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| <b>Report Title</b> | <b>Proposed Spine Road and Development Plateaus,<br/>Western Gateway, Wrexham Technology Park,<br/>Wrexham - Ecological Management Plan</b> |
| <b>Client</b>       | <b>Wrexham County Borough Council</b>                                                                                                       |
| <b>Date</b>         | <b>November 2012</b>                                                                                                                        |



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| <b>Client</b>              | Wrexham County Borough Council                                                                                               |
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*Figure 1 – Site Location*

*Figure 2 – Management Zones*

*Figure 3 – Phase 1 Habitat Map (Prior to Development)*

*Appendix 1 – WCBC plan entitled 'Indicative Development Plan' Dwg no. T07701/6000C dated 19/09/12.*

*WCBC plan entitled 'Landscape Masterplan' Dwg no. TE07701/6002C dated 19/09/12.*

# 1 VISION STATEMENT/ EXECUTIVE SUMMARY

## 1.1 General Introduction

- 1.1.1 The format of this Ecological Management Plan (EMP) is adapted from that provided by Alexander (2005<sup>1</sup>). It only includes relevant sections and has been simplified appropriate to its purpose. This EMP was written by Marches Ecology on behalf of Wrexham County Borough Council (WCBC). It will be subject to review with the planning authority, the organisation that will undertake the management and the Countryside Council for Wales (CCW) as necessary. It covers a period of five years. Management prescriptions are provided for a five-year period. As much of the habitat to which this EMP relates will have just been created an interim review is proposed after two years to ensure that the management prescribed remains appropriate. Subsequently a review will take place after five years and a new Action Plan compiled for the next five-year period.
- 1.1.2 This EMP is to be submitted as part of the supporting information for a planning application. The planning application primarily concerns the construction of primary infrastructure to serve future development of the next phase of Wrexham Technology Park; Phase 2 of the Western Gateway project. Phase II of the Western Gateway project includes construction of a spine road and associated infrastructure, construction of Junction 2 on the Ruthin Road, clearance and creation of the development plateaus, and improvements at the A483/A525 interchange. It has the principal aims of traffic/ road improvements and facilitation of future development of the Western Gateway site. The Western Gateway site is located to the north of the A525 Ruthin Road and between the A483 and Croesnewydd Road, Wrexham (OS Grid Ref. for central point: 331724, 350389). Further detailed information with regard the proposed development is provided in Marches Ecology (2012a & b) and WCBC (2012a & b). *Figure 1* shows the approximate site boundary.
- 1.1.3 The EMP concerns an area shown as the 'Ecological Areas'<sup>2</sup> on the '*Indicative Development Plan*'<sup>3</sup> (henceforth referred to as the IDP) to be submitted with the application. The EMP does not cover management of other areas of soft landscaping such as within the 'Landscape Areas' shown on the IDP or any other areas that may be provided in the future within the development plots. This EMP should be used in conjunction with the IDP and the '*Landscape Masterplan*'<sup>4</sup>. The IDP and Landscape Masterplan are attached for information as *Appendix 1*.
- 1.1.4 The Ecological Area is largely to be provided to mitigate and compensate for any potential impacts on the local ecological resource as a result of the proposed Phase II development/ clearance works. Management of the Ecological Area concentrates on the key habitats/ species as identified in *Section 3*. The EMP identifies existing ecological features of interest within the Ecological Area where known.

<sup>1</sup> Alexander, M. (2005). *The CMS Management Planning Guide*. CMS Consortium, Talgarth, Wales, UK. [www.esdm.co.uk/cms](http://www.esdm.co.uk/cms)

<sup>2</sup> The 'Ecological Areas' shown on the IDP are referred to throughout this report as the 'Ecological Area' for simplicity.

<sup>3</sup> WCBC plan entitled '*Indicative Development Plan*' Drawing no. T07701/6000/C dated 19/09/12.

<sup>4</sup> WCBC plan entitled '*Landscape Masterplan*' Drawing no. TE07701/6002C dated 19/09/12.

1.1.5 While Badgers use the Ecological Area due to the sensitive nature of this information they will not be discussed in detail in this EMP. Specific management prescriptions are provided for them although they are not identified as such and management undertaken for other species/ habitats is also likely to be indirectly beneficial. The presence of Badgers on the site does have implications for anyone undertaking management operations and as such the managing organisation should ensure that they are aware of this, the location of any sett and inherent implications for their work. Detailed information with regards Badgers on the site is provided in Marches Ecology (2012c).

1.1.6 It is currently intended that the proposed Phase II work would be put out to tender early in 2013 and that clearance/ construction start would be in the financial year 2013/2014 subject to securing the appropriate funding. Completion of the Phase II works is anticipated to take approximately 12 months. The start date of this EMP has been assumed to be following completion of the construction works along with all proposed landscaping/ habitat creation. Habitat creation is detailed separately in the Ecological Mitigation Strategy (Marches Ecology 2012d). The Action Plan includes management prescriptions for after-care of the newly created habitats. The Ecological Area is also, in part, provided to satisfy the requirements of the Wrexham Unitary Development Plan (UDP) General Development Principle:

- **Policy GDP1.** *All new development should: h). Safeguard sites and areas of nature conservation and wildlife interest, and to provide new habitats where there is an unavoidable loss of existing habitats and areas of wildlife interest.*

1.1.7 Marches Ecology (2012d) details all required mitigation and compensation measures. Some of these measures are required subsequent to completion of the construction phase and as such would run concurrent with this EMP. It includes required monitoring of the mitigation/ compensation measures. This EMP should be used in conjunction with the Ecological Mitigation Strategy.

## 1.2 Vision Statement

1.2.1 The aim of management of the Ecological Area will be to provide a range of inter-connected habitats that will be of benefit to both key species and other species that may be present. The Central Woodland (*Figure 2*), River Gwenfro corridor and areas of neutral grassland will be the main habitat features. The existing value of the Central Woodland will be maintained and enhanced wherever possible. Due to the existing value of the woodland management would be via non/limited intervention. The River Gwenfro corridor will be managed to create an area of (wet) woodland providing dense cover for Otters (*Lutra lutra*) and potential foraging/ commuting habitat for bats. The areas of neutral grassland will be managed to benefit this habitat along with species richness. The grassland may also be of value for other species such as foraging Badgers and bats.

1.2.2 Habitat connectivity is an important part of the proposed Ecological Area. Along with enhancement of the river corridor and retention of existing woodland several new hedgerows will be provided, and strips of neutral (wildflower) grassland are to be created on both sides of the spine road as well as the western/ northwestern edge of the site. Open swales will provide damp/wet grassland habitat on either side of the spine road. Two attenuation lagoons will further diversify the available habitat. Further detail with regard the proposed habitat creation is provided on the '*Landscape Masterplan*'.

1.2.3 While Woodland, Neutral Grassland and the River Gwenfro/ Otters are the primary features of importance, several secondary features have been identified for which management prescriptions have been provided with the exception of Badger. While Badger is considered to be a secondary feature of the site as explained previously no specific information with regards this species is detailed in the EMP. Prescribed management does take into account their presence on the site. The secondary features are as follows:

- Breeding birds;
- Bats; and
- Wetlands.

### 1.3 Executive Summary

1.3.1 This management plan will be reviewed every five years and amended as necessary to ensure the objectives are being met. As this is a new management plan and some of the habitat is to be created the first review will follow after two years to ensure that the management prescriptions are achieving the objectives set.

1.3.2 The Ecological Area is to be provided in compensation for the loss of habitat and wildlife due to the proposed Phase II development. The nature conservation features of interest of the proposed development site have been identified as woodland, neutral grassland, the River Gwenfro/ Otters, Badger, breeding birds, bats and wetlands. The created/ retained habitats will be managed both to benefit floral diversity and to provide appropriate conditions for key species. Management operations have been prescribed for these features that include:

- Non-intervention/ limited intervention in the Central Woodland and along the River Gwenfro;
- Annual mowing of grassland areas to benefit floristic diversity;
- The retention of an exclusion area where non-intervention will be practised;
- Management of areas of planted woodland to benefit Otters, nesting birds, bats and Badgers;
- Management of existing/ planted hedgerows for the benefit of bats;
- The management of wetland features (attenuation lagoons, swamp and swales/ ditches); and
- Maintenance of a number of bird- and bat-boxes.

1.3.3 In order to ensure that management is achieving the conservation objectives a number of monitoring projects have been prescribed including:

- Monitoring of the Central Woodland;
- Monitoring of the neutral grassland and swales;
- Monitoring of Otters on the River Gwenfro;
- Monitoring of non-native plants;
- Monitoring of breeding birds; and
- Recording use of the bird- and bat-boxes.

1.3.4 The success of management and the results of the monitoring will be reported and reviewed annually.

## 1.4 Wildlife Legislation and Policy

### Introduction

- 1.4.1 This sub-section provides a brief summary of key legislation. It should not be considered a comprehensive review and is not meant to be so. It is provided here for information only and is not intended to replace specialised legal advice. It does not reproduce the text of the legislation, but summarises the salient points.
- 1.4.2 Due to the legal status of various species/ species groups such as the Otter, Badger and bats this has implications for any management/ maintenance undertaken within the site. The advice of the Countryside Council for Wales (CCW), Wrexham County Borough Council's ecologist and or a consultant ecologist should be sought to clarify any potential licensing or mitigation requirements.

### Badger

- 1.4.3 The Badger is protected in Britain under the *Protection of Badgers Act 1992* and *Schedule 6 of the Wildlife and Countryside Act 1981* (as amended). The legislation affords protection to Badger and Badger setts, and makes it a criminal offence to:
- wilfully kill, injure, take, possess or cruelly ill-treat a Badger, or attempt to do so;
  - intentionally or recklessly interfere with a sett by damaging or destroying it;
  - intentionally or recklessly obstruct access to, or any entrance of, a Badger sett; or
  - intentionally or recklessly disturb a Badger when it is occupying a sett.
- 1.4.4 A Badger sett is defined in the legislation as '*any structure or place, which displays signs indicating current use by a Badger*'. The guidance provided in CCW (2011) indicates that a sett also includes '*seasonally used setts*'. This may extend to outliers and possibly day-nests/couches.
- 1.4.5 With regards '*current use*' CCW (2011) states that '*Before a sett can be damaged or closed without a licence it would have to be demonstrated that the sett had been abandoned by badgers and is not just currently unoccupied. Monitoring for a period of up to 12 months may be needed to demonstrate this*'.
- 1.4.6 The Wrexham Biodiversity Action Plan (Wrexham County Borough, 2003) includes a SAP for Badgers in Wrexham. The Wrexham BAP is a supplementary planning guidance document.

### Bats

- 1.4.7 All species of British bat are listed on *Schedule 5 of the Wildlife and Countryside Act 1981* (as amended), and receive full protection under *Section 9*. They are also listed as European Protected Species on *Schedule 2 of The Conservation of Habitats and Species Regulations 2010* (as amended) which gives them full protection under *Regulation 40(1)*. Protection was extended by the *Countryside and Rights of Way Act 2000* (the CRow Act).

1.4.8 Under the above legislation it is an offence to intentionally or recklessly:

- kill, injure or take an individual of such a species;
- possess any part of such species either alive or dead;
- damage, destroy or obstruct access to any place or structure used by such species for shelter, rest, protection or breeding;
- disturb such a species whilst using any place of shelter or protection; or
- sell or attempt to sell any such species.

1.4.9 Several species of bat, including the Common Pipistrelle (*Pipistrellus pipistrellus*) are included as priority species in the UK BAP and also as species of principal importance for the conservation of biological diversity in Wales under *Section 42* of the *NERC Act*. The WBAP includes a Species Action Plan (SAP) for Lesser Horseshoe Bat (*Rhinolophus hipposideros*).

1.4.10 All species of British bat are also protected under *Schedule 6* of the *Wildlife and Countryside Act 1981* (as amended). This protection relates specifically to trapping and direct pursuit of the species.

#### **Otter**

1.4.11 The Otter (*Lutra lutra*) is listed on *Schedule 5* of the *Wildlife and Countryside Act 1981* (as amended), and receive full protection under *Section 9*. The 1981 Act was amended by the *Countryside and Rights of Way Act 2000* (the *CRoW Act*) which further extends the protection. It is also listed on *Annexes II* and *IV* of the European Union Directive on Natural Habitats and Wild Fauna and Flora (*Council Directive 92/43/EEC*), which is implemented in the UK by *The Conservation of Habitats and Species Regulations 2010* (as amended). It is included on *Schedule 2* of these regulations which gives it full protection under *Regulation 40(1)*. The Otter is therefore a so-called European Protected Species.

1.4.12 Under the above legislation it is an offence to intentionally or recklessly:

- kill, injure or take an individual of such a species;
- possess any part of such species either alive or dead;
- damage, destroy or obstruct access to any place or structure used by such species for shelter, rest, protection or breeding;
- disturb such a species whilst using any place of shelter or protection; or
- sell or attempt to sell any such species.

1.4.13 The Otter is also a UK BAP priority species and is included in *Section 42* of the *NERC Act 2006* as a species of principal importance for the conservation of biological diversity in Wales. The WBAP includes a SAP for Otter.

#### **Reptiles**

1.4.14 Viviparous Lizard (*Zootoca vivipara*), Grass Snake (*Natrix natrix*), Slow-worm (*Anguis fragilis*) and Adder (*Vipera berus*) are all listed under *Schedule 5* of the *Wildlife and Countryside Act 1981* (as amended), in respect of *Section 9(5)* and part of *Section 9(1)*. This protection was extended by the *CRoW Act*.

1.4.15 Under the above legislation it is an offence to:

- intentionally or recklessly kill or injure any individual of such a species; or
- sell or attempt to sell any part of the species alive or dead.

1.4.16 All four of the above listed reptiles are UK BAP priority species, are included in *Section 42* of the *NERC Act 2006* (as species of principal importance for the conservation of biological diversity in Wales) and are included on the provisional list of locally important/ endangered species in the Wrexham BAP.

### **Birds**

1.4.17 All species of bird are protected under *Section 1* of the *Wildlife and Countryside Act 1981* (as amended). The protection was extended by the CROW Act.

1.4.18 The legislation makes it an offence to intentionally or recklessly:

- kill, injure or take any wild bird;
- take, damage or destroy the nest of any wild bird while that nest is in use or being built; or
- take or destroy an egg of any wild bird.

1.4.19 Certain species of bird are listed on *Schedule 1* of the *Wildlife and Countryside Act 1981* (as amended) and receive protection under *Sections 1(4)* and *1(5)* of the Act. The legislation confers special penalties where the above mentioned offences are committed for any such bird and also make it an offence to intentionally or recklessly:

- disturb any such bird, whilst building its nest or it is in or near a nest containing dependant young; or
- disturb the dependant young of such a bird.

1.4.20 Several species of principal importance for the conservation of biological diversity in Wales have bred on the site, including Song Thrush (*Turdus philomelos*), Bullfinch (*Pyrrhula pyrrhula*) and Dunnock (*Prunella modularis*).

## **1.5 Structure of this Management Plan**

1.5.1 The remainder of this Management Plan is structured as follows:

*Section 2* provides a description of the site and its context;  
*Section 3* identifies features of interest;  
*Section 4* sets objectives and details monitoring projects;  
*Section 5* provides the management projects;  
*Section 6* provides operational objectives;  
*Section 7* is the action plan and details all management tasks required; and  
*Section 8* details the requirements of project recording and review.

## 2 GENERAL DESCRIPTION

### 2.1 General Information

#### Location and Site Boundaries

- 2.1.1 *Figure 1* illustrates the location of the site (OS Grid ref. for centre of site is SJ 317 503). It is approximately 1.5 km west of Wrexham town centre. Vehicular access is currently off the A525 Ruthin Road via a field gate. Once constructed access to the Ecological Area is likely to be off the spine road.

#### Tenure

- 2.1.2 This is not a legal document. Please refer to the original tenure documents before taking any decision or any action which may have legal implications.

|                                |                                                                                                                                                                                                                                                                                                               |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Stakeholders:                  | WCBC                                                                                                                                                                                                                                                                                                          |
| Type of holding:               | Management Contract                                                                                                                                                                                                                                                                                           |
| Date of Agreement:             | None at present.                                                                                                                                                                                                                                                                                              |
| Length of Management Contract: | None at present.                                                                                                                                                                                                                                                                                              |
| Total Area:                    | 71,632 m <sup>2</sup> (Ecological Area)                                                                                                                                                                                                                                                                       |
| Reservations:                  | None at present.                                                                                                                                                                                                                                                                                              |
| Agreed Management Policy:      | None at present.                                                                                                                                                                                                                                                                                              |
| Legal Rights of Access:        | A public footpath is adjacent to the line of Hedge 5 (see <i>Figure 2</i> ), subsequently crossing to the southwest corner of the site. It dissects Hedge 6 and also crosses parts of Zones 2, 5 and 6 (see <i>Figure 2</i> ). The route of this footpath may be changed as part of the proposed development. |

#### Management/ organisational infrastructure

- 2.1.3 Ownership of the Ecological Area will be retained by Wrexham County Borough Council (WCBC). Management would also be undertaken by WCBC. WCBC would therefore fund the management. As the responsible department is not known at this time the organisational infrastructure is not provided.

#### Map coverage

- 2.1.4 Selected relevant maps:
- OS Landranger 117 Chester & Wrexham 1: 50,000.
  - OS Explorer 257 Whitchurch 1: 25,000.
  - Wrexham UDP, Map 2: The Western Gateway site is largely identified for Employment use (E1, E2, E7) with part for Housing (H1).

- Wrexham *Landmap* includes the Western Gateway site in an area of 'moderate' biodiversity value.

## 2.2 Management Zones

2.2.1 The Ecological Area has been divided into management zones/ habitat features based both on the habitat present and to be created, and the management prescriptions applicable. The zone boundaries are based on the *Landscape Masterplan* and are presented in *Figure 2*. The management zones/ habitat features are as follows:

- Zone 1 - the Central Woodland.
- Zone 2 - neutral grassland. This includes all retained and created grassland.
- Zone 3 - hedgerows (1-7). This includes all retained and created hedgerows.
- Zone 4 - River Gwenfro corridor.
- Zone 5 - wetlands. This includes the retained swamp, and the swales/ ditches and attenuation lagoons.
- Zone 6 - non-intervention/ limited intervention. Small parts of the site where little management is prescribed.

## 2.3 Environmental Information

### Physical

2.3.1 Further information with regard the geology of the site is provided in Bullen Consultants Ltd (2005). Briefly, the central section of the site is underlain by glacial till, with the section to the west of the Central Woodland along with the eastern section of the site being underlain by glacial sands and gravel. A thin strip of alluvium continues northwards on either side of Croesnewydd Road, leading to the River Gwenfro and also bounds the river. The till is described as being mainly silty, sandy clays, with gravel, cobble and occasional boulder, containing bands of sand and gravel, which may be water bearing.

### Biological

#### *Habitats/communities*

2.3.2 The proposed development site has been subject to various ecological surveys including an Extended Phase 1 Habitat Survey undertaken on 8<sup>th</sup> October 2008 and subsequent walkover surveys on 15<sup>th</sup> July 2010 and 2<sup>nd</sup> February 2011. However most of the site is to be the subject of vegetation clearance and significant earthworks as part of the proposal. As such it is considered more appropriate to describe the habitats to be created here rather than the current resource. This description can be updated once the new habitats have become established. Where vegetation is to be retained (see *Landscape Masterplan*) the description is taken from the Extended Phase 1 Habitat Survey. Principally areas to be retained include the Central Woodland, trees/ scrub adjacent to the River Gwenfro, a hedge and associated wetland feature (Hedge 5/ swamp) and small fragments of neutral grassland. Further detail with regard the retained habitats is provided in Marches Ecology (2012a).

2.3.3 The following broad habitat types are to be retained/ created within the Ecological Area:

- Broad-leaved and wet semi-natural woodland;
- Broad-leaved plantation woodland;
- Hedgerows;
- Species-rich neutral grassland;
- Various wetlands including that associated with the Central Woodland, the small swamp to be retained, swales/ ditches and attenuation lagoons;
- The River Gwenfro; and
- Stands of tall herbs/ *Rubus fruticosus* agg. (Bramble).

Woodland

2.3.4 The Central Woodland (Zone 1) is associated with a minor stream corridor. Towards the northwest end it has an open structure, and comprises scattered mature trees, mainly *Fraxinus excelsior* (Ash) and *Acer pseudoplatanus* (Sycamore) with occasional *Quercus robur* (Pedunculate Oak). The field layer comprises *Urtica dioica* (Common Nettle) dominated tall-herb vegetation. On the southwest side of the wood there is an extensive stand of tall-herb vegetation that in places, where the ground is damp, is characterised by *Epilobium hirsutum* (Great Willowherb) and *Equisetum telmateia* (Great Horsetail). *Caltha palustris* (Marsh-marigold) is also locally frequent. This vegetation could perhaps more accurately be described as tall-herb fen.

2.3.5 Towards the southeast the woodland is possibly ancient in origin and is largely aligned along a stream corridor. The canopy is mainly dominated by *Fraxinus excelsior* (Ash) and *Acer pseudoplatanus* (Sycamore) with locally frequent *Alnus glutinosa* (Alder) (mainly alongside the stream) and *Quercus robur* (Pedunculate Oak), and rarely *Pinus sylvestris* (Scots Pine). In the north of this woodland belt the shrub layer is fairly sparse, comprising occasional *Crataegus monogyna* (Hawthorn) bushes with tree saplings. Where adjacent to the stream it is much denser, comprising frequent *Ilex aquifolium* (Holly), and occasional *Corylus avellana* (Hazel), *Sambucus nigra* (Elder), *Viburnum opulus* (Guelder-rose), *Rosa arvensis* (Field-rose) and *Prunus spinosa* (Blackthorn). The field layer is also variable – low-lying damp stands support plants such as *Carex remota* (Remote Sedge), *Caltha palustris* (Marsh Marigold), *Allium ursinum* (Ramsons), *Chrysosplenium oppositifolium* (Opposite-leaved Golden-saxifrage), *Equisetum telmateia* (Great Horsetail), *Urtica dioica* (Common Nettle) and *Solanum dulcamara* (Bittersweet). Where drier the field layer often supports a carpet of *Hedera helix* (Ivy) with other scattered plants recorded including *Geum urbanum* (Wood Avens), *Mercurialis perennis* (Dog's Mercury), *Geranium robertianum* (Herb-robert), *Viola riviniana* (Common Dog's-violet), *Anemone nemorosa* (Wood Anemone), *Conopodium majus* (Pignut), *Deschampsia cespitosa* (Tufted Hair-grass) and rarely, *Hyacinthoides non-scripta* (Bluebell). An internal bank by a ditch supports locally frequent *Melica uniflora* (Wood Melick) and *Carex sylvatica* (Wood-sedge) with a small amount of *Bromopsis ramosa* (Hairy-brome) and *Festuca gigantea* (Giant Fescue).



**The southwest corner of the Central Woodland with tall herb fen vegetation in the foreground (October 2008).**

- 2.3.6 There is a small area of scrub/ woodland located along the River Gwenfro that will be retained (Zone 4). It comprises a complex area of open woodland/ scrub-woodland and tall-herb vegetation. It often comprises scattered mature *Crataegus monogyna* (Hawthorn) bushes with associated tall-herb vegetation dominated by the alien invasive *Impatiens glandulifera* (Indian Balsam). Mature trees present include *Alnus glutinosa* (Alder) (especially immediately adjacent to the River Gwenfro), *Fraxinus excelsior* (Ash) and *Acer pseudoplatanus* (Sycamore). Locally this vegetation is dominated by young *Alnus glutinosa* (Alder).
- 2.3.7 A small area of broad-leaved woodland is proposed to be planted to the northeast of the River Gwenfro. As such it has been included in Zone 4. The planting mix is provided on the *Landscape Masterplan*. The principal trees included are *Alnus glutinosa* (Alder), *Betula pendula* (Silver Birch), *Fraxinus excelsior* (Ash) and *Quercus robur* (Pedunculate Oak). A wider band of wet woodland is to be planted to the south of the River Gwenfro. The principal trees included are *Alnus glutinosa* (Alder), *Betula pendula* (Silver Birch), *Fraxinus excelsior* (Ash) and *Salix fragilis* (Crack Willow).
- 2.3.8 A small area of broad-leaved plantation woodland will be retained on the A483 embankment (Zone 6). The canopy tree species present include *Alnus incana* (Grey Alder), *Acer pseudoplatanus* (Sycamore), *Acer campestre* (Field-maple), *Fagus sylvatica* (Beech), *Pinus sylvestris* (Scots Pine) and *Ulmus procera* (English Elm). The sub-canopy contains *Crataegus monogyna* (Hawthorn) and small amounts of *Ilex aquifolium* (Holly). In places *Ulmus procera* (English Elm) is locally frequent in the canopy and sub-canopy. Occasional low-growing *Rubus fruticosus* agg. (Bramble) occupies the shrub layer; the field layer is mostly species-poor.

#### Hedgerows

- 2.3.9 Parts of three existing hedgerows (Hedges 4, 5 and 7; *Figure 2*) will be retained; either side of the A525 road and just to the northeast of the Central Woodland. The hedge to the northeast of the Central Woodland (Hedge 5) is unmanaged and overgrown. It is characterised by a wide range of woody species, none of which achieve particular dominance; these include *Prunus spinosa* (Blackthorn), *Sambucus nigra* (Elder), *Crataegus*

*monogyna* (Hawthorn), *Acer campestre* (Field-maple), *Salix caprea* (Goat Willow), *Ilex aquifolium* (Holly), *Rosa canina* agg. (Dog-rose) and *Acer pseudoplatanus* (Sycamore). Young *Acer pseudoplatanus* (Sycamore) and *Fraxinus excelsior* (Ash) trees also occur. The associated field layer is mostly bare, or locally dominated by *Urtica dioica* (Common Nettle). A shallow, dry ditch is located on the southern margin of the hedge. It is more akin to a line of scrub than a hedge and contains three large trees, one of which is dead.

- 2.3.10 The hedge located on the southern side of Ruthin Road (Hedge 7) is locally dominated by both *Crataegus monogyna* (Hawthorn) and *Prunus spinosa* (Blackthorn), although a wide range of other woody species are present, mostly at low levels of abundance. These include *Acer pseudoplatanus* (Sycamore), *Ulmus procera* (English Elm), *Ulmus glabra* (Wych Elm), *Corylus avellana* (Hazel), *Acer campestre* (Field-maple), *Sambucus nigra* (Elder), *Ilex aquifolium* (Holly) and *Fraxinus excelsior* (Ash). The field layer appears well shaded and species-poor. The Locally Scarce<sup>5</sup> scrambler *Bryonia dioica* (White Bryony) is present.
- 2.3.11 The remnant of the hedgerow to the north of Ruthin Road (Hedge 4) is species-poor being dominated by *Crataegus monogyna* (Hawthorn) with few woody associates; it has a species-poor field layer.
- 2.3.12 Five new stretches of hedgerow are to be planted; four of these are located along the A525 road at Junction 2 (Hedges 1-4), while the fifth links the eastern corner of the Central Woodland with the River Gwenfro corridor (Hedge 6). As such the latter hedgerow also divides the employment land from the residential land. The planting mix is provided on the *Landscape Masterplan*. They will be dominated by *Crataegus monogyna* (Hawthorn) with significant proportions of *Ilex aquifolium* (Holly) and *Corylus avellana* (Hazel). These new hedges will also incorporate individual trees as detailed on the *Landscape Masterplan*.

#### Neutral Grassland

- 2.3.13 One small area of (semi-improved/ unimproved) neutral grassland is to be retained (Zone 2); part of the existing resource on the disused railway and a small corner of the field to the south. The sward on the disused railway comprises a variety of grasses including *Holcus lanatus* (Yorkshire-fog), *Agrostis capillaris* (Common Bent) and *Festuca rubra* (Red Fescue) with occasional tussocks of *Dactylis glomerata* (Cock's-foot). A wide variety of low growing herbs and forbs are present including locally abundant *Lotus corniculatus* (Common Bird's-foot-trefoil), frequent *Anthyllis vulneraria* (Kidney Vetch), locally frequent *Pilosella officinarum* (Mouse-ear-hawkweed), *Geranium pyrenaicum* (Hedgerow Crane's-bill), occasional *Achillea millefolium* (Yarrow), *Centaurea nigra* (Common Knapweed), *Knautia arvensis* (Field Scabious), *Centaureum erythraea* (Common Centaury), *Hypericum perforatum* (Perforate St. John's-wort), *Clinopodium vulgare* (Wild Basil), *Rhinanthus minor* (Yellow-rattle), *Plantago lanceolata* (Ribwort Plantain), *Potentilla reptans* (Creeping Cinquefoil) and *Rumex acetosa* (Common Sorrel). Occasional shrubs of *Rosa canina* agg. (Dog-rose) and *Crataegus monogyna* (Hawthorn) are scattered, especially at the edges.

<sup>5</sup> In Vice County 50, a scarce plant is described as being recorded in 4-15 10 km squares (Green, 2006).



**The disused railway viewed from near the A483 looking southeast (October 2008). Part of this area would be located within the Ecological Area.**

- 2.3.14 A field unit supporting semi-improved neutral grassland is located directly south of the mineral railway. Here the sward appears to be dominated by the grasses *Holcus lanatus* (Yorkshire-fog) and *Festuca rubra* (Red Fescue) with a range of other grasses present such as *Agrostis capillaris* (Common Bent), *Anthoxanthum odoratum* (Sweet Vernal-grass), *Cynosurus cristatus* (Crested Dog's-tail) and occasional tussocks of *Dactylis glomerata* (Cock's-foot). The sedges *Carex nigra* (Common Sedge) and *Carex hirta* (Hairy Sedge) were also recorded, the latter being locally frequent where the substrate is damp. Here it forms small stands with the rushes *Juncus effusus* (Soft-rush) and *Juncus inflexus* (Hard Rush), as well as *Galium palustre* (Common Marsh-bedstraw) and *Agrostis stolonifera* (Creeping Bent). Overall this grassland resource is variable but includes a range of common herbs and forbs: locally abundant *Lotus corniculatus* (Common Bird's-foot-trefoil), frequent *Ranunculus bulbosus* (Bulbous Buttercup), *Achillea millefolium* (Yarrow), *Ranunculus acris* (Meadow Buttercup), *Trifolium repens* (White Clover), locally frequent *Trifolium pratense* (Red Clover), *Centaurea nigra* (Common Knapweed) and lesser amounts of *Luzula campestris* (Field Wood-rush), *Odontites vernus* (Red Bartsia), *Cerastium fontanum* (Common Mouse-ear), *Malva moschata* (Musk-mallow) and *Hypericum perforatum* (Perforate St. John's-wort). The most species-rich area is towards the western end where *Dactylorhiza fuchsii* (Common Spotted-orchid) was recorded scattered around the edges of the scrub. Five spikes of the Locally Scarce species *Ophrys apifera* (Bee Orchid) were also recorded in this area.
- 2.3.15 Large areas of neutral (wildflower) grassland are to be created principally along the road verges with a further strip along the western boundary (Zone 2). This new grassland is shown on the *Landscape Masterplan*. It is to be sown with the British Seed Houses WFG4 'Neutral Soils' mix<sup>6</sup>.

<sup>6</sup> [http://www.bshamenity.com/product-detail.php?product=wfg4\\_neutral\\_soils](http://www.bshamenity.com/product-detail.php?product=wfg4_neutral_soils)

## Wetlands

- 2.3.16 Two existing wetland features (other than the River Gwenfro) will be retained within the Ecological Area. There is a small swamp within the hedgerow (Hedge 5) to the north of the Central Woodland (identified as 'Swamp' on *Figure 2*). The swamp (Zone 5) has developed in a depression along a field boundary. It is dominated by *Equisetum fluviatile* (Water Horsetail) with locally dominant *Typha latifolia* (Bulrush). A range of other wetland plants are scattered throughout. *Dactylorhiza fuchsii* (Common Spotted-orchid) is present in the adjacent vegetation.



- 2.3.17 There is a small pond located in the Central Woodland and as such is included in Zone 1. It is near the source of the stream that flows through the woodland and is believed to be spring-fed. The pond flows into the stream. It measures approximately 5 m by 8 m. It is full of silt and woody debris, and is well shaded by adjacent trees. The depth of water ranges between 0.1 and 0.3 m. It supports wetland vegetation throughout with abundant *Apium nodiflorum* (Fool's Water-cress), *Rorippa nasturtium-aquaticum* (Water-cress) and lesser amounts of *Solanum dulcamara* (Bittersweet), *Phalaris arundinacea* (Reed Canary-grass) and *Mentha aquatica* (Water-mint).
- 2.3.18 The proposed development will include the creation of two attenuation lagoons (identified as 'Attenuation Lagoon (west)' and 'Attenuation Lagoon (east)' on *Figure 2*), with swales/ditches on both sides of the spine road. These wetland features (Zone 5) are part of a Sustainable Urban Drainage scheme (SUDs). The attenuation lagoons will be planted with *Phragmites australis* (Common Reed) in the margins and the banks would be planted with the Emorsgate Seeds EG8 'Meadow Grass Mix for Wetlands'<sup>7</sup>. This seed mix includes six species of grass some of which are tussock-forming species. The attenuation lagoons are likely to be artificially lined. No further detail is available with regard these lagoons.

<sup>7</sup> <http://wildseed.co.uk/mixtures/view/41>

- 2.3.19 The swales will also be planted with the Emorsgate Seeds EG8 'Meadow Grass Mix for Wetlands'. Their size and depth varies although to the west of the spine road they would generally be approximately 12 m wide and 1 m deep; on the east side of the spine road they are smaller/ shallower. They would provide strips of damp/wet grassland on either side of the spine road. No further detail is available with regard these swales.

#### River Gwenfro

- 2.3.20 The river (Zone 4) is largely similar in character throughout the length within the site, being approximately 2 to 3 m wide and 0.2 to 0.5 m deep with a moderate flow. The river generally flows over pebbles/ gravel/ cobbles with earth banks. The banks rise to approximately 1 m above the water level although in places there are higher (1.5-2 m) exposed earth banks. In most places the banks have a fairly gentle slope (30-50°). It is largely well shaded by adjacent trees/ shrubs. No aquatic or marginal vegetation was recorded.
- 2.3.21 Trees along the banks include *Alnus glutinosa* (Alder), *Acer pseudoplatanus* (Sycamore), *Ulmus glabra* (Wych Elm) with a range of shrubs including *Salix cinerea* (Grey Willow), *Salix viminalis* (Osier), *Crataegus monogyna* (Hawthorn), *Corylus avellana* (Hazel), *Ilex aquifolium* (Holly) and *Rosa canina* agg. (Dog-rose). Along more open stretches the banks are largely dominated by *Impatiens glandulifera* (Indian Balsam) with abundant *Rubus fruticosus* agg. (Bramble) and *Urtica dioica* (Common Nettle). The woodland herbs *Hyacinthoides non-scripta* (Bluebell), *Mercurialis perennis* (Dog's Mercury) and *Allium ursinum* (Ramsons) are locally frequent on the banks.



**The River Gwenfro within the Ecological Area looking downstream (December 2008).**

Scrub/ tall herbs

- 2.3.22 Some small stands of tall herbs/ scrub will be retained within the Ecological Area, for example adjacent to hedges, the Central Woodland and the swamp. Zone 6 (Area B) includes a small area near the southwest corner of the site that will be retained as non-intervention. It is likely that this area will develop tall herb and scrub vegetation.
- 2.3.23 A similar area nearby has developed such vegetation due to cessation of agricultural management. It is characterised by young *Salix caprea* (Goat Willow) scrub with some *Salix cinerea* (Grey Willow) and a small amount of *Acer campestre* (Field-maple). The ground layer is dominated by various tall herbs with *Rubus fruticosus* agg. (Bramble): abundant *Urtica dioica* (Common Nettle), locally abundant *Chamerion angustifolium* (Rosebay Willowherb), frequent *Epilobium hirsutum* (Great Willowherb), *Galium aparine* (Cleavers), *Cirsium arvense* (Creeping Thistle) and occasional *Heracleum sphondylium* (Hogweed).

Flora

- 2.3.24 Seven plant species of note were recorded from the site during the various surveys however it is likely that only four of these would be retained within the Ecological Area: *Bryonia dioica* (White Bryony), *Mentha spicata* (Spear Mint), *Ophrys apifera* (Bee Orchid) and *Ulmus procera* (English Elm). All four of these plant species are identified as 'scarce'<sup>8</sup> in VC50 - Denbighshire (Green 2006). However Spear Mint is listed as 'established' (e.g. it is not native). Both Cheffings & Farrell (2005) and Dines (2008) categorise all of these species as of 'Least Concern' in the most recent Vascular Plant Red Data List for Great Britain and Wales respectively.
- 2.3.25 The locally scarce species recorded are located as follows:
- *Bryonia dioica* (White Bryony). Hedge 7 (Zone 3).
  - *Mentha spicata* (Spear Mint). The swamp (Zone 5).
  - *Ophrys apifera* (Bee Orchid). The neutral grassland to the east of the Attenuation Lagoon (west) (Zone 2).
  - *Ulmus procera* (English Elm). Frequent throughout the site in hedges (4, 5 and 7), the Central Woodland (Zone 1) and plantation (Zone 6).

It should be noted that these locally scarce species (and indeed other notable plants) may be present elsewhere within the site.

- 2.3.26 *Impatiens glandulifera* (Indian Balsam) is an invasive non-native species that is present in extensive stands along the River Gwenfro corridor (Zone 4). *Fallopia japonica* (Japanese Knotweed) was also recorded from two locations within the river corridor/ disused railway (Zone 4). These plants are listed on *Schedule 9* of the *Wildlife and Countryside Act 1981* as non-native invasive species. Under the *Wildlife & Countryside Act 1981* it is an offence to 'plant or otherwise cause [Japanese Knotweed/ Indian Balsam] to grow' in the wild. This includes spreading the species or transferring polluted ground material from one area to another.

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<sup>8</sup> In Vice County 50, a scarce plant is described as being recorded in 4-15 10 km squares.

## Fauna

2.3.27 The proposed development site has been the subject of a range of ecological surveys. These are listed and discussed in Marches Ecology (2012a). The ecological surveys undertaken to inform the EclA included an Extended Phase I Habitat Survey/ botanical survey and detailed surveys for Badgers (*Meles meles*), Otters (*Lutra lutra*), Water Voles (*Arvicola amphibius*), bats, Great Crested Newts (*Triturus cristatus*), reptiles and breeding birds. The Extended Phase I Habitat Survey Map is presented as *Figure 3* for information only. The Target Notes associated with this map have not been reproduced in this EMP; Marches Ecology (2012a) should be referred to for further detail. Summary findings of these surveys are as follows:

- Badgers forage on the site, their activity being largely restricted to the area between the A483 embankment and the Central Woodland. A sett is present.
- Otters frequently use the stretch of the River Gwenfro within the site. The river corridor includes features that provide potential resting places. Otters have travelled along the stream in the Central Woodland in the past although this may no longer occur due to grills having been installed across the watercourse at Croesnewydd Road.
- Four species of bat have been recorded foraging/ commuting on the site; Common Pipistrelle (*Pipistrellus pipistrellus*), Soprano Pipistrelle (*Pipistrellus pygmaeus*), Noctule (*Nyctalus noctula*) and Whiskered/ Brandt's bat (*Myotis mystacinus/ brandtii*). No roosts have been recorded but there are a number of, in particular large trees, which provide roosting potential. The site is of particular value for Common Pipistrelle and to a lesser extent Whiskered/ Brandt's bat (*Myotis mystacinus/ brandtii*). The latter species was associated with the river corridor/ disused railway.
- A range of fairly widespread species of bird have bred on the site; largely woodland and or scrub-nesting species. They include a small number of species of conservation interest such as Dunnock (*Prunella modularis*), Bullfinch (*Pyrrhula pyrrhula*) and Song Thrush (*Turdus philomelos*).
- A small number of other species of conservation interest are known to use the site and include Common Frog (*Rana temporaria*) in the swamp, and Bullhead (*Cottus gobio*) and Brown Trout (*Salmo trutta*) in the River Gwenfro.

2.3.28 Great Crested Newts, reptiles and Water Voles were not recorded although there is habitat of potential value for these species/ species groups within the site.

## 2.4 Cultural

2.4.1 There is insufficient information available to complete many of the sub-sections normally included in this section.

### Past/ Present Land Use

2.4.2 The Western Gateway site has periodically been farmed. The field to the south of Hedge 5 and the Central Woodland has been cultivated for arable crops in the last few years although prior to 2008 it had not been managed for at least three years. The field to the north of Hedge 5 is not currently managed although it may have been used for livestock in the past. The stretch of disused railway that forms part of the northeast boundary of the site is a section of the former Croesnewydd Triangle to Gatewen railway line.

- 2.4.3 There are two small backfilled sand and gravel pits on the site. Further information with regard past land use is included in Bullen Consultants Ltd (2005).

### **Present Legal Status of the Site**

- 2.4.4 The Ecological Area is included within land (Sites 21 and 39) allocated by the adopted Wrexham UDP for employment development and housing between 2001 and 2011 (Policies E1/ E2/ E7, H1). Site 39 is identified as 'Wrexham: Ruthin Road Development Area' extending to 15.2 hectares. Site 21 is identified as 'Ruthin Road' extending to 11 hectares. Policy E2 allocates the site for high quality B1 employment development comprising high technology, manufacturing, research and development, and prestige offices. UDP policy requires development to be of a low density, with buildings and hard surfaced areas of high quality design and materials set within an attractive natural and designed landscape setting.
- 2.4.5 The disused railway is identified as a walking/ cycling route (Site 3, 4/ Policy T10). Policy T10 requires the route to be safeguarded for walking/ cycling.
- 2.4.6 The emerging Local Development Plan 2006-2021 (Deposit Plan) classifies the site as a Strategically Important Employment Area. Policy SP5 within the plan protects the site and the existing Technology Park for employment purposes.
- 2.4.7 The Ecological Area (to which this EMP relates) is being provided to offset perceived impacts due to the proposed development of this site. As such management of the Ecological Area will generally be for the benefit of the ecological resource although some maintenance procedures will be required.

## **2.5 Landscape**

- 2.5.1 Wrexham LANDMAP<sup>9</sup> identifies the proposed development site as being located within Landscape Character Area 7d: West Wrexham Ridges and Valleys. This is described as '*a complex area of former mining villages, industry, farmland and woodland in a landscape of distinct ridges and valleys which are aligned towards Wrexham town.*' It further describes the ecological character as being dominated by improved grassland or arable, with Gatewen SSSI and the Gwenfro valley as providing an important wetland resource.
- 2.5.2 The northern boundary of the proposed development site immediately abuts Landscape Character Area 10: Wrexham Town, described as '*a thriving historic market town set on a lowland plateau*'.
- 2.5.3 The site is bounded to the west by the A483(T) road and to the south by the A525 Ruthin Road. Further to the west and south there is open agricultural land; predominantly cattle and sheep-grazed pasture with some arable fields. The northern boundary is largely formed by the former Croesnewydd Triangle to Gatewen railway line. Further to the north there is a range of brown-field plots and recent development associated with the Wrexham Technology Park. Much of this recent development comprises small commercial/ office premises. To the northeast (on the opposite side of Croesnewydd Road) is located the extensive grounds and buildings of Wrexham Maelor General Hospital. The eastern site boundary is bordered

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<sup>9</sup> [http://www.wrexham.gov.uk/english/planning\\_portal/landmap/spg.htm](http://www.wrexham.gov.uk/english/planning_portal/landmap/spg.htm)

by Croesnewydd Road and a recent residential housing development at Pentre Bach. The land to the east of Croesnewydd Road is currently being developed.

- 2.5.4 The site is located within the lower section of the valley associated with the River Gwenfro. At this location the valley is shallow and the site is located on an undulating plain. Most of the site was farmed until 2005. The southern approximately half of the site has been in agricultural use again for the last four years. The site has an undulating profile across its east-west axis. The high point of the land area lies in the southwest corner of the site at the junction of the A483 with the A525 at an elevation of 107.5 m. The lowest point is in the northeastern corner at elevation 95.5 m. The soils across the site are primarily derived from glacial till with alluvial soils along the watercourses (Terence O'Rourke 2007a<sup>10</sup>).
- 2.5.5 The plantation on the A483 road embankment encloses the view across the western/northwestern boundary of the site. Key landscape features within the site are the Central Woodland and the wooded railway/ River Gwenfro corridor; and to a lesser extent the hedgerows.

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<sup>10</sup> Terence O'Rourke (October 2007a). *The Western Gateway Masterplan and Development Brief*. Unpublished report produced on behalf of WCBC.

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### 3 NATURE CONSERVATION FEATURES OF INTEREST

#### 3.1 Identification and Confirmation of Conservation Features

##### Primary Conservation Features

###### *Woodland*

- 3.1.1 The Central Woodland may include elements of both lowland mixed deciduous woodland and wet woodland. Both the woody component and in particular the rich ground flora suggest that at least some parts of this woodland may be ancient in origin; ancient woodland is a rare habitat in Wrexham (WCB 2003). This woodland (including the resource located outside the immediate site boundary) extends to just less than a hectare. The majority of woodlands in Clwyd are much larger than this; 98.2% are over 2 hectares although this includes plantations (Forestry Commission 2002<sup>11</sup>). Small woodlands where Oak is the principal species are frequent and widespread although no figures are provided for Alder (Forestry Commission, op. cit.). WBP (2008<sup>12</sup>) suggests that the following should be considered for selection (as a County Wildlife Site):
- undesignated semi-natural woodlands, of whatever size, which support an assemblage of ancient woodland indicator species.
  - all undesignated semi-natural woodland with a wet woodland component.
  - all undesignated semi-natural woodland with a mixed deciduous woodland component.
- 3.1.2 The Central Woodland also includes a small pond, stream, marshy grassland and tall herb fen vegetation. The Central Woodland (when considered on its own) would meet all of the above listed criteria and so despite its size may qualify for selection as a Wildlife Site, and therefore be of county importance. Due to the value of this woodland it has been retained within the Ecological Area and management will aim to maintain this habitat.
- 3.1.3 Other areas of woodland within the Ecological Area are restricted to the River Gwenfro corridor (Zone 4) and the plantation on the A483 embankment (Zone 6). The woodland, or more accurately scrub-woodland, by the River Gwenfro is very small and has been subject to historic disturbance. While a number of woodland plants (e.g. Bluebell, Ramsons) are recorded in places along the immediate banks of the River Gwenfro much of the ground layer here is species-poor and dominated by the non-native plant Indian Balsam. It would satisfy the third of the criteria listed above but as a woodland habitat is unlikely to be of county value. It is also considered more appropriate to consider the value of this habitat as part of the River Gwenfro corridor. Similarly the large area of wet woodland to be planted in Zone 4 is also considered as part of the river corridor below.

<sup>11</sup> Forestry Commission (2002). *National Inventory of Woodlands and Trees Wales – Clwyd*. Forestry Commission, Edinburgh.

<sup>12</sup> Wales Biodiversity Partnership (February 2008). *Wildlife Sites Guidance Wales: A Guide to Develop Local Wildlife Systems in Wales*. Available online: <http://www.biodiversitywales.org.uk>

- 3.1.4 The plantation woodland is of no more than local value as defined in Marches Ecology (2012a<sup>13</sup>) in accordance with IEEM (2006<sup>14</sup>).

*Neutral Grassland*

- 3.1.5 The Lowland Meadows UK BAP priority habitat type covers most forms of unimproved neutral grassland including those grazed by livestock (BRIG 2011<sup>15</sup>). The small areas of grassland to be retained on the disused railway and field to the south (adjacent to the Attenuation Lagoon West) may be covered by this priority habitat type. WBP (2008) states that '*all relatively species-rich neutral grasslands... of any significant extent and or examples of neutral grasslands that contain uncommon species*', should be considered for selection (as County Wildlife Sites). The grassland on the disused railway is particularly species-rich and supports two locally scarce species of plant although these would be lost due to the proposed development. As such it could qualify as a County Wildlife Site and is therefore considered to be of county value. The field unit to the south has a variable composition although it is species-rich in places, it also supports one locally scarce species of plant. It is considered that this field may be of district value.
- 3.1.6 The value of the grassland on the disused railway and the field to the south will be significantly affected by the proposed spine road in that only small fragments of the existing resource will be retained. Due to their subsequent size and potential disturbance the retained grassland is unlikely to continue to be of county/ district value. However it is proposed to sow 33,400 m<sup>2</sup> of the Ecological Area with a wildflower seed mix. It is hoped in the short to medium-term that this will offset the impact due to the loss of grassland. Through positive management floristic richness would be promoted. It is also hoped that locally scarce species may colonise these new habitat areas.

*River Gwenfro/ Otters*

- 3.1.7 The River Gwenfro is a tributary of the River Clywedog which in turn flows into the Afon Dyfrdwy (River Dee) Site of Special Scientific Interest (SSSI)/ River Dee and Bala Lake / Afon Dyfrdwy a Llyn Tegid (Wales) Special Area of Conservation (SAC). *Annex II* species present as a qualifying feature are Sea Lamprey, Brook Lamprey, River Lamprey, Bullhead and Otter. The latter two species are known to be present on the stretch of the River Gwenfro within the Ecological Area and WBP (2008) indicates that '*waterbodies supporting resident populations*' of Bullhead should be considered for selection as County Wildlife Sites.
- 3.1.8 The Rivers UK BAP priority habitat type '*includes a very wide range of types, encompassing all natural and near-natural running waters in the UK (i.e. with features and processes that resemble those in 'natural' systems)*' (BRIG 2011). The River Gwenfro would qualify (in accordance with the current criteria) to be covered by this priority habitat type due to the presence of *Annex II* Habitats Directive and or UK BAP priority species rather than the

<sup>13</sup> Marches Ecology (2012a). *Proposed Spine Road and Development Plateaus, Western Gateway, Wrexham Technology Park, Wrexham– Ecological Impact Assessment – Confidential Badger Survey Annex*. Unpublished report on behalf of WCBC.

<sup>14</sup> IEEM (2006). *Guidelines for Ecological Impact Assessment in the United Kingdom (Approved Version: 26 June 2006)*. Unpublished.

<sup>15</sup> Biodiversity Reporting and Information Group (ed. Maddock, A.) (2011). *UK Biodiversity Action Plan; Priority Habitat Descriptions*. Available online: [http://jncc.defra.gov.uk/PDF/UKBAP\\_PriorityHabitatDesc-Rev2011.pdf](http://jncc.defra.gov.uk/PDF/UKBAP_PriorityHabitatDesc-Rev2011.pdf)

quality of the habitat alone. As the stream within the Central Woodland is a tributary of the River Gwenfro it is recognised as an integral part of this ecological system; they are evaluated together.

- 3.1.9 While the channel of the River Gwenfro within the site has been subject to much modification, disturbance and pollution it retains features of a natural, dynamic pattern of fluvimorphology, *e.g.* exposed earth banks on meander bends, pools, side and mid-channel gravel bars. WBP (2008) provides four criteria for selection of different types of river as County Wildlife Sites. The most applicable criterion to this stretch of the River Gwenfro is '*all examples of sections of undesignated watercourses (regardless of scale) with exposed sediment and/or erosion features such as soft cliffs*'. As such the stretch of the River Gwenfro (and tributary) within the site may be considered of county value; this is further emphasised by its value to several species of conservation interest and as it forms part of the River Dee catchment. While the River Gwenfro is not specifically mentioned in WCB (2003) the River Clywedog is listed as a principal river. WBP (2008) also suggests that where designated any CWS should '*include 'buffer zones' of adjacent habitat up to 7m wide from either bank top*'. On the River Gwenfro this would encompass much of the scrub-woodland within Zone 4.
- 3.1.10 Approximately 6546 m<sup>2</sup> of the Ecological Area (Zone 4) to the southwest of the River Gwenfro will be planted with 'wet woodland'. This will provide a buffer to the retained habitat adjacent to the river as well as enhancing the value of the river corridor. It will also greatly extend the woodland resource within the site.
- 3.1.11 In addition to the legislative protection the Otter receives it is a *Section 42* species, a UK BAP priority species and is included on the provisional list of locally important/ endangered species (WCB 2003). Otters require a large territory that supports an abundant and varied food resource. Depending on the productivity of the river and other factors the range of a male Otter may be up to 70 km (of linear watercourse) while for a female it could be 25-40 km; a male Otter may overlap with two or three female territories (*e.g.* Woodroffe 2001<sup>16</sup>). Within an occupied territory, Otters may have up to around 30 resting places some used regularly while many more are used only once or a few times.
- 3.1.12 Based on the evidence recorded in 2008/ 2009 the River Gwenfro forms an important part of the territory of at least one male Otter, and towards the River Clywedog may also be included within the territory of a/ group of female Otters. But during the present survey no breeding location/ natal site (Liles 2003<sup>17</sup>, describes key features) was confirmed; although potential sites are available. The stretch within the Ecological Area includes some features that may be used as resting places. The Otter remains a widely distributed species in Wales. However WBP (2008) suggests that '*areas which are critical for nesting, foraging, roosting (laying up), territorial or other significant use*' may be considered for selection as a County Wildlife Site. In terms of resource usage these criteria are met although arguably the Otter population supported by the river is of greater than county value; '*a regularly occurring, locally significant population*'.

<sup>16</sup> Woodroffe, G. (2001). *The Otter*. The Mammal Society, London.

<sup>17</sup> Liles, G. (2003). *Otter Breeding Sites Conservation and Management. Conserving Natura 2000*. Rivers Conservation Techniques Series no. 5, English Nature, Peterborough.

## Secondary Conservation Features

### *Badgers*

- 3.1.13 Badgers are noted as a secondary feature of conservation value at the site. As stated previously no detail is provided due to the sensitive nature of this information.

### *Breeding Birds*

- 3.1.14 No birds protected under *Schedule 1* of the *Wildlife and Countryside Act 1981* (as amended) are known to breed on the proposed development site based on the 2009 breeding bird survey. Three species of principal importance under the *NERC Act* (Song Thrush, Dunnock and Bullfinch) have been recorded and confirmed as nesting within the proposed development site while a further three are possible breeders (Reed Bunting, Kestrel and Starling). All three *Section 42* species confirmed as breeders are strongly linked with scrub habitat. Song Thrush, Dunnock and Bullfinch could all continue to nest within the Ecological Area. Furthermore species such as the Reed Bunting may find greater opportunities associated with the wetlands (Zone 5). A number of other species of conservation interest (identified as locally important in the Wrexham BAP or as UK BAP priority species; Birds of Conservation Concern) have also bred/ possibly breed within the proposed development site.
- 3.1.15 The breeding bird interest of the proposed development site (in 2009) was largely associated with the Central Woodland, the central hedgerow (Hedge 5) and the River Gwenfro and associated habitat. Much of this habitat will be retained within the Ecological Area. The breeding bird assemblage within the site is unlikely to meet the selection criteria for County Wildlife Site status provided by WBP (2008). However WBP (2008) also suggests that any site supporting a breeding population of Kestrel could be considered for selection. Breeding by this species was not confirmed during 2009 although a pair are thought to have nested nearby and used the site for hunting. Further there is the potential for this species to nest within the site. This species is identified as a species of principal importance in Wales only; it is not included on the *Section 41* list in England. The Kestrel is listed on the Amber list in the UK (Eaton *et al.* 2009<sup>18</sup>) and the Red List in Wales (RSPB 2009<sup>19</sup>) due to its unfavourable conservation status across Europe. Should this species be found to be breeding on site this evaluation could be revised. However similar nesting opportunities and habitat is available outside the site. It is therefore considered that the breeding bird assemblage supported by the site is of district value.
- 3.1.16 In the fullness of time it may be possible to identify a particular species for this feature, for example Song Thrush. Management for this species is likely to be of benefit to other scrub-nesting species such as the Dunnock.

<sup>18</sup> Eaton, M.A., Brown, A.F., Noble, D.G., Musgrove, A.J., Hearn, R., Aebischer, N.J., Gibbons, D.W., Evans, A. & Gregory, R.D. (2009). Birds of Conservation Concern 3: the population status of birds in the United Kingdom, Channel Islands and the Isle of Man. *British Birds* 102, pp296-341.

<sup>19</sup> RSPB (2009). *The Population Status of Birds in Wales 2*. RSPB Cymru, Cardiff.

### Bats

- 3.1.17 Four species of bat were recorded foraging/ commuting throughout much of the site; Common Pipistrelle (*Pipistrellus pipistrellus*), Soprano Pipistrelle (*Pipistrellus pygmaeus*), Noctule (*Nyctalus noctula*) and Whiskered/ Brandt's bat (*Myotis mystacinus/ brandtii*). In addition to the legislative protection these species receive the former three are *Section 42* species; Soprano Pipistrelle and Noctule are also UK BAP priority species and they are all included on the provisional list of locally important/ endangered species in Wrexham (WCB 2003). No roosts were identified although potential roosting opportunities are associated with large trees.
- 3.1.18 The sheltered areas around individual broadleaved trees and woodlands, hedgerows and the river corridor are likely to support foraging bats throughout their active season. However, the level of feeding activity was found to vary greatly between survey visits although this is not uncommon and is ultimately linked to prey availability. There were two readily identifiable commuting routes being used by Common Pipistrelles; Hedges 4 and 5. Hedge 5 is the more regularly used of the two hedgerows. Whiskered/ Brandt's bats were less frequent than Pipistrelle bats and were limited to foraging activity along the River Gwenfro on either side of Croesnewydd Road (it is possible that they fly beneath the culvert).
- 3.1.19 WBP (2008) state that '*any undesignated significant roosting sites, vital flight and commuting routes and priority feeding areas attached to roosts*' could be considered for selection as a County Wildlife Site. While several important flight/ commuting routes exist that are likely to be close to a Common Pipistrelle roost it is not known whether they are 'vital'. The site remains connected to the wider landscape via several hedgerows, blocks of woodland and the river corridor although this is fragmentary in nature due to roads and built development. This habitat diversity within a reasonably well linked landscape provides potentially moderate quality foraging/ commuting habitat for bats. When considered in this context, and as part of an ecological unit, the habitat within the site may be of district value (for foraging/ commuting bats).

### Wetlands

- 3.1.20 The wetlands in Zone 5 are largely to be created as part of the proposed development (attenuation lagoons, swales/ ditches). As such the value of these features is not known at present but it is expected that they will diversify the available habitat resource on the site and be of benefit to a range of species including plants, birds and bats.
- 3.1.21 The swamp that will be retained within the Ecological Area supports a diverse marginal/ wetland vegetation community. It is also of value to a range of wildlife including the Common Frog (*Rana temporaria*). It is considered to be of local value.

**Confirmed List of Conservation Features**

- 3.1.22 The table below lists the features that will be the focus of the remaining management planning process and indicates the conservation status of each species/ species group/ habitat.

| Feature               | International Status | National Status | Local Status |
|-----------------------|----------------------|-----------------|--------------|
| Woodland              |                      |                 | ✓            |
| Neutral Grassland     |                      |                 | ✓            |
| River Gwenfro/ Otters | ✓ (Otters)           | ✓ (Otters)      | ✓            |
| Badgers               |                      |                 | ✓            |
| Breeding birds        |                      |                 | ✓            |
| Bats                  |                      |                 | ✓            |
| Wetlands              |                      |                 | ✓            |

## 4 MANAGEMENT OBJECTIVES AND MONITORING

### 4.1 Woodland

#### Summary Description

- 4.1.1 The Central Woodland is one of the most valuable ecological resources within the site as well as being a key landscape feature. It contains a significant proportion of the large trees present within the site. The number of mature/ over-mature trees and therefore dead-wood habitat is notable. Due to the presence of a pond and stream the woodland is particularly diverse and also supports tall-herb fen vegetation which is of value in its own right. The woodland is of particular value for these habitat types and for foraging/ commuting bats and nesting birds.
- 4.1.2 This section considers the Central Woodland only. The woodland in Zone 4 is considered further below under the River Gwenfro. While management prescriptions are provided for the plantation woodland in Zone 6 it is not of great ecological value and as such is not considered here.

#### Management Objective

- 4.1.3 The current value of the Central Woodland has developed in the absence of recent management. In particular the presence of large amounts of dead wood in the canopy, rot-holes and other such features in the trees is of value to wildlife. The temptation to over-manage the trees within the Central Woodland should be resisted. Ideally non-intervention would be prescribed for this feature but it is recognised that some arboricultural work may be required around the edges where it is necessary for safety. Such work should be restricted to the minimum required and should be undertaken in consultation with a suitably qualified ecologist. Furthermore any such work on trees would require an inspection by a bat ecologist before undertaking the work (see Marches Ecology 2012d). Such arboricultural work should only be undertaken where required for safety and not for other reasons such as achieving good form. The number of mature/ over-mature trees should be encouraged along with dead wood habitat where possible.
- 4.1.4 The southwest portion of the Central Woodland has a particularly open nature. This habitat feature and the vegetation it supports should be viewed as an asset and proposals such as tree planting in this area should also be resisted. Due to the drainage pattern through this wood this open area largely supports tall herb fen vegetation which is of ecological value and forms an important component of the woodland ecosystem. The current extent of this open area/ fen vegetation should be maintained.
- 4.1.5 The Central Woodland will be managed through limited intervention. The only management that should be allowed in this area would be limited tree pruning for safety as detailed above and maintenance of bird/ bat-boxes; otherwise it should be left to develop by itself. The condition of the woodland should be monitored (in accordance with JNCC 2004a<sup>20</sup>) to determine whether management may need to be undertaken in the future (control of *Acer pseudoplatanus* Sycamore may be considered necessary).

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<sup>20</sup> JNCC (2004a). *Common Standards Monitoring for Woodland Habitats - Version February 2004*. JNCC.

### **Favourable Conservation Status**

- 4.1.6 Two of the biggest threats to the ecological value of the Central Woodland are disruption of the local hydrology and over-management. Construction of the spine road and development plateaus will impact the local hydrology which may in turn affect the wetland habitat within the Central Woodland. Individual developments may also have an impact as the plots are brought forward. The construction contractor will be required to monitor the hydrological inputs to the Central Woodland and minimise any perceived impacts. The monitoring proposed below will also review the condition of different attributes of the woodland but importantly the tall-herb fen vegetation and the wet woodland.
- 4.1.7 Should the local hydrology be impacted to any great extent it may cause the wetland habitat within the Central Woodland to dry out. The species composition within the fen vegetation and wet woodland would change over time which should be detected by the condition monitoring. Should the fen vegetation become drier it is likely to be colonised by Bramble and tall herb species more typical of dry ground (e.g. Common Nettle, Rosebay Willowherb); and eventually scrub. Any changes in the water chemistry may also result in changes to the vegetation communities. Such changes are likely to result in a reduction in habitat diversity and a shift to less valuable vegetation communities.
- 4.1.8 As previously noted mature/ over-mature trees and dead wood habitat are important attributes of the Central Woodland. Over management could easily lead to a reduction in the value of this attribute. Furthermore planting of open spaces that may be perceived to be less valuable could result in the loss of important vegetation communities (e.g. tall herb fen).
- 4.1.9 At present there is no detailed information regarding the condition of the valuable attributes of the Central Woodland. Furthermore in the absence of such data it is difficult to suggest appropriate attributes for monitoring although some are suggested in the table below. As long-term data is not available, it is not known whether the value/ condition of the attributes is decreasing, being maintained, or increasing. Without information regarding the status of the woodland it is not possible at this stage to define the Favourable Conservation Status (FCS). The FCS should be defined once sufficient information is available.

### **Monitoring**

- 4.1.10 This section details the proposed monitoring project for the feature of interest (woodland).
- 4.1.11 At the present time there is insufficient information with which to define the target values for the attributes of this feature. Possible attributes are suggested in the table below. Of importance is the maintenance of the extent of woodland types (wet and over-mature/ open structure stand), and the extent and functioning of the wetlands (extent of the fen vegetation, the pond and wet woodland).

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Available online: [http://jncc.defra.gov.uk/pdf/CSM\\_woodland.pdf](http://jncc.defra.gov.uk/pdf/CSM_woodland.pdf)

**Woodland Condition Monitoring****Methodology**

During the first visit it will be necessary to identify the attributes (of the feature) that need to be assessed and subsequently the targets associated with these attributes. Possible attributes that may be appropriate for the Central Woodland would be:

- (Extent of) semi-natural woodland.
- (Extent of) tall herb fen vegetation.
- Number of over-mature trees (Suggested 5-10 trees/ hectare).
- Canopy cover over 30-90% of area (needs to be defined on first visit).
- At least 95% of cover in any one layer of site-native or acceptable naturalised species.
- Presence/ abundance of key woodland indicator species maintained.

The following assessment procedure is provided by JNCC (2004a) and this document should be referred to for further guidance. The assessment should be based on a structured walk around the Central Woodland with a series of observation stops along the way. On an appropriate-scaled map (usually 1:10,000) mark a route that gives a reasonable coverage of the area to be assessed, taking account of any known variability, *e.g.* from previous visits, aerial photographs *etc* and any areas under high risk of change. Checking that important glades are still open may need to be done more often than assessing overall canopy cover. Within limits imposed by health and safety considerations the route should not be confined to paths but should go across the middle of stands, across the contours *etc*. Allow about 1-2 hours for a survey visit.

The simplest approach to ensuring systematic coverage is to mark ten "stops" on the map along the route, evenly spaced or to cover the expected variation. These will be the main assessment points, but the state of the wood between the stops should be used as well. It is not essential that the same points will be re-surveyed on future visits, but it may be helpful if there is at least some overlap. In particular, if there are areas that raised concerns previously these should be included on this visit.

The aim is to gain as good an overview of the woodland feature as possible within a limited time, to enable judgement as to whether the targets are being met or not. The pre-determined route and ten stops are there to help with consistency between assessments between sites. Do not be too constrained by the route or precise position of the stops if minor deviations will give you a better picture of the wood. However do record any major variations in the route.

Do not rely on your memory to assess the area visited at the end of the walk. Make notes relevant to the targets at each of the ten stops. There will be additional comments worth making on the state of the wood between stops. A balance needs to be struck between this assessment and carrying out a full Phase 2 survey, which is not the intention. Make notes even if a woodland feature is so uniform that the notes at each stop start to be the same as those at the start. The feature may be changing gradually and by the next assessment we will want to be sure of what it has changed from across the whole of the area assessed.

At each stop consider the woodland around you that you can see easily. In most sites this will equate to about a 50 x 50 m plot but it is not necessary to measure out a plot as this is not meant to be a quantitative sampling process. Make a brief note against each of the attributes and the targets associated with them. If the area around the stop is atypical of what you had been walking through up to that point note this.

The "stops" are not intended to be a formal statistical sample; the targets cannot just be ticked as favourable/ unfavourable at each stop and then totalled at the end to give the overall state of the wood. Rather the notes made at each will contribute to your overall judgement. So make the notes helpful to you and to the surveyor who will come after you. If the target is a quantitative one try and give your estimate of what the cover/density/*etc* is, rather than simply saying whether it meets the target or not. This may help in judging trends at the next visit.

Be prepared to alter your ideas as you go through the wood, particularly if you are not that familiar with the site. The first few stops may look in very bad condition but subsequently it may become clear that this state applies

| Woodland Condition Monitoring                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
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| <p>to only a very small area (or vice versa). Alternatively what appears to be a favourable state initially - a well-structured stand with old trees and dense under-storey - may, because it is repeated across the whole site, be undesirable: the wood lacks any open space and too many of the old trees are in danger of being over-topped by younger growth.</p> <p>You are assessing condition, not management, but make a note of any recent management or other activity that may help in interpreting your condition assessment and what should be done as a consequence. Condition assessment is only one part of the management control cycle.</p> |                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Timing and Location:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | One annual visit, Years 1 to 5. After this five year period and subject to review it may be possible to adjust the frequency of visits (perhaps to every three years or similar). It may be most appropriate to undertake the survey visit before leaves have fully unfurled and at a time when woodland vernal plants are most visible. It is suggested that the first visit is undertaken in May and that this is subsequently reviewed. Zone 1. |
| <b>Equipment:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Survey form, clipboard, map, camera, 30 m tape measure.                                                                                                                                                                                                                                                                                                                                                                                            |

## 4.2 Neutral Grassland

### Summary Description

- 4.2.1 Unimproved/ semi-improved neutral grassland associated with the disused railway and the field to the south of this is acknowledged as one of the most valuable ecological resources on the site. Most of the existing resource will be lost due to the proposed development but a similar area will be created to offset this impact. At present the grassland supports three locally scarce species of plant although at least two of these may be lost due to the proposed development. The small population of *Ophrys apifera* (Bee Orchid) may be maintained within a retained area of grassland. The created grassland is to be sown with a 'wildflower mix' suitable for neutral soils. The number/ presence of locally scarce species of plant is proposed as an indicator of the overall health of the habitat.

### Management Objective

- 4.2.2 The current value of the grassland has developed in the absence of recent formal management. However there are a number of factors that contribute to the condition of this ecological resource. The most important of these factors is probably limited grazing by Rabbits and use of the area for informal recreation (including the use of motorbikes). This has given rise to a range of different sward heights along with intimate mosaics with tall herbs and patches of Bramble providing a variety of ecological niches. Rabbit browsing keeps the sward particularly low in places, while the informal recreation has created areas that are compacted and include some bare substrate. Elsewhere the sward height is defined by the flowering heads of the constituent grasses in the absence of grazing.
- 4.2.3 It is acknowledged that it will be difficult to replicate these conditions, particularly where the grassland is to be created on road verges/ embankments. The small area of grassland to be retained on the disused railway and the field to the south may continue to be subject to these factors however elsewhere active formal management is likely to be required to benefit floristic diversity. As with the Central Woodland the risk here will be to over-manage the grassland, particularly where present on the verges. This should be resisted; there is little point in sowing a 'wildflower mix' at considerable additional expense if the species of

wildflower included are lost through inappropriate or over-management. Good examples of successful grassland creation and subsequent management such as those on the M40 in Oxfordshire/ Warwickshire should be mirrored. Some useful guidance is provided in The Chilterns Conservation Board (2009<sup>21</sup>) although the Design Manual for Roads and Bridges (DMRB) is probably the most relevant source in this instance<sup>22</sup>.

- 4.2.4 The created neutral grassland will be managed through periodic mowing during the summer (no more than once a year) followed by removal of the cut material. The grassland on the disused railway and the retained part of the field to the south (to the east of the Attenuation Lagoon West) will initially not be subject to formal management although some scrub clearance may be required. It is hoped that the sward here will be maintained once Rabbit browsing is re-established. This will need to be monitored and active management introduced if required. These retained areas should provide species-rich neutral grassland of varying lengths (10-50 cm) with bare patches, and stands of scrub around the edges.
- 4.2.5 Parts of the embankments/ verges within the Phase I part of the Western Gateway scheme (Junction 3 on Croesnewydd Road) are to be sown with a wildflower seed mix. This grassland should be managed in the same way as that prescribed for the sown grassland within the Ecological Area.
- 4.2.6 The height of the sward elsewhere, within the created grassland, will be dictated by the management regime. Ideally management (limited intervention initially) of the retained grassland should maintain the population of Bee Orchid, and hopefully management of the entire grassland resource will facilitate colonisation by other locally scarce species of plant. It is suggested that Zone 2 should support two or more locally scarce plant species.

#### **Favourable Conservation Status**

- 4.2.7 If the created grassland remains unmanaged it is likely that the sward will gradually be colonised by coarse-leaved grasses such as *Arrhenatherum elatius* (False Oat-grass) and *Dactylis glomerata* (Cock's-foot) and/or be subject to scrub invasion. Should the grassland be over-managed it is again likely that a few vigorous grass species would benefit and there would be a reduction in floristic richness. In this instance it is likely that locally scarce species characteristic of species-rich neutral grassland would be lost. While the created grassland will require active management to maintain its interest the retained grassland should be left to be maintained by existing factors (e.g. Rabbits) where possible.
- 4.2.8 At present there is little detailed information regarding the size of the Bee Orchid population on site. Five individual spikes were recorded on one occasion in 2009. As long-term data is not available, it is not known whether the population size is decreasing, being maintained, or increasing. Furthermore no information is currently available on the created grassland. Without information regarding the status of the locally scarce species in the area or the condition of the grassland it is not possible at this stage to define the FCS.

<sup>21</sup> The Chilterns Conservation Board (2009). *Environmental Guidelines for the Management of Highways in The Chilterns*. Available at:

[http://www.buckscc.gov.uk/assets/content/bcc/docs/transport/Chilterns\\_Highway\\_guidelines.pdf](http://www.buckscc.gov.uk/assets/content/bcc/docs/transport/Chilterns_Highway_guidelines.pdf)

<sup>22</sup> Design Manual for Roads and Bridges Volume 10 Section 3 (Part 1) HA 67/93. *The Wildflower Handbook*. Available at: <http://www.dft.gov.uk/ha/standards/dmrb/vol10/section3/ha6793.pdf>

## Monitoring

- 4.2.9 This section details the proposed monitoring project for the feature of interest (grassland).
- 4.2.10 At the present time there is insufficient information with which to define the target values for the attributes of this feature. Possible attributes are suggested in the table below. In particular it is suggested that at least two locally scarce species of plant characteristic of species-rich neutral grassland should be recorded from Zone 2. Species richness and sward structure within the retained grassland are also important as is the extent of the retained grassland. The extent of the scrub within the retained grassland should be mapped on the first visit. A decision can then be taken as to the extent that will be tolerated and therefore whether management is required.

| Grassland Condition Monitoring                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
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| Methodology                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <p>During the first visit it will be necessary to identify the attributes (of the feature) that need to be assessed and subsequently the targets associated with these attributes. Possible attributes that may be appropriate for the neutral grassland would be:</p> <ul style="list-style-type: none"> <li>• (Presence/ number of) locally scarce species.</li> <li>• (Extent of) retained grassland (<i>e.g.</i> with regards scrub encroachment).</li> <li>• Sward structure/ height.</li> <li>• Species richness.</li> <li>• Sward structure: grass/ herb ratio.</li> </ul> <p>The following assessment procedure is based on that provided by JNCC (2004b<sup>23</sup>) and Robertson &amp; Jefferson (2000<sup>24</sup>) and these documents should be referred to for further guidance. In particular pages 133 to 136 in Robertson &amp; Jefferson (2000) provide a detailed methodology. The assessment should be based on a structured walk around Zone 2 visiting both retained and created grassland with a series of observation stops along the way. On an appropriate-scaled map (usually 1:10,000) mark a route that gives a reasonable coverage of the area to be assessed, taking account of any known variability, <i>e.g.</i> from previous visits, aerial photographs <i>etc</i> and any areas under high risk of change. Allow for about 4 hours for a survey visit.</p> <p>The simplest approach to ensuring systematic coverage is to mark twenty “stops” on the map along the route, evenly spaced or to cover the expected variation. These will be the main assessment points, but the state of the grassland between the stops should be used as well. It is not essential that the same points will be re-surveyed on future visits, but it may be helpful if there is at least some overlap. In particular, if there are areas that raised concerns previously these should be included on this visit. After the first visit it may be considered appropriate to undertake fewer stops but more than 10 should always be completed.</p> <p>The aim is to gain as good an overview of the grassland feature as possible within a limited time, to enable judgement as to whether the targets are being met or not. The pre-determined route and stops are there to help with consistency between assessments between sites. Do not be too constrained by the route or precise position of the stops if minor deviations will give you a better picture of the grassland. However do record any major variations in the route.</p> <p>Do not rely on your memory to assess the area visited at the end of the walk. Make notes relevant to the targets at each of the stops. There will be additional comments worth making on the state of the grassland between stops. A balance needs to be struck between this assessment and carrying out a full Phase 2 survey,</p> |

<sup>23</sup> JNCC (2004b). *Common Standards Monitoring for Lowland Grassland Habitats - Version February 2004*. JNCC. Available online: [http://jncc.defra.gov.uk/PDF/CSM\\_lowland\\_grassland.pdf](http://jncc.defra.gov.uk/PDF/CSM_lowland_grassland.pdf)

<sup>24</sup> Robertson, H.J. & Jefferson, R.J. (2000). *Monitoring the Condition of Lowland Grassland SSSIs. I. English Natures Rapid Assessment Method*. English Nature Research Report 315, Peterborough. Available at: <http://publications.naturalengland.org.uk/publication/64033>

### Grassland Condition Monitoring

which is not the intention. Make notes even if a grassland feature is so uniform that the notes at each stop start to be the same as those at the start. The feature may be changing gradually and by the next assessment we will want to be sure of what it has changed from across the whole of the area assessed.

At each stop indicator species/ other attributes should be looked for in a 'search area' in front of the surveyor. A standard quadrat size (2m × 2m) should be used for this search area. Make a brief note against each of the attributes and the targets associated with them. If the area around the stop is atypical of what you had been walking through up to that point note this.

It is better to pre-determine an approximate stopping distance, say every 20 paces, depending on the dimensions of the route followed, rather than having to 'choose' a place which leads to worries over subjectively picking a 'good bit' or a 'bad bit'. It does not matter if paces are uneven, as the aim is merely to be more objective about where to stop.

The "stops" are not intended to be a formal statistical sample; the targets cannot just be ticked as favourable/ unfavourable at each stop and then totalled at the end to give the overall state of the wood. Rather the notes made at each will contribute to your overall judgement. So make the notes helpful to you and to the surveyor who will come after you. If the target is a quantitative one try and give your estimate of what the cover/density/*etc* is, rather than simply saying whether it meets the target or not. This may help in judging trends at the next visit.

Be prepared to alter your ideas as you go around the grassland, particularly if you are not that familiar with the site. The first few stops may look in very bad condition but subsequently it may become clear that this state applies to only a very small area (or vice versa). Alternatively what appears to be a favourable state initially may, because it is repeated across the whole site, be undesirable.

You are assessing condition, not management, but make a note of any recent management or other activity that may help in interpreting your condition assessment and what should be done as a consequence. Condition assessment is only one part of the management control cycle.

In addition to the 'structured walk' it may be necessary to employ alternative techniques for assessing the extent of features such as scrub encroachment onto the retained grassland. The most applicable is probably the use of transects and mapping of the edge of the habitats as described in Robertson & Jefferson (2000) on page 27.

|                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Timing and Location:</b> | One annual visit, Years 1 to 5. After this five year period and subject to review it may be possible to adjust the frequency of visits (perhaps to every three years or similar). The survey visit should be undertaken before the grass is cut and coincide with the flowering period of indicator species ( <i>e.g.</i> locally scarce plants). The first two weeks of July may be most appropriate but this can be altered following the first visit or in accordance with weather conditions, <i>etc.</i> Zone 2. |
| <b>Equipment:</b>           | Survey form, clipboard, map, camera, 30 m tape measure, centimetre scale. The survey form can be adapted from that provided in Robertson & Jefferson (2000). That provided for the 'MG5' community is possibly most applicable (pages 73 & 74).                                                                                                                                                                                                                                                                       |

### 4.3 River Gwenfro/ Otters

#### Summary Description

- 4.3.1 The River Gwenfro is a minor watercourse that is a tributary of the River Clywedog. Within the site the channel is approximately 2 to 3 m wide and 0.2 to 0.5 m deep with a moderate flow. It also exhibits some natural geomorphological forms and processes in contrast to the constrained/ engineered character of the stretch through much of Wrexham town. The River Gwenfro is tree-lined through the site with an adjacent small area of scrub-woodland. There are a number of mature trees present. The river corridor and associated habitat may provide a potential dispersal route for a range of wildlife. The river corridor is also of value for foraging/ commuting bats and nesting birds.
- 4.3.2 The River Gwenfro supports a population of Otters that are likely to be part of the meta-population supported by the Dee. At least one male Otter is thought to use the River Gwenfro along with a small number of females. The River Gwenfro also supports a population of the Bullhead; this species of fish along with Otters is an *Annex II* qualifying feature of the Afon Dyfrdwy (River Dee) Site of Special Scientific Interest (SSSI)/ River Dee and Bala Lake / Afon Dyfrdwy a Llyn Tegid (Wales) Special Area of Conservation (SAC). The Otter is suggested as an indicator species for this feature.

#### Management Objective

- 4.3.3 Zone 4 includes the River Gwenfro and associated retained habitat along the immediate banks along with the proposed wet woodland planting and broad-leaved woodland on the opposite side of the spine road. Arguably the Otter population (and therefore the habitat that supports it) is the most important feature of this site. As with other ecological resources within the site there may be a risk that the bank side trees/ woodland are subject to over-management. As such the retained woodland should be subject to non-intervention where possible. The proposed planted woodland will require active management initially. Once established any further management requirements can be reviewed. Again the aim should be to limit management thereby minimising disturbance along the river corridor.
- 4.3.4 Large trees within Zone 4 should be allowed to grow to maturity/ over maturity wherever possible. Such trees particularly where present on the river banks may be utilised by Otters as resting places and are also of value for other wildlife. Dense tall herb vegetation and scrub should be allowed to develop wherever possible for the same reason. The extent and abundance of Japanese Knotweed may need to be monitored; future control may need to be undertaken if necessary.
- 4.3.5 Maintenance/ monitoring of mitigation measures including Otter exclusion fencing and the ledge beneath the new culvert is detailed in Marches Ecology (2012d).

### Favourable Conservation Status

- 4.3.6 Based on the survey findings in 2008/ 2009 it is thought that the River Gwenfro through the site supports at least one male Otter and that it is used on a regular basis although no definition of 'regular' is possible. As long-term data (over more than one year) is unavailable it is not known whether the local Otter population is decreasing, being maintained or increasing. However based on the results of the most recent national survey in 2009-2010 it is likely that the local Otter population is increasing in parallel with most other parts of Wales. It is therefore suggested that based on the size/ length of the River Gwenfro and known population densities for England and Wales that it would be in favourable condition where it continues to support at least one adult Otter. It is therefore assumed that the site Favourable Conservation Status is currently being maintained.

### Monitoring

- 4.3.7 The River Gwenfro should continue to support at least one adult Otter. Furthermore during the proposed survey visits notes will be made about the general habitat condition in relation to features of benefit to Otters, particularly the availability of resting places and dense vegetative cover.

| Otter Monitoring                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                               |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Methodology                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                               |
| <p>Survey the River Gwenfro and the Attenuation Lagoons for signs of Otter activity. The area surveyed is mapped along with the positions and densities of spraints, feeding remains, footprints, holts, couches, and other field signs. The survey methodology broadly follows that outlined in NRA (1993<sup>25</sup>) and Chanin (2003<sup>26</sup>) conforming to the level of effort outlined in the Design Manual for Roads and Bridges Volume 10: Nature Conservation Advice in Relation to Otters (dated February 2001)<sup>27</sup>.</p> <p>The survey should be extended by at least 200 m up and down stream of the site. The survey should include a check beneath the A483 bridge upstream of the site and the covered bridge in the grounds of the hospital; further information is provided in Marches Ecology (2012a). Access permission will be required.</p> |                                                                                                                                                                                                                                                                                               |
| <b>Timing and Location:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Twice a year for the first three years after completion of the Phase II works (Years 1 to 3) and subsequently every five years. The survey visit should be undertaken in and following appropriate weather conditions, <i>etc.</i> Suggested months for survey are May and September. Zone 4. |
| <b>Equipment:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Survey form, clipboard, map, camera, waders, torch, (walking) stick.                                                                                                                                                                                                                          |

- 4.3.8 Both Japanese Knotweed and Indian Balsam have been recorded from Zone 4. The extent of both should be recorded throughout Zone 4 during/ after one of the Otter survey visits. No Japanese Knotweed will be tolerated and management will need to be prescribed if recorded. Indian Balsam was recorded throughout the scrub-woodland and would be difficult and costly to control. There would be little point in removing Indian Balsam from this area if it is not controlled elsewhere on the River Gwenfro. At the present time management is unlikely to be proposed for this plant but this should be reviewed as appropriate.

<sup>25</sup> National Rivers Authority (1993). *Otters and River Habitat Management*. Conservation Technical Handbook 3.

<sup>26</sup> Chanin, P. (2003). *Monitoring the Otter (Lutra lutra)*. Conserving Natura 2000. River Monitoring Series no. 10, English Nature, Peterborough.

<sup>27</sup> Available at: <http://dft.gov.uk/ha/standards/dmrb/vol10/section4/ha8199.pdf>

| Non-native Invasive Plant Monitoring                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                       |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|
| Methodology                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                       |
| All parts of Zone 4 should be visited and the presence/ absence of any non-native invasive plants noted (particularly Japanese Knotweed and Indian Balsam). The extent should be estimated and mapped by visual observation. Notes should be made with regard the frequency of occurrence and potential spread of the species. The requirement for a management project (to control the species) to be added to this management plan should be reviewed after each visit. |                                                       |
| <b>Timing and Location:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                               | Every three years in May/ June. Zone 4.               |
| <b>Equipment:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Survey form, clipboard, map, camera, waders/ wellies. |

#### 4.4 Breeding Birds

##### Summary Description

- 4.4.1 The breeding bird assemblage supported by the site in 2009 was considered to be of district value. It included a number of widespread passerines some of which are of conservation interest. The site is used by a number of breeding birds that prefer areas of dense scrub and open woodland *e.g.* Song Thrush, Dunnock and Bullfinch. The Song Thrush is a familiar bird in gardens, woods and hedgerows. One or more species of bird will be identified in the future as a valuable feature of the site and the following management amended accordingly. This species is likely to be a scrub or tree-nester to focus appropriate management.
- 4.4.2 As Song Thrush and Dunnock are likely to continue to nest within the Ecological Area (although the number of pairs may be reduced following development) these species have been chosen as indicators. The Ecological Area should continue to support both species.

##### Management Objective

- 4.4.3 The site will be managed to provide potential nesting habitat for birds that prefer woodland and scrub, such as the Song Thrush, Dunnock and Bullfinch. The retained area of woodland will be maintained at its current extent, while the planted woodland (7434 m<sup>2</sup>) will be managed to ensure a dense under-storey of shrub species. Enhancement measures outlined in Marches Ecology (2012d) include the provision of a number of regularly maintained bird-boxes.

##### Favourable Conservation Status

- 4.4.4 In 2009 the site supported 2-3 pairs of Dunnock, 1-2 pairs of Bullfinch and 2-4 pairs of Song Thrush. However following the proposed development the site will be much changed and it is unlikely to support such numbers of nesting birds, at least until the created habitats become established in the medium-term. It is considered unlikely that the site would continue to support the numbers of pairs listed above however it is not unrealistic to suppose that at least one pair of Dunnock and Song Thrush would continue to nest on the site. As the proposed development will result in the creation of new habitat features it is possible that other species of conservation interest could start to use the site (*e.g.* Reed Bunting on the attenuation lagoons).

- 4.4.5 As long-term data is unavailable it is not known whether the number of Dunnock and Song Thrush or other key breeding species is decreasing, being maintained or increasing. It is not possible to define the Favourable Conservation Status of these or other species at this time. The FCS should be defined following a few years of survey.

### Monitoring

- 4.4.6 The Ecological Area should support at least one pair of Song Thrush and one pair of Dunnock. These target values may need to be re-defined following a few years of survey. It may be appropriate to include target values for other species of conservation interest.
- 4.4.7 Territory-holding birds will be monitored through visiting the site twice between April and July each year. The visits will be conducted within 2.5 hours of sunset or sunrise and will involve mapping all individuals, particularly singing birds. Occupancy/ use of the nest-boxes will also be checked at this time.

| Breeding Bird Monitoring                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                              |
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| Methodology                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                              |
| The site will be visited within 2.5 hours of sunset or sunrise. All registrations of key species (e.g. Song Thrush, Bullfinch, Dunnock) will be recorded and mapped within the Ecological Area. The visits will concentrate on locating birds that are holding territory or are nesting. This survey would use the British Trust for Ornithology's (BTO) Common Bird Census technique (Marchant 1983 <sup>28</sup> ) and Gilbert <i>et al.</i> (1998 <sup>29</sup> ). |                                                                                                                                                              |
| <b>Timing and Location:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                           | Two visits annually in April to July. Visits to be undertaken for three years after completion of development and subsequently every three years. All Zones. |
| <b>Equipment:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Survey form, clipboard, map, camera, binoculars.                                                                                                             |

## 4.5 Bats

### Summary Description

- 4.5.1 No bat roosts have been recorded on the site although some of the trees are of potential value. Four species of bat have been recorded foraging/ commuting on the site. The site is of particular value for the Common Pipistrelle and to a lesser extent the Whiskered/ Brandt's bat. The latter is largely associated with Zone 4. Following the 2009 survey the site was considered to be of district value for foraging/ commuting bats. The Common Pipistrelle is the most frequently encountered species of bat in urban/ semi-urban settings. It is considered likely that this species will continue to use the site for foraging/ commuting. It is also possible that the Whiskered/ Brandt's bats and Soprano Pipistrelle would continue to use the site. It is less likely that Noctule bat would continue to use the site.
- 4.5.2 The river corridor, woodland and hedges are the most valuable features for foraging/ commuting bats on the site. Monitoring projects have been prescribed for the former two habitats; it is therefore appropriate to monitor the hedges as well.

<sup>28</sup> Marchant, J.H. (1983). *BTO Common Bird Census Instructions*. British Trust for Ornithology, Tring.

<sup>29</sup> Gilbert, G., Gibbons, D.W. & Evans, J. (1998). *Bird Monitoring Methods – a manual of techniques for key UK species*. RSPB, Sandy.

### Management Objective

- 4.5.3 The hedges to be retained and created on the site (Hedges 1-7) are to be managed to promote their general habitat value along with maintaining connections with habitat features. Hedges 1-4, 6 and 7 will be the subject of a formal management regime while Hedge 5 will be the subject of limited intervention. Through lack of management Hedge 5 has developed as a line of trees/ shrubs. Over-management of this feature will be resisted; it will be retained as a line of trees/ shrubs. The landscape and ecological value of many hedges is damaged by over cutting. The timing and severity of flailing can significantly affect the appearance of the hedge, and its importance as a habitat and food source for wildlife. Annual management should be avoided wherever possible.
- 4.5.4 The areas of grassland, woodland and river corridor will provide potentially valuable foraging/ commuting habitat; their management is briefly discussed above. Furthermore the wetland features described below will provide additional potential foraging habitat.
- 4.5.5 Enhancement measures outlined in Marches Ecology (2012d) include the provision of a number of regularly maintained bat-boxes.

### Favourable Conservation Status

- 4.5.6 No roosts have been identified on site as such there is no existing information on roosting bats. The only information available on foraging/ commuting bats is more-or-less limited to the 2009 survey data. As long-term data is not available, it is not known whether use of the site is decreasing, being maintained, or increasing. Without information regarding the status or the condition of local bat populations it is not possible at this stage to define the FCS.

### Monitoring

- 4.5.7 Due to the ease with which bat-boxes can be monitored their use by roosting bats may be the simplest way of monitoring continued use of the site. The condition of the hedges, particularly Hedges 4 and 5 should also be monitored. Target values should be set after a few years of monitoring.

| Bat Monitoring                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                         |
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| Methodology                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                         |
| <p>A number of bat-boxes are to be provided in Zones 1, 3 (Hedge 5 only) and 4. All bat-boxes should be inspected and the presence/ evidence of any bats should be noted. The inspection should not be undertaken in June, July and August when bats are giving birth and lactating. It is important to remember that once discovered, a bat roost is legally protected and must not be disturbed. If a bat roost is suspected to be present a suitably qualified and licensed person should undertake the bat-box inspection.</p> <p>At the same time as the bat-box inspection all hedges on the site should be inspected. Notes should be made on the likely value of the feature for foraging/ commuting bats, whether any gaps are present (and their size), whether they have been subject to any management, whether any further management is required, <i>etc.</i></p> |                                                                                                                                                                                                                                                         |
| <b>Timing and Location:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | One visit annually in mid to late-September. Visits to be undertaken for three years after installation of the bat-boxes (though not in the first year) and subsequently every three years. Zones 1 and 4 for bat-boxes, Zone 3 for hedges & bat-boxes. |
| <b>Equipment:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Survey form, clipboard, map, camera, ladder.                                                                                                                                                                                                            |

## 4.6 Wetlands

### Summary Description

- 4.6.1 No current information is available with regard the attenuation lagoons. Two lagoons are to be provided (Attenuation Lagoon West and Attenuation Lagoon East) which will receive water from the swale/ditch system. The swales will be up to approximately 12 m wide and 1 m deep although the dimensions vary considerably. The swales are to be seeded with a grass mix that includes tussock-forming species. It is hoped that the swales will provide a varied and tussocky strip of damp/wet grassland and the attenuation lagoons will incorporate small reed-beds.
- 4.6.2 The small swamp that is to be retained within Zone 4 (along Hedge 5) supports a diverse marginal vegetation community.

### Management Objective

- 4.6.3 No design is currently available for the attenuation lagoons and as such it is not possible to prescribe management at this time. They are likely to be managed in accordance with the relevant guidance contained within the Design Manual for Roads and Bridges (DMRB)<sup>30</sup>. Cutting of the vegetation is recommended on a 5-10 year cycle in the DMRB. This management should be on a rotational basis so that not all vegetation is cleared in any one year; it should be completed over three years with a third being removed each time. Cut material should be removed. Sediment clearance may be required annually but wherever possible the frequency of this management should also be minimised. Sediment should also be cleared over three years where possible.
- 4.6.4 As with the neutral grassland on the road verges there will be a temptation to over-manage the swales. However as the seed mix includes tussock-forming species they should be given every opportunity to develop a varied structure and floristic composition. The swales would be managed in accordance with the relevant guidance contained within the Design Manual for Roads and Bridges (DMRB)<sup>31</sup>. Cutting of the swales is recommended on a monthly or after each major storm basis in DMRB. The latter option should be employed to minimise the number of cuts each year. Ideally the swales should be cut as few times as possible with the cuttings removed. The DMRB notes that swales are most efficient at treating water when the grass sward is dense and about 100-200 mm long. Management of the swales in Zone 5 should aim for the top end of this range as a minimum height; 200 mm.
- 4.6.5 As the process of succession continues the swamp is likely to eventually infill. At present the swamp vegetation is considered sufficiently valuable to retain and as such no management is proposed. This requirement should be reviewed and rotational clearance/ dredging may be required in the future.

<sup>30</sup> <http://dft.gov.uk/ha/standards/dmr/vol4/section2/ha10306.pdf> Accessed on 10/09/12 at 13.01 pm.

<sup>31</sup> <http://dft.gov.uk/ha/standards/dmr/vol4/section2/ha10306.pdf> Accessed on 10/09/12 at 13.01 pm.

### Favourable Conservation Status

- 4.6.6 At present there is no detailed information regarding the status/ condition of the swamp and the swales/ lagoon have not been created. As long-term data is not available, it is not known whether the value of this feature is decreasing, being maintained, or increasing. Without information regarding the status of these wetlands it is not possible at this stage to define the FCS.

### Monitoring

- 4.6.7 At the present time there is insufficient information with which to define the target values for the attributes of this feature. They will need to be defined following the first survey visit.

| Wetland Condition Monitoring                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                              |
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| Methodology                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <p>It is suggested that monitoring of the swales is combined with monitoring of the neutral grassland in Zone 2. Furthermore a similar approach should be adopted (see details above). During the first visit it will be necessary to identify the attributes (of the feature) that need to be assessed and subsequently the targets associated with these attributes. Possible attributes that may be appropriate for the swales would be:</p> <ul style="list-style-type: none"> <li>• Sward structure/ height.</li> <li>• Species richness (presence of at least six species of grass).</li> <li>• Sward structure: grass/ herb ratio.</li> </ul> <p>Once the monitoring of the swales has been completed the lagoons and the swamp could be visited separately. General notes should be made on the development of the vegetation, species richness, any management that has been undertaken, any management that may be required, <i>etc.</i> Following the first survey visit it may be possible to define target values for attributes of these features and subsequent monitoring visits can focus on them. At this time it may be appropriate to design a protocol based on the condition monitoring guidelines provided in JNCC (2004c<sup>32</sup>).</p> |                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Timing and Location:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | One annual visit, Years 1 to 5. After this five year period and subject to review it may be possible to adjust the frequency of visits (perhaps to every three years or similar). The survey visit should be undertaken ideally before the grass is cut. The first two weeks of July may be most appropriate but this can be altered following the first visit or in accordance with weather conditions, <i>etc.</i> Zone 5. |
| <b>Equipment:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Survey form, clipboard, map, camera, 30 m tape measure, centimetre scale. The survey form can be adapted from that provided in Robertson & Jefferson (2000). That provided for the 'MG5' community is possibly most applicable (pages 73 & 74).                                                                                                                                                                              |

<sup>32</sup> JNCC (2004c). *Common Standards Monitoring for Lowland Wetland Habitats - Version February 2004*. JNCC. Available online: [http://jncc.defra.gov.uk/pdf/CSM\\_lowland\\_wetland.pdf](http://jncc.defra.gov.uk/pdf/CSM_lowland_wetland.pdf)

## 5 MANAGEMENT PROJECTS

### 5.1 Introduction

- 5.1.1 The following tables describe the prescribed management projects required to achieve the management objective. Marches Ecology (2012d) provides brief details with regard the proposed habitat creation within the Ecological Area and should be referred to for further information. The sub-sections are divided according to the management zones described in *Section 2.2*. Projects applicable to all or more than one of these management zones are listed under the section entitled 'all zones'. The use of management zones in this part of the EMP diverges somewhat from the approach proposed in Alexander (2005). This is considered justifiable as it maintains a simple and transparent approach. Management will be subject to periodic review by the managing organisation.

### 5.2 Zone 1: Central Woodland

| Woodland/ Tree Management  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
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| <b>Methodology</b>         | <p>The existing woodland within Zone 1 should ideally be subject to non-intervention. The requirement for any management in the future should be subject to review and an appropriate management project inserted in this plan at that time.</p> <p>Should any arboricultural work (pruning/ felling) be required at any time it should be restricted to the minimum required and should be undertaken in consultation with a suitably qualified and licensed bat consultant. Any such work on trees would require an inspection by a bat ecologist before undertaking the work (see Marches Ecology 2012d) in accordance with the DMRB<sup>33</sup>.</p> <p>Should any roosts or potential roosts be identified further detailed survey and or mitigation measures may be required before work can proceed. Furthermore arboricultural work should not be undertaken during the bird nesting season (March-August inclusive). Such arboricultural work should only be undertaken where required for safety and not for other reasons such as achieving good form.</p> <p>Felling of any tree should be on the advice of an arboriculturist (and further to consultation with an ecologist) and should be regarded as a last resort measure. It should be felled only if it is diseased or damaged and constitutes a safety risk, which requires felling of the tree, rather than limited tree surgery. Age itself is not a reason for felling, unless it also constitutes a safety risk for the above reasons. Before the decision is taken to fell, options to reduce the safety risk by other means must be considered. Should any tree be felled no replacement planting is required.</p> <p>Any cut wood should be retained in piles on site wherever possible. Such log piles should avoid any areas of botanical interest. The logs may need to be wired together. Brash should also be left in tidy piles; it should not be chipped.</p> <p>Chainsaw operators must hold a current chainsaw certificate. Low eco-toxicity non-fling bio-degradable chain oil to be used. No lone working is allowed during these works and appropriate PPE must be worn. All work must comply with HASAW, COSHH and FEPA regulations. Method Statement, Risk Assessments and appropriate insurances required.</p> |
| <b>Purpose</b>             | <p>The purpose of non-intervention management is to maintain relatively undisturbed conditions. Much of the value of the Central Woodland is associated with mature/ over-mature trees and dead wood. As much of this habitat will be retained as far as possible. The fen vegetation should also be retained undisturbed.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Timing and Location</b> | <p>All years. Zone 1. <u>No management to be undertaken during the bird nesting season (March to August inclusive).</u></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

<sup>33</sup> Design Manual for Roads and Bridges Volume 10 Section 4 (Part 3) HA 80/99. *Nature Conservation Advice in Relation to Bats*. Available at: <http://dft.gov.uk/ha/standards/dmr/vol10/section4/ha8099.pdf>

**5.3 Zone 2: Neutral Grassland**

| <b>Grassland Management</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
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| <b>Methodology</b>          | <p><b>Created Grassland</b></p> <p>The created grassland is that part of Zone 2 outside the area shown as 'Retained Grassland' on <i>Figure 2</i>. The management prescribed here should also be applied to the wildflower grassland to be created on the embankments/ verges at Junction 3. The seed-supplier should be contacted for advice as to appropriate management during the establishment phase and once established. Further advice is provided in <i>The Wildflower Handbook</i> and this should be followed as appropriate. As such the management detailed here should be viewed as guidelines only. If the grassland is autumn sown the sward should be cut to 7.5 cm in March if there is sufficient material or in May to 7.5 cm in the first year (or as directed by the supplier). The sward should then be cut whenever growth exceeds 20 cm and again in August/ September. If it is sown in spring or mid-summer then it may require management within six weeks of sowing, and then again in May (and whenever the sward is between 10 cm - 20 cm height) and August/ September. In the second year revert to the standard management regime below.</p> <p>After the first year the created grassland including road verges should be mown no more than once a year, usually in late August/ September, to allow plants to flower and set seed. Depending on the fertility of the substrate in which the grassland has been sown the number of cuts may need to be reviewed in future years although no more than two cuts should be undertaken. The cutting blade should be set at a height of about 10 cm. A flail mower, rear-mounted rotary cutter or other machinery that chops up the vegetation should be used. After each cut the clippings should be removed. The grass cuttings should be left in-situ and then raked off after 24 hours.</p> <p>To maintain a tidy and managed appearance a 1 m wide band adjacent to the carriageway and 50 cm wide band by footpaths should be cut to a nominal frequency. Sightlines/ visibility splays <i>etc</i> may require a more intensive mowing regime.</p> <p>It may be necessary to undertake weed control (<i>e.g.</i> docks, thistles, sow-thistles, <i>etc</i>) during the first few years after sowing. This can either be achieved by hand-pulling which is preferable where it is for a small area/ few plants, or by spot-spraying using a knapsack sprayer. A glyphosate-based herbicide such as Roundup should be used (although use of herbicide will be kept to a minimum).</p> <p>The created grassland should be regularly checked in the first few years after sowing to ensure management is achieving the required result. The requirement to change the cutting frequency (<i>e.g.</i> should more than one annual cut be required to maintain the interest of the grassland) and timing of cut should be subject to review.</p> <p><b>Retained Grassland</b></p> <p>The grassland on the disused railway and the retained part of the field to the south (to the east of the Attenuation Lagoon West) will initially not be subject to formal management although some scrub clearance may be required. The area of 'retained grassland' is identified on <i>Figure 2</i>. It is hoped that the sward here will be maintained once Rabbit browsing is re-established. This will need to be monitored and active management introduced if required.</p> |
| <b>Purpose</b>              | To provide extensive areas of species-rich neutral grassland capable of supporting locally scarce plant species. To maintain the existing population of Bee Orchid.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Timing and Location</b>  | Timing detailed above. Standard cut to be undertaken in late August/ September. Zone 2. <u>No cutting or other management must be undertaken in Zone 6.</u>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

**5.4 Zone 3: Hedgerows**

| <b>Hedgerow Management</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
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| <b>Methodology</b>         | <p><b>Hedges 1, 2, 3, 4 and 6</b></p> <p>The young plants within Hedges 1-4 and 6 should be cut back in the first year to approximately one-third of their height to promote bushy growth. Once the hedge has been planted it should be kept weed-free through appropriate application of glyphosate-based herbicide such as Roundup (although use of herbicide will be kept to a minimum). This maintenance operation should be undertaken once a year for the first three years during the growing season. Herbicide should be applied by, or under the immediate direction of a person holding FEPA PA1 and 6A certificate or equivalent. Herbicide treatment must not be completed if rain is forecast within six hours or in frost, strong winds or hot weather. Any losses should be replaced in the first five years after planting during October/ November.</p> <p>A well established hedge will require trimming from about the sixth year. Cutting will then be required annually until the required size and shape is achieved. The hedge shape should be about 2 m high and at least 2.5-3 m wide. The hedge should then be cut once every two or three years where it does not interfere with operation of the site or adjacent roads. Management of Hedges 1-4 may be required annually. Where hedges are located adjacent to roads the roadside of the hedge should be cut, usually once a year between November and early February. The top of the hedge should be cut on a two-year rotation, usually in January and early February avoiding frosty weather. This will avoid removing sources of food (berries) for wildlife during the winter months. This can be undertaken by a tractor-mounted hedge cutter where possible.</p> <p>Once established the hedge should be laid every 10-30 years between mid-November and early March. The best time to lay the hedge would be when stem growth reaches between 5-10 cm diameters at the base (Sutherland &amp; Hill 1995<sup>34</sup>).</p> <p><b>Hedge 5</b></p> <p>Hedge 5 should be subject to limited intervention and maintained as a line of trees/ shrubs. As part of the habitat creation scheme it will be subject to infill planting. The area around these plants should be kept weed-free through appropriate application of glyphosate-based herbicide such as Roundup (although use of herbicide will be kept to a minimum). This maintenance operation should be undertaken once a year for the first three years during the growing season. Herbicide should be applied by, or under the immediate direction of a person holding FEPA PA1 and 6A certificate or equivalent. Herbicide treatment must not be completed if rain is forecast within 6 hours or in frost, strong winds or hot weather. Any losses should be replaced in the first five years after planting during October/ November.</p> <p>Hedge 5 contains a small number of mature trees. Should these trees require arboricultural work then the guidance provided in <i>Section 5.2</i> should be followed. Pruning/ felling should be avoided wherever possible.</p> <p>The requirement for future management of this hedge should be reviewed. It may be necessary to consider coppice management on an appropriate rotation.</p> <p><b>Hedge 7</b></p> <p>Cutting will be required annually until the required size and shape is achieved. The hedge shape should be about 2 m high and at least 2.5-3 m wide. The hedge should then be cut once every two or three years where it does not interfere with operation of the site or adjacent roads.</p> |

<sup>34</sup> Sutherland, W.J. & Hill, D.A. (ed.) (1995). *Managing Habitats for Conservation*. Cambridge University Press, Cambridge.

| Hedgerow Management        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
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|                            | <p>Management adjacent to Berse Road may be required annually. Where the hedge is located adjacent to Berse Road it should be cut, usually once a year between November and early February. The top of the hedge should be cut on a two-year rotation, usually in January and early February avoiding frosty weather. Where the hedge is located at the back of the verge cutting should be undertaken at the end of the winter period (January/ early February) avoiding frosty weather every two years. This can be undertaken by a tractor-mounted hedge cutter where possible.</p> <p>This hedge should be laid every 10-30 years between mid-November and early March. The best time to lay the hedge would be when stem growth reaches between 5-10 cm diameters at the base.</p> |
| <b>Purpose</b>             | The new hedgerows will increase habitat connectivity across the site. They are to be provided in particular for the benefit of foraging/ commuting bats, Badgers and nesting birds. Hedge 6 links Zone 1 to Zone 4.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Timing and Location</b> | Zone 3; Hedges 1-7. Cutting to be undertaken at the end of the winter period (January/ early February). <u>No management to be undertaken during the bird nesting season (March to August inclusive).</u>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

## 5.5 Zone 4: River Gwenfro

| River Corridor Management |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
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| <b>Methodology</b>        | <p><b>Retained Habitat</b></p> <p>The retained woodland should be subject to non-intervention where possible. Large trees should be allowed to grow to maturity/ over maturity wherever possible. Dense tall herb vegetation and scrub should also be retained undisturbed.</p> <p>Where roadside scrub needs to be cut back, it should be coppiced on a regular cycle, of between 3 and 10 years. As the spine road is located on an embankment at this location such management may not be required. Scrub growing within two metres of the carriageway should be cut every three years. The cut stumps should be allowed to re-grow, and not be removed or poisoned.</p> <p>The retained vegetation within Zone 4 contains a number of mature trees. Should these trees require arboricultural work then the guidance provided in <i>Section 5.2</i> should be followed. Pruning/ felling should be avoided wherever possible.</p> <p>Should any management/ other works be required in Zone 4 it is likely that a protected species survey (particularly with regard Otter) would be required prior to such work. A suitably qualified ecologist should be consulted prior to undertaking any work within the area of retained vegetation or within close proximity to the River Gwenfro. Subsequent to completion of this survey mitigation measures may be required to allow the work to proceed.</p> <p>Should any work be required close to the River Gwenfro appropriate pollution prevention measures should be implemented. Generic potential impacts on the River Gwenfro should be avoided through the implementation of best practice measures to protect the watercourse from sediment release, sediment run-off, pollution by fuel and oil and other accidental spillages. All fuelling of tools and equipment will be undertaken a minimum of 20 m from the water course and at least one fluid spill-kit will be located on site at all times. The general advice contained in the Pollution Prevention Guidance (PPG) leaflets produced by SEPA, EA and the Environment and Heritage Service (Northern Ireland) should be adhered to, particularly the following:</p> <ul style="list-style-type: none"> <li>• PPG1: General Guide to the Prevention of Pollution.</li> <li>• PPG5: Works in, Near or Liable to Affect Watercourses.</li> </ul> |

| River Corridor Management  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
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|                            | <ul style="list-style-type: none"> <li>• PPG6: Working at Demolition and Construction Sites.</li> <li>• PPG7: Refuelling Facilities.</li> </ul> <p><b>Plantation Woodland</b></p> <p>The proposed planted woodland (wet woodland and native broad-leaved woodland) will require active management initially. Once the trees have been planted, an area of at least 1 m<sup>2</sup> around them should be kept weed-free through appropriate application of glyphosate-based herbicide such as Roundup (although use of herbicide will be kept to a minimum). This will control competition with grasses/ other plants. This maintenance operation should be undertaken once a year for the first three years during the growing season. Appropriate guidance for the use of herbicides near watercourses should be adhered to. Herbicide should be applied by, or under the immediate direction of a person holding FEPA PA1 and 6A certificate or equivalent. Herbicide treatment must not be completed if rain is forecast within 6 hours or in frost, strong winds or hot weather. Any losses should be replaced in the first five years after planting during November. Once established any further management requirements can be reviewed (e.g. thinning). Again the aim should be to limit management thereby minimising disturbance along the river corridor.</p> <p><b>Non-native Invasive Plants</b></p> <p>The Environment Agency provide guidance for the control of non-native plants in or near water<sup>35</sup>. This guidance document includes measures for control of <i>Fallopia japonica</i> (Japanese Knotweed) and <i>Impatiens glandulifera</i> (Indian Balsam).</p> <p>Small stands of <i>Fallopia japonica</i> (Japanese Knotweed) are present in Zone 4. Where these are not controlled during construction of the road they should be subject to management/ control. An appropriately qualified contractor should be commissioned to undertake this work as soon as possible after the construction phase. All Japanese Knotweed within Zone 4 should be subject to control measures.</p> <p>It should be noted that Zone 4 also contains extensive stands of <i>Impatiens glandulifera</i> (Indian Balsam). Both of these plants are listed on <i>Schedule 9</i> of the <i>Wildlife and Countryside Act 1981</i> as non-native invasive species. Any work to be undertaken within Zone 4 will require the provision and appropriate implementation of a Bio-security Risk Assessment to ensure neither species is spread. The stands of Indian Balsam should be controlled with appropriate methodologies prior to starting any physical works. Care will be taken with regard to removing this species from the site for disposal to ensure it is not spread throughout the site and elsewhere.</p> |
| <b>Purpose</b>             | To minimise disturbance of the habitat within the river corridor. Limited intervention would ensure as far as possible that mature trees and dense vegetation are retained; both are of importance for Otters.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Timing and Location</b> | All years. Zone 4. <u>No management to be undertaken during the bird nesting season (March to August inclusive).</u>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

<sup>35</sup> Environment Agency (2010). *Managing Invasive Non-native plants: Managing invasive non-native plants in or near fresh water. Revised version April 2010*. Environment Agency, Bristol. Available at: <http://cdn.environment-agency.gov.uk/geho0410bsbr-e-e.pdf>

**5.6 Zone 5: Wetlands**

| <b>Wetland Management</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
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| <b>Methodology</b>        | <p><b>Swamp</b></p> <p>The swamp should be subject to non-intervention. This requirement should be reviewed and rotational clearance/ dredging may be required in the future.</p> <p><b>Swales/ Ditches</b></p> <p>The swales would be managed in accordance with the relevant guidance contained within the Design Manual for Roads and Bridges (DMRB)<sup>36</sup>. Cutting of the swales is recommended on a monthly or after each major storm basis in DMRB. The latter option should be employed to minimise the number of cuts each year. Ideally the swales should be cut as few times as possible with the cuttings removed. The DMRB notes that swales are most efficient at treating water when the grass sward is dense and about 100-200 mm long. Management of the swales in Zone 5 should aim for the top end of this range as a minimum height; 200 mm.</p> <p>The aim should be to minimise management where possible. When required management operations should be spread across more than one year. This will minimise disturbance of the habitat and also maintain habitat availability across years.</p> <p><b>Attenuation Lagoons</b></p> <p>No design is currently available for the attenuation lagoons and as such it is not possible to prescribe management at this time. The details provided below should therefore be considered as guidelines only. Management prescriptions should be inserted into this EMP once the detailed design is available. They are likely to be managed in accordance with the relevant guidance contained within the Design Manual for Roads and Bridges (DMRB). Cutting of the vegetation is recommended on a 5-10 year cycle in the DMRB. This management should be on a rotational basis so that not all vegetation is cleared in any one year; it should be completed over three years with a third being removed each time. Cut material should be removed. Sediment clearance may be required annually but wherever possible the frequency of this management should also be minimised. Sediment should also be cleared over three years where possible.</p> <p>Clearance of marginal/ emergent vegetation should be undertaken in autumn/ winter. Where possible clear the advancing front face of some beds of emergent plants, so maintaining stable conditions on the landward interface, and cut others in bands from water to land. To be effective emergent plants must be removed 'roots and all' otherwise rapid re-growth will occur. Digging out may be effective over small areas but for larger jobs careful use of an excavator may be required. All vegetation material should be left near the lagoon for at least 24 hours before composting.</p> <p>Dredged sediment should be disposed of away from the lagoons although it should be stored overnight adjacent to the lagoon to allow any animals to crawl back in. Dredging should be completed in autumn/winter.</p> <p>The aim should be to minimise management where possible. When required management operations should be spread across more than one year. This will minimise disturbance of the habitat and also maintain habitat availability across years.</p> <p>It is possible that other management of the lagoons may be required; this would be subject to review and subsequently undertaken as required.</p> <p>A protected species survey may be required prior to undertaking work in Zone 5, particularly at</p> |

<sup>36</sup> <http://dft.gov.uk/ha/standards/dmr/vol4/section2/ha10306.pdf> Accessed on 10/09/12 at 13.01 pm.

| Wetland Management         |                                                                                                                                                                                                                                                                                                                                                |
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|                            | the swamp and the attenuation lagoons once established. The potential presence of invasive non-native plants should also be checked. A suitably qualified ecologist should be consulted prior to undertaking any work within Zone 5. Subsequent to completion of this survey mitigation measures may be required to allow the work to proceed. |
| <b>Purpose</b>             | The aim of management of these wetlands is to maximise their ecological value while, in the case of the lagoons and swales/ ditches maintaining their drainage function. The existing ecological value of the swamp is to be maintained although the potential for future enhancement should be reviewed.                                      |
| <b>Timing and Location</b> | Clearance/ control of vegetation and sediment in the attenuation lagoons to be undertaken in autumn/ winter. Zone 5. <u>No management to be undertaken during the bird nesting season (March to August inclusive).</u>                                                                                                                         |

## 5.7 Zone 6

| Vegetation Management      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
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| <b>Methodology</b>         | <p><b>Area A</b></p> <p>This area of plantation woodland should be managed in accordance with the DMRB<sup>37</sup>. Native species of tree, in particular <i>Ulmus procera</i> (English Elm), should be promoted over non-native species. Where thinning is undertaken species such as <i>Alnus incana</i> (Grey Alder), <i>Acer pseudoplatanus</i> (Sycamore) and to a lesser extent <i>Fagus sylvatica</i> (Beech) and <i>Pinus sylvestris</i> (Scots Pine) should be preferentially removed before native species. Sub-canopy shrubs should be retained where possible; these include <i>Ulmus procera</i> (English Elm), <i>Crataegus monogyna</i> (Hawthorn) and <i>Ilex aquifolium</i> (Holly).</p> <p>A protected species survey may be required prior to undertaking work in Zone 6, particularly for Badger. A suitably qualified ecologist should be consulted prior to undertaking any work within Zone 6 that could impact protected species. Subsequent to completion of this survey mitigation measures may be required to allow the work to proceed.</p> <p>No management of Area A is currently prescribed for the period of this EMP.</p> <p><b>Area B</b></p> <p>Area B should be subject to non-intervention. Area B is to be appropriately fenced. No management should be undertaken in this area and it should not be otherwise accessed. A suitably qualified ecologist should be consulted before entering this area. Management operations are restricted in this area due to the presence of Badgers.</p> |
| <b>Purpose</b>             | Area B must be retained undisturbed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Timing and Location</b> | Zone 6. <u>No management to be undertaken during the bird nesting season (March to August inclusive).</u>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

<sup>37</sup> Design Manual for Roads and Bridges Volume 10 Section 3 (Part 2) HA 108/04. *Landscape Management Handbook*. Available at: <http://www.dft.gov.uk/ha/standards/dmr/b/vol10/section3/ha10804.pdf>

**5.8 All Zones**

| <b>Bird-box Management</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
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| <b>Methodology</b>         | Bird nest-boxes require annual maintenance as they can become heavily infested with parasites. All maintenance should be carried out when the last bird has left the nest-box; at least October. As such all nest-boxes should be cleaned in late-autumn (late October/ November). At least 2 to 3 weeks should be allowed after fledging before undertaking any cleaning. The <i>Wildlife and Countryside Act 1981</i> , as amended states that cleaning should only be carried out between 1st August and 31st January and that any eggs present should be destroyed immediately. All nest material should be completely removed and disposed of safely along with any other debris. To ensure that parasite build-up is controlled the inside of the nest-box should be cleansed with boiling water. For safety, this should be undertaken with the nest-box located on the ground. Care should be taken when opening nest-boxes as it is possible that they could be inhabited by bees, wasps or even bats. |
| <b>Purpose</b>             | To offset loss of potential nest sites from elsewhere within the site.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Timing and Location</b> | All years - late October/ November. Zones 1, 3 (Hedge 5 only) and 4.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

| <b>Bat-box Management</b>  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Methodology</b>         | <p>It is important to remember that once discovered, a bat roost is legally protected and must not be disturbed. If a bat roost is suspected to be present a suitably qualified bat consultant or the local Bat Group should be contacted and may need to undertake the annual maintenance operations detailed below. To discover whether a bat-box is being used they can be watched at dusk during the summer to see if any bats emerge or a search can be conducted beneath the box entrance for the characteristic crumbly bat droppings. Again should it be necessary to inspect the bat-box an appropriately licensed individual may be required to undertake this work. Occasionally a bat-box may be used by nesting birds. If this is the case it should be cleaned as per the procedure outlined above (for nesting birds).</p> <p>The bat-boxes require annual maintenance. All maintenance should be carried out when bats have left the bat-box to hibernate in winter (late autumn to early spring). At this time the slotted entrance should be carefully brushed to remove any build up of dust, dirt or cobwebs that could block the opening. Any branches or other vegetation that may have grown up around the bat-box should also be pruned/ removed. If any of the bat-boxes is not used after three years they should be re-sited.</p> |
| <b>Purpose</b>             | To enhance the site for roosting bats.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Timing and Location</b> | All years - late autumn to early spring. Zones 1, 3 (Hedge 5 only) and 4.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

## 6 OPERATIONAL OBJECTIVES

6.1.1 Operational objectives are listed to ensure legal and any other site obligations are met:

- Marches Ecology (2012d) details all required mitigation and compensation measures. Some of these measures are required subsequent to completion of the construction phase and as such would run concurrent with this EMP. It includes required monitoring of the mitigation/ compensation measures.
- All structures provided as part of the mitigation/ compensation works (*e.g.* Otter exclusion fence, exclusion fence around Zone 6B) will be monitored and maintained as required.
- The managing body will comply with all legal obligations, particularly in respect of Otters, Badgers, bats and nesting birds as detailed in the preceding sections. Some of the management operations on the site may require an appropriate Welsh Government licence to be considered lawful.
- *Occupiers Liability Act* - This imposes an obligation on the occupiers of the land to ensure that every reasonable care is taken to remove any risk both to legitimate visitors and to trespassers. WCBC will need to set-up an appropriate system to ensure compliance, *e.g.* a safety audit.
- *Health and Safety at Work Act* - All operations carried out on the site must only be undertaken by trained personnel, using methods and equipment which comply with approved codes of practice arising from the *Health and Safety at Work Act* and also in compliance with both national and local safety procedures. The need for a safety audit also applies to this section.
- Litter should be cleared from all management zones at least once a year.
- Check all new planting once a year for first five years/ until established.
- An annual meeting will be convened to review work undertaken at the site each year. Attendees will include the managing body/ representatives of WCBC including the county ecologist and CCW if appropriate. In addition to annual review of the monitoring and management work undertaken the efficacy of the management plan will be reviewed. Management prescriptions will be adapted accordingly. The current management plan will be fully reviewed after the second year and every fifth year thereafter. If required an updated management plan will be implemented the year following the review. The reviews will take into account all required revisions and assess the findings of the monitoring programme.
- A brief report will be prepared for discussion at the annual meeting by the managing body/ ecologist. The report will provide the results of all monitoring undertaken in that year, and review the success or otherwise of management.

## 7 ACTION PLAN

7.1.1 The table below provides a summary of the tasks to be completed as part of the EMP and the year (or years) that the task is to be completed. It details all management tasks required following creation of the new habitats. For full details of the management required see *Section 5*.

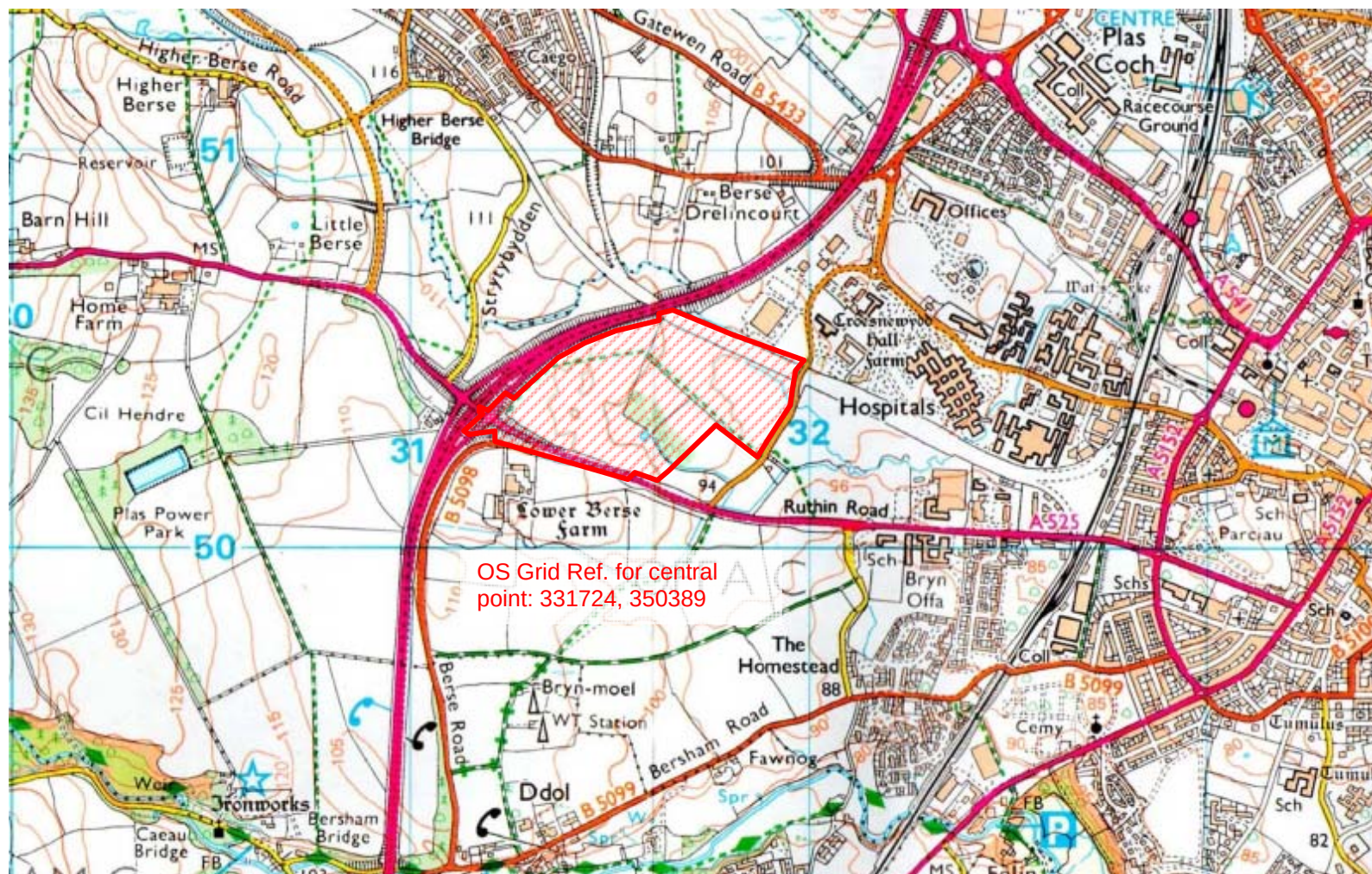
| Task                                                                  | Year                              |                  |                  |                  |                  |
|-----------------------------------------------------------------------|-----------------------------------|------------------|------------------|------------------|------------------|
|                                                                       | Year 1                            | Year 2           | Year 3           | Year 4           | Year 5           |
| <b>Zone 1</b>                                                         |                                   |                  |                  |                  |                  |
| <b>Non-intervention</b>                                               |                                   |                  |                  |                  |                  |
| <b>Tree safety works as required</b>                                  | Winter                            | Winter           | Winter           | Winter           | Winter           |
| <b>Zone 2</b>                                                         |                                   |                  |                  |                  |                  |
| <b>Cut areas of created grassland</b>                                 | As detailed in <i>Section 5</i> . | Late Aug./ Sept. | Late Aug./ Sept. | Late Aug./ Sept. | Late Aug./ Sept. |
| <b>Weed control in areas of created grassland</b>                     | Growing season                    | Growing season   | Growing season   |                  |                  |
| <b>Retained grassland: non-intervention</b>                           |                                   |                  |                  |                  |                  |
| <b>Zone 3</b>                                                         |                                   |                  |                  |                  |                  |
| <b>Cut back Hedges 1-4 and 6</b>                                      | Jan/ early Feb.                   |                  |                  |                  |                  |
| <b>Herbicide application to control weeds: Hedges 1-4 and 6</b>       | Growing season                    | Growing season   | Growing season   |                  |                  |
| <b>Replaces losses Hedges 1-6</b>                                     | Oct/ Nov                          | Oct/ Nov         | Oct/ Nov         | Oct/ Nov         | Oct/ Nov         |
| <b>Roadside Hedges (1-4 and part of 7) may require annual cutting</b> | Jan/ early Feb.                   | Jan/ early Feb.  | Jan/ early Feb.  | Jan/ early Feb.  | Jan/ early Feb.  |
| <b>Limited intervention: Hedge 5</b>                                  |                                   |                  |                  |                  |                  |
| <b>Herbicide application around infill planting: Hedge 5</b>          | Growing season                    | Growing season   | Growing season   |                  |                  |
| <b>Cutting: Hedge 7 where not adjacent to Berse Road</b>              | Jan/ early Feb.                   |                  | Jan/ early Feb.  |                  | Jan/ early Feb.  |
| <b>Zone 4</b>                                                         |                                   |                  |                  |                  |                  |
| <b>Retained habitat: non-intervention</b>                             |                                   |                  |                  |                  |                  |
| <b>Tree safety works as required</b>                                  | Winter                            | Winter           | Winter           | Winter           | Winter           |
| <b>Plantation woodland: herbicide application around trees</b>        | Growing season                    | Growing season   | Growing season   |                  |                  |
| <b>Plantation woodland: replace losses</b>                            | Oct/ Nov                          | Oct/ Nov         | Oct/ Nov         | Oct/ Nov         | Oct/ Nov         |

| Task                                                                     | Year                        |                             |                             |                             |                             |
|--------------------------------------------------------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
|                                                                          | Year 1                      | Year 2                      | Year 3                      | Year 4                      | Year 5                      |
| <b>Control Japanese Knotweed</b>                                         | Aug.-Sept.                  |                             |                             |                             |                             |
| <b>Zone 5</b>                                                            |                             |                             |                             |                             |                             |
| <b>Swamp: non-intervention</b>                                           |                             |                             |                             |                             |                             |
| <b>Cutting of swales in accordance with DMRB</b>                         | Growing season              | Growing season              | Growing season              | Growing season              | Growing season              |
| <b>Attenuation lagoons: cutting/ clearance of emergent vegetation</b>    |                             |                             |                             |                             | Autumn/ winter              |
| <b>Attenuation lagoons: clearance of sediment/ dredging of one-third</b> | Autumn/ winter              | Autumn/ winter              | Autumn/ winter              | Autumn/ winter              | Autumn/ winter              |
| <b>Zone 6</b>                                                            |                             |                             |                             |                             |                             |
| <b>Area A: manage in accordance with DMRB</b>                            |                             |                             |                             |                             |                             |
| <b>Area B: Non-intervention</b>                                          |                             |                             |                             |                             |                             |
| <b>All Zones</b>                                                         |                             |                             |                             |                             |                             |
| <b>Maintain bird-boxes: Zones 1, 3 and 4</b>                             | Late Oct/ Nov.              | Late Oct/ Nov.              | Late Oct/ Nov.              | Late Oct/ Nov.              | Late Oct/ Nov.              |
| <b>Maintain bat-boxes: Zones 1, 3 and 4</b>                              | late autumn to early spring | late autumn to early spring | late autumn to early spring | late autumn to early spring | late autumn to early spring |
| <b>Monitoring</b>                                                        |                             |                             |                             |                             |                             |
| Woodland condition monitoring Zone 1                                     | May                         | May                         | May                         | May                         | May                         |
| Grassland condition monitoring Zone 2                                    | July                        | July                        | July                        | July                        | July                        |
| Otter monitoring Zone 4                                                  | May & Sept.                 | May & Sept.                 | May & Sept.                 |                             |                             |
| Non-native invasive plants monitoring Zone 2                             | May/ June                   |                             |                             | May/ June                   |                             |
| Breeding bird monitoring. All Zones                                      | Apr-Jul                     | Apr-Jul                     | Apr-Jul                     |                             |                             |
| Bat monitoring Zones 1, 3 & 4                                            |                             | mid to late-Sept.           | mid to late-Sept.           | mid to late-Sept.           |                             |
| Wetland condition monitoring Zone 5                                      | July                        | July                        | July                        | July                        | July                        |
| <b>Operational Objectives</b>                                            |                             |                             |                             |                             |                             |
| Monitoring in accordance with Marches Ecology (2012d)                    |                             |                             |                             |                             |                             |
| Monitor/ maintain all mitigation structures                              |                             |                             |                             |                             |                             |
| Comply with all legal obligations                                        |                             |                             |                             |                             |                             |
| Clear litter in all zones once a year                                    | Once a year                 | Once a year                 | Once a year                 | Once a year                 | Once a year                 |
| Check all new planting                                                   | Once a year                 | Once a year                 | Once a year                 | Once a year                 | Once a year                 |

| Task                           | Year   |        |        |        |        |
|--------------------------------|--------|--------|--------|--------|--------|
|                                | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 |
| Annual meeting                 | Dec.   | Dec    | Dec.   | Dec.   | Dec.   |
| Annual report                  | Nov.   | Nov.   | Nov.   | Nov.   | Nov.   |
| Review current Management Plan |        |        |        |        |        |

## **8 PROJECT RECORDING AND REVIEW**

- 8.1.1 An annual report covering the results of all of the monitoring and management undertaken in that year will be prepared by the managing body/ ecologist and submitted for review by WCBC/ WCBC ecologist and CCW if appropriate in November of each year. This report and the associated meeting in each December will form the main component of the review process. The main purpose of this meeting will be to ensure that the site is being managed in accordance with the approved management plan. Compilation of the report will require records to be maintained throughout the year.
- 8.1.2 The management plan will be reviewed after two years when the created habitats have stabilised, and then subsequently every five years thereafter.



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## Marches Ecology

### C076 Proposed Spine Road and Development Plateaus, Western Gateway, Wrexham Technology Park, Wrexham – Ecological Management Plan

#### Figure 1 – Site Location

Drawn by: ME

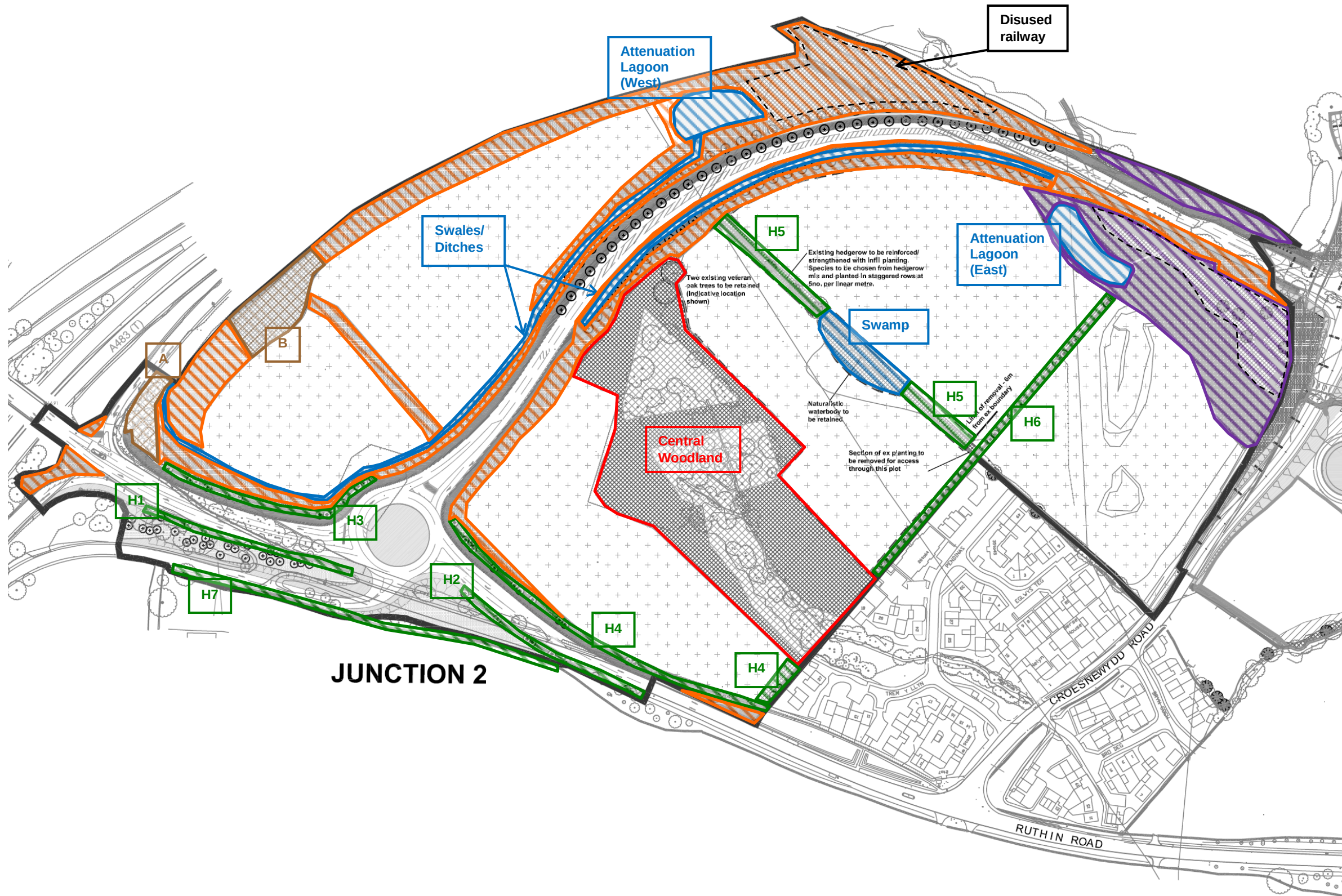
Checked by: TK

Date: 05.10.12

#### Key



Approximate proposed development site boundary



Base mapping from a Wrexham County Borough Council plan entitled 'Western Gateway, Wrexham – Landscape Masterplan', drawing no. TE07701 6002C, dated 19/09/12.



**C076 Proposed Spine Road and Development Plateaus, Western Gateway, Wrexham Technology Park, Wrexham – Ecological Management Plan**

**Figure 2 – Management Zones**

Drawn by: ME  
Checked by: TK  
Date: 05.10.12

**Key**

-  Zone 1 (Central Woodland)
-  Zone 2 (Neutral Grassland)
-  Zone 3 (Hedges)
-  Zone 4 (River Gwenfro)

-  Zone 5 (Wetlands: Swamp, Lagoons, Swales/ Ditches)
-  Zone 6
-  Retained vegetation in Zone 2 (where associated with disused railway) and Zone 4



## Marches Ecology

**C076 Proposed Spine Road and Development Plateaus, Western Gateway, Wrexham Technology Park, Wrexham – Ecological Management Plan**

**Figure 3 – Phase 1 Habitat Map (Prior to Development)**

Drawn by: ME  
Checked by: TK  
Date: 05.10.12

### Key

- Broad-leaved woodland
- Broad-leaved plantation woodland
- Continuous scrub
- Scattered scrub
- Broad-leaved tree (indicative only)
- Species-rich hedge
- Species-poor hedge

- Unimproved neutral grassland
- SI Semi-improved neutral grassland
- PSI Poor semi-improved neutral grassland
- I Improved grassland
- A Arable
- Tall-ruderal
- Tall-ruderal/ neutral grassland mosaic
- Swamp
- Standing water

- Running water
- Ditch
- Hard-standing / other habitat
- Building
- Fence-line / wall
- FJ *Fallopia japonica* (Japanese Knotweed)
- Survey boundary
- 1 Target Note

***Appendix 1***

WCBC plan entitled '*Indicative Development Plan*' Dwg no. T07701/6000C dated 19/09/12.

WCBC plan entitled '*Landscape Masterplan*' Dwg no. TE07701/6002C dated 19/09/12.