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E C O L O G Y

Barry Waterfront

**Environmental Statement
Chapter F**

Ecology

August 2009

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1.0 Introduction

Purpose of Assessment

1.1 This chapter addresses the potential ecological effects of the proposed development at Barry Waterfront (hereafter referred to as 'the site') on the existing ecological features within the scheme footprint. The chapter includes a summary of the current conditions found within the surveyed area, a valuation of the ecological features and an indication of impacts/mitigation associated with the construction and operation of the proposed development based on the parameter plans and indicative masterplan layout.

1.2 The scope of the Ecological Impact Assessment (EIA) for the proposed development scheme has been developed iteratively based on:

- Consideration of any ecological resources, focusing on those for which there is legal or planning policy in favour of protection or enhancement.
- Data on sites of national and county importance within 1–2km of the proposed development boundary.
- Data on notable flora and fauna; for example, legally protected, nationally rare/scarc, county rare/scarce, Local (Vale of Glamorgan) and UK Biodiversity Action Plan, and other species of conservation concern within 1-2km of the proposed development boundary.
- Review of parameter plans and indicative masterplan layout and its effect on ecological resources.

2.0 Planning Policy Context

2.1 For each of the valued ecological features identified, (for example, a habitat or species) any relevant planning policy, legislative protection or other conservation interest (for example, the UK or Vale of Glamorgan Biodiversity Action Plan - BAP) is described. The main legislative considerations are those contained within the Wildlife and Countryside Act 1981 (as amended), The Conservation (Natural Habitats, etc.) Regulations 1994 (amended 2007) the Countryside and Rights of Way Act 2000, and the Natural Environment and Rural Communities (NERC) Act 2006.

2.2 In terms of planning policy, a number of over-arching policies are of relevance not least of which are those described within Planning Policy Wales (PPW¹), which sets out land use planning policies of the Welsh Assembly Government with Chapter 5 dealing with Conserving and Improving Natural Heritage and Coast. The advice contained within PPW is supplemented for some subjects by Technical Advice Notes (TAN's), with TAN 5 addressing Nature Conservation. This TAN was subject to public consultation between January and 21 April 2006, with a revised version due to be published.

Technical Advice Note 5

2.3 Under the proposed revisions to TAN 5, some of the key principles which the town and country planning system in Wales should incorporate are identified as being to:

- work to achieve nature conservation objectives through a partnership between local planning authorities, CCW, the Environment Agency, voluntary organisations, developers, landowners and other key stakeholders (PPW 5.1.5 and 5.2.5);
- integrate nature conservation into all planning decisions looking for development to deliver social, economic and environmental objectives together over time (PPW 5.1.3 and 5.1.4);
- ensure that the UK's international obligations for site, species and habitat protection are fully met in all planning decisions (PPW 5.3.8-10);
- look for development to provide a net benefit for biodiversity conservation with no significant loss of habitats or populations of species, locally or nationally (PPW 5.1);

¹ National Assembly for Wales. 2002. Planning Policy Wales

Vale of Glamorgan Adopted Unitary Development Plan (1996-2011)

- 2.4 Within the adopted UDP, Section 3 describes the policies of relevance to the Environment with one of the stated objectives being:

‘To protect and enhance the countryside and coast, fostering biodiversity throughout the Vale and recognising areas of importance for landscape and nature conservation’ (Paragraph 3.3.1, 1st bullet point).

- 2.5 Under this over-arching objective are a number of policies, although given the ecological features present within and adjacent to the application site and the site’s status as a Brownfield site, none are considered particularly relevant. The only exception relates to Policy ENV 16, which addresses protected species, i.e. common reptiles, nesting birds and foraging bats which would require consideration in light of their confirmed presence.

- 2.6 The presence of a species protected by legislation is a material consideration in the determination of planning applications. ENV 16 states that:

‘Permission will only be given for development that would cause harm to or threaten the continued viability of a protected species if it can be demonstrated that:

- 1) There are exceptional circumstances that justify the proposals*
- 2) There is no satisfactory alternative*
- 3) Effective mitigation measures are provided by the developer. ‘*

The Natural Environment and Rural Communities (NERC) Act 2006

- 2.7 The *Natural Environment and Rural Communities Act 2006* (NERC) places a duty on all public authorities, in exercising its functions to have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity - including restoring or enhancing a population or habitat. The duty applies to all public authorities and aims to raise the profile and visibility of biodiversity, to clarify existing commitments with regard to biodiversity and make it a natural and integral part of policy and decision-making.

3.0 **Assessment Methodology & Significance Criteria**

- 3.1 The current assessment has been undertaken using best practice guidelines published by the Institute of Ecology and Environmental Management (IEEM). This guidance has been developed by the National Working Group on Ecological Impact Assessment convened under the auspices of IEEM. These guidelines have been subject to extensive formal consultation with amongst others, English Nature (Natural England from October 2006), the Environment Agency, the Institute of Environmental Management and Assessment (IEMA) and the Countryside Council for Wales. The final publication was published in June 2006.
- 3.2 The IEEM guidelines for EclA represent current best practice and their use as part of this Environmental Statement is considered appropriate. It should be noted that the terms used to assign value to a given ecological feature and to assess the impact of the proposed development within these guidelines differ from those used within other chapters of this Environmental Statement.

Study Area

- 3.3 The site itself occupies an area of 43 Ha (c.106 acres) in Barry Waterfront, comprising unmanaged neutral grassland, ruderal 'Brownfield' vegetation and dense stands of colonised scrub, which lie over uneven ground, rubble and large areas of concrete. Within the landscape there are a number of indications which imply that the land has a history of large-scale storage and transport. For example, large concrete foundations and areas of gravel aggregate covered much of the land area on south quay and south of west pond with large tracks of access road.
- 3.4 Barry Waterfront supports a limited range of typical pioneer communities that are established at different stages across the site as a result of the mixed history of clearance and decommissioning. The vegetation communities (grassland, scrub etc) that have established at the site have colonised ground subject to high levels of contamination, associated with its industrial past. This is discussed further in the Ground Contamination Chapter of this ES (Chapter I).

Consultation

- 3.5 In order to provide an ecological context for the site, ecological records were requested from relevant organisations including:
- South East Wales Biodiversity Records Centre (SEWBRc);
 - Vale of Glamorgan County Council;
 - Countryside Council for Wales (CCW);
- 3.6 Habitat and species action plans listed in the UK Biodiversity Action Plan (BAP) were also consulted with regards to species or habitats that are potentially present on the site or in the surrounding study area. Biodiversity Action Plans represent the UK Governments response to the 1992 Convention for Biodiversity (the 'Rio Summit'). They describe the UK biodiversity resource and detail plans at a national and local level to protect priority habitats and species. Relevant local plans within the Vale of Glamorgan BAP were also consulted.
- 3.7 Other sources of information such as the Phase 1 Survey of Wales (CCW 2005) and National Biodiversity Network Gateway were also utilised as appropriate to identify protected or notable nature conservation sites in the wider area.

Extended Phase 1 Habitat Survey

- 3.8 An Extended Phase 1 Habitat Survey of the proposed development site was undertaken on 26th February and 6th March 2008. The survey methodology followed the standard JNCC guidelines (1990) as amended by the Institute of Environmental Assessment (1995) to include protected and/or notable species. Within the surveyed areas, habitats and other ecological features were described and mapped and target notes used to identify features of particular interest/note.
- 3.9 The survey incorporated a search for any evidence of certain protected species such as Badger *Meles meles*, and incidental recording of birds seen or heard. Trees and buildings (where access was possible) were also subjectively assessed from the ground for their suitability to support roosting bats.
- 3.10 Following completion of the Extended Phase 1 Habitat survey, a number of targeted Stage 2 surveys were identified and subsequently undertaken within recognised survey windows using standard or best practice guidelines where appropriate. These surveys are described further in the following sections.

Phase 2 Surveys

Grassland

- 3.11 In order to characterise and map the different habitats on site in greater detail as well as identifying rare or protected plant species within these habitats, a series of National Vegetation Classification (NVC) surveys were conducted on 23 June and 14 July 2008.
- 3.12 Of the Phase 1 habitats recorded on site, the survey effort was focused specifically on areas of good semi-improved neutral grassland. These were assessed visually in terms of species composition and vegetation structure to enable similar stands to be grouped, mapped and subsequently sampled together.
- 3.13 Each stand of vegetation i.e. a vegetation type that bears distinctive floristic and structural properties was then sampled in accordance with standard National Vegetation Classification (NVC) methodology (Rodwell 1997). Five 2m x 2m random quadrats were sampled in most stands, taking care to avoid areas of atypical vegetation e.g. scuffed ground, ruts and paths. The only exception was the vegetation of the upper cliff behind South Quay where issues of inaccessibility and safety constrained data collection to a single quadrat.
- 3.14 The frequency and aerial cover of every plant species (vascular plants, mosses and liverworts) as well as lichens present in each quadrat was recorded and the data were subsequently combined into a floristic table. These data were analysed using MATCH software to produce a co-efficient of similarity with published NVC communities/sub-communities. Surveyor experience and detailed vegetation descriptions provided within the British Plant Communities series (Rodwell 1992, 2000) were then used to confirm the classification of each stand in terms of the NVC. It should be noted that as a tool for vegetation description, the NVC has limitations, especially with respect to plant communities arising from, or influenced by significant levels of human disturbance. Some vegetation communities cannot therefore be satisfactorily classified in terms of NVC descriptions.

Amphibians

- 3.15 The Extended Phase 1 habitat survey identified an area of standing water within the West Pond area that was considered potentially suitable to support amphibians. In order to confirm the presence of breeding amphibians, including Great Crested Newts *Triturus cristatus* within these ponds, a series of four evening surveys were conducted between early April and early May 2008. Surveys included refuge searching, egg searching, torching and netting following guidelines and methodologies recommended by English Nature (2001).

Reptiles

- 3.16 In order to establish the presence of reptiles on the site, a series of surveys were conducted using methods described in the Herpetofauna Workers Manual (Gent & Gibson 1998) and by Froglife (1999).
- 3.17 The land within the proposed development boundary was divided into representative habitat areas considered suitable for reptiles and artificial refugia (in the form of 0.5m² of roofing felt) deployed. These were deployed in sunny spots across the grassland and scrub boundaries. The survey involved a series of seven visits between late April and late June 2008 to check under and around these refuges for basking and sheltering reptiles under suitable environmental conditions as defined by Froglife, 1999.

Bats

- 3.18 As part of the Extended Phase I Habitat survey, a number of derelict buildings were identified on the eastern end of South Quay. The buildings included an office block, a warehouse and a storage facility, all of which appeared accessible to bats.
- 3.19 An external assessment of possible access points into the buildings was undertaken following methodology described in The Bat Mitigation Guidelines (English Nature, 2004). This survey involved a search for any signs of bats such as droppings and staining on the walls, roof tiles or in cracks in masonry.
- 3.20 This appraisal was supplemented with a series of three dusk emergence surveys and a dawn re-entry survey by a team of three surveyors to confirm likely absence of any bat roosts between late May and early July in 2008. These surveys involved observations of possible emergence from roosts for 15 minutes before sunset and 90 minutes after (the dawn survey involved observations from 90 minutes prior to sunrise and 15 minutes after), using Pettersson D-240x ultrasound (time expansion) detectors. Following this emergence period, transects which covered the main body of the survey site were walked. All calls were recorded and identified to species on computer-based sonogram analysis software (Wavesurfer 1.8.5).
- 3.21 On each survey visit, weather conditions were appropriate for bat activity and did not constrain the survey effort.

Birds

- 3.22 The ornithological importance of the survey area was assessed following a Breeding Bird Survey (BBS), supplemented by incidental observations of bird activity during the course of other ecological surveys conducted at the site. Five separate survey visits were carried out between early May and late July 2008, incorporating an early visit to record resident species as well as early migrants.

- 3.23 The methods broadly followed those outlined in Gilbert *et al* (1998) as well as mapping methods outlined by Bibby *et al* (2000). All birds seen or heard were mapped using standard notation outlined by the British Trust for Ornithology (2004). Particular attention was paid to evidence of breeding (e.g. song, display, adults carrying food, nest material or faecal sacks and the presence of juvenile birds).

Terrestrial Invertebrates

- 3.24 To establish the existing invertebrate interest within the site, a series of three surveys were conducted between early June, early July and mid September 2008.

- 3.25 The habitats of the site were primarily sampled using a 50cm sweep-net, together with samples beaten from taller vegetation. Samples were initially sorted in the field, with material from a wide range of groups being collected and retained for subsequent identification. Sweep and beating samples were retained in a dry condition. Some large and easily identified invertebrates (e.g. butterflies and dragonflies) were captured and identified in the field before being released. Stones, logs and other refugia were turned over and investigated for ground-dwelling invertebrates.

Badgers

- 3.26 The Extended Phase I Habitat survey identified some evidence of the possible presence of Badgers in parts of East Quay. This included a number of tunnel entrances along the southern quayside of the former repair dock as well as a single excavation on the northern quayside.
- 3.27 These features were revisited a further three times between April and May to check for recent activity or use. Excavations were investigated further with the use of an inspection mirror and torch.

Potential Impacts, Effects and Receptors

- 3.28 Where an ecological feature (i.e. a habitat or species) is likely to be subject to an impact, both the value of the feature/resource and the likelihood of a significant effect occurring are considered. Where a significant effect is identified, the effect on the particular feature was evaluated as adverse or beneficial at the relevant geographical scale (local, district etc.).
- 3.29 The potential impacts of the masterplan development during construction and operation on identified ecological receptors comprise:
- direct loss of habitats;
 - isolation and fragmentation of habitats;
 - changes in artificial light levels and
 - increased disturbance from construction, traffic and people.
- 3.30 Potentially sensitive ecological receptors are identified through the collation of baseline data from surveys and existing records. Once the receptors are identified information on their legal and policy, conservation and distribution status, plus any known trends (i.e. population or migratory) are considered to measure their value.
- 3.31 All ecological receptors are described (including conservation status, status on site, sensitivity, planning and legal protection etc) and assigned a value. The scale of value for ecological resources used in the present assessment is as follows:
- International;
 - UK;
 - National (Wales);
 - Regional (South Wales);
 - County (Vale of Glamorgan);
 - District (Barry);
 - Local (Barry Docks/Barry Island); and
 - Within immediate zone of influence or within the development site boundary.

- 3.32 All resources valued at above a given threshold of value (in this case within the immediate zone of influence is the lowest level) are considered in terms of whether any effects are likely to be ecologically significant or not. The activities associated with the development are likely to cause significant ecological effects, therefore it is necessary to identify associated changes and their implications in terms of scale, magnitude, duration, reversibility and timing for valued ecological resources.
- 3.33 For the purposes of this assessment, an ecologically significant effect is defined as an effect (adverse or beneficial) on the integrity of a defined site or ecosystem(s) and/or the conservation status of habitats or species within a given geographical area, including cumulative effects (based on IEEM, 2006 guidance). In this context, integrity is defined as the:
- “Coherence of a site’s ecological structure and function across its whole area that allows it to sustain the habitat, complex of habitats and/or levels of populations...”*
- 3.34 The term ecologically significant should not be confused with any other definitions of the term ‘significant’ used elsewhere in this ES. Ecological significance of an effect is considered descriptively in terms of its nature (for example, beneficial or adverse). The ecological value of the resource and the planning policy and legal context are described and used to determine the scale (see above) at which the effect is considered. Finally, the residual effect of the scheme including consideration of any additional mitigation measures is presented.

4.0 Baseline Conditions

4.1 The ecological baseline was established by identifying the valued and sensitive ecological resources within the boundary of the development scheme and in adjoining areas by a combination of desk study and field surveys. The desk study consultation via SEWBReC included the 3 km grid squares in which the site is located (ST 10 67, ST 11 67 & ST 12 67) and an adjoining 1 km buffer area. The field surveys were largely confined to the habitats within and immediately adjacent to the application boundary.

4.2 The following ecological resources were identified as being present within the survey area and to have the potential to be impacted by the development. They were assigned value based on their status in policy, conservation status, distribution, trends, rarity and potential value.

Statutory Sites

4.3 There are two sites with statutory nature conservation designations within 1 km of the proposed development site. These are Barry Island and Hayes Point to Bendrick Rock, both of which are geological Sites of Special Scientific Interest (SSSI). Given the physical separation of both of these sites, the nature of their designation and the extent of the proposed scheme, neither would be considered of ecological relevance and no further consideration is given in this chapter.

Habitats and Vegetation Communities

Grassland

4.4 The extent of grassland habitat at the site established during the Extended Phase 1 Habitat Survey is shown on Figure F1a/F1b, with accompanying target notes included as Appendix F1. Subsequent mapping of grassland communities during the NVC surveys is shown on Figure F2. Following analysis, most of the semi-improved grassland was classified as one of two communities of neutral grassland (OV 23c; OV23d as shown on Figure F2) and calcareous grassland (CG3 community) restricted to the limestone cliff overlooking South Quay.

4.5 A total of 155 plant species were recorded during the NVC survey, several of which were of some conservation concern in context of national or local rarity or threat. This included Childing Pink *Petrorhagia nanteuilim* (a nationally rare plant, protected under the Wildlife and Countryside Act 1981 (as amended)), Corky Fruited Water- Dropwort *Oenanthe pimpinelloides* and Corn Parsley *Petroselinum segetum* (both locally rare). The grassland supporting Childing Pink was located outside, but adjacent to the planning application boundary – no colonies of this species were noted within the application site.

- 4.6 Grassland on the flatter areas of ground across much of the site e.g. West Pond and East Quay appeared to be unmanaged and grass-dominated (typically 80%+ cover). Prominent grasses included Creeping Bent *Agrostis stolonifera* and Red Fescue *Festuca rubra*, with less frequent associates including Yorkshire-fog *Holcus lanatus*, Common Bent *A. capillaris* and Cock's-foot *Dactylis glomerata*.
- 4.7 The central part of the West Pond contained a series of spoil heaps around 3-4 metres in height, colonised by neutral grassland dominated by Creeping Bent and Hairy Sedge *Carex hirta* with Vigorous herbs such as Bristly Ox-tongue *Picris echioides*, docks, Wild Parsnip *Pastinaca sativa* and Creeping Thistle *Cirsium arvense*. Some small areas of this spoil heap also support significant stands of Great Horsetail *Equisetum telmateia* and Coltsfoot *Tussilago farfara*.
- 4.8 On the whole, the extensive areas of grassland in West Pond and East Quay are considered to have low intrinsic botanical interest. In general, herbs attained much lower cover than the grasses, with those indicative of fertile semi-disturbed habitats most prominent (vetches, thistles, docks, clovers etc.). Large mat-forming mosses were also abundant across much of the grassland, particularly in areas of impeded drainage, where patches of Hard Rush were common.
- 4.9 These grassland communities, whilst of limited intrinsic diversity do represent a notable ecological resource in terms of area coverage, particularly at a local geographical scale. At this scale, there are no other comparable grassland habitats and a valuation at the local scale is considered appropriate.
- 4.10 There is an area of MG1a grassland in a small area to the south of West Pond (Figure F2), which was dominated by False Oat-grass in association with other coarse grasses and tall herbs such as Common Ragwort *Senecio jacobaea* and Yarrow *Achillea millefolium*. One patch of this community supported Corky-fruited Water-Dropwort *Oenanthe pimpinelloides*, a perennial herb that is very rare in Glamorgan. This grassland is considered to have botanical value at a local scale on the basis of supporting a rare species.
- 4.11 On the cliff behind South Quay, soils appeared to be slightly more calcareous (though still classified as neutral) and supported patchy secondary grassland dominated by False Brome *Brachypodium sylvaticum*, with patchy Hawthorn *Crataegus monogyna* scrub and encroaching Bramble and Traveller's-Joy *Clematis vitalba*. This habitat was classified as CG3 calcareous and was considered have a botanical value at a local scale because of its scarcity in the area and the fact that it lies within the definition of two UKBAP priority habitats. The botanical diversity of this habitat was relatively low.

- 4.12 Overall, the neutral and calcareous grassland on the site were considered to be a habitat resource of ecological value at a local scale based on consideration of their botanical diversity, condition and extent.

Early successional vegetation

- 4.13 There were extensive areas of this habitat type (classified as Ephemeral/short perennial in the Phase 1 Habitat Survey, Figures F1a and F1b) across the site, especially in the South Quay area. Underlying substrates were variable, but were all freely draining, and on the whole comprised an irregular mixture of crushed hard materials (brick, concrete, pebbles). This vegetation appeared to be the most diverse in the surveyed area, with a wide range of herbs, grasses and mosses present generally between 30% and 70% cover. Among the species was a patchy cover of herbs such as Hoary Mustard *Hirschfeldia incana*, Canadian Fleabane *Conyza canadensis*, Black Medick *Medicago lupulina*, Tall Melilot *Melilotus altissimus* and Great Lettuce *Lactuca vireola*. Small mosses were also frequent, especially *Barbula unguiculata*, *Didymodon fallax* and *Bryum capillare*.
- 4.14 In some places, the early successional vegetation formed transitions to species-poor neutral grassland dominated by Creeping Bent, or occasionally to tall herb (tall ruderal) vegetation where herbs typical of disturbed ground e.g. Hoary Mustard and Great Lettuce formed dense stands.
- 4.15 There were large areas of bare ground across the West Pond and South Quay, including concrete footings of demolished buildings and structures and the compounds and tracks associated with existing buildings. There were also areas of compacted soil/hard material mixtures with very low and patchy cover of vegetation (often ephemeral mosses and species such as Procumbent Pearlwort *Sagina procumbens* and Annual Meadow-grass *Poa annua*). Quayside areas of stone chippings and tarmac on South Quay supported linear strips of vegetation in cracks and alongside disused rail tracks. Some of this vegetation was considered to be quite diverse, and at least one locally rare plant (Lesser Chickweed *Stellaria pallida*) was seen there.
- 4.16 On the East Quay there is an extensive area of Brownfield vegetation colonised over calcareous stone chippings, which appear to be at least moderately diverse and support notable plant species. Identifiable species include Common Bird's-foot-trefoil *Lotus corniculatus*, Ribwort Plantain *Plantago lanceolata* and the moss *Cratoneuron filicinum*.
- 4.17 Within the application site boundary, this habitat type was considered to have ecological value at this geographical scale as representative of early successional vegetation typical of Brownfield habitats.

Scrub Habitat

- 4.18 Scrub was present across much of the site (Figures F1a and F1b), mostly as scattered bushes in grassland and ephemeral vegetation (Gorse, Butterfly-bush,

Bramble and Hawthorn). Dense stands of the same species were also present on banks and cliffs (e.g. West Pond and South Quay areas) and along many of the existing and decommissioned railway lines.

- 4.19 This habitat was considered to have low botanical value although it was considered to have some potential for nesting birds on the site. Overall, the scrub habitat was considered to have an ecological value at a scale within the application boundary.

Scattered Trees

- 4.20 The few trees that were present on the site either part of landscape planting or associated with the dense scrub areas. A separate arboricultural assessment of the trees at the site is included as Chapter M of this Environmental Statement. There were Willow *Salix sp* sub-mature trees along the southern cliff face of South Quay, which were on steep eroded slopes with highly exposed root systems. The grounds of the NERC Research Vessel Service office on South Quay supported a number of ornamental trees including a number of young planted Maples *Acer sp*, two sub-mature Crack/Goat Willow trees and a tall Leyland Cypress *Cupressocyparis leylandii*.
- 4.21 None of these trees were particularly large nor mature and would be considered to have negligible ecological value.

Habitat mosaic

- 4.22 As is shown on Figures F1a and F1b, the individual habitat types at the site exist as a mosaic across different areas, for example the bare ground, scrub and grassland habitats present on West Pond. In order to maintain clarity in the assessment of impacts and to allow differentiation between impacts on a particular feature, valuation and assessment has been primarily based on the individual components of the habitat mosaic as described above.
- 4.23 However, open mosaics on previously developed (brownfield) land are listed as a habitat of 'principal importance' in Wales under Section 42 of the NERC Act and it is recognised that the value of the overall mosaic may be greater than the individual elements considered in isolation. Based on the scale of the application site, the habitat mosaic overall would be considered of value at a District (Barry) geographical scale.
- 4.24 For the purposes of the assessment of impacts, for the reasons described in 4.22, potential effects on individual habitat types are assessed in the first instance and, based on consideration of this process, a separate assessment generated for the habitat mosaic.

Fauna

Amphibians

- 4.25 The presence of ephemeral standing water on West Pond was considered potentially suitable to support common amphibians such as Palmate Newt *T. helveticus* and Smooth Newt. This water feature was not considered of particular potential for Great Crested Newts *T. cristatus* based on the known habitat preferences of the species and the presence of limiting factors such as little/no aquatic vegetation.
- 4.26 On all visits no folded leaves or eggs were found or even any frog or toad spawn noted. The combination of survey methods did not reveal any evidence of Great Crested Newts or other amphibian species in this water body. Consequently the amphibian resource at the site is considered to have negligible ecological value and will not be considered further in this chapter.

Reptiles

- 4.27 Much of the site area is considered capable of supporting reptile populations, particularly in the grassland and vegetated areas across West Pond and East Quay. However, survey confirmed the presence of Slow Worms *Anguis fragilis* only within the South Quay area (Figure F3). A total of 128 Slow worm records were noted over the course of the survey along the base of the cliff and within the grounds of the NERC building on South Quay. Interpretation of the reptile records based on the highest number of sightings in a single visit (23 animals) indicated that the surveyed area supports a low to medium-sized reptile population.
- 4.28 Based on the results of the presence/absence survey, it is considered that the likely absence of reptiles from West Pond and East Quay would correspond to a negligible value for reptiles. The population within South Quay was considered to be of value within the application boundary.

Bats

- 4.29 The NERC buildings provide numerous means of access into the internal voids through broken windows and loose/broken boarding. Of the potential features identified in the external inspection, none showed any evidence of use by bats (e.g. droppings, staining). The emergence and re-entry surveys revealed some limited foraging activity around the buildings but there was no evidence to suggest that bats were emerging from or returning to the buildings to roost during the survey period.
- 4.30 The general activity survey revealed a low level of bat activity on the site, restricted to small numbers of Common Pipistrelle *Pipistrellus pipistrellus* foraging along lit footpaths and occasional passes from Noctule *Nyctalus noctul* and Myotis species (Figure F4).

- 4.31 The surveys revealed a low level of activity restricted to certain features of the site, namely the linear scrub corridors in West Pond, the foot of the cliff face in South Quay and the lit public footpath along the eastern boundary of West Pond. These attributes are likely to provide clear navigational features used by commuting bats moving to and from other local feeding sites.
- 4.32 The distribution of bat species across South Wales varies with Common Pipistrelle widespread throughout. The Vale of Glamorgan BAP contains a species action plan for Common Pipistrelle. Based on the level of activity and species recorded over the course of the surveys, the surveyed area would be considered of to have ecological importance at a local scale.

Birds

- 4.33 The assemblage of birds noted during this survey were generally typical of the habitats and season (Spring/Summer) and included up to 44 species, although some species were only seen flying over the site or associated with the dock basin. It was considered likely that 20 of the species seen were breeding on the site, 3 of which were breeding on or within the site buildings (Herring Gull *Larus argentatus*, Lesser black backed Gull *Larus fuscus* and Feral Pigeon), the remaining species within the grassland and scrub habitats. Grassland species included Skylark *Alauda arvensis*, Meadow Pipit *Anthus pratensis*, and Wheatear *Oenanthe oenanthe* and species observed among the scrub included linnet *Carduelis cannabina*, Goldfinch *C. carduelis*, Robin *Erithacus rubecula*, Song Thrush *Turdus philomelos*, Blue Tit *Parus caeruleus*, Wren *Troglodytes troglodytes*, Blackbird *T. merula* and Whitethroat *Sylvia communis*. A map of all field sightings is included as Figure F5 and a full list of all bird species noted during the course of the survey is included in Appendix F2. Figure F5 uses standard abbreviations to indicate the location of a particular species sighting.
- 4.34 Of the 20 species considered likely to be breeding on the site, seven are of conservation significance (Dunnock, Herring Gull, Lesser Black Back Gull, Song Thrush, Skylark, Meadow Pipit and Linnet) namely listed on UKBAP/Section 42/ Birds of Conservation Concern (BCC) in UK (Gregory et al. 2002).
- 4.35 Other species seen during the surveys included Short-eared Owl, Eurasian Hobby, Black Redstart, and Curlew. The Short-eared Owl and Hobby were quickly mobbed by the resident gull and corvid assemblage. The Black Restart and Curlew were seen early in April on a single visit and were not considered to be breeding on the site. In addition to those seen on the site, other birds seen in the dock basin and along the walls included Great Crested Grebe *P. cristatus*, Cormorant *Phalacrocorax carbo*, Sandwich Tern and Common Sandpiper.
- 4.36 The location of the site on the coast and its current status as brownfield land has provided a valuable stopover site for birds on passage (migration), which is described by the presence of unlikely species on the site in April such as Black Redstart and Hobby. Overall, the site supports a good range of breeding birds, some of which are species of conservation status that are threatened by

continued population declines. The bird interest at the site was considered to have an ecological significance at a District scale based on the resource it represents to both passage and breeding birds.

Invertebrates

- 4.37 A broad range of invertebrates was recorded on the site, most of which are common and ubiquitous although 11 were of some conservation status and 13 were considered local or regionally uncommon. A complete species list together with a plan showing the areas surveyed is included within Appendix F3 with an explanation of species status (Nationally Notable A etc) included as Appendix F4.
- 4.38 The Nationally Notable 'A' weevil *Polydrusus formosus* was present on young trees in East Quay. The grasslands supported the Nationally Notable 'B' species *Ophonus ardosiacus* (a ground beetle) and *Oxystoma cerdo* (a weevil). They also support three species of Orthoptera (long-winged conehead *Conocephalus discolor*, speckled bush-cricket *Leptophytes punctatissima* and mottled grasshopper *Myrmeleotettix maculates*) and several species from other groups that are considered local or regionally uncommon.
- 4.39 A moderate range of butterfly species was recorded, comprising 13 species in total. These include Dingy Skipper *Erynnis tages*, which features in the UK BAP. A range of dragonflies and damselflies were recorded near the inundated areas in the West Quay.
- 4.40 A broad range of invertebrates was recorded across the site and included species highlighted as having some conservation significance. The areas and habitats considered to have the highest value to invertebrates on the site include the base of the cliff in South Quay, the pond area in West Pond, the herb-rich grasslands in the northern part of East Quay and the grassland margins across the site as a whole. These features were considered to be of value at a local scale, with the remainder of the site of value within the application boundary. For the purposes of the impact assessment, the higher valuation of local has been considered.

Badgers

- 4.41 The extended Phase I Habitat survey identified some evidence of the possible presence of badgers in parts of East Quay. This included a number of tunnel entrances along the southern quayside of the former repair dock as well as a single excavation on the northern quayside. Field signs associated with this species, such as a small number of guard hairs were noted at the entrance of one of the burrows.
- 4.42 On further inspection (May 2008), the excavations along the southern quayside were deep enough to form an underground tunnel system that was wide enough for badgers at the surface but quickly tapered off to a much smaller gauge unsuitable for badgers after approx. 30cm. A large number of rabbit pellets

were also evident in the floor of the tunnel entrance. It was also discovered that the culvert chamber on northern dock of East Quay was defined by a concrete/brick wall on the dock side and by hard rubble fill elsewhere, which significantly limited the size of the tunnel. No recent evidence of further excavation (by any species) was noted and no further guard hairs/bedding material/footprints etc were found in or around the entrance to the chamber.

- 4.43 A population of rabbits currently occupies the southern quayside excavations at East Quay and it is possible that badgers may have foraged around the entrance in the past leaving some evidence of their presence. The chamber on the northern dock could be irregularly used as a 'bolt-hole' by badgers locally but was generally unsuitable to function as a regularly used sett. No field signs associated with badgers were recorded in any of the other areas surveyed.
- 4.44 On this basis, the area within the proposed application boundary was considered to represent a resource of negligible value to any badgers that may be present locally as there was no evidence to suggest regular or historical use of the habitats within the site boundary. Therefore, badgers are not considered further within the EcIA.

Summary of valued ecological features

- 4.45 A summary of the ecological features described as part of the baseline and their value at a geographical scale are summarised in Table F1. Only those features identified at a value of 'within the site boundary' or above have been included and are considered further in this assessment.

Resource/Feature	Value at geographical scale
<i>Habitats</i>	
Grassland	Neutral grasslands OV23 c,d – Local Semi- improved grasslands MG1a with Corky fruited Dropwort- Local Calcareous grassland CG3 – Local Overall Grassland resource- Local
Early successional Vegetation	Within application boundary
Scrub	Within application boundary
Habitat Mosaic	District
<i>Species</i>	
Reptiles	Within application boundary
Bats	Local
Birds	District
Terrestrial Invertebrates	Local

Table F1: Summary of Valued Ecological Features (Baseline)

5.0 Potential Impacts

5.1 The following section considers the overall effect of the development on the ecological receptors, assessing the adverse effects that arise from construction and operation of the scheme and any beneficial environmental effects of mitigation and habitat creation measures.

5.2 In considering the likelihood of a significant ecological impact on each of the valued ecological receptors, consideration has been given to factors such as whether the impact is likely to be beneficial or adverse, magnitude (size) of the impact, extent, duration, timing and frequency and reversibility. Where an impact is identified, the likelihood of occurrence is also indicated based on a four-point scale:

- Certain/near-Certain: probability estimated at 95% chance or higher.
- Probable: probability estimated above 50% but below 95%.
- Unlikely: probability estimated above 5% but less than 50%.
- Extremely Unlikely: probability estimated at less than 5%.

5.3 Only the ecological features that are considered to be of value at or above '*within application boundary*' have been included in the ecological impact assessment. The predicted impact for each ecological feature has been assessed on the basis of the worst-case scenario. Although not all impacts are identified as being ecologically significant (that is the integrity of the feature may not be affected) there is still the possibility for beneficial or adverse effects on certain resources of value at a given geographical scale. In the case of any adverse effects, appropriate mitigation measures are considered.

5.4 The effects will be considered based on the IEEM Guidelines (2006) and for the purposes of this assessment, will be separated for short-term activities such as site clearance and construction and long term effects associated with an occupied residential/mixed use development based on the masterplan. The assessment of impacts presented in these sections is in the absence of any mitigation measures, which are summarised in the Mitigation Measures section in greater detail.

Site Clearance and Construction

5.5 The following measures are considered as integral to this stage of the scheme and the assessment of impacts is based on the assumption that they would be implemented.

- Vegetation clearance;
- Demolition of site buildings

- Raising of site levels via in-fill (as described in Chapter H of this ES)
- Set up of contractors compounds and site security fencing;
- Change in disturbance levels from increased presence of people and vehicles;
- Changes in artificial lighting; and,
- Excavation of ground for housing foundation and laying of infrastructure

5.6 Details on the proposed phasing of the works are outlined elsewhere within this ES and, whilst this has been considered in the assessment of ecological impacts, only a single impact is identified for each receptor during the construction phase. In summary the proposed phasing of construction would follow a sequence of 1) District Centre, 2) West Pond, 3) Arno Quay, 4) South Quay and 5) East Quay.

Habitats

- 5.7 All habitats within the main areas of the site will be subject to clearance and subsequent in-fill of material to raise the site level ahead of development. Whilst this operation would be phased, it is considered certain that a significant adverse impact would result representing a permanent loss of the existing habitats within the development footprint.
- 5.8 This impact would affect most of the habitat types including the OV23 and MG1 grassland communities, early successional vegetation and scrub habitats of varying ecological value from 'Within the application boundary' to 'Local'.
- 5.9 The CG3 grassland community is on the cliff habitat to the south of South Quay and will not be affected by the site clearance and construction phase of the development. Therefore the impact on this habitat is unlikely to be significant in the short term although an adverse impact is probable due to the instability of the cliff habitat and the projected levels of scrub encroachment in absence of management.
- 5.10 The proposed development footprint also excludes a strip of neutral (OV23 community) grassland along the south of East Quay and peripheral scrub habitats on the cliff at South Quay and around the western margins of West Pond. No significant adverse impact would be associated with these features although in the absence of mitigation (see section 6.0) an adverse effect within the immediate zone of influence is probable.
- 5.11 The phasing of the clearance and construction stage is an integral part of the scheme, which will lessen the short-term ecological impacts on the grassland plots, but ultimately the overall impacts will be significant.

- 5.12 The loss of most of the individual habitat components (neutral grassland, scrub, early colonizing vegetation etc) during site preparation and construction would translate into a significant adverse effect on the overall habitat mosaic, which was considered of value at a District scale without the implementation of any mitigation measures.

Fauna

Reptiles

- 5.13 Field surveys undertaken confirmed the presence of Slow-Worm within the grounds of the NERC Building on South Quay and was considered to have a value of 'within the application boundary'. Based on the complete loss of habitat within this area during site clearance works and the raising of levels, it is certain that a significant adverse impact would result in the absence of mitigation.

Bats

- 5.14 There was no evidence to suggest the presence of roosting bats within the buildings identified for demolition (NERC buildings and Tank Wash). A total of three bat species were noted foraging across the site although activity was greatest along linear features (base of cliff on South Quay, western boundary of West Pond and the lit pathway along the eastern boundary of West Pond). Bat activity at the site was considered to be representative of a feature of local ecological value.
- 5.15 In consideration of the absence of roosting opportunities within the site, dominance of bat activity by aerial hawking species such as Pipistrelles (Noctule to a lesser extent), and the retention of peripheral site features known to be used by foraging/commuting bats, it is considered unlikely that the loss of habitats associated with site clearance/construction would result in a significant adverse impact. However, an adverse impact within the immediate zone of influence is probable due to the loss of foraging habitats and interruption of flight/feeding corridors along the eastern edge of West Pond. There is also potential for indirect adverse impacts through increased lighting and noise at this geographical scale (immediate zone of influence) in the absence of any mitigation measures.

Birds

- 5.16 The bird assemblage across the surveyed area was considered to be of ecological value at a District Scale. During site clearance, most of the existing nesting, foraging and migratory staging habitat would be lost. In addition, the demolition of the buildings will result in the loss of breeding habitat for gulls. The direct loss of habitat and resources on this scale would be certain to result in a significant adverse impact on the bird assemblage in the absence of mitigation. Whilst phasing of site clearance operations would allow any resident bird species to move into areas as yet unaffected, this would only

represent a temporary reduction in the magnitude of the impact and in any event is likely to result in an overall reduction in bird numbers/density due to an increased demand for resources in retained habitats/areas.

- 5.17 Similarly, for any retained habitat such as on East Quay and along the base of the cliff at South Quay, it is probable that the indirect effects of disturbance increased noise and human activity would result in a significant adverse impact (albeit indirectly) in the absence of any mitigation.

Terrestrial Invertebrates

- 5.18 The invertebrate assemblage recorded on the site was considered of Local value.
- 5.19 As described for reptiles and birds, the vegetation clearance works will result in the loss of much of the terrestrial habitat with the exception of the area along the base of the cliff on South Quay, which will be retained throughout the site clearance and construction phase – this area and the retained cliff-face was noted during the field survey as of particular importance locally for invertebrates.
- 5.20 With this retention in mind, the net loss of invertebrate habitat on the site is certain to result in a significant adverse impact within the application site boundary. In the absence of any mitigation, an adverse impact (not significant) on retained habitats and their invertebrate communities was considered probable.

Operational Impacts

- 5.21 The operational stage assumes that all houses and commercial facilities are constructed and functional. As with the consideration of construction impacts, the assessment in this section does not include for mitigation measures – these are described in the Mitigation Measures section (Section 6.0). The operational stage will take into consideration the following likely impacts:
- Increased disturbance from people and traffic;
 - Increased disturbance from artificial lighting;

Habitats

Grassland

- 5.22 The site clearance and construction phase would effectively result in the removal of most of the valued grassland elements within the application boundary. On this basis, it is unlikely that a significant impact would result from the operational stage over and above that resulting from previous site activity. For retained habitats within the site, such as the grassland on East Quay and cliff habitat along South Quay, whilst these would undoubtedly be

subject to on-going disturbance from e.g. noise and human activity, these would seem unlikely to significantly impact upon the habitats themselves (potential impacts on birds and invertebrates are assessed separately) although an adverse impact within the application site is probable due to increased recreational pressure and in the absence of management.

- 5.23 The operational stage of the masterplan allows for the provision of a number of areas of public open space and a sports pitch and in that respect would replace, in area terms at least, some of the grassland resource. However, in the absence of ecological mitigation measures, this is unlikely to represent a significant (beneficial) operational impact.

Fauna

Reptiles

- 5.24 Works associated with site operation would not result in any additional habitat loss over and above that from previous stages. However, the operational phase of the development is likely to represent further disturbance to any reptiles that may be present in retained areas (e.g. base of cliff at South Quay) and in adjoining habitats. This is unlikely to represent a significant adverse impact although an adverse effect within the immediate zone of influence is probable due to factors such as increased disturbance, predation from domestic cats etc.

Bats

- 5.25 The site clearance and construction phase would have resulted in the removal of much of the existing foraging resource within the operational boundary and no additional losses would be associated with the operation stage. In the absence of mitigation measures, particularly in relation to site lighting, the potential for an adverse impact could not be precluded. However, this would be unlikely to be significant as the main use of the site was by Pipistrelle species, which are known to be relatively tolerant of artificial lights and were noted foraging around such features as part of the 2008 surveys.

Birds

- 5.26 The operational phase of the development will result in increased levels of disturbance (human activity, pets and traffic) and increased predation (from e.g. cats), particularly in the residential areas. Overall, the result of the scheme is considered certain to result in a significant adverse impact. Overall the resources on the site for scrubland and grassland bird species will be replaced with those more suited to urban and garden species such as House Sparrow, Blue Tits and Great Tits.

Terrestrial Invertebrates

- 5.27 The removal of much of the terrestrial habitat during site clearance and construction was considered to represent a significant impact on a locally valuable resource. However, no additional site clearance during operation would occur and a significant impact over and above that already described was considered unlikely. The retained areas along the base of the cliff on south quay was considered unlikely to incur further significant adverse impacts although in the absence of mitigation, an adverse impact within the immediate zone of influence is probable due to increased disturbance.

6.0 Mitigation Measures

Overview

- 6.1 In identifying the type and extent of mitigation through the site clearance, construction and operation stages, consideration has been given to the extensive scale of the works within the application boundary and the requirement to fill all areas of the site – this latter activity in particular constraining the possibility of retaining existing habitats/features at ground level.
- 6.2 Consultation with the local authority ecologist and Countryside Council for Wales established the principle that habitat loss within the development footprint would be an inevitable consequence of the scheme. Protection of adjoining habitats/features, maximising the biodiversity value of new planting/open space and provision of specific on-site mitigation measures were discussed as the key points in mitigating the effects of the scheme.
- 6.3 The mitigation strategy developed and incorporated into the scheme masterplan is presented in Figure F6 and in summary incorporates the following key features:
- Retention and protection of 2m wide strip at the cliff base and face along the South Quay;
 - Retention of 5300m² grassland areas for Skylark to the south of East Quay;
 - Design of Public Open Space in East Quay to provide grassland of potential value to Skylark (2200m²);
 - Possible retention of 7100m² of ABP land on East Quay to retain grassland habitat in-situ and provide potential resource to Skylark;
 - Provision of 1000m² wildflower meadow as part of public open space at East Quay;
 - Creation of linear park swale and meadow strip habitat through West Pond;
 - Up to 61,400m² of public space including grass, bulb, herbaceous, trees and shrub species selected to be beneficial to biodiversity;
 - Street tree network to contribute to foraging corridors for birds, bats;
 - Retention and protection of rare plant (Childing Pink) areas off site (East Quay) and translocation of species (Corky Fruited Water Dropwort);
 - Provision of brown roofs on the District Centre in West Pond (approximately 2600 m² of habitat).
 - Brownfield habitat to be provided – up to 2000m² - as part of green corridor around south-western periphery of site. This provision would be at ground level with 7m wide scrub/hedge border adjacent to the

development. Substrate of crushed brick/concrete to be seeded with native grasses/wildflowers and maintained as a brownfield meadow.

- Translocation of reptiles from within the application boundary to a suitable offsite area (Cosmeston Country Park)
- Creation of 'green corridor' link between off-site railway scrub and the cliff corridor.
- Retention of the cliff top green space managed as wildlife gardens, allotments and open space.
- Up to 1:10 of the approximate 600 houses in South Quay to have bird boxes.
- Up to 600 m² of thicket scrub in East Quay Park.

6.4 The impact assessment presented in Section 5.0 was on the basis that no mitigation would be applied. The following sections address each of the valued ecological receptors and describe the measures to be adopted through site clearance, construction and operation to minimise as far as practicable the effects of the scheme.

6.5 For ease of reference, a table is presented at the end of this section (Table F2) that summarises the impacts of the scheme on each of the valued ecological receptors in the absence of and following mitigation.

6.6 It should be noted that for an operation of this scale and duration (i.e. direct effects on up to 43 ha. over 9 years) that adverse impacts and an overall loss of biodiversity within the immediate zone of influence are likely to be inevitable. Similarly, replacement of habitats on a like for like basis would not be practicable within the application boundary given the needs of the masterplan and other site constraints (e.g. requirement to in-fill). The mitigation measures described within this section have been devised to retain elements of the key biodiversity resources identified at the site and to contribute to the maintenance of biodiversity locally.

Habitats and Vegetation communities

Grassland

6.7 Activities associated with site clearance and construction would be certain to result in a significant adverse impact. Mitigation for habitat loss on this scale would not be practicable and has instead focused on enhancing the retained habitats and transferring the botanical interest (specifically Corky Fruited Water Dropwort from grassland south of West Pond) from habitats due to be lost to areas on the site not subject to development.

6.8 The retention and enhancement of the grassland areas in East Quay will maintain some of the grassland resource in situ (retention of up to 12,400m² or 1.24ha. of the existing 6.45ha. resource at East Quay). The CG3 community

along the cliff face on South Quay will also be retained and improved through selective removal of scrub, thereby opening the sward to the benefit of the grassland community.

- 6.9 No direct impacts would affect the base or face of the Cliff along South Quay and similarly no direct impacts are anticipated. In order to prevent any damage or use of this area by construction or operational activities, a fence would be installed along the base. This fencing is also likely to be a requirement on H&S grounds during the construction phase to discourage members of the public from entering the site.
- 6.10 The process of turf translocation would be used to transfer some of the interest associated with the existing MG1a community (with Corky Fruited Water Dropwort) from West Pond to the retained grassland habitat on East Quay (see Figure F6). Turfs containing the rare plants would be cut and moved to prepared ground in advance of site preparation works. It is therefore considered unlikely that the scheme will have a long-term adverse impact on this resource.
- 6.11 The Chiding Pink colony has not specifically been included within the assessment of impacts as it lies outside the application boundary (beyond the eastern boundary of East Quay). However, given its status as a protected plant on Schedule 8 of the Wildlife and Countryside Act 1981 (as amended), protective measures (existing fencing retained, avoidance of storage/stock-piling, vehicle traffic etc. in areas where the species occurs) would be implemented throughout the clearance, construction and operational phases of the development.
- 6.12 The site masterplan would also provide 1000m² of new wildflower meadow within the public open space at East Quay together with a 7m wide meadow grass strip (up to 1100m²) alongside the swale in West Pond. Other areas of public open space, concentrated within the Linear Park at West Pond and at East Quay would contribute 42,000m² of mainly amenity grassland with other landscape planting. Although the proposed soft landscape of the scheme has not been developed as a specific ecological mitigation measure, many of the species and planting schemes have been chosen with biodiversity in mind.
- 6.13 In summary, the masterplan would provide for up to 14,500m² (1.45ha) of either retained or created grassland as a biodiversity resource on the site. Public open space (including amenity grassland) would contribute a further 6.14ha. and although the primary function of this latter area would be for public amenity rather than biodiversity, it is likely to provide a resource for common species (e.g. birds, invertebrates).
- 6.14 For the retained areas on South Quay and East Quay, a significant adverse impact on the grassland resource is unlikely. However, the existing extent (as mapped during the 2008 surveys – see Figures F1a and F1b) of neutral grassland within the application boundary is in excess of 15ha (9.25ha West Pond, 6.45 ha. East Quay). Although up to 1.24ha of this resource would be

retained at East Quay, a significant adverse impact within the application site was considered probable (i.e. loss of over 90%). As previously identified given the requirements (housing numbers) and constraints to site development (need to in-fill to raise site levels), an adverse impact on grassland habitats was always likely to occur.

Brownfield Mosaic

- 6.15 As with the grassland communities, activities associated with site clearance and construction would be certain to result in a significant adverse impact for the existing Brownfield mosaic (including grassland, ephemeral short perennial and scrub vegetation). Mitigation will include the provision of replacement Brownfield habitat – up to 2000m² - as part of green corridor around the southeastern periphery of site. This provision would be at ground level with 7m wide scrub/hedge border adjacent to the development. The habitat will be based upon a substrate of crushed brick/concrete to be seeded with native grasses/wildflowers and maintained as a Brownfield meadow. In addition to the Brownfield meadow, an area of Brownfield habitat equivalent to 2600m² will be created as Brown roofs on West Pond and South Quay.
- 6.16 In summary, within the boundary of the survey area (Figure F6), 4600m² of Brownfield would be created through provision of Brownfield meadow and brown roofs. These mitigation measures, whilst of value in retaining an important element of the existing biodiversity interest at the site would not represent a like-for-like replacement. As previously indicated, this would not be practicable/achievable with the current masterplan requirements/ constraints. Overall, it is probable that a significant adverse impact on the habitat mosaic within the application boundary would result from the development. The likelihood of a significant impact at the local scale would be reduced by the mitigation measures described although an adverse effect is probable based on the reduction in area of the resource.

Scrub

- 6.17 The existing scrub resource within West Pond and East Quay amounted to approximately 1.3ha. Although this would be lost as part of site clearance/ construction, peripheral areas of scrub around the application boundary would be retained and protected during the phased site development. In addition, the masterplan allows for new scrub planting to the south of West Pond (7m wide scrub belt surrounding Brownfield meadow), a 600m² thicket of native scrub within East Quay and new scrub planting to supplement the retained resource at the south western corner of the site – see Figure F6. On this basis, a significant adverse impact is unlikely. In the short term, an adverse impact within the application boundary is probable, reducing to a neutral impact in the long term as new planning matures.

Fauna

Reptiles

- 6.18 The loss of habitat associated with the scheme would be certain to result in a significant adverse impact in the absence of mitigation. All common reptiles are protected against killing and injury under the Wildlife and Countryside Act 1981 (as amended) and typically this translates to exclude them from areas of development where they could be at risk or to capture and transfer them to areas outside the development. For the Barry Waterfront Scheme, the latter is the only practicable solution.
- 6.19 Prior to site clearance and construction, a reasonable capture effort would be expended to transfer as many reptiles as practicable from within the application boundary to a suitable receptor site. Temporary exclusion fencing would be deployed along the base of the cliff on south quay in advance of site clearance to prevent immigration of reptiles into the works area.
- 6.20 On the basis reasonable efforts would be expended to transfer reptiles to suitable habitats off-site, a significant impact is considered unlikely. However, it is perhaps inevitable that some reptiles could be killed or injured during the process of transfer and that some may subsequently not survive within the retained areas due to increased competition for resources. Overall it is considered probable that an adverse impact within the application boundary would result over the duration of the scheme.

Bats

- 6.21 The key ecological features on the site for bats include the linear features associated with areas of scrub and the lit pathway along west pond. The peripheral scrub corridors would be largely retained throughout development.
- 6.22 One of the main issues potentially affecting bats is fixed site lighting, which can have disruptive implications on the foraging and commuting behaviour on bat species sensitive to artificial light. This issue can be mitigated in some parts of the site by maintaining 'dark corridors' and restricting the lighting of the public open spaces, wildflower areas and cliff habitat on South Quay. Where standard height street lighting was required adjacent to the retained habitats, directional or cowled lanterns should be adopted that limit light spill. Lantern design should be of high-pressure sodium type. Where possible, options for low-level lighting would also be explored. On this basis, the impact of operational site lighting is unlikely to have a significant adverse impact on bats. Lighting can be attractive to night-flying insects and could offer a useful additional foraging resource to the more common bat species known in the area (Pipistrelle and Noctule), however this would not be considered an ecologically significantly positive impact.
- 6.23 The loss of open areas in the site is likely to reduce the foraging resource although this could be at least partly offset by the provision of public open

space and management of features such as retained/created grassland at East Quay, the swale and meadow strip on West Pond and the scrub/ Brownfield area in the south western part of the site. These are likely, in the long term to provide alternative commuting and foraging features.

- 6.24 With the inclusion of all these measures, the overall development is considered unlikely to result in a significant adverse impact on bats. With the provision of new habitats and maintenance of habitat corridors, an adverse impact in the short term within the immediate zone of influence is probable, reducing towards neutral in the long term as the new planting matures. Although not specifically considered as part of this assessment, opportunities for provision of roosting opportunities as part of new built form (e.g. bat bricks incorporated into buildings) would be sought wherever possible.

Birds

- 6.25 The activities associated with the site clearance, construction and operation phases are certain to result in a significant adverse impact on birds due to loss of nesting/foraging habitat and disturbance of retained habitat. For a scheme of this size, mitigation to replace habitat would not be practicable.
- 6.26 In order to minimise impacts as far as practicable and comply with the legislation, clearance of scrub and grassland areas within the application boundary would be undertaken outside the bird breeding season which typically runs from March to August inclusive.
- 6.27 The site and surrounding area supports a range of summer and winter visiting birds, which are considered vulnerable to disturbance by the construction and operational stages of the development.
- 6.28 Avoidance of the breeding season (March – August inclusive) during site clearance will avoid disturbance and threat to breeding birds in the scrub and grassland habitats. This activity can be carried out in winter where the effect will be minimised. Retention of peripheral scrub habitats as described for bats would retain nesting/foraging habitat within the immediate zone of influence
- 6.29 The creation of wildflower areas across the site, including provision of up to 4600m² of Brownfield habitat, will help offset the long-term disturbance effect by providing a habitat for shelter as well as presenting additional foraging opportunities. The areas of public open space, sports pitches wildflower meadow, swale/meadow strip, Brownfield meadow and domestic gardens are all likely to provide foraging opportunities for the bird assemblage known to occur at the site.
- 6.30 Discussion with the local authority and CCW indicated that consideration could be given to the provision of nest boxes that could encourage local birds such as Swift.

- 6.31 With the inclusion of these measures, the overall development is considered probable to result in a significant adverse impact on the bird assemblage with levels of disturbance and possibly predation by domestic cats likely to increase relative to the existing situation. The overall effect is considered to be adverse at the local scale, as the species prone to disturbance will be replaced by typical urban species as planting matures. The provision of nest boxes within retained/new planting and on built form would be considered wherever possible and has been included as a mitigation measure on South Quay (see Figure F6).
- 6.32 In addition to the bird assemblage overall, mitigation measures specific to use of the site by breeding Skylark have been incorporated into the masterplan. This species was recorded within grassland habitat on West Pond and at East Quay (Figure F5). The retention of grassland habitat on East Quay combined with the design of public open space to provide potential habitat to this species would retain nesting/foraging habitat in situ. With the inclusion of these measures, continued use of the site by Skylark would seem possible although it is probable that a significant adverse impact would result in the long term due to net loss of available habitat and increased disturbance.

Terrestrial invertebrates

- 6.33 The activities associated with the site clearance, construction and operation phases are certain to result in a significant adverse impact on the invertebrate assemblage due to habitat loss. A number of uncommon and rare species were noted within the application boundary, particularly associated with the cliff and cliff-base habitat on South Quay.
- 6.34 The most important feature for invertebrates was identified as being the base of the cliff along south quay. This area will be retained and protected. In order to reduce the risk of damage to these populations, the clearance and fill activities in the adjacent area will be phased to allow invertebrates to disperse into retained cliff habitats and to subsequently re-colonise post fill. This mitigation is also likely to incorporate hand-searching/removal of larger boulders/rocks from the base of the cliff, which were considered a locally important micro-habitat for species of Coleoptera (Beetles). A strip at least 2m wide would be retained free of development on South Quay at the base of the cliff. .
- 6.35 Specific mitigation to retain some invertebrate habitat/resources in other parts of the site include the provision of brown roofs at the District Centre and the Brownfield meadow south of West Pond. In addition, the swale/meadow strip in West Pond and wildflower meadow habitats at East Quay would provide additional resources to a range of nectar feeding insects. In the long term, planting in domestic gardens is also likely to provide resources to common species.
- 6.36 Within the boundary of the application, based on the extent of habitat loss, it is certain that a significant adverse impact would result from the scheme in the

short term. However, retention of existing habitat at South and East Quay (cliff and grassland respectively) combined with the provision of brown roofs, Brownfield meadow, wildflower areas and domestic gardens would combine in the long term to reduce the overall impact such that a significant adverse impact was unlikely. An overall adverse impact is however probable within the application boundary based on the net loss of resources.

7.0 Residual Impact Assessment

7.1 Following consideration of the potential impacts of the development on valued ecological resources during construction and operation, and the implementation of mitigation measures described in section 6.0, the residual impact of the scheme is summarised in Table F2 below.

7.2 The table indicates that significant adverse effects on a number of receptors, ranging in value from District (e.g. birds, brownfield habitat mosaic) to Within the Application Boundary (e.g. common reptiles) would be associated with the proposed development. As indicated in sections 6.1 – 6.2 and within the summary and conclusions (section 8), the development constraints associated with the site and the masterplan requirements (in terms of housing numbers) limit the potential of the mitigation measures to minimise, or reduce the ecological significance of construction and operational impacts. For example, retention of appreciable areas of brownfield habitat at ground level as part of a masterplan required to provide up to 2000 residential units would be impractical.

7.3 The highest valuation of District was assigned to the Brownfield habitat mosaic and the bird assemblage at the site. The mitigation proposed would provide for long term persistence of brownfield habitat (e.g. brown roofs, brownfield meadow) and resources for nesting/foraging birds although, for the reasons described above and in preceding sections could not replace the loss of the existing resource in terms of scale – hence a significant adverse impact on these features would be predicted.

Environmental Topic	Description of Impact		Description of Mitigation Measures	Description of Residual Impact	
	Description	Significance		Description	Significance
Grassland: Construction Impacts					
1) Neutral Grassland	1) 100% Loss of habitat	1) Significant Adverse Direct Permanent Long term Certain	1) Retention of 8% of habitat resource.	1) 92% Loss of habitat	1) Significant Adverse Direct Permanent Long-Term Certain
2) Neutral Grassland (with Corky Fruited Water Dropwort)	2) 100% Loss of habitat	2) Significant Adverse Direct Permanent Long term Certain	2) Translocation of resource to retained area	2) Feature retained	2) Significance Unlikely Adverse Direct Temporary Short-term Probable
3) Calcareous Grassland	3) Disturbance by machinery	3) Significance Unlikely Adverse Indirect Temporary Short-term Probable	3) Installation of protective fencing	3) Minimal disturbance (i.e. dust, vibration)	3) Significance Unlikely Neutral Indirect Temporary Short-term Probable
Grassland: Operational Impacts					
1) Neutral Grassland	1) Disturbance (recreational)	1) Significance Unlikely Adverse Indirect Permanent Long-Term Probable	1) Retained habitats not included as public open space; Creation of wildflower habitat, maximising biodiversity value of Public Open Space.	1) Net loss of habitat; Retention of 8% of habitat; creation of habitat	1) Significant Adverse Direct Permanent Long-Term probable
2) Neutral Grassland (with Corky Fruited Water Dropwort)	2) Disturbance (recreational)	2) Significance Unlikely Adverse Indirect Permanent	2) None	2) Habitat interest transferred to retained grassland on	2) Significance Unlikely Adverse Direct Temporary Short-term

Environmental Topic	Description of Impact		Description of Mitigation Measures	Description of Residual Impact	
	Description	Significance		Description	Significance
3) Calcareous Grassland	3) None	Long-Term Probable 3) Significance Unlikely Neutral Indirect Temporary Short-term Probable	3) None	site 3) Minimal disturbance by vibration, dust etc	Probable 3) Significance Unlikely Neutral Indirect Temporary Short term Probable
Brownfield: Construction Impacts	100 % Loss of habitat	Significant Adverse Direct Permanent Long-Term Certain	Retention of habitats at East Quay and at cliff base on South Quay	Loss of over 90% Brownfield Habitat mosaic	Significant Adverse Direct Permanent Long-Term Certain
Brownfield: Operational Impacts	No further impacts		Creation of 2600m ² of Brown-roof habitat; creation of 2000m ² Brownfield habitat	Net loss of habitat	Significant Adverse Direct Permanent Long-Term Probable
Scrub: Construction Impacts	100% Loss of habitat	Significant Adverse Direct Permanent Long-Term Certain	Peripheral areas protected by demarcation	Complete loss of scrub habitat within application boundary	Significant Adverse Direct Permanent Long-Term Certain
Scrub: Operational Impacts	No further impacts		Creation of scrub corridor to south east, new planting at East Quay	Existing peripheral areas retained and new planting provided	Significance Unlikely Adverse Direct Short-Term Probable
Reptiles: Construction Impacts	100% Loss of habitat, risk of killing or injury	Significant Adverse Direct Permanent Short-Term Certain	Transference of reptiles to suitable receptor area off-site (Cosmeston Country Park)	Reptile population excluded from development zone	Significance Unlikely Adverse Direct Permanent Long-Term Probable
Reptiles: Operational Impacts	No further impacts				

Environmental Topic	Description of Impact		Description of Mitigation Measures	Description of Residual Impact	
	Description	Significance		Description	Significance
Bats: Construction Impacts	Net Loss of foraging habitat;	Significance Unlikely Adverse Indirect temporary Short-Term Probable	Retention of peripheral habitat corridors,	Net loss of foraging habitat	Significance Unlikely Adverse Indirect temporary Short-Term Probable
Bats: Operational Impacts	Disturbance by increased human presence; traffic and artificial light	Significance unlikely Adverse Indirect Permanent Long-Term Probable	Retention and new scrub planting around site periphery: creation of foraging areas and green corridors	Net loss of foraging habitat and flight corridors	Significance Unlikely Adverse Indirect Permanent Short term Probable
Birds: Construction Impacts	Net loss of breeding, wintering, shelter habitat; disturbance by machinery and increased traffic/human presence	Significant Adverse Indirect Temporary Short-Term Certain	Vegetation clearance outside the breeding season: retention of peripheral scrub habitats	Net loss of habitat; disturbance	Significant Adverse Indirect Temporary Short-Term Certain
Birds: Operational Impacts	Disturbance by increased traffic and human presence; increased predation by domestic cats	Significant Adverse Indirect Permanent Long-Term Certain	Creation of foraging and nesting habitats; provision of bird boxes	Net loss of habitat; some nesting; shelter habitat opportunities within planting scheme	Significant Adverse Indirect Permanent Long-Term Probable
Skylark: Construction Impacts	Net loss of breeding, shelter habitat; disturbance by machinery and increased traffic/human presence	Significant Adverse Indirect Temporary Short-Term Certain	Vegetation clearance outside the breeding season.;	Net loss of habitat; disturbance	Significant Adverse Indirect Temporary Short-Term Certain
Skylark: Operational Impacts	Disturbance by increased traffic and human presence; increased	Significant Adverse Indirect Permanent Long-Term Certain	Retention of existing habitat and design of public open space at East Quay	Net loss of habitat;	Significant Adverse Indirect Permanent Long-Term Probable

Environmental Topic	Description of Impact		Description of Mitigation Measures	Description of Residual Impact	
	Description	Significance		Description	Significance
	predation by domestic cats				
Terrestrial Invertebrates: Construction Impacts	Net loss of habitat; mortality of important species associated with clearance and filling activities; disturbance by machinery	Significant Adverse Direct Temporary Short term Certain	Retention and protection of habitat along South Quay cliff; Phasing of clearance along South Quay to allow movement up to cliff habitat; retention of grassland at East Quay and peripheral scrub corridors	Net loss of habitat; lower risk of mortality to important species	Significant Adverse Indirect Temporary Short-Term Certain
Terrestrial Invertebrates: Operational Impacts	Disturbance of retained habitat by recreational use	Significance unlikely Adverse Indirect Permanent Long-Term probable	Retained areas not included as public open space; creation of wildflower habitats, Brownfield and roof habitats.	Net loss of habitat; reduced disturbance of retained habitats and opportunities in created ecological habitats	Significance Unlikely Adverse Indirect Permanent Long-Term Probable

Fig F2 Summary Table of Residual Effects of the Proposal Together with Mitigation Measures

8.0 Summary and Conclusions

- 8.1 The combination of desk and field surveys undertaken at the Barry Waterfront site have identified that valued ecological features exist within and adjacent to the proposed development footprint.
- 8.2 The site is not covered by, or located in close proximity to any feature designated for its nature conservation interest although two geological Sites of Special Scientific Interest lie to the south beyond the existing urban settlement of Barry Island. The proposed development site comprises of a limited number of habitat types – principally grassland, scrub, colonising vegetation and bare ground – that have established over this Brownfield site in the period since it was last in general use as part of the Port of Barry. These habitats in turn supported several notable species of flora and fauna including nesting and passage (migratory) birds, a population of Slow-worm (South Quay only), foraging bats and terrestrial invertebrates.
- 8.3 The ecological features (i.e. habitats and species) at and immediately adjacent to the site were assigned a value at a geographical scale ranging from ‘District’ (Barry) to ‘within the application site boundary’. The potential impacts of the scheme on these features were subsequently assessed using best practice guidelines.
- 8.4 As part of the site preparation works in advance of construction, the level of the site would need to be raised to address flood issues and this would effectively remove most of the existing ecological features at the site. This activity would result in significant adverse impacts on the brownfield habitat mosaic as well as nesting birds, common reptiles and terrestrial invertebrates. A significant adverse impact on bats was not predicted given the absence of roosting opportunities and that most activity was associated with peripheral scrub corridors (foraging Pipistrelle bats). An adverse impact on bats within the application boundary was considered probable.
- 8.5 A range of mitigation measures to avoid or minimise the impacts of the development during construction and operation have been incorporated into the scheme masterplan, although given the development requirements and site constraints, mitigation on a like-for-like basis would not be practicable.
- 8.6 Mitigation measures incorporated into the construction phase include the retention and protection of the cliff/cliff base on South Quay, retention of grassland at East Quay, avoidance of key periods (e.g. bird nesting season) during clearance works and retention/protection of peripheral scrub habitats. As part of the masterplan new habitat features would be created and would include brown roofs, Brownfield meadow, supplementary scrub planting, wildflower meadow, swale and wildflower meadow strip and a network of street trees to provide foraging/commuting areas for aerial species such as birds and bats. The population of Slow Worms at South Quay would be transferred to

suitable habitat off-site and notable plant species within grassland at West Pond would similarly be transferred to retained grassland at East Quay. The retention of grassland at East Quay and design of Public Open space in this area would retain nesting opportunities for Skylark.

- 8.7 Overall, the development of the site is likely to result in a significant adverse impact for the existing site habitats and mitigation for this loss on a like for like basis would not be practicable. The mitigation measures proposed would allow for retention and/or provision of habitats, albeit at a smaller scale and this in turn would provide resource for continued use of the site by birds, foraging bats and terrestrial invertebrates. For these groups, the significance of any adverse impacts is likely to reduce over the long term as planting natures etc although an overall loss of biodiversity (largely due to the scale of area lost to development) at the site level is likely to arise as a result of development.

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