>	Common Evening-primrose	R
(<i>Oenothera glazioviana</i>)	(Large-flowered Evening-primrose)	(R)
<i>Ophrys apifera</i>	Bee Orchid	R
<i>Pastinaca sativa</i>	Wild Parsnip	LF
<i>Persicaria maculosa</i>	Redshank	R
<i>Phleum cf pratense</i>	Timothy	R
<i>Phragmites australis</i>	Common Reed	R
<i>Picris echinoides</i>	Bristly Ox-tongue	F
<i>Pinus nigra</i>	Corsican Pine	LF
<i>Pinus radiata</i>	Monterey Pine	R
<i>Plantago lanceolata</i>	Ribwort Plantain	F
<i>Plantago major</i>	Greater Plantain	O
<i>Poa annua</i>	Annual Meadow-grass	O
<i>Polygonum aviculare</i>	Knotgrass	O

Scientific Name	Common Name	Frequency
<i>Polypogon viridis</i>	Water Bent	O
<i>Populus alba</i>	White Poplar	LF
<i>Potentilla anserina</i>	Silverweed	O
<i>Potentilla fruticosa</i>	Shrubby Cinquefoil	R
<i>Potentilla reptans</i>	Creeping Cinquefoil	LA
<i>Prunella vulgaris</i>	Self-Heal	F
<i>Prunus domestica</i>	Wild Plum	R
<i>Prunus laurocerasus</i>	Cherry Laurel	R
<i>Prunus spinosa</i>	Blackthorn	LF
<i>Pulicaria dysenterica</i>	Fleabane	O
<i>Quercus ilex</i>	Holm Oak	R
<i>Ranunculus acris</i>	Meadow Buttercup	R
<i>Ranunculus bulbosus</i>	Bulbous Buttercup	R
<i>Ranunculus repens</i>	Creeping Buttercup	F
<i>Reseda luteola</i>	Weld	R
<i>Rhamnus catharticus</i>	Purging Buckthorn	R
<i>(Rhinanthus minor)</i>	(Yellow Rattle)	(R)
<i>Rosa canina</i>	Dog Rose	R
<i>Rosmarinus officinalis</i>	Rosemary	R
<i>Rubus fruticosus agg.</i>	Bramble	F
<i>Rumex acetosa</i>	Common Sorrel	R
<i>Rumex conglomeratus</i>	Clustered Dock	R
<i>Rumex crispus</i>	Curled Dock	O
<i>Rumex obtusifolius</i>	Broad-Leaved Dock	O
<i>(Rumex sanguineus)</i>	(Wood Dock)	(R)
<i>Sagina apetala</i>	Annual Pearlwort	F
<i>Sagina procumbens</i>	Procumbent Pearlwort	R
<i>Salix alba</i>	White Willow	R
<i>Salix caprea</i>	Goat Willow	O
<i>Salix cinerea</i>	Grey Willow	R
<i>Salix viminalis</i>	Osier	R
<i>Sambucus nigra</i>	Elder	R
<i>Sanguisorba minor</i>	Salad Burnet	LO
<i>Scrophularia nodosa</i>	Common Figwort	R
<i>Sedum acre</i>	Biting Stonecrop	LO
<i>Senecio erucifolius</i>	Hoary Ragwort	F
<i>Senecio inaequidens</i>	Narrow-leaved Ragwort	O
<i>Senecio jacobaea</i>	Ragwort	O
<i>Senecio squalidus</i>	Oxford Ragwort	R
<i>Solanum dulcamara</i>	Bittersweet	R
<i>Solanum nigrum</i>	Black Nightshade	R
<i>Sonchus asper</i>	Prickly Sow-thistle	R
<i>Sonchus oleraceus</i>	Soft Sow-thistle	R
<i>Sorbus aucuparia</i>	Rowan	R
<i>Symphoricarpos x chenaultii</i>	Chenault's Coralberry	R
<i>Stachys sylvatica</i>	Hedge Woundwort	O
<i>Tanacetum vulgare</i>	Tansy	O
<i>Taraxacum sp.</i>	Dandelion	O
<i>Trifolium campestre</i>	Hop Trefoil	R
<i>Trifolium dubium</i>	Lesser Trefoil	R
<i>Trifolium pratense</i>	Red Clover	O
<i>Trifolium repens</i>	White Clover	R

Scientific Name	Common Name	Frequency
<i>Tripleurospermum inodorum</i>	Scentsless Mayweed	LF
<i>Tussilago farfara</i>	Colt's Foot	F
<i>Ulex europaeus</i>	Common Gorse	O
<i>Urtica dioica</i>	Nettle	LF
<i>Verbascum thapsus</i>	Greater Mullein	R
<i>Verbena officinalis</i>	Vervain	O
<i>Veronica persica</i>	Common Field-speedwell	O
<i>Veronica serpyllifolia</i>	Thyme-leaved Speedwell	O
<i>Viburnum davidii</i>	David Viburnum	R
<i>Viburnum opulus</i>	Guelder Rose	R
<i>Viburnum tinus</i>	Laurustinus	R
<i>Vicia cracca</i>	Tufted Vetch	O
<i>Vicia sativa</i>	Common Vetch	O
<i>Vicia tetrasperma</i>	Smooth Tare	F
<i>Vinca major</i>	Greater Periwinkle	R
<i>Vulpia bromoides</i>	Squirreltail Fescue	O
BRYOPHYTES		
<i>Barbula convoluta</i>	Lesser Bird's-claw Beard-moss	+
<i>Brachythecium rutabulum</i>	Rough-stalked Feather-moss	+
<i>Bryum argenteum</i>	Silver-moss	+
<i>Bryum spp.</i>	Thread-moss	+
<i>Calliergonella cuspidata</i>	Pointed Spear-moss	+
<i>Cratoneuron filicinum</i>	Fern-leaved Hook-moss	+
<i>Kindbergia praelonga</i>	Common Feather-moss	+
<i>Rhytidiadelphus squarrosus</i>	Springy Turf-moss	+
LICHENS		
<i>Peltigera sp.</i>	Dog Lichen	+
<i>Xanthoria parietina</i>	Golden Shield Lichen	+
FUNGI		
<i>Melampsora epitea</i>	Willow Rust	+
<i>Suillus granulatus</i>	Weeping Bolete (near Pine)	+
<i>(Lepiota cristata)</i>	(Stinking Dapperling)	(+)
<i>Melampsorea populnea</i>	Poplar Rust (on White Poplar)	+
<i>Polyporus squamosus</i>	Dryad's Saddle (on dead stump)	+
<i>Puccinia poarum</i>	Rust (on Colt's-foot)	+
BUTTERFLIES AND MOTHS		
<i>Aglais urticae</i>	Small Tortoiseshell Butterfly	+
<i>Autographa gamma</i>	Silvery Y Moth	++
<i>Aphantopus hyperantus</i>	Ringlet Butterfly	+
<i>(Coenonympha pamphilus)</i>	(Small Heath Butterfly)	(+)
<i>(Camptogramma bilineata)</i>	(Yellow Shell Moth)	(+)
<i>Maniola jurtina</i>	Meadow Brown Butterfly	+
<i>(Ochlodes venata)</i>	(Large Skipper Butterfly)	(+)
<i>Pieris napi</i>	Green-veined White Butterfly	+
<i>Pieris rapae</i>	Small White Butterfly	+
<i>Polygonia c-album</i>	Comma Butterfly	+
<i>Polyommatus icarus</i>	Common Blue Butterfly	+
<i>Pyronia tithonus</i>	Gatekeeper Butterfly	+
<i>Thymelicus sylvestris</i>	Small Skipper Butterfly	+
<i>Tyria jacobaeae</i>	Cinnabar Moth (caterpillars)	+
<i>Vanessa atalanta</i>	Red Admiral Butterfly	+
<i>Vanessa cardui</i>	Painted Lady	+

Scientific Name	Common Name	Frequency
<i>Zygaena filipendulae</i>	6-spot Burnet Moth	+
BIRDS		
<i>(Anthus pratensis)</i>	(Meadow Pipit)	(+)
<i>Carduelis cannabinum</i>	Linnet	+
<i>Carduelis carduelis</i>	Goldfinch	+
<i>(Carduelis chloris)</i>	(Greenfinch)	(+)
<i>(Columba livia)</i>	(Feral Pigeon)	(+)
<i>Columba palumbus</i>	Wood Pigeon	+
<i>Corvus corone</i>	Carrion Crow	+
<i>Corvus monedula</i>	Jackdaw	+
<i>Cyanistes caeruleus</i>	Blue Tit	+
<i>Erithacus rubecula</i>	Robin	+
<i>Fringilla coelebs</i>	Chaffinch	+
<i>(Hirundo rustica)</i>	(Swallow)	(+)
<i>Larus argentatus</i>	Herring Gull	(adjacent mud flats)
<i>Larus fuscus</i>	Lesser Black-backed Gull	(adjacent mud flats)
<i>Larus ridibundus</i>	Black-headed Gull	(adjacent mud flats)
<i>(Numenius arquata)</i>	(Curlew)	(adjacent mud flats)
<i>(Phylloscopus collybita)</i>	(Chiffchaff)	(+)
<i>Pica pica</i>	Magpie	+
<i>Prunella modularis</i>	Dunnock	+
<i>Sturnus vulgaris</i>	Starling	+
<i>Sylvia communis</i>	Whitethroat	+
<i>(Tadorna tadorna)</i>	(Shelduck)	(adjacent mud flats)
<i>Tringa totanus</i>	Redshank	(adjacent mud flats)
<i>Troglodytes troglodytes</i>	Wren	+
<i>Turdus merula</i>	Blackbird	+
<i>(Turdus philomelos)</i>	(Song Thrush)	(+)
MAMMALS		
<i>Oryctolagus cuniculus</i>	Rabbit (live sightings)	+
<i>Vulpes vulpes</i>	Fox (footprints)	+

Appendix 2. Photographs

Photographs are presented in approximately the same order as the target note numbering.



Photograph 1. Ornamental tree and shrub planting beside access road at TN1, looking south-east towards motorcycle container storage area.



Photograph 2. Access road at TN2, looking north-west, showing sparse grassland and scrub either side of track.



Photograph 3. Motorcycle compound at TN3 with containerised storage, looking south east towards estuary.



Photograph 4. Shaded ditch adjacent to track at TN4.



Photograph 5. Flower-rich grassland at TN5, looking north-east, with scrub and TN12 and shoreline at TN8 in the distance.



Photograph 6. Recently formed steep-sided bank of bare slag at TN6, with bund at top of slope. Looking north towards steelworks.



Photograph 7. Flower-rich grassland at TN7, with dense scrub in right of picture. Looking north-east along coastal footpath.



Photograph 8. Shoreline at TN8, looking north-east, showing exposed and eroding slag material, and shingle formed from slag and rubble. The membrane that caps the slag is visible below the soil layer (mostly burned away). The dense coastal scrub can be seen above this.



Photograph 9. Shoreline at TN8, looking north-east slightly further north of previous picture. The exposed membrane in this section has not been burned and is hanging down over the face of the eroding tip.



Photograph 10. Flower-rich grassland at TN9, looking south-west. The strip of uncapped slag beside the scrap-yard boundary in the right of the picture is largely dominated by Butterfly Bush scrub.



Photograph 11. Typical view across central part of site at TN10, showing mix of developing neutral grassland, sparse ephemerals and scattered scrub. Looking south towards estuary.



Photograph 12. Flower-rich grassland at TN11, looking north-east along the coastal footpath.



Photograph 13. Dense scrub at TN12, looking south-west, showing almost impenetrable mix of Bramble, Sea Buckthorn, Blackthorn and Hawthorn.



Photograph 14. Clearing within the planted trees and scrub at TN13, showing mix of conifers and broadleaved trees with self-sown willow and Bramble. The ground flora is maintained as short grassland by rabbit grazing.



Photograph 15. Looking north-east from TN6, towards the trees and scrub at TN13, and clearing at TN9, with scrap-yard in left of picture.



Photograph 16. Mix of tall herbs, scattered scrub and bare ground just above shoreline at TN14. A large stand of Dittander is shown in the foreground.



Photograph 17. Flower-rich grassland and tall herbs at TN15, looking west with dense scrub and steelworks beyond.



Photograph 18. Open area with sparse ephemeral vegetation at TN16, looking northwest towards Rover Way.