

However, although birds of conservation importance were recorded throughout the survey area, it is the mosaic of woodland, grassland and heathland habitats, both in the south-western and south-eastern corners of the site Boxes 10, 11 and 12), that are considered to be the most important for birds.

Bats

Roost Surveys

16.5.48 The surveys undertaken within the refinery fence during 2001 revealed that lesser horseshoe bats were both roosting and feeding within the site. One building (see Figure 4, red Target Note 9, in Appendix 16.A) was being used as a day roost, and a number of other, mainly derelict, buildings scattered across the site (largely within the area indicated by Box 3 on Figure 16.2a) showed evidence of being used a feeding perches by lesser horseshoe bats. However, the very small quantity of droppings present in the day-roosts indicates use by a small number of bats, probably either a lone male, or a small number of non-breeding animals (rather than a maternity roost) and no horseshoe bats were recorded during the activity surveys in 2003 and 2004 (see below). None of the other various electricity sub-stations and former air-raid shelters showed signs of being used by roosting/ hibernating bats. A number potentially suitable bat roost sites in trees with dead wood, holes and fissures were identified (see Figure 4, red Target Note 13, in Appendix 16.A). The site was assessed as likely to represent a significant foraging resource for bats and to support habitats used by bats commuting from roosts outside the survey area.

16.5.49 With regard to the proposed Southern Access, although no droppings or other signs of roosting bats were recorded during the interior inspection of Penisa'r-coed Farm, a small number of pipistrelles were recorded during the emergence surveys (see Appendix 16.B for details). Given that no droppings were recorded, it is likely that they are using cracks and crevices in the stonework. Two mature oaks containing woodpecker holes suitable for roosting bats were identified at the edge of the steep hillside covered in sessile oak (Box 4, Figure 16.2b), although no bats were recorded emerging from these features.

Emergence/activity Surveys

16.5.50 The application area was found to be used by up to five species of foraging and commuting bat (common and soprano pipistrelles; possible Natterer's and whiskered/Brandt's bats; and Noctule), although they were recorded in lower numbers than anticipated for such a site. No horseshoe bats were recorded during these surveys, suggesting that the droppings recorded during the roost surveys in 2001 were indeed likely to have been produced by a lone individual using the site only on an occasional basis. The water bodies within the application boundary provided a focus for foraging bats, with common pipistrelles being recorded foraging over the North Site Reservoir and, in particular, over the areas of open water in the former tip/containment area in the west of the site (Box 7, Figure 16.2a). Noctules were also recorded flying in the vicinity of these water bodies on a number of occasions.

16.5.51 The areas of species-rich grassland, and to a lesser extent the wetter areas in and around the tank bases, also provided a focus for foraging bats, predominantly common pipistrelles and to a lesser extent soprano pipistrelles, noctules and *Myotis* species. The grasslands of particular value appeared to be those on the site of the old tank bases in the south-east of the site (particularly those at the northern end of Box 12), and the large area of grassland and associated dry heath in the middle of the site (Box 6).

16.5.52 Of particular value for foraging bats, particularly pipistrelle species, appeared to be the areas of tall scrub and woodland blocks, in particular those along the railway line at the western edge of the site (between Boxes 5 and 6, Figure 16.2a), the track running in a north-east, south-west alignment in the south of the site (i.e. the western edge of the area indicated by Box 12), and the tree-lined track along the northern edge of the containment area (Box 7). These particular habitat features, together with the woodland areas at the southern boundary of the refinery (Boxes 10 and 12), also appeared to be of value for commuting bats, notably pipistrelle species and, on a few occasions, noctules, natterer's and myotis species.

16.5.53 A number of foraging and commuting routes were identified along the route of the proposed Southern Access. The canal and the open strip within the wet woodland (Box 5, Figure 16.2b) represented particularly valuable foraging habitat, and a number of pipistrelles and myotids were also recorded foraging along the northern edge of the SAC woodland. The track that runs alongside the refinery fence (to the north of the woodland indicated by Box 1) also represented a valuable foraging and commuting route. The habitats to the east of the proposed new road were of limited value, and no bats were recorded flying over this hillside. Again, no horseshoe bats were recorded during these surveys.

Badgers

16.5.54 The badger population within the application boundary does not appear to be significant. Within the refinery fence, the majority of the badger activity is focussed in the south-eastern corner of the site (Box 12, Figure 16.2a), where the woodland and scrub habitats border large areas of farmland dominated by grazed pasture. Two small 'outlying' setts were identified in this area as well as a dung pit, several paths and two crossing points under the refinery fence. A further small 'outlying' sett was recorded in the far north of the site (Box 1).

16.5.55 A former 'main' badger sett was identified along the proposed Southern Access, on the steep hillside covered in grazed Sessile Oak and Bracken (Box 4, Figure 16.2b). Very few obvious paths were present, suggesting low levels of activity, and that the sett is probably now being used sporadically as a 'subsidiary' sett or as a 'main' sett by a declining social group. The sett had nine entrances, comprising one well-used, three partially-used and five disused entrance holes. There is the potential for a further ('annexe') sett to be present within an area of gorse to the south of the former 'main' sett; however, no paths into the scrub were visible, and therefore the presence of a sett is considered unlikely. A number of semi-improved grassland fields to either side of the proposed route of the Southern Access appeared to represent potential badger foraging habitat, but few signs of badger activity were recorded.

Otters and Water Voles

16.5.56 Signs of otters were recorded along the Tennant Canal (Box 7, Figure 16.2b), although no holt sites were found. No signs of water voles were recorded, neither along the canal, nor within the swamp (Box 5), nor the areas of marshy grassland near to the derelict farm (Box 2), although the canal and the areas of swamp did represent potentially valuable habitat for this species.

16.6 Assessment of Nature Conservation Importance

General Overview

- 16.6.1 An important feature of the application area is the wide variety of different habitats that have developed, particularly within the refinery fence, including species-rich grassland, heathland, scrub, woodland and aquatic habitats. The full range of habitat succession is represented, from areas of concrete and bare soil through to mature oak and birch woodland, and this has provided habitat for a large number of species (notably diverse assemblages of birds and invertebrates).
- 16.6.2 Lesser horseshoe bats, great crested newts and otters are all protected under the Wildlife & Countryside Act (1981, and amendments) (WCA) and under the EC Habitats Directive (as enacted in the UK under the Conservation (Natural Habitats &c.) Regulations, 1994), and are also listed as Priority Species in the UKBAP and the Neath Port Talbot local BAP. They are also listed as species of principal importance for biodiversity in Wales, under Section 74 of the CRoW Act (2000). Lesser horseshoe bats may forage over much of the site, and are certainly using a number of the refinery buildings as places of shelter. Great crested newts breed in the triangular pond in the centre of the site, and are likely to hibernate and forage in suitable habitats within a radius of up to 500m from the pond (although the majority will be within 250m). However, no additional populations of this species were found to occur within the wider environs of the refinery, thus the origins of this population are unclear. Otters are known to use the Tennant Canal.
- 16.6.3 Common lizards, which are also given some protection under the WCA, are also known to occur over much of the application area, and this is likely to represent a locally important population of this species. Grass snakes, slow worms and adders are similarly protected, and have also been recorded in certain habitats within the application boundary
- 16.6.4 A large number of bird species, including at least five UKBAP Priority Species, have been recorded within the boundaries of the refinery. The relatively large numbers and diverse assemblage of birds that the site supports are likely to be due to a combination of the wide variety of habitats available and the currently low levels of human disturbance (both within the refinery and in the farmland to the south). The lack of disturbance over much of the site, with certain areas (particularly in the south of the refinery) barely visited by refinery staff since decommissioning, is likely to be a key factor in its value for birds.
- 16.6.5 One UKBAP Priority Species of invertebrate, the double line moth, was recorded during the invertebrate surveys. This species is largely restricted to wet grassland habitats in Devon, Cornwall and south-west Wales, and has recently been recorded from only four other sites in Neath Port Talbot. The site overall supports a very diverse invertebrate fauna, and this is again likely to be due to the variety of habitats present, as well as to the close proximity of the Crymlyn Bog SAC. A number of other invertebrates of particular conservation importance were recorded, including two Red Data Book species (i.e. they are known from fewer than 15 10km squares in the UK) and eight that are nationally notable/scarse (i.e. they are known from between 15 and 100 10km squares). The most valuable sites for invertebrates were the large mosaic of woodland, grassland and heathland in the south-eastern corner of the site (see Box 12 on Figure 16.2a), the areas of species-rich grassland in the south-western corner (Box 11), and the heathland/grassland habitats on the hillside in the centre of the site (Box 6).

Assessment of Nature Conservation Value

- 16.6.6 In order to undertake a meaningful assessment of nature conservation importance, the ecological resources of the refinery site and the surrounding area have been classified into readily identifiable ecological sub-units based on the results of the extensive survey work carried out over the last seven years (see Appendices 16.1 and 16.2).
- 16.6.7 The most obvious, and clearly the most important, of these units is Crymlyn Bog. This site is designated a Special Area of Conservation (SAC) (incorporating Crymlyn Bog SSSI, and Pant-y-Sais SSSI), is also designated a Wetland of International Importance under the Ramsar Convention, and nearly half (114 ha) has been declared a National Nature Reserve. It is therefore considered to be of 'international' importance.
- 16.6.8 As part of the initial, detailed ecological assessment of the site (see Appendix 16.A) a number of key areas, or 'zones', within the refinery site were identified as representing separate ecological units of particular nature conservation importance. These zones (which equate in part to the areas indicated by the summary text boxes on Figure 16.2a) are illustrated in Figure 16.3 and are described and assessed below, along with the remaining areas of habitat both within the refinery fence and along the corridor of the proposed Southern Access route.
- 16.6.9 Two areas of wet woodland, a Priority Habitat in both the UKBAP and the Neath Port-Talbot local BAP (and a Section 74 habitat of principal importance for biological diversity in Wales), occur on the western and north-western boundaries of the refinery site (see Zone 1 on Figure 16.3). These both represent reasonable areas of important BAP habitat (with the area beneath the railhead being of particular value because of its important bryophyte flora), and both also provide an important natural buffer between the refinery and the SAC. A detailed evaluation of the nature conservation importance of Zone 1 on the basis of the criteria/guidelines presented in Ratcliffe (1977) ⁽⁶⁾ and Treweek (1999) ⁽⁷⁾ is provided in Appendix 16.A. According to the Glamorgan assessment criteria for Sites of Importance for Nature Conservation (SINC), Zone 1 would be considered a candidate for SINC status on the basis of: (i) the presence of more than 0.5 Ha of 'semi-natural carr woodland'; and (ii) its role as an important buffer to the Crymlyn Bog SAC.
- 16.6.10 In combination, therefore, these two areas of wet woodland would be classified as being of 'County/Unitary Authority' importance for nature conservation.
- 16.6.11 Zone 2 comprises a hilltop of species-rich dry grassland skirted by a hillside dominated by Heather. The heathland habitat (which is a Priority Habitat in both the UKBAP and the Neath Port-Talbot local BAP, and also a Section 74 habitat) is considered to be the most valuable area within the application boundary for reptiles. It was also found to contain a rare (RDB3) rove beetle not previously recorded in Wales, while the grassland supported a diverse invertebrate fauna, including three nationally scarce species. A detailed evaluation of nature conservation importance, as above, confirmed that Zone 2 would also be considered a candidate for SINC status. This is on the basis of: (i) the presence of more than 0.5 Ha of 'degraded and secondary heathland and/or grass-heath communities', and (ii) the presence of Red Data Book and nationally scarce species of invertebrates.
- 16.6.12 This zone is therefore classified as being of 'County/Unitary Authority' importance for nature conservation.

- 16.6.13 Zone 3, which occupies the south-western corner of the refinery site, comprises a large mosaic of habitats including mature oak woodland, species-rich dry grassland and scrub. It represents an important natural buffer between the refinery and the SAC and other valuable habitats to the south and west of the site. The area supports a diverse invertebrate fauna, including at least two nationally notable/scarse species, and is also an important area for reptiles, birds and bats. According to the Glamorgan SINC assessment criteria, Zone 3 would be considered a candidate for SINC status on the basis of at least three features: (i) the presence of more than 0.5 Ha of 'undegraded semi-natural woodland dominated by Oak; (ii) the presence of nationally scarce species of insects; and (iii) its role as an important buffer to the Crymlyn Bog SAC.
- 16.6.14 This zone is therefore also classified as being of 'County/Unitary Authority' importance for nature conservation.
- 16.6.15 Zone 4 comprises a large, west-facing expanse of wooded hillside interspersed with areas of heathland, grassland and scrub. A proportion of the woodland, towards the bottom of the slope, is classified wet woodland. The area supports a diverse invertebrate fauna, including a rare horse fly (RDB3) and at least five nationally notable species, and is also an important area for bats, reptiles and birds. Zone 4 would be considered a candidate for SINC status on the basis of at least three features: (i) the presence of more than 0.5 Ha of 'undegraded semi-natural woodland.. dominated by Oak..'; (ii) the presence of more than 0.5 Ha of 'degraded and secondary heathland and/or grass-heath communities'; and (iii) the presence of nationally scarce species of insects.
- 16.6.16 The triangular pond located in the centre of the site (red Target Note 15, Figure 16.2a) is one of the most important habitat features within the refinery fence, and is marked in red on the constraints plan. The pond itself supports a breeding population of great crested newts, as well as the RDB3 caddis fly *Tricholeiochiton fagesii* and the Notable B dragonfly *Brachytron pratense*, and is surrounded by a narrow band of scrubby heathland. The areas of grassland, wetland and scrub habitat in the vicinity of the pond are likely to be the most important areas of foraging and hibernation habitat for great crested newts, and together these features represent Zone 5 on Figure 16.3. However, much of this area currently comprises cleared ground or hard standing following decommissioning of the site. Because of the newt population, the pond and its surroundings would also qualify for SINC status. Great crested newts are relatively uncommon in the local area, and, given the small size and relative isolation of the Llandarcy population, the risks of stochastic extinction appear to be high and the population is likely to be on the margins of viability.
- 16.6.17 Zone 5 is therefore also classified as being of 'County/Unitary Authority' importance/sensitivity.
- 16.6.18 Throughout much of the rest of the site, areas of scrub and relatively species-rich grassland have developed on the thin soils. Although very much typical brownfield environments, these habitats have been found to be of some local importance for their populations of invertebrates, reptiles and birds, and would therefore, particularly because of the large scale of the site, be considered to be of 'local' importance for nature conservation.
- 16.6.19 The remaining areas of the refinery site generally comprise bare ground, hard standing, disused buildings and contaminated water bodies, and these would normally be considered to be of negligible nature conservation value. However, some of the areas of bare ground and hard standing provide potential nesting habitat for lapwings, while a number of the buildings have also been found to provide temporary

shelter for night-roosting bats, as well as nesting sites for birds. These features would therefore be considered to be of 'negligible to local' value for nature conservation.

- 16.6.20 The small areas of wet woodland and marshy grassland within the corridor of the proposed Southern Access route (outside of Crymlyn Bog SAC) were considered to be of some intrinsic nature conservation value. In addition, these areas were found to be of some value to birds, reptiles and invertebrates (particularly moths, including the double line moth, a UKBAP priority species). However, the habitats are relatively small and degraded (largely through over-grazing), so these features would therefore be considered to be of 'local' value for nature conservation.
- 16.6.21 Finally, the remainder of the corridor of the proposed Southern Access generally comprises common and widespread habitats, such as improved/species-poor semi-improved grassland, bracken and scattered scrub. These areas are therefore considered to be of no more than 'negligible' nature conservation importance.
- 16.6.22 These various zones and features are listed in Table 16.4 along with the importance/sensitivity category assigned to each one.

Table 16.4 Summary Assessment of Nature Conservation Importance

Receptor	Importance/ Sensitivity
Crymlyn Bog SAC	International
Zone 1 - Wet woodland on the western and north-western boundaries of the refinery site	County/Unitary Authority
Zone 2 – Heathland hillside and species-rich grassland within the centre of the refinery site	County/Unitary Authority
Zone 3 – Mosaic of oak woodland, heathland, scrub and species-rich grassland on the south-western boundary of the refinery site	County/Unitary Authority
Zone 4 - Mosaic of oak/wet woodland, heathland, scrub and species-rich grassland in the south-eastern corner of the refinery site	County/Unitary Authority
Zone 5 – Great crested newt pond and foraging habitat	County/Unitary Authority
Areas of scrubby grassland and other regenerating habitats throughout the refinery (including their resident reptile and invertebrate populations)	Local
Remaining areas of bare ground, hard standing, buildings and contaminated water bodies within the refinery site	Negligible/Local
Areas of wet woodland and marshy grassland within the corridor of the proposed Southern Access route (outside of Crymlyn Bog SAC)	Local
Remaining features within the corridor of the proposed Southern Access route (mainly improved, or species-poor semi-improved, grassland, but including reptile and bird assemblages)	Negligible/local

16.7 Future Trends without the Project

Ecological Trends

- 16.7.1 The current ecological trend across much of the site is of natural succession, from bare ground to grassland/ephemeral herbs, and then to scrub and finally woodland, which is typical of such areas of former industrial land. As buildings and tanks are demolished, and areas are cleared, the resultant patches of bare ground, hard-standing and rubble are gradually becoming recolonised. In many areas, particularly where a thin soil has developed (such as on the former tank bases), a combination of grasses and low-growing ruderal herbs has developed into a relatively species-rich grassland. In other areas, often where rubble and areas of degraded hard standing are present, scrub is beginning to become established. Scrub is now also starting to invade the more established habitat areas, such as the heathland and species-rich grassland. Birch and Buddleia are the most vigorous of the colonising species, and it is likely that these will become dominant throughout much of the site over the next ten to twenty years.

The Do-Nothing Scenario

- 16.7.2 The do-nothing option would result in the majority of the site being left in its existing post-demolition condition for an indeterminate amount of time, such that the natural succession described above would continue.
- 16.7.3 It is anticipated that there would be some negative and some positive ecological effects associated with such a scenario. Clearly, if the site were not to be developed, large areas of habitat that would otherwise be lost under the footprint of the development would be retained. However, it should be emphasized that most of habitat due to be lost comprises existing hard standing, and that the Masterplan for the scheme has specifically been designed with the intention of retaining the majority of the valuable habitat. Nevertheless, even those areas that are currently of relatively low nature conservation value would, in time, develop into scrub and eventually woodland.
- 16.7.4 Furthermore, without development the site would also remain a very large area of undisturbed habitat, allowing sensitive and more reclusive species, particularly birds, to thrive. Without artificial lighting, it is also likely that the site would become more attractive to those species of bats that tend to avoid well-lit areas, in particular horseshoe bats and long-eared bats.
- 16.7.5 Conversely, if the site were to be left alone with no human intervention, a number of the habitats present with the refinery fence would lose value over time without some form of management. For example, two of the more important habitats on site, heathland and species-rich grassland, are currently in the process of being invaded by scrub. Without active scrub management, these features would eventually disappear, along with the species associated with them, particularly invertebrates, reptiles and birds (including lapwings). A crucial feature of the site is the mosaic nature of the habitats, and this intimate juxtaposition of grassland, bare ground, heathland, scrub and woodland has contributed in large part to the wide variety of species present. Without intervention, habitat diversity would reduce significantly.
- 16.7.6 In addition, the creative conservation measures proposed in Section 16.10, in particular the creation of large areas of valuable wetland habitat, would not take place. These wetland areas would represent an extremely valuable extension to the SAC, and would be of value to a wide range of species, including wildfowl and

waders, reed buntings and reed warblers, otters, water voles, grass snakes and great crested newts. Currently, the great crested newt population is confined to one small water body, the triangular pond in the centre of the site. Without the creation of an extensive network of new ponds, the carrying capacity of the site for this species is limited, and the population may even not be viable in the longer term, as it is small enough to be vulnerable to stochastic extinction.

- 16.7.7 Finally, without the development remediation strategy, contamination of the soil and groundwater would persist both within the refinery site and in ecologically valuable off-site receptors (particularly Crymlyn Bog). This could lead to a long-term suppression of species diversity (particularly pollution-intolerant species) in those areas most seriously affected. It is likely that less contaminated parts of the site would bio-remediate (i.e. without the need for human intervention) over a shorter time scale (see Section 4 for a detailed assessment of contamination issues under the Do-Nothing Scenario).

16.8 Predicted Impacts during Construction

Avoidance of Impacts through the Master planning Process

- 16.8.1 The potential impacts associated with construction of the scheme were substantially avoided/reduced from the outset of the project through the deliberate use of ecological information in the design of the Masterplan. Detailed ecological surveys were undertaken early in the process in order to identify the most important features at the site to allow their conservation. The results of this survey work were used to inform production of an ecological constraints plan for both the refinery site and the proposed Southern Access (see Figures 16.4a and 16.4b, respectively).
- 16.8.2 The areas marked in red on the constraints plans (Figures 16.4a and 16.4b) are the most valuable and ecologically sensitive, and were therefore considered to represent the greatest constraint to the remediation and re-development of the application area. The majority of these areas comprise habitats listed in the UKBAP as Priority Habitats; although these habitats are not legally protected, the presumption against their development has been strengthened through the Countryside and Rights of Way (CRoW) Act (2000) and the planning process. Some of the red areas were also selected on the basis of the presence of protected species (e.g. great crested newts in the triangular pond). Wherever possible, the red areas were deliberately retained intact and, where appropriate, will be enhanced as mitigation for losses elsewhere within the site (see Section 16.9, below).
- 16.8.3 Orange areas comprise habitats that are not classified as UKBAP Priority Habitats but which are of some nature conservation importance, not least because of the diversity of species they support (particularly invertebrates, reptiles and birds). Many of these areas would benefit from improved management to increase their value. This includes areas of potentially valuable grassland that would benefit from an appropriate grazing/cutting regime, and habitats that are currently becoming degraded by the development of scrub (in particular, gorse and birch scrub).
- 16.8.4 Much of the remainder of the site represents habitat that is of limited intrinsic nature conservation value but which may be of importance to reptiles, birds and a range of more common species. Impacts of development on these areas (marked in yellow on Figure 16.4a, b) are unlikely to be significant, although some mitigation will be required. This includes: capture and re-location exercises for reptiles (and possibly great crested newts) prior to site clearance, followed by destructive searching of habitat; the removal of potential bird nesting habitat outside of the breeding season; and the provision of habitats and features within the landscaping proposals that would