

8 ARCHAEOLOGY AND HISTORIC LANDSCAPE

8.1 Introduction

- 8.1.1 Glamorgan-Gwent Archaeological Trust's Projects Division have been commissioned to undertake an assessment of the impact of the proposed development upon the archaeological resource and historic landscape (ASIDOHL2), which forms the present chapter of the Environmental Impact Assessment (EIA).

8.2 Policy and Legislation

ASIDOHL2

Register of landscapes of outstanding historic interest in Wales

- 8.2.1 In 1998, after an extensive consultation exercise, Cadw in association with the Countryside Council for Wales (CCW) and the International Council on Monuments and Sites (ICOMOS UK), published Part 2.1 of its *Register of Landscapes of Outstanding Historic Interest in Wales* (Cadw/CCW/ICOMOS 1998). This volume forms part of a series of publications, collectively known as the *Register of Landscapes, Parks and Gardens of Special Historic Interest in Wales*. The first part of the Register (Part 1) deals with historic parks and gardens, and is being produced in a series of county volumes. Part 2, which deals with landscapes, has been published in two volumes covering all of Wales. The first of these volumes (Part 2.1) covers the Landscapes of Outstanding Historic Interest; the second (Part 2.2) deals with landscapes of more regional value (Landscapes of Special Historic Interest).

The historic landscape

- 8.2.2 In addition to any direct effects of the proposal on known and potential archaeological sites, the development has the potential to affect the historic landscape in general and the area of the Historic Landscape of Merthyr Mawr, Kenfig and Margam Burrows (HLW (MGI) 1) in particular. Recently updated guidance outlined a methodology for assessing the indirect and visual effects of proposals on the historic landscape (ASIDOHL2). The present study of the effects of the proposed development was undertaken according to this methodology. What follows in Section 8 is a summary of the ASIDOHL2 process; the full details appear as a Technical Annex within the Guide to good practice on using the Register of Landscapes of Historic Interest in Wales in the planning and development processes, Revised (2nd) edition including revisions to the assessment process (ASIDOHL2) (Cadw/CCW/Welsh Assembly 2007).

Welsh Historic Landscapes and Historic Landscape Character Areas

- 8.2.3 The Welsh landscape is steeped in history and displays the influence of man from later prehistoric times through to the industrial era. Some landscapes are of especial historic significance, and in recent years this fact has been recognised by the identification of 58 areas as being key Historic Landscapes. These are described within the *Register of Landscapes of Outstanding Historic Interest in Wales* (Cadw/CCW/ICOMOS 1998) and the *Register of Landscapes of Special Historic Interest in Wales* (Cadw/CCW/ICOMOS 2001).
- 8.2.4 Recent historic landscape characterisation projects across Wales have sought to describe in

detail the Historic Landscapes. Each project involves detailed examination of the landscape; on the basis of which analysis, the Historic Landscape is divided into a number of Historic Landscape Character Areas (HLCAs). Each HLCA is a discrete entity, defined according to archaeological and historical attributes, or by cultural associations, which distinguish it from adjacent areas; HLCAs take diverse forms, ranging from Bronze Age funerary zones to recent industrial landscapes, from unenclosed upland to densely populated settlements.

8.2.5 Historic Landscape Characteristics are the tangible evidence for the activities and habits of past land users and occupiers and reflect their beliefs, attitudes, traditions and values. Such characteristics might equally reflect specific events or functional evolution over time. Historic Landscape Characterisation sets out to establish the historic depth of past human activity within the modern landscape by identifying its principal historic components. In establishing the historical characterisation of landscapes, recent work in Wales has suggested that adopting a practical approach based on subdivision of the overall historic landscape into sub-units of broadly homogenous character is an effective method. This process can be summarised as:

- One (or more) components dominant pattern
- One (or more) dominant patterns coherent character
- Coherent character (with definable limits) character area (HLCA)
- Several HLCAs local landscape

8.2.6 HLCAs form the basic unit assessed within the ASIDOHL2. As discussed below, the contribution of each HLCA to the wider Historic Landscape (and thus its value in ASIDOHL2 terms) is variable: some are key elements, whilst others are only of incidental importance. Each HLCA directly or indirectly affected by the proposed development is assessed individually within Stages 2-4 of ASIDOHL2. In Stage 5 the results of Stages 2-4 are combined to produce an assessment of the overall impact on the Historic Landscape described by the *Register*.

Historic landscapes and the planning process

8.2.7 The *Register* seeks to promote policies to preserve the character of historic landscapes, although it imposes no additional planning controls and recognises that continuing development is a necessary part of a living landscape. Nevertheless, historic landscapes remain a factor in the planning process:

‘When Environmental Assessment is necessary, the Town and Country Planning (Assessment of Environmental Effects) Regulations 1988 require, amongst other things, the significant effects of the development on the landscape and cultural heritage to be assessed. ... Factors that need to be borne in mind include the effect of the development on the overall historic integrity and coherence of the area on the Register, whether by outright removal, severance, fragmentation, or dislocation of historic elements. The cumulative effects of secondary or piecemeal changes over time should also be taken into account.’

(Cadw/CCW/ICOMOS 1998)

8.2.8 Similarly, the most recent guidance given to planning authorities states that:

‘Information on the landscapes on the second part of the Register should also be taken into account by local planning authorities in preparing UDPs (Unitary Development Plans), and in considering the implications of developments which are of such a scale that they would have more than local impact on an area on the Register.’

Planning Policy Wales (March 2002, Para. 6.5.23)

Historic landscapes and the planning process

8.2.9 The development area lies within the Merthyr Mawr, Kenfig and Margam Burrows historic landscape included within the Cadw/CCW/ICOMOS *Register of Landscapes of Outstanding Historic Interest in Wales*. *Planning Policy Wales (2002)* states that “*Information on the landscapes on the second part of the Register should be taken into account in considering the implications of developments which are of such a scale that they would have a more than local impact on an area on the Register*”.

8.2.10 The guidance emphasises the interaction between different aspects of impact, including landscape and the archaeological heritage, requiring an Environmental Statement to include a description of “the likely significant effects of the development on the environment, which should cover the direct effects and any indirect, secondary, cumulative, short medium and long-term, permanent and temporary effects ... and the description by the applicant of the forecasting methods used to assess the effects on the environment.” In the Register, guidance has been given on the approach to fulfilling this requirement in relation to historic landscapes where effects to be assessed include “the effect of the development on the overall historic integrity and coherence of the area on the Register.” This guidance has been amplified in *Guide to Good Practice on Using the Register of Landscapes of Historic Interest in Wales in the Planning and Development Process*.

8.2.11 Merthyr Mawr, Kenfig and Margam Burrows have been selected as a landscape of outstanding historical interest for (principally) one out of five potential criteria (Cadw/CCW/ICOMOS 1998):

- (4) Buried/Subsumed or destroyed
- Landscapes whose past use may usually only be inferred by historical (documentary) or archaeological (remote or intrusive) methods of investigation.

8.3 Assessment Methodology and Criteria

8.3.1 The assessment comprises a review of existing information about the archaeological resource of an area of 225 hectares on which the Island Farm development is located. The study area is centred on NGR SS 86926 78134 and is outlined in green in Figure 19, Areas of Archaeological Interest. The assessment is intended to conform to the *Institute for Archaeologists’ Standards in British Archaeology: Archaeological desk-based assessments*.

8.3.2 Information recorded on the regional Historic Environment Record and National Monuments Record was assessed. Cartographic, pictorial and documentary sources were studied, along

with relevant published information. Current Listed Building data and information on Scheduled Ancient Monuments and registered landscapes was obtained from Cadw. Collections of aerial photographs held by the Central Register of Air Photography for Wales were examined and additional information requested from the Royal Commission on the Ancient and Historical Monuments of Wales. A site visit was made on 7th of August 2009

Assessment criteria

- 8.3.3 The archaeological sites within the study area are categorised in accordance with the only available criteria that are nationally agreed; these are set out in the Department of Transport/Welsh Office/Scottish Office Design Manual for Roads and Bridges paragraph 3.4 Vol. 11 Section 3 Part 2 (Cultural Heritage).
- Category A: national importance
 - Category B: regional importance
 - Category C: local importance
 - Category D: low importance
- 8.3.4 To these an additional category has been added
- Category U: unknown
- 8.3.5 The assessment of the **importance** of individual sites is essentially a subjective exercise based upon the experience of the project team. The importance of certain sites will be implied by their status within the statutory framework. Scheduled Ancient Monuments will always be of national importance; Listed Buildings will be of at least regional importance. Values assigned to other sites are given both in relation to their individual importance and to their context within the wider landscape.
- 8.3.6 The **condition** of individual sites and the general overall condition of surviving remains has bearing on the value of the sites themselves and on the value that they impart within a wider landscape context. The condition of sites is recorded following the system used by the GGAT HER, using the following criteria:
- Intact: the site is intact
 - Near intact: the site is nearly intact
 - Damaged: the site has been moderately damaged
 - Near destroyed: the site has nearly been destroyed
 - Destroyed: the site has been destroyed
 - Restored: the site has been restored
 - Moved: the site has been moved (usually finds)
 - Not known: the condition of the site is not known

8.3.7 For the purposes of desk-based assessments, **rarity** is assessed at regional level only. The following criteria are used:

- High: very few sites of this type are known
- Medium: the site is not unusual, but cannot be considered common
- Low: the site is quite common

8.3.8 **Group association** is where a connection between sites within the landscape can be demonstrated. These will usually be of the same period, but may include groups where the presence of an earlier site or sites has led to the formation of a later complex, or where an earlier site or sites can be shown to have acquired importance as part of a later complex. The criteria are as follows:

- High: the site forms part of an interconnected complex occupying a clearly definable landscape where little or no fragmentation has occurred
- Medium: the site is part of an interconnected complex, which is either limited in scope or badly fragmented
- Low: there are few or no other sites, which are associated

8.3.9 **Historical association** is where there is a link between the site and known historical or cultural persons or events. Prehistoric sites, which are by definition before historical evidence, cannot have any contemporary historical association, but they may acquire later associations. For the Roman and Early Medieval periods, where survival of historical evidence is poor and patchy, any contemporary documentation at all will be important. Two classifications are given for historical association, one reflecting the certainty of the identification, and the other its importance. Only sites with certain or possible association can be assessed for importance, and historical association can only increase the importance of a site; the absence of it will never decrease its importance.

Historical association- identification

- Certain
- Possible
- Unknown

Historical association- importance

- High
- Medium
- Low

8.3.10 The assignment of values to identified interests requires consideration of the reliability and

accuracy of the source data, ranging from fully-recorded features seen in open excavation to antiquarian comments on finds of note from a poorly-defined location. The **confidence** with which the values have been assigned is noted, using the following criteria:

- High: existing information is reliable and detailed
- Medium: existing information is apparently reliable but limited in detail
- Low: existing information is too limited to allow its reliability to be assessed

8.3.11 The **effect** of the proposal on the archaeological resource has been assessed using the following criteria:

- Severe: total loss
- Major: significant loss, likely to result in a reduction of value of the surviving site
- Minor: loss unlikely to result in a reduction of value of the surviving site
- None: no identifiable effect
- Beneficial: development will protect, preserve or enhance the site better than if the development did not occur

ASIDOHL Assessment Methodology

The Guidelines

8.3.12 Guidelines setting out a suggested methodology for historic landscape assessment have been produced by Cadw and CCW, in consultation with the Welsh Archaeological Trusts (Cadw/CCW/Welsh Assembly 2007).

Summary of ASIDOHL2 stages

8.3.13 ASIDOHL2 is structured into five stages, summarised in the table below. A concluding statement follows the final stage.

Table 8.1: the ASIDOHL2 process

Stage 1	Compilation of an introduction of essential, contextual information
Stage 2	Description and quantification of the direct, physical impacts on the HLCAs affected
Stage 3	Description and quantification of the indirect impacts on the HLCAs affected
Stage 4	Evaluation of the relative importance of the parts of the HLCAs affected by development in relation to: the whole of the HLCA concerned the whole of the Historic Landscape the national context

Stage 5	Assessment of the overall significance of development, and the effects that altering the HLCAs concerned has on the whole of the Historic Landscape
----------------	---

Quantification of results

- 8.3.14 ASIDOHL2 Stages 2 - 4 involve a grading and scoring process, by which figures can be offered for the direct and indirect impacts, and for the relative importance of the HLCAs (and their individual components) within a local and national context. Leading from this, a similar grading process is followed in Stage 5, producing a single figure for the overall significance of the impact of the proposed development. It is noteworthy that the ASIDOHL methodology as it presently stands cannot lead to the expression of positive benefits of a development, the range of impacts being graded from Very Severe to Very Slight.
- 8.3.15 The basic grading and scoring criteria are reproduced in the tables below. The formulae and working processes leading to the final scores for Stages 2-5 are not replicated here, for they are unnecessary for all but the most specialist reader of this report. The full methodology can be found in the Technical Annex described above (Cadw/CCW/Welsh Assembly 2007).

The ASIDOHL2 Stages

Stage 1: Contextual information

- 8.3.16 The first stage is to gather essential contextual information that forms the introduction to the report. In addition to information such as the planning history, necessary issues such as the historical background to the area are addressed within the early pages of the present report.

Stage 2: Direct effects

- 8.3.17 Direct physical impacts are quantified and expressed in three ways, namely:
- (a) *in absolute terms, expressed as a percentage of the area of land that is directly affected*
 - (b) *in relative terms, expressed as a percentage of key elements that are directly affected*
 - (c) *in landscape terms, expressed by statements concerning the extrinsic value of elements that are directly affected*
- 8.3.18 Table 8.2, on the following page, shows the criteria for assessing the magnitude of the direct physical impacts of a proposed development on an historic landscape in absolute and relative terms – steps (a) and (b) above.

Table 8.2: Criteria for assessing the magnitude of direct physical impacts on elements of an HLCA

75-100%	permanently lost or removed	Very severe
50-74%	permanently lost or removed	Severe

30-49%	permanently lost or removed	Considerable
15-29%	permanently lost or removed	Moderate
5-14%	permanently lost or removed	Slight
1-4%	permanently lost or removed	Very Slight

8.3.19 The intrinsic importance or status of each element or characteristic affected should also be briefly described, recorded together with a statement of intrinsic importance or status using the categories adopted by the Welsh Archaeological Trusts (that extend those as set out in the Department of Transport/Welsh Office/Scottish Office Design Manual for Roads and Bridges paragraph 3.4 Vol. 11 Section 3 Part 2 (Cultural Heritage):

- Category A: national importance
- Category B: regional importance
- Category C: local importance
- Category D: low importance
- Category U: unknown

8.3.20 Table 8.3 shows the criterion for expressing the magnitude of the direct effects of a proposed development in landscape terms – step (c) above. This aspect is considered in two stages. First, the value of each affected element to the HLCA is assessed. Second, the effect of the loss (or partial loss) of that element or characteristic to the HLCA is considered; for example, how much does the loss of element X (or part thereof) diminish the value of Y as a landscape?

Table 8.3: Criteria for assessing the magnitude of direct effect on landscape value

Element – value to the HLCA	Landscape value Effect
Very High	Lost
High	Substantially Reduced
Considerable	Considerably Reduced
Medium	Moderately Reduced
Low	Slightly Reduced
Very Low	Very Slightly Reduced

8.3.21 Key to the ASIDOHL2 process is its scoring system, by which the overall magnitude on an HLCA can be expressed, detailed in Table 8.4 below. The scores for each affected element are added together and then the total averaged. To this mean figure is added the score for the magnitude of absolute impact (the total area of the HLCA to be affected). This produces a final figure, which provides a measure of the overall magnitude of direct, physical impacts.

Scores are then graded against the 28-point scale shown in Table 8.5.

Table 8.4: Direct physical impacts: grades and scores

Impacts and element sensitivity	Score
Direct physical impacts – absolute	
Very Severe	6
Severe	5
Considerable	4
Moderate	3
Slight	2
Very Slight	1
Direct physical impacts – relative	
Very Severe	6
Severe	5
Considerable	4
Moderate	3
Slight	2
Very Slight	1
Site Category	
A	4
B	3
C	2
D	1
U	1
Direct physical impacts – landscape value	
Very High	6
High	5
Considerable	4
Medium	3
Low	2
Very Low	1
Landscape value effect	

Lost	6
Substantially Reduced	5
Considerably Reduced	4
Moderately Reduced	3
Slightly Reduced	2
Very Slightly Reduced	1

Table 8.5: Overall magnitude of direct physical impacts

Score	Grading
24-28	Very Severe
19-23	Severe
14-18	Considerable
9-13	Moderate
4-8	Slight
0-3	Very Slight

Stage 3: Indirect effects

8.3.22 Indirect physical effects are classified by ASIDOHL2 as physical and visual.

8.3.23 Indirect physical effects are categorised as:

(a) *An increased risk of exposure, erosion, disturbance, decay, dereliction or any other detrimental physical change to elements, during or consequent to development.*

(b) *Related to (a), the likelihood of increased management needs to maintain elements as, for example, through altered habitats, water levels, increased erosion, new access provision, etc., during or consequent to development.*

(c) *The severance, fragmentation, dislocation or alteration of the functional connections between related elements, for example, a field system becomes 'severed' from its parent farmstead by an intervening development.*

(d) *The frustration or cessation of historic land use practices, for example, it becomes more difficult or impossible to manage an area in a traditional manner as a result of development.*

(e) *The frustration of access leading to decreased opportunities for*

education, understanding or enjoying the amenity of elements, during or consequent to development.

8.3.24 Indirect (non-physical) visual effects are categorised as:

(a) Visual impact on elements from which a development can be seen (considered up to its maximum height). Impacts can be on 'views to' or 'views from' elements, and should be assessed with particular reference to key historic viewpoints and essential settings. These should be considered in relation to a site's original character and function, as well as to the vantage points and visual experience of a visitor today. In some cases, key historic viewpoints may no longer be identifiable, but it may be possible to make reasonable assumptions on the basis of archaeological or historical information. Key viewpoints should also include those that have subsequently become acknowledged as such, for example, as depicted in artists' drawings and paintings, or as features on popular routes or trails.

(b) Impact on the visual connections between related elements, by occlusion, obstruction, etc. For example, an essential line of sight between historically linked defensive sites will become blocked or impaired by an intervening development.

(c) Conversely, the creation of inappropriate visual connection between elements not intended to be inter-visible originally, by the removal of intervening structures, barriers, shelters, screening or ground.

(d) Visual impact of the development itself in relation to the existing historic character of the area, considering:

(i) its form – the scale, number, density, massing, distribution, etc. of its constituent features;

(ii) its appearance – the size, shape, colour, fabric, etc. of its constituent features.

8.3.25 For each category of indirect physical or visual impact the magnitude is graded as Very Severe, Severe, Considerable, Moderate, Slight or Very Slight. The assessment of severity is based on professional judgement rather than on fixed criteria. The magnitudes are scored between 6 and 1, according to the scale for direct physical impacts (shown above in the second row of Table 8.4).

8.3.26 The overall magnitude of indirect impacts are also graded in a similar fashion to the overall magnitude of direct impacts, using the 28-point scale shown in Table 8.5.

Stage 4: Evaluation of relative importance

8.3.27 Stage 4 is concerned with evaluating the relative importance of the part of each HLCA directly or indirectly affected by the development, in relation to:

(a) *the whole of the HLCA*

(b) *the whole of the Historic Landscape*

8.3.28 followed by an evaluation of:

(a) *the relative importance of the HLCA within the national context*

8.3.29 The criterion for determining the relative importance or value of the HLCAs and their component elements are as follows:

- Rarity
- Representativeness
- Documentation
- Group value
- Survival
- Condition
- Coherence
- Integrity
- Potential
- Amenity
- Associations

8.3.30 Each criterion is graded as Very High, High, Moderate, Low and Poor. Criteria values in steps (a), (b) and (c) are scored as shown below in Table 8.6.

Table 8.6: Stage 4 evaluation scores

Criterion value	Score
Very High/ Good	5
High/ Good	4
Moderate/ Medium	3
Low	2
Very Low/Poor	1

8.3.31 These scores enable a figure to be calculated that reflects the relative importance of individual HLCA elements and entire HLCAs in the terms of the immediate Historic Landscape and the national context.

- 8.3.32 The final part of Stage 4 is to determine the average, overall value of all the HLCAs (or parts thereof) affected. This is achieved by combining the scores in steps (a), (b) and (c); once again the calculations are not rehearsed below, but the average overall figure is graded as shown in Table 8.7.

Table 8.7: Stage 4 grades of overall value

Score	Grading
80-100	Very High
60-79	High
40-59	Considerable
20-39	Moderate
5-19	Low
0-4	Very Low

Stage 5: Assessment of overall significance of impact

- 8.3.33 This final stage combines the results of Stages 2 - 4 to produce an assessment of the overall significance of impact of development, and the effects that altering the HLCA (or HLCAs) concerned will have on the whole of the Historic Landscape as identified by the *Register*. This is determined by setting out and scoring the value of the affected HLCAs against the consequent reduction in value caused by the proposed development to the Historic Landscape.
- 8.3.34 Stage 5 summarises the findings from earlier parts of the process by focussing on three specific issues:
- (a) *Impact caused by development (based on Stages 2 and 3 results)*
 - (b) *Value of HLCAs (based on Stage 4 results)*
 - (c) *Reduction of value of the Historic Landscape*
- 8.3.35 Each criterion is graded as Very High, High, Medium, Low or Very Low. Although scoring is used extensively in Stages 2 - 4, it is not recommended that the scores from these stages are directly combined or 'converted' to determine the Stage 5 score. Rather, judgements are based on professional interpretation and judgement; this approach enables the data to be assessed more flexibly, and for significant 'highs' and 'lows' to be considered, rather than merely the average figures. The overall significance of impact score is graded as show below.

Table 8.7: Stage 5 overall significance of impact

Score	Grading
26-30	Very Severe
21-25	Severe
16-20	Fairly Severe
10-15	Moderate
4-9	Slight
0-3	Very Slight

8.4 Baseline Data and Assessment

Walkover survey

- 8.4.1 A walkover survey was conducted on 7th of August 2009. The area was photographed; all sites previously identified from a search of the regional Historic Environment Record and National Monuments Record were visited in order to assess their current condition. A sample of photographs taken illustrating the current condition of the archaeological interests and the site in general can be seen in Volume 3, Appendix 8.1.

General historical background (Figure 19 Areas of Archaeological Interest)

Prehistoric (up to AD43) and Roman (AD43 to 410)

- 8.4.2 There is evidence of human activity in the vicinity of the study area from the Mesolithic period onwards. At Merthyr Mawr Warren, located a short distance to the southeast of the proposed development, recovered artefacts indicate that the site was occupied during the Mesolithic, Neolithic, early Bronze Age (represented by cist graves and tumuli), Iron Age (with evidence of metal working) and medieval periods, and the area is included in the Register of Landscapes, Parks and Gardens of Special Historic Interest in Wales.
- 8.4.3 The excavation of a Neolithic causewayed enclosure at Ewenny (PRN 00404m), less than a kilometre south of the study area, has produced evidence setting the landscape of the area into its environmental and chronological context. There was no evidence for the clearance of mature or ancient wildwood for the construction of the monument, with the landscape appearing to have been cleared for some time, with some secondary regeneration woodland of oak, ash, alder, yew and apple trees as well as shrubs and bushes such as hazel, blackthorn, gorse/broom, and heather. These range of species suggest woodland and woody communities growing on neutral to podzolic soils, and the shrubs (gorse/broom, hazel and heather) tend to confirm a more open sparsely wooded environment, perhaps with mature trees (oak, ash, yew) on the steeper slopes. Within the wider landscape some cultivation of hulled wheat (emmer) occurred, the grains recovered were relatively large and typical of Neolithic assemblages where grain was hand picked (Lewis forthcoming).
- 8.4.4 Other Neolithic monuments found in the area include Coed y Cwm chambered tomb (00369s/Gm116) and Tinkinswood Long Cairn (00374s/Gm09). Tinkinswood is the most

impressive monument of its type in the Vale of Glamorgan and when excavated in the early 20th century was found to be 40m long by 2m high and contained over 50 individuals in a chamber capped by the largest capstone in Wales (weighing 40 tons) (Pearson and Lewis 2003, 7). Bronze Age round barrows are broadly distributed across the Vale of Glamorgan and tend to be sited in elevated positions and those near the coast have fine views out over the estuary, like those at Sully and Dunraven, whilst those inland tend to be grouped into small cemeteries (Lewis and Hudson 2006, 8).

- 8.4.5 The proposed development lies on what is believed to be the alignment of the Roman road from Caerleon to Neath. The route west from Cardiff generally follows the route of the modern A48, although its exact location in the Bridgend area is less clear. It has been suggested that it headed towards Ewenny Priory, crossing the Ewenny and Ogmore Rivers, before again mirroring the alignment of the A48 towards Port Talbot (Hunter 2002).
- 8.4.6 The route of the road between the two rivers is somewhat clearer, as an agger (a cambered earthwork forming part of a Roman road) has been recorded by the RCAHMW in 1983, running from SS 9040 7827 to SS 9020 7834, a distance of approximately 220m. However, these grid references place the feature parallel, but almost 100m to the northeast of the generally accepted line of the road (ID 01016.5w). Therefore, it is suspected that an error in the NGR is responsible for the discrepancy (Sherman and Evans 2004, 24). The regional HER notes that the route of this agger may be extended by two straight field boundaries (IDs 01016.5w and 01016.6w), which have been noted as being different in content and appearances to others nearby. Whilst these two hedges are on a different alignment to that of the agger (see Figure 19 - Areas of Archaeological Interest) this is probably explained by the inaccuracy in the RCAHMW grid references.
- 8.4.7 The Roman fort of *Bomium* is also located in the vicinity, although again its exact location remains unclear. Documentary evidence (in the form of the Antonine Itinerary) places the site somewhere between Caerleon and Neath. However, the historic distances do not match the modern measurements. The Antonine Itinerary, which details distances in Roman miles mp (*mens pedalis*) along roads spanning the Roman Empire, states in *Iter XII* that *Bomium* is situated 15mp from *Nidum* (Neath) and 27mp from *Isca* (Caerleon). The total distances between places described in *Iter XII* do not add up correctly, and attempts have been made to correct the figures given. While in no way conclusive, these studies have suggested that *Bomium* is situated somewhere to the west of the Ewenny River, possibly between it and the Ogmore River.

Early Medieval (410 to 1066)

- 8.4.8 Relatively little is known of the Vale of Glamorgan in the period between the 5th and the 11th centuries AD. Known settlement sites are few, though the defended settlement at Dinas Powys was shown by excavation to have been of a high status site from the 5th to the 7th centuries. In general, excavation has shown that there was a reoccupation of the earlier Iron Age hillforts in a period of political fragmentation and increased security. Early-medieval burials and artefacts have been found at a number of Roman sites suggesting some form of continuity of occupation. Other large burial sites have been found at the Atlantic Trading Estate (Barry) and more recently at Llandough (Penarth) (Lewis and Hudson 2006, 10).
- 8.4.9 References to pre-Norman settlement at Kenfig, such as that in the now partly discredited *Gwentian Brut*, to settlement at Kenfig existing during the 9th century, and traditions that in 1080 Iestyn ap Gwrgan, the last native ruler of *Morgannwg*, had a castle (location as yet

unknown) at Kenfig are compelling (Roberts 2003, 25).

- 8.4.10 The early part of this period was the 'Age of the Saints' and in the Vale, in the late 5th and 6th centuries, tradition places the early Christian monastic communities of St Illtyd at Llantwit Major and St Cadoc at Llanccarfan (Lewis and Hudson 2006, 10). A number of decorated stones carved between the 10th and 12th centuries have been discovered a short distance to either side of the development area at Ewenny Priory and Ogmore. These stones are of a religious nature and possibly indicate the presence of a monastic settlement in this area, which may have been a precursor to the Norman foundation of Ewenny Prior (Maylan 1991, 14).

Medieval (1066 to 1485)

- 8.4.11 A short distance to the southwest of the study area an impressive, moated, masonry castle was established as early 1116 by William de Londres (Ogmore Castle, 00234m/Gm37/93019). Ogmore Castle was built on the southern bank of the River Ewenny at a strategically important tidal ford; the castle was abandoned between the 1530s and 1632 with the exception of the Court House that stayed in use until the early 19th century. A little over a kilometre to the north of Ogmore Castle a further castle (Candleston 00258m/Gm095/LB11230/93050) was constructed. The castle and corresponding manor derive their name from the Cantilupes, who were the first tenants at Candleston after the St Quintins sub-eneffed the site. The standing structural remains at Candleston represent four main periods of masonry building, the most significant being the 12th century tower-house (a lightly fortified manor house, one of only five built in Glamorgan). The site continued in use as a farmhouse until the 19th century.
- 8.4.12 Perhaps the most interesting medieval settlement in the area is that of Kenfig. The church of Maudlam, dedicated to St Mary Magdalane and first mentioned in the mid-13th century documents, has a sub-rectangular churchyard, possibly indicating an early origin, with its original Early-medieval dedication now lost. The strategic and exposed position of the castle borough as the western outpost of the Lords of Glamorgan in the 12th century accounts for its exceptionally full documentary record. Between 1167 and 1321 the Welsh, now confined to the nearby uplands of Margam Mountain, made no less than eight recorded attacks on Kenfig. Both Kenfig Castle and the Church of St James are first mentioned in the period 1135-54. It is clear therefore, that the borough with its recorded church had been founded at the latest by the middle of the 12th century and had been provided with earth and timber defences. In the middle of the 14th century, Kenfig was a substantial borough of perhaps 700-800 persons. 'High', 'East' and 'West' Streets are recorded, as well as a chapel to St Thomas, the Guildhall and a *maladaria* (a hospital or leper house). By 1470, the town had been virtually abandoned, due to sand encroachment. The following year the burgesses were instructed to leave their church and move to Pyle, where a new settlement was developing. By the 1530s the antiquary Leland noted only 'a village on the est side of Kenfik, and a Castel, both in ruins and almost shokid and devoured with the sandes that the Severne se there castith up'. By 1572, only three burgesses remained, while a borough survey of 1665 recorded only a single family living 'on the site of the ould castle' (Roberts 2003, 25).

Post-medieval (1485 to 1901) and modern (1901 to present)

- 8.4.13 For the most part the Vale, lacking the mineral resources of coal, iron ore and limestone, was spared the rapid industrial expansion of the valleys to the north during the Post-medieval

period, with pottery being the principal industry in this area. At least fifteen production sites have been identified (Lewis 1982, 3). The local industry reached a peak in the 19th century when it was producing ornate display pieces as well as more functional items. The clays were also exploited for brick making and large areas of clay pits must have been excavated in the region. In spite of the Industrial revolution and the concomitant population explosion in the neighbouring Welsh valleys, the Vale of Glamorgan has remained largely unaffected, continuing its long and relatively prosperous agricultural history (Lewis and Hudson 2006, 12).

- 8.4.14 Some years before the Second World War, Glamorgan County Council acquired land at Island Farm for their proposed Police Headquarters. However, the looming outbreak of war resulted in the postponement of their plans, the Police Headquarters subsequently being housed in a redundant munitions factory east of Bridgend (Hunter 2002).

Specific historical background

- 8.4.15 During the late 1930s the Island Farm complex (ID 2214m/31802) was constructed as a barracks to house women employed at the Brackla ammunition storage Royal Ordnance factory (NPRN 308124) and the Waterton shell filling Royal Ordnance factory (NPRN 91719), a short distance outside of Bridgend. The huts consisted of two single-storey prefabricated concrete accommodation wings with a central, brick-built ablutions block. At the rear of each hut was a two-storey brick-built tower, which housed a boiler room below a water tank.
- 8.4.16 The accommodation was unpopular, however, and the site remained unused until 1943, when the 2nd Battalion, 109th Infantry Regiment of the United States Army were stationed there prior to the D-day landings.
- 8.4.17 The barracks were converted to a PoW camp (Camp 198) shortly after the Normandy Landings in 1944, with accommodation for nearly 200 German and Italian prisoners. The site was not fully completed when the first consignment of Germans arrived at the camp and a number of the huts and a small church were built by the prisoners.
- 8.4.18 During the night of the 10th March 1945, 67 prisoners escaped from Hut 9 (ID 2215m/31803). This was the largest escape of German prisoners in Britain during World War II. The escape tunnel was dug from the room on the south side of Hut 9 (Howell 2000, 8). The tunnel had been fitted with electric lighting, a ventilation pipe made of conjoined tin cans and a hand-operated fan to circulate fresh air around the excavations. The tunnel had been propped up with wooden props fashioned from camp furniture. A 'pin-up' of a woman was painted on the wall above the tunnel entrance, in order to distract the attentions of the guards (Vincent 1990).
- 8.4.19 One group of prisoners stole a car in Bridgend intending to drive to Croydon, where they knew a large airfield was located. The car they choose failed to start, as the prisoners were debating their course of action, four guards returning from a night-out, offered to give the vehicle a push start. Once the car had been started the prisoners headed towards the English border only to become entirely lost, taking a risk they decided to ask a passing pedestrian for directions. The man, a tram driver going home after a late-night shift, believed the prisoners cover story of being Norwegian engineers and accepted a lift to the outskirts of Cardiff. On leaving the tram driver the prisoners headed towards England only to run out of petrol somewhere between Chepstow and Gloucester, where they were arrested having abandoned the car (Daily Worker, March 12th 1945 and Daily Express, March 12th 1945).
- 8.4.20 Two of the escaped prisoners made it as far as Southampton before being discovered

sleeping in a wood, by a local farm hand (Daily Express, March 16th 1945). All of the escapees were eventually re-captured and returned to Island Farm.

- 8.4.21 Exactly how the tunnel was excavated was unknown at the time of the escape, as no tools or spoil were discovered by the prison guards, although it was assumed that crude tools had been created out of kitchen utensils. The method of spoil disposal was only discovered in the mid-1980s when Hut 9 was vandalised. The excavated clay had been shaped in round clay balls and then passed through a false air vent into a cavity created behind a false wall, built on the inside of the L-shaped walls of the hut (Coast 2009). The escape tunnel was re-opened in 2003 by a group of local history enthusiasts and was found to be largely intact, with the wooden props still preventing roof collapse (*Ex Inf*).
- 8.4.22 The successful tunnel was the second of two escape routes excavated by the prisoners, a tunnel dug from Hut 16 having been discovered some weeks earlier by the prison guards. Previously to the breakout of the 10th March two prisoners had successfully escaped by fashioning a crude set of wire-cutters out of a pair of iron bars and cutting a hole in the perimeter fences. Their escape was only discovered when they were arrested by chance in Port Talbot (www.islandfarm.fsnet.co.uk).
- 8.4.23 The last of the 1634 rank and file prisoners were transferred to Camp 181 in Worksop, Nottinghamshire on the 31st March 1945; after which Island Farm was designated Special Camp XI. The new camp held over 180 senior German officers awaiting trial on war crime charges. They included some of Hitler's closest advisers, including *Generalfeldmarschalls* Rundstedt, Manstein, Kleist and Brauchitsch. The last prisoners left the camp in May 1948, the camp was then used as a centre for displaced persons (Western Mail, 22nd April, 1948) and is marked on the fourth edition (1941) Ordnance Survey map as hostels and a well fare centre. The remains of the camp were demolished in 1994, with the exception of Hut 9 (Howell 2000, 8).

Archaeological background

- 8.4.24 In 1992 GGAT Projects conducted a watching-brief on the excavation of 62 geotechnical test-pits on the site of the Island Farm POW camp (02214m/31802). Examination of the test-pits revealed no traces of any archaeological features apart from a remnant of the Post-medieval/modern plough soil relating to former land use; the development area lay within an extensive tract of farmland prior to the construction of the Bridgend By-pass between the First and Second World Wars (Sell 2001, 5).
- 8.4.25 GGAT Projects conducted an archaeological assessment on the site of Island Farm in 2000 (Howell 2000) that identified 29 sites of archaeological interest, including fifteen Grade II Listed Buildings and five new sites within the project's defined studied area. In 2002 a desk-based assessment was conducted by CgMs Consulting on the site of Island Farm (Hunter 2002). This desk-based assessment clarified the information presented by Howell in 2000. All of these sites have been identified in the current desk-based assessment (see Appendix 8.2 for detailed site descriptions).

Review of Cartographic and Aerial Resources

Cartographic Sources (Figure 20 Historical maps – Maps 1-5)

- 8.4.26 The 1807 map of Ewenny Demesne showing other lands adjoining in the several parishes of

Ewenny, Coity and Coychurch (D/DE 476) shows the southeastern quarter of the study area. This map shows an arable landscape covered in a network of sub-rectangular fields and a narrow strip of woodland paralleling the course of the Ewenny River.

- 8.4.27 The 1840 tithe map for the parish of Coity Lower (P/80/2 and P/80/3) depicts a landscape dominated by arable fields, with a small patch of woodland to the southwest of Island Farm Barn and Pond (04353m), referred to as 'Shaw' in the accompanying apportionment. This name is likely to derive from the Old English word *shaw* meaning a 'small wood' 'thicket' or 'copse' (Hanks 1979). Running through the centre of the proposed development area is a narrow lane (04354.0m) running towards Island Farm. This lane forms part of the *Heolgam* or 'Crooked Way' that was closed by order of the Quarter Sessions in *circa* 1860 (Randall 1955), consequentially by the time of the first edition (1878) Ordnance Survey map a substantial section of this lane is not marked. However, the route of the lane is preserved in the modern landscape by well-established hedgerows, which may have formed part of the original route boundary.
- 8.4.28 The pattern of land division has changed little between the surveying of the tithe map in 1840 and the third edition Ordnance Survey map in 1918, with the exception of the construction of the Vale of Glamorgan Railway in 1889. The route of this railway is shown curving through the southeastern quarter of the development area from the second edition (1899) Ordnance Survey Map onwards. However, some field boundaries were removed in the southern and eastern parts of the area between 1840 (tithe map) and the first edition (1878) Ordnance Survey map. The fourth edition Ordnance Survey map of 1941 reveals a dramatic change in the character of the area, with the construction of Island Farm PoW camp, numerous new houses, schools and the A48 trunk road.

Pictorial Sources

- 8.4.29 A series of four black and white photographs taken in the late 1940's showing German officers arriving and leaving Bridgend after the Second World War where examined at the Bridgend Central Library. Two of the photographs showed Field Marshall von Rundstedt who had been Commander of Chief for the German armies in the west during 1940 and 1942, as well as commanding the German Southern Wing in the East in 1941. Although von Rundstedt was brought to trial at Nuremberg he was not charged and returned to Island Farm where he was held until his release in 1948. The most interesting of these photographs shows von Rundstedt leaving Island Farm for Nuremberg in 1946, passing past a rank of 187 saluting German Generals (Hawthorne 1989).
- 8.4.30 A collection of digital photographs showing objects created by the inmates of Island Farm and held by the South Wales Police Museum (SWPM) where examined on the website for Welsh heritage and culture (Gathering the Jewels (GTJ), www.gtj.org.uk). These objects consisted of a wooden hand mirror (GTJ reference GTJ75009, SWPM reference 1992-154/1), a crude knife (GTJ reference GTJ75010, SWPM reference 1992-154/2) illegally fashioned from a metal strap and a wooden board game (GTJ reference GTJ75007, SWPM reference 1990-1/1-4). Concealed within the board game were five cylindrical compartments, which contained a German bullet, an English bullet and a button. Written on the back of the board game, in broken English, is an inscription that reads: "This box have been in a terrible place. In side is a German bullet also button also British bullet. Mine one is covered."
- 8.4.31 A selection of digital photographs (www.islandfarm.fsnet.co.uk) taken between the late-1980s and the early-1990s showing some of the war art painted by the Island Farm prisoners was

studied. The pictures were painted directly onto the walls of the hut and included a variety of subjects. By far the most popular subject were pictures of partially clothed young women, including portraits of women called Cora, Monika, Ann, Ulla and Erika. Other subject matter included Germanic urban and rural scenes, a map of the western coast of Europe, coats of arms for the cities of Fürth and Elbing and planes in combat. A number of German slogans were also painted on the walls that included *Für unsere Heimat alles* (Everything for our homeland) and *Unfrei is nicht ehrlos* (Captivity is not dishonourable).

Aerial Photography

- 8.4.32 The earliest coverage of the development area dates from 1946 showing the entirety of the proposed area of development. The Island Farm PoW camp (02214m/31802) is shown fully constructed although seemingly vacant with no visible activity noted at the site. To the east of the development area an enclosed field system is shown, similar to that marked on the first – third edition Ordnance Survey mapping. Bridgend's southwestern suburb Whiterock is shown at its current extent and rows of houses are shown on both sides of Ewenny Road, much like today. However, the hotel contained within the triangle formed by the A473, Ewenny Road and the rail-tracks has yet to be built; instead the land is occupied by enclosed fields with grazing stock visible on the photograph.
- 8.4.33 Coverage dating to 1948 (CPE UK 2433 3078 – 3081) shows a new, tarmac-surfaced, bridge on the Ewenny Road constructed over the Ewenny River. Coverage from 1950 (58 RAF 497 5105 – 51010) shows that a roundabout has been constructed on the intersection of the Ewenny Road and the A473. An aerial photograph from 1962 shows that buildings in the western section of the PoW camp have been demolished, with the exception of Hut 9, which is still extant today. The row of residential housing to the east of the PoW camp (Island Farm Road and Island Farm Close) has been extended to its modern-day pattern. Coverage from the late 1960s and 1970s shows the continued urbanization of the southern edge of Bridgend with a small hotel being shown on aerial photographs OS 67 090 102 - 105 and a tennis court been shown on aerial photographs OS 79 129 083 - 084. Coverage from 1981 shows the PoW camp overgrown with vegetation and the roofs having collapsed on a number of the northern buildings. Aerial photographs MAFF 911 177 and 179 taken in 1982 show Crossways House (IF10) seemingly overgrown and abandoned. Aerial photographs from the late 1980s to the late 1990s (OS 89 073 539 – 540, OS 89 278 001 – 002, OS 89 387 078 – 079 & 095 – 096, OS 90 082 232 – 235, Geonex 7391 136 – 137, 1PRU RAF 2470 005 – 006 and 050 – 051, Terrence Soames Photography and COWI 2006) show the continued decline in the PoW camp, with the site gradually being over grown with shrubs and trees and all of the buildings, bar Hut 9, being demolished.

Archaeological Interests

- 8.4.34 There are 50 sites of archaeological interest identified within the study area (Table 8.1). None of these are Scheduled Ancient Monuments; fourteen are protected as Listed Buildings, all at Grade II level. Further information relating to these interests can be found in the gazetteer in Appendix 8.3. Part of the Registered Historic Landscape of Merthyr Mawr, Kenfig and Margam Burrows lies within the study area, and a separate ASIDOHL study has been conducted in order to assess the significance of the impact of the development on the Historic Landscape.
- 8.4.35 Numbers with a letter suffix are Primary Record Numbers (PRNs) in the regional Historic

Environment Record (HER). Five and six figure numbers without a letter suffix are National Primary Record Numbers (NPRNs) of the National Monuments Record (NMR), as supplied to the HER under the ENDEX agreement. Numbers with a 'LB' prefix are Listed Buildings, as provided by Cadw. Numbers with an 'IF' prefix are new sites identified during the course of the assessment.

Table 8.8: Identified archaeological interests

ID	Name	NGR	Period	Status	Value
00401m/40797	Ewenny Pottery	SS90377779	Post-medieval	None	B
00413m	Possible location of <i>Bomium</i>	SS90457815	Roman	None	A
00904m/19440/LB11 262	Newbridge Farm	SS89717880	Post-medieval	LBII	B
01016.5w/86926	Glanwenny/Caerleon - Loughor Roman Road	SS90307813	Roman	None	B
01016.6w/86926	Glanwenny/Caerleon - Loughor Roman Road	SS90407827	Roman	None	B
01055m	Pottery sherds (possible kiln site)	SS904774	Post-medieval	None	C
01704m	Stone artefact	SS90287822	Unknown	None	C
01810m	Possible location of <i>Bomium</i>	SS89257861	Roman	None	A
01892m/37616/LB11 263	Newbridge Farm Barn	SS89657880	Post-medieval	LBII	A
02214m/31802	POW Camp (198) Special Camp XI	SS89857845	Modern	None	A
02215m/31803/LB11 362	Hut 9	SS90037847	Post-medieval	LBII	B
02430s	Vale of Glamorgan Railway	SS90217789	Post-medieval	None	C
02483m	Vervil bank and ditch	SS892775	Unknown	None	C
02570m	Claypits Pottery	SS902778	Post-medieval	None	B
02572m	Ochr-Draw/Ewenny Bridge Pottery	SS90307746	Post-medieval	None	B
02573m	Ochr-Draw Farmhouse	SS90177743	Unknown	None	C

ID	Name	NGR	Period	Status	Value
02574m	Ochr-Draw Barn	SS90177740	Unknown	None	C
04352m	Island Farm	SS90257847	Post-medieval	None	C
04353m	Island Farm Barn	SS90127815	Post-medieval	None	C
04354.0m	Trackway	SS899607819 5	Unknown	None	B
04355m	Quarry	SS90407867	Post-medieval	None	C
05192m	Group of Clearance Cairns at Merthyr Mawr	SS892077835 4	Modern	None	C
18409	Cottage Homes	SS90157875	Post-medieval	None	B
18789	Glanwenny House Lodge	SS90537824	Post-medieval	None	C
19324	72 Merthyr Mawr Road	SS9078	Post-medieval	None	C
19559	Pandy	SS89337877	Post-medieval	None	C
31859/LB11338	Preswylfa Childrens Home	SS90177882	Post-medieval	LBII	B
31860/LB11339	Preswylfa Childrens Home 1	SS90207879	Post-medieval	LBII	B
31861/LB11340	Preswylfa Childrens Home 2	SS90207876	Post-medieval	LBII	B
31862/LB11341	Preswylfa Childrens Home 3	SS90187874	Post-medieval	LBII	B
31863/LB11342	Preswylfa Childrens Home 4 and 5	SS90167872	Post-medieval	LBII	B
31864/LB11343	Preswylfa Childrens Home 6 and 7	SS90147868	Post-medieval	LBII	B
31865/LB11344	Preswylfa Childrens Home 8	SS90117872	Post-medieval	LBII	B
31866/LB11345	Preswylfa Childrens Home 9 and 10	SS90067875	Post-medieval	LBII	B

ID	Name	NGR	Period	Status	Value
31867/LB11346	Preswylfa Childrens Home 11	SS90087877	Post-medieval	LBII	B
31868/LB11347	Preswylfa Childrens Home 12	SS90107879	Post-medieval	LBII	B
31869/LB11348	Preswylfa Childrens Home 13	SS90127881	Post-medieval	LBII	B
43139	Pont Ogwr	SS89277866	Post-medieval	None	C
265766	Glanwenny Garden	SS90307818	Post-medieval	None	C
IF01	Rifle Range	SS895167858 2	Post-medieval	None	C
IF02	Quarry	SS900087864 0	Post-medieval	None	C
IF03	Quarry	SS895237804 9	Post-medieval	None	C
IF04	Claypits	SS904537796 1	Post-medieval	None	C
IF05	Mount Pleasant Farm	SS904537796 1	Post-medieval	None	C
IF06	New Inn Pottery	SS906607849 5	Post-medieval	None	B
IF07	Marl Pit	SS906957854 0	Post-medieval	None	C
IF08	Pond	SS894607820 0	Post-medieval	None	C
IF09	Building	SS900107788 0	Post-medieval	None	C
IF10	Crossways	SS896807838 0	Modern	None	C
IF11	Pottery	SS899607871 0	Post-medieval	None	C
IF12	Group of 3 cairns	SS896707815 0	Unknown	None	A

8.5 Historic Landscape Baseline Data and Assessment – ASHIDOL 2

8.5.1 The development comprises a total of 52.05ha in area, 35.37ha of which lies within the Ochr Draw and Island Farm Historic Landscape Area (HLCA017) (Roberts 2003). However, there is the potential for up to a further five character areas to be in-directly affected, Merthyr Mawr (HLCA012), Merthyr Mawr Warren/Cwningaer Merthyr Mawr (HLCA013), Candleston/Trecantle (HLCA014), Ogmore Down/Rhos Ogwr (HLCA016) and Ogmore/Ogwr (HLCA018). The following are the relevant HLCA description excerpts from the Merthyr Mawr, Kenfig and Margam Burrows Landscape Characterisation report (Roberts 2003; see Figure 21 Historical Character Areas):

HLCA 017 Ochr Draw and Island Farm

Historic Background

8.5.2 The historic landscape area of Ochr Draw and Island Farm comprises a surviving fragment of agricultural landscape now dominated by regular fields, which represent the final stages of rationalisation of a former medieval pattern of strip fields. The Dunraven Estate maps and the tithe map of the area indicate stages in the development of the current post-medieval field pattern from the vestiges of survival of the former medieval 'infield-outfield' system characterised by varied dispersed ownership of small plots or quillies throughout the area. By the latter half of the 18th century land ownership in the area has already been largely consolidated and the majority holding by this date is under the control of the Dunraven Estate, however lesser holdings survive, isolated within and dividing the Dunraven lands into fragmentary parcels. The 1st edition 6-inch OS 1884 depicts the former farmstead of Island Farm, now demolished and replaced by a retail park, and just beyond the boundary of the character area. The farmstead itself dated from the 19th century; its plan typical of an industrial agricultural farm with agricultural buildings, set apart from the dwelling, and arranged around a rectangular yard.

8.5.3 The surviving buildings of the area include Ochr Draw Farm adjacent to the line of the Vale of Glamorgan Railway (location unchanged from 1st edition OS 6-inch 1884) and Newbridge Farm, the latter an interesting early 17th century 3-storey farmhouse with 19th century additions and internal alterations (Listed Grade II along with an outbuilding). The house, though subject to recent drastic restoration retains a number of original features including hollow- and sunk-chamfered mullioned windows, entrance doorway with carved spandrels and a hollow-and-wave moulding, and hoodmoulds. Island Farm Barn, an isolated field barn with an adjacent cruciform pond, depicted on the tithe of 1840 within an enclosure called 'Cae Skibbor' (Barn Field), also remains.

8.5.4 The Vale of Glamorgan Railway in use for mineral and passenger traffic since 1897 (virtually a subsidiary of the Barry Railway from inception) crosses the eastern part of the area. The line survived to be separately amalgamated into the GWR under the Railways Act, 1921, ceased passenger services in 1964, but continued open for through-freight, notably coal to the CEGB Aberthaw Generating Station, its usefulness boosted by an additional single line extension just to the north of the area in 1980, to serve the Ford Company's Bridgend plant.

8.5.5 Just beyond the eastern boundary of the area lie remains of clay pits associated with the well-known Ewenny Pottery and Clay Pits Pottery.

8.5.6 An interesting, though generally uncharacteristic feature of the area are the remains

associated with the Island Farm WWII PoW camp, built as a barracks for munitions workers during the late 1930s and adapted for use as a prison camp and in 1943 the scene of the only major escape of German POWs.

Key Historic Landscape Characteristics

'Largely post-medieval agricultural landscape, with evolved but fairly regular field pattern and distinctive boundaries; post-medieval agricultural settlement; communications corridor including line of Roman road (Caerleon-Loughor) and public/industrial rail'

- 8.5.7 Ochr Draw and Island Farm, a largely post-medieval agricultural landscape, is characterised by evolved but fairly regular field pattern of medium-large regular fields; distinctive boundaries and an associated loosely dispersed settlement pattern of isolated farms/cottages, including interesting examples of vernacular architecture, such as Newbridge Farm. The area contains an important communication route (ie the Roman road between Caerleon-Loughor, its alignment preserved by two sections of straight field boundary), as well as tracks, and lanes both straight and winding of early post-medieval if not medieval date including *Heolgam* (the crooked way) depicted title of 1840. The eastern side of the area is clipped by the extant line of the former Vale of Glamorgan Railway, while the north of the area is crossed by the A48.

HCA 012 Merthyr Mawr

Historic Background

- 8.5.8 The historic landscape area of Merthyr Mawr is a landscape of some importance and includes the bulk of the registered park and gardens of Merthyr Mawr House (PGW: site evaluation Grade II*; Listed buildings Merthyr Mawr House and stables (Grade II); lodge (Grade II), included as a 'small, attractive landscape park laid out at the same time as the house was built in the early nineteenth century. Contemporary pleasure grounds with some good specimen trees and shrubs, and gardens with a very fine large glasshouse of 1900. Remains of the walled gardens of the earlier house.'
- 8.5.9 It should be noted that the boundary of character between HLCA 012 and the adjacent HLCA 018 is at best imprecise and difficult to define, with many characteristic traits overlapping and in common. The most obvious and historic boundary in the area is the *Afon Ogwr* (river Ogmor) itself, despite minor differences between historic, parish boundaries, agricultural holding boundaries and more recently designated boundaries; for this reason the boundary between the HLCAs has been placed along the line of the River Ogmor itself. This satisfies the area of the park and garden as defined on the 1st edition OS 6-inch map. HLCA 013 is defined as those parts of the demesne land lying within the parish of Merthyr Mawr, and an area of associated farmland adjacent to the west around Warren Farm. Two enclosures contained within the registered park and garden on the opposite side of the Ogmor River notably Coed Pwll-y-fflew and Waun-y-ferwill (only the latter formed part of the Merthyr Mawr Demesne land in 1813) have been included within HLCA 018.
- 8.5.10 The house of Merthyr Mawr was constructed between 1806 and 1809 on a new site by Sir John Nicholl in a classical style (Henry Wood of Bristol, architect and sculptor), replacing the earlier 16th/17th century Hall of the Stradling family (St Donants). The house is a five-bay two-storey classical mansion faced in white local carboniferous limestone, with a hipped roof

and sash windows, and central single-storey porch with Tuscan columns in the north front. A lower wing, partly built later than the main projects to the east, while on the west side a veranda with a glass canted roof supported on cast-iron pillars, built in 1819, runs along the entire length of the house. The Old Hall was situated to the south-west of the 19th century house, on or near the site of the Farm; remains of the Tudor courtyard now forms one of the farm outbuildings, the rest having been demolished c1806.

- 8.5.11 The park was designed and planted between 1806 and 1838 by Sir John Nicholl, most of the work being carried out after the house was completed in 1809. An estate map of 1794 by John Williams shows the area of the park as fields, with very little woodland, and with the old Hall and its gardens along what became the west boundary. The garden and grounds were laid out by Sir John Nicholl between 1806 and 1838, at the same time as the park was made. The present layout differs in some respects from that shown on the William Weston Young estate map of 1813 and on a drawing of the same date by him: at that time there was a slope bounded by a semicircular fence in front of the house, a fence extending to the west, a smaller veranda, and a 'greenhouse' to the west of the house, on the site of the present summer house. The map shows that at this stage the northern half of Chapel Hill was not yet wooded, that in 1813 the pleasure grounds did not extend south-westwards to the road, and that the garden to the west was laid out with a rather rococo design of waving paths and irregular but symmetrical shrubberies. Further evidence of the development of the garden comes from a picture of about 1860 showing grass terraces in front of the house, and the garden bounded by a stone-built ha-ha. A painting by Mary de La Beche Nicholl of 1867 shows island beds and bedding on the lawn and a view framed by trees to Ogmore Castle. By 1875-77 (Ordnance Survey map) the present layout is mostly in place.
- 8.5.12 To the north of Merthyr Mawr House is Chapel Hill with its small roofless fifteenth-century chapel, St Roque's Chapel (Scheduled ancient monument: Gm 247), in which are two 11th century carved stones (Scheduled Ancient Monument: Gm 26). This stands within a small Iron Age fort, Chapel Hill camp (Scheduled ancient monument: Gm 248), the only visible remnant of which is a low bank encircling the hilltop.
- 8.5.13 Beyond the wall of the Merthyr Mawr estate, the estate village of Merthyr Mawr is a rare survival. The lack of modern intrusions gives an impression of rural pre-1950s Vale settlement, since lost elsewhere. While the cottages in the village have undergone minor visual alteration (ie fenestration), they largely retain their original character and are still thatched. The main examples are Church Cottage, 17th century lobby-entry plan, with the entry at the right end of the façade, subsequently was moved to the left end. Keeper's Cottage, extended, is also of the lobby-entry type. Holly Cottage (with stair projection), Diana Cottage, c1700 and Wellingtonia, the latter extended, are end-entry houses with entrance doorways in the end wall beside the hall fireplace. Oak Cottage retains its original four-centered stone doorway (16th century), which opens into an unheated room, with the hall off. Examples of pattern-book estate architecture are also found in the village, eg the Lodge to Merthyr Mawr House with its hipped thatched roof, central chimneystack, and symmetrical façade. Cartographic evidence indicates the village had a mill, millpond and race (18th/19th century maps), which appear to have been supplanted by a sawmill.
- 8.5.14 The parish church of St Teilo (1849-51) at the west end of the village was designed by Benjamin Ferrey a fellow pupil and biographer of Pugin, in partnership with John Prichard of Llandaff in the Early English style with frequent local architectural references (e.g. Caerphilly Castle hall and Llandaff Cathedral chapter house). The churchyard contains two medieval

figural monuments and a collection of fragmentary head-stones and crosses generally of 11th-12th century date, found in the churchyard or on the site of the medieval church, and also from the St Roch (St Roque's) chapel. The latter includes one with interlace, and a much earlier stone, bearing a fragmentary inscription in Roman capitals, dated to the 5th century.

Key Historic Landscape Characteristics

'Post-medieval gentry estate: house, parkland and garden, and associated estate village; varied settlement pattern; post-medieval vernacular, picturesque and polite estate architecture; post-medieval agricultural landscape; distinctive field boundaries; relict prehistoric and medieval settlement/fields'

- 8.5.15 Merthyr Mawr is characterised as a largely intact post-medieval gentry estate, centred on Merthyr Mawr House, within its parkland and garden setting (Registered park and garden: PGW (Gm) 12 (BRI)), and associated estate village ranged between the parish church and Home Farm. The estate village, which includes church, schoolhouse, farmsteads, cottages and Post Office is characterised by its nucleated – organic and loosely scattered settlement pattern and retains important examples of post-medieval vernacular, picturesque and polite estate architecture. The surrounding associated landscape setting is characterised as an essentially post-medieval agricultural landscape typified by evolved, but fairly regular post-medieval field pattern showing signs of having evolved from medieval strip fields. The area retains distinctive field boundaries with evidence for relict prehistoric and medieval settlement and fields. While ecclesiastical landscape characteristics are represented by the post-medieval church built on site of medieval church (St Teilo's), which has an early medieval foundation supported by an important collection of Early Christian Monuments (inscribed stones and crosses). The medieval chapel (St Roque's), within the grounds of Merthyr Mawr House is a further indication of the ecclesiastical importance of the area. The multi-faceted nature of the area is emphasised by numerous other site types from prehistoric military/defensive features to industrial archaeological features (eg fulling mill), buried archaeological remains (cropmarks/parchmarks), communications features (ie footpaths, tracks and lanes both winding and straight) and a number of historic associations. The development of the landscape is well documented by surviving cartographic sources, and the area would benefit from further in-depth study of this material.

HLCA 013 Merthyr Mawr Warren/Cwningaer Merthyr Mawr

Historic Background

- 8.5.16 The historic landscape area of Merthyr Mawr Warren/Cwningaer Merthyr Mawr is a landscape area of some historical importance, reflected in its partial status as a Scheduled Ancient Monument (SAM Gm 432), based on a concentration of archaeological features and finds revealed from time to time from beneath the shifting sands. The area, a national nature reserve and SSSI, is the location of the deserted medieval village and Manor of Candleston, the majority of which was abandoned following sand incursion by the early post-medieval period. During the post-medieval period the land was acquired by the Merthyr Mawr Estate.

Key historic Landscape Characteristics

'Nationally important unenclosed be-sanded landscape; multi-period and multi-functional'

landscape; post-medieval rabbit warren'

- 8.5.17 Merthyr Mawr Warren/Cwningaer Merthyr Mawr is characterised as an unenclosed be-sanded landscape, the majority of which is a Scheduled Ancient Monument. The character of the area is as a multi-period and multi-functional buried landscape: comprising buried prehistoric, medieval and post-medieval deserted settlement/fields (eg cultivation ridges, settlements at Pwll-y-defaid and near Candleston, and site of Coniger or Warren House, medieval manor house), and prehistoric funerary and ritual landscape. Buried finds of all periods have been recovered from the area. Other characteristic site types include prehistoric to post-medieval 'industrial' features (eg Iron Age bloomery and post-medieval corn mill), post-medieval rabbit warren, post-medieval and modern military/defensive structures and a firing range. In addition a small stretch of medieval road is partly exposed from the sand.

HLCA 014 Candleston /Trecantle

Historic Background

- 8.5.18 The historic landscape area of Candleston/Trecantle is dominated by the remains of Candleston Castle, built c14th century and occupied until the early 19th century. This was the fortified manor house of the de Cantelupe family. The site is defended by a D-shaped enclosure of the 14th century, crenellated as part of the early 19th century alterations which include a stable. The original 15th century structure comprised two parts: a single-pile range across the east end of the enclosure, with a tower added to the outside of the enclosure on the south. The Hall range, 14th century, was partly remodelled during c1500; the first-floor hall of this date retains an impressive perpendicular chimneypiece with four-centred ogee arch constructed of the local green sandstone. The tower retains a pointed, chamfered arch into a ground-floor cellar, and adjacent mural stair and an externally corbelled fireplace among other features such as garderobe and remains of parapet corbelling of the roofs, blocked west opening at the stair-head, originally opening on to the wall-walk of the enclosure wall.

Key historic Landscape Characteristics

'Manorial centre of Candleston Castle set within an area of mixed agricultural and wooded landscape (including Ancient Woodland) on the fringe of Merthyr Mawr Warren; relict archaeology: medieval and post-medieval settlement/fields (including fortified manor); buried archaeology; historic associations'

- 8.5.19 Candleston/Trecantle comprises the Manorial centre of Candleston Castle and includes three south facing valleys adjoining Merthyr Mawr Warren. The area is characterised by varied but generally evolved/irregular field pattern with tracts of Ancient and other broadleaved woodland and 20th century forestry. The area is strongly characterised by relict archaeological features: ranging from the fortified manor of Candleston Castle, an important example of medieval/post-medieval vernacular architecture, with associated medieval and post-medieval agricultural landscape (including Candleston Farm). The area, like the adjacent HLCA 013, also has buried archaeological remains, mainly indicated by prehistoric find scatters. The area has historic associations with the de Cantelupe family.

HLCA 016 Ogmore Down/Rhos Ogwr

Historic Background

- 8.5.20 The historic landscape area of Ogmore Down/Rhos Ogwr is an area of unenclosed common land above Ogmore village and an area containing a typical variety of relict archaeological features. The irregular boundary of the area is indicative of encroachment from the late medieval, but mainly early post-medieval periods (eg agricultural settlement of landless farm labourers are typically located extending along several of the lanes leading to and from the Down, such as alongside Heol-y-mynydd as depicted on the 1st edition 6-inch OS map. Part of the area is currently used as a golf course.

Key Historic Landscape Characteristics

'Unenclosed common; recreational open space; Ancient and other broadleaved woodland; with a small multi-period relict archaeological landscape element with communication features'

- 8.5.21 Ogmore Down/Rhos Ogwr is characterised as an area of unenclosed Down or Common with important potential as recreational open space and partly comprises dry un-improved hill pasture, and is partly in use as a golf course. The area includes, in addition to the open common, Kings Wood a tract of Ancient and other broadleaved woodland, and unmanaged scrub (*Graig Ddu*). The area retains a small number of relict archaeological features including a single known prehistoric funerary and ritual feature, a Bronze Age round cairn (PRN 0230m), possible medieval agricultural and settlement landscape element is represented by features such as pillow mounds and recti-linear terracing of indeterminate age and a deserted rural settlement, a medieval long hut, at the head of Pant Norton. Numerous communication routes, from footpaths, to tracks and lanes, including the possible medieval routes of Heol-y-Mynydd and Heol-y-Slough, which connect the site of Ogmore Castle and the Downs, also traverse the area.

HLCA 018 Ogmore/Ogwr

Historic Background

- 8.5.22 The historic landscape area of Ogmore/Ogwr comprises the low-lying river terrace at the junction of the Ogwr (Ogmore) and Ewenny rivers. The area includes two enclosures contained within the registered park and garden of Merthyr Mawr, which lies on the opposite side of the Ogmore River (see HLCA 012) notably Coed Pwll-y-fflew and Waun-y-fervill (only the latter formed part of the Merthyr Mawr Demesne land in 1813). HLCA 018 is based around the shrunken settlement of Ogmore. The medieval and early post-medieval settlement at Ogmore originally comprised a nucleated grouping; prior to the Glyndwr rebellion the settlement comprised 22 tenants and 27 cottages, the rebellion reduced it to six tenants. The settlement remains as a farm, Ogmore Farm and a small hamlet to the south of the Castle.
- 8.5.23 The castle of Ogmore (SAM Gm 037) was originally constructed c1100 by William de Londres; the primary castle was an oval ringwork with attached D-shaped bailey to the west. The masonry defences date from the 12th and 13th centuries most significant is a 2-storey rectangular Keep (early 12th century, later heightened), probably one of the earliest Norman

buildings in the region, the rectangular 'cellar' and the a curtain wall and gateway (13th century) with parallels at Coity and Newcastle. The outer bailey contains the courthouse (14th/15th century), a structure where manorial courts were held until the early 19th century.

Key Historic Landscape Characteristics

'Nucleated-organic shrunken settlement and medieval ringwork/stone castle strategically located within agricultural/floodplain landscape with enclosures of medieval or earlier origin; buildings of architectural interest; multi-period relict archaeological landscape including prehistoric promontory fort and medieval ecclesiastical features Ancient and other broadleaved woodland; communication corridor and historic associations'

- 8.5.24 Ogmor/Ogwr is characterised as an area of enclosed generally low-lying land at the confluence of the Ogmor and Ewenny Rivers, largely typified by water meadow land liable to flooding, but including the small area of the enclosed Fleming's Down with its Iron Age promontory Fort (SAM Gm 466). The concentration of settlement is found at the village of Ogmor with its strategically placed medieval Castle, the centre of medieval Lordship. The settlement is characteristically a nucleated organic cluster of farms/cottages (including public house, the Pelican Inn, on the 1st edition OS 1884) centred on castle. Characteristic; medieval/post-medieval vernacular buildings/regional houses are represented by Ogmor Farm, Ogmor Cottage and Ty-maen, the latter a regional house with chimney backing on entry and outside cross passage.
- 8.5.25 The agricultural landscape has evolved, and varied field pattern of small to large enclosures, with some indications of medieval strip fields surviving and is characterised by varied, yet distinctive boundaries. An area of Ancient woodland (Kings Wood) survives at the foot of Fleming's Down.
- 8.5.26 The area is an important multi-period relict archaeological landscape of considerable time depth and variety including: prehistoric, medieval and post-medieval settlement/fields, a medieval shrunken/deserted village. The area is dominated by military/defensive features including prehistoric promontory fort and medieval Castle (Ogmor), and has also been considered the possible site of Roman fort (the illusive *Bomium*), as yet unproven.
- 8.5.27 The location of early medieval slab cross and inscribed stones found at Ogmor castle suggest some former ecclesiastical function/importance; the Vervil boundary dyke (SAM Gm 465), nearby also indicates territorial boundaries dating to at least the early-medieval period if not earlier. The area has characteristic features (eg a medieval weir and the system of leats and a millrace at Ogmor Corn mill) associated with rural industry: mostly associated with milling, including fulling (14th century) and tidal mills, sawmill, limekilns are also indicated. The area is also characterised by numerous features connected with transport and communications, including the possible Roman/medieval Road *Heol-y-milwyr*, footpaths, tracks and both winding and straight lanes. A variety of river crossings/fording points including the ancient stepping stones (SAM Gm 184) at Ogmor Castle and a number of interesting bridges such as the striking late 16th or earlier four-arched New Inn Bridge, the New Bridge of 1827, and a steel cabled suspension footbridge of 1840 (all Grade II Listed) are characteristic of the area (and the adjacent HLCA 013).

8.6 Predicted Effects – Archaeological Sites

Effect of the development on archaeological sites (Table 8.2)

8.6.1 A total of 50 sites have been identified within the study area, ten of which are located within the proposed development area. The impact of the proposed development has been assessed as 'severe' in eight cases, 'major' in a single case and with a 'beneficial' effect for one site. The impact of the proposed development on the remaining 39 sites situated within the study area, but outside of the actual development area, has been assessed as 'none'; these entries have been removed from the table below.

Table 8.9: Effect of the development on known archaeological interests

ID	Name	NGR	Period	Value	Effect
02215m/31803 /LB11362	Hut 9	SS90037847	Modern	A	Beneficial
02214m/31802	POW Camp (198) Special Camp XI	SS89857845	Modern	A	Major
01016.5w/869 26	Glanwenny/Caerleon - Loughor Roman Road	SS90307813	Roman	B	Severe
01016.6w/869 26	Glanwenny/Caerleon - Loughor Roman Road	SS90407827	Roman	B	Severe
04353m	Island Farm Barn	SS90127815	Post-medieval	C	Severe
04354.0m	Trackway	SS899607819 5	Unknown	B	Severe
IF08	Pond	SS894607820 0	Post-medieval	C	Severe
IF09	Building	SS900107788 0	Post-medieval	C	Severe
IF10	Crossways	SS896807838 0	Modern	C	Severe
IF12	Group of 3 possible Cairns	SS896707815 0	Unknown	A	Severe

Justification of assessment

02215m/31803/LB11362

8.6.2 Hut 9 (ID 02215m/31803/LB11362) is located to the north of the area designated as the 'Nature Conservation Area' and a new maintenance road will be constructed off the A48 Bypass road to enable the council to maintain it, therefore the proposed development has been assessed as having a 'beneficial' effect of this site. It should, however, be noted that CCW have concerns with the effects on a population of lesser horseshoe bats currently roosting in Hut 9. A purpose built bat-house will hopefully displace the bats from this sub-optimal habitat and allow the Council to perhaps restore the site as a visitors centre in the future.

8.6.3 Improving access to the site of Hut 9 (ID 02215m/31803/LB11362) will have a 'beneficial'

effect on this site. Improving the appearance of Hut 9 and providing public interpretation boards describing the historic use of the site and the resulting prison break would enhance the 'beneficial' effect on this monument. It is, however, noted that these further improvements are not practical at the current time due to the presence of a population of lesser horseshoe bats roosting in Hut 9 (see paragraph 8.6.2 above).

02214m/31802

- 8.6.4 The proposed development has been assessed as having a 'major' impact on the Island Farm PoW camp as a large proportion of this site will be destroyed by groundworks associated with the construction of the development's access road off the A48 By-pass Road and the 'Green Bridge'. It is noted, however, that the Island Farm PoW camp is located within the 'Nature Conservation Area', if the surviving remains of the site were incorporated within the design of this area and preserved *in situ* the effect of the development upon the PoW camp could be reduced to 'minor'.

01016.5w/86926 and 0106.6w/86926

- 8.6.5 The exact route of the Roman road as it passes through this part of the development area is uncertain; the RCAHMW has recorded a section of agger running for 220m, however, the location of this agger is dubious due to a perceived error in the recorded NGR. The regional Historic Environment Record notes two straight field boundaries as being of a different content and appearance to those nearby and suggests that they may represent the fossilised route of the Roman road, however, they are on a different alignment to the recorded location of the agger. The Ordnance Survey and Margary (Margary 1957) believe that the route of the road is fossilised in the course of the A48 By-pass Road. Due to this debate it will be necessary to locate the route of the road prior to development; a geophysical survey was discussed but is considered impractical due to the topography of the site. Therefore a programme of test-pitting followed by excavation has been recommended.
- 8.6.6 The proposed development has been assessed as having a 'severe' impact on the eastern section of the Glanwenny/Caerleon – Loughor Roman road (ID 01016.5w/86926), as noted on the regional Historic Environment Record, as it will be destroyed by groundworks associated with the construction of the 'Phase II Extension to the Science Park'.
- 8.6.7 The proposed development has been assessed as having a 'severe' impact on the western section of the Glanwenny/Caerleon – Loughor Roman road (ID 01016.6w/86926), as noted on the regional Historic Environment Record. The field boundary forming site 01016.6w/86926 is located within the 'Nature Conservation Area', if the surviving remains of the site were incorporated within the design of this area and preserved *in situ* the effect of the development upon the PoW camp could be reduced to 'none'.

04353m

- 8.6.8 The proposed development has been assessed as having a 'severe' effect on the Island Farm Barn and the associated cruciform pond, as it is assumed that landscaping related to the construction of science park will remove them.

04354.0m

- 8.6.9 The proposed development has been assessed as having a 'severe' effect on the sunken

trackway as it will be destroyed landscaping and groundworks associated with the 'Bridgend Town Football Club' stadium, the 'Out Door Amphitheatre', the 'Piazza Open Space', the access road off the A48 By-pass Road and the 'science park'.

- 8.6.10 An archaeological evaluation across the route of the trackway was considered as a method of mitigating this effect, however, given the nature of sunken trackways, it was decided that this technique would not provide a positive outcome; it is considered more appropriate to record the nature of the trackway as it exists today. Therefore topographic and photographic surveys are recommended in order to preserve this monument in record before it is removed.

IF08

- 8.6.11 The proposed development has currently been assessed as having a 'severe' effect of the Pond IF08 as it is assumed that landscaping involved with the 'Nature Conservation Area' will destroy this site. It is, however, noted that should this site be preserved *in situ* within the 'Nature Conservation Area' the effect of the proposed development may be reduced to 'none'.

IF09

- 8.6.12 The proposed development has been assessed as having a 'severe' effect upon Building IF09 as it will be removed by groundworks associated with the construction of the 'Indoor 4G Training Pitch'.

IF10

- 8.6.13 The proposed development has currently been assessed as having a 'severe' effect on Crossways (ID IF10) as it is assumed that landscaping involved with the 'Nature Conservation Area' will destroy this site. Should this site be preserved *in situ* within the 'Nature Conservation Area' the effect of the proposed development may be reduced to 'none'.

IF12

- 8.6.14 The proposed development has been assessed as having a 'severe' effect upon the Group of three possible Cairns as it will be destroyed by groundworks associated with the 'Shared Car Parking' and the three 'Out Door Training Pitches'.

8.7 Predicted Effects – ASIDOHL2

Assessment of direct, physical impacts of the Island Farm development (ASIDOHL2 Stage 2)

- 8.7.1 The development area comprises 52.05ha, 35.37ha of which lies within the Merthyr Mawr, Kenfig and Margam Burrows Historic Landscape. The overall Merthyr Mawr, Kenfig and Margam Burrows Historic Landscape extends to 3370.521ha; therefore the maximum overall area, which could be directly affected by the application proposal, represents approximately 1.05% of the entire area on the register. Approximately 70% of the development area lies within HLCA017 (Ochr Draw and Island Farm Historic Landscape Area) the rest of the development area lies outside of the landscape on the register (see Figure 21).

Table 8.10 Assessment of direct physical impacts of the development (ASIDOHL2 Stage 2)

Assessment of direct, physical impacts on historic character area 017				
Absolute impact (loss of area)		Magnitude & score		
35.37ha of 106.9ha, 33.09%		Considerable - 4		
Relative and landscape impacts (loss of known characteristics or elements) & scores				
Element / % loss	Status	Magnitude	Landscape value	Landscape value effect
Largely post-medieval agricultural landscape, with evolved but fairly regular field pattern and distinctive boundaries – 64%	C – 2	Severe – 5	Considerable - regular shaped fields with distinctive patterns – 4	Substantially reduced - 5
Post-medieval agricultural settlement – 34%	C – 2	Considerable – 4	Considerable – one of three remaining post-medieval agricultural buildings (island farm barn) in character area – 4	Considerably reduction - 4
Communications corridor including line of roman road (caerleon – loughor) and public/industrial rail – 5%	A – 4	Slight - 2	Low – 0.4km of possible medieval trackway preserved as field boundaries – 2	Slightly reduced - 2
A group of three possible prehistoric funerary monuments – 100%	U – 1	Very severe – 6	Very high – a group of three previously unrecorded, possible funerary monuments – 6	Lost - 6
Overall magnitude of direct physical impacts on historic character area 017				
Score		Grading		
19		Severe		
Summary of overall magnitude of direct impact on historic character areas				
Impact	Score		Magnitude	
Hlca 017	19		Severe	
Absolute overall magnitude of direct impact on combined historic character areas				
Impact	Average score on scale of 28		Magnitude	
Hlcas within development area	19		Severe	

Assessment of indirect impacts on the historic landscape of the Island Farm development (ASIDOHL2 Stage 3)

Indirect, physical impacts (ASIDOHL2 Stage 3a)

- 8.7.2 The development has the potential to have an indirect, physical impact on a single Historic Character Area, Ochr Draw and Island Farm (HLCA017).

Table 8.11 Assessment of indirect physical impacts of the development (ASIDOHL2 Stage 2)

Assessment of indirect, physical impacts on historic character area 017		
Impacts	Status & score	Magnitude & score
Increased risk of disturbance to the field boundaries forming part of the post-medieval agricultural landscape	C – 2	Moderate – 3
Increased fragmentation of field boundaries possibly preserving route of Caerleon – Loughor Roman Road	A – 4	Very Severe - 6
Increased management need for the area of the post-medieval agricultural landscape, which is to be turned into a nature conservation area	C – 2	Slight – 2
Further fragmentation of the post-medieval agricultural landscape	C – 2	Considerable - 4
The fragmentation of the possible medieval trackway preserved as field boundaries and sunken trackways	A – 4	Considerable - 4
The fragmentation post-medieval agricultural settlement	C - 2	Considerable - 4
The cessation of historic land use practices – agriculture	C – 2	Considerable - 4
Overall magnitude of indirect visual impacts on historic character area 017		
Average score: 6.43		

Indirect (non-physical) impacts (ASIDOHL2 Stage 3b)

- 8.7.3 The proposed development has the potential to have an indirect, non-physical impact on four Historic Character Areas, Merthyr Mawr Warren (HLCA013), Ogmore Down (HLCA016), Ochr Draw and Island Farm (HLCA017) and Ogmore (HLCA018).
- 8.7.4 It is considered that the development will have no visual impact on the Historic Character Areas of Merthyr Mawr (HLCA012) and Candleston (HLCA014). The proposed development area is not visible from Merthyr Mawr (HLCA012) due to the woodland (based on previous fieldwork in the area (Lewis 2003) between it and the development. Candleston (HLCA014) is located within dense woodland and there are no long or medium ranged views looking east

towards the proposed development.

- 8.7.5 The significant historical views from Merthyr Mawr House (PGW (Gm) 12 (BRI), which is located within the Merthyr Mawr (HLCA012) Historic Character Area are to the southeast and southwest (Cadw and ICOMOS 2000, 14) and are orientated away from the direction of the proposed development; therefore the Island Farm development will have no impact upon them.

Table 8.12 Assessment of indirect physical impacts of the development (ASIDOHL2 Stage 2)

Assessment of indirect, visual impacts on historic character area 017		
Impacts	Status & score	Magnitude & score
View to hlca012 partially altered (from ngr ss 90280 78300, view to west)	C – 2	Very slight – 1
View to hlca018 partially blocked (from ngr ss 89880 78210, view to southwest)	C – 2	Moderate - 3
View from hlca013 partially altered (from key view 09, view to north-northeast)	C – 2	Slight – 2
View from hlca016 partially altered (from key views 05 and 06, both views to northeast)	C – 2	Moderate - 3
View to the western and eastern extremes of hlca017 partially altered (from ngr ss 89750 77870, from to east and west respectively)	C – 2	Moderate - 3
Large-scale change to the essential setting of the post-medieval agricultural settlement within hlca 017	C – 2	Considerable - 4
Development form (average value of element sensitivity: $12/6 = 2$)	2	Moderate - 3
Development appearance (average value of element sensitivity $12/6 = 2$)	2	Moderate - 3
Overall magnitude of indirect visual impacts on historic character area 017		
Average score: 4.75		
Overall magnitude of indirect impacts on historic character area 017		
Total score on 28 point scale	Grading	
(4.75 + 6.43 = 11.18): $\frac{11.18 \times 28}{20} = 15.65 = 16$	Considerable	
Assessment of indirect, visual impacts on historic character area 013		
Impacts	Status & score	Magnitude & score

View to hlca017 partially altered (from key view 09, view to north-northeast)	C – 2	Slight - 2
Development form (average value of element sensitivity: 2/1 = 2)	2	Moderate - 3
Development appearance (average value of element sensitivity: 2/1 = 2)	2	Slight - 2
Overall magnitude of indirect visual impacts on historic character area 013		
Average score: 4.33		
Overall magnitude of indirect impacts on historic character area 013		
Total score on 28 point scale	Grading	
(4.33 + 0 = 4.33): $4.33 \times 28 = 6.06 = 6$ 20	Slight	
Assessment of indirect, visual impacts on historic character area 016		
Impacts	Status & score	Magnitude & score
View to hlca017 partially altered (from key views 05 and 06, both views to northeast)	C – 2	Moderate - 3
Development form (average value of element sensitivity: 2/1 = 2)	2	Moderate - 3
Development appearance (average value of element sensitivity: 2/1 = 2)	2	Slight - 2
Overall magnitude of indirect visual impacts on historic character area 016		
Average score: 4.67		
Overall magnitude of indirect impacts on historic character area 016		
Total score on 28 point scale	Grading	
(4.67 + 0 = 4.67): $4.67 \times 28 = 6.54 = 7$ 20	Slight	
Assessment of indirect, visual impacts on historic character area 018		
Impacts	Status & score	Magnitude & score
View to hlca017 partially altered (from key views 01, 02 and 018, views from south-southwest, southwest and north-northeast respectively)	A - 4	Considerable - 4
View from hlca017 partially altered (from ngr ss 89880 78210, view to southwest)	C – 2	Moderate - 3

Development form (average value of element sensitivity: $6/2 = 3$)	3	Moderate - 3
Development appearance (average value of element sensitivity $6/2 = 3$)	3	Moderate - 3
Overall magnitude of indirect visual impacts on historic character area 018		
Average score: 6.25		
Overall magnitude of indirect impacts on historic character area 018		
Total score on 28 point scale	Grading	
$(6.25 + 0 = 6.25)$: $\frac{6.25 \times 28}{20} = 8.75 = 9$	Moderate	
Summary of overall magnitude of indirect impact on historic character areas		
Impact	Score	Magnitude
HIca017	16	Considerable
HIca013	6	Slight
HIca016	7	Slight
HIca018	9	Moderate
Absolute overall magnitude of indirect impact on combined historic character areas		
Impact	Average score on scale of 28	Magnitude
HLcas affected by the development	10	Moderate

Evaluation of relative importance (ASIDOHL2 Stage 4)

- 8.7.6 By its place in the Register, the historic landscape of Merthyr Mawr, Kenfig and Margam Burrows is considered to be a landscape of outstanding historic interest in its entirety. The evaluation of the character areas in a national context therefore *'should not be regarded as down grading of certain areas: it is simply acknowledging that within a landscape that is all of national importance, some areas, characteristics, or elements may well be of greater value than others'*.
- 8.7.7 The guidelines for the evaluation of relative importance, stage 4 of the ASIDOHL2 process, are summarised above. Stage 4 is concerned with evaluating the relative importance of the part of each HLCA directly or indirectly affected by the development, in relation to:

- (a) *the whole of the HLCA*
- (b) *the whole of the Historic Landscape*

8.7.8 It was considered that assessing the relative importance of the HLCA within the national context (Stage 4c of the ASIDOHL2 process), a difficult and onerous task itself, would not aid the assessment of the landscape to any great degree; for this reason it was omitted in this study.

8.7.9 The criteria used to determine the relative importance, or value, of the historic character areas affected by the development are those established in the 'Guide To Good Practice'; these are based on the following:

- Rarity
- Representative-ness
- Documentation
- Group Value
- Survival
- Condition
- Coherence
- Potential
- Integrity
- Amenity
- Associations
-

8.7.10 Criteria values in steps (a), (b) and (c) are scored as follows:

Table 8.13: Stage 4 criteria values

Asidohl2 stage 4: evaluation scores	
Criterion value	Score
Very high/good	5
High/good	4
Moderate/medium	3
Low	2
Very low/poor	1

Evaluation of the relative importance of the part of Historic Character Area 017 effected by the development in relation to: (a) the whole of the historic character area, and (b) the whole of the historic landscape area on the Register

Table 8.14 Evaluation of the relative importance of the part of historic character area 017 affected by development

Value	(a) whole of historic character area					(b) whole of historic landscape area on the register				
	V. High / v. Good	High / good	Mod. / med.	low	Poor / none	V. High / v. Good	High / good	Mod. / med.	low	Poor / none
In relation to:	(a) whole of historic character area					(b) whole of historic landscape area on the register				
Rarity	✓						✓			
Representative-ness	✓								✓	
Documentation		✓					✓			
Group value			✓					✓		
Survival		✓					✓			
Condition			✓					✓		
Coherence	✓					✓				
Integrity		✓						✓		
Potential			✓					✓		
Amenity			✓					✓		
Associations				✓				✓		

Relative importance of the part of historic character area 017 affected by development		
Average score (a) out of 55	Average score (b) out of 55	Average of (a) and (b)
41	37	39

8.7.11 Justifications for evaluations within category a) whole of Historic Character Area:

- A singular example of a field boundary noted on the regional Historic Environment Record as being different in content and appearance to others nearby. This field boundary is believed to mark the line of the Caerleon – Loughor Roman road.
- The section of the Historic Landscape Area affected by the proposed development contains all of the characteristics of the entire Historic Landscape Area.

- The landscape retains its original function – an agricultural landscape interspersed with agricultural settlements.
- Whilst large sections of Antonine Itinerary *Inter XII* (Margary's route RR60c) have been authenticated by various authorities (see below) the section of the road thought to be fossilised in the hedge boundary with the Historic Character Area has yet to be fully authenticated.

8.7.12 Justifications for evaluations within category b) whole of Historic Character Area on the Register:

- Only two or three similar historic elements are broadly similar to other elements within this HLCA on the *Register* (a largely post-medieval agricultural landscape, a post-medieval agricultural settlement and a communications corridor including the line of a Roman road).
- The landscape retains its original function – an agricultural landscape interspersed with agricultural settlements.
- The route of the Roman road forms part of the Antonine Itinerary *Inter XII* (Margary's route RR60c), while stretches of this route are predicted from limited evidence; large stretches of it are authenticated by RCAHMW, the Ordnance Survey and Margary.

Evaluation of the relative importance of the historic character areas 013, 016 and 018 indirectly effected by the development in relation to (b) the whole of the historic landscape area on the Register

Table 8.15 Evaluation of the relative importance of historic character area 013 indirectly affected by development

Value	V. High / v. Good	High / good	Mod. / med.	Low	Poor / none
In relation to:	(b) whole of historic landscape area on the register				
Rarity	✓				
Representativeness	✓				
Documentation			✓		
Group value	✓				
Survival	✓				
Condition	✓				
Coherence		✓			
Integrity			✓		
Potential	✓				
Amenity	✓				

Associations		✓			
--------------	--	---	--	--	--

Relative importance of historic character area 013 indirectly affected by development		
Average score (a) out of 55	Average score (b) out of 55	Average of (a) and (b)
0	49	49

8.7.13 Justifications for evaluations within category b) whole of Historic Character Area on the Register:

- This Historic Character Area is a multi-period landscape (prehistoric onwards) and forms the core landscape within the *Register*. Due to the landscapes survival and preservation and its multi-period nature it is unique within the historic landscape of Merthyr Mawr, Kenfig and Margam Burrows.
- The be-sanded nature of the landscape means that survival and condition of the elements forming the landscape is very good; however, due to the be-sandment the original function of the landscape has ceased, whilst the be-sandment also means that the landscape is difficult to interpret by the non-specialist.
- The buried and well-preserved nature of the multi-period landscaped within this Historic Character Area offers considerable scope for further landscape studies.
- The dune-system provide wide-ranging scope for public educational and recreational facilities.

Table 8.16 Evaluation of the relative importance of historic character area 016 indirectly affected by development

Value	V. High / v. Good	High / good	Mod. / med.	Low	Poor / none
In relation to:	(b) whole of historic landscape area on the register				
Rarity		✓			
Representativeness				✓	
Documentation			✓		
Group value			✓		
Survival			✓		
Condition			✓		
Coherence			✓		
Integrity			✓		
Potential			✓		

Amenity			✓		
Associations				✓	

Relative importance of historic character area 016 indirectly affected by development		
Average score (a) out of 55	Average score (b) out of 55	Average of (a) and (b)
0	32	32

8.7.14 Reasoning for judgements within category b) whole of Historic Character Area on the Register:

- Only two or three similar historic elements are broadly similar to other landscapes on the Register (ancient woodland and unenclosed common).
- The landscape contains three of four linked elements (possible medieval agricultural and settlement landscape represented by features such as pillow mounds, deserted rural settlement and a medieval long hut).
- The historic themes of the landscape are present, such as the deserted rural settlement and medieval long hut, meaning this is a landscape of moderate articulation.
- The historic elements are present within the landscape but given their nature are not readily visible or easy to understand.

Table 8.17 Evaluation of the relative importance of historic character area 018 indirectly affected by development

Value	V. High / v. Good	High / good	Mod. / med.	Low	Poor / none
In relation to:	(b) whole of historic landscape area on the register				
Rarity	✓				
Representativeness		✓			
Documentation	✓				
Group value	✓				
Survival	✓				
Condition		✓			
Coherence	✓				
Integrity	✓				

Potential		✓			
Amenity	✓				
Associations	✓				

Relative importance of historic character area 018 indirectly affected by development		
Average score (a) out of 55	Average score (b) out of 55	Average of (a) and (b)
0	52	52

8.7.15 Reasoning for judgements within category b) whole of Historic Character Area on the Register:

- Sole example of an Iron Age promontory fort within the historic landscape of Merthyr Mawr, Kenfig and Margam Burrows.
- Historic Character Area contains most of the elements that characterize the landscape (medieval ringwork/stone castle, agricultural landscape, multi-period relict archaeological landscape, ancient and broadleaf woodland and communication corridor).
- More than 80% of the elements within the landscape survive, however those elements only survive in a moderate condition for their class.
- The dominant historic themes are present within the landscape and they retain their original function.
- The elements within the landscape retain their original character and are both highly visible and easily understood.
- The Iron Age promontory fort, medieval castle and relict archaeological landscape provide a wide-ranging scope for public educational and recreational facilities.
- The medieval castle and village of Ogmor is associated with the Glyndwr rebellion, while the two enclosures located within the Historic Character Area are associated with Merthyr Mawr House (PGW (Gm) 12 (BRI), which is located within the Merthyr Mawr (HLCA012) Historic Character Area.

Table 8.18 Summary of average overall values for historic character areas affected by the development

Historic Character Area	Average value from stages a-c converted to a scale of 1-100	Grading
HLCA 017	(70.91) – 71	High
HLCA 013	(89.09) – 89	Very High
HLCA 016	(58.18) – 58	Considerable
HLCA 018	(94.55) – 95	Very High

Average Overall value, or combined evaluation figure for stage 4	
Average overall value	Grading
(78.18) – 78	High

**Assessment of the overall significance of the impact of the development
(ASIDOHL2 Stage 5)**

- 8.7.16 This section assesses the overall significance of the impact of this development and the effects that altering the Historic Character Areas concerned will have on the whole of the Historic Landscape Area on the Register. This final stage combines the results of Stages 2 to 4 to produce an assessment of the overall significance of impact of development and the effects that altering the historic character areas concerned has on the whole of the Historic Landscape Area on the Register. This is determined by setting out and scoring the value of the character areas affected in relation to the effect caused by development and the consequent reduction in value of the historic landscape area on the Register. The results are set out in the following table:

Table 8 19 ASIDOHL2 stage 5: summary of the overall significance of impact on landscape of historic interest 'hlca 017'

Value of character area (based on stage 4 results)	Impact caused by development (based on stages 2 & 3 results)	Reduction of value of historic landscape area on register
Medium Key elements of varying intrinsic importance and/or condition and/or group value and/or generally typical of this or other historic landscape areas on the Register.	High Substantial land loss and consequent fragmentation and/or visual intrusion causing some key elements to be removed or changed so that group value and/or coherence and/or integrity are significantly diminished, and/or amenity value greatly reduced.	Medium Development impact on key elements is such that there is some, but still appreciable, reduction in the overall value of the historic landscape area on the Register.
SCORE: 6	SCORE: 7	SCORE: 6
TOTAL SCORE: 19	OVERALL SIGNIFICANCE OF IMPACT: Fairly Severe	

Table 8.20 ASIDOHL2 stage 5: summary of the overall significance of impact on landscape of historic interest 'hlca 013'

Value of character area (based on stage 4 results)	Impact caused by development (based on stages 2 & 3 results)	Reduction of value of historic landscape area on register
Very High Key elements of very high intrinsic importance and/or condition and/or group value, and/or not found elsewhere in this or other historic landscape area on the Register.	Very Low Marginal land loss and consequent fragmentation and/or visual intrusion causing negligible changes to elements and their values.	Very Low Development impact on key elements is such that the value of the historic landscape area on the Register remains essentially unchanged.
SCORE: 9	SCORE: 1	SCORE: 1
TOTAL SCORE: 11	OVERALL SIGNIFICANCE OF IMPACT: Moderate	

Table 8.21 ASIDOHL2 stage 5: summary of the overall significance of impact on landscape of historic interest 'hlca 016'

Value of character area (based on stage 4 results)	Impact caused by development (based on stages 2 & 3 results)	Reduction of value of historic landscape area on register
Medium Key elements of varying intrinsic importance and/or condition and/or group value and/or generally typical of this or other historic landscape areas on the register.	Very low Marginal land loss and consequent fragmentation and/or visual intrusion causing negligible changes to elements and their values.	Very low Development impact on key elements is such that the value of the historic landscape area on the register remains essentially unchanged.
Score: 5	Score: 1	Score: 1
Total score: 7	Overall significance of impact: slight	

Table 8.22 ASIDOHL2 stage 5: summary of the overall significance of impact on landscape of historic interest 'hlca 018'

Value of character area (based on stage 4 results)	Impact caused by development (based on stages 2 & 3 results)	Reduction of value of historic landscape area on register
High Key elements of high intrinsic importance and/or condition and/or group value, and/or uncommon elsewhere in this or other historic landscape areas on the register.	Low Slight land loss and consequent fragmentation and/or visual intrusion causing limited numbers of key elements to be removed or changed so that group value and/or coherence and/or integrity are slightly diminished, and/or amenity value slightly reduced.	Low Development impact on key elements is such that there is slight reduction in the overall value of the historic landscape area on the register.
Score: 8	Score: 3	Score: 3
Total score: 14	Overall significance of impact: moderate	

Summary of loss through development impact

- 8.7.17 The development will have a direct impact and an indirect physical impact on a single Historic Landscape Character Area (Ochr Draw and Island Farm HLCA017), and an indirect, visual impact on four Historic Landscape Character Areas (HLCAs) of the Registered Merthyr Mawr, Kenfig and Margam Burrows Historic Landscape. The overall significance of impact of the proposed development on each of these four HLCAs and the entirety of the Historic Landscape on the Register is summarised in the following table:

Table 8.23 Overall significance of impact of the island farm development on the merthyr mawr, kenfig and margam burrows landscape of outstanding historic interest

Impact	Total score	Overall significance of impact
Hlca 017	19	Fairly severe
Hlca 013	11	Moderate
Hlca 016	7	Slight
Hlca 018	14	Moderate
Average of combined hlcas 013, 016, 017 and 018	$(19+11+7+14)/4 = 12.75$	Moderate
Historic landscape on the register	13	Moderate

8.8 Mitigation and Enhancement Measures

- 8.8.1 A map regression exercise combined with analysis of documentary sources and aerial photographs has identified ten sites of archaeological interest within the area of proposed development, of these sites it has been determined that the potential development will have a 'beneficial' effect on one site, a 'major' effect on a single site and a 'severe' effect on the eight remaining sites.
- 8.8.2 Improving access to the site of Hut 9 (ID 02215m/31803/LB11362) will have a 'beneficial' effect on this site. Improving the appearance of Hut 9 and providing public interpretation boards describing the historic use of the site and the resulting prison break would enhance the 'beneficial' effect on this monument.
- 8.8.3 The northern section of the proposed development area is occupied by the site of the Island Farm PoW camp (ID 02214m/31802); the site visit conducted for this assessment established that the remains of the PoW camp are more intact than previously thought. As a result it is recommended that a total station survey should be conducted across this site in order to record the locations of the surviving remains. Due to the dense coverage of trees and shrubs across the site it is not currently possible for this survey to be conducted, therefore a programme of vegetation clearance will be necessary before the survey can be achieved.
- 8.8.4 The proposed development will have a 'severe' effect on the projected route of the Glanwenny/Caerleon – Loughor Roman road (IDs 01016.5w/86926 and 01016.6w/86926). The exact route of this Roman road as it passes through the proposed development area is not known, therefore it is recommended that a series of archaeological test-pits are excavated across the site in order to locate it; once the line of the road is established two evaluation trenches should be cut across the road in order to record its composition.
- 8.8.5 The proposed development will have a 'severe' effect on the Island Farm barn and the associated cruciform pond (ID 04353m), in order to mitigate this effect it is recommended that a Level 2 building survey, as set out in *English Heritage's Understanding Historic Buildings: A guide to good recording practice* (2006) should be conducted on the barn and a Level 2 monuments survey as set out in *RCHME's Recording Archaeological Field Monuments* (1999) should be conducted on the pond, prior to the commencement of development works.
- 8.8.6 The route of a sunken trackway (ID 04354.0m) of probable medieval date, forming part of the *Heolgam* or the Crooked Way has been identified as running through the proposed development area on a northeast – southwest alignment. The proposed development will have a 'severe' effect upon this trackway. Therefore topographic and photographic surveys to a Level 3 monuments survey as set out in *RCHME's Recording Archaeological Field Monuments* (1999) is recommended in order to preserve this monument in record before it is destroyed.
- 8.8.7 During the map regression exercise a group of three possible prehistoric cairns (IF12) were identified on the first through to fourth edition Ordnance Survey maps (1878 – 1941) and on the modern Ordnance Survey mapping. Unfortunately it was not possible to visit this site during the production of this assessment, so it was not possible to positively identify these monuments. As a result it is recommended that an archaeological evaluation be conducted at the site of these monuments prior to the commencement of development works, in order to confirm the identification and inform a more detailed mitigation strategy.
- 8.8.8 The proposed development has currently been assessed as having a 'severe' effect on the

pond and Crossways (IDs IF08 and IF10), it is currently recommended that this effect should be mitigated by conducting an archaeological watching-brief on all groundworks in these areas. However, it is noted that these two sites are located within the confines of the 'Nature Conservation Area' and the provision of more detailed construction methods may reduce the effect of the proposed development upon these sites and the corresponding nature of the archaeological response.

- 8.8.9 It has been assessed that the proposed development will have a 'severe' effect on building IF09; it is therefore recommended that an archaeological watching-brief be conducted during all groundworks in the area of this site.
- 8.8.10 The archaeological works should be carried out to the professional standards laid down by the *Institute for Archaeologists*.

Residual Impact

- 8.8.11 Provided that the mitigation recommendations for sites 02214m/31802, 01016.5w/8961, 01016.6w/8961, 04353m, 04354.0m, IF08 – IF10 and IF12 are followed the effect of the proposed development will be reduced to 'none' and as a consequence there will be no residual impact on the archaeological resource.
- 8.8.12 The mitigation for Hut 9 (ID 02215m/31803/LB11362) will result in a need for continual management of the site in order to maintain public access to Hut 9.
- 8.8.13 If sites 02214m/31802, 01016.6w/8961, IF08 and IF10 are incorporated within the 'Nature Conservation Area' and preserved *in situ* for continual management of the site to prevent these sites from deteriorating.

8.9 Summary and Conclusions

- 8.9.1 The Glamorgan-Gwent Archaeological Trust, Projects Division (GGAT Projects) have undertaken a desk-based assessment of the archaeological effects of a proposed development at Island Farm, Bridgend. The assessment reviewed information held by the regional Historic Environment Record (HER) and the National Monuments Record (NMR), as well as cartographic and documentary sources. Aerial photographs were examined and a site visit conducted.
- 8.9.2 Part of the Registered Historic Landscape of Merthyr Mawr, Kenfig and Margam Burrows lies within the study area, and a separate ASIDOHL study has been conducted in order to assess the significance of the impact of the development on the Historic Landscape (see Section X). This ASIDOHL and desk-based assessment form part of a larger Environmental Impact assessment.
- 8.9.3 A total of 50 sites of archaeological interest were identified within the study area during the course of the desk-based assessment, none of which are Scheduled Ancient Monuments. Fourteen of these have statutory protection as Grade II Listed Buildings, although only one (Hut 9 of PoW Camp (198) Special Camp XI, 02215m/31803/LB11362) is located within the study area.
- 8.9.4 The effect of the development on the sites of known archaeological interest has been assessed as Severe in five cases, major in a single case and Beneficial in one. The severely affected sites are two sections of the projected route of the Glanwenny/Caerleon - Loughor

- Roman Road (01016.5w/86926 and 01016.6w/86926), Island Farm Barn (04353m) and a sunken Trackway (04354.0m), whilst the proposed development will have a major effect on the POW Camp (198) Special Camp XI (02214m/31802). It is considered that the development will have a Beneficial effect on Hut 9 (02215m/31803/LB11362).
- 8.9.5 A map regression exercise combined with analysis of documentary sources and aerial photographs has identified four previously unrecorded sites of archaeological interest within the development area a Pond (IF08), a Building (IF09), Crossways (IF10) and group of three possible Cairns (IF12). It has been assessed that the proposed development will have a Severe effect on all four sites.
- 8.9.6 In order to mitigate against the effect the proposed development will have on the above sites of archaeological interest it has been suggested that:
- 8.9.7 A total station survey should be conducted on the site of POW Camp (198) Special Camp XI (02214m/31802).
- 8.9.8 A series of test-pits should be excavated across the projected route of the Glanwenny/Caerleon - Loughor Roman Road (01016.5w/86926 and 01016.6w/86926); once the route has been established two evaluation trenches should be excavated across its route.
- 8.9.9 A topographic and photographic survey should be conducted along the route of the Trackway (04354.0m).
- 8.9.10 An archaeological evaluation should be conducted on the group of three possible Cairns (IF12) in order to confirm their identification and inform future mitigation.
- 8.9.11 An archaeological watching-brief should be conducted on all groundworks in the vicinity of the Pond IF08, the Building IF09 and Crossways (IF10).
- 8.9.12 It should be noted that the development lies within a landscape of high archaeological complexity, with important remains of all periods. Given the historical and archaeological importance and sensitivity of the surrounding landscape, and the high numbers of finds recovered from the vicinity, it is clear that there is potential for buried remains dating to all periods in the development area.
- 8.9.13 The ASIDOHL2 assessment exercise has established the overall significance of the impact of the Island Farm development upon the historic landscape of Merthyr Mawr, Kenfig and Margam Burrows has been assessed as 'moderate'. However, 'moderate' is relatively low on the ASIDOHL2 scale of significance, and as a result it is not considered that the proposed development would greatly reduce the capacity for understanding or appreciating the landscape's historical meaning or significance.

ASIDOHL2 Concluding Statement

- 8.9.14 The ASIDOHL2 process has identified that there will be a single direct physical impact upon the historic landscape, in the Historic Landscape Character Area (HLCA) of Ochr Draw and Island Farm (HLCA017). The direct physical impact of the proposed development to HLCA017 has been assessed as 'severe' with 64% of the post-medieval agricultural landscape and 34% of the post-medieval agricultural settlement being destroyed, along with a minor loss (5%) to the communication corridors running through the character area. The proposed development will also lead to the complete loss of three possible funerary monuments.

- 8.9.15 On the basis of principal representative viewpoints (PRVs) and with reference to contour mapping and site visits, the ASIDOHL2 process identified a range of visual impacts to four HLCAs, Merthyr Mawr Warren (HLCA 013), Ogmore Down (HLCA016), Ochr Draw and Island Farm (HLCA017) and Ogmore HLCA018). The visual impact was assessed taking into account the sensitive nature of the architectural plan, where the development has been designed to blend into the surrounding landscape (eg the 'green roof' on the 4G Indoor Sports Centre (Chapter 10, Paragraph 10.6.11) see Chapter 10 for a full discussion of the architectural and visual design of the proposed development) and the 'tree screening' to be planted around the development. Therefore, the proposed development will have a 'slight' effect on HLCAs 013 and 016, a 'moderate' effect on HLCA018 and 'considerable' effect on HLCA017.
- 8.9.16 The overall significance of the impact of the Island Farm development upon the historic landscape of Merthyr Mawr, Kenfig and Margam Burrows has been assessed as 'moderate'. However, 'moderate' is relatively low on the ASIDOHL2 scale of significance, and as a result it is not considered that the proposed development would greatly reduce the capacity for understanding or appreciating the landscape's historical meaning or significance.

8.10 References

Sources cited in the text

- Barrie D S M, 1994, A regional history of the railways of Great Britain, volume 12 South Wales (2nd edition), Nairn*
- Cadw/CCW/ICOMOS, 1998, Register of landscapes of outstanding historic interest in Wales, Cadw*
- Cadw/CCW/ICOMOS, 2001, Register of landscapes of special historic interest in Wales, Cadw*
- Cadw/CCW/Welsh Assembly, 2007, Guide to good practice on using the register of landscapes of historic interest in Wales in the planning and development process: revised (2nd) edition including revisions to the assessment process (ASIDOHL2), Cadw*
- English Heritage, 2006, Understanding Historic Buildings, A guide to good recording practice, Swindon*
- Hanks P (ed.), 1979, Collins Dictionary of the English Language, Collins*
- Hawthorne, S, M, 1989, Island Farm Special Camp 11 for Prisoners of War, Brynteg Comprehensive School, Bridgend*
- Howard Humphries Consulting Engineers, 1997, Geological desk-top study of Island Farm, in Island Farm and Brewery Field, Bridgend: a leisure, sports, business and residential development, submission for outline planning consent*
- Howell K, 2000, Island Farm, Bridgend: an archaeological assessment, GGAT Report no. 2000/067*
- Hunter J, 2002, Island Farm, Bridgend: an archaeological desk-based assessment, CgMs Consulting Report no. 3137*

Lewis, R, forthcoming, Ewenny, a causewayed enclosure in the Vale of Glamorgan: post-excavation report

Lewis, R and Hudson, N, 2006, Landscapes working for the Vale of Glamorgan: History and archaeology aspect, GGAT Report no. 2006/012

Lewis, R, 2003, Merthyr Mawr Estate, Vale of Glamorgan: Tir Gofal HE2 Farm Visit report, GGAT Report no. 2003/078

Lewis, J, M, 1982, The Ewenny Potteries, Cardiff

Margary, I, D, 1957, Roman roads in Britain, Volume 2, London

Maylan, N, 1991, Archaeological desk-top survey Schwyll to Brackla Watermain, GGAT unpublished report

Newman J, 1995 The Buildings Of Wales: Glamorgan, Yale University Press

Pearson, A and Lewis, R 2003, Prehistoric funerary & ritual sites: Blaenau Gwent, Caerphilly, Cardiff, Monmouthshire, Newport, Torfaen and the Vale of Glamorgan, GGAT report no. 2003/027

Randall H J, 1955, Bridgend: the storey of a market town, Bridgend Library and Information Service

Roberts, R, 2003, Historic Landscape Characterisation: Merthyr Mawr, Kenfig and Margam Burrows. Part 1 and 2 landscape characterisation and management, GGAT Report no. 2003/081

Sell, S, H, S, 2001, Bridgend Science Park, archaeological watching-brief, GGAT Report no. 2001/002

Sherman, A, and Evans, E, 2004, Roman roads in South East Wales: desk-based assessment with recommendations for fieldwork, GGAT Report no. 2004/073

Vincent, J, 1990, 'Island Farm Camp', After the Battle, 67, 28-39

Welsh Assembly, 2002, Planning Policy Wales, Welsh Assembly

Newspaper articles

Daily Express, March 12, 1945

Daily Express, March 16, 1945

Daily Worker, March 12, 1945

Western Mail, April 22, 1948

Internet sites

www.islandfarm.fsnet.co.uk , 4th August 2009

www.gtj.org.uk , 11th August 2009

Television programmes

Coast, Series 4, Lands End to Porthcawl (TV Programme) BBC 2, 28th July, 2009

Sources consulted but not cited

Cadw, ICOMOS UK, 2000, Register of Landscapes, Parks and Gardens of Special Historic Interest in Wales, Part 1: Parks and Gardens (Glamorgan), Cadw

Caple, R, F, 1992, Proposed residential and associated development at 'Broadlands', Bridgend, an archaeological appraisal

Thomas, R, 2003, Twentieth century military recording project: Prisoner of war camps (1939 – 1948), English Heritage

Harmers Limited, 2002, Environmental statement: proposed development comprising WRU National Academy, sport and leisure facilities, hotel/restaurant, business park, housing and associated access arrangements, Island Farm, Bridgend, Volume 1 – None technical summary

G, T, Clark's map of Bridgend, 1848, RCAHMMW

George Yates's map of Glamorgan, 1799, RCAHMMW

The Dunraven map of Bridgend, 1778, A map of part of the estates of Charles Edwin, surveyed by Edward Thomas, RCAHMMW

Thomas, H, 2007, Historic Gardens of the Vale of Glamorgan. Welsh Historic Gardens Trust

Cartographic sources

A map of Ewenny Demesne with other lands adjoining in the several parishes of Ewenny, Coity and Coychurch, 1807, Jn Williams, D/DE 476

Tithe Map and Apportionment for the parish of Coity Lower, 1840, P/80/2 and P/80/3

Ordnance Survey 1:2500, 1878, First Edition

Ordnance Survey 1:2500, 1899, Second Edition

Ordnance Survey 1:2500, 1918, Third Edition

Ordnance Survey 1:2500, 1941, Fourth Edition

SSEW, 1983, 1:250,000 Soil Map of England and Wales and Legend, Harpenden

8.11 Glossary

ASIDOHL: *Assessment of the Significance of Impacts of Development on Historic Landscape*

CRAPW: *Central Registry of Air Photographs for Wales*

HER: Historic Environment Record

LBII: Grade II Listed Building

NGR: National Grid Reference

NMR: National Monuments Record

PGW: Parks and Gardens of Wales

*RCHME: Royal Commission on the Historical Monuments of England (now part of
English Heritage)*

RCAHMW: Royal Commission on the Ancient and Historical Monuments of Wales

SSSI: Site of Special Scientific Interest

9 ECOLOGY AND NATURE CONSERVATION

9.1 Introduction

9.1.1 This chapter of the ES will consider the ecological impacts of the Island Farm development.

9.1.2 The study seeks to identify:

- The existing ecological features of the proposed Application Site and its surroundings and the role the site plays in hosting biodiversity in the wider landscape; and,
- The likely impacts of the proposed development, whether negative or positive, on the ecology of the area, in the light of proposed mitigation measures.

9.1.3 This study has been prepared in accordance with best practice guidance for Ecological Impact Assessment (EclA), including, but not limited to ODPM (2000), IEMA (2004) and IEEM (2006). It contains sections that:

- Describe the baseline environment;
- Identify and evaluate the likely ecological impacts from the development; and,
- Describe appropriate mitigation and enhancement measures.

9.2 Policy and Legislation

9.2.1 To provide background and context for this EclA, we first summarise relevant conservation and legal issues as they pertain to wildlife sites, habitats and species. This summary is organised according to present relevant international, national and regional/local laws and policies.

International

9.2.2 The EC Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora 92/43/EEC (the '**Habitats Directive**'), Annex II, lists animal and plant species of Community interest whose conservation requires the designation of Special Areas for Conservation (SACs) – sites of European Community importance. Annex IV of the Directive lists animal and plant species of Community interest (usually referred to as 'European Protected Species'), in need of strict protection.

9.2.3 The Conservation (Natural Habitats, &c.) Regulations 1994 (the '**Habitats Regulations**') transpose the Habitats Directive into national law. The Conservation (Natural Habitats, & c.) (Amendment) Regulations 2007 (the 2007 Regulations) came in force on 21 August 2007. This has amended the 1994 Regulations and introduced some significant changes to species protection provisions. Importantly, many defences that existed in the Habitats Regulations have been removed, including the commonly relied on 'incidental result of a lawful operation defence'.

9.2.4 The European Directive on the Conservation of Wild Birds 79/409/EEC (the '**Birds Directive**') is relevant to the ornithological features on any proposed development site. One of the main provisions of this Directive is: *The maintenance of the favourable conservation status of all*

wild bird species across their distributional range (Article 2), with the encouragement of various activities to that end (Article 3). Article 4(1) states ‘...species mentioned in Annex I shall be the subject of special conservation measures concerning their habitat...member states shall classify...the most suitable...as special protection areas (SPAs)...’ and Article 4(2) ‘...take similar measures for regularly occurring migratory species not listed in Annex I...’ There is also a requirement under Article 4(4) that member states ‘...take appropriate steps to avoid pollution or deterioration of habitats...outside these protection areas...’.

- 9.2.5 SAC and SPA sites together form the *Natura 2000* network of internationally important sites.

National

- 9.2.6 The Wildlife & Countryside Act 1981 (as amended) provides the basis for most of the UK’s wildlife protection measures. This national legislation provides the legal framework for the notification of Sites of Special Scientific Interest (SSSIs) as the very best national examples of sites for wildlife or geology.
- 9.2.7 The Natural Environment and Rural Communities (NERC) Act 2006 amends part of the 1981 Act in relation to SSSIs, for example in relation to offences and the serving of notices. Planning Policy Statement 9 (PPS 9) (see below) pays particular attention to the protection of designated sites, stating that development will not normally be granted on land within or outside an SSSI which is considered likely to have an adverse effect on that site’s interest features.
- 9.2.8 The Wildlife & Countryside Act 1981 (as amended) also contains a wide variety of species protection measures under Schedules 1, 5 and 8. All wild birds have a measure of protection making it illegal to deliberately or recklessly kill, injure or take wild birds, or take, damage or destroy a nest while in use or being built. Some rare bird species are afforded special additional protection under Schedule 1 of the Act, often referred to as Schedule 1 birds.
- 9.2.9 Other species likely to be encountered on potential development sites are afforded protection by the 1981 Act (as amended), for example, water voles, all British species of bats, and great crested newts (all under Schedule 5). Additionally, the four relatively widespread reptiles of Britain – the adder, grass snake, slow worm and common lizard – receive partial protection under Schedule 5 of the Act, making it an offence to knowingly kill or injure any of these species.
- 9.2.10 Species protection measures were updated through the Countryside and Rights of Way Act 2000 (CRoW), and some are afforded European protected status also through the EC Habitats Directive (above) and the Bern Convention (The Convention on the Conservation of European Wildlife and Natural Habitats 1982). The Bern Convention imposes legal obligations on contracting parties, such as the UK, to protect over 500 wild plant species and more than 1,000 wild animal species.
- 9.2.11 Some of these species may also be UK Biodiversity Action Plan (UK BAP) species. Biodiversity Action Planning is the UK Government’s response to the Convention on Biological Diversity (CBD) signed in Rio in 1992 (JNCC 2006). This has established a detailed approach for the protection of biological resources and is comprised of linked Habitat Action Plans (HAPs), Species Action Plans (SAPs) and Local Biodiversity Action Plans (LBAPs). Implementation of the BAP continues to gather momentum because of 2010 biodiversity targets (e.g. www.countdown2010.net; ALGE 2006).

- 9.2.12 National HAPs provide detailed actions and targets for conserving different habitats which are a priority at a national level (JNCC 2006). National SAPs involve action for hundreds of species which are rare or declining at a national level, along with the habitats which support them. The protection of these habitats and species is considered to be of vital importance nationally and may also be significant locally.
- 9.2.13 Though initially largely a voluntary initiative, BAP species and habitats were given statutory protection through Section 74 of the CRoW Act 2000 in England and Wales, superseded recently by Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006. This requires the listing of habitats and species of principal importance for the purpose of conserving biodiversity, and the habitats and species in Section 74 have been adopted for this purpose. Section 42 of the NERC Act 2006 lists species of principal importance for conservation of biological diversity in Wales.
- 9.2.14 For birds, in addition to the protection measures outlined above, the UK lists of Birds of Conservation Concern (e.g. RSPB *et al.* 2002, 2009) have gained recognised significance in the UK. Red-list species are of high importance, some of which are globally threatened, whilst the Amber-list birds also have an unfavourable conservation status and are of conservation concern. Additionally, farmland birds are the subject of a Public Service Agreement (PSA) target which aims to reverse the long-term decline in their numbers by 2020 (Defra 2005).
- 9.2.15 Other legislation that is relevant to this EclA at the national level includes the Protection of Badgers Act 1992, the Hedgerow Regulations 1997 (HMSO 1997), and Red Data Book or other listings for invertebrates.
- 9.2.16 Though a relatively common species, the Protection of Badgers Act 1992 makes it illegal to wilfully kill, injure or take any badger, or attempt to do so, and it is an offence to intentionally or recklessly damage, destroy or obstruct access to any part of a badger sett.
- 9.2.17 The Hedgerows Regulations 1997 provide arrangements for LPAs in England and Wales to protect important hedgerows by controlling their removal through a system of notification. To be 'important', as defined under the Regulations, all or part of the hedgerow must have existed for 30 years or more, and meet at least one of the criteria in Part II of Schedule 1 (see Defra 2002). The Regulations are useful for valuing hedgerows and identifying those that planning authorities are likely to be concerned about.
- 9.2.18 Though the British invertebrate fauna is extremely large, Ball (1986) identified uncommon invertebrate species which are classified as Nationally Notable (= Nationally Scarce). This category is sub-divided into Notable A (Na) and Notable B (Nb) based upon the known distribution of the species, with Na being scarcer. Red Data Book (RDB) insects are listed in Shirt (1987), sub-divided into species that are Endangered (RDB 1), Vulnerable (RDB 2) or Rare (RDB 3). Britain has international obligations to protect certain species of invertebrate under the EC Habitats Directive (above) and the Bern Convention. Species of invertebrate are also protected under the Wildlife and Countryside Act 1981, including selected RDB species.
- 9.2.19 Planning Policy Wales 2002 (PPW) sets out the land use planning policies of the Welsh Assembly Government. PPW, Technical Advice Notes and Circulars together comprise national planning policy which should be taken into account by local planning authorities in Wales when making decisions on individual planning applications, the aim being to promote the conservation of landscape and biodiversity and in particular the conservation of native

wildlife and habitats. Importantly PPW aims to ensure that action in Wales contributes to meeting international responsibilities and obligations for the natural environment; that statutorily designated sites are properly protected and managed; and that protected species are safeguarded.

- 9.2.20 As well as national policies regarding how biodiversity is to be protected through the planning system, PPW contains specific guidance on aspects such as designated and local sites, woodland and trees, and protected species.
- 9.2.21 Strict protection is to be afforded to statutorily designated sites, including SSSIs. The importance of non-statutory designations, such as Sites of Interest for Nature Conservation (SINCs), is also recognised but it is noted that such designations should not unduly restrict acceptable development.
- 9.2.22 Local planning authorities should seek to protect trees, groups of trees and areas of woodland where they have natural heritage value or contribute to the character or amenity of a particular locality. Ancient and semi-natural woodlands are irreplaceable habitats of high biodiversity value which should be protected from development that would result in significant damage. It is noted that local planning authorities should, as appropriate, make full use of their powers to protect and plant trees, to maintain and improve the appearance of the countryside and built up areas.
- 9.2.23 The presence of a species protected under European or UK legislation is recognised as a material consideration when a local planning authority is considering a development proposal which, if carried out, would be likely to result in disturbance or harm to the species or its habitat
- 9.2.24 Importantly, PPW indicates that the planning system has an important part to play in meeting biodiversity objectives by promoting approaches to development which create new opportunities to enhance biodiversity, prevent biodiversity losses, or compensate for losses where damage is unavoidable. Local planning authorities must address biodiversity issues in development control decisions.
- 9.2.25 At an operational level, PPW is supplemented by a series of Technical Advice Notes, with TAN(W) 5 *Nature Conservation and Planning* 1996 being the one of most relevance to ecology. This includes guidance on how development proposals affecting designated sites or protected species should be considered.
- 9.2.26 Importantly, TAN(W) 5 notes that statutory sites and non-statutory sites, together with features which provide wildlife corridors, links or stepping stones from one habitat to another, all contribute to the network necessary to ensure the maintenance of the current range and diversity of our flora and fauna and the survival of important species.
- 9.2.27 The requirements of PPW and TAN(W) 5 are therefore very important in the context of impact assessment, mitigation and compensation, for any development project in Wales.

Regional & Local

- 9.2.28 Local Biodiversity Action Plans (LBAPs) exist to drive the implementation of the UK BAP at the local level. The delivery of these plans at the local level is important in the context of the CRoW Act 2000, the NERC Act 2006 and PPW.
- 9.2.29 The study area falls within the BCBC administrative area, but with the Glamorgan County

boundary lying close to the south and south-east of the site. The objectives of both the Bridgend BAP and the Vale of Glamorgan BAP are therefore relevant, including their lists of priority habitats and species.

- 9.2.30 Local nature conservation sites, such as SINCs, are identified by local partnerships as sites of local importance for wildlife, geology, landscape or recreation. These sites may be of importance locally for the delivery of BAP targets and some may be of SSSI quality. Detailed guidance on the identification, selection and management of local sites is available (Defra 2006a).
- 9.2.31 At the local level, areas of woodland or individual trees may be the subject of Tree Preservation Orders (TPOs) and thus have a formally recognised value. TPOs can be applied to all types of trees, including hedgerow trees, and can be applied to one or more trees, an area of trees, or woodland.
- 9.2.32 TPOs are used by local planning authorities to protect selected trees and woodlands if their removal would have a significant impact on the local environment and its enjoyment by the public (ODPM 2000). PPW also sets out a presumption against developments that would impact on ancient woodland and aged or veteran trees outside of ancient woodlands.

9.3 Assessment Methodology and Criteria

- 9.3.1 The assessment is undertaken using best practice methodology for EclA developed by the Institute for Ecology and Environmental Management (IEEM 2006). This is being widely used in our profession and has been endorsed by the statutory nature conservation organisations of Great Britain.
- 9.3.2 After desk research and field survey in order to describe baseline conditions, the assessment proceeds as a five stage process, as follows:
- Ecological knowledge of the site is used to **value** the ecological features present, taking account of relevant conservation and legal issues;
 - **Impact assessment** is undertaken, in the absence of any mitigation for the impacts;
 - Assessment of the **significance** of impacts is undertaken, categorised in terms of the level of importance/sensitivity of the feature and the scale of likely effect;
 - **Mitigation** proposals are developed, in order to reduce or eliminate, where possible, the constructional and operational impacts identified; and,
 - **Residual impact assessment** is undertaken, identifying and characterising impacts that remain after the proposed mitigation measures are taken account of.

- 9.3.3 Further details are provided in the sections that follow.

Ecological valuation

- 9.3.4 The objective for this part of the assessment is to assign values to the ecological features/resources present in the study area, including those that have been designated for their nature conservation interest. We follow the procedure outlined in IEEM (2006) in order

to undertake the evaluation.

- 9.3.5 It is important to understand that legal protection and the policy framework is not implicitly used during the valuation process, though some aspects are relevant, for example lists of the status of internationally and nationally important species, BAP habitat and species listings, and methods that assess the relative importance of particular features, such as Hedgerow Regulations (1997) criteria.
- 9.3.6 In accordance with IEEM (2006), we adopt categories of ecological value that relate to a geographical framework (e.g. international to local), using examples of the ecological features/resources that qualify for each category. This is summarised in the following table.

Level of value	Indicative values of ecological features
International ●●●●●●	Internationally designated or candidate/proposed site. Regularly occurring population of an internationally important species.
National ●●●●●	Nationally designated site, or nationally important habitat. Regularly occurring population of a nationally important species, including national level BAP species.
Regional ●●●●	Viable area of key habitat identified in a regional BAP. Regularly occurring population of a regionally important species.
County ●●●	County designated site or important habitat listed in a county BAP. Regularly occurring population of a species important at a county level.
District ●●	Area of habitat identified in a District/Borough BAP. Regularly occurring population of a species important at District/Borough level.
Parish ●	Area of habitat of appreciable nature conservation value.

- 9.3.7 Often the valuation of a feature is relatively straightforward, for example the valuation of a designated site. However, in the absence of a recognized categorisation for all habitats and species in all localities, valuation is sometimes based on professional judgment, referring to a range of guidance material, including:
- Designated status of sites and the interest features supported;
 - Designated status of habitats and relevant Habitat Action Plan objectives;
 - Vulnerability and restoration/re-creation potential (e.g. of woodlands);
 - Designated status of species and relevant Species Action Plan objectives;
 - Rarity, distribution and trends of species.
- 9.3.8 Legal protection status is not used in valuation per se (although some legally protected species may have a high biodiversity value).

Impact assessment

- 9.3.9 The objective for this part of the assessment is to predict and characterise the impacts arising from the proposed development in the absence of any mitigation. Assessments are presented separately for the construction and operational phases of the development. Mitigation is outlined in Section 9.6, followed by an assessment of residual impacts for the fully mitigated scheme in Section 9.7.
- 9.3.10 Impact assessment is carried out by considering the nature/scale of each development impact on the ecological features within the study area, and assessing the likely direction, magnitude and scale of impacts, guided by the following criteria for sites, habitats and species.

Impact	Criteria for SITES	Criteria for HABITATS	Criteria for SPECIES
Major Negative ⇓⇓	The change is likely to cause a permanent adverse effect on the integrity of a key site or ecosystem.	The change is likely to cause a permanent adverse effect on the conservation status of habitats present.	The change is likely to cause a permanent adverse effect on the conservation status of species present.
Negative ⇓	The change adversely affects a key site, but there will probably be no permanent effects.	The change adversely affects a key habitat but there will probably be no permanent effect.	The change adversely affects a species, but there will probably be no permanent effects.
Neutral ⇔	No significant effect	No significant effect	No significant effect
Positive ⇑	The change is likely to benefit a key site in terms of the factors that confer it ecological value.	The change is likely to benefit a key habitat in terms of the factors that confer it ecological value.	The change is likely to benefit a key species in terms of the factors that confer it ecological value.
Major Positive ⇑⇑	The change is likely to restore the integrity of a key site or ecosystem, or create it for the first time.	The change is likely to restore a habitat to a favourable conservation status, or create it for the first time.	The change is likely to restore a key species to a favourable conservation status, or create it for the first time.

- 9.3.11 For the purposes of this assessment, a permanent (irreversible) impact is one from which recovery is not possible within a reasonable timescale or for which there is no reasonable chance of action being taken to reverse it. A reversible (temporary) impact is one from which spontaneous recovery is possible or for which effective mitigation is possible and a commitment has been made.
- 9.3.12 Two other aspects of these criteria warrant further explanation – the application of the concept of ‘integrity’ and conservation status.

Site or ecosystem integrity

- 9.3.13 The term 'integrity' has a long lineage in the ecological literature and is a concept that has evolved for ecosystems, but which can be applied to sites that can reasonably be considered to represent an ecosystem. A widely accepted definition, though drafted for internationally designated sites, appears in HMSO (2005) and is as follows:

'The integrity of a site is the coherence of its ecological structure and function, across its whole area, which enables it to sustain the habitat, complex of habitats and/or the levels of populations of the species for which it was classified'.

- 9.3.14 A site/ecosystem that achieves this level of coherence is considered to be at favourable condition.
- 9.3.15 In order to test whether or not an impact will affect the integrity of a site or ecosystem it is necessary to understand whether the changes arising from the proposed project are likely to move the baseline conditions at the site or ecosystem closer to, or further from, the condition which constitutes 'integrity' for that system. In the absence of precise methods, expert judgment is used.
- 9.3.16 IEEM (2006) recommends that in order to assist with this the answers to the following questions should be considered:
- Will any site/ecosystem processes be removed or changed?
 - What will be the effect on the nature, extent, structure and function of component habitats?
 - What will be the effect on the average population size and viability of component species?
 - And, that this should be in the light of the overall question:
 - 4. Will this move the condition of the ecosystem/site towards or away from favourable condition?

- 9.3.17 We have applied these principles as part of our assessment of the scale of impacts and, in doing so, have, by necessity, considered functions and processes acting outside of the application site's formal boundary. Thus, our predictions consider wider ecosystem processes, especially as they pertain to the conservation interests of nearby sites with international and national designations.

Conservation status

- 9.3.18 Following IEEM (2006), where possible, we utilize the concept of 'conservation status' in determining whether an impact on a habitat or species is likely to be ecologically significant. For habitats, conservation status is determined by the sum of the influences acting on the habitat and its typical species, which may affect its long-term distribution, structure and functions, as well as the long-term survival of its typical species within a given geographical area. For species, conservation status is determined by the sum of influences acting on the species concerned that may affect the long-term distribution and abundance of its populations within a given geographical area.

9.3.19 When assessing potential effects on conservation status, similar philosophies are applied as for integrity. The known or likely trends and variations in population size are considered, as well as the level of ecological resilience.

Assessing significance

9.3.20 After determining the scale of each impact, significance is categorised with respect to the level of importance/value and sensitivity of the site, habitat or species, and the scale of the likely effect. Significance is defined as a combination of a particular value and the predicted magnitude of impact, as shown in the following table.

	International ●●●●●●	National ●●●●●	Regional ●●●●	County ●●●	District ●●	Parish ●
Major negative ⇓⇓	Very high	Very high to High	High	High	Medium	Medium to Low
Negative ⇓	Very high to High	High	High to Medium	Medium	Medium to Low	Low
Neutral ⇔	No impact					
Positive ↑	Very high to High	High	High to Medium	Medium	Medium to Low	Low
Major positive ↑↑	Very high	Very high to High	High	High	Medium	Medium to Low

9.3.21 As with other parts of this assessment, professional judgement has been exercised during this assessment of impacts and their significance.

Mitigation

9.3.22 Mitigation measures are identified in order to reduce and if possible eliminate constructional and operational impacts and, where possible, enhance the site in accordance with best practice for net ecological gain (IEEM 2006) and in harmony with PPW.

9.3.23 Within this part of the assessment, we outline measures identified to:

- Avoid negative ecological impacts;
- Reduce negative impacts that cannot be avoided; and,
- Enhance the biodiversity of the site.

9.3.24 Where possible, priority is given to the avoidance of impacts at source through the re-design of the scheme (so-called 'designed-in' mitigation). Where this does not prove possible,

measures are identified to reduce impacts ideally to the point that they are no longer significant. Enhancement measures are included to provide positive biodiversity benefits, as promoted by PPW.

Residual impact assessment

- 9.3.25 Impact assessment is repeated taking account of the proposed mitigation measures in order to assess the residual impacts of the development.

Consultations

- 9.3.26 Throughout the compilation of this EclA, we have maintained contact with the following experts:

- Jane Gardner & Claire Bryant, Countryside Council for Wales.
- Steve Moon, County Borough Ecologist, BCBC.

- 9.3.27 This has included consultations on survey methodologies, results and findings, potential impacts, mitigation and enhancement solutions.

9.4 Baseline Data and Assessment

- 9.4.1 In this section of the EclA, identifies the ecological features/resources that could be affected by the development, and this is the main purpose of this baseline description. This description has been compiled from desk research and new survey data collected during the 2009 field season (Appendices 9.1 to 9.8) and pre-existing ecological information (Appendices 9.9 to 9.13), as described further below.

Information sources

Collation of existing ecological information

- 9.4.2 A search for relevant ecological information was conducted using on-line resources such as the National Biodiversity Gateway (www.searchnbn.net) and via a request for environmental records to the South East Wales Biodiversity Records Centre (SEWBRc), extending to a 3-km buffer around the study site.
- 9.4.3 The data search results are presented and interpreted in Appendix 9.1, results utilised in describing the baseline environment below.
- 9.4.4 Information from previous ecology reports, whose coverage was coincidental or overlapped in parts with the study area, was also utilised (*i.e. Wye Valley Surveys 2002; ELMAW 2004, 2005, 2006, 2009*). These reports contained information on habitats or species recorded or speculated to occur in the area. The reports are reproduced as Appendices 9.9 to 9.13.

Key feature surveys, 2009

- 9.4.5 Key features were identified from these resources, including key habitats and species that are likely to be affected by the scheme. These were the focus of detailed specialist survey in 2009, including surveys of hedgerows, bats, otter, breeding birds, reptiles, amphibians and

invertebrates, and the results are presented in Appendices 9.2 to 9.8. Dormice were not surveyed in 2009, as they had been extensively surveyed in previous years.

- 9.4.6 Full details of the methodologies utilised in compiling these results are outlined in the appended reports and are not repeated here.

Baseline ecological environment

Wildlife sites

- 9.4.7 Details for wildlife sites within or close to the study area are included in Appendix 9.1.
- 9.4.8 Part of the study area is a Site of Importance for Nature Conservation, see Figure 22 SINC Location Plan, (The Island Farm POW Camp SINC), designated for its grassland mosaic and because of the dormice present. The SINC makes up the north-west part of the overall site but extends into the arable zone and encompasses the larger of the swallow holes present (see Figure A1, Appendix 9.1).
- 9.4.9 There is no statutory designated site close enough to the study area whose features would be affected by the development (see Appendix 9.1). The nearest is the Craig-Y-Parcau Woodland LNR, an area of Ancient semi-natural woodland at approximately 400m from the Island Farm site. Ewenny and Pant Quarries SSSI, some 820m away, are notified for their geological interest, whist plants, dormice and invertebrates are the key features at Old Castle Down SSSI, lying more than 1-km from the study area.
- 9.4.10 These sites, shown in Figure A1 – Appendix 9.1, are the key sites for consideration in this EclA.

Habitats

- 9.4.11 Habitat information for the study area was compiled from earlier ecology survey reports (Appendices 9.9 and 9.13), supplemented by a detailed survey of hedgerows conducted in 2009 (Appendix 9.2). The appendices provide full details with only an overview of the key habitats present within the study area provided here.
- 9.4.12 In very broad terms, two main habitat areas are present: 'brownfield' land to the north-west of the site and 'agricultural' land to the south and east. From approximately 51.9ha in total, the brownfield area occupies approximately 13.3ha and the agricultural land the remaining 38.6ha.
- 9.4.13 The brownfield area is largely unmanaged and comprises of semi-natural broadleaved woodland, scrub, grassland and rubble/hard standing. It is described as containing a "young flora mostly developing towards woodland" (Appendix 9.9). The woodland appears to have developed post 1600 and is not particularly species rich (Appendix 9.13). There is late succession scrub developing into woodland as well as areas of continuous and scattered younger scrub, dominated by bramble. The grassland areas include cocksfoot *Dactylis glomerata*, Yorkshire fog *Holcus lanatus*, dog rose *Rosa canina* and rosebay willowherb *Epilobium angustifolium* as dominants, with some areas including bramble scrub. The brownfield area also includes the remnants of an old PoW camp, with only Hut 9 remaining, which is a Grade II listed building.
- 9.4.14 The agricultural land is actively farmed and comprised of four main habitats: arable

fields/pasture, hedgerow, ponds and swallow holes. The arable fields and pasture are notably poor in plant species (see below). The two ponds present are reported to be relatively small, man-made, heavily silted, support very few plants and are prone to drying out (Appendices 9.9 and 9.13). The swallow holes were more notable for the shrubs and trees present, with an abundance of ferns (see further below).

- 9.4.15 For a recent Extended Phase 1 survey, ELMAW (2009) identified a total of 16 habitat types across the site as a whole, with arable farmland the most prevalent (covering c.35.8ha) (Appendix 9.13). The additional fifteen habitat types were: semi-natural broadleaved woodland (c.2.4ha); continuous scrub/woodland (c.1.68ha); continuous scrub (c.2.64ha); scattered scrub (c.0.05ha); intact hedgerow with trees (c.840m); intact species-rich hedgerow without trees (c.3,908m); scattered trees (small number); semi-improved species poor neutral-slightly acidic grassland (c.4.24ha); improved species poor rank grassland (c.0.18ha); improved species poor horse-grazed pasture (c.2.07ha); ruderals (c.0.03ha); ruderals with developing scrub (c.0.19ha); standing water (i.e. pond); bare ground and buildings (c. 0.22ha).
- 9.4.16 Based on this information the site supports four habitats of particular importance, namely:
- Ancient and species-rich hedgerows
 - Lowland dry acid grassland
 - Lowland mixed deciduous woodland
 - Ponds
- 9.4.17 All are habitats considered notable under the NERC (2006) Section 42 list of habitats of principal importance in Wales, whilst hedgerows and lowland dry acid grassland are also Bridgend BAP habitats.
- 9.4.18 The habitats of primary importance are identified in Figure 23, Phase 1 Habitat Plan reproduced from ELMAW 2009 (Appendix 9.13).

Hedgerows

- 9.4.19 The hedgerows on site were surveyed by Wye Valley Surveys (2002) and it was noted that those separating the agricultural land from the brownfield area appeared to be old and perhaps of historic importance (Appendix 9.9). Given this observation and because hedgerows are habitats of principal importance in Wales, a detailed survey of hedgerows was conducted in 2009 and is reported in Appendix 9.2.
- 9.4.20 A total of 7.1km of boundaries were surveyed, including 22 hedgerow sections (3.9km) and 18 'other' boundaries including wide and former hedgerows, woodland strips, and scrub/woodland boundaries (3.2km). The most common woody species were blackthorn *Prunus spinosa*, hawthorn *Crataegus monogyna* and hazel *Corylus avellana*. Other species included sycamore *Acer pseudoplatanus* and lime *Tilia* sp, whilst ivy, bramble and honeysuckle and were also frequent in hedgerows across the site. The only veteran/mature hedgerow trees recorded were ash and oak by the road in the western corner of the site, and in the wide wooded strip by the horse pasture.
- 9.4.21 No relevant ancient woodland indicator species were recorded amongst the ground flora. Common ground flora species which were widespread across the site included cleavers

Galium aparine, nettle *Urtica dioica*, red campion *Silene dioica* and ground ivy *Glechoma hederacea*. The ground flora of many of the hedgerows bordering the arable fields was fairly species-poor and nutrient enriched, though the roadside hedges at the south and south western boundary of the site were slightly better.

9.4.22 Assessment of the hedgerow data indicated that four hedgerows were classified as 'Important' under the Hedgerow Regulations 1997, and these, plus two others, were also species-rich according to the UK BAP definition (*i.e.* contain at least five woody species per 30m). Species-rich hedgerows are highlighted as important by the Local BAPs for Bridgend County Borough and the Vale of Glamorgan.

9.4.23 The hedgerows of primary importance are identified in Figure A1 - Appendix 9.2.

Species

9.4.24 Species information for the study area was compiled from desk research (Appendix 9.1), earlier ecology reports (Appendices 9.9 to 9.13) and specialist protected species surveys undertaken in 2009 (Appendices 9.3 to 9.8). These appendices provide full details with only an overview of the key species present within the study area provided here.

9.4.25 Wye Valley Surveys (2002) record the botanical value of the study area to be limited overall. No notable 'arable weed' species were recorded and the value of the agricultural fields is largely restricted to the hedgerows, which vary in ecological value (see above). Swallow holes add very limited plant diversity (Appendix 9.9).

9.4.26 The brownfield area is regarded to be of greater value, but lacking in notable plant species; only *Carex spicata* appears to be notably localised and uncommon within Glamorgan, but a few others, such as *Cirsium acaule* are localised, but often abundant where they are found (Appendix 9.9). A mosaic of woodland, scrub, bramble and grasslands provides a good mix of habitats for faunal species.

9.4.27 Overall, the botanical composition of the study area is relatively poor and ordinary.

9.4.28 The presence of the **common dormouse** *Muscardinus avellanarius* across the site has been well established in earlier surveys. Dormice are a European protected species, a UK BAP species and are priority species within the Bridgend BAP.

9.4.29 A WDA Biodiversity Audit Dormouse Survey, in 2000, found dormouse-predated nuts within the brownfield part of the site, whilst a nut search by Cresswell Associates in 2001 found dormice to be present in four areas of the brownfield (reported in Woods 2004). Wye Valley Surveys (2002) found evidence of dormice across some parts of the site (Appendix 9.9), whilst the Vincent Wildlife Trust reported there to be 'good evidence' of dormice and 'valuable habitats' in the brownfield area (from Woods 2004).

9.4.30 In the first comprehensive survey, ELMAW (2004) reported dormice to be present throughout the site and the site was considered to offer good quality dormouse habitat (Appendix 9.10). Ten dormouse nests were recorded from 300 dormouse tubes monitored, three in the brownfield area and seven in the hedgerows of the agricultural land. Similarly, nine dormouse nests were recorded by ELMAW from 300 tubes in 2006 (one in the brownfield area and eight in the farmland hedgerows – Appendix 9.12). Woods (2004) considered that dormice were likely to be present at a density of 4-5 per hectare (confirmed by ELMAW 2004), giving a likely population estimate of 26-32 animals for the site (ELMAW 2004 – Appendix 9.10).

- 9.4.31 The brownfield area is considered to be the most suitable and to provide the core of the dormouse population's habitat. Hedgerows are considered to primarily function as commuting and dispersal habitats for young adults (ELMAW 2004; Woods 2004).
- 9.4.32 ELMAW (2005) report the results of bat activity and roosting surveys from 2004 and 2005 (Appendix 9.11). Preliminary results from bat surveys in 2009 (April to July) are reported in Appendix 9.3.
- 9.4.33 Hut 9 supports a **lesser horseshoe bat** *Rhinolophus hipposideros* roost, with between three and nine bats recorded between October 2004 and October 2005 (one torpid **brown long-eared bat** *Plecotus auritus* was also recorded in this building in October 2004).
- 9.4.34 Two visits to the Hut 9 roost were made during 2009, on the 2nd July and on the 14th August 2009. Eighteen **lesser horseshoe** were counted in July, with 14 in one room, whilst one **brown long-eared** was recorded also. The August visit produced 30 **lesser horseshoe** bats and one **brown long-eared**, indicating that the numbers had increased since the July survey (JUST ECOLOGY, pers. obs.). The lesser horseshoe bats were concentrated across several rooms in the middle of the building. There was no sign of young, but the survey was conducted quickly in order to minimise disturbance.
- 9.4.35 The Hut 9 roost is considered to be a satellite roost of sub-optimal quality, probably linked to the known larger lesser horseshoe maternity roost at Merthyr Mawr, just over 1km from the Hut 9 building¹⁸. There are no other known bat roosts on the Island Farm site.
- 9.4.36 The lesser horseshoes do not appear to feed on the Island Farm site and instead use the woodland, scrub and hedgerow habitats, within the brownfield area in the north and west of the site, to commute from and into the site from the direction of Merthyr Mawr Road (Appendix 9.3).
- 9.4.37 In addition to lesser horseshoes, six species of bats were recorded feeding or commuting at various locations within the site in 2004/2005, mostly in the brownfield area and along hedgerows and tree lines in parts of the agricultural land (Appendix 9.11). The species recorded were **common pipistrelle** *Pipistrellus pipistrellus*, **soprano pipistrelle** *Pipistrellus pygmaeus*, **brown long-eared**, **noctule** *Nyctalus noctula*, **natterer's** *Myotis nattereri* and **whiskered** *Myotis mystacinus* bats. All of these species were again recorded in 2009 except for whiskered and brown long-eared bats, with an unconfirmed record of the rare **barbastelle** recorded at the south-westernmost point of the site being of particular note (although a single pass by this species only – see Appendix 9.3).
- 9.4.38 These additional bat species feed and commute primarily within the brownfield parts of the site, but also along hedgerows in the agricultural fields, where some opportunistic feeding can also take place. However, the available data suggest that the site is not being used by bats as a preferred foraging habitat (Appendices 9.3 & 9.11).
- 9.4.39 The 2004 and 2005 bat surveys suggest that bats enter the site from a number of specific points, at the road junction of Merthyr Mawr Road and New Inn Road, and from the intersection of hedgerows with the railway bridge on New Inn Road (Appendix 9.11).

¹⁸ In 2002, this larger roost supported 79 lesser horseshoe bats (see Appendix 9.3).

- 9.4.40 Wye Valley Surveys (2002) considered that there was a lack of old trees with suitable bat roost features. However, ELMAW (2005) noted that a number of trees within the brownfield area did have the potential for a small number of roosting bats within a number of small cavities found within the trees (Appendix 9.11). This was confirmed during the 2009 surveys, although no bat roosts within trees have been located (Appendix 9.3).
- 9.4.41 Several of the bats recorded on site are European protected species and/or UK BAP species and are the subject of a species-group action plan within the Bridgend BAP.
- 9.4.42 Surveys for the **European otter** *Lutra lutra* were conducted on the two rivers that lie closest to the site: the rivers Ogmore and Ewenny (Appendix 9.4). Otters were found to extensively use both rivers, although no breeding sites were located and no evidence for otters was found away from the rivers on the Island Farm site. Otter are a UK BAP species a priority species within the Bridgend BAP. They are highly sensitive to habitat degradation and disturbance and so otters are a key consideration for this EclA.
- 9.4.43 Wye Valley Surveys (2002) report the presence of a range of common bird species within the Island Farm site (Appendix 9.9), information superseded by comprehensive breeding bird survey in 2009 (Appendix 9.5). Forty-one species were recorded within the Island Farm site, including red-listed Birds of Conservation Concern (**skylark** *Alauda arvensis*, **song thrush** *Turdus philomelos* and **house sparrow** *Passer domesticus*) and amber-listed species also (**green woodpecker** *Picus viridis*, **dunnock** *Prunella modularis*, **common whitethroat** *Sylvia communis*, **willow warbler** *Phylloscopus trochilus* and **bullfinch** *Pyrrhula pyrrhula*). Some of these are also UK BAP species and skylark is listed as a Bridgend BAP species and song thrush as a Vale of Glamorgan BAP species. Eight UK BAP species were recorded overall: **herring gull** *Larus argentatus*, skylark, dunnock, song thrush, **common starling** *Sturnus vulgaris*, house sparrow, **linnet** *Carduelis cannabina* and bullfinch (Appendix 9.5).
- 9.4.44 Evidence of breeding activity was recorded and it is likely that many of the bird species recorded breed on site (although not skylark, house sparrow, herring gull, common starling and linnet). The former PoW camp was identified as the area with the highest levels of bird activity, with the brownfield as a whole supporting the majority of the birds recorded (Appendix 9.5).
- 9.4.45 Wye Valley Surveys (2002) reported **slow worm** *Anguis fragilis* to be present close to the northern entry point to the site; but an absence of reptiles elsewhere (Appendix 9.9). ELMAW (2009) considered that the woodland edge, scrub and rough grasslands in the brownfield area had the potential to support reptiles (and perhaps also the hedgerow bottoms) (Appendix 9.13).
- 9.4.46 Comprehensive reptile survey in 2009 confirmed that slow worms are present in the north-west of the site, within the brownfield area, in two localities, but with only a maximum of nine recorded from the five survey visits made (Appendix 9.6). A single **grass snake** *Natrix natrix* was reported during these surveys also (on the southern boundary of the horse pasture field), and two have been reported subsequently in the area where the slow worms have been recorded (N.P. Roberts, in litt.). These results indicate that relatively small numbers of slow worms and grass snakes are present on site, but with a very restricted distribution.
- 9.4.47 Wye Valley Surveys (2002) report an absence of amphibians (Appendix 9.9), whilst ELMAW (2009) refers to a survey of a pond on site for amphibians, with none found (Appendix 9.13). However, amphibian survey at the two ponds on site in 2009 confirmed the presence of small populations of both **smooth newt** *Triturus vulgaris* and **palmate newt** *Triturus helveticus*,

with breeding confirmed at the two ponds. Great crested newt *Triturus cristatus* was not recorded, with the ponds present being assessed as unfavourable for this species (Appendix 9.7).

- 9.4.48 Wye Valley Surveys (2002) reported data for **moths** from 1997, 2001 and 2002 from the Island Farm the study area (Appendix 9.9). The wooded parts of the site were assessed as valuable for several localised species of moth and the site as a whole may be notable for a range of common **butterfly** species.
- 9.4.49 In 2009, comprehensive invertebrate survey was undertaken, sampling both the brownfield and agricultural areas, using a variety of survey techniques (Appendix 9.8). A total of 511 invertebrate species was recorded, the majority being widespread and common species typical of the wider countryside. The greatest invertebrate diversity was found in the brownfield area in the north-west part of the site.
- 9.4.50 Three invertebrate species classified as nationally scarce were recorded (**a species of a flower beetle, a rove beetle, and a picture-winged fly**), all recorded in the northern part of the site, with the rove beetle also found in the field margins.
- 9.4.51 Species information of primary importance has been combined with the key habitat information and is presented in Figure 24 Ecological Constraints.

Information gaps and other constraints

- 9.4.52 Pre-existing information has been utilised to help describe the baseline environment. Some of the information used is not contemporary, much of it was not collected for this specific purpose and the data often relate to different study zones and so the exact match of records is not perfect. Whilst this collation of information is considered to be informative, these limitations should be borne in mind.
- 9.4.53 A wide range of surveys have been undertaken using best practice survey methods. We utilise these survey data to good effect, but cannot completely eliminate the possibility of important ecological features being found through further investigation and/or by survey at different times of the year or in different years. We therefore recommend a precautionary approach is taken both to the interpretation of our findings and during any implementation of the proposed development on site.

Valuation of ecological receptors

- 9.4.54 This section presents the valuation of the ecological features and resources within the study area. Methods used are described in section 3. Justifications for the values assigned are provided in Table 9.1, with an overall summary in Table 9.2.
- 9.4.55 This assessment highlights that a number of valued sites, habitats and species are susceptible to the effects of an unmitigated scheme, including:
- Habitats of principal importance in Wales (ancient and species-rich hedgerows, lowland dry acid grassland, lowland mixed deciduous woodland and ponds) and nationally important or rare/declining/vulnerable species (dormouse, bats and otter).
 - A local wildlife sites important at the county level, the Island Farm PoW Camp SINC, and the breeding birds and reptiles that this site supports.

9.4.56 The key ecology constraints are mapped in Figure 24 Ecological Constraints Detailed impact assessment is required in order to assess the level of significance of the effects of the proposed development upon the ecological features identified. The potential impacts are outlined in Section 9.5, and an impact assessment provided in Section 9.6.

Table 9.1: Assessment of value of key ecological receptors within the study area

Receptor	Level of Value ¹⁹	Justification
Island Farm POW Camp SINC	●●●	Site is identified at the local level as being important for wildlife. Known to contain habitats used by European protected species.
Ancient and species-rich hedgerows	●●●●●	Habitat of principal importance in Wales and also recognised as important in the Bridgend BAP.
Lowland dry acid grassland	●●●●●	Habitat of principal importance in Wales and also recognised as important in the Bridgend BAP.
Lowland mixed deciduous woodland	●●●●●	Habitat of principal importance in Wales.
Ponds	●●●●●	Habitat of principal importance in Wales.
Dormouse	●●●●●	European protected species, UK BAP species and also Bridgend BAP species.
Bats (lesser horseshoe, brown long-eared, noctule, natterer's, whiskered, common pipistrelle, soprano pipistrelle)	●●●●●	European protected species and a number are UK BAP species. All bats are highlighted as important in the Bridgend BAP.
Otter	●●●●●	UK BAP and Bridgend BAP species.
Breeding birds (including skylark, song thrush, house sparrow, green woodpecker, dunnock, common whitethroat, willow warbler, bullfinch etc.)	●●●	UK BAP, red-list and amber-list species and birds flagged as important at the local level either on the Bridgend or Vale of Glamorgan BAP. However low numbers and thus probably only significant at the county level.

¹⁹ Note that where a feature has value at more than one level, its overriding value is that of the highest level. For example, hedgerows are nationally important as UK BAP habitat, but are also locally important as Bridgend BAP habitat. Their overall importance at a national level is adopted for the purposes of valuation.

Receptor	Level of Value ¹⁹	Justification
Reptiles (slow worm, grass snake)	●●●	UK BAP species, although low numbers probably only significant at the county level.
Amphibians (smooth newt, palmate newt)	●	No conservation status, though protected from harm by the Wildlife and Countryside Act 1981.
Invertebrates (including three nationally scarce species)	●●	Abundance of invertebrates and presence of two Nationally Notable (Scarce) species and one RDB species.

Table 9.2: Summary assessment of values of key ecological receptors

Value	Receptor
National ●●●●●	Dormouse Bats, Otter
Regional ●●●●	Ancient and species-rich hedgerows, Lowland dry acid grassland, Lowland mixed deciduous woodland, Ponds
County ●●●	Island Farm POW Camp SINC, Breeding birds Reptiles
District ●●	Invertebrates
Parish ●	Amphibians

9.5 Predicted Effects

- 9.5.1 The Figure 5 - Illustrative Masterplan and a description of the proposed development at the Island Farm site are included in Volume 2 of the ES and Chapter 2.
- 9.5.2 Figure 5 was tested within this EclA together with the parameter plans provided at Volume 2 – Parameters Plans and Figure 25 A48 Link Road Lighting Illuminance Levels. It should be noted that this impact assessment and the mitigation measures outlined in Section 6 may need revision on account of any changes to the Masterplan, parameters, construction or operational details.
- 9.5.3 In outline, the proposed development provides for the construction of a new multi-use sports development (a sports village), which will include rugby league, rugby union, football, tennis and boxing facilities within a landscaped parkland environment. The development will also include an extension to the Bridgend Science Park, providing low density, high technology office use, a sports centre and a wildlife conservation area. Access roads and tracks will be required and the development proposals will also provide for public open space areas, landscaping and wildlife areas.

- 9.5.4 Within this section of the ES, project activities that have the potential to cause ecological damage, stress or disturbance are identified, both for the construction phases of the project and for the completed development.
- 9.5.5 Using the methodology outlined in Section 9.3, impact assessment is presented for each phase of the development, taking account of the baseline ecological environment and the project activities that might impact on the ecology of the study area.

Construction

Impact description

- 9.5.6 Construction activities have been grouped and characterised according to their likely ecological impacts, as shown in Table 9.3. After site-wide enabling works of approximately 6-9 months, an overall 20 month construction period is envisaged for the sports village, and five years for the science park, and thus a 7-8year construction period overall.
- 9.5.7 The primary direct impact on ecology arises from the enabling works at the overall project and at the start of the construction period for each phase of the development, involving site clearance and the removal/disturbance of existing vegetation and soils. Permanent loss of wildlife habitats will occur, mainly in the agricultural zone, but including some habitat areas within the Island Farm POW SINC site.
- 9.5.8 Major land re-profiling will be required. A geotechnical and geo-environmental desk study report has been provided by Terra Firma and is reported as Appendix 7.1. The site sits on rocks of the Lias which typically comprise inter-bedded limestones and calcareous shales. The solid geology is overlain by Glacial Sands and Gravels or Boulder Clay. A geotechnical and geo-environmental site investigation was undertaken thereafter, in May 2009 (see Appendix 7.2).
- 9.5.9 The Terra Firma desk report (Appendix 7.1) suggested that ground contamination is likely to be limited to potential hydrocarbons in the brownfield area (associated with the former POW camp) and, in the south of the site, to fly tipping activity within the swallow holes, which may also have been used historically for the disposal of agricultural waste. Follow-up site investigation did not reveal any levels of contamination of particular concern and it was concluded that excavation of the site should not pose any particular risk to the environment.
- 9.5.10 Excavation and re-profiling of a large proportion of the agricultural fields will be necessary in order to create the correct plateaux and contours for the infrastructure, buildings and sports pitches on the Island Farm site, with associated disturbance to vegetation, soils and underlying geology.
- 9.5.11 . The cut-and-fill balance has been calculated to be neutral meaning that there should be no mass import or export of soils or rock, and thus no environmental impacts associated with the off-site haulage of such materials.
- 9.5.12 Secondary impacts are primarily associated with disturbance on wildlife species because of the increased levels of noise and construction activity that will occur on site, primarily initially associated with the building of the access roads and foundations for buildings and subsequently the stadia themselves, sports facilities, associated buildings, car parks, etc., and also the construction of the science park and landscape and wildlife areas.

- 9.5.13 Outline foundation solutions for the various structures have been proposed in section 7.5.5 of Chapter 7 and are either traditional (raft or trench) or piled solutions, as follows:
- Sports Centre – Traditional foundations
 - Main Rugby League Stadium – Traditional or Piled foundations
 - Rugby Union Stadium – Traditional or piled foundations
 - Tennis Centre – Traditional or piled foundations
 - Football Stand - Traditional or piled foundations
 - Other Low Rise Structures - Traditional foundations
- 9.5.14 It should be noted that even the larger structures may be built with traditional foundations, however, auger piling may prove necessary where Karst features are encountered under, for example, under the proposed Rugby League and Rugby Union stadia.
- 9.5.15 Baseline noise levels are available, as measured on roads and housing areas within the vicinity of the site (Chapter 13). As to be expected, construction activities could see noise levels increase by 37-59dB, and perhaps higher very close to construction activity (P. Trew, pers. comm.).
- 9.5.16 Vibration from construction activity has been considered in Chapter 13 and may be important for the ecological receptors on site. For humans, at least, the impact of vibration from various construction activities (excavation, compaction, heavy vehicles, hydraulic breaker and auger piling) is considered to be perceptible over distances of 5-40m only, depending on the construction activity concerned (see Chapter 13, Table 13.1 for details).
- 9.5.17 Disturbance from construction activities will therefore occur on site but will be most evident during the start-up enabling works (6-9 months) and during the 20 month period of construction for the sports village, when activities such as piling may be required on for some of the buildings. Levels of disturbance from construction activities are expected to decline after this period when only science park construction is to occur, and is progressed in phases.

Table 9.3: Ecological characterisation of activities involved in the provision of a new multi-use sports development at Island Farm.

Construction activities	Impact characterisation
Enabling works, including vegetation clearance, the removal or disruption of top-soil/sub-soil, and construction of temporary access roads into site and site compound(s).	This is the primary impact on site during construction, resulting in permanent habitat loss and disturbance to wildlife species. The activity will be extensive across site and take perhaps 6 months to complete, both for the sports village and the science park areas.
Earthworks, including major land re-profiling, excavation and ground re-profiling, for land drainage, water storage, landscaping and to support proposed buildings, roads and footpaths. Temporary surface water and pollution management measures (bunds and ditches) will also be constructed.	This is a secondary impact, occurring in areas where habitat loss has already occurred. These works cause disturbance to wildlife species and may affect off-site areas through impacts on water flows and site hydrology. The activity will be extensive across site and take perhaps 6 months to complete, both for the sports village and the science park areas.
Construction activities, including foundation works and the building of the stadia, sports pitches, sports centre, office units, car-parks, and also the construction of roads, the green bridge and pedestrian/cycle tracks.	This is a secondary impact, occurring in areas where habitat loss has already occurred. These works cause disturbance to wildlife species. The activity will be extensive across site and take perhaps 20 months to complete in the sports village area and 5 years for the science park (although not continuous).
Installations, including stadia and sports pitch lighting, service corridors, foul sewerage system, water distribution system, street lighting, landscaping and planting, security and other fencing.	This is a secondary impact, occurring in areas where habitat loss has already occurred. These works cause disturbance to wildlife species. The activity will be restricted to certain areas and, in each case, will take months to complete.

Predicted Impacts

- 9.5.18 The projected ecological impacts of the construction activities are shown in Table 9.4.
- 9.5.19 This assessment highlights that an unmitigated scheme would have significant negative effects on a number of the valued ecological receptors on site, including wildlife sites, habitats and species.
- 9.5.20 An impact of **High** significance is predicted to occur because of the loss of habitats for dormice, foraging bats and breeding birds (Table 9.4). Impacts of **High to Medium** significance would occur because of the potential loss of three of four important/species rich hedgerows on site and losses of areas of lowland dry acid grassland, lowland mixed deciduous woodland and ponds.
- 9.5.21 The overall loss of habitats within the Island Farm POW SINC has been assessed as being of **Medium** significance given that the integrity of the site will probably remain intact. So too has the unmitigated impact on reptiles because reptiles largely occur away from the areas of greatest impact.
- 9.5.22 After the loss of these habitats, disturbance to dormice, bats and breeding birds (given their national importance) have also been assessed to be impacts of **High** significance during the

construction period. **Medium** level impacts are projected for disturbance to reptiles and **Low** level impacts for disturbance to amphibians.

- 9.5.23 There would appear to be **No Impact** on otters from constructional activities because of no direct impact on otter habitats and little scope for disturbance given the distances to the closest rivers

Table 9.4: Assessment of potential ecological impacts during construction

Receptor	Value	Impact description ²⁰	Likely scale of impact	Justification for scale of impact	Likely significance of impact
Island Farm POW Camp SINC	●●●	Enabling works/ Earthworks	Negative ↓	Adverse effect on a key site, with some 12% of habitat within the site being lost or significantly modified.	Medium
		Construction activities/ Installations	Negative ↓	Adverse effect on the remaining part of the site through disturbance to wildlife species.	Medium
Ancient and species-rich hedgerows	●●●●	Enabling works/ Earthworks	Negative ↓	Important hedgerow on the west site boundary will be unaffected but three other important hedgerows are likely to be impacted and/or be permanently removed.	High to Medium
		Construction activities/ Installations	N/A	N/A	N/A
Lowland dry acid grassland	●●●●	Enabling works/ Earthworks	Negative ↓	Permanent adverse effect, with some 20% of habitat being removed, but this small scale loss unlikely to affect the conservation status of this habitat as a whole.	High to Medium
		Construction activities/ Installations	N/A	N/A	N/A
Lowland mixed deciduous woodland	●●●●	Enabling works/ Earthworks	Negative ↓	Permanent adverse effect, with some 20% of habitat being removed, but this small scale loss unlikely to affect the conservation status of this habitat as a whole.	High to Medium
		Construction activities/ Installations	N/A	N/A	N/A

²⁰ Refer to Table 9.3 for a full description of the projected impact.

Receptor	Value	Impact description ²⁰	Likely scale of impact	Justification for scale of impact	Likely significance of impact
Ponds	●●●●	Enabling works/ Earthworks	Negative ↓	Unless ponds can be avoided, habitat will be removed, although the ponds themselves are of very poor quality.	High to Medium
		Construction activities/ Installations	N/A	N/A	N/A
Dormouse	●●●●●	Enabling works/ Earthworks	Negative ↓	The change adversely affects this species, with an estimated loss of 8% of the primary dormouse habitat and some hedgerow connectivity, but there will probably be no permanent effects.	High
		Construction activities/ Installations	Negative ↓	Adverse effects arising from disturbance, but as the core dormouse habitat is being retained there will probably be no permanent effects.	High
Bats	●●●●●	Enabling works/ Earthworks	Negative ↓	The change adversely affects bats, with an estimated loss of 10% of the primary bat habitat and some hedgerow connectivity, but there will probably be no permanent effects. The Hut 9 roost site will be unaffected.	High
		Construction activities/ Installations	Negative ↓	Adverse effects arising from disturbance, but as the core bat habitat is being retained there will probably be no permanent effects. The Hut 9 roost site will be unaffected.	High
Otter	●●●●●	Enabling works/ Earthworks	Neutral ↔	No significant effect – species does not occur on or sufficiently close to the site.	No impact
		Construction activities/ Installations	Neutral ↔	No significant effect – species does not occur on or sufficiently close to the site.	No impact

Receptor	Value	Impact description ²⁰	Likely scale of impact	Justification for scale of impact	Likely significance of impact
Breeding birds	●●●●●	Enabling works/ Earthworks	Negative ↓	Adverse effects because of loss of nesting and foraging habitat, but, given the status of the birds involved and their ability to re-locate, there will probably be no permanent effects.	High
		Construction activities/ Installations	Negative ↓	Adverse effects arising from disturbance, but, birds will settle in surrounding areas and there will probably be no permanent effects.	High
Reptiles	●●●	Enabling works/ Earthworks	Negative ↓	The change adversely affects reptiles, with an estimated loss of 10% of habitat but there will probably be no permanent effects.	Medium
		Construction activities/ Installations	Negative ↓	Adverse effects arising from disturbance, but will probably be no permanent effects given the recorded locations of reptiles.	Medium
Amphibians	●	Enabling works/ Earthworks	Negative ↓	Unless ponds can be avoided, habitat for amphibians will be removed.	Low
		Construction activities/ Installations	Negative ↓	Adverse effects arising from disturbance, but will probably be no permanent effects.	Low
Invertebrates	●●	Enabling works/ Earthworks	Negative ↓	Adverse effects because of loss of invertebrate habitats, but, given the ability to re-locate, there will probably be no permanent effects.	Medium to Low
		Construction activities/ Installations	Neutral ↔	No significant effects likely to arise from disturbance.	No impact

9.5.24 N/A = Not assessed because the impact on the habitat will have already occurred by enabling/earthwork activities

Operation

Impact description

9.5.25 Ongoing-activities, post development, have been grouped and characterised according to their likely ecological impacts, as shown in Table 9.5.

9.5.26 The primary impact arises from use of the site by potentially large numbers of people and

- vehicles, causing disturbance to wildlife species, especially so on match days, and from the included sport centre and communal areas.
- 9.5.27 A Movement Assessment by Opus International Consultants (presented as Appendix 6.) provides an assessment of traffic issues and people numbers for the Island Farm site.
- 9.5.28 The main access route to site will be via a new 'T' junction on the A48 and will take vehicles through the 'brownfield' area to the centre of the site. A secondary access through the existing science park (accessed from Eweny Road via Technology Drive) is envisaged. Footpaths will be provided on both sides of these carriageways and access by bicycle across the site as a whole is to be facilitated and encouraged.
- 9.5.29 An overall parking capacity of 2,262 spaces has been incorporated into the development (1,735 in the sports village and 527 in the science park), with some normal day-to-day vehicle movements anticipated and larger influxes of traffic on match days.
- 9.5.30 The Island Farm site will accommodate three stadia for the home grounds of the Celtic Crusaders, Bridgend Ravens and Bridgend Town FC, with 15,000, 5,000 and 2,000 seats respectively.
- 9.5.31 Based on known and anticipated attendance figures, the maximum attendance for all three stadia has been projected at about 7,000 people, arriving either on foot or by car or bus/coach. Whilst some events will generate more visitors it is realistic that this will in turn result in an increased occupancy of cars and a greater use of minibuses / coaches rather than an increase in actual vehicle numbers.
- 9.5.32 It is projected that only half of the games played by any of the clubs involved will be at home and therefore at Island Farm, equating to perhaps 60 to 120 home games overall, the majority during the day, but with some evening games also (starting at 6pm).
- 9.5.33 It is not envisaged that all the facilities on site will be used to capacity simultaneously and it is not expected that capacity crowds will be achieved in any of the stadia, unless a special event is being hosted.
- 9.5.34 Disturbance to wildlife will inevitably occur from stadium, sports-pitch noise, vehicle and people movements at the Island Farm site and this could be especially relevant to species such as dormice, otter, bats and breeding birds. For the sports facilities there will be both crowd and PA noise, with crowd noise generally exceeding PA noise.
- 9.5.35 Relative to baseline levels (measured only in adjoining housing areas), crowd and player noise when games are being played could perhaps reach 60dB or more within a distance of approximately 20m from the pitch (P. Trew, pers.comm.). This would normally be restricted to possibly 90 minutes at the most and determined by the size of the crowd and the tempo of the game. It is not known what the overall level of noise might be should there be more than one event taking place at a time. Traffic noise during match events, by comparison, will be relatively insignificant, adding only 4dB above baseline (P. Trew, pers.comm.) and will largely be restricted to a period of about one hour either side of a sports match.
- 9.5.36 It is clear that such noise, which may extend into the late evening and will have important implications for species such as dormice and breeding birds.
- 9.5.37 Nocturnal wildlife species will be especially sensitive to the use of obtrusive lighting on the site (particularly on match days) and this is especially relevant to species such as dormice,

otter and foraging bats.

- 9.5.38 Highways lighting along the A48 is proposed to be 150W glass bowl street lighting mounted on 10m columns, whilst the arrangement for the internal roads is a maximum of 100W-on 7m columns. Standard street lighting will be required along principal pavements and in public areas. Some low level lighting will also be required in car parking areas for security and health and safety purposes. No lighting is proposed within 20m of a sensitive boundary.
- 9.5.39 A light spill analysis for the main access road through the brownfield area is presented in Figure 25 A48 Link Road Lighting Illuminance Levels and suggests that assuming 70W lights are used on 7m columns, then lux levels will drop below 1 lux (deep twilight) 18m from the road edge where a light is positioned. The cross section through the proposed link road demonstrates that the higher illuminance (10-15 lux) is confined over the road corridor rapidly decreasing to less than 3 lux at 13m from the road centre. With tall and wide hedgerow or tree planting at 10m from the road centre light levels could essentially be blocked and be significantly reduced to 1 lux or less beyond this vegetative barrier. The overall lighting plan for the site, Figure 9 – Lighting Intensity indicates that there is no lighting proposed within the SINC, except for along the adopted highway (see above), which will need to conform to highways standards and therefore be of at least medium intensity. Similarly the plan shows that there will be no lighting around most of the boundary of the Island Farm site, and across the periphery of the science park, with low intensity lighting within the science park and around the main stadia.
- 9.5.40 Overall, lighting impacts will occur relative to baseline levels and these will have particular implications for the nocturnal wildlife species residing at the Island Farm site.

Table 9.5: Ecological characterisation of activities involved in the operation of a new multi-use sports development at Island Farm.

Completed Activities	Development/Operational	Impact characterisation
Use of the site including access and travel on/off-site, presence of people, noise (from sports events and sports centre use), vehicles and work activities.		This is the primary impact on site during operation, resulting in disturbance to wildlife species. Noise levels and people pressure will be greatest during sports events and for limited periods only.
Use of installations including flood, street and security lighting and security fencing in selected areas.		This is a secondary impact on site, resulting in disturbance to nocturnal wildlife species and possibly restricted movements. The impact will be restricted to certain areas especially road corridors and around sports pitches, especially where flood-lighting cannot be easily contained..

Impact assessment

- 9.5.41 The projected ecological impacts arising from operation of the proposed developments are summarised in Table 9.6.
- 9.5.42 Disturbance to habitats that support dormice, bats or breeding birds, and/or the insensitive

use of lighting on site, were considered to cause impacts of **High** significance for these species if unmitigated (Table 9.6), species well known to be sensitive to such effects.

- 9.5.43 Other species, such as otter on nearby rivers, and reptiles and amphibians on site, were not considered to be significantly affected by the use of the site post-construction.
- 9.5.44 Given the regional status of ancient and species rich hedgerows, lowland dry acid grassland, lowland mixed deciduous woodland and ponds, their open nature and potential vulnerability to human abuse, uncontrolled access and disturbance was judged to cause impacts of **High to Medium** significance for these habitats, and an impact of **Medium** significance for the Island Farm POW Camp SINC as a whole.
- 9.5.45 If unmitigated, the proposed development of the Island Farm site will significantly change the landscape in this area, and especially the southern part, from a rural, farmed and low-intensity use area into a busy and artificially-lit area for both vehicles and people.
- 9.5.46 As a consequence, the assessment of operational impacts highlights that an unmitigated scheme would have significant implications for the ecology of the area.

Table 9.6: Assessment of potential ecological impacts during operation

Receptor	Value	Impact description ²¹	Likely scale of impact	Justification for scale of impact	Likely significance of impact
Island Farm POW Camp SINC	●●●	Use of the site by people, vehicles etc.	Negative ↓	Damage and disturbance to the site could potentially occur and cause a permanent adverse effect on the integrity and conservation status of this site.	Medium
		Use of installations	Negative ↓	Insensitive use of lighting could affect movements and behavior of species within the site.	Medium
Ancient and species-rich hedgerows	●●●●	Use of the site by people, vehicles etc.	Negative ↓	Damage and disturbance to hedgerows could potentially occur and cause a permanent adverse effect on the conservation status of this habitat.	High to Medium
		Use of installations	N/A	N/A	N/A
Lowland dry acid grassland	●●●●	Use of the site by people, vehicles etc.	Negative ↓	Ongoing damage and disturbance could cause a permanent adverse effect on the integrity and conservation status of this habitat.	High to Medium
		Use of installations	N/A	N/A	N/A
Lowland mixed deciduous	●●●●	Use of the site by people, vehicles etc.	Negative ↓	Ongoing damage and disturbance could cause a permanent adverse effect on the integrity and conservation status of this habitat.	High to Medium

²¹ Refer to Table 5 for a full description of the projected impact.

Receptor	Value	Impact description ²¹	Likely scale of impact	Justification for scale of impact	Likely significance of impact
		Use of installations	N/A	N/A	N/A
Ponds	●●●●	Use of the site by people, vehicles etc.	Negative ↓	Ongoing damage and disturbance could cause a permanent adverse effect on the integrity and conservation status of this habitat.	High to Medium
		Use of installations	N/A	N/A	N/A
Dormouse	●●●●●	Use of the site by people, vehicles etc.	Negative ↓	Disturbance within or close to habitats with dormice could have an adverse affect and road casualties are a possibility.	High
		Use of installations	Negative ↓	Insensitive use of lighting could affect movements and behavior of dormice within the site, and light spill could effectively make a further 5% of remaining habitat unfavourable to dormice.	High
Bats	●●●●●	Use of the site by people, vehicles etc.	Negative ↓	Disturbance within or close to habitats with bats could have an adverse affect and road casualties are a possibility.	High
		Use of installations	Negative ↓	Insensitive use of lighting could affect movements and behavior of bats within the site, and light spill could reduce the amount of habitat available to bats.	High
Otter	●●●●●	Use of the site by people, vehicles etc.	Neutral ↔	No significant effect – species does not occur on or sufficiently close to the site.	No impact
		Use of installations	Neutral ↔	No significant effect – species does not occur on or sufficiently close to the site.	No impact
Breeding birds	●●●●●	Use of the site by people, vehicles etc.	Negative ↓	Adverse affects arising from disturbance, but, birds will settle in surrounding areas and there will probably be no permanent effects.	High
		Use of installations	Neutral ↔	No significant effect (lighting unlikely to significantly affect movements and behavior of bird species).	No impact
Reptiles	●●●	Use of the site by people, vehicles etc.	Neutral ↔	No significant effect (reptiles occur in only a few areas on site and are unlikely to be extensively disturbed).	No impact
		Use of installations	Neutral ↔	No significant effect (lighting unlikely to significantly affect movements and behavior of reptile species).	No impact

Receptor	Value	Impact description ²¹	Likely scale of impact	Justification for scale of impact	Likely significance of impact
Amphibians	●	Use of the site by people, vehicles etc.	Neutral ↔	No significant effect (amphibians occur in only a few areas on site and are unlikely to be extensively disturbed).	No impact
		Use of installations	Neutral ↔	No significant effect (lighting unlikely to significantly affect movements and behavior of amphibian species).	No impact
Invertebrates	●●	Use of the site by people, vehicles etc.	Neutral ↔	No significant effect (invertebrates are unlikely to be extensively disturbed).	No impact
		Use of installations	Neutral ↔	No significant effect (lighting unlikely to significantly affect movements and behavior of invertebrate species).	No impact

9.6 Mitigation and Enhancement Measures

9.6.1 Mitigation measures are identified in order to reduce and if possible eliminate predicted constructional and operational impacts and, where possible, enhance the site in accordance with best practice for net ecological gain.

9.6.2 Where possible, priority has been given to the avoidance of impacts at source through the re-design of the scheme (so-called 'designed-in' mitigation). Elements of designed-in mitigation are described and have been reflected in the Masterplan for the development.

9.6.3 Where the avoidance of impacts has not proved possible, mitigation measures are identified here in order to avoid and reduce impacts ideally to the point that they are no longer significant. Enhancement measures are included to provide positive biodiversity benefits, where possible.

9.6.4 It is strongly recommended that an **Ecological Clerk of Works** be employed to continue to advise the project team and oversee the implementation of the mitigation strategy outlined below as the development progresses.

Construction

9.6.5 This section provides a summary of the mitigation necessary to off-set any of the constructional impacts identified previously. Mitigation measures are presented for each key impact in Table 9.4. The various elements of mitigation (avoid through design; other avoidance/reduction measures; and, enhancement measures) are further described below.

Table 9.7: Mitigation and enhancement measures to off-set potential construction impacts, including enabling works and all construction activities

9.6.6 Impacts assessed as neutral or N/A in Table 9.4 are excluded.

Receptor	Designed-in mitigation	Other avoidance/ reduction measures	Enhancements
Island Farm POW Camp SINC	Retain as much of the SINC as possible, the best parts and allow for connectivity with other green areas.	<p>Fence off retained area and establish as strict 'no-go' area for construction plant and materials.</p> <p>Seek to avoid habitat disturbance or damage, either direct or indirect.</p> <p>Do not allow construction lighting to strongly illuminate habitats within the SINC after dark.</p>	<p>Seek to extend the SINC boundary as shown as in Figure 4.</p> <p>Commission a 25 year management plan to improve the quality of wildlife habitats within the expanded SINC with target species in mind (including dormice, bats, breeding birds and invertebrates).</p>
Ancient and species-rich hedgerows	Retain and keep intact as many hedgerows as possible and, especially, species-rich hedgerows.	<p>Fence off retained hedgerows and establish as strict 'no-go' areas for construction plant and materials.</p> <p>Seek to avoid hedgerow disturbance or damage, either direct or indirect.</p> <p>Do not allow construction lighting to strongly illuminate hedgerows after dark.</p>	<p>Transplant or newly plant hedge lines to increase the width of retained hedgerows so they are more viable as habitats for species such as dormice.</p> <p>Supplement with a diversity of native hedgerow plant species to increase species richness.</p> <p>Introduce best practice hedgerow management as part of the maintenance plan for the Island Farm site.</p>
Lowland dry acid grassland	Retain as much lowland dry acid grassland as possible.	Seek to avoid grassland disturbance or damage, either direct or indirect.	Plan for the provision of high quality grassland habitat within the management plan for the SINC.
Lowland mixed deciduous	Retain as much woodland as possible.	Seek to avoid woodland disturbance or damage, either direct or indirect.	Plan for the provision of high quality woodland habitat within the management plan for the SINC.
Ponds	<p>Retain the two ponds on site if at all possible.</p> <p>Provide further ponds or wetland habitats within the overall site.</p>	<p>Permanently fence off and establish as strict 'no-go' areas, limiting access to people and preventing damage during construction works.</p> <p>Avoid and prevent pollution, enrichment and siltation.</p>	<p>Restore any remaining ponds to provide high quality pond habitats.</p> <p>Introduce best practice pond management as part of the maintenance plan for the Island Farm site.</p>

Receptor	Designed-in mitigation	Other avoidance/ reduction measures	Enhancements
Dormouse	<p>Dormice will benefit from the designed-in mitigation for habitats proposed above.</p> <p>Additionally, all areas of scrub and hedgerows that can be retained will be retained, across any part of the site.</p> <p>Retain some hedge lines to allow for connectivity to off-site areas, as far as practicable.</p>	<p>Provide a green bridge to allow for safe movements across main access road.</p> <p>Restrict enabling and construction activities to day-light hours only (or 6pm in winter).</p> <p>Survey and re-locate dormouse nest boxes and tubes that are in areas to be developed.</p> <p>No habitat removal during November to February, when dormice are hibernating and most vulnerable to disturbance.</p>	<p>Ensure the habitat requirements of dormice feature as a key issue in the management plan for the SINC and the maintenance plan for the Island Farm site.</p> <p>Ensure food plants for dormice are included in any planting scheme for new or existing hedgerows.</p>
Bats	<p>Bats will benefit from the designed-in mitigation for habitats proposed above.</p> <p>No development to be permitted within 50m of the Hut 9 bat roost.</p> <p>Additionally, all trees, areas of scrub and hedgerows that can be retained will be retained, across any part of the site.</p> <p>Removal of mature/dead trees kept to the absolute minimum.</p>	<p>Provide a green bridge on the current main flight line to allow for safe passage across main access road.</p> <p>Restrict construction activities to day-light hours only (or 6pm in winter).</p> <p>Trees to be inspected for bats prior to any felling/surgery work.</p> <p>Trees to be soft-felled, with ecological supervision as necessary.</p> <p>No felling/surgery on trees during November to February or April to September, to avoid hibernation and maternity periods for bats.</p>	<p>Ensure the habitat requirements of bats feature as a key issue in the management plan for the SINC and the maintenance plan for the Island Farm site.</p> <p>Construct a new purposely-designed bat roost site for species including lesser horseshoe bats within the SW of the SINC area and close to the current main flight line.</p> <p>Two bat boxes to be installed within the woodland for every mature tree removed from the site.</p>

Receptor	Designed-in mitigation	Other avoidance/ reduction measures	Enhancements
Breeding birds	<p>Birds will benefit from the designed-in mitigation for habitats proposed above.</p> <p>Additionally, all trees, areas of scrub and hedgerows that can be retained will be retained, across any part of the site.</p>	<p>Removal of nesting habitats for birds to take place outside of the bird breeding season (March to July inclusive).</p> <p>Retain as much potential nesting habitat as possible, including hedgerow, trees and scrub.</p>	<p>Ensure the habitat requirements of breeding birds feature as a key issue in the management plan for the SINC and the maintenance plan for the Island Farm site.</p> <p>Implement landscaping and planting plan²² that will provide suitable nesting, foraging and cover for breeding birds.</p>
Reptiles	<p>Reptiles will benefit from the designed-in mitigation for habitats proposed above.</p> <p>Additionally, all areas of scrub, grassland and hedgerow that can be retained will be retained, across any part of the site.</p>	<p>No habitat removal during November to February, when reptiles are dormant and at their most vulnerable.</p> <p>Destructive searches to take place where potential reptile habitat is to be removed, especially along the main access road.</p>	<p>Ensure the requirements of reptiles feature in the management plan for the SINC site.</p>
Amphibians	<p>Amphibians will benefit from the designed-in mitigation for habitats proposed above.</p> <p>Avoid impact on the two ponds on site if at all possible.</p>	<p>If any pond is to be destroyed, drain in winter (and before February) when breeding adult amphibians are not present.</p> <p>No terrestrial habitat removal during November to February, when amphibians are dormant and at their most vulnerable.</p>	<p>Ensure the requirements of amphibians feature in the management plan for the SINC site and the maintenance plan for the Island Farm site.</p> <p>Ensure new wetland features created across the Island Farm are suitable for amphibians.</p>
Invertebrates	<p>Invertebrates will benefit from the designed-in mitigation for habitats proposed above.</p> <p>Additionally, all areas of woodland, scrub and grassland that can be retained will be retained, across any part of the site.</p>	<p>Retain felled tree trunks, limbs and brush on site and create timber piles for use by invertebrates and other wildlife species.</p>	<p>Ensure the requirements of invertebrates feature in the management plan for the SINC site and the maintenance plan for the Island Farm site.</p>

²² All planting to include native species only, ideally sourced from local, sustainable sources. No ornamental planting to be permitted in ecology areas, including the nature conservation area and boundary hedgerows.

Designed-in mitigation

- 9.6.7 Designed-in mitigation is a form of avoidance and is a key feature of good project design. The key aim is to iterate the development proposals in order to retain as many key habitat features as possible, in whole or part, and to minimise impacts on the most important habitats, including those on which key species depend.
- 9.6.8 For the Island Farm development, impact on the most ecologically important part of the site (the 'brownfield' northern area – the SINC) has been restricted to the loss of a narrow corridor of habitat that will contain the main access route into the site, and also a minimal amount of habitat along the A48 across the north of the site, to allow for safe access to the site. The area where the SINC extends into the agricultural fields at the south of the brownfield (centred on the main swallow hole) will also be lost. Importantly, the position of the access road has been moved approximately 50m west from a similar junction arrangement (planning approved 2003) to take advantage of more open grassland habitat and avoid scrub and woodland.
- 9.6.9 Overall, for the SINC, approximately 12.65 ha of habitat will be retained from a former area of 14.15 ha. Although a 11% loss of total area will therefore occur, there is a commitment shown in the MasterPlan and within this mitigation strategy to seek to extend the SINC to incorporate the field to the south-west of the site, and also to introduce habitat enhancements and favourable management over the SINC as a whole. The proposed new boundary for the SINC will bring the total SINC area back to 15.17 ha, a 7% increase overall.
- 9.6.10 Avoidance of a major impact on woodland and scrub within the SINC has largely been achieved by aligning the access road through the grassland area down the centre of the site. Connectivity between the habitats within the SINC and other areas has been maintained by retaining boundary hedgerows on the site perimeter and brownfield boundaries, which will also be enhanced (see below). The bat roost area at Hut 9 has been avoided altogether.
- 9.6.11 Where possible an impact on hedgerows defined as important or species-rich has been avoided, and the two ponds on site have been retained through re-alignment of an access road. Where possible, mature trees have been avoided and retained within the development, and existing areas of scrub similarly retained.
- 9.6.12 The designed-in measures are expected to assist with the retention of key species on site, including dormice, bats, breeding birds, reptiles, amphibians and invertebrates. Furthermore, the enhancements and the optimal management proposed for habitats on site (discussed below) aims to assist key species and allow them to thrive on the Island Farm site.

Other avoidance/reduction measures

- 9.6.13 **Permanent fencing** should be erected to discourage uncontrolled human access into the SINC area, and also ingress by construction staff and their vehicles. This should be installed at the very start of the scheme.
- 9.6.14 The fencing will help to prevent habitat damage or disturbance to wildlife species. For similar reasons, other potentially sensitive habitats (e.g. hedgerows, ponds/wetlands) should also be permanently fenced off, with access gates for maintenance purposes, again at the very start of the scheme. A fencing plan should be prepared and agreed with the Ecological Clerk of Works as part of the pre-construction documentation. The fence should allow for the free movement of wildlife species.

- 9.6.15 A key element of our recommended impact reduction measures is the incorporation of a green bridge over the main access road to the site (position shown on the MasterPlan). This is because this road could potentially interfere with the movement of dormice and lesser horseshoe bats, both of which are known to be reluctant to cross well used roads.
- 9.6.16 The green bridge has been positioned so that it lies on the known key flight line for lesser horseshoe bats from the Hut 9 roost, and close to good dormouse habitat. An example of a similar green bridge is shown in the Design and Access Statement. The green bridge at Island Farm should be a minimum 5m wide to maximise the probability of it being used.
- 9.6.17 Importantly the bridge will be planted with a mix of target species including hazel, hawthorn, blackthorn, bramble and honeysuckle, with new scrub planting at each side of the bridge, and splayed out into the site so that it connects to existing scrub areas. The Ecological Clerk of Works should specify the quantities and precise mix of trees and shrubs to be planted as part of the pre-construction documentation. Plants of local provenance should be used and native species only. Transplants from other parts of the site should be considered (see below) and after care should be provided so that this habitat establishes effectively and as quickly as possible.
- 9.6.18 The use of semi-standard trees and shrubs is recommended. Planting young trees and shrubs ('whips') will result in long delays (up to ten years) before adequate foraging and sheltering habitat is available for dormice to use, and semi-standards would provide alternative habitat much more rapidly (within one or two years potentially).
- 9.6.19 An alternative may be to transplant any existing mature habitat from the road route or agricultural area. This will involve physically digging-up the existing hedgerow or scrub and moving it to prepared holes within the bridge structure.
- 9.6.20 Transplanting the existing habitat, possibly with some additional planting of certain species, e.g. honeysuckle, should provide a usable dormouse habitat almost instantly, certainly within one year, although the habitat should be monitored by the Ecological Clerk of Works to ensure adequate health, flowering and fruiting.
- 9.6.21 Although the most rapid in terms of habitat establishment, transplanting will require specific horticultural expertise and experienced, knowledgeable machine operators with experience of this type of work. However, this method would enable the movement of large clumps of, for example, bramble (a key species), into the new habitat areas, where planting of small bramble plants will take many years to establish. Transplantation is therefore recommended.
- 9.6.22 Also important to the success of the green bridge is the detail of the lighting proposals for this part of the site, where it should be noted any direct or strong illumination of the green bridge area should be avoided. Any nearby lighting should be minimal and at low level to ensure street lighting does not preclude dormice or bats using the green bridge. Light levels on the bridge should not exceed the average lux levels currently experienced within the SINC. The Ecological Clerk of Works should advise further on the lighting arrangements for the green bridge area and the access road as a whole.
- 9.6.23 This strategy is designed to allow for the safe passage for dormice and bats through this part of the site, ensuring connectivity with different parts of the SINC area. It is considered to be a far superior solution to the use of rope or wire frame bridges for dormice, since such bridges have not been shown to work. It's efficacy should be monitored and reported, to inform future mitigation projects for this species

- 9.6.24 Dormouse nest boxes and nesting tubes are scattered across the Island Farm site (remnants from previous site surveys), including within many of the hedgerows and in parts of the northern brownfield area. In habitats that are to be impacted by the development, dormouse nest boxes and tubes should be surveyed and then removed and re-located into parts of the site that will remain undisturbed. This work should be undertaken by a licensed ecologist in October, when vegetation die-back allows the boxes and tubes to be located and prior to dormice entering hibernation. *In view of the proposed start date on site, this task should be undertaken in October 2009.*
- 9.6.25 The value of both current and created wildlife habitats, especially aquatic habitats including ponds and wetland features, may be severely compromised by pollution events. Pollutants can arise from a variety of sources but are most likely to occur from fuel and oil seepage from the many vehicles that will use parts of the Island Farm site.
- 9.6.26 As a consequence, the implementation of standard pollution prevention measures (both during construction and operation) is recommended including appropriate site protocols, interceptors and emergency procedures, for pollutants, dusts and silts, as a safeguard in the vicinity of sensitive ecological receptors, such as the SINC and the habitats within, and all wetland features. The potential addition of silt to watercourses should also be avoided and managed, as part of the mitigation strategy for the site.
- 9.6.27 Mature and dead trees are a key habitat feature for species including bats and breeding birds and, as a consequence, their removal will be prohibited except where essential. Mature and dead trees and hedgerows to remain should be subject to standard tree-protection measures during the constructional phases of the project.
- 9.6.28 Once it has been identified which mature or dead trees need to be felled or significantly managed, these should be subject to a pre-works assessment for breeding birds and bats (and bat emergence surveys, if required) and the trees 'soft-felled' under ecological supervision, as necessary. The trunks of felled trees should remain on site and be moved into the SINC or retained hedgerows to rot under normal process. Cut limbs and piles of brash wood should also remain on site and be used to create timber piles for use by nesting birds and invertebrates. The Ecological Clerk of Works can advise on methods and the sighting of such features.
- 9.6.29 For a variety of the ecological receptors on site, careful timing of works can be used to avoid the most sensitive time of year or period of the day for the species concerned. The Ecological Clerk of Works should be invited to input into the construction programme and working methods to make sure that insensitive timing of works is avoided.
- 9.6.30 Avoiding the destruction of nesting habitats for birds (e.g. hedge, scrub, woodland, trees, and ground vegetation *etc.*) during the bird breeding season (usually March to July) is important, which will also help to avoid an impact on summer roosts for bats.
- 9.6.31 Also, works to dead/mature trees should be avoided during winter (November to February) because of their potential to support bats in hibernation (i.e. at winter roosts). Avoiding the breeding and hibernation periods for dormice will also be critical and, finally, if any ponds are to be destroyed, these should be drained in mid-winter (December or January) when breeding amphibians will not be present.
- 9.6.32 An overall summary of vulnerable periods for relevant protected species is included below, periods during which disturbance should be minimised or avoided altogether.

- 9.6.39 Finally, the restriction of constructional activity to day-light hours (or 6pm in winter) is also recommended to reduce disturbance effects on nocturnal wildlife species.

Enhancement measures

- 9.6.40 Given the loss of site area for the SINC, a critical part of this mitigation strategy is the commissioning of an expert ecological design for the south west field, and the field containing the new wetland area in the west, that seeks to provide high-quality wildlife habitats that are appropriate to the setting and that target key species for which this site has maximum potential. The design should include:
- A well-researched habitats plan;
 - Targets for habitats (wetland, grassland, scrub) and species (dormice, bats, reptiles, birds, invertebrates);
 - Detailed design information for the creation of the target habitats and for the creation of features to attract the target species, including profiling, contouring and planting specifications;
 - Suitable access arrangements for controlled human access and management.
- 9.6.41 Habitat enhancement in this area should aim to compensate for the loss of habitat to the main access road through the SINC. The detailed ecological design will need to be commissioned once the concept has been formally agreed. At the same time, as noted above, an extension to the SINC boundary should be sought to encompass this extended area of prime wildlife habitat. This will be explored in discussion with the landowner and BCBC, with the proposed extension illustrated in Figure 22 SINC Boundary.
- 9.6.42 In parallel with the design of the nature conservation area, a long-term 25-year **management plan** should be prepared for the whole of the SINC site. This should be produced by a qualified ecologist covering all habitats within the site and should include detailed prescriptions for appropriate management of all habitats, together with a time-scale for implementation of all management and necessary remedial actions if the replacement habitat fails to flourish or is damaged by vandalism or fails for other unforeseeable reasons. The management plan should detail the organisations responsible for managing and implementing all stages of the management plan, together with those responsible for funding such work.
- 9.6.43 The management plan should seek to maintain and enhance both the created and the retained wildlife habitats, and should allow management to be adapted to changing circumstances and in the light of monitoring results from the site. The management plan should be gifted to the owners of the site and should provide the blueprint for the management of the ecology of the SINC.
- 9.6.44 Very important also will be the provision of a purposely designed and built **bat roost** building within the south-west field within the expanded SINC area. This has been positioned so that it lies on the known key flight line for lesser horseshoe bats from the Hut 9 roost, and close to the prime feeding habitats on the River Ogmore and the Merthyr Mawr estate. This new roost site should be constructed in the very first stages of the development so that it becomes available should there be any temporary disturbance to the Hut 9 roost. The indicative position of the new bat roost is shown on the Masterplan.

- 9.6.45 The new roost site would need to have suitable access points for both lesser horseshoe and brown long-eared bats, and be able to provide a variety of roosting conditions, such as differing temperature regimes, to suit seasonal and diurnal changes in temperature. This building would need a warm roof void, as well as a constant and cool cellar. The building will need to be locked and made secure. Key design parameters are as follows:
- The building should be two-storey, with an upper room for summer maternity use and a cellar room for winter hibernation use.
 - The building should have a footprint area of 5x5m, with a cellar height of 2.5m and an upper room height of 3.5m.
 - Direct flight access for lesser horseshoe bats through the roof of the building, with access to the cellar area provided within.
 - A suitable thermal regime should be provided for, thus:
 - A steeply pitched roof (42° is optimum) with one pitch facing south, so as to achieve high temperatures in summer (up to 50°C maximum) but with a choice of roosting temperatures. Dark-coloured roof coverings, such as black slates, will help to produce high temperatures.
 - Stable temperatures in the cellar area of ideally 6-10°C for horseshoe bats.
 - A high relative humidity within the cellar area of over 90%. This could be provided by allowing for ground water to seep in one side of the cellar with a sump letting out the excess. Omitting any damp-proofing in below-ground areas will also assist in raising humidity.
 - The building should be made as resistant to damage by vandalism as possible; access will be required into both rooms for monitoring purposes.
- 9.6.46 If this building were to be positioned towards the west of the 'brownfield land', should the bats be encouraged to use it, it would negate their need to commute across the site, as they currently do. Artificial lighting should be avoided altogether in this area with any direct illumination of the new bat roost site and nearby fields and hedgerows avoided. Further design detail can be provided by the Ecological Clerk of Works, who can specify and supervise the construction of the new bat roost at Island Farm.
- 9.6.47 The new roost site for bats is likely to become important in helping to support local bat populations on a landscape scale. A further enhancement measure for bats will be the provision of two bat boxes for every mature tree removed from the Island Farm site. The types of bat boxes to be used and advice on the sighting of these boxes will be provided by the project's Ecological Clerk of Works.
- 9.6.48 Enhancement is also proposed for the boundary hedgerows on site, including all of those along the southern perimeter of the site and those that define the new (extended) SINC boundary. It is suggested that this is achieved either by transplanting the better quality hedgerows from areas where such hedgerows will be lost, or by further planting, or a combination of each. This work should be guided by the Ecological Clerk of Works, with any new planting comprising of native species of local provenance. The general principles established above for the planting-up of the green bridge should apply to these features also, including ensuring their suitability for dormice and bats.

- 9.6.49 Future maintenance of any translocated or planted hedges will need to be provided to ensure establishment and recovery. This will need to include after care and additional planting with locally appropriate species at a suitable density (usually 4/6 plants per metre in a double staggered row), further remedial repairs, and a cutting regime which encourages recovery of a dense low hedge. Key food sources for dormice, birds and invertebrates should be provided.
- 9.6.50 The two existing ponds on site that will remain post-construction should be restored to provide a good quality environment for wildlife. This will involve the removal of duckweed, green algae and stagnant sediments, establishing the correct mix of shade and sunlight and water quality, and re-planting with suitable marginal and aquatic plants, using only native species. No fish or waterfowl should be added.
- 9.6.51 These general measures will greatly increase the pond's wildlife value for amphibians, dragonflies, damselflies and many other groups. Supervision and instruction can be provided by the Ecological Clerk of Works.
- 9.6.52 Four new wetlands are proposed for the site and these should be optimally designed and planted with wildlife species in mind.
- 9.6.53 An overall **maintenance plan** should be compiled for the remainder of the Island Farm site (i.e. the none-SINC area) that provides for the sensitive and appropriate management of the habitats within the wider site, e.g. hedgerows, scrub, trees, pond and wetland features *etc.*.
- 9.6.54 Whilst the production of this plan is best left until a later stage in the project, the production of the plan is strongly recommended since the habitats within the wider site are important in providing connectivity between the SINC and the surrounding countryside, for example for bats, birds and dormice.

Operation

- 9.6.55 This section provides a summary of the mitigation necessary to off-set any of the operational impacts identified. Mitigation measures are presented for each key impact in Table 8. The various categories of mitigation are overviewed here, although designed-in mitigation, which is described under construction above, is not repeated here.

Avoidance/reduction measures

- 9.6.56 Through the operational phase of this development, a number of the mitigation measures established during the construction phases of the project will need to be maintained in order to avoid and reduce impacts on wildlife habitats and species.
- 9.6.57 The fencing installed to protect the SINC and key habitat features (i.e. hedgerows, ponds and wetland features) should be maintained to protect the integrity of these wildlife habitats, whilst allowing for movement of wildlife. The green bridge will need to be maintained as an optimal habitat corridor for dormice and bats, and the new bat roost site protected from damage and disturbance.
- 9.6.58 The lighting installed during construction of the scheme should continue be operated so that excessive illumination of wildlife areas is prohibited, to the benefit of nocturnal species. Although the sports pitches and stadia will require flood-lighting to enable them to be used to full benefit, it should be possible to restrict the use and timing of any flood-lights to minimise

adverse impacts on nocturnal species.

- 9.6.59 Flood-lights in the main stadia should be turned off after 11pm and after 9.00pm on the training and football pitches, to allow dormice and bats the rest of the night-time to feed and forage unaffected. Car-park lighting should be turned off after midnight and the car-parks gated to prevent access after this time. Streetlights throughout the rest of the site should be turned off during the early hours of the morning to enable the habitats alongside these roads to be used for foraging activities. Taken as whole, this would enable the existing SINC and proposed enhanced habitats within the SINC to provide suitable dormouse/bat habitat, with reduced levels of disturbance when these animals are active.
- 9.6.60 For ponds and wetland areas, the pollution prevention measures established for the construction phases of this development should be maintained in perpetuity, in order to prevent and manage any pollution events that may impact on the wildlife zones.

Enhancement measures

- 9.6.61 A key part of the overall mitigation strategy for this development is the delivery of long-term management within the SINC and across the wider site that allows wildlife habitats and species to survive and prosper. Thus the agreed management and maintenance plans for the site need to be implemented in full and the success of the measures monitored and revised as appropriate to deliver maximum wildlife gain.
- 9.6.62 Over the longer-term of operation, the wildlife management and maintenance plans for the Island Farm site should be formally reviewed at 5-year intervals to ensure they remain fit-for-purpose and, if necessary, to agree changes that would seek to protect and enhance the key wildlife features on site.
- 9.6.63 Bat boxes and the new bat roost site should also be monitored on a 5-year interval basis, and these provisions maintained, repaired and replaced, as necessary. Other forms of damage to wildlife habitats should be rectified should damage or destruction take place.

Table 9.9 Mitigation and enhancement measures to off-set potential operational impacts, including use of site by vehicles and people and use of installations including lighting. - Impacts assessed as neutral or N/A in Table 9.6 are excluded.

Receptor	Designed-in mitigation	Other avoidance/ reduction measures
Island Farm POW Camp SINC	Maintain fences to continue to discourage uncontrolled public access to the SINC and habitat damage or disturbance. Continue to ensure lighting regime does not excessively illuminate this area to the detriment of nocturnal wildlife species.	Ensure long-term management plan for the SINC is being implemented, monitored and revised as appropriate to gain maximum wildlife benefit from this area.

Receptor	Designed-in mitigation	Other avoidance/ reduction measures
Ancient and species-rich hedgerows	Maintain fences to continue to prevent damage or disturbance to hedgerows. Continue to ensure lighting regime does not excessively illuminate hedgerows to the detriment of nocturnal wildlife species.	Ensure management and maintenance plans for the Island Farm site are being implemented, including assisting hedgerow establishment and delivering optimal hedgerow management.
Lowland dry acid grassland	Falls within SINC so protection measures above apply.	Ensure long-term management plan for the SINC is being implemented, monitored and revised as appropriate to gain maximum wildlife benefit from this area.
Lowland mixed deciduous	Continue to ensure lighting regime does not excessively illuminate woodland areas to the detriment of nocturnal wildlife species.	Ensure long-term management plan for the SINC is being implemented, monitored and revised as appropriate to gain maximum wildlife benefit from this area.
Ponds	Maintain fences to prevent uncontrolled access to all wetland features and thus avoid damage or disturbance. Continue to intercept potential pollutants or silts. Remove litter and remove or treat pollutants.	Ensure management and maintenance plans for the Island Farm site are being implemented, including assisting wetland establishment and delivering optimal wetland management.
Dormouse	Dormice will benefit from avoidance/ reduction measures for habitats outlined above.	Ensure management and maintenance plans for the Island Farm site are being implemented, including delivering optimal habitat management for dormice.
Bats	Bats will benefit from avoidance/ reduction measures for habitats outlined above.	Ensure management and maintenance plans for the Island Farm site are being implemented, including delivering optimal habitat management for bats and maintenance of the new bat roost and bat box roost sites.
Breeding birds	Birds will benefit from avoidance/ reduction measures habitats outlined above.	Ensure management and maintenance plans for the Island Farm site are being implemented, including delivering optimal habitat management for bird species.

Residual Impacts

- 9.6.64 The implementation of the ecological mitigation strategy for the Island Farm site should be overseen by an Ecological Clerk of Works, employed specifically for this purpose and to work as an integral part of the construction team. Only then will there be the required impetus to ensure that the ecology of the site is disturbed as little as possible, and that the enhancements specified are implemented to good effect.

- 9.6.65 The Ecological Clerk of Works should develop, maintain and communicate an appropriate Schedule of Ecology Commitments. This will provide an effective means of ensuring that the correct procedures are followed at the correct time during the life of this development project.
- 9.6.66 A key assumption integral to this residual impact assessment is that the habitat enhancements proposed, including the creation of the green bridge, new bat roost, new wildlife habitats within the SINC, the fencing off of wildlife zones, and the planting and augmenting of hedgerows will take place as early as possible in the life of the project (first six months in year 1), so that habitats can establish, mature and begin to accommodate wildlife species displaced or disturbed by the scheme. This is important especially to the residual impact assessment for the construction phases of the project.
- 9.6.67 Equally important will be that the overall landscape mitigation strategy is being implemented for the scheme, as outlined in Chapter 10 and Figure 7 Landscape Framework Plan, for this will deliver important benefits for the wildlife species on site. Particular aspects of importance for ecology include:
- 1,700m of translocated hedgerows to be established on site, mainly along the boundaries of the main access road and A48 visibility splays, and also around the perimeter of the Bridgend Ravens Rugby Club site.
 - 10ha of proposed woodland and scrub.
 - 5,430m² of ponds.
 - No parking is to be within 10m of the SINC boundary.
 - No building development is to be within 15m of the SINC boundary.
 - No roads or buildings to be located within 5m of other retained hedgerows or within root protection areas of important trees whichever is the greatest.
 - A combined hedgerow and tree belt of minimum 10m depth is to be located between the playing pitches stadia, 4G and sports centre.
 - No development within 30m of the badger sett location in the east boundary hedgerow (5)
- 9.6.68 Taken together, these mitigation measures will go a long way to minimising the impacts of the proposed development overall and have produced some significant positive benefits. As shown in Tables 9.10, 9.11 and 9.12, the measures proposed have eliminated some negative impacts altogether and have transformed others into positive ones, for example:
- 9.6.69 The provision of optimally designed, managed and high quality wildlife habitats within the expanded SINC site, providing extended and optimized habitats including hedgerow, woodland, grassland and scrub (extending over the construction and operational phases of the scheme).
- 9.6.70 The provision of extended and optimally-managed habitats for dormice both in the SINC site and across the wider landscape habitats that are to be provided (extending over the construction and operational phases of the scheme).
- 9.6.71 The provision of a new dedicated bat roost on the key flight line for bats and closer to prime feeding areas, within the construction phase, with new feeding areas created for bats in the

SINC, around pond areas and within the wider landscape of the site.

- 9.6.72 The restoration of ponds and the provision of new pond habitats during the construction phase, which will be of benefit for amphibians, reptiles, foraging bats and invertebrates.
- 9.6.73 These mitigation measures should help compensate for some initial disturbance and displacement of, especially, dormice and breeding birds during the early phases of enabling and construction activity that will arise through relatively small-scale habitat removal, noise and light impacts.
- 9.6.74 Overall, provided the new habitat provisions proposed are created as early as possible in the enabling and construction phases of the project, and the long-term mitigation measures proposed in this EclA are adopted, there should be minimal long-term impact on biodiversity within the Island Farm site, with a positive impact expected as the new and enhanced habitats that remain mature and develop into a bio-diverse and rich habitat for wildlife.

Table 9.10: Residual impact assessment for potential construction impacts, including enabling works and all construction activities

- 9.6.75 Cross refer to Table 9.9 for details of mitigation proposed. Compensatory habitats to be established as soon as possible during the construction period.

Receptor	Likely significance (without mitigation)	Residual significance (with mitigation)	Reasoning
Farm Camp Island POW SINC	Medium	Neutral	An estimated 89% of the original SINC area will be retained, and then expanded to produce a 7% gain overall, although there will be some construction phase disturbance. The remaining habitat will be fenced off and managed to become prime wildlife habitat.
Ancient and species-rich hedgerows	High to Medium	Low	Three from four species-rich hedgerows will be lost although transplanted, but remaining hedgerows will be protected and enhanced for wildlife, although disturbed during the construction phase.
Lowland dry acid grassland	High to Medium	Low	An estimated 20% of this small area of habitat will be lost although the remainder will be protected from damage and optimally managed and grassland will be re-created in the extended SINC site.
Lowland mixed deciduous woodland	High to Medium	Medium	An estimated 20% of this small area of habitat will be lost although the remainder will be protected from damage and optimally managed and trees planted to extend the woodland in the SW of the extended SINC site. Woodland takes a long-time re-create, however, so this impact has a moderate degree of significance during the construction phase.

Receptor	Likely significance (without mitigation)	Residual significance (with mitigation)	Reasoning
Ponds	High to Medium	Positive impact	The two ponds on site will be retained and protected and restored, with good pond design and good pond management. Four additional ponds will be created and so there will be a net gain overall.
Dormouse	High	Low	Although habitat loss has been minimised, dormice will lose habitat initially and will experience impacts from light and noise. However, light impacts will be mitigated by good lighting design, the introduction of lighting curfews and the planting of dense vegetation screens to minimise light spill. Noise impacts from construction will be limited to day-light hours only and will be most severe in parts of the site away from the prime dormouse habitats. Construction impacts overall will be most prevalent during the first two years of construction. In both the short and longer terms, habitats will be enhanced for dormice in areas away from where disturbance will be the most intense and habitat area extended, which will help to compensate for the disturbance caused.
Bats	High	Low	The Hut 9 bat roost has been avoided and no known bat roosts will be impacted. A dedicated alternative bat roost will be provided. There will be temporary loss of foraging opportunity for bats on site, although most feeding takes place elsewhere. Lighting impacts should have minimum consequences for commuting bats given the green bridge proposed and retained connectivity to the wider countryside. Noise impacts should also be marginal because high noise levels from construction will be limited to day-light hours only when bats are not active. The mitigation proposed, including significant habitat enhancements and extended habitat area will successfully mitigate for the impacts and be positive for bats.
Breeding birds	High	Low	Impacts on breeding birds will be avoided by removal of nesting cover outside of the breeding season. Relatively low numbers of breeding birds will be impacted, and breeding birds will benefit from the habitat enhancements proposed, including significant scrub, hedgerow and tree planting.
Reptiles	Medium	Neutral	Reptiles are present in low numbers and are mainly located away from the proposed works. Impact on reptiles will be avoided by correct timing of works and destructive searches. The habitat enhancements proposed, including significant scrub, hedgerow and wetland creation will benefit reptiles, even over the short-term.

Receptor	Likely significance (without mitigation)	Residual significance (with mitigation)	Reasoning
Amphibians	Low	Positive	Common species of amphibians are present in low numbers. Impact on amphibians will be avoided by correct timing of works and destructive searches. The habitat enhancements proposed, including significant scrub, hedgerow and pond creation/restoration will benefit amphibians, even over the short-term.
Invertebrates	Medium to Low	Neutral	There will inevitably be some direct impact on invertebrates and indirect impacts through habitat losses. However, invertebrates will benefit from habitat enhancements proposed for the site, which will add diversity, and from the optimal management of the retained habitats.

Table 9.11: Residual impact assessment for potential operational impacts, including use of site by vehicles and people and use of installations including lighting - Cross refer to Table 9.8 for details of mitigation proposed.

Receptor	Likely significance (without mitigation)	Residual significance (with mitigation)	Reasoning
Farm Camp Island POW SINC	Medium	Positive impact (feature enhanced)	Measures will be in place to limit damage and disturbance to habitats and species in the SINC. High quality habitats will have been created. Bespoke long-term management of the site will be delivered to optimise the quality of the habitats present and provide for important wildlife species.
Ancient and species-rich hedgerows	High to Medium	Positive impact (feature enhanced)	Measures will be in place to limit damage and disturbance to hedgerow habitat. High quality habitats will have been created. Bespoke long-term management will be delivered to optimise the quality of the habitats present.
Lowland dry acid grassland	High to Medium	Positive impact (feature enhanced)	Measures will be in place to limit damage and disturbance to grassland habitat. High quality habitats will have been created. Bespoke long-term management will be delivered to optimise the quality of the habitats present.
Lowland mixed deciduous woodland	High to Medium	Positive impact (feature enhanced)	Measures will be in place to limit damage and disturbance to woodland habitat. High quality habitats will have been created. Bespoke long-term management will be delivered to optimise the quality of the habitats present.
Ponds	High to Medium	Positive impact (feature enhanced)	Measures will be in place to limit damage and disturbance to ponds and wetland habitat. High quality habitats will have been created. Bespoke long-term management will be delivered to optimise the quality of the habitats present.

Receptor	Likely significance (without mitigation)	Residual significance (with mitigation)	Reasoning
Dormouse	High	Positive impact (feature enhanced)	Unless operated very sensitively, the ongoing lighting regime for the site may have important consequences for dormice, even with the mitigation proposed. Noise levels may also be of concern, particularly for match day evening events, although these over short time periods only. However, dormice are expected to benefit from the habitat extensions, habitat enhancement and habitat management proposed and green corridors will exist, with minimal lighting, to allow for movement through the site. Indeed dormice will be the key species targeted in landscaping, planting and the management of the site and will find themselves in optimum habitat rather than the unmanaged habitat that exists today. Hence they should prosper.
Bats	High	Low to Positive (feature enhanced)	Unless operated very sensitively, the ongoing lighting regime for the site may have important consequences for bats, even with the mitigation proposed. Noise levels may also be of concern, particularly for match day evening events. However, bats will be provided with a new dedicated roost site and are expected to benefit from the habitat enhancement and habitat management proposed and green corridors will exist, with minimal lighting, to allow for movement through the site.
Breeding birds	High	Neutral	Breeding birds are expected to benefit from the significant habitat enhancements, the new habitats created and optimal site management. Birds are very likely to acclimatise to the noise and light emissions and settle within the re-configured site.

Table 9.12: Summary of residual impact assessment for construction and operational impacts on ecology

9.6.76 Cross refer to Tables 9.5 and 9.6 for impact descriptions, and to Tables 9.7 and 9.9 for mitigation details.

Phase	Receptor	Likely significance (without mitigation)	Residual significance (with mitigation)
Construction	Island Farm POW SINC	Medium	Low
Operation		Medium	Positive

Phase	Receptor	Likely significance (without mitigation)	Residual significance (with mitigation)
Construction	Ancient and species-rich hedgerows	High to Medium	Low
Operation		High to Medium	Positive
Construction	Lowland dry acid grassland	High to Medium	Low
Operation		High to Medium	Positive
Construction	Lowland mixed deciduous woodland	High to Medium	Medium
Operation		High to Medium	Positive
Construction	Ponds	High to Medium	Positive
Operation		High to Medium	Positive
Construction	Dormouse	High	Low
Operation		High	Positive
Construction	Bats	High	Low
Operation		High	Low to Positive
Construction	Breeding birds	High	Low
Operation		High	Neutral

Phase	Receptor	Likely significance (without mitigation)	Residual significance (with mitigation)
Construction	Reptiles	Medium	Neutral
Operation		No impact	No impact
Construction	Amphibians	Low	Positive
Operation		No impact	Positive
Construction	Invertebrates	Medium to Low	Neutral
Operation		No impact	No impact

Key legal and licensing issues

- 9.6.77 Relevant policy and legal issues are overviewed in Section 3 of this EclA and are not repeated here.
- 9.6.78 The developer and his contractors should maintain good communications with the Ecological Clerk of Works to ensure that offences are not committed and that any necessary licences and consents are requested in good time.
- 9.6.79 Key issues on site include habitat loss and disturbance to dormice, the potential loss of bat roosts in trees, and the removal of some species rich and important hedgerows, and so advice is presented here relating to each of these issues in turn.

Dormice

- 9.6.80 Dormice are a legally protected species, listed under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) and Schedule 2 of The Conservation (Natural Habitats & c) Regulations 1994. Taken together, this legislation makes it illegal to:
- Intentionally or deliberately kill, injure or capture dormice.
 - Deliberately disturb dormice (whether in a nest or not).
 - Damage or destroy, or obstruct access to, dormouse breeding sites or resting places.
 - Possess or transport a dormouse or any part of a dormouse, unless acquired legally.

- Sell, barter or exchange dormice, or parts or dormice.

9.6.81 The above legislation affords protection to both dormice and their habitat. It is an offence to damage a dormouse breeding site or place of shelter, or obstruct access to such a place, which translates to providing protection for dormouse habitat, along with protection of the animal itself. As a consequence of the above legislation, any development which removes dormouse habitat, or obstructs access to such habitat, requires licensing and mitigation in order to safeguard the conservation status of the species.

9.6.82 In Wales, licences to allow acts which would otherwise be unlawful can be granted by the Welsh Assembly Government (following consultation with CCW) for reasons of overriding public interest. Under the Conservation (Natural Habitats & c) Regulations 1994 licenses cannot be granted unless:

- There is no satisfactory alternative, and
- The action authorised will not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their natural range.

9.6.83 Licences can only be granted after planning permission has been approved but the preparation of them and the necessary consultation can take several weeks, with the licence application itself taking 30 days or so for determination. **It is therefore recommended that the licence be prepared without delay and that the likely mitigation requirements for dormice be programmed into the development appropriately.**

Bats

9.6.84 All bat roosts are robustly protected by Law and fully protected under the Wildlife and Countryside Act 1981 (as amended) and the Conservation (Natural Habitats, &c.) Regulations 1994 (the Habitats Regulations), which defines these animals as European Protected Species. An offence would be committed if roosts, whether occupied or not, were destroyed, damaged or obstructed, or if bats themselves were harmed or disturbed.

9.6.85 The Hut 9 bat roost should be largely unaffected by the proposed development but there is a possibility of bat roosts within trees to be removed from the site. The presence of bat roosts therefore poses a risk to the project, a risk that will need to be recognised, monitored and managed, under the direction of the Ecological Clerk of Works.

9.6.86 If bat roosts are found, a European Protected Species licence from the Welsh Assembly Government (following consultation with CCW) will be needed to permit the displacement of bats and the destruction of the roost, thus allowing actions that would otherwise be unlawful. As with dormice, the licence application will need to address the key tests for which a licence may be issued. In this case the applicant (land-owner or developer) will need to demonstrate that:

- There is a requirement of overriding public interest.
- There is no satisfactory alternative.
- The proposed actions will not be detrimental to the maintenance of the population

of the species concerned at a favourable conservation status in their natural range.

- 9.6.87 As with dormice, the applicant will need expert assistance from a consultant ecologist to prepare a successful licence application. The application includes a method statement with full details of the work to be undertaken under the licence, including how harm to bats will be avoided and how the loss of roost sites will be compensated for.

Hedgerows

- 9.6.88 Under the Hedgerows Regulations 1997 it is against the law to remove or destroy certain hedgerows without permission from the local planning authority. These regulations do not apply to any hedgerow within the curtilage of, or marking the boundary of the curtilage of, a dwelling house, though this is clearly not relevant to the Island Farm site.
- 9.6.89 Permission is required before removing hedges defined as 'important' under the Regulations (this applies to some hedgerows at Island Farm). Permission is gained by submitting a **Hedgerow Removal Notice** to the local planning authority as set out in Schedule 4 to the Regulations. The local planning authority will then assess the importance of the hedgerow using criteria set out in Schedule 1 of the Regulations.
- 9.6.90 Permission is not required in the following instances:-
- To make a new opening in substitution for an existing one which gives access to land.
 - To obtain temporary access to any land in order to give assistance in an emergency.
 - To gain access to land where another means of access is not available or is available at a disproportionate cost.
 - For national defence purposes.
 - Where planning permission has been authorised, except where permission has been granted by the Town and Country Planning General Permitted Development Order 1995.
 - To carry out work for the purposes of flood defence or land drainage.
 - To prevent the spread of, or ensure the eradication of, a plant or tree pest.
 - For work undertaken by the Secretary of State in respect of any highway for which he is the highway authority or in relation to which he has the same powers as the local highway authority.
 - To prevent obstruction of or interference with electric lines and plant or prevent danger under the Electricity Act 1989.
 - For the proper management of the hedgerow.
- 9.6.91 All hedgerows are potentially protected by the Hedgerows Regulations 1997, except those that are automatically excluded.

- 9.6.92 Removal of a hedgerow must not commence until permission to remove the hedgerow is granted by the local planning authority or until 42 days after the local planning authority has acknowledged receipt of the Hedgerow Removal Notice.
- 9.6.93 No other timing restrictions are necessary for hedgerow removals except that **it is** recommended that the implications of hedgerow removal are considered within the scope of the dormouse licence and that removal takes place outside of the bird nesting season and outside of the key periods of sensitivity for dormice or other wildlife species.

9.7 Summary and Conclusions

- 9.7.1 This chapter of the ES considers the ecological impacts of a sports village development at the Island Farm site, Bridgend. It contains sections that describe the baseline environment; identify and evaluate the likely ecological impacts from the development; and, describe appropriate mitigation and enhancement measures.
- 9.7.2 Also provided is a summary of relevant conservation policy and legal issues as they pertain to wildlife sites, habitats and species. The study has been prepared in accordance with best practice guidance for Ecological Impact Assessment (EclA), principally that of the Institute of Ecology and Environmental Management (IEEM 2006).
- 9.7.3 There are no internationally-designated sites or SSSIs close enough to the study area whose features would be affected by the development. A site of local importance, the Island Farm POW SINC, occurs on site, and will be directly affected.
- 9.7.4 The study area includes a mix of woodland, grasslands, scrub, hedgerow, ponds and agricultural fields. Habitats of principal importance in Wales include ancient and species-rich hedgerows, lowland dry acid grassland, lowland mixed deciduous woodland, and ponds (although the ponds are in very poor condition).
- 9.7.5 Species of principal importance in the study area include dormice, lesser horseshoe and other bat species and a variety of breeding bird species, whilst otter occur on nearby rivers, and small numbers of reptiles occur on site.
- 9.7.6 The assessment of ecological sensitivities highlights that a number of valued habitats and species are susceptible to the effects of an unmitigated scheme, necessitating the requirement for impact assessment and mitigation proposals.
- 9.7.7 An analysis of the potential impacts of the development on ecological receptors is provided, for both the construction and operational phases of the development. The analysis is based on the Masterplan Version 16 (reference 5200-V16/20090710/02), and the project description contained within Chapters 1 and 2 of the ES.
- 9.7.8 Impact assessment highlights that an unmitigated scheme would have significant negative effects on a number of the valued ecological receptors on site, including wildlife sites, habitats and species.
- 9.7.9 Of most importance, impacts of very high to high significance are predicted to occur because of constructional and operational impacts on nationally important habitats (lowland dry acid grassland, lowland mixed deciduous woodland, species-rich hedgerows and ponds) and key species including dormice, bats and breeding birds.
- 9.7.10 The proposed development at Island Farm will transform the landscape in this area from a

rural, farmed, and low-intensity use area into a busy and artificially-lit area for sports and business use. As a consequence, the assessment of impacts highlights that an unmitigated scheme would have significant implications for the ecology of the area.

- 9.7.11 Mitigation measures are identified in order to reduce and if possible eliminate predicted constructional and operational impacts and, where possible, enhance the site in accordance with best practice for net ecological gain. Measures to avoid impacts through scheme design, spatial or temporal restrictions, and enhancements are provided for each ecological receptor for both the construction and operational phases of the project.
- 9.7.12 A key aspect of the mitigation is to retain as much of the SINC site as possible, which is the key habitat for dormice, bats, breeding birds and invertebrates, to expand and enhance this site, and to provide connectivity to the wider countryside. SINC habitats will be augmented and subject to optimal wildlife management under a proposed 25 year management plan. Further enhancements will include the provision of a green bridge to facilitate movement by dormice and bats over the main access road and the provision of new bat roost sites.
- 9.7.13 Avoidance and reduction measures will include the provision of interceptors and adoption of pollution prevention protocols and emergency procedures; and the adoption of sensitive working practices, including correct seasonal work periods and the pre-inspection of grassland and scrub for reptiles, and trees for bats and breeding birds. Finally, appropriately positioned, specified and operated lighting will limit effects on nocturnal species, whilst landscaping will be used to limit noise impacts and provide cover and shelter.
- 9.7.14 The implementation of the ecological mitigation strategy for the Island Farm site should be overseen by an Ecological Clerk of Works, to ensure that the ecology of the site is disturbed as little as possible, and that the enhancements specified are implemented to good effect.
- 9.7.15 Residual impact assessment has been undertaken to consider the impacts of the mitigated scheme, with the assumption that the habitat enhancements proposed, including the creation of the new wildlife habitats within the SINC, the fencing off of wildlife zones, and the planting of buffers with hedgerow and scrub will take place as early as possible in the life of the project (within 6 months in year 1), allowing sufficient time for habitats to establish and mature.
- 9.7.16 The mitigation measures proposed eliminate some impacts and transform some negative impacts into positive ones. An overall loss of established woodland habitat, and displacement/disturbance to dormice and bats, primarily through noise, vibration and lighting effects, remain as key residual impacts judged to be of high to medium significance and occurring during the construction and operational phases of the project. These impacts are direct or indirect and permanent, with displacement and disturbance occurring over the short and long terms.
- 9.7.17 However, significant beneficial impacts of moderate to major significance will be delivered through habitat enhancements, commencing in the short term (year 1) and extending over the long-term, associated with the protection and enhancement of the SINC; the buffering and enhancement of boundary features; and the creation of an enhanced SINC, containing optimally designed and managed high priority wildlife habitats.
- 9.7.18 These habitat provisions can be expected to impact positively on a variety of wildlife species, both the current residents of the site, and new species that might be attracted, providing a beneficial change overall for the biodiversity of the Island Farm site.

9.8 References

ALGE. 2006. PAS 2010. *Planning to halt the loss of biodiversity: Biodiversity standards for planning in the United Kingdom – Code of Practice*. British Standards Institute.

Ball, S.G. 1986. *Terrestrial and freshwater invertebrates with Red Data Book, Notable or Habitat Indicator Status*. Invertebrate Site Register Report (CTD Report No. 637), No. 66. Nature Conservancy Council, Peterborough

Defra. 2002. *Hedgerow survey handbook: a standard procedure for local surveys in the UK*. Prepared on behalf of the Steering Group for the UK. <http://www.english-nature.org.uk/pubs/publication/PDF/hedge1.pdf>

Defra. 2005. *Farmland bird populations; good progress towards government target*. <http://www.defra.gov.uk/news/2005/050404f.htm>

Defra. 2006a. *Local sites: Guidance on their identification, selection and management*.

Defra. 2006b. *Lighting in the Countryside -Towards Good Practice*.

ELMAW. 2004. *Dormouse strategy*. Island Farm, Bridgend, South Wales.

ELMAW. 2005. *Bat survey & strategy overview*. Island Farm, Bridgend, South Wales.

ELMAW. 2006. *Addendum to Dormouse strategy*. Island Farm, Bridgend.

ELMAW. 2009. *Extended Phase 1 habitat survey*, Island Farm, Bridgend.

HMSO.1997. *The Hedgerow Regulations 1997 - Statutory Instrument 1997 No. 1160*. <http://www.hmso.gov.uk/si/si1997/97116001.htm>

HMSO. 2005. *Planning and Policy Statement 9: Biological and Geological Conservation*

IEEM. 2006. *Guidelines for ecological impact assessment in the United Kingdom*. Institute of Ecology and Environmental Management

IEMA. 2004. *Guidelines for Environmental Impact Assessment*. Institute of Environmental Management and Assessment, Lincoln

ILE. 2009. *Bats and lighting in the UK*. *Bats and the Built Environment Series*. Institute of Lighting Engineers.

Joint Nature Conservation Committee. 2003. *Handbook for Phase 1 habitat survey - a technique for environmental audit*. Field manual. JNCC, Peterborough

Joint Nature Conservation Committee. 2004. *Handbook for Phase 1 habitat survey - a technique for environmental audit*. JNCC, Peterborough

Joint Nature Conservation Committee. 2006. *UK Biodiversity Action Plan*

[http://www.ukbap.org.uk/GenPageText.aspx?id=54Methodological guidelines](http://www.ukbap.org.uk/GenPageText.aspx?id=54Methodological%20guidelines)

ODPM. 2000. *Environmental impact assessment: A guide to procedures*.
www.communities.gov.uk/index.asp?id=1143250

ODPM. 2005. *Planning Policy Statement 9: Biodiversity and Geological Conservation*. HMSO, Norwich.

RSPB et al. 2002. *The Population Status of Birds in the UK. Birds of Conservation Concern: 2002-2007*.

Shirt, D.B. 1987. *British Red Data Books: 2. Insects*. Nature Conservancy Council, Peterborough.

Woods, M. 2004. *Island Farm Bridgend – Technical Advice on Dormice*. Unpublished report to CCW.

Wye Valley Surveys. 2002. *Island Farm Bridgend. Ecological Report. August 2002*.