



Llywodraeth Cymru
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A487 New Dyfi Bridge

Environmental Statement
- Volume 3: Appendix 9.1

Desk Study and Extended Phase 1 Report

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1 Introduction

1.1 Background

Ove Arup and Partners Ltd was commissioned by Alun Griffiths (Contractors) Ltd to undertake ecological surveys to inform an Environmental Impact Assessment (EIA) of the proposed A487 New Dyfi Bridge scheme (The Scheme) on land to the north of Machynlleth, Mid-Wales, located at National Grid Reference SH747017.

Welsh Government proposes to provide a new section of the A487 trunk road which also incorporates the provision of a new crossing of the River Dyfi upstream of the existing road bridge, Pont-ar-Ddyfi. The existing A487 trunk road leading northward from Machynlleth has been subject to increased traffic and repeated flooding over the years, and the continued deterioration of the existing masonry bridge (Pont-ar-Dyfi) which leads to the junction of the A487 and the A493 has resulted in structural strengthening works and repairs being required to keep the bridge in operation.

The Scheme is a 1200m new section of single carriageway road. The proposed route is to the south east of the existing route and Pont-ar-Dyfi Bridge. The scheme includes a 750m viaduct and river bridge across the river Dyfi and associated floodplain. The existing A487 will be de-trunked between the two ends of the scheme.

1.2 Scope of this Report

This report provides information on the ecological desk study and extended Phase 1 habitat survey. It details the methodologies used, provides a description of the designated sites, species records within the vicinity of the site, the habitats present within the site and immediate vicinity, and the potential for legally protected or otherwise notable species (e.g. Species of Principal Importance for the Conservation of Biodiversity listed in response to Section 42 of the Natural Environment and Rural Communities (NERC) Act 2006).

The objective of this report is to establish the ecological conditions on site and within the immediate vicinity, including its potential to support habitats and notable/protected species and to highlight any potential ecological constraints to future development.

2 Methodology

2.1 Desk Study

An ecological desk study for The Scheme was undertaken in August 2015. A biodiversity information request was submitted to the Biological Information Service (BIS), and also the North Wales Environmental Information Service (Cofnod). The Multi-Agency Geographic Information for the Countryside (MAGIC) website and the Countryside Council for Wales Protected Sites and Landscapes Map were reviewed for information on internationally and nationally designated sites of nature conservation importance.

In accordance with the relevant guidance, the ecology desk study area for the Scheme extends to 10km for SACs designated for bats (Collins, 2016), 5km for other internationally designated sites, 2km for nationally designated SSSIs and 1km for locally designated non-statutory Sites of Importance for Nature Conservation (SINCs).

For legally protected species the desk study area extends for 5km around the centre line of the scheme and 1km for other species of conservation concern¹ using the records supplied by BIS and Cofnod.

2.2 Extended Phase 1 Habitat Survey

A Phase 1 habitat survey (JNCC, 2010) was undertaken on various dates in July and August 2015 by experienced ecologists, with additional verification undertaken in December 2015 and January 2016. The survey methodology followed JNCC protocol and the 'Extended Phase 1' methodology as set out in Guidelines for Baseline Ecological Assessment (IEA, 1995). This method of survey provides information on the habitats in the survey area, using a standard set of habitat definitions for classifying areas of land based on the vegetation present. The Extended Phase 1 habitat survey also provides additional information through recording signs of legally protected species, and in assessing the potential for protected species to occur in, or adjacent to the site. The framework of legislation protected wildlife within the UK is set out in Appendix A.

Surveys were undertaken by two ecologist on several occasions, during suitable weather conditions, as documented in Table 1. All accessible areas of the site were walked and relevant habitat types classified according to their vegetation types and presented in the standard Phase 1 survey format. Predominant flora species within each habitat were also recorded. Target Notes (TNs) were used to identify areas of particular interest including the potential for protected species to be present. The TNs are listed in Appendix B. The survey included the following:

¹ Local Biodiversity Action Plan species, locally rare and scarce species (as identified by local experts), and species listed as being of Principal Importance for the Conservation of Biological Diversity in response to Section 42 of the Natural Environment and Rural Communities Act 2006 (known as Section 42 Species).

- A visual inspection of trees and other structures to assess potential for bat roosts in accordance with the Bat Conservation Trust guidance (Collins, 2016);
- A search for signs of badger (*Meles meles*) activity, such as setts, tracks and latrines;
- An assessment of habitat potential for reptiles and amphibians, in particular great crested newts (*Triturus cristatus*) Habitat Suitability Index Assessments following published methods (ARGUK, 2010).

A search was also undertaken for evidence of the presence of legally controlled invasive plant species within, and immediately adjacent to, habitats where the Scheme will be located. These invasive plants are those listed on Schedule 9 of the Wildlife & Countryside Act 1981, and subject to strict legal control.

Table 1 Survey dates and weather conditions

| Date | Temperature °C | Wind speed (Beaufort) | Wind direction | Cloud cover (%) | Conditions |
|------------|----------------|-----------------------|----------------|-----------------|---------------|
| 28/07/2015 | 18 | 2 | NE | 60 | Sunny |
| 29/07/2015 | 16 | 3 | E | 70 | Light showers |
| 18/08/2015 | 16 | 1 | NE | 70 | Dry |
| 19/08/2015 | 16 | 1 | NE | 100 | Steady rain |
| 23/12/2015 | 10 | 3 | SW | 60 | Dry |
| 13/01/2016 | 6 | 2 | N | 60 | Light drizzle |
| 08/03/2016 | 6 | 1 | N | 100 | Steady rain |
| 09/03/2016 | 7 | 1 | N | 90 | Steady rain |

2.3 Hedgerow Assessments

Hedgerow surveys were carried out on 68 hedgerows, with information being collected from the central 30m of each hedgerow. Each hedgerow was surveyed for attributes identified in the Hedgerows Regulations 1997; these data were then used to ascertain the ‘importance’ of the hedgerows according to the Hedgerow Regulations. Information recorded for each hedgerow included:

- Height and width of hedgerow (metres);
- Species composition;
- ‘Associated features’ (According to sub-paragraph 4, Section 7 of Part II of Schedule 1 of the Hedgerow Regulations 1997);
- Public Rights of Way (PRoW).

Information was recorded in the field using recording sheets held on iPads with Global Positioning System (GPS) mapping capabilities. The GPS was used to record the location for each recording sheet completed. Field signs or features relevant to the survey were photographed, with an attached GPS location. An

individual recording sheet was used for each hedgerow survey, which can be found in Appendix C.

The hedgerows were assigned to categories which provide a description of the hedgerow; this was to standardise recording and to inform the final assessment of hedgerow importance. Table 2 provides details of the nine categories used to identify the type of hedgerow. These categories are based on descriptions given in the Hedgerow Survey Handbook (2007).

Table 2 Description of the hedgerow categories

| Title of Category | Category Description |
|--------------------------------------|---|
| Intact managed hedgerow | This type of hedgerow has evidence of recent management (such as having a neat, cropped appearance) but has less than 10% gaps within its entire length. |
| Intact unmanaged hedgerow | This type of hedgerow has an untidy and natural appearance with no signs of management, and has less than 10% gaps within its entire length. |
| Managed 'gappy' hedgerow | This type of hedgerow has gaps within, but has signs of being managed (such as having a neat, cropped appearance). Gaps are defined in the Hedgerow Survey Handbook as 'any section of hedgerow that is not occupied by woody vegetation and is under 20m in length' (a gap over 20m is not included as part of the hedgerow). Even breaks in the canopy of less than 1m are regarded as gaps. Gaps also include spaces filled by walls, fences, brambles, or other non-structural hedgerow species, including climbers and dead sections of hedgerow. Access points are not included as gaps for the purpose of condition assessment. A hedgerow with more than 10% gaps over its entire length was defined as a 'gappy hedgerow'. |
| Unmanaged 'gappy' hedgerow | This type of hedgerow has gaps within (see above), and has an untidy and natural appearance with no signs of management. |
| Hedgebank with occasional shrubs | A hedgebank is an earth bank or mound relating to the hedgerow, distinct from the surrounding landform. For example, a hedge growing on a raised earth embankment with occasional shrubs. |
| Managed hedgerow within mature trees | A hedgerow with a neat, cropped appearance with mature trees. |
| New/reinstated hedgerow | A hedgerow which on visual inspection appears to be newly planted. |
| Tree line | A line of trees where the base of the canopy is greater than 2m from the ground and the gaps between tree canopies is less than 20m, so that the woody linear feature as a whole appears as a 'line of lollipops'. |

| | |
|------------|---|
| Fence line | A fence with vertical posts and strands of any type of wire running horizontally, or a fence with vertical posts and horizontal railings. |
|------------|---|

Hedgerows are considered ‘important’ under the Hedgerows Regulations if they meet the following criteria, however the scope of this assessment was limited to ecological criteria:

- Being 20m or more in length;
- Meeting another hedgerow at each end;
- Being at least 30 years old;
- Satisfy at least 1 of the criteria listed below which are taken from Part II of Schedule 1 of the Regulations:
 - The hedgerow contains species listed in part I of Schedule 1; Schedule 5; or Schedule 8 of the Wildlife and Countryside Act 1981, or Red Data Book species;
 - The hedgerow is adjacent to a Public Right of Way (excluding adopted highways but including roads used as a ‘road used as a public path’ (RUPP)) and contains at least four woody species and at least two Associated Features (as detailed below);
 - The hedgerow includes one or more of the following:
 1. At least seven woody species;
 2. At least six woody species, and has associated with it at least three of the ‘associated features’;
 3. At least six woody species including one of the following: black poplar tree (*Populus nigra* spp *betulifolia*); large-leaved lime (*Tilia platyphyllos*); small-leaved lime (*Tilia cordata*); wild service-tree (*Sorbus torminalis*);
 4. At least five woody species and has associated with it at least 4 of the ‘associated features’.

The Regulations do not apply to garden hedges, even if land on the other side of the hedge meets the above criteria.

Associated features are as follows:

- A bank or wall for at least half the length;
- A ditch for at least half the length;
- Gaps over no more than 10% of the length;
- At least one standard tree per 50m;
- At least three ground flora woodland species as defined in Schedule 2 of the Regulations within 1m of the hedgerow;

- Connections scoring four or more points, where connection with a hedgerow counts as one, a broad-leaved woodland or pond counts as two;
- A parallel hedge within 15m.

Climbers and bramble do not count towards the total woody species (except for roses). Hedgerows that contain fewer woody species but have a rich basal herbaceous flora may also be defined as species-rich, but the criteria to define these have to be set on a local basis as there is no national definition.

The collected species composition information was cross-referenced with the Woodland Species list in Schedule 2 and the Woody Species list in Schedule 3 of the Hedgerows Regulations.

The surveys were carried out between July and August 2015 and associated features were confirmed in December 2015 and early in 2016 following design changes. The dates of survey and weather recorded are detailed in Table 1.

2.4 Limitations

Whilst not a full protected species or botanical survey, an extended Phase 1 habitat survey allows an experienced ecologist to obtain a sufficient understanding of the ecology of a site; in order to either confirm the conservation importance of the site and assess the potential for impacts on habitats and species likely to represent a material consideration in planning terms, or to ascertain that further surveys will be required before such confirmation can be made.

Some surveys were undertaken between December and March, as the relevant access permissions to certain areas of land to the west and east of the Scheme had not been received during the summer months.

As these months lie outside of the optimum survey period for the identification of vegetation, this presents a limitation in terms of the number of species that can be identified on site, and the presence of certain field signs of protected species e.g. water vole (*Arvicola amphibius*) feeding signs. However as a number of other protected species surveys will be undertaken for The Scheme, the classification of habitats within these areas will be checked and updated prior to the submission of any Environmental Statement for The Scheme.

The findings presented in this report represent those at the time of the survey and reporting, and data collected from available sources. Ecological surveys can be limited by factors affecting the presence of plants and animals, such as the time of year, migration patterns and behaviour. The surveys undertaken were within the appropriate seasons advocated by best practice guidance. Absence of evidence of any particular species should not be taken as conclusive proof that the species is not present or that it will not be present in the future.

3 Baseline Conditions

3.1 Desk Study

3.1.1 Designated Sites

Pen Llyn a'r Sarnau/Lleyn Peninsula and the Sarnau Special Area of Conservation (SAC) lies 4.3km from the site. This SAC is a marine European Site designated for its sandbanks which are slightly covered by sea water all the time; estuaries; coastal lagoons; large shallow inlets and bays; and reefs. These habitats support a range of flora and fauna including otter (*Lutra lutra*), grey seal (*Halichoerus grypus*) and bottlenose dolphin (*Tursiops truncatus*).

The site is included within the Dyfi Biosphere, an area designated by UNESCO in 2009 for its diversity of natural beauty, heritage and wildlife. The following designations are included within the Biosphere, and lie approximately 4.6km to the south west of the scheme boundary as shown on Figure 2:

- The Aber Dyfi Special Protection Area (SPA) includes the estuary, adjoining saltmarsh, marshy grassland and improved grassland. The site is of importance as a traditional wintering area for Greenland white-fronted goose (*Anser albifrons flavirostris*), representing at least 1% of the wintering population in the UK.
- Cors Fochno and Dyfi Ramsar site comprises of the Dyfi estuary, calcareous dune systems and raised mire. The flora and invertebrate fauna are of national importance, and the site also designated for overwintering Greenland white-fronted goose and is a key site in Wales for breeding waders. It also contains national important and Red Data Book lower plant species, dune slack and shingle bryophyte assemblages, dune fungal assemblages and a mire bryophyte assemblage.
- Cors Fochno/Borth Bog SAC lies on the south side of the Dyfi estuary and is designated for its active and degraded raised bogs, with associated bog moss species assemblages.
- The Dyfi SSSI is designated for its geological and biological features. The site has important populations of invertebrate species and has a wide range of breeding and wintering birds; the site is used by a nationally significant population of approximately 5000 over-wintering wigeon (*Anas penelope*), and a flock of approximately 140 Greenland white-fronted geese use the site as the only regular wintering population in Wales. Resident dormouse (*Muscardinus avellanarius*), otter (*Lutra lutra*), polecat (*Mustela putorius*) and good populations of amphibians and reptiles are also present on site.

There are a number of ancient woodland sites within 2km of the scheme boundary, comprising of Ancient Semi-Natural Woodland, Plantation on Ancient Woodland Sites, Plantation on Ancient Woodland Sites (PAWS) Restoration Priority Areas, Restored Ancient Woodland Sites and Ancient Woodland sites of Unknown Category. Sites in close proximity to the scheme include areas of

plantation, semi natural and unknown category Ancient woodlands, and PAWS Priority Areas shown on Figure 3, including sites:

- 200m north in Foel-y-Ffridd;
- 660m north in Coed-y-Ffridd;
- 650m west within Coed-y-Penryn; and
- 200m from the southern boundary of the scheme near Fron-y-gog.

3.1.2 Species Records

Information provided by BIS and Cofnod of previous species records within the search area is summarised below. Historic records described are defined as those pre-dating the year 2000.

3.1.2.1 European Protected Species

Bats

Bat species recorded in the area include brown long-eared bat (*Plecotus auritus*), common pipistrelle (*Pipistrellus pipistrellus*), soprano pipistrelle (*Pipistrellus pygmaeus*), noctule bat (*Nyctalus noctula*), Daubenton's bat (*Myotis daubentonii*), Brandt's bat (*Myotis brandti*), whiskered bat (*Myotis mystacinus*), greater horseshoe bat (*Rhinolophus ferrumequinum*) and lesser horseshoe bat (*Rhinolophus hipposideros*).

There are numerous records of bat roosts within 5km of the Scheme;

- Historic records of bat roosts within the immediate vicinity of the Scheme and 831m north near Ffridd gate.
- Historic and more recent records of pipistrelle roosts 1.3-1.5km from the Scheme at Pantperthog and Gelligen Fach.
- Historic record of a brown long-eared bat roost approximately 1.9km to the north of the Scheme and a number of historic records between 1.9 – 4.2km at Gelligen Fawr, Pantperthog, Plas Llwyngwern and Garthgwynion, Glaspwll.
- A number of brown long eared bat and pipistrelle roosts have been recorded approximately 2.5km from the Scheme at Pantperthog.
- Record of an unspecified bat roost 2.3km from the Scheme at Pantperthog and records of roosts 4.3km north east at Ger y Llan, Llanwin.
- A known bat roost located 2.5km from the Scheme, where lesser horseshoe bat, greater horseshoe bat and brown long-eared bats have been counted.
- Records of a potential lesser horseshoe bat roost 2.7km and 2.9km from the Scheme at Pennal.

- Historic records of a Brandt's bat roost 4.2km south west of the Scheme at Garthgwynion, Glaspwll.

There are records of brown long eared bat activity approximately 1.4-1.9km from the Scheme at Pant Lludw and Gelligen Fawr. There are recent records of noctule foraging approximately 1.4km from the Scheme along the A487 and at 3.6km south east at Coed Ty Gwyn. There are a number of records of Daubenton's bat activity along the Afon Dulais 1.4km south east, and 4.5km north east at Llanwrin, and an historic record of whiskered bat 3.8km away near Pennal. There are records of greater and lesser horseshoe bats at Plas Llwyngwern. There are further records of lesser horseshoe bats near Pantperthog and the Ceinws Slate Mine.

There are further historic and more recent records of lesser horseshoe bat, brown long eared bat, whiskered bat and pipistrelle species in the wider 5km search area.

Otter

There are numerous records of otter along the River Dyfi within the immediate vicinity of the Scheme and along the Afon Dulas, Pantperthog, including sightings and field signs records. There are records of field signs 394m west and 834m north of the scheme on the Afon Dyfi. There are two records of road casualties 1.6km north of the scheme on the A487, a record 1.9km south of the site and numerous records of field signs, holts and lay ups 2.5 – 2.8km north near Pantperthog and south along the Aber Dyfi. There are numerous records of road casualties and field signs within the wider 5km search area, along the Afon Pennal, the Afon Crewi and at Coed Ty Gwyn.

Hazel Dormouse

There are historic records of hazel dormouse 551m from site at Foel y Ffridd, 1.1km south west of the Scheme in Machynlleth, approximately 1.4km north near Pantperthog and 1.4km from site at Coed y Ffridd and Gellygen Fach. There are further historic records 2.9km south near Glaspwll and Glanmeryn, and more recent records of field signs north near the Centre for Alternative Technology, 2.4-2.7km north near Pantperthog, Morben Isaf and 3.4km south east at Coed Ty Gwyn. There are numerous historic records between 3-5km north and west of the Scheme near Pantperthog, Coed Esgair Foel – Eirin, and Pennal, and more recent records approximately 3.1km north of the Scheme in the same area.

Great Crested Newt

There are five historic records of great crested newt (*Triturus cristatus*) in various garden ponds on the Newlands Estate, Machynlleth, within 1km of the scheme.

Marsh Fritillary

There are two historic records of marsh fritillary (*Euphydryas aurinia*) 5km south east of the Scheme at Ceniarth.

Flora

There is one historic record of Killarney fern (*Trichomanes speciosum*) at Gelligoch, Machynlleth, approximately 2.2km south west of the Scheme.

3.1.2.2 UK Protected Species

Badger

Badgers (*Meles meles*) have been recorded within the immediate vicinity of the Scheme along the A487 near the Dyfi Bridge, with records of sightings 500m south near Mynydd Griffiths. There are records of setts and field signs north of the Scheme at Pantperthog and within woodland at Nant Esgair-gwenyn. There are numerous records of field signs approximately 1.5km north of the Scheme near Coed Esgair, and a disused sett recorded 1.7km north in Coed Esgair woodlands. There are a number of records of used and disused setts approximately 1.8km north of the Scheme in the same area of woodland at Coed Esgair. Road casualties have been recorded 1.8km west of Dyfi Bridge, and there are records approximately 2km north near Pantperthog and Glan Dulas-mawr. There are records of field signs and an active sett 2.5km south west of the Scheme along the A493. There are further records of road casualties and field signs in the wider 5km search area.

Reptiles

Slow worm (*Anguis fragilis*) have been recorded approximately 550m from the scheme at Machynlleth Station. There are records north east of the Scheme near the Centre for Alternative Ecology, 1.8 - 2.1km north of the Scheme near Glan Dulas-mawr and approximately 4.3 and 4.9km north near Ceinws.

There is an historic record of grass snake (*Natrix natrix*) 150m south of the Scheme at Machynlleth railway station, and a more recent record 3km north of the site at Ceinws. There is an historic record 4.1km from Scheme at Pennal, and a more recent record 4.4km north east at Ceinws.

Common lizard (*Zootoca vivipara*) have been recorded 890m north-east of the Scheme at Ffridd gate, Macynlleth, with a historic record approximately 600m south at Pen Yr Allt. There are also records 4km north at Dyfi Forest, Pantperthog and 4.4km north at Ceinws and Cwm Cadian.

Adder (*Viperus berus*) have been recorded 4.6km south west of the Scheme at Pennal.

Amphibians

There is one historical record of smooth newt (*Lissotriton vulgaris*) in a garden pond at Maesy Garth, Machynlleth and more recently approximately 1.9km north east of the Scheme.

There are recent records of multiple adult palmate newts (*Lissotriton helveticus*) north of the Scheme near Pantperthog and Llwyn-gwern farm, and one historical record 3.5km north-east.

There are four historic records of common frog (*Rana temporaria*), one of which 860m south east of the Scheme, and 19 recent records within 5km of the search area.

There are 14 recent records and two historical records for common toad (*Bufo bufo*), with records 2.9-5km from the Scheme.

Other Species

There is one historic record (1959) of pine marten (*Martes martes*) approximately 4.4km north of the scheme at Ceinws forest.

There are no records of white-clawed crayfish (*Austropotamobius pallipes*) or water vole within the 5km search area.

3.1.2.3 Birds

Schedule 1 Species

Kingfisher (*Alcedo atthis*) have been recorded along the Afon Dulas approximately 550m north of the Scheme, at Dolygelynen Farm, Glangwynedd, with a recent record of a breeding pair at Morfa Dyfi. There is also a historic record at Maes y Garth.

There are osprey (*Pandion haliaetus*) records 735m north-west of the Scheme near Foel-y-Ffridd.

There are historic records of goshawk (*Accipiter gentilis*) to the south-west of the Scheme at Bwlch-y-Groes. There are more recent records approximately 1.9km south within Coed Llynlleod.

There is a recent record of a breeding pair of barn owl (*Tyto alba*) at Y Ffridd in the immediate vicinity of the Scheme. Records include breeding pairs approximately 270m north of the Scheme at Glan Dulas Mawr, Glanfechan and at Bwlch and Pwllglas. There are records 1.9km south of the Scheme in Coed Llynlleod and 2.4km south east of the Scheme near Pebrhosmawr. There are further records 3.9km south west at Derwenlas and 4.5km east near Abercegir.

There are numerous historic red kite (*Milvus milvus*) records within the area, and more recent records north of the Scheme at Foel y Ffridd and 2.8km south east at Llyn Glanmerin.

There is a historic record of merlin (*Falco columbarius*) approximately 500m from the Scheme at Fron-y-Gog, and two more recent records at Morfa Dyfi.

A little ringed plover territory (*Charadrius dubius*) has been recorded 1.5km downstream of the Dyfi Bridge.

There are two records of hen harrier (*Circus cyaneus*) 1.2km south-west of the Scheme.

There is a record of 54 black tailed godwit (*Limosa limosa*) undertaking spring passage 4.7km from the Scheme at Morfa Dyfi.

Red List Species²

Birds within the Red List include the following:

² Birds of Conservation Concern 4: the population status of birds in the United Kingdom, Channel Islands and the Isle of Man (Eaton, et al., 2015).

White-fronted geese have been recorded at Glandyfi (south) approximately 5km from site.

There are five historic records of curlew (*Numenius arquata*) between 3-5km south west of the Scheme at Glandyfi (south) and approximately 2km south west at Bwlch-y-Graes-Faen.

There are three historic records of kestrel (*Falco tinnunculus*) 2.2km from site at Bwlch-Groes-Faen and a recent record 4.7km from site at Morfa Dyfi William Condry.

There are two historic records of black headed gull (*Chroicocephalus ridibundus*) and herring gull (*Larus argentatus*) 5.2km from the Scheme at Glandyfi (south).

There are five historic records of spotted flycatcher (*Muscicapa striata*) 720m from the Scheme at Fron-y-Gog, 980m at Glanwynedd and 2.4km at Bwlch-y-Groes-Faen,

There are numerous records of starling (*Sturnus vulgaris*) throughout the search area, with recent records 600m-1km away in Machynlleth.

There are three historic records of linnet (*Linaria cannabina*), 900m from the Scheme at Bwlch-y-Groes-Faen and approximately 2km south-east.

Five historic records of yellow hammer (*Emberiza citrinella*) recorded 2.1-2.4km away at Bwlch-y-Groes-Faen were also found.

Common bullfinch (*Pyrrhula pyrrhula*) has been recorded 2.4km north at Gellygen Fawr.

Wood warbler (*Phylloscopus sibilatrix*) have been recorded singing 3.9km north east at Tan Y Coed, near Corris. There are three historic records south of the Scheme at Fron-y-Gog, north at Esgairgeiliog, and south west at Bwlch-y-Graes-Faen.

Cuckoo (*Cuculus canorus*) have been recorded calling 1.7km south of the Scheme at Coed Llynllloed.

There are four historic records of pied flycatcher (*Ficedula hypoleuca*); 530m north in Ffriddgate, eight pairs recorded at Fron-y-Gog golf course, and at Bwlch-y-Groes farm. There is a more recent record at Nant Ceniarth, 3.6km south east of the Scheme.

There are three historic records of skylark (*Alauda arvensis*) 1.9km south west of the Scheme near Bwlch-Groes-Faen, 3km south west, and a more recent record 1.8km south in Coed Llynllloed.

Song thrush (*Turdus philomelos*) have been recorded approximately 700m south of the Scheme in Machynlleth, north at Ceinws, and 2-3km south west of the site near Derwenlas. There are historic records 600m north of the scheme at Glangwynedd and at Bwlch-y-Groes, Machynlleth.

There are numerous historic and more recent records of house sparrow (*Passer domesticus*) within the search area, with records in the immediate vicinity of the

Scheme along the Dyfi, approximately 800m south in Machynlleth and approximately 600m north in Ffriddgate.

There are historic records of tree pipit (*Anthus trivialis*) pairs approximately 450m south east near the golf course Fron-y-Gog, Machynlleth and 1.9km south west. A number of more recent records 3-4km west near Derwenlas.

Amber List Species

Birds within the Amber List include the following:

Woodcock (*Scolopax rusticola*) have been recorded 1.9km south of the Scheme near Coed Llynllloedd.

One historic record of reed bunting (*Emberiza schoeniclus*) breeding near Fron-y-Gog, approximately 450 south east of the Scheme, and a more recent record of eight pairs breeding approximately 4.5km south west at Morfa Dyfi, near Derwenlas.

Redwing (*Turdus philomelos*) have been recorded within the search area, with multiple adults 450m south east of the Scheme at Fron-y-Gog golf course and 3km south west, with a more recent record 3.3km south west in Derwenlas.

There are 11 recent records of dunnoek (*Prunella modularis*) within the search area; 5 of which within 500m-1km south of the Scheme in Machynlleth. There are further records 2km south east of the Scheme, approximately 3km south west near Derwenlas and approximately 4km north at Ceinws. There are five historic records, 540m north near Glangwynedd, 780m east and 2km south west at Bwlch-y-Groes.

There are three historic records of fieldfare (*Turdus pilaris*) south of the Scheme in Fron-y-Gog, north at Glangwynedd, and south west at Bwlch-y-Groes-Faen.

Pintail (*Anas acuta*) have been recorded 1.2km south-west and historically 5.2km from the Scheme at Glandyfi (south).

3.1.2.4 Other Species of Principal Importance in Wales (within 1km)

The diving beetle (*Bidessus minutissimus*) is listed on the S42 List of Species of Principal Importance in Wales and has been recorded historically on the Afon Dyfi, with a more recent record within the immediate vicinity of the site, in a shallow bay at the edge of the shingle bank on the Afon Dyfi.

There are historic and recent records of Section 42 invertebrates such as grayling (*Hipparchia semele*), wall (*Lasiommata megera*), small heath (*Coenonympha pamphilus*) and Ashworth's rustic (*Xestia ashwrothii*) within the immediate vicinity of the Scheme, south at Penyrallt and Trem y Ddyfi, south east at Fron-y-Gee and north of the Scheme near the Centre for Alternative Technology.

Numerous historic records of polecat were found between 1.1km - 4.8km of the Scheme, in Machynlleth, Pantperthog, Gellygen, Maes-y-wern-goch, Derwenlas

and Llanwrin. There are a number of more recent records between 3.2km - 4.3km near Machynlleth, Forge and Uwch-y-Garreg, Penegoes and Pennal.

Seven recent records of West European hedgehog (*Erinaceus europaeus*) were found including sightings and road casualties between 802m south near Graig Fach, Machynlleth, and 4km from the scheme along the A487 Derwenlas.

Red squirrel (*Sciurus vulgaris*) have been recorded 1.5km east of the scheme at the Plas Dolguog hotel in 2003.

3.1.2.5 Notable Lower Plant Species (within 1km)

Records of bryophytes and other lower plants have been reviewed in line with the requirements to undertake a specific bryophyte survey recommended from previous studies. The following are identified as Section 42 species.

Liverworts

There are historic records of bifid crestwort (*Lophocolea bidentata*), overleaf peltia (*Pellia epiphylla*) and water earwort (*Scapania undulata*) 890m north of the Scheme at Ffridd gate. There is a record of southern grey physcia (*Physcia tribacioides*) 900m away at Hoel Maengwyn, Machynlleth.

Mosses

There are historic records of rough stalked feather moss (*Brachythecium rutabulum*), bank haircap (*Polytrichum formosum*) and common tamarisk moss (*Thuidium tamariscinum*) within the immediate vicinity of the Scheme, near the cycle path over the Dyfi River.

There are also historic records of common smoothcap (*Atrichum undulatum*), marsh bryum (*Bryum pseudotriquetrum*), rock pocket moss (*Fissidens dubius*), slender mouse tail moss (*Isoetecium myosuroides*), swans neck thyme moss (*Mnium hornum*) and dotted thyme moss (*Rhizomnium punctatum*) at Ffridd gate 890m north of the Scheme.

Lichens

There is one record of southern grey physcia lichen (*Physcia tribacioides*), a Section 42 species, 900m from the scheme on common hornbeam (*Carpinus betulus*) trees in a street near Hoel Maengwyn.

3.1.2.6 Invasive Species

There are no records of invasive species within the 5km search area.

3.2 Extended Phase 1 Habitat Survey

3.2.1 Habitats

A total of 30 habitat types were identified within the Survey Area and immediate surrounding area. These are shown in Figure 4 and described below in broad categories.

Woodlands

Semi-natural broadleaved woodland lies between the River Dyfi and the A487. The species assemblage includes ash (*Fraxinus excelsior*), alder (*Alnus glutinosa*), hazel (*Corylus avellana*), hawthorn (*Crataegus monogyna*), rowan (*Sorbus aucuparia*) and sessile oak (*Quercus petraea*), with areas of more mature pedunculate oak (*Quercus robur*). Willows (*Salix spp.*) line the river bank on the northern side. Woodland ground flora includes bluebell (*Hyacinthoides non-scripta*), enchanter's nightshade (*Circaea lutetiana*), yellow archangel (*Lamium galeobdolon*), hard fern (*Blechnum spicant*), harts tongue fern (*Asplenium scolopendrium*) and hemlock water-dropwort within ditches associated with the woodland (*Oenanthe crocata*), indicating that this area is well established as a woodland. It appears that the woodland has been allowed to regenerate as broadleaf from a previously coniferous plantation. The woodland ground flora becomes less diverse towards the eastern side, adjacent to the Millennium Bridge. Japanese knotweed (*Fallopia japonica*) and Indian balsam (*Impatiens glandulifera*) are also present throughout the woodland, mainly along the river banks.

There are large areas of woodland contiguous with the northern boundary of the Scheme. Woodland within the Y Ffridd farm property to the north of the A487 is dominated by oak and ash on its eastern edge, with little ground flora, including grasses, bramble (*Rubus fruticosus*) and bracken (*Pteridium aquilinum*). This area of woodland is within a steeply sloping area of rocky outcrop, and has been subject to grazing by sheep. This woodland continues to the south-west of Y Ffridd along a steep slope, where large mature oak trees dominate. Other species within the woodland include ash and sycamore (*Acer pseudoplatanus*), with the ground flora dominated by dense bramble and bracken. There is an area of broadleaved woodland with a similar assemblage surrounding the Ffridd farm house further west, suggesting that this slope to the north of the river contained continuous broad-leaved woodland prior to the agricultural development of the area.

There is a broadleaved riparian woodland corridor along the river contiguous with the north eastern survey boundary, containing species such as alder, oak, goat willow (*Salix caprea*), crack willow (*Salix fragilis*), sycamore, hawthorn, ash and hazel. Ground flora includes bramble, dog-rose (*Rosa canina*), bracken, bluebell, holly (*Ilex aquilifolium*) and umbellifer species, where the bankside vegetation is subject to grazing by sheep in the adjacent fields. There are also areas of Japanese knotweed throughout the woodland area, along the river bank.

An area of broadleaved plantation in the northern-western corner of the Scheme appears to be more recently planted than that of the woodlands to the east, consisting of younger, more uniform stands of beech (*Fagus sylvatica*) and silver birch (*Betula pendula*), with an access track running throughout. There is a low diversity of ground flora within this section of woodland, with some understorey of hawthorn and hazel. There is a small area of older woodland further west, containing larger, more mature oak *spp* trees.

Scattered broadleaved trees are located throughout the Scheme; most marking the boundaries between agricultural fields to the south-east and south-west, and within fields in the centre of the Scheme. Species include willow, hawthorn, hazel, alder, ash, beech and silver birch. There are scattered broadleaved trees along the site boundary to the south, parallel to the railway line, and scattered trees along both sides of the cycle path to the north.

There is an area of recently felled mixed woodland within the slopes at the north-western survey boundary, directly opposite the Dyfi Bridge.

Scrub

There are areas of dense scrub along the western slope adjacent to the A487 and at the north-eastern corner of the Survey Area; these areas are dominated by European gorse (*Ulex europaeus*), bracken and bramble. There are areas of dense scrub of similar assemblage along the northern river banks to the south-east and along the southern river banks to the west of the Dyfi Bridge. There are also small areas of scrub adjacent to the cycle path to the north of the Millennium Bridge, and associated with the edges of broadleaved woodland habitats within the Survey area boundary. There are areas of scattered scrub dominated by European gorse along the northern and southern banks of the River Dyfi, and within the poor semi-improved/marshy grassland in the centre of the Survey area.

Continuous bracken is present within the rocky outcrop/basic inland cliff area immediately south/south-east of the Y Ffridd farm, and adjacent to the A487 in the northern section of the Survey area. There are areas of scattered bracken associated with scattered trees along the northern boundary of the Survey area, to the east of the broadleaved woodland within the Y Ffridd farm. There is scattered bracken within semi-improved grasslands in the north-western corner of the Survey area, and along the southern boundary of an improved grassland area to the west of the broadleaved woodland, where significant areas of bracken are associated with the fence line marking the boundary between this field and the A487 road.

Grasslands

There are areas of semi-improved neutral grassland along the northern bank of the River Dyfi, to the north-west and south west of the railway line and within a small field to the north-west of the Millennium Bridge and cycle path, adjacent to the A487. These areas of grassland contain a higher species diversity, with a higher abundance of herbaceous species such as creeping buttercup (*Ranunculus repens*), common mouse-ear (*Cerastium fontanum*), greater bird's foot trefoil (*Lotus*

pedunculatus) and marsh thistle (*Cirsium palustre*), with grasses such as sweet vernal grass (*Anthoxanthum odoratum*), common bent (*Agrostis capillaris*) and perennial rye-grass (*Lolium perenne*). These areas are damp with soft rush (*Juncus effusus*) scattered throughout.

There are a number of more intensively managed improved grasslands within the Scheme, all of which are subject to grazing by sheep, and some by horses and cattle; these include the large fields to the west and north-east of the Scheme, along the steep slopes north of the A487, within the central agricultural fields and to the south of the railway line. The vegetation within these fields is of a low floral diversity, and includes species such as creeping buttercup, white clover (*Trifolium repens*), Yorkshire fog (*Holcus lanatus*), red fescue (*Festuca rubra*) and perennial ryegrass.

Marshy grassland areas occur as patches and within ditches in areas of improved and poor semi-improved grassland within the Scheme, dominated by soft rush, with other species including hard rush (*Juncus inflexus*), marsh thistle, creeping bent (*Agrostis stolonifera*) and Yorkshire fog. These patches occur mainly within the central fields adjacent to the River Dyfi, to the south-west of the Scheme boundary and within fields to the south-south-west. There is a small area of marshy grassland to the north of the river, within the Y Fridd farm adjacent to the broadleaved woodland.

The majority of the fields within the Scheme consist of poor semi-improved grasslands, containing a herbaceous assemblage of common knapweed (*Centaurea nigra*) greater birds foot trefoil, creeping buttercup, common mouse-ear, creeping thistle, red clover (*Trifolium pratense*) and white clover, and species such as soft rush, broad leaved dock (*Rumex obtusifolius*), common bent and Yorkshire fog.

There is a small area of amenity grassland within the garden area of the Haulfryn property to the north-east of the site boundary.

Watercourses

There are a number of ponds, ditches and flooded grassland areas within the Survey area. The majority of ponds are located around the boundaries of improved grassland within the centre of the Survey area, with other water-bodies located along broadleaved woodland habitat to the east of the Millennium Bridge and along field boundaries at the edge of poor semi-improved and semi-improved grasslands to the west. There are ditches containing water and reed mace (*Typha latifolia*) running parallel to the A487 to the south of the Dyfi Bridge, and along the south-eastern boundary of the Survey area next to the railway line. There is a ditch network with running water around the field boundaries to the south-west of the railway line. There are some smaller ditches associated with hedges between field boundaries to the south of the Survey area, which are likely to be seasonally wet.

Areas of grassland immediately adjacent to the River Dyfi are likely to be seasonally wet, although larger areas of standing water within the fields adjacent to the southern bank of the River Dyfi may only occasionally dry out completely.

Invasive Species

Invasive species identified on site include Japanese knotweed, Indian balsam and rhododendron (*Rhododendron ponticum*). Japanese knotweed and Indian balsam are concentrated along the river bank to the east, along both banks of the River Dyfi through the centre of the Survey area, within woodland areas to the north of the river and within hedgerows in the centre of the Survey area. There is Japanese knotweed associated with the ditches along the southern boundary and the garden centre, and within the ditch network to the south of the railway line/petrol station. A large area of rhododendron was identified within the broadleaved woodland immediately south/south-west of the recently felled mixed woodland in the north-western corner of the Survey area. This is likely originating from the gardens of properties located along the A487.

Hedgerows

There are a number of intact species poor hedges within the Survey area; a garden hedge along the eastern side of the A487 to the north, and a short hedge within Y Ffridd intersecting areas of marshy grassland and woodland, containing species such as blackthorn, hawthorn and ash. There is a managed species poor field boundary hedge to the east of the Millennium Bridge parallel to the broadleaved woodland, and along the south-western boundary. Intact species poor hedges intersect semi-improved/improved grassland within the north-western corner of the Survey area.

There is one defunct species rich hedge located within the centre of the Survey area, marking the boundary between improved and poor semi-improved grasslands. This hedge contains elder (*Sambucus nigra*), ash, alder, hawthorn, holly and dog-rose, with ground flora including foxglove (*Digitalis purpurea*), marsh thistle and Himalayan balsam.

There are a number of tree-lines and defunct species poor hedges within the centre of the Scheme marking the boundaries between improved/ poor semi-improved fields, and to the west of the A487 road within areas of marshy and improved grassland.

Intact species rich hedges are located along the A493 to the north-west of the Scheme boundary, on both sides of the A487 to the south of the Dyfi Bridge and along the A487 to the north-east of the Scheme. Species include hazel, hawthorn, blackthorn, dog-rose, ash, sycamore, willow *spp.*, alder and elder.

The importance of hedgerows is consider further below.

Fence-lines

There is stock proof fencing throughout the Scheme marking the boundaries between fields. Most are in good condition with many associated with hedges. Many fence lines marking the boundaries between fields in the north-eastern, south-western and within the centre of the Scheme are associated with areas of scrub and tree-lines. Species present include bramble, European gorse, bracken, ash, hawthorn, blackthorn, oak, willow and alder.

Metal fencing lines both sides of the A487 to the south of the Dyfi Bridge.

Buildings

Buildings contained within the Survey area boundary include Haulfryn at the north-eastern edge of the boundary, a small outbuilding located along the access driveway to the Y Ffridd farm, a row of residential properties opposite the Dyfi Bridge at the north-western side and Y Ffridd farmhouse. There are three farmhouses located in the north-western corner of the site boundary.

Bare ground and tarmac

The A487 road and associated footpaths are tarmac, along with the cycle path over the Millennium Bridge and footpath through the Survey area along the southern bank of the river.

Shingle beaches

There are shingle beaches located along the meanders of the River Dyfi, the largest along the northern bank to the east of the Millennium Bridge and along the southern bank to the west of the Millennium Bridge.

Basic inland cliff

Areas of rocky outcrop are located adjacent to the access road to the Y Ffridd farm, and along the slopes to the east of the A487. There are areas of rocky outcrop within the eastern extent of the broadleaved woodland at Y Ffridd, and within improved/marshy grassland fields in north-western corner of the Survey area boundary.

3.3 Hedgerow Assessments

A total of 68 hedgerows were recorded during the surveys and subsequently assessed for their importance. The locations of these hedgerows are shown in Figure 5. A summary of the results is shown in Table 3 below.

Seven hedgerows were identified as being ‘important’ hedgerows in regard to the Hedgerow Regulations 1997, and are described below;

Hedge 9 is located to the north of the Survey area, running along the eastern side of the A487 and adjacent to an area of broad-leaved woodland. It was classified as an intact managed hedgerow and contains more than seven woody species; ash, blackthorn, hazel, holly, pedunculate oak, rose and willow *spp*. It also has gaps accounting for less than 10% of the hedge length, a parallel hedge within 15m and connections with another hedgerow and a woodland.

Hedge 10 is located directly opposite to Hedge 9 across the A487, and was classified as an intact managed hedgerow. It contains five woody species; blackthorn, elder, hawthorn, hazel and rose *spp*. Associated features include a

connection to another hedgerow, a connection to a woodland, a parallel hedge within 15m and a Public Right of Way footpath.

Hedge 13 is within the south-western area of the Survey area, and marks the boundary between agricultural fields/poor semi-improved grassland. It is classified as an intact unmanaged hedgerow and contains seven woody species; ash, blackthorn, hawthorn, hazel, sessile oak, rose *spp.* and willow *spp.* Associated features included a ditch for at least half its length and connections with four hedgerows.

Hedge 16 is located within the south-western area of the Survey area, and is connected to Hedge 13. It is classified as an intact managed hedgerow and contains seven woody species; hazel, hawthorn, dog-rose, ash, sycamore, goat willow and elder. Associated features included connections to three hedgerows.

Hedge 20 is located within the eastern area of the Survey area, on the western side of the A487. It is classified as an intact managed hedgerow and contains four woody species; blackthorn, hawthorn, hazel and rose *spp.* Associated features included a bank/wall for at least half its length, a parallel hedge within 15m, connections with four hedgerows and a Public Right of Way.

Hedge 44 is located within the north-western area of the Survey area, along southern side of the A493. It is classified as an intact managed hedgerow, containing six woody species; ash, hawthorn, holly, alder and rose *spp.* Associated features include evidence of a protected species (badger trail and latrine), gaps accounting for less than 10% of the hedge length, a parallel hedge within 15m, two connections to hedgerows and adjacent to a Public Right of Way.

Hedge 50 is located directly opposite Hedge 43. It is classified as an intact managed hedgerow and contains seven woody species; ash, beech, blackthorn, hawthorn, hazel, holly and rose *spp.* Associated features include gaps accounting for less than 10% of the hedge length, a parallel hedge within 15m, two connections to hedgerows and a Public Right of Way.

The majority of the hedgerows (32) were categorised as being ‘intact managed hedgerows’, with four categorised as being ‘intact unmanaged hedgerows’, 6 as a ‘managed gappy hedgerows’, 13 as ‘unmanaged gappy hedgerows’ and 13 as a ‘treeline’.

Table 3 Summary of hedgerow survey results

3.3.1 Important Hedgerows

3.4 Potential for Protected Species

The following section outlines the potential for the Survey area to support legally protected species.

3.4.1 Badger

There is suitable habitat for badger present on site, in the form of hedgerows with connections throughout the Survey area, scrub habitat and a large area of woodland on the northern side of the River Dyfi, providing potential commuting and foraging opportunities for badgers. Foraging signs were observed throughout fields to the south-east of the Survey area, on the southern side of the River Dyfi and within fields between the A493 and the northern river bank (TN8, TN27, TN28 and TN31). An established trail was observed between two parallel hedges along the A493, where a latrine was noted (TN32).

A badger sett was found within the woodland to the north of the River Dyfi and to the west of Y Ffridd farm, which appeared to have at least seven entrance holes that could be identified (TN14). The sett appears to be in use due to the presence of freshly excavated soil outside one of the larger entrances, however a number of holes have collapsed entrances, features of disuse and/or were flooded with water. This sett is considered to be a likely outlier sett.

A possible outlier was also noted on the railway embankment in the south western part of the Survey area, but it could not be accessed to confirm its use.

3.4.2 Otter

Twenty water-bodies were surveyed within the study area for the potential to provide suitable habitat for otter. Two of the water-bodies assessed were considered to have high potential (the River Dyfi and its tributary to the north-east of the Site), three considered to have medium potential, thirteen considered to have low potential and two water-body as having negligible potential to support otter.

A large dog otter was observed in the River Dyfi during the July survey (TN19) approximately 300m downstream of the Millennium Bridge. The River Dyfi provides good commuting and foraging opportunities for otter, and there are sites suitable for laying up and resting along the northern river bank, within the woodland (TN5). The southern river bank is likely to be highly disturbed by walkers, cyclists and anglers. Full otter survey results are provided in the riparian mammals report.

3.4.3 Water Vole

Suitable habitat for water voles is present within the study area. Full details of the survey undertaken for this species are provided in the riparian mammals report.

3.4.4 Bats

Sixty four trees were considered to have potential to provide roosting opportunities for bats within the study area, in addition to a large number of trees within the broadleaved woodland to the north of the River Dyfi. These included ash, alder, oak, sycamore, crack willow and goat willow.

Of the 64 trees, five were considered to have high roost potential, 25 were considered to have medium roost potential, 32 were considered to have low roost potential and two considered to have negligible roost potential.

Bat activity surveys have also been undertaken and will be reported separately, along with further details of the potential for trees to contain bat roosts following further survey work.

3.4.5 Dormice

There is some habitat suitable for dormice within the study area, including hedgerows and areas of woodland. Many of the hedgerows within the floodplain are defunct in their nature with many gaps. To the north of the river the hedgerows along the existing A487 at the northern tie-in are regularly managed by local landowners, which is likely to restrict the availability of food plants for dormice.

While it is acknowledged that records are present to the north of the study area, there are no recent records within the immediate search area used for the desk study, the results of which are set out above.

On the basis of this habitat assessment and review of records, and using professional judgement, it is not considered necessary to undertake species specific surveys for dormice.

3.4.6 Wintering Birds

The fields within the floodplain have potential to support wintering birds. Specific surveys, in particular for wintering geese, are proposed and will be reported separately.

3.4.7 Reptiles

There is good potential habitat present for common species such as common lizard and grass snake to be present within the marshy grassland areas, semi-improved grassland areas, woodland and scrub. Hedge banks and rocks can provide suitable habitat for foraging, basking and hibernation for reptiles.

3.4.8 Amphibians

All waterbodies within 500m of the proposed scheme footprint were subject to a Habitat Suitability Index (HSI) to assess their potential to support great crested newts. This included permanent ponds, stagnant or slow flowing ditches and ephemeral pools. 38 water-bodies were assessed, of which 30 obtained a score of less than 0.5 (poor habitat quality), seven obtained a score of 0.5-0.59 (below average habitat quality) and one obtained a score of 0.6-0.69 (average habitat quality). Waterbodies identified as having good habitat quality for great crested newts are located in the south-western area of the study area, mostly reens and ditches associated with hedgerows and the A487.

Those waterbodies identified as having below average or greater suitability for great crested newts will be subjected to further presence / absence surveys for all amphibian species in spring 2016, along with other permanent ponds within the Study Area. The presence/absence surveys for great crested newt will be in accordance with the methodology prescribed within the Great Crested Newt Mitigation Guidelines³.

3.4.9 Invasive Species

Japanese knotweed and Indian balsam have been identified within the study area; along the River Dyfi banks, within the woodland areas to the north of the river and within hedgerows and treelines in the western and north-eastern areas of the site. Rhododendron has also been identified within the broadleaved woodland/recently felled mixed woodland to the north of the Dyfi Bridge, and within the woodland on the northern bank of the River Dyfi. . There is widespread dense Japanese knotweed along the ditches within the fields to the south of the railway line and petrol station.

³ English Nature (2001) Great Crested Newt Mitigation Guidelines.

4 Conclusion

The study area supports a range of relatively common habitats which have the potential to support legally protected species. These are subject to further survey works as follows:

- Breeding birds - The hedgerows, woodland and scrub areas have the potential to support nesting birds, as do some of the grassland areas depending on how they are managed.
- Great crested newt - Ditches and ponds within the site have potential to support great crested newt.
- Riparian mammals (Otters and Water voles) - The River Dyfi provides connectivity for otters to travel through the area, where the woodland provides potential habitat for resting places. Ditches and ponds have the potential to support water voles.
- Badger - There is good habitat present for badger, where a sett was located within broadleaved woodland to the north.
- Bats - The woodland, hedges and river corridor are likely to be used by bats for foraging and commuting, and a number of trees are present which have potential to support bat roosts.
- Bryophytes – as required by the Contract awarded by Welsh Government and following recommendations from previous studies.

Habitats of potential nature conservation significance will also be subject to further survey in accordance with National Vegetation Classification (NVC) methodology.

The results of further detailed, species specific surveys will be reported separately.

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- JNCC. (2010). *Handbook for Phase 1 Habitat Survey - a technique for environmental audit*. Peterborough: Joint Nature Conservancy Council.

Figures

Figure 1 Site Location Plan

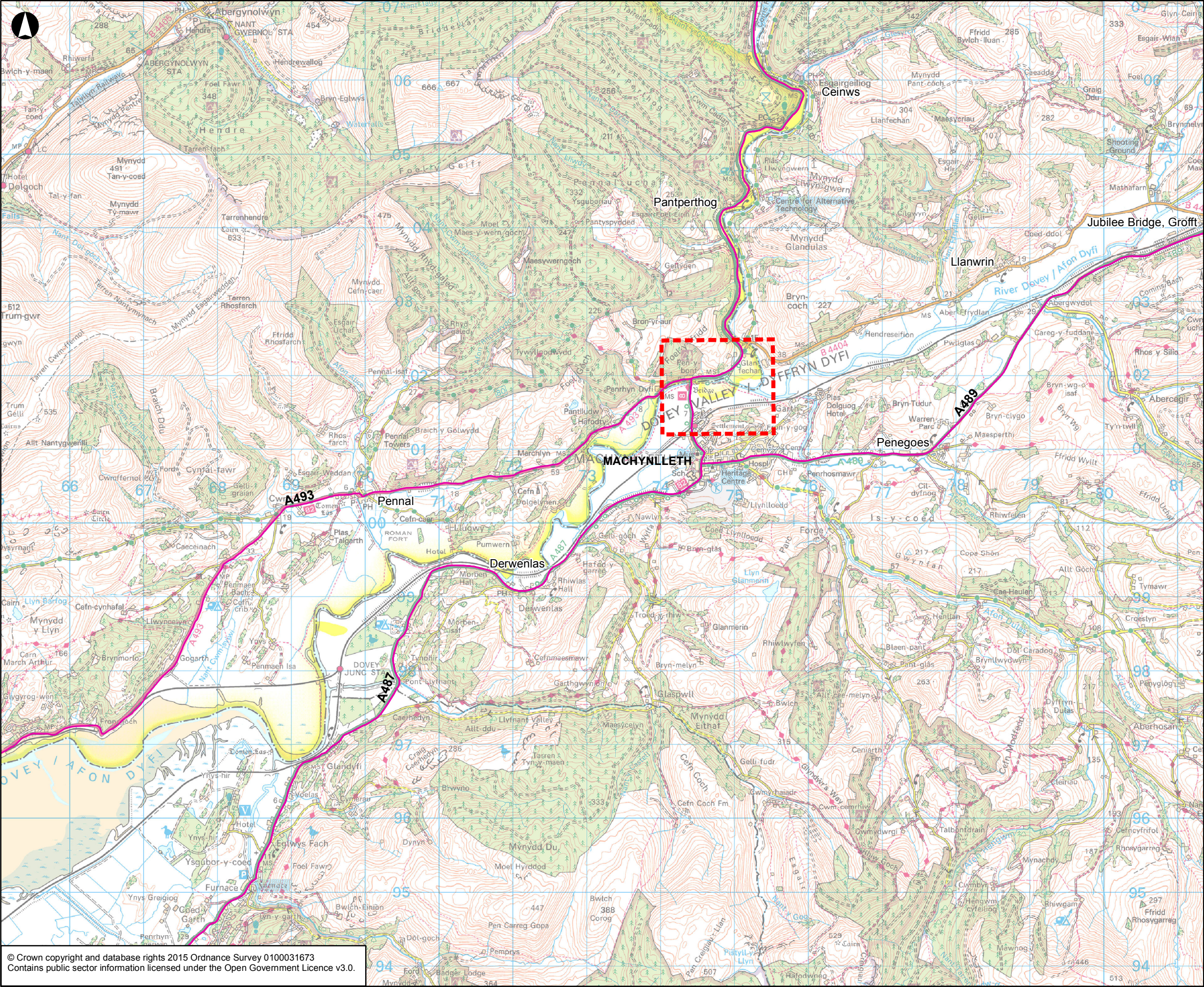
Figure 2 Statutory Designated Sites

Figure 3 Non-Statutory Designated Sites

Figure 4 Phase 1 Habitat Plan (01)

Figure 5 Phase 1 Habitat Plan (02)

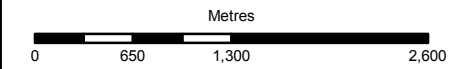
Figure 6 Hedgerow Assessment



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Legend

 Site Location



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| P01.2 | 14/07/16 | EB | PW | JP |
|-------|----------|----|----|----|

| | | | | |
|-----|------|----|------|------|
| Rev | Date | By | Chkd | Appd |
|-----|------|----|------|------|



Blythe Gate Blythe Valley Park
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www.arup.com



Project Title
A487 New Dyfi Bridge

Drawing Title
**Figure 1
Location Plan**

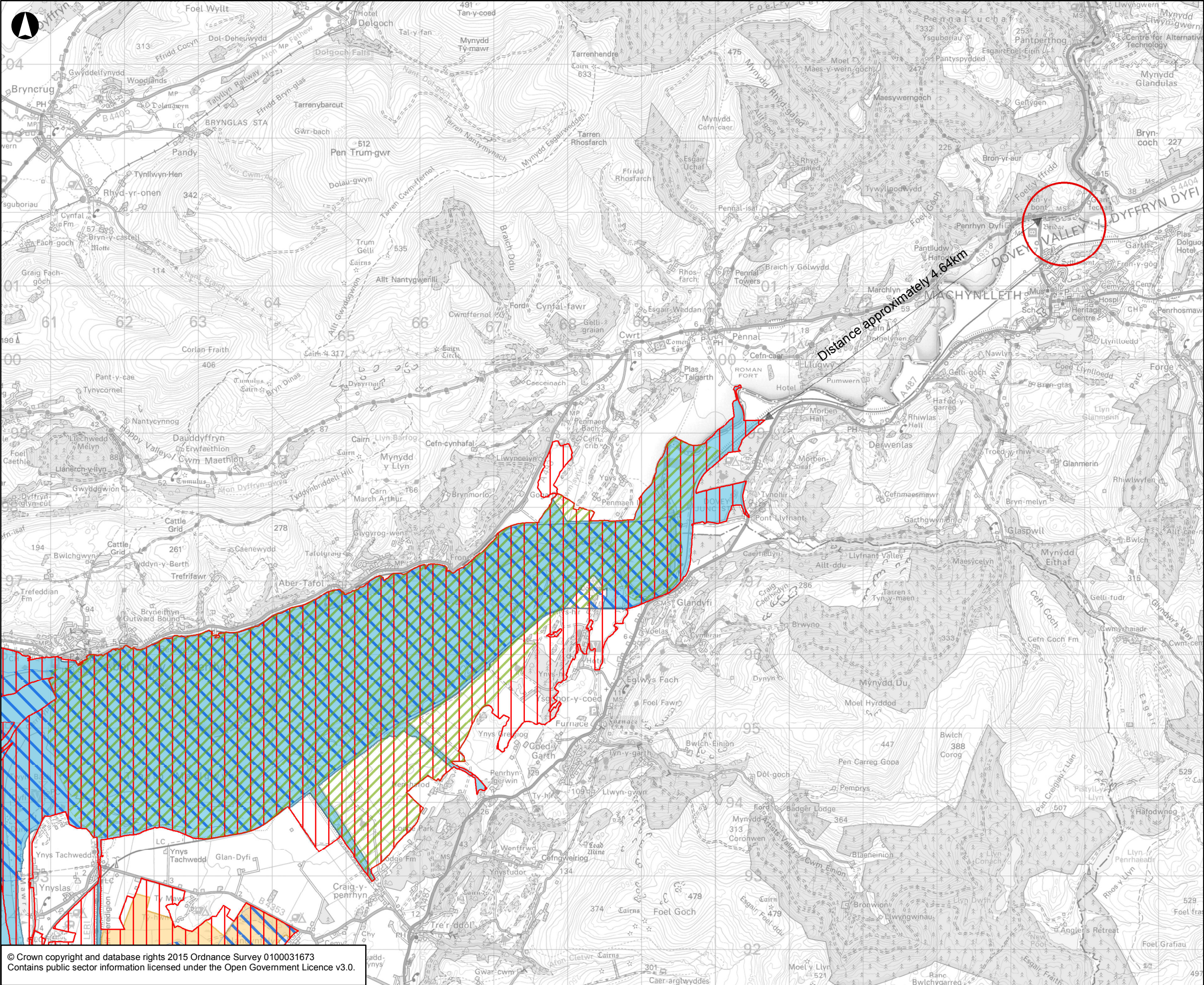
Scale at A3 **1:50,000**

Role
Specialist Designer - Environmental

Suitability
S0 - Initial non-contractual

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| Arup Job No 244562-00 | Rev P01.2 |
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| Name 900237-ARP-ZZ-ZZ-DR-YE-00062 |
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Legend

- Site Location
- Pen Llyn a'r Sarnau / Llyn Peninsula and the Sarnau Special Area of Conservation (SAC)
- Cors Fochno SAC
- Cors Fochno and Dyfi Ramsar site
- Dyfi Estuary / Aber Dyfi Special Protection Area (SPA)
- Dyfi Site of Special Scientific Interest (SSSI)

Metres

0 650 1,300 2,600

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WHS

Client


Llywodraeth Cymru
Welsh Government

Project Title

A487 New Dyfi Bridge

Drawing Title

**Figure 2
European and Nationally
Designated Sites**

Scale at A3

1:50,000

Role

Specialist Designer - Environmental

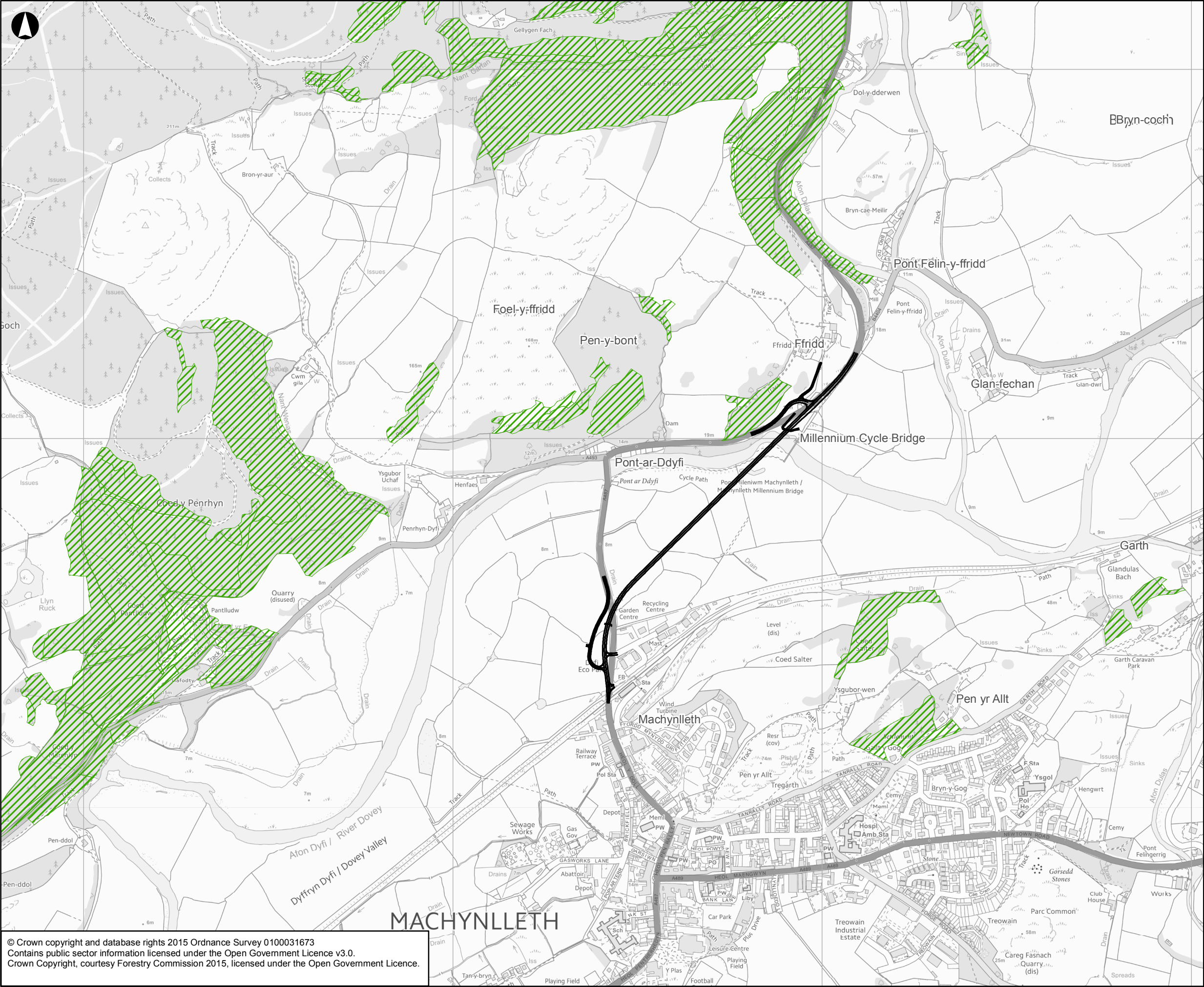
Suitability

S0 - Initial non-contractual

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| Arup Job No | Rev |
| 244562-00 | P01.2 |

Name

900237-ARP-ZZ-ZZ-DR-YE-00046



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Legend
Proposed Scheme
Ancient Woodland

Note:
No other Non-Statutory Sites

Metres

0135270540

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| Rev | Date | By | Chkd | Appd |
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Blythe Gate Blythe Valley Park
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Tel +44 121 213 3000 Fax +44 121 213 3001
www.arup.com

Client

Llywodraeth Cymru
Welsh Government

Drawing Title

Figure 3
Ancient Woodlands

Scale at A3

1:10,000

Role

Specialist Designer - Environmental

Suitability

S0 - Initial non-contractual

Arup Job No

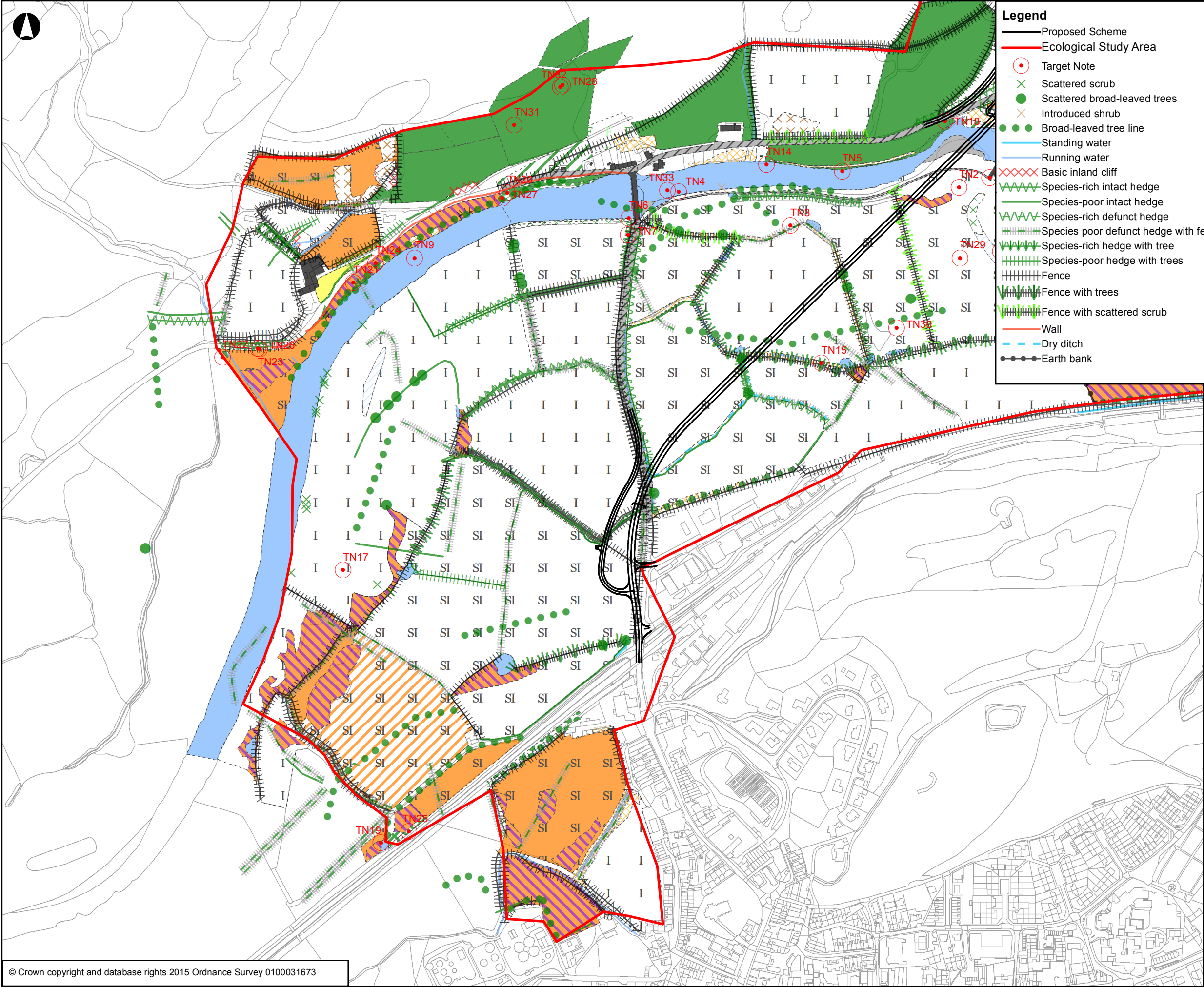
244562-00

Rev

P01.2

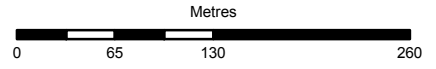
Name

900237-ARP-ZZ-ZZ-DR-YE-00047



Legend

- Proposed Scheme
- Ecological Study Area
- Target Note
- Scattered scrub
- Scattered broad-leaved trees
- Introduced shrub
- Broad-leaved tree line
- Standing water
- Running water
- Basic inland cliff
- Species-rich intact hedge
- Species-poor intact hedge
- Species-rich defunct hedge
- Species poor defunct hedge with fence
- Species-rich hedge with tree
- Species-poor hedge with trees
- Fence
- Fence with trees
- Fence with scattered scrub
- Wall
- Dry ditch
- Earth bank
- Semi-natural broadleaved woodland
- Broad-leaved plantation
- Dense scrub
- Scattered scrub
- Scattered broad-leaved trees
- Felled mixed woodland
- Semi-improved acid grassland
- Semi-improved neutral grassland
- Improved grassland
- Marshy grassland
- Poor semi-improved grassland
- Continuous bracken
- Scattered bracken
- Tall ruderal
- Inundation vegetation
- Standing water
- Running water
- Basic inland cliff
- Amenity grassland
- Introduced shrub
- Buildings
- Bare ground
- Gravel and concrete
- Tarmac



| | | | | |
|-------|----------|----|----|----|
| P01.1 | 21/09/16 | EB | PW | PC |
|-------|----------|----|----|----|

| | | | | |
|-----|------|----|------|------|
| Rev | Date | By | Chkd | Appd |
|-----|------|----|------|------|



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Project Title
A487 New Dyfi Bridge

Drawing Title
Figure 4
Phase 1 Survey Map 1

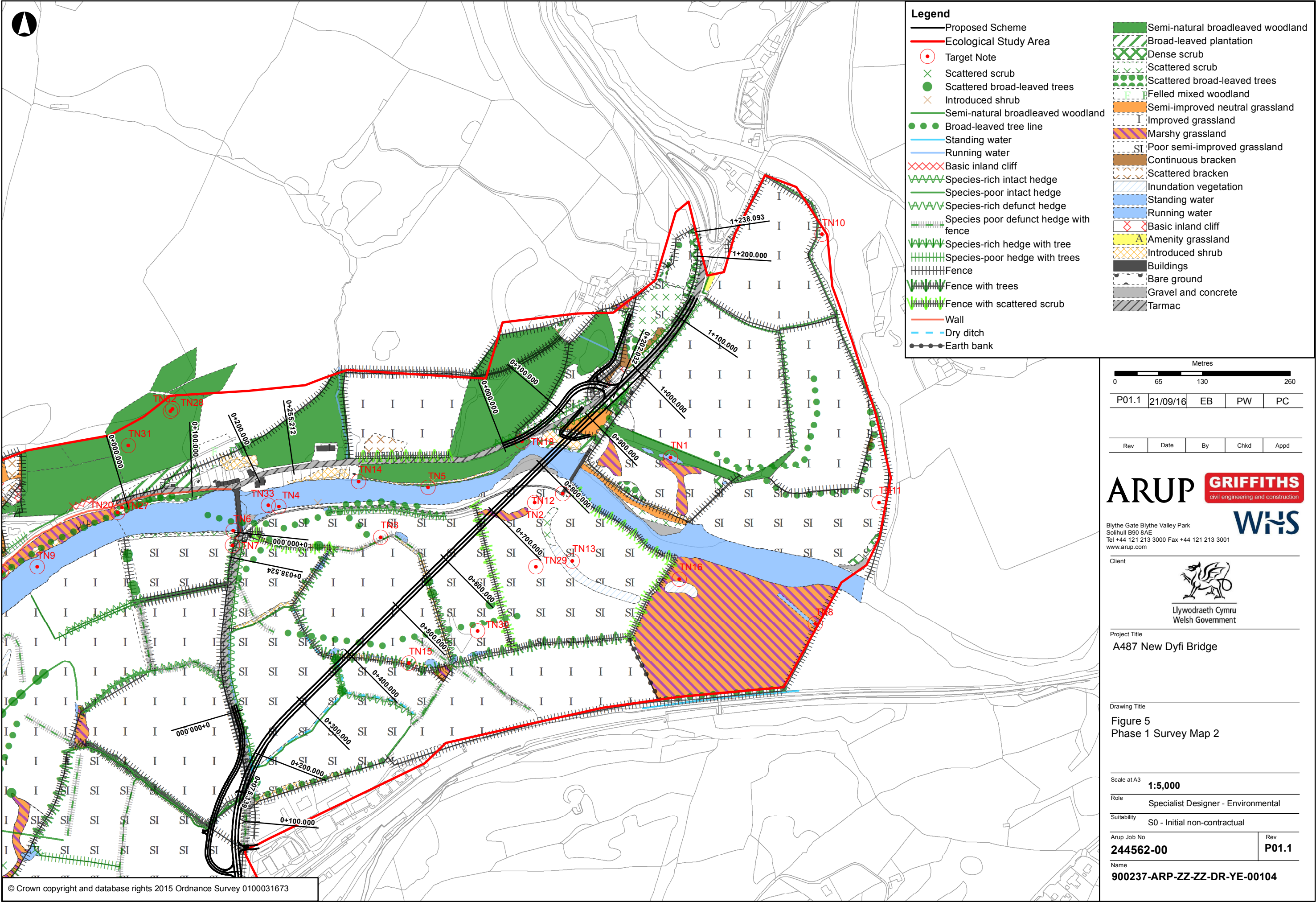
Scale at A3
1:5,000

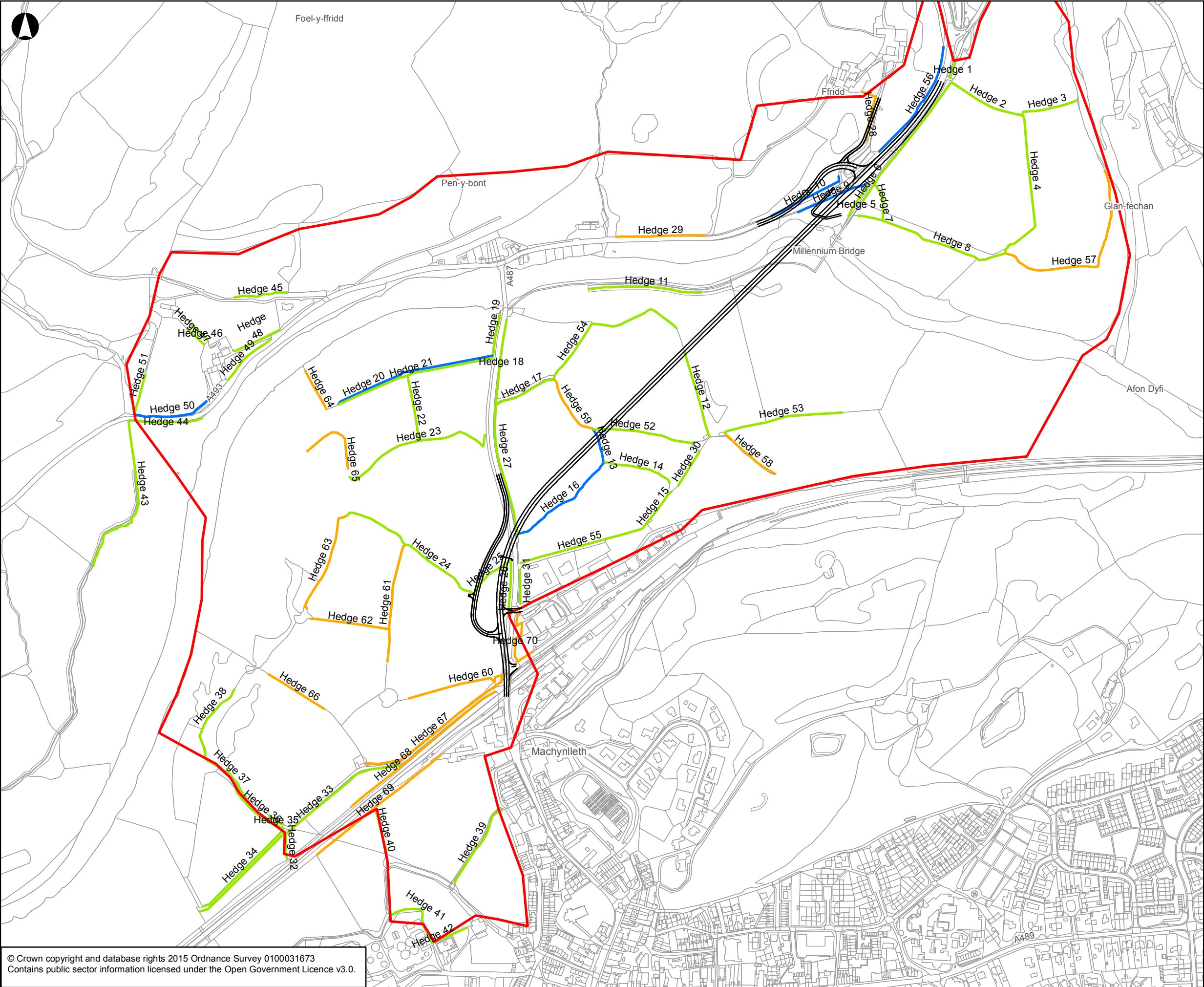
Role
Specialist Designer - Environmental

Suitability
S0 - Initial non-contractual

| | |
|--------------------------|--------------|
| Arup Job No 244562-00 | Rev P01.1 |
|--------------------------|--------------|

Name
900237-ARP-ZZ-ZZ-DR-YE-00103





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Legend
— Proposed Scheme
— Ecological Study
Hedges Importance
— Important
— Unconfirmed
— Not important

Metres
0 75 150 300

| | | | | |
|-------|----------|----|----|----|
| P01.3 | 21/09/16 | AH | PW | PC |
|-------|----------|----|----|----|


| | | | | |
|-----|------|----|------|------|
| Rev | Date | By | Chkd | Appd |
|-----|------|----|------|------|

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GRIFFITHS
civil engineering and construction

WHS

Client


Llywodraeth Cymru
Welsh Government

Project Title

A487 New Dyfi Bridge

Drawing Title

**Figure 6
Hedgerows**

Scale at A3 **1:5,700**

Role **Specialist Designer - Environmental**

Suitability **S0 - Initial non-contractual**

| | |
|---------------------------------|---------------------|
| Arup Job No 244562-00 | Rev P01.3 |
|---------------------------------|---------------------|

Name
900237-ARP-ZZ-ZZ-DR-YE-00053

Appendix A

Legislative Context

A framework of international and national legislation exists to protect and conserve wildlife and habitats. This is described in the following sections.

A1 Statutory Designated Sites

A network of nationally designated sites has been established through the designation of Sites of Species Scientific Interest (SSSI) under the Wildlife and Countryside Act 1981 (as amended). The protection afforded by the Act means it is an offence to carry out or permit to be carried out any operation listed within the notification without the consent of the Statutory Nature Conservation Organisation⁴ (Natural Resources Wales).

The protection afforded to SSSIs is used to underpin the designation of areas at a European Level. European Sites comprise:

- Special Areas of Conservation (SAC) designated under the Conservation of Habitats and Species Regulations 2010 (as amended) (known as the Habitats Regulations);
- Special Protection Areas (SPA) designated under the Wildlife and Countryside Act.

Wetlands of International Importance (Ramsar Sites) declared under the Convention on Wetlands of International Importance especially as Waterfowl Habitat 1971 are normally also notified as SSSIs but are only considered European Sites as a matter of UK and Local Government Policy.

The Habitats Regulations transpose the requirements of Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (the Habitats Directive) in to law within England and Wales, while the Wildlife and Countryside Act transposes Directive 79/409/EEC on the Conservation of Wild Birds (the Birds Directive) in the law within England and Wales. Equivalent legislation exists to transpose these directives in the law within Scotland and Northern Ireland.

The Habitats Regulations require that consideration is given to the implications of plans and projects (developments) on European Sites are considered. Specifically Regulation 61(1) states:

“A competent authority, before deciding to undertake, or give any consent, permission or other authorisation for, a plan or project which –

- a) is likely to have a significant effect on a European site or European marine site (either alone or in combination with other plans or projects), and*
- b) is not directly connected with or necessary to the management of that site,*

⁴ Section 28 of the Wildlife and Countryside Act 1981 (as substituted by Schedule 9 of the Countryside and Rights of Way Act 2000).

must make an appropriate assessment of the implications for that site in view of that site's conservation objectives."

The formal consideration of effects on European Sites is therefore undertaken by the determining authority such as the Local Planning Authority. Local Nature Reserves can be given protection against damaging operations through powers within the National Parks and Access to the Countryside Act 1949 (as amended). However this protection is usually conveyed through inclusion of protection within local planning policy relating to these sites and other non-statutory sites such as Sites of Importance for Nature Conservation.

A2 European Protected Species

The Habitats Regulations convey special protection to a number of species of fauna which are listed in Schedule 2 of the Regulations and are referred to as European Protected Species (EPS):

- All UK resident bat species;
- Common otter (*Lutra lutra*);
- Wild cat (*Felis silvestris*);
- Common dormouse (*Muscardinus avellanarius*); All whale and dolphin species;
- Pool frog (*Rana lessonae*);
- Natterjack toad (*Bufo calamita*);
- Great crested newt (*Triturus cristatus*);
- Smooth snake (*Coronella austriaca*);
- Sand lizard (*Lacerta agilis*);
- All marine turtles.
- Sturgeon (*Acipenser sturio*);
- Large blue butterfly (*Maculinea arion*);
- Fisher's estuarine moth (*Gortyna borelii lunata*); and
- Lesser whirlpool ram's-horn snail (*Anisus vorticulus*).

Regulation 41 makes it an offence to:

- a) Deliberately capture, injure or kill any wild animal of an EPS;
- b) Deliberately disturb wild animals of such a species;
- c) Deliberately takes or destroys the eggs of such a species;
- d) Damages or destroys a breeding site or resting place of such an animal.

Disturbance in the context of the offences above is disturbance which is likely to impair the ability of the animals to survive, to breed or reproduce, to nurture their young, to hibernate, to migrate; or to affect significantly the local distribution of the species.

Licences can be granted by the relevant SNCO for developments (sometime referred to as EPS Licences or Derogation Licences) providing the purposes of the licence is for “preserving public health or public safety or other imperative reasons of overriding public interest, including those of a social or economic nature and beneficial consequences of primary importance for the environment”.

A3 UK Protected Species

The Wildlife and Countryside Act 1981 provide protect to both EPSs and other species including (but not limited to) wild birds, water voles and reptiles.

All wild birds, their nests and eggs are protected with some rare species afforded extra protection from disturbance during the breeding season (these species are listed in Schedule 1 of the Act). It is illegal to take any wild bird or damage or destroy the nests and eggs of breeding birds. There are certain exceptions to this in respect of wildfowl, game birds and certain species that may cause damage.

Water vole receive protection under the Wildlife and Countryside Act 1981 which prohibits the killing, injuring or taking by any method.

All native reptile species in the UK are subject to partial protection from intentional or reckless killing or injury only.

Badger and their setts are protected under the Protection of Badgers Act 1992 which makes it an offence to kill, injure or take a badger, or interfere with a sett.

A4 Other Legislation Relating to Species

The Natural Environment and Rural Communities (NERC) Act 2006 includes a duty on all public authorities to have regard to the conserving of biodiversity in the exercise of their functions. This duty applies to government bodies, local authorities and statutory undertakers. The Act also requires lists to be published of Habitats and Species considered to be of Principle Importance for the conservation of Biological diversity. These are referred as Section 41 habitats and species in England and Section 42 habitats and species in Wales after the sections of the Act which require the publication of lists in each devolved area.

A5 Hedgerow Regulations 1997

The Hedgerow Regulations 1997 set out a framework for the protection of hedgerows against removal where they are deemed to be important either due to their age, ecological or archaeological features. Approval is required from the local authority prior to the removal of Important Hedgerows.

Appendix B

Extended Phase 1 Target Notes

B1

| Target Note Number | Habitat | Description |
|--------------------|---------------------------------|--|
| 1 | Standing water | Redshank |
| 2 | PSI | Reduced species diversity in south side of river as it is more grazed. Less herbs recorded e.g. creeping & meadow buttercup, white clover, broadleaved dock. |
| 3 | Improved grassland | At least 2 old mammal holes found (probably rabbit) under hawthorn, in sandy bank on grazed improved grassland |
| 4 | River bank | Possible old kingfisher or sand martin holes both seen on site |
| 5 | Broad leaf woodland | Potential otter layup site. Possible otter footprints slightly upstream |
| 6 | River | Kingfisher seen near bridge |
| 7 | River | 3 dippers and a kingfisher seen by bridge |
| 8 | Improved grassland | Number of possible badger snuffle holes throughout field |
| 9 | River | Cormorant fishing on river to west of existing Dyfi bridge |
| 10 | River connecting to Dyfi bridge | Female mallard and male |
| 11 | Floodplain | Lapwing heard calling |
| 12 | Field | Flush in field. Juncos effusus is dominant species. Potential for amphibians to use. |
| 13 | Inundation vegetation | Snipe flew towards railway line to south. Ephemeral pool. Potential for wintering birds and amphibians to use when inundated. |
| 14 | River | Otter sighting |
| 15 | Defunct hedgerow | Kingfisher flew out of tree |

| | | |
|----|---------------------------|---|
| 16 | Inundation vegetation | Ephemeral pool.. Potential for amphibian to use when inundated. |
| 17 | Inundation vegetation | Ephemeral pool.. Potential for wintering birds and amphibians to use when inundated. |
| 18 | River | Probable laying up/holt |
| 19 | Pond and marshy grassland | Frog spawn just outside pond at end of treeline/adjacent to railway line |
| 20 | River | Kingfisher flew out from underneath river bank below our feet and upstream towards the river. Has been seen on 2 previous occasions in this area. |
| 21 | River | Otter footprints found on northern bank of the Dyfi. Large and smaller, probably adult and cub. |
| 22 | Marshy grassland/pasture | Badger snuffle holes |
| 23 | Semi improved grassland | Hole under fence, with a trail going parallel to hedge into field where there are snuffle holes |
| 24 | Dense scrub | Two mammal tracks, rabbits |
| 25 | Marshy grassland | Badger footprint |
| 26 | Marshy grassland | Several snuffle holes |
| 27 | Semi improved grassland | Badger latrine |
| 28 | Broadleaved woodland | Mammal track through woodland |
| 32 | Broadleaved woodland | Mammal path |
| 33 | River | Kingfisher sighting |

Appendix C

Hedgerows Assessed for Importance

| Reference | Hedgerow Category | Important Hedgerow | GPS Latitude | GPS Longitude |
|-----------|----------------------------|--------------------|--------------|---------------|
| H1 | Intact managed hedgerow | No | 52.603599 | -3.845665 |
| H2 | Intact managed hedgerow | No | 52.603081 | -3.84386 |
| H3 | Intact managed hedgerow | No | 52.603119 | -3.84369 |
| H4 | Intact managed hedgerow | No | 52.60261 | -3.843897 |
| H5 | Intact managed hedgerow | No | 52.602105 | -3.8474 |
| H6 | Intact managed hedgerow | No | 52.602188 | -3.847152 |
| H7 | Treeline | No | 52.601711 | -3.847375 |
| H8 | Intact managed hedgerow | No | 52.601546 | -3.845828 |
| H9 | Intact managed hedgerow | Yes | 52.601957 | -3.847965 |
| H10 | Intact managed hedgerow | Yes | 52.601899 | -3.848832 |
| H11 | Intact unmanaged hedgerow | No | 52.600486 | -3.852838 |
| H12 | Unmanaged 'gappy' hedgerow | No | 52.599435 | -3.85134 |
| H13 | Intact unmanaged hedgerow | Yes | 52.598327 | -3.853449 |
| H14 | Unmanaged 'gappy' hedgerow | No | 52.598122 | -3.853176 |
| H15 | Intact managed hedgerow | No | 52.597337 | -3.852238 |
| H16 | Intact managed hedgerow | Yes | 52.597929 | -3.853512 |
| H17 | Intact managed hedgerow | No | 52.598788 | -3.856 |
| H18 | Intact managed hedgerow | No | 52.599516 | -3.855842 |
| H19 | Intact managed hedgerow | No | 52.599791 | -3.855829 |
| H20 | Intact managed hedgerow | Yes | 52.599498 | -3.856518 |
| H21 | Intact managed hedgerow | No | 52.599138 | -3.857305 |

| Reference | Hedgerow Category | Important Hedgerow | GPS Latitude | GPS Longitude |
|-----------|---------------------------|--------------------|--------------|---------------|
| H22 | Intact managed hedgerow | No | 52.598577 | -3.857693 |
| H23 | Intact managed hedgerow | No | 52.598042 | -3.858197 |
| H24 | Intact unmanaged hedgerow | No | 52.596943 | -3.857762 |
| H25 | Intact managed hedgerow | No | 52.596573 | -3.855849 |
| H26 | Intact unmanaged hedgerow | No | 52.597664 | -3.855696 |
| H27 | Intact managed hedgerow | No | 52.59739 | -3.855404 |
| H28 | Intact managed hedgerow | No | 52.603148 | -3.8473754 |
| H29 | Intact managed hedgerow | No | 52.601239 | -3.8521612 |
| H30 | Intact managed hedgerow | No | 52.59798 | -3.851812 |
| H31 | Managed 'gappy' hedgerow | No | 52.597347 | -3.855384 |
| H32 | Treeline | No | 52.592599 | -3.860298 |
| H33 | Managed 'gappy' hedgerow | No | 52.592395 | -3.860987 |
| H34 | Managed 'gappy' hedgerow | No | 52.592639 | -3.860902 |
| H35 | Intact managed hedgerow | No | 52.592955 | -3.860692 |
| H36 | Managed 'gappy' hedgerow | No | 52.592998 | -3.860682 |
| H37 | Managed 'gappy' hedgerow | No | 52.593394 | -3.861372 |
| H38 | Unmanaged gappy hedgerow | No | 52.59425 | -3.862271 |
| H39 | Unmanaged gappy hedgerow | No | 52.593142 | -3.855645 |
| H40 | Unmanaged gappy hedgerow | No | 52.592617 | -3.857917 |
| H41 | Treeline | No | 52.591867 | -3.857662 |
| H42 | Intact managed hedgerow | No | 52.591456 | -3.856712 |

| Reference | Hedgerow Category | Important Hedgerow | GPS Latitude | GPS Longitude |
|-----------|--------------------------|--------------------|--------------|---------------|
| H43 | Treeline | No | 52.598094 | -3.863919 |
| H44 | Intact managed hedgerow | Yes | 52.598447 | -3.863744 |
| H45 | Unmanaged gappy hedgerow | No | 52.600424 | -3.860825 |
| H46 | Intact managed hedgerow | No | 52.599832 | -3.862604 |
| H47 | Intact managed hedgerow | No | 52.599573 | -3.862581 |
| H48 | Intact managed hedgerow | No | 52.599763 | -3.861086 |
| H49 | Intact managed hedgerow | No | 52.599588 | -3.861173 |
| H50 | Intact managed hedgerow | Yes | 52.598614 | -3.864159 |
| H51 | Managed 'gappy' hedgerow | No | 52.598738 | -3.863949 |
| H52 | Treeline | No | 52.598416 | -3.851865 |
| H53 | Treeline | No | 52.598915 | -3.850497 |
| H54 | Treeline | No | 52.599716 | -3.851613 |
| H55 | Treeline | No | 52.600944 | -3.8428051 |
| H56 | Unmanaged gappy hedgerow | No | 52.598391 | -3.8503132 |
| H57 | Unmanaged gappy hedgerow | No | 52.598795 | -3.8541756 |
| H58 | Treeline | No | 52.599603 | -3.8540125 |
| H59 | Treeline | No | 52.600005 | -3.8545446 |
| H60 | Treeline | No | 52.593385 | -3.8592973 |
| H61 | Treeline | No | 52.594865 | -3.857100 |
| H62 | Intact managed hedgerow | No | 52.595752 | -3.8590441 |
| H63 | Unmanaged gappy hedgerow | No | 52.596341 | -3.8579798 |

| Reference | Hedgerow Category | Important Hedgerow | GPS Latitude | GPS Longitude |
|-----------|--------------------------|--------------------|--------------|---------------|
| H64 | Treeline | No | 52.596565 | -3.8595848 |
| H65 | Unmanaged gappy hedgerow | No | 52.59717 | -3.8583832 |
| H66 | Unmanaged gappy hedgerow | No | 52.598318 | -3.8592887 |
| H67 | Unmanaged gappy hedgerow | No | 52.598975 | -3.8599754 |
| H68 | Unmanaged gappy hedgerow | No | 52.594851 | -3.860162 |