

Welsh Government

M4 Corridor around Newport

December 2016 Environmental
Statement Supplement

Appendix SR10.35
Draft SSSI Mitigation Strategy

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1 Introduction and Background

1.1 Project Background

1.1.1 RPS was commissioned to develop a Gwent Levels Sites of Special Scientific Interest (SSSI) Mitigation Strategy in support of the proposed M4 Corridor around Newport project (referred to herein as the Scheme) located between Castleton and Magor.

1.1.2 The Scheme includes a new section of motorway which would be approximately 23 kilometres (km) in length and would provide three lanes in both directions.

1.1.3 In addition to the junctions at Castleton and Magor, two new junctions would be provided along the route of the new section of motorway (at Newport Docks and at Glan Llyn). New or diverted lengths of highway, public rights of way and private means of access would be provided to replace those affected by the new section of motorway. There would be new crossings over the River Usk and River Ebbw.

1.2 The Gwent Levels SSSIs

1.2.1 Approximately two thirds of the route for the proposed new section of motorway would cross the Gwent Levels. The Gwent Levels comprise one of the most extensive areas of reclaimed wet pasture in Great Britain and the largest area of its kind in Wales.

1.2.2 The land within the Gwent Levels is low lying with an elevation typically of between 5 – 6 m above ordnance datum (AOD). It lies below high mean water level and is protected from inundation by the sea by coastal defences. Fields are drained by a system of grips which connect to a system of interconnected ditches, the largest of which are known as reens, which eventually flow into the Severn Estuary.

1.2.3 As the area is below the level of high tide, the reens serve as a storage facility when outfalls are tide locked. The water levels in the reens are controlled by a series of sluice structures. NRW are responsible for the management and maintenance for the watercourses classified as Main Rivers (generally running north to south) and also all other reens within the Caldicot and Wentlooge Levels Internal Drainage District. These two types of watercourse are subject to differing maintenance regimes which are currently under review. Further information on the reen system is provided in *Caldicot & Wentlooge Levels Internal Drainage Board – A Conservation Strategy (Caldicot and Wentlooge Levels IDB, 2008)*.

1.2.4 The water level management regime in the reens is divided into Winter Penning Level (WPL) and Summer Penning Level (SPL). WPL is the water level in the reen during winter which is kept lower to provide additional storage capacity. SPL is the water level during summer which is kept higher to provide a water source for agricultural purposes and for nature conservation. During extreme storm events it is possible for water levels to rise above these levels.

1.2.5 Natural Resources Wales (NRW) review the WPL and SPL on a five year cycle taking into account landowner considerations.

1.2.6 Field ditches are managed by landowners.

1.2.7 The Gwent Levels are notified as a series of Sites of Special Scientific Interest (SSSIs). Four of the Gwent Levels SSSIs would be directly affected by the proposed new section of motorway. These are the:

- Gwent Levels – St Brides SSSI.
- Gwent Levels – Nash and Goldcliff SSSI.
- Gwent Levels – Whitson SSSI.
- Gwent Levels - Redwick and Llandeenny SSSI.

1.2.8 The Welsh Government has duties under Section 28G of the Wildlife and Countryside Act 1981 to take reasonable steps, consistent with the proper exercise of their functions, to further the conservation and enhancement of the features for which the Gwent Levels SSSIs are of special interest. More generally, the Welsh Government is also under a duty in exercising its functions, to have regard, so far as is consistent with the proper exercise of those functions, to conserve biodiversity under Section 40(1) of the Natural Environmental and Rural Communities (NERC) Act 2006.

1.2.9 Both duties have been strengthened by the Environment (Wales) Act which received Royal Assent on 21 March 2016. Part 1 of the Act is concerned with the sustainable management of natural resources and within this part, Section 6 sets out a biodiversity and resilience of ecosystems duty. This enhances the duty under the NERC Act and requires all public authorities, when carrying out their functions in Wales, to seek to 'maintain and enhance biodiversity' where it is within the proper exercise of their functions. In doing so, public authorities must also seek to "promote the resilience of ecosystems'. As under the NERC Act the new duty applies to a range of public authorities such as the Welsh Ministers, local planning authorities and public bodies. This will ensure that biodiversity is an integral part of the decisions that public authorities take in Wales. It will also link biodiversity with the long term health of ecosystems and the biodiversity duty will align to the framework for sustainable natural resource management in the Act. The Act requires all public authorities in Wales to report on the actions they are taking to improve biodiversity and promote ecosystem resilience.

1.2.10 The special features of each of the SSSIs, as set out in the SSSI Site Management Statements, include the following.

- Reen and ditch habitat, which supports a wide range of aquatic plants, including many rare or scarce species that in turn support a wide variety of other wildlife.
- A diverse community of insects and other aquatic invertebrates, which inhabit reens and ditches. For example, the assemblage of water beetles found across the Gwent Levels is unique in Wales and includes the great silver beetle *Hydrophilus piceus*, which is found nowhere else in Wales and at only a few other sites in southern England.
- Shrill carder bee *Bombus sylvarum* which utilises unmown ditch banks and rough grass areas containing favoured nectar and pollen sources, including red clover *Trifolium pratense*, creeping thistle *Cirsium arvense* and black knapweed *Centaurea nigra*.

1.2.11 The reens and ditches also provide habitat for protected species including otter, water vole, grass snake and amphibians.

1.2.12 In addition to these features, there are specific interests associated with individual SSSIs:

- St Brides SSSI – reens support rich invertebrate communities, including a number of nationally notable and notable marshland species such as the true fly

Chrysogaster macquarti and the beetle *Hydaticus transversalis*, and interesting plant species, notably thread-leaved water crowfoot *Ranunculus trichophyllus* and small pondweed *Potamogeton berchtoldii*; and reed banks and green lanes support relict meadow plants, such as the regionally notable grass vetchling *Lathyrus nissolia* and common meadow-rue *Thalictrum flavum*. It is the only area on the Gwent Levels where the rare fly *Stenomicrobia cognata* has been recorded.

- Nash and Goldcliff SSSI - the only area in Wales where least duckweed *Wolffia arrhiza* can be located. There is also an interesting community where two species of hornwort *Ceratophyllum submersum* and *C. demersum* grow together. The invertebrate interest is also high, as rare and notable species such as *Odontomyia ornata*, *Oplodontha viridula* and *Hydaticus transversalis* are present.
- Whitson SSSI - of particular importance for its large number (65 recorded to date) of nationally rare and notable invertebrate species, including *Anthomyza bifasciata*, *Coptophlebia volucris* and *Hydrophilus piceus*. The site also supports the nationally rare hairlike pondweed *Potamogeton trichoides* and is the only location in Gwent where tussock sedge *Carex elata* can be found. Arrowhead *Sagittaria sagittifolia* also grows in abundance in several main reens.
- Redwick and Llandeveyn SSSI - supports rich assemblages of invertebrate species, including *Chalcis sispes* a parasite of the *Stratiomys* fly larvae, the beetle *Scirtes orbicularis* and the drone fly *Pharhelophilus consimilis*. A number of nationally rare plant species can also be found on site, including the rare *Myriophyllum verticillatum* in peaty ditches and the brackish water crowfoot *Ranunculus baudotii* associated with ditches along the sea wall.

1.2.13 NRW has provided the SSSI Feature Sheets for these SSSIs. The important features of those SSSIs which would be crossed by the proposed new section of motorway, as set out in these feature sheets, are summarised in Table 1.1.

Table 1.1: Summary of SSSI Features

Gwent Levels – St Brides SSSI
A. Terrestrial: Standing Water Ditch/ditches Other
B. Plant <i>Potamogeton trichoides</i>
C. Animal <i>Coenagrion pulchellum</i> <i>Odontomyia ornata</i> <i>Hydrophilus piceus</i> <i>Plateumaris braccata</i> <i>Hydaticus transversalis</i> Shrill carder bee <i>Bombus sylvarum</i>
D. Assemblage Assemblage of Aquatic and Marginal RDB & Nationally Scarce Vascular Plants: <i>Hydrocharis morsus-ranae</i> <i>Potamogeton trichoides</i> <i>Oenanthe fistulosa</i> <i>Sagittaria sagittifolia</i> Grazing Levels Invertebrate assemblage:

(See list at Appendix A)
Gwent Levels – Nash and Goldcliff SSSI
A. Terrestrial Standing water Ditch/ditches Swamp Other
B. Plant <i>Wolffia arrhiza</i> <i>Potamogeton trichoides</i>
C. Animal <i>Hydaticus transversalis</i> <i>Hydrophilus piceus</i> <i>Odontomyia ornata</i>
D. Assemblage Assemblage of Aquatic and Marginal RDB & Nationally Scarce Vascular Plants: <i>Wolffia arrhiza</i> <i>Hydrocharis morsus-ranae</i> <i>Oenanthe fistulosa</i> <i>Potamogeton trichoides</i> <i>Ceratophyllum submersum</i> Grazing levels invertebrate assemblage: (See list at Appendix A)
Gwent Levels – Whitson SSSI
A. Terrestrial Standing water Ditch/ditches Swamp Other
B. Plant <i>Potamogeton trichoides</i> <i>Carex elata</i>
C. Animal <i>Coenagrion pulchellum</i> <i>Hydaticus transversalis</i> <i>Hydrophilus piceus</i> <i>Limnoxenus niger</i> <i>Odontomyia ornata</i> Shrill carder bee <i>Bombus sylvarum</i>
D. Assemblage Assemblage of Aquatic and Marginal RDB & Nationally Scarce Vascular Plants: <i>Wolffia arrhiza</i> <i>Hydrocharis morsus-ranae</i> <i>Potamogeton trichoides</i> <i>Oenanthe fistulosa</i> <i>Sagittaria sagittifolia</i> Grazing levels invertebrate assemblage: (See list at Appendix A)
Gwent Levels – Redwick and Llandeenny SSSI

A. Terrestrial Standing water Ditch/ditches Other
B. Plant <i>Potamogeton trichoides</i>
C. Animal <i>Hydaticus transversalis</i> <i>Hydrophilus piceus</i> <i>Odontomyia ornata</i> <i>Limnoxenus niger</i>
D. Assemblage Assemblage of Aquatic and Marginal RDB & Nationally Scarce Vascular Plants: <i>Wolffia arrhiza</i> <i>Hydrocharis morsus-ranae</i> <i>Oenanthe fistulosa</i> <i>Sagittaria sagittifolia</i> <i>Potamogeton trichoides</i> Grazing levels invertebrate assemblage: (See list at Appendix A)

1.2.14 The Gwent Levels reens and ditches are rich in plant species and communities, many of which are rare or absent in other Levels systems. This is largely due to the variety of reen types and management regimes. In addition, the aquatic invertebrate community is diverse, with many nationally rare or notable species. The area is important in Wales for its snails and dragonflies and the assemblage of water beetles is unique in Wales. The Levels are also an important area for shrill carder bee, which is known to inhabit fewer than 20 sites in the UK.

1.2.15 NRW have confirmed that shrill carder bee is a qualifying feature of the:

- Gwent Levels: Rumney and Peterstone SSSI.
- Gwent Levels: St Brides SSSI.
- Gwent Levels: Nash and Goldcliff SSSI.
- Gwent Levels: Whitson SSSI.
- Gwent Levels Redwick and Llandevenny SSSI.
- Gwlyptiroedd Casnewedd/ Newport Wetlands SSSI.

1.2.16 There are also populations within the Gwent Levels: Magor and Undy SSSI and Magor Marsh SSSI, but these are not regarded as of qualifying status at present, although it is recognised that they are likely to be part of the same meta-population as the other Gwent Levels SSSIs.

- 1.2.17** The large number of hedgerows adds to the diversity of the area and, together with the main reen banks, provide a habitat for nationally important assemblages of terrestrial invertebrates such as the big-headed (Pipunculid) flies *Pipunculus fonscai* and *Tomosvaryella minima*.

1.3 Effects of the Scheme

- 1.3.1** The proposed new section of motorway would result in the loss of reen and ditch habitat, would have consequential effects on insects and other invertebrates associated with these habitats, and would result in loss of vegetation which supports shrill carder bee.
- 1.3.2** Specific mitigation measures are included as part of the Scheme to mitigate these effects, principally through the Revised Reen Mitigation Strategy, which includes the replacement of 2,755 m of reens with 2,826 m of new reens and 9,373 m of field ditches with 10,594 m of new field ditches and the provision of suitable habitat for shrill carder bee, principally in the form of species-rich grassland along the embankments of the new section of motorway (as shown on the Landscape Environmental Masterplan, Figure R2.6 of the Environmental Statement Supplement (ESS)).
- 1.3.3** In addition to the loss of reen and ditch habitat, it is also the case that land within the Gwent Levels SSSIs would be affected by the proposed new section of motorway. The land affected is summarised in Table 1.2.

Table 1.2: Land within the Gwent Levels SSSIs Affected

	St Brides	Nash and Goldcliff	Whitson	Redwick and Llandeenny	Total (all affected Gwent Levels SSSIs)	Affected SSSIs West of River Usk	Affected SSSIs East of River Usk
Permanent Loss							
Grassland (grazing marsh)	25.30 ha	15.43 ha	1.92 ha	34.93 ha	77.58 ha	25.30 ha	52.28 ha
Other land	9.74 ha	12.23 ha	3.16 ha	2.27 ha	27.4 ha	9.74 ha	17.66 ha
SSSI Area	35.04 ha	27.66 ha	5.08 ha	37.20 ha	104.98 ha	35.04 ha	69.94 ha
Temporary Loss							
Grassland (grazing marsh)	5.04 ha	1.66 ha	0.32 ha	1.83 ha	8.85 ha	5.04 ha	3.81 ha
Other land	1.04 ha	9.09 ha	1.11 ha	0.39 ha	11.63 ha	1.04 ha	10.59 ha
SSSI Area	5.58 ha	10.75 ha	1.43 ha	2.23 ha	19.99 ha	5.58 ha	14.41 ha
Temporary and Permanent Loss							
Grassland (grazing marsh)	30.34 ha	17.09 ha	2.24 ha	36.76 ha	86.43 ha	30.34 ha	56.09 ha
Other land	10.78 ha	21.32 ha	4.27 ha	2.66 ha	39.03 ha	10.78 ha	28.25 ha
SSSI Area	40.62 ha	38.41 ha	6.51 ha	39.43 ha	124.97 ha	40.62 ha	84.35 ha

- 1.3.4** As set out in Table 1.2 a total of some 125 hectares (ha) of land within the Gwent Levels SSSIs would be affected by the proposed new section of motorway.
- 1.3.5** The SSSI land affected to the west of the River Usk is located entirely within the Gwent Levels St Bride's SSSI. The SSSI land affected to the east of the River Usk is located within the Gwent Levels Nash and Goldcliff, Whitson, and Redwick and Llandeveyry SSSIs.
- 1.3.6** Grazing marsh has been measured as all grassland within the footprint of the proposed new section of motorway that would be affected. Other land includes arable land, areas of hardstanding and other land which does not contribute to the interest of the Gwent Levels SSSIs.
- 1.3.7** Land included under the heading of 'permanent loss' is that which would be covered with tarmac, or which would form part of the highway drainage system, including grassed channels and water treatment areas. This also includes land acquired for other purposes such as mitigation planting, and field corners which would be severed by the Scheme.
- 1.3.8** Land included under 'temporary loss' is that which, although affected during the period of construction, would be reinstated to vegetation compatible with the SSSI designations such as grassland, hedgerows or small areas of tree planting. In the case of hedgerow and tree planting, care would be taken to ensure that these did not shade the reën and ditch network.
- 1.3.9** As set out in Table 1.2, the temporary and permanent loss of grazing marsh would amount to some 86.4 ha and this is the area which has been used in considering the requirements for land to mitigate for this loss.

1.4 Aims of the Mitigation Strategy

- 1.4.1** The aim of this Mitigation Strategy is to provide mitigation for the loss of coastal grazing marsh habitat (measured as explained above as all grassland within the footprint of the proposed new section of motorway) as a result of the proposed new section of motorway and, where practicable, to ecologically enhance the Gwent Levels SSSIs.
- 1.4.2** Three mitigation areas have been identified as being of potential value with regard to the aims of this Mitigation Strategy. These are at Tatton Farm, Maerdy Farm and Caldicot Moor. The extent of the areas proposed to be used for mitigation is shown in Figures 1a, b and c. The total area covered by the three sites is approximately 130 ha.
- 1.4.3** In addition to physical and ecological characteristics, and the aim of providing some mitigation land to both the west and east of the River Usk, land ownership has also been an important consideration in identifying land which would be suitable for ecological enhancement so as to provide the essential mitigation for the loss of grazing marsh. In the first instance land already owned by Welsh Government has been considered in order to avoid the need to acquire privately owned land. The land at Tatton Farm is owned by the Welsh Government. Consideration was next given to land within agricultural holdings which would be significantly affected by the proposed new section of motorway and where there is the potential for reversion of arable land to grassland. Maerdy Farm was identified as a suitable site where the land is severed by the proposed new section of motorway and comprises arable land. Finally, consideration was given to land close to but outside the existing SSSIs, which is otherwise of similar character and would be capable of ecological enhancement.

Caldicot Moor is the only such area identified. This is immediately adjacent to the eastern boundary of the Gwent Levels – Magor and Undy SSSI and is within the Caldicot and Wentlooge Levels Internal Drainage District.

1.4.4 In determining the area of land required to provide sufficient mitigation, two types of mitigation have been considered; firstly reversion of arable land to permanent grassland; and secondly, enhancement of the biodiversity value of existing grasslands. The relevant areas are shown on the plans at Figure 2 and are summarised in Table 1.3 below.

Table 1.3: Summary of Mitigation Areas

Mitigation Area	Arable reversion	Grassland enhancement	Protected species mitigation	Total
Tatton Farm	N/A	37.0 ha	3.5 ha	40.5 ha
Maerdy Farm	33.9 ha	N/A	N/A	33.9 ha
Caldicot Moor	12.2 ha	24.0 ha	19.0 ha	55.2 ha
Total	46.1 ha	61.0 ha	22.5 ha	129.6 ha

1.4.5 The requirements for grazing marsh mitigation have been discussed with NRW and it has been agreed that, for arable reversion, a mitigation ratio of 1:1 has been used since the arable land is not considered to contribute in any material way to SSSI purposes. For grassland enhancement, recognising that the land already has biodiversity value, a mitigation ratio of 1.5:1 has been used, so for every hectare of grassland lost, 1.5 ha would be enhanced.

1.4.6 Considering grassland enhancement at Tatton Farm first, this amounts to 37.0 ha. At a ratio of 1.5:1 this mitigates for the loss of 24.7 ha of grazing marsh. Subtracting this from the total area lost of 86.4 ha leaves 61.7 ha. Maerdy Farm provides 33.9 ha of arable land which would be converted to grassland. At a ratio of 1:1, this leaves 27.8 ha to be found at Caldicot Moor. Caldicot Moor provides 12.2 ha of arable land which would be converted to grassland. At a ratio of 1:1 this leaves 15.6 ha to be mitigated by grassland enhancement. At a ratio of 1.5 to 1 this requires 23.4 ha of land. The total area of grassland within the land identified at Caldicot Moor is some 43 ha. However land in the north of this area has been identified as essential for mitigation for protected species. This area amounts to 19.0 ha leaving 24.0 ha for grassland enhancement. Thus the land identified at Tatton Farm, Maerdy Farm and Caldicot Moor is sufficient, based on the ratios agreed with NRW, to satisfy the requirement for mitigation of the loss of grazing marsh.

1.4.7 Section 2 of this Mitigation Strategy describes the mitigation areas, their locations, existing management practices, habitats, and the species of nature conservation value known to utilise them. Section 3 describes the objectives of this strategy with regard to each site, and Section 4 provides the broad prescriptions for mitigation and management proposed. The final detailed prescriptions for mitigation and management will be agreed in advance with NRW, and will be included in the final Mitigation Strategy/Mitigation Area Management Plans.

2 Mitigation Areas

2.1 Tatton Farm Mitigation Area

- 2.1.1** The Tatton Farm Mitigation Area is located to the east of the River Usk, between Broadstreet Common and the A4810, and is centred around OS grid Reference ST 354 858. The extent of the site is shown on Figure 1a and it covers approximately 44 ha.
- 2.1.2** The farm is owned by the Welsh Government and is let on an annual farm business tenancy and is entirely grassland. The farm house does not form part of the current farm tenancy and is vacant and derelict. The grassland supports breeding ewes and suckler cows. All fields have a piped water supply for stock. There is no agri-environment agreement attached to the land and NRW manages the reens.
- 2.1.3** Figure 1a shows the habitats located within and surrounding the Tatton Farm Mitigation Area. It largely comprises species-poor semi-improved grassland fields bordered by reens, ditches and hedgerows.
- 2.1.4** Tatton Farm forms part of the Gwent Levels - Nash and Goldcliff SSSI. Features of ecological interest within the wider Nash and Goldcliff SSSI are described in Section 1.2.
- 2.1.5** Other habitats in the Nash and Goldcliff SSSI which are of ecological value include green lanes and hedgerows. These habitats provide a valuable resource for protected species including breeding birds and bats.
- 2.1.6** Key results of protected species surveys undertaken in 2014 and 2015 in order to inform the Environmental Impact Assessment (EIA) of the Scheme are shown on Figure 1a. Further details are provided in Volume 3 (Appendices 10.2-10.33) of the March 2016 ES.
- 2.1.7** Water vole activity was recorded along watercourses on the site and in the surrounding area. Great crested newt DNA was recorded to the south of the site during analysis of watercourses carried out in 2015. Bats were recorded foraging and commuting across the site in 2014 and 2015, and common pipistrelles were confirmed to be roosting within Tatton farmhouse in 2015.

2.2 Maerdy Farm Mitigation Area

- 2.2.1** The Maerdy Farm Mitigation Area is located to the west of the River Usk, south of Coedkernew and Duffryn, and is centred around OS grid Reference ST 284 831. The extent of the site is shown on Figure 1b and it covers approximately 35 ha.
- 2.2.2** The farm is a freehold arable farm. Hedgerows and watercourses (including reens) act as field boundaries across the holding. There are no piped water supplies and there is no agri-environment agreement attached to the land. Figure 1b shows the habitats located within and surrounding the site.
- 2.2.3** The Maerdy Farm Mitigation Area is within the Gwent Levels - St Brides SSSI. Features of ecological interest within the wider St Brides SSSI are described in Section 1.2.

2.2.4 Key results of protected species surveys undertaken in 2014 and 2015 in order to inform the Environmental Impact Assessment (EIA) of the Scheme are shown on Figure 1b. Further details are provided in Volume 3 (Appendices 10.2-10.33) of the March 2016 ES.

2.2.5 Signs of water vole and otter activity were recorded along Percoed Reen bordering the northern boundary of the Maerdy Farm Mitigation Area and along watercourses to the north of the farm. Bats were recorded foraging and commuting across the site, and lapwings were observed breeding on the site in 2015. Results of the 2015 aquatic macrophyte survey confirmed Percoed Reen to be of high quality with regard to plant species diversity and rarity (see R5, R6 and R7 on Figure 3b).

2.3 Caldicot Moor Mitigation Area

2.3.1 The Caldicot Moor Mitigation Area is located to the west of Undy, south of the existing M4 and is centred around OS grid Reference ST 452 867. The extent of the site is shown on Figure 1c and it covers approximately 55 ha.

2.3.2 Figure 1c shows the habitats located within and surrounding the Caldicot Moor Mitigation Area. It largely comprises arable, improved grassland and species-poor semi-improved grassland fields bordered by reens, ditches and hedgerows (mostly species-poor).

2.3.3 The Caldicot Moor Mitigation Area is located outside the Gwent Levels SSSIs but is immediately adjacent to the Gwent Levels – Magor and Undy SSSI. Features of ecological interest within the wider Magor and Undy SSSI are described in Section 1.2. The boundary of the Magor and Undy SSSI includes a sea wall ditch, which contains brackish water fauna and flora, including the water beetle *Agabus conspersus* and nationally rare brackish water crowfoot.

2.3.4 Lapwings were observed breeding on the site in 2015.

3 Objectives of the SSSI Mitigation Strategy

3.1.1 As explained in Section 1.4, the principal objective of this strategy is to mitigate for the loss of grazing marsh within the Gwent Levels SSSIs which would result from the land take for the proposed new section of motorway. The ecology and nature conservation objectives have been developed in consultation with NRW and take into account the results of the baseline ecology surveys undertaken to inform the EIA of the Scheme and the features of known ecological interest in the Gwent Levels SSSIs to ensure that opportunities for other ecological benefits are realised. Detailed method statements for the Mitigation Strategy will be agreed with NRW prior to the commencement of works.

3.1.2 The general habitat and species objectives of this strategy are set out below, followed by site-specific objectives for the three mitigation areas.

Grassland

- **Enhance the plant species diversity in existing grassland fields** by, for example, spreading green hay, slot seeding, etc.
- **Increase the area of species-diverse grassland in the SSSIs** through arable reversion.
- **Create additional areas of species-diverse grassland outside the Gwent Level SSSIs** through arable reversion and grassland enhancement measures.
- **Manage grassland to benefit breeding lapwing and other ground-nesting wet grassland bird species.**
- **Manage grassland in order to benefit soil invertebrate populations.**

Wetland Habitats

- **Continue the current NRW water level management regimes** in order to provide varying water levels throughout the year for the benefit of a diversity of species, including invertebrates and wetland plants (i.e. to include high mid-summer water levels in all reens, and at least 20 cm-deep water levels in approximately half of the field ditches).
- **Enhance the biodiversity value of existing watercourses** for plants, invertebrates and other protected species in the area, through measures including:
 - **rotational clearance/casting of silt and leaf litter, and thinning of aquatic vegetation** in order to maintain flow and water quality, and create a more competitive environment for a greater diversity of plant species;
 - **re-profiling of banks** so as to create a diversity of micro-habitats and enable sunlight to reach banks and channels, which would benefit a diversity of species including invertebrates and wetland plants (e.g. by creating ledges at high-water levels, widening narrow channels and creating a diversity of slope angles to banks);
 - **removal and/or coppicing of hedgerows and scrub along the banks of watercourses** where they are over-shading watercourses and are resulting in the build-up of leaf litter in the channel;

- **management of scrub along the banks of watercourses** in order to aid the establishment and spread of good grass cover and plant species diversity;
- **potential spreading over banks of watercourses, soils taken from banks of watercourses known to contain a rich diversity of plant species**, including rare species, in order to enhance plant species interest on site; and
- **clearance and control of invasive plant species.**
- **Increase the amount of habitat of potential value to aquatic/semi-aquatic plants and insects** found across the Gwent Levels SSSI by:
 - **re-creating historic ditches; and**
 - **reinstating grips.**

Other Measures to Benefit Protected and Otherwise Notable Species

- Installation of **bat roost boxes** suitable for species known to be present in the Gwent Levels SSSIs.
- Installation of **barn owl nest boxes** on suitable mature trees and/or farm buildings.
- **Enhancement and management of watercourses and grassland for the benefit of water voles**, including creating ledges along the banks of watercourses at high-water level, enhancing bank-side grass cover and reduce over-shading by overhanging hedgerows, scrub and trees.
- **Potential to use mitigation areas as receptor sites for water voles** that are to be translocated from the area affected by the proposed new section of motorway. This could offer the opportunity to expand the existing range of water voles in the area, including to the west of the River Usk.

Monitoring

- **Establish a monitoring regime** in order to assess the effectiveness of the Mitigation Strategy against the strategy's objectives and inform ongoing management.

3.2 Area-specific Mitigation Objectives

3.2.1 Figures 2a, 2b and 2c show the proposals for ecological enhancement of the Tatton Farm, Maerdy Farm and Caldicot Moor Mitigation Areas respectively. As explained in Section 1 the principal aim is to mitigate for the loss of grazing marsh within the Gwent Levels SSSIs as a result of the land take for the proposed new section of motorway. This will be achieved by establishment of new areas of permanent grassland on areas currently used for arable cropping (at Maerdy Farm and Caldicot Moor) and by ecological enhancement of existing grassland (at Tatton Farm and Caldicot Moor).

3.2.2 In addition, the mitigation areas at Maerdy Farm and Caldicot Moor will provide significant lengths of new field ditches, principally by the re-cutting of historical ditches which have been infilled.

3.2.3 Existing ditches would be enhanced at all Maerdy Farm and Caldicot Moor providing improved habitats for aquatic plants and invertebrates. This would include hedgerow removal and/or management to reduce shading of existing reens and ditches.

3.2.4 The measures outlined above would provide new/improved habitat for species associated with the reens and ditches such as water vole, otter and grass snake. Specific measures would be implemented to enhance the sites for other protected species including bats and barn owl.

3.2.5 The habitat creation and enhancement measures which would be provided across the three mitigation areas (as shown on Figures 2a, 2b and 2c) are summarised in Table 3.1 and described in more detail below.

Table 3.1: SSSI Grazing Marsh Mitigation Measures

Mitigation	Tatton Farm	Maerdy Farm	Caldicot Moor	Total
Arable to grassland	N/A	33.9 ha	12.2 ha	46.1 ha
Grassland enhancement	37.0 ha	N/A	24.0 ha	61.0 ha
New field ditches	N/A	3,500 m	2,365 m	5,865 m
Enhanced existing ditches	N/A	1,478 m	345 m	1,823 m
Hedgerow removal/management	3,361 m	N/A m	1,918 m	5,279 m

3.2.6 In addition to these areas, 3.5 ha at the south of Tatton Farm would be used to provide ponds and terrestrial habitat for great crested newt. At Caldicot Moor, 19 ha at the north of the site would be used to provide wetland habitat for Cetti's warbler and common crane.

Tatton Farm Mitigation Area

3.2.7 The site-specific mitigation and management measures proposed for the Tatton Farm Mitigation Area are shown on Figure 2a and are summarised below.

- **Enhance the plant species diversity in grassland fields) through:**
 - the introduction of **appropriate grass seed mixes**;
 - use of **no (or very low) fertiliser input**;
 - **hay cut**; and/or
 - **low intensity grazing/aftermath grazing**.
- **Continue the current NRW water level management regime** as described above.
- **removing hedgerows and scrub** from banks in order to open up channels and banks to sunlight and encourage the establishment and spread of a diversity of ground-vegetation, and reduce leaf litter in the channel.

- **Removing hedgerows and scrub from banks of watercourses** in order to open up channels and banks to sunlight and encourage the establishment and spread of a diversity of ground-vegetation, and reduce leaf litter in the channel.
- **Establish a rotational management plan for retained hedgerows** (i.e. those retained as habitat corridors and resources and that do not over-shade watercourses) in order to limit any potential overhang of watercourses and encourage the development of a wide thick hedge and provide hedgerow resources across the site each year (see hedgerows marked on Figure 2a).
- **Install bat roost boxes** of potential value to the species recorded on site and in the surrounding area (marked as Bon Figure 2a).
- **Establish a monitoring regime** in order to assess the effectiveness of the Mitigation Strategy and inform the ongoing management.

Maerdy Farm Mitigation Area

3.2.8 The site-specific mitigation and management measures proposed for the Maerdy Farm Mitigation Area are shown on Figure 2b and are summarised below.

3.2.9 Due to pollution concerns relating to ditches located alongside the adjacent railway line, these will remain unconnected to new field ditches on the Maerdy Farm Mitigation Area in order to help prevent the spread of contamination.

- **Arable reversion** to species diverse grassland using an appropriate grass seed mix.
- **Manage grassland in order to encourage the establishment and spread of a diversity of plant species** through:
 - **no(or very low) fertiliser input;**
 - **hay cut** and, where possible, **aftermath grazing;** and/or
 - **low intensity grazing.**
- **Manage grassland to benefit a diversity of species including plant species and breeding lapwing**, i.e. use of late hay cut followed by aftermath grazing and/or extensive grazing.
- Continue the current **NRW water level management regime.**
- **Enhance existing watercourses** (marked as Won Figure 2b) in order to benefit a diversity of species of ecology and nature conservation interest, including aquatic plants and invertebrates, by:
 - **removing hedgerows and/or scrub from banks** (along the southern bank of watercourses, or either east or west banks) in order to open up watercourses and banks to sunlight and encourage the establishment and spread of a diversity of ground-vegetation and reduce leaf litter in the channels;
 - establishing a **rotational management plan in order to remove silts and thin aquatic vegetation** in order to create a diversity of habitats with varying degrees of ground cover and bare soil;
 - **managing the spread of algae and invasive plant species;** and

- **re-profiling of watercourse banks** (excluding polluted ditches alongside the railway line) (i.e. widen channels, create a diversity of slope angles, create approximately 0.5 m-wide ledges at summer and/or winter high water levels) in order to provide a diversity of microhabitats of benefit to a diversity of species including aquatic plants, invertebrates and water voles.
- **Increase the amount of habitat of value to aquatic/semi-aquatic insects and plants by:**
 - replacing field drains shown on first edition OS maps, ensuring no direct physical connection is created to ditches located adjacent to the railway line.
- **Establish a rotational management plan for retained hedgerows** (i.e. those retained as habitat corridors and resources and that do not over-shade watercourses) in order to limit any potential overhang of watercourses and encourage the development of a wide thick hedge and provide hedgerow resources across the site each year (see hedgerows marked H on Figure 2a).
- **Install bat roost boxes and barn owl nest boxes** on suitable mature trees and/or farm buildings of potential value to the species recorded on site and in the surrounding area (marked as Bon Figure 2a).
- **Establish a monitoring regime** in order to assess the effectiveness of the Mitigation Strategy and inform the ongoing management, including monitoring of lapwing breeding pairs and breeding success.

Caldicot Moor Mitigation Area

3.2.10

The site-specific mitigation and management measures proposed for the Caldicot Moor Mitigation Area are shown on Figure 2c and are summarised below.

- **Arable reversion** to species diverse grassland using an appropriate grass seed mix.
- **Enhance the plant species diversity in existing grassland fields through:**
 - the introduction of an **appropriate grass seed mix**;
 - use of **no (or very low) fertiliser input**;
 - **hay cut and, where practicable, aftermath grazing**; and/or
 - **low intensity grazing**.
- **Manage grassland to benefit a diversity of species including plant species and breeding lapwing**, i.e. use of late hay cut followed by aftermath grazing and/or extensive grazing.
- **Review the NRW water level management regime** and continue/adapt as appropriate to enhance the quality of the watercourses. The area falls within the Caldicot and Wentlooge Levels Internal Drainage District and, therefore, the reen network is already subject to similar management to that of the Gwent Levels SSSIs.
- Caldicot Moor does not form part of the current Gwent Levels SSSI designation due to the intensity of drainage on the site, which has meant that reens and ditches on Caldicot Moor are less able to support the SSSI invertebrate and plant species and diversity of interest. Therefore, measures to reduce field drainage (including

potentially blocking underdrainage) and re-wet the fields, as described below, would help to restore the potential value of the area with regard to SSSI features of interest.

- **Enhance existing watercourses in order to benefit a diversity of species of ecology and nature conservation interest** (see watercourses marked as W on Figure 2c) including aquatic plants and invertebrates, by:
 - **managing scrub and hedgerows along banks** in order to open up channels to sunlight and encourage the establishment and spread of a diversity of ground-vegetation and reduce leaf litter in the channels;
 - establishing a **rotational management plan in order to remove silts and thin aquatic vegetation** in order to create a diversity of habitats with varying degrees of ground cover and bare soil;
 - **managing the spread of algae and invasive plant species**; and
 - **re-profiling of watercourse banks** (i.e. widen channels, create a diversity of slope angles, create approximately 0.5 m-wide ledges at summer and/or winter high water levels) in order to provide a diversity of microhabitats of benefit to a diversity of species, including aquatic plants, invertebrates and water voles.
- **Increase the amount of habitat of value to aquatic/semi-aquatic insects and plants** by:
 - replacing field ditches shown on first edition OS maps.
- **Establish a rotational management plan for retained hedgerows** (i.e. in addition to managing overhang along watercourses), encourage the development of wide, thick hedgerows, with good ground cover at least along sides of the hedge which do not overhang watercourses, and ensure the provision of hedgerow resources (including fruit and cover) across the site each year (see hedgerows marked H on Figure 2c).
- **Establish a monitoring regime** in order to assess the effectiveness of the Mitigation Strategy and inform the ongoing management, including monitoring of lapwing breeding pairs and breeding success.
- **Install bat roost boxes and barn owl nest boxes** on suitable mature trees and/or farm buildings of potential value to the species recorded on site and in the surrounding area (see B on Figure 2c).

4 Management Prescriptions

4.1 Introduction

4.1.1 This section describes the prescriptions for mitigation and management measures to be carried out in accordance with the objectives of this SSSI Mitigation Strategy. The final detailed prescriptions for works to be undertaken will be agreed with NRW and provided in the final Mitigation Strategy/Mitigation Area Management Plans. This section firstly provides a proposed management structure of regular review and monitoring designed to ensure the most effective implementation of the management prescriptions. The proposals for the establishment and management of new and enhanced grassland areas and ditches are then provided and proposals are also outlined for the maintenance and potential enhancement of existing features within the mitigation areas.

4.2 Review and Monitoring of the Mitigation Areas

4.2.1 An SSSI Mitigation Area Management Group would be established, the role of which would be to review the establishment of the mitigation areas and make recommendations for their ongoing management. The initial membership of the group would include representatives of Welsh Government, NRW, the Contractor (and relevant advisors) and those implementing the management of the land, and could also include representatives of other groups such as the Living Levels Project and the Gwent Wildlife Trust. The management of the group would change as the development of the mitigation areas progressed. For example, the Contractor would cease to be involved after the contract maintenance period (5 years following completion of construction of the proposed new section of motorway).

4.2.2 The group would initially meet on a quarterly basis whilst the mitigation areas were establishing (likely to be 2 years) and then every 6 months. The focus of the meeting would be to determine the effectiveness of the management of the land in increasing the biodiversity value of the mitigation areas, and to make recommendations regarding the future management, both in the short and long term.

Monitoring and Reporting

4.2.3 In addition to the reviews by the management group, there would be a formal process of monitoring and reporting with respect to the aims and objectives of the Mitigation Strategy.

4.2.4 The grassland would be monitored in June/July in order to determine the level of success of initial establishment and the potential need for additional seed or changes to management. Indicators of success would be monitored and these may include:

- by the second year of management bare ground should cover no greater than 5%, so as to minimise soil erosion and prevent undesirable and/or more competitive species from becoming dominant;
- by the third year of management, at least 2-3 of the rarer floral species should be present at least occasionally;
- by the fifth year, annual arable weeds should be rare or absent, and the cover of wildflowers should be between 20 and 90%; and

- scrub encroachment should be rare or absent.

4.2.5 Annual monitoring surveys of existing and constructed watercourses would be undertaken with regard to the guidelines published by the Countryside Council for Wales (now NRW) (1996a, 1996b and 1996c). Surveys would be undertaken between mid-May and the end of July, with the optimum period being between late June and early July.

4.2.6 Parameters reported on may include:

- a list of all plant species and abundances of plants recorded at each monitoring location;
- the conservation status of plants recorded;
- a comparison of results with previous results from the same monitoring location and, where relevant, from other monitoring locations elsewhere within the same mitigation area;
- an evaluation of mitigation measures/management practices with regard to their impact on plant species; and
- recommendations for ongoing management and further monitoring.

4.3 Establishment of Grassland Areas

Arable Reversion

4.3.1 In order to increase the grassland habitat within the SSSI, arable fields within the mitigation areas will be reverted to species-diverse wet grassland.

Suitable Soil Conditions

4.3.2 The success of any arable reversion would be largely dependent on existing soil conditions. Therefore, soil analysis will be undertaken prior to the commencement of arable reversion on Maerdy Farm and Caldicot Moor (as well as the grassland enhancement on Tatton Farm and Caldicot Moor, see below).

4.3.3 Soil analysis will be carried out in order to identify pH levels, soil nitrate and phosphate levels.

4.3.4 Where the aim is to create a species-rich grassland site, a phosphorus (P) index of 0 is ideal, with an index of 1 being satisfactory and 2 marginal. An index of 3 or above is generally unsuitable. However, stress, including waterlogging, can result in a more competitive environment that favours a greater number of plant species and, therefore, a moderate phosphorus index could be acceptable. In addition, a moderate phosphorus index could be acceptable where regular removal of plant matter is proposed (e.g. as a hay cut), since a reduction in soil phosphorus could result over time as phosphorus will be removed in the plant matter.

4.3.5 The pH of a soil can also impact upon the phosphorus index of a soil; phosphorus will bind tighter to more acidic soils (i.e. pH levels of less than 6); however, if the soil pH is 6 or more, conditions are more favourable to phosphorus uptake by plants. Therefore, the removal of plant matter can have a greater impact with more alkaline soils with regard to reducing soil phosphorus index.

- 4.3.6** The regular removal of plant matter would also help to reduce nitrate levels, which in turn would help increase the competitive environment required to enable the establishment of a greater diversity of plant species.

Site Preparation for Arable Reversion

Timing of Works

- 4.3.7** In order to protect any nests from damage, and to prevent unnecessary disturbance and potential injury to nesting birds and their young, works will be undertaken between August/September and February inclusive.

Reducing the Weed Burden

- 4.3.8** The weed burden will be reduced to a manageable level prior to sowing a seed mix, as widespread application of herbicides once the seed mix has been spread will not be undertaken.
- 4.3.9** Weeds will be treated using herbicides in the preceding arable crop. Where weeds are a serious problem, more than one year of treatment may be needed. Weeds will be left untreated so as to allow them to show in the crop and then a series of cultivations and/or applications of herbicide will be made throughout the growing season in order to kill off each flush of weed growth.
- 4.3.10** Alternatively, on well-drained land, the land could be ploughed in spring, leaving the soil in furrows. Repeated cultivations could be made throughout the summer to help dry out the soil and break up and dry out any roots. Re-growth of weeds throughout this process would help to tire the weed plants.
- 4.3.11** Following harvesting of the preceding arable crop and management of the weed burden, fields will be ploughed in the spring (e.g. April, although dependent on suitable weather and soil conditions – to avoid working on waterlogged soils). Ploughing will be undertaken in order to level off ruts and turn over any additional weed growth. The soil will then be harrowed in order to create a finer tilth with a firm and level seedbed.

Site Preparation for Grassland Enhancement

- 4.3.12** Grassland fields will be assessed in order to determine whether or not measures are required to break up the sward and create gaps sufficient enough to enable new seed to come into contact with the soil and become established. The aim will be to achieve frequent patches of bare ground of at least 10 cm diameter. Where suitable breaks in the sward are not present, they will be created using mechanical means (harrow or discs).

Arable Reversion and Grassland Enhancement Seed Mix

- 4.3.13** The wet grassland seed mix to be used in arable reversion and grassland enhancement measures will comprise species typical of the area and, where practicable, be of local origin, and will be approved by NRW. The wildflower seed component will comprise at least 10% of the seed mix.

Arable and Grassland Enhancement Sowing of Seed

- 4.3.14** Once an appropriate seedbed has been established, a wet grassland seed mix, approved by NRW, will be broadcast across the field. It is proposed that the seed mix

would be broadcast (e.g. using a drill with the coulters lifted) in late summer/early autumn (August/September), when there is still some moisture in the soil, i.e. when the majority of the species would typically germinate and for those species that require a drop in temperature (vernalisation) over winter to trigger germination in the spring.

- 4.3.15** Once spread, the seed will be rolled in to ensure good seed-to-soil contact. Where soils are likely to cap, a Cambridge roller will be used, otherwise a heavy flat roller will be used. Harrowing or raking are not recommended as finer seeds may be blown around or buried too deep.
- 4.3.16** In fields which are not prone to drought during late spring/summer months, if a late summer/early autumn sowing is not possible, a spring sowing will be undertaken. However, weed problems are often associated with spring sowings and plants can be more susceptible to drought conditions. Therefore, this is not the preferred option.
- 4.3.17** Seed rates for the areas of arable reversion would be in the range of 15-25 kg/ha, in order to create a more open and competitive sward and to provide an opportunity for plant species from surrounding areas to establish naturally. Lower seed rates would increase the risk of developing weed problems.

Invasive or Weed Species

- 4.3.18** Invasive or weed species will be dealt with as soon as practicable between May and September/October. All plants will be dealt with in accordance with best practice guidelines and works will be completed in accordance with a biosecurity method statement, pre-approved by NRW, in order to help prevent the further spread of the species.

Green Hay Use on the Arable Reversion Areas

- 4.3.19** If considered necessary, and subject to a suitable donor site being available and agreed with NRW, additional seed could be spread as green hay on these areas. The green hay will be collected when the seed is ready (around mid-July).
- 4.3.20** Spreading hay may be a good method where there is archaeological interest and disturbance to the ground needs to be minimised.
- 4.3.21** Although bare ground is necessary, there is no need to create a fine seed bed prior to spreading hay.
- 4.3.22** Green hay would be transported and spread using a low ground pressure forage harvester with trailer. The hay will be spread as soon as practicable and ideally within a couple of hours and no more than 12 hours of being cut. It is essential that the seed does not warm up during the period between cutting and spreading.
- 4.3.23** Green hay could be spread over part of each field, so as to ensure as many fields as practicable receive some new seed. The hay would be spread thinly so as to allow light to reach the soil and so as not to inhibit germination and establishment.
- 4.3.24** The green hay would be left on the fields for a period of at least one week under dry conditions, or up to three weeks under wet conditions, in order to enable the seed to drop.
- 4.3.25** Fields would then be rolled and the hay removed in order to prevent matting and nutrient enrichment of soils. Heavy machinery would have low ground pressure tyres and would not be tracked across waterlogged soils.

- 4.3.26** Arisings would then be removed from site.

Management of Grassland Areas following the Establishment Phase

- 4.3.27** Within the arable reversion areas, the management in the initial year would be by cutting. The number of cuts would be determined by the establishment of the sward and the need to control weed growth.
- 4.3.28** Within the grassland enhancement areas, the management in the first year could be by cutting or a combination of grazing and cutting.
- 4.3.29** If cutting is appropriate, the sward would be cut after seed has been shed, and when the majority of ground-nesting birds have finished nesting, between late July and September. Depending on the regrowth of the sward and the emergence of weeds, further cuts may be carried out as necessary. Arisings would be removed from the areas unless it is considered that, where establishment is limited, the establishment of the sward would benefit from arisings being left in situ.
- 4.3.30** Where sowing has failed and considerable areas of bare/poorly vegetated soil are evident, these will be made good during the establishment period, i.e. additional seed will be spread following the scarification of soils where necessary, in order to ensure good ground cover and prevent the spread and dominance of weed species.

Grazing

- 4.3.31** As stated above, grazing would not be introduced in the early stages (1-2 years) of sward establishment on the arable reversion areas. However, when it is considered appropriate to introduce grazing into the management regime, stocking densities and the timing and duration of grazing will be managed so as to prevent over-grazing and poaching, which could result in the colonisation of aggressive weed species. The condition of the grassland would be monitored weekly during the grazing season to ensure that changes to the grazing regime are made within a suitable timescale.
- 4.3.32** The monitoring would in particular take into account the need to maintain favourable conditions for breeding lapwing on Maerdy Farm and Caldicot Moor, where the results of breeding bird surveys completed in 2015 confirmed the presence of lapwing.
- 4.3.33** Densities of grazing would be agreed in advance of the grazing season which would be likely to be between March/April and September/October, depending on ground conditions. A general guideline for stocking density based on grazing throughout the year would be 0.5- livestock unit (LSU)/ hectare (1 LSU = 1 cow). However, this density will be used as a guideline only and will be monitored and altered as required according to the time of year, soil conditions and duration of grazing.
- 4.3.34** In addition, should any supplementary feeding be required during the grazing period, the location of troughs/feeders would be adjusted within the fields at regular intervals to reduce the potential for localised poaching and enrichment from dunging.

4.4 Fly-tipping

- 4.4.1** Fly-tipping will be monitored regularly and fly-tipped materials will be disposed of appropriately off-site as soon as practicable and at any time of year.

4.5 Recreation of Historic Field Ditches and Grips

- 4.5.1** Figure 2 shows the indicative locations of historic field boundaries (as taken from 1st edition OS maps) that could be re-created in agreement with NRW. These boundaries would be re-created as field ditches.
- 4.5.2** Ditch excavation will be likely to commence from late August/September so as to avoid the breeding bird season. If commencing works in late August, a pre-works survey will be undertaken in order to confirm the absence of breeding birds in the area. Should ground-nesting birds be present, works will be delayed until an ecologist can confirm any young have fully fledged and left the nest. These works would continue into the autumn period as long as ground conditions are suitable for the machinery to be employed.
- 4.5.3** In addition, many in-field grips have now been lost (e.g. vegetated over or compressed due to farming operations). These can provide valuable wet grassland habitat and a range of grass heights across a field of potential value to a diversity of species, including semi-aquatic plants, invertebrates, wetland birds and foraging bats. Therefore, in agreement with NRW, historic in-field grips would be re-dug. Where applicable, the frequency and depth of grips will take into account the need to take an annual hay cut, i.e. heavy machinery can be hindered by deeper excavations.
- 4.5.4** In agreement with NRW, grips could be constructed as either standalone structures that are detached from adjacent watercourses or as connected features that drain into adjoining watercourses. Grips would only be connected to boundary watercourses if these are known not to be polluted and not to contain invasive plant species that could spread along grips.
- 4.5.5** The methodology for ditch and grip construction will be pre-approved by NRW.
- 4.5.6** In order to prevent grips becoming over grown and drying up, they will be re-cut or cleaned as necessary.

4.6 Management and Enhancement of Existing Features

Management of Existing Watercourses

- 4.6.1** NRW would continue to manage both the Main River and Internal Drainage District (IDD) reens according to the annual maintenance programme. There may be opportunities to sequence the management of all watercourses, including field ditches, in a way which is beneficial to the overall strategy.
- 4.6.2** The purpose of management would be to remove built-up silts and leaf litter, to clear/thin vegetation so as to maintain flow and good water quality, and to create areas of open water of benefit to a diversity of species, including aquatic/semi-aquatic plants and insects and amphibians.
- 4.6.3** The timing of the maintenance works will be in accordance with NRW Guidance. In order to maintain flow rates and flood-storage capacity, most of the IDD reen banks are mown annually and the ditches de-weeded regularly. However, mowing, de-weeding or de-silting operations are always the minimum necessary to accomplish the drainage function and are timed, where possible, to cause the least damage to environmental features. In any case, except for emergency work, where practicable bank flailing in any of the SSSIs does not take place between 1st March and 1st July and de-weeding

does not take place until after the 1st of September. De-silting of IDB ditches takes place on extended rotations of 5-10 years.

4.6.4 Works will be undertaken by hand and/or using low ground-pressure diggers with sufficient reach in order to reduce the impact on watercourses and their banks. Heavy machinery will not be tracked across waterlogged soils.

4.6.5 Excavated silts and vegetation will be spread across the banks within 10m of watercourses to enable any animals present to return to the watercourse. Should it be considered necessary (e.g. due to the volume of material), material will be relocated after 2 days to a suitable location for disposal. If such disposal was required then a permit under the Environmental Permitting Regulations 2010 would be needed.

Enhancement of Existing Watercourses

4.6.6 Remedial works will be undertaken in order to repair any eroded or damaged banks of watercourses. Works will be undertaken between October and February, where practicable and taking into account the need to access watercourses across newly established grassland habitats, particularly in the arable reversion areas; however, works may be required during other times of the year to maintain required flow rates. These works may also offer the opportunity to carry out reprofiling of identified watercourses to allow more sunlight to reach the banks and channels, promoting plant growth and potentially benefitting a diversity of invertebrates.

4.6.7 Natural regeneration of ground vegetation will be the preferred method of regeneration of remediated banks and would normally be expected to be sufficient to ensure natural regeneration. However, if necessary, banks will be reseeded so as to prevent soil erosion and sediment build-up. Any seed mix used will be pre-approved by NRW and will include native species typical of the area and, where possible, of local origin.

4.6.8 Where stock access to watercourses for drinking is resulting in the erosion of banks, stock-proof electric fencing will be installed temporarily along the banks to prevent access to the length of the watercourse affected.

Boundary Hedgerows and Scrub

4.6.9 Due to the potential value of hedgerows and scrub to breeding birds, all management described below will be undertaken in accordance with measures described in Section 4.10, and in particular outside the bird breeding season (i.e. management will be completed between September and February inclusive)

4.6.10 The management of both sides of the hedgerows within the mitigation areas may be restricted by the ownership of land immediately adjacent to the land. However, where practicable, management of both sides of a hedgerow will follow the agreed management regime.

4.6.11 Where hedgerows and scrub located along the banks of a watercourse over-shade the watercourse and/or create an excess build-up of leaf litter in the channel that is affecting water flow, water quality, plant diversity and/or plant cover, the following measures will be set in place along at least the majority of the bank so as to open up the channel and banks to sunlight and reduce the amount of leaf litter in the channel:

- coppice and stump treat hedgerows and/or scrub with a herbicide appropriate for working close to water (applied in accordance with supplier and manufacturer guidelines);

- uproot and remove hedgerow and/or scrub and reinstate the bank; and/or
- cut back overhanging and over-shading branches.

4.6.12 Where practicable, where hedges are present on both banks of a watercourse, the preferred option will be to completely remove at least one of the hedgerows and manage to prevent regrowth. The other bank will be managed to a specified height (or potentially removed as well). The objective will be to provide a balance of fully open and shaded areas to encourage a full range of species.

4.6.13 Within the mitigation areas, cuttings may be removed from site or could be stacked on site as long-term dead wood habitat.

Management of Trees

4.6.14 Should trees require management (e.g. coppicing/pruning for health and safety reasons, or in order to open up over-shaded watercourses), works will be undertaken between October and February inclusive, unless the tree is a known bat roost. All works to mature trees will be undertaken in accordance with the management prescription provided in Section 4.7

4.6.15 Works will be undertaken by hand (using hand saws or chainsaws).

4.6.16 At least some timber and felled branches will be stacked as close to the retained tree as practicable in areas of scrub or hedgerow margins on site as habitat for a diversity of species including lower plants, invertebrates and herpetofauna (amphibians and reptiles). Dead wood habitat will be retained whenever practicable as a habitat and resource of value to a diversity of specialist saproxylic (dead wood) invertebrates and lower plants. Timber piles will be limited in size, i.e. approximately 4 m² x up to 0.5 m in height. Brush could be stacked tightly; however, timber stacks will be stacked loosely so as to enable air flow between timber sections.

4.7 Protected Species Requirements

Breeding Birds

4.7.1 Should vegetation of potential value to nesting birds (including areas of rough grassland, hedgerows, scrub and mature trees) require management, this will be undertaken outside of the bird breeding season (i.e. management will be completed between September and February inclusive).

4.7.2 However, should it not be possible to limit works to outside of the bird breeding season, vegetation will be inspected for active nests immediately prior to the commencement of any works on vegetation of potential value to nesting birds. Where it is not possible to carry out a thorough visual inspection of potential nesting sites, e.g. due to the density of vegetation, the habitat will be surveyed for between one and two hours between dawn and 09.00 am. This would be undertaken immediately prior to the commencement of works in order to identify potential breeding activity, such as birds carrying nesting material or food into the habitat being surveyed. If it is not possible from an initial survey to confirm the absence of nesting birds, surveys will be continued until the surveyor is able to confirm absence, or a precautionary approach will be taken (i.e. nesting birds will be presumed to be present).

No habitat containing an active nest will be disturbed, and if necessary management will be delayed until young birds have fledged.

Barn Owls

- 4.7.3** As soon as practicable and preferably prior to the commencement of the main bird-breeding season (mid-February to August inclusive) and at least 30 days prior to the commencement of works, at least two barn owl nest boxes would be installed on suitable retained mature trees and farm buildings on Maerdy Farm and Caldicot Moor Mitigation Areas (at least one nest box would be installed in each mitigation area).
- 4.7.4** The nest boxes would be located at least 50 m from working areas and would be installed under the direction of an appropriately experienced ecologist.

Bats

- 4.7.5** Should management of mature trees be required, a survey in order to assess the potential value for roosting bats would be undertaken prior to the commencement of the works. The survey would be completed by an appropriately experienced ecologist(s) in accordance with best practice guidelines (i.e. Collins (ed.) 2016, or subsequent updates). Should a bat roost be located, works would require an NRW licence, and a licence is likely to require works to be completed in October and/or April so as to reduce the likelihood of bats being present and limit the likely impact on any bats that might be present.

Water Voles

- 4.7.6** Prior to the commencement of any works to watercourses that could affect water voles, a survey would be undertaken by an appropriately experienced ecologist in order to confirm whether or not water voles and their burrows are present. For all watercourses known to support water voles, a detailed method statement would be agreed with NRW and, if necessary, an NRW licence would be obtained prior to the commencement of works so as to minimise the potential impact on water voles.

4.8 Archaeological Interest

- 4.8.1** There are no known features of archaeological interest within the boundaries of the Maerdy Farm or Caldicot Moor Mitigation Areas. There is an area of archaeological interest within the Tatton Farm Mitigation Area, to the north of the new section of motorway (as shown on Figure 2a). The feature of interest is a small moated enclosure, likely to be an abandoned medieval farmstead and perhaps a precursor to Tatton Farm itself. No significant excavation or other works which could damage archaeological interests would be carried out in the vicinity of this feature. There is the potential for unknown buried features of interest to be present here and in the two other mitigation areas. Thus the precautionary measure of an archaeological watching brief would be provided to oversee the creation of ditches and any other works that could result in damage to shallow buried features.
- 4.8.2** The location of the mitigation areas, mitigation measures and long term management proposals described in this strategy were discussed during a meeting with NRW, Cadw, Newport County Council and Monmouthshire County Council on the 25 January 2016. The overall consideration was that this strategy would be beneficial in terms of historic landscape. The final detailed version of this Mitigation Strategy and any associated method statements would be developed in consultation with the above

listed consultees to help ensure no adverse effect and maximise the potential benefit with regard to archaeological interest and historic landscape.

5 Measures to Ensure Compliance with the SSSI Mitigation Strategy

5.1 General Scheme-wide Practice

- 5.1.1** The Contractor would be responsible for commissioning an appropriately qualified and experienced professional in order to manage, co-ordinate, supervise and/or undertake all site establishment works (i.e. excluding long term management) described in this Mitigation Strategy.
- 5.1.2** The long term management of the SSSI mitigation areas would be the responsibility of Welsh Government. In practice management is likely to be undertaken through arrangements with farm tenants or other local farmers and would be subject to management plans which would be agreed with NRW following the principles set out in this Mitigation Strategy.
- 5.1.3** NRW would continue to manage water levels in the reens as is currently the case.
- 5.1.4** All licenced works would also be undertaken in accordance with the requirements of any relevant NRW licence.

5.2 Land Access and Permissions

- 5.2.1** Welsh Government is the existing owner of Tatton Farm Mitigation Area and would purchase the freehold of Maerdy Farm and Caldicot Moor (through Compulsory Purchase Order or other means agreed with existing land owners) to ensure the undertaking of works described in this Mitigation Strategy.

5.3 Auditing and Reporting

- 5.3.1** A record of all works undertaken as described in the SSSI Mitigation Strategy during the establishment period will be produced by the supervising professional and maintained by the Contractor and Welsh Government. It will be made available to NRW. The Contractor will be responsible for any remedial works required during the establishment period.
- 5.3.2** Following the establishment period, Welsh Government will be responsible for ensuring that appropriate records of monitoring, management and other works carried out are maintained, and for any remedial works which may be required.

6 References

Caldicot and Wentlooge Levels IDB (2008) Caldicot & Wentlooge Levels Internal Drainage Board – A Conservation Strategy.

Collins, J. (ed.) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn). The Bat Conservation Trust, London.

Countryside Council for Wales (1996a) Guidance Note One: General Guidance Monitoring Of Physical Developments within The Gwent Levels Sites Of Special Scientific Interest (SSSI) Draft

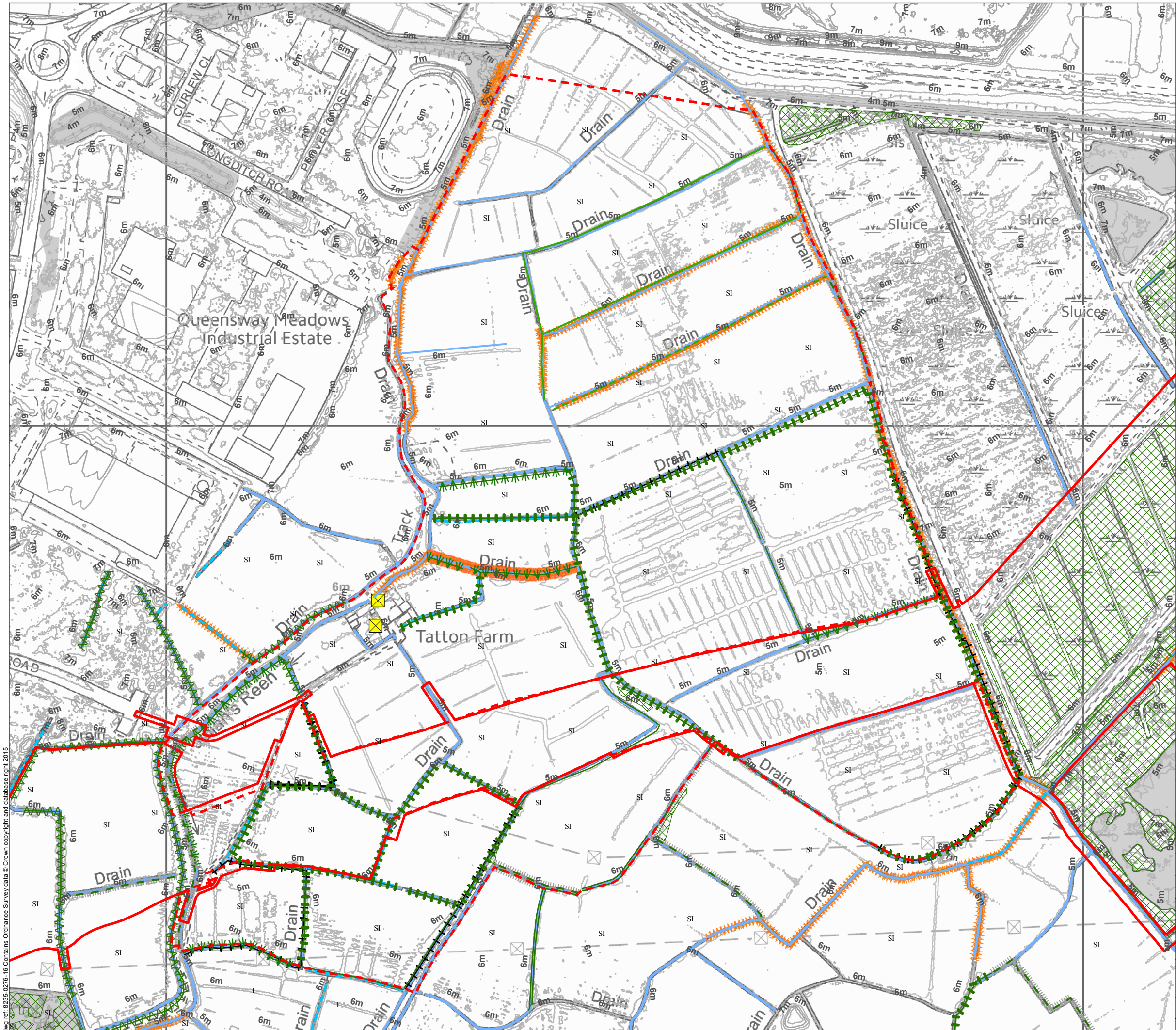
Countryside Council for Wales (1996b) Guidance Note Two: Flora Monitoring on The Gwent Levels Sites Of Special Scientific Interest Countryside Council For Wales (now Natural Resources Wales)

Countryside Council for Wales (1996c) Guidance Note Four: Water Quality Monitoring on The Gwent Levels Sites Of Special Scientific Interest Countryside Council For Wales Draft

Figures

Figure 1

SSSI Mitigation Areas



Legend

Limit of Permanent and Temporary Works for New Section of Motorway

Mitigation Area

Existing Habitats

A

Arable

I

Improved grassland

SI

Semi-improved grassland

+++

Fence

Watercourse

Dry ditch

Species-rich intact hedge

Species-rich defunct hedge

Species-rich hedge with trees

Species-poor hedge with trees

Species-poor defunct hedge with fence

Species-poor intact hedge

Species-poor defunct hedge

Species-poor intact hedge

X X

Scattered scrub

Protected Species

Common Pipistrelle bat roost

Watercourses/waterbodies with signs of water vole activity

Watercourses/waterbodies with signs of otter activity

L

Lapwing – breeding bird survey, 2015



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Appendix SR10.35 SSSI Mitigation Strategy

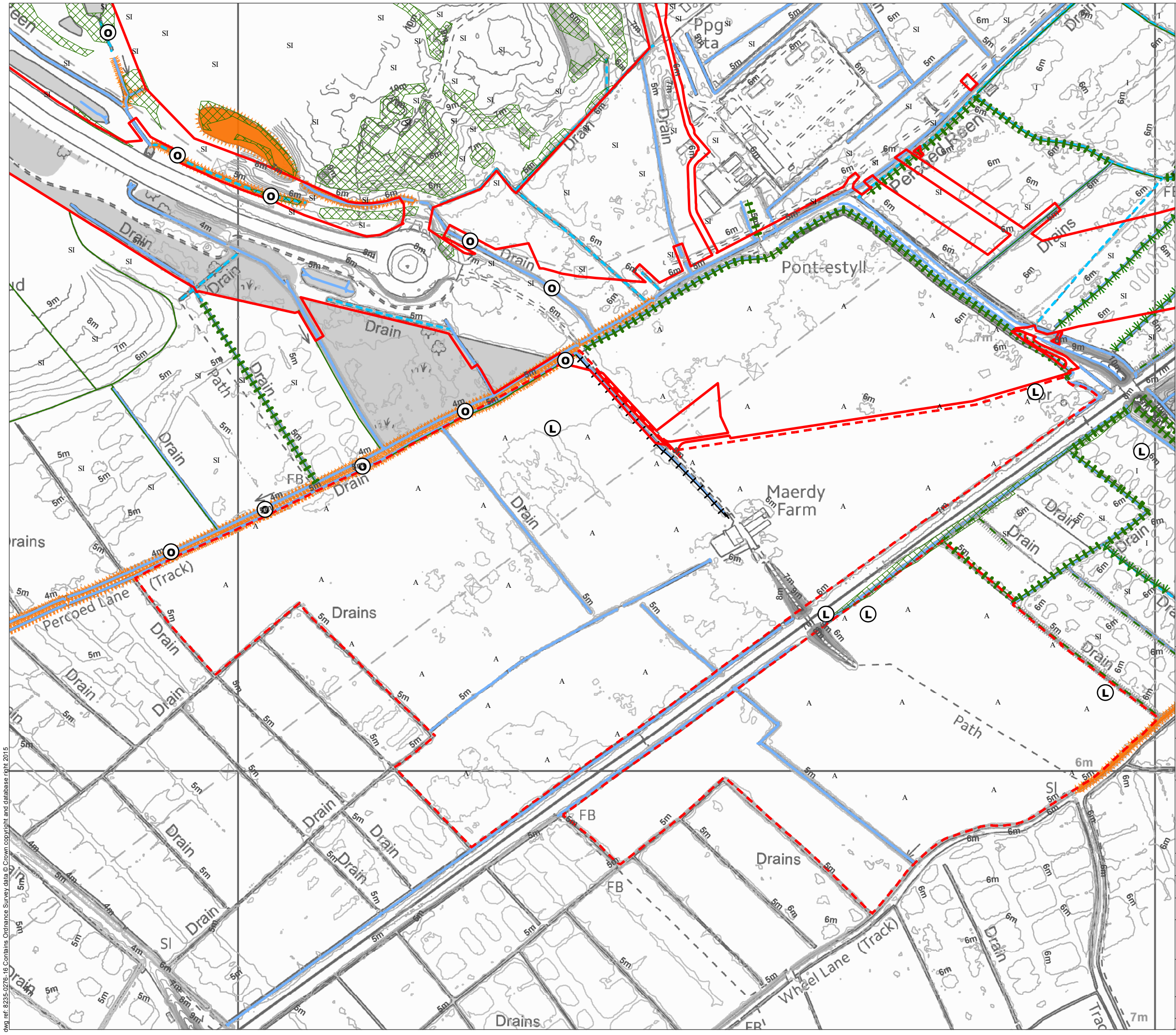
SSSI Mitigation Area:
Tatton Farm

Figure: 1a	Revision:
Date: December 2016	Status: AT ISSUE
Drawn: CR	Checked: KJ

Scale: A3 @ 1:4,000

065130m

N



- Legend**
- Limit of Permanent and Temporary Works for New Section of Motorway
 - Mitigation Area
 - Existing Habitats**
 - Arable
 - Improved grassland
 - Semi-improved grassland
 - Fence
 - Watercourse
 - Dry ditch
 - Species-rich intact hedge
 - Species-rich defunct hedge
 - Species-rich hedge with trees
 - Species-poor hedge with trees
 - Species poor defunct hedge with fence
 - Species-poor intact hedge
 - Species-poor defunct hedge
 - Scattered scrub
 - Protected Species**
 - Common Pipistrelle bat roost
 - Watercourses/waterbodies with signs of water vole activity
 - Watercourses/waterbodies with signs of otter activity
 - Lapwing – breeding bird survey, 2015

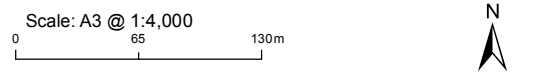


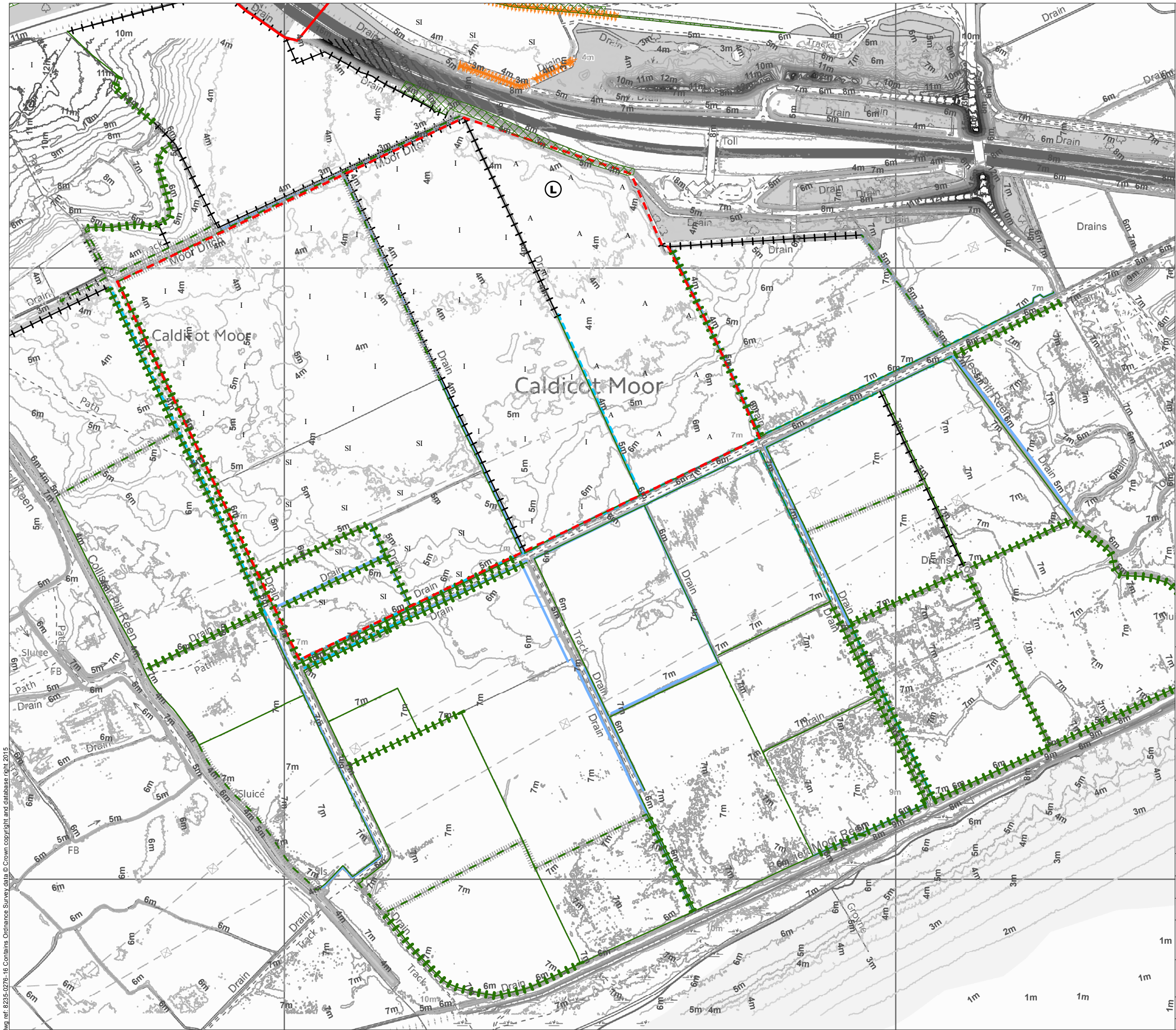
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Appendix SR10.35 SSSI Mitigation Strategy

SSSI Mitigation Area:
Maerdy Farm

Figure: 1b	Revision:
Date: December 2016	Status: AT ISSUE
Drawn: CR	Checked: KJ





Legend

Limit of Permanent and Temporary Works
for New Section of Motorway

Mitigation Area

Existing Habitats

A

Arable

I

Improved grassland

SI

Semi-improved grassland

+++

Fence

Watercourse

Dry ditch

Species-rich intact hedge

Species-rich defunct hedge

Species-rich hedge with trees

Species-poor hedge with trees

Species poor defunct hedge with fence

Species-poor intact hedge

Species-poor defunct hedge

Scattered scrub

Protected Species

Common Pipistrelle bat roost

Watercourses/waterbodies with signs of
water vole activity

Watercourses/waterbodies with signs of
otter activity

L

Lapwing – breeding bird survey, 2015



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Appendix SR10.35 SSSI Mitigation Strategy

SSSI Mitigation Area:
Caldicot Moor

Figure: 1c	Revision:
Date: December 2016	Status: AT ISSUE
Drawn: CR	Checked: KJ

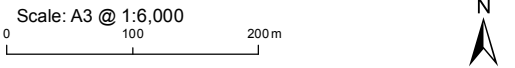
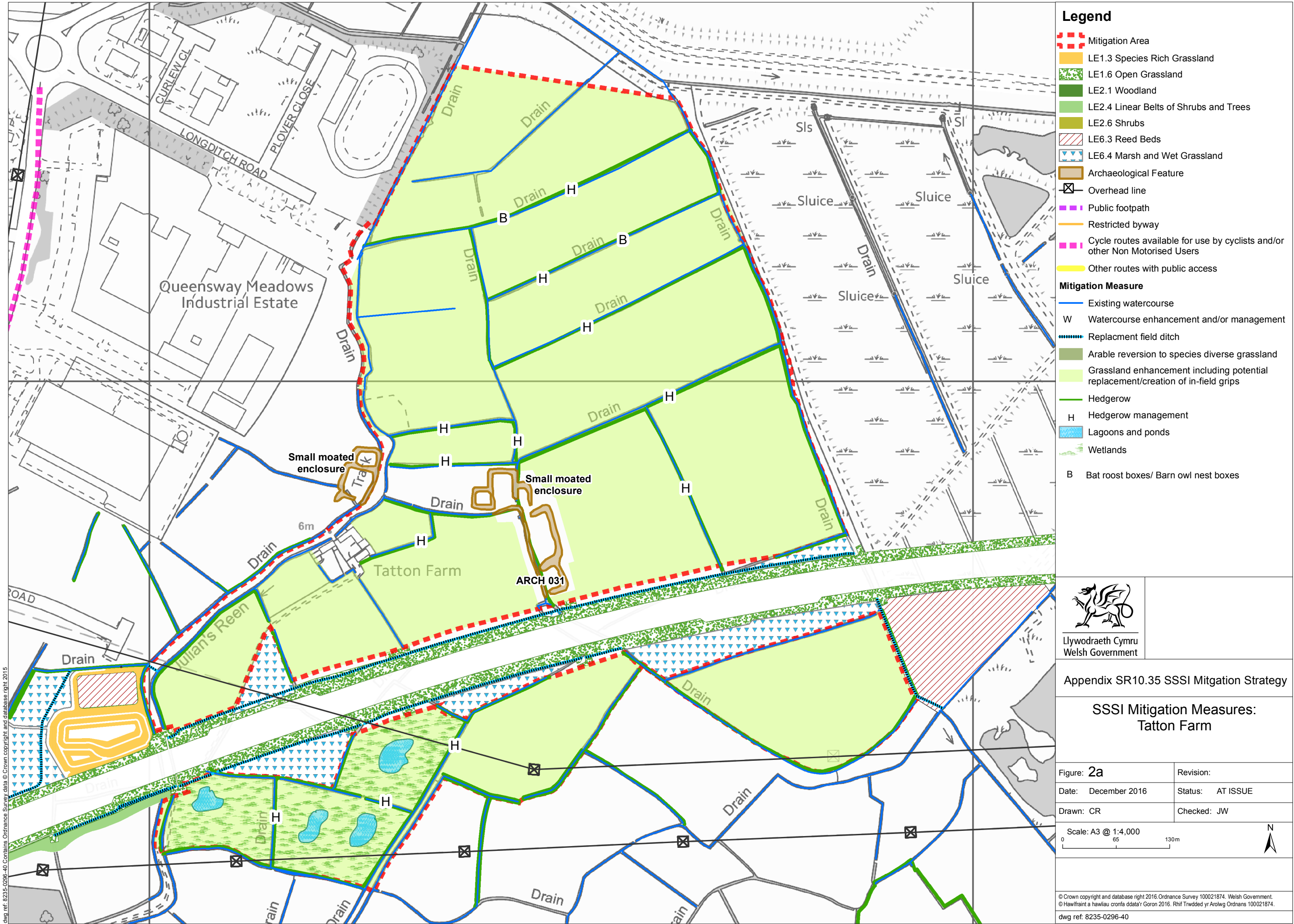
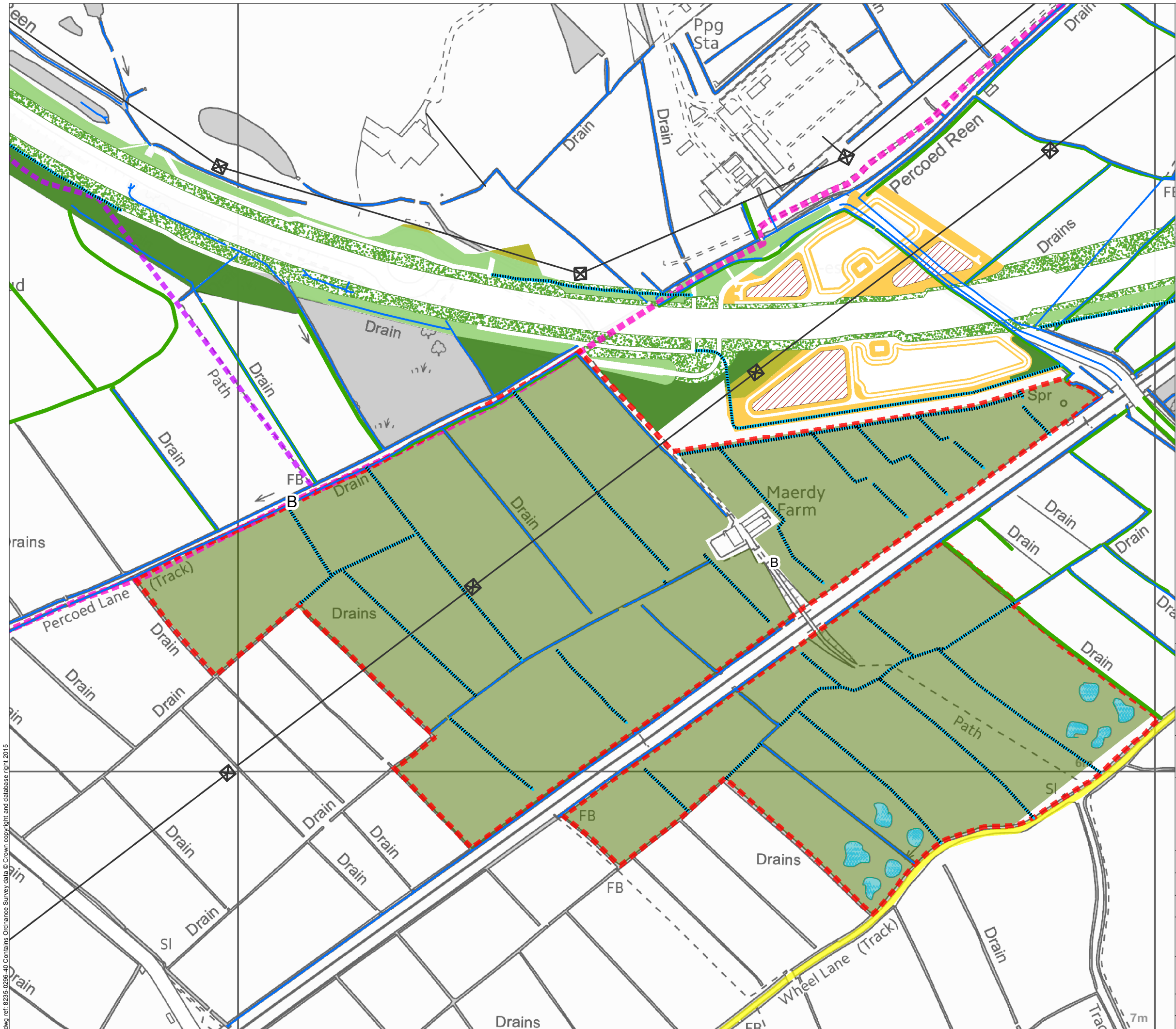


Figure 2

SSSI Mitigation Measures





Legend

Mitigation Area

LE1.3 Species Rich Grassland

LE1.6 Open Grassland

LE2.1 Woodland

LE2.4 Linear Belts of Shrubs and Trees

LE2.6 Shrubs

LE6.3 Reed Beds

LE6.4 Marsh and Wet Grassland

Archaeological Feature

Overhead line

Public footpath

Restricted byway

Cycle routes available for use by cyclists and/or other Non Motorised Users

Other routes with public access

Mitigation Measure

Existing watercourse

W

Watercourse enhancement and/or management

Replacment field ditch

Arable reversion to species diverse grassland

Grassland enhancement including potential replacement/creation of in-field grips

Hedgerow

H

Hedgerow management

Lagoons and ponds

Wetlands

B

Bat roost boxes/ Barn owl nest boxes

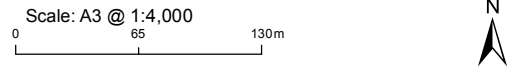


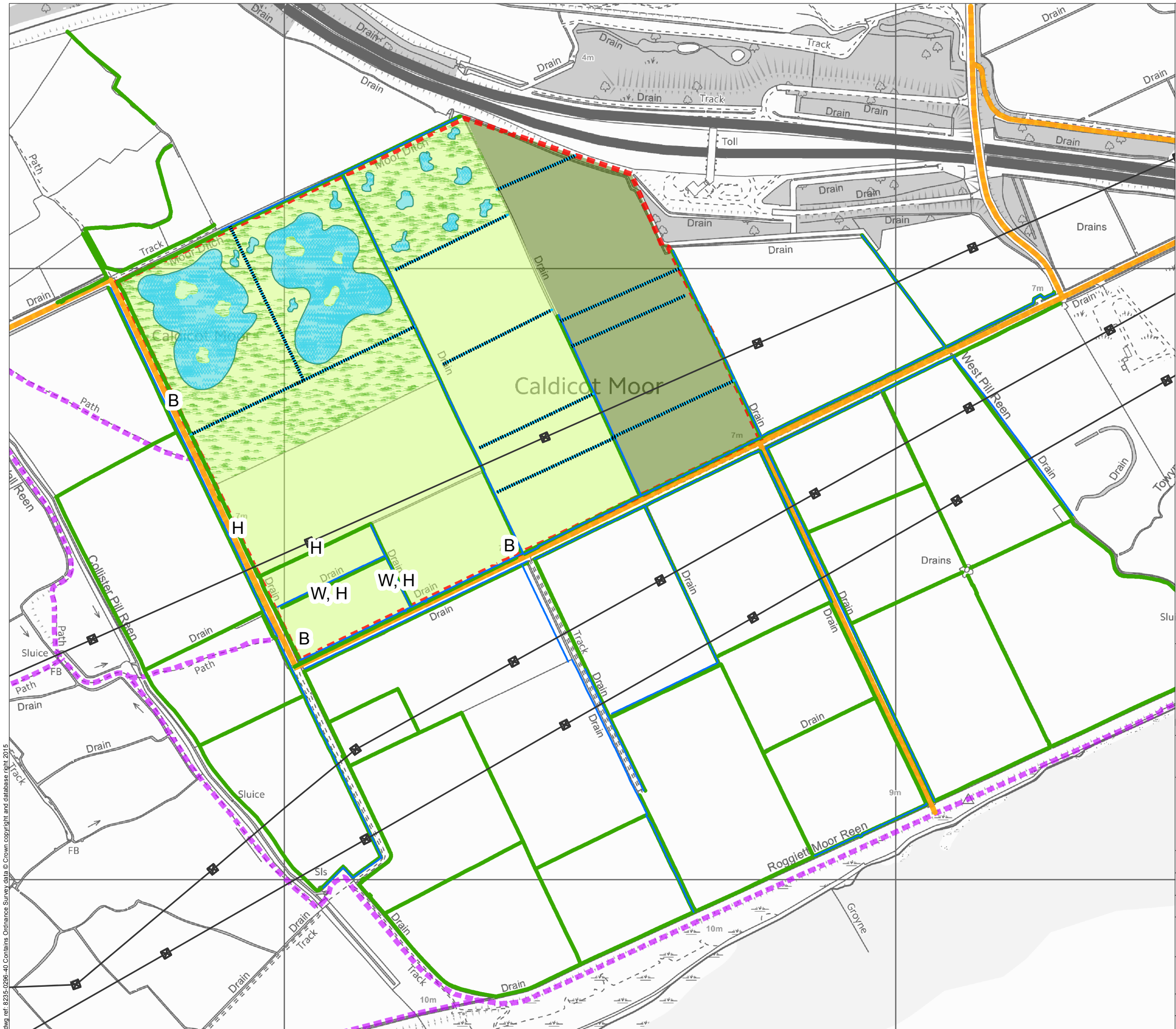
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Appendix SR10.35 SSSI Mitigation Strategy

SSSI Mitigation Measures:
Maerdy Farm

Figure: 2b	Revision:
Date: December 2016	Status: AT ISSUE
Drawn: CR	Checked: JW





Legend

Mitigation Area

LE1.3 Species Rich Grassland

LE1.6 Open Grassland

LE2.1 Woodland

LE2.4 Linear Belts of Shrubs and Trees

LE2.6 Shrubs

LE6.3 Reed Beds

LE6.4 Marsh and Wet Grassland

Archaeological Feature

Overhead line

Public footpath

Restricted byway

Cycle routes available for use by cyclists and/or other Non Motorised Users

Other routes with public access

Mitigation Measure

Existing watercourse

W

Watercourse enhancement and/or management

Replacement field ditch

Arable reversion to species diverse grassland

Grassland enhancement including potential replacement/creation of in-field grips

Hedgerow

H

Hedgerow management

Lagoons and ponds

Wetlands

B

Bat roost boxes/ Barn owl nest boxes



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Appendix SR10.35 SSSI Mitigation Strategy

SSSI Mitigation Measures:
Caldicot Moor

Figure: 2c	Revision:
Date: December 2016	Status: AT ISSUE
Drawn: CR	Checked: JW

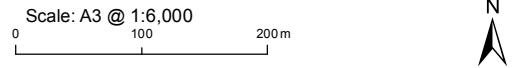
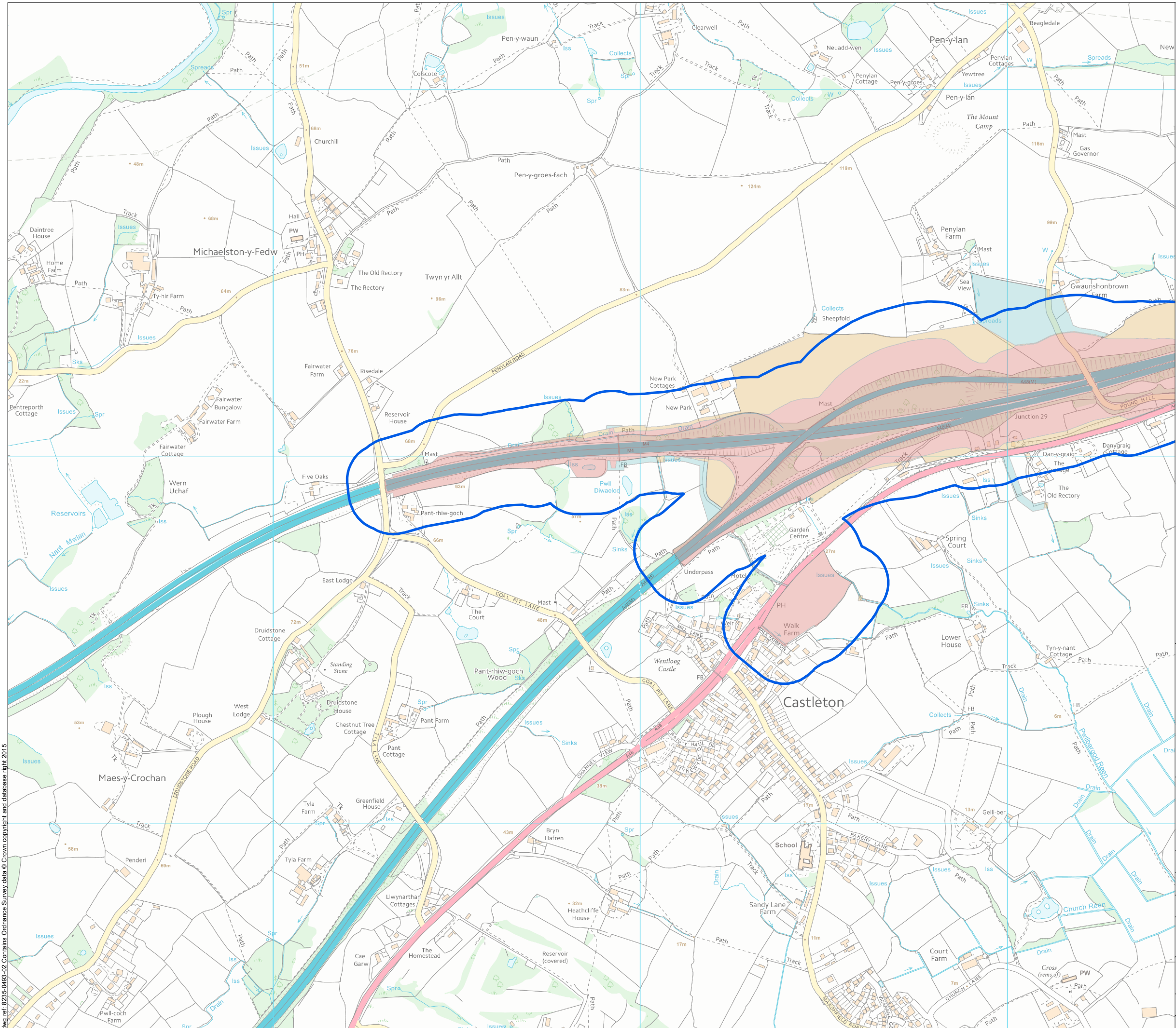


Figure 3

2015 Aquatic Macrophytes Survey



Legend

Permanent highway land within fenceline, including water treatment areas

Other permanent land take e.g. mitigation planting.

Temporary construction land

100m Study area

Aquatic Macrophyte 20m Sample

Low

Moderate

Moderate-High

High

Very High

Study area shown reflects the scheme design at the time of the survey



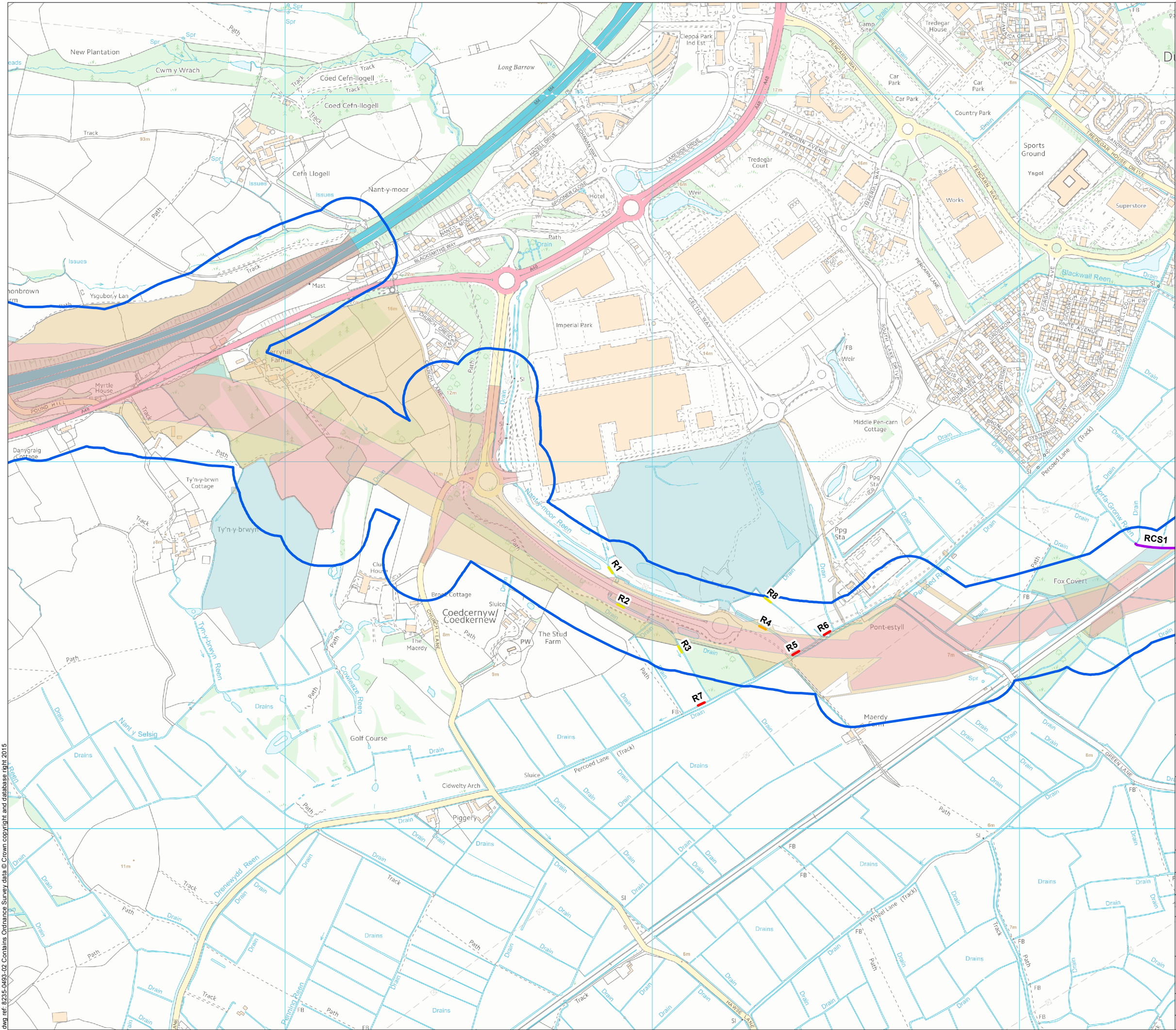
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Appendix SR10.35 SSSI Mitigation Strategy

2015 Aquatic Macrophytes Survey

Figure: 3a	Revision: -
Date: December 2016	Status: AT ISSUE
Drawn: CR	Checked: JW





Legend

Permanent highway land within fenceline, including water treatment areas

Other permanent land take e.g. mitigation planting.

Temporary construction land

100m Study area

Aquatic Macrophyte 20m Sample

Low

Moderate

Moderate-High

High

Very High

Study area shown reflects the scheme design at the time of the survey



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Appendix SR10.35 SSSI Mitigation Strategy

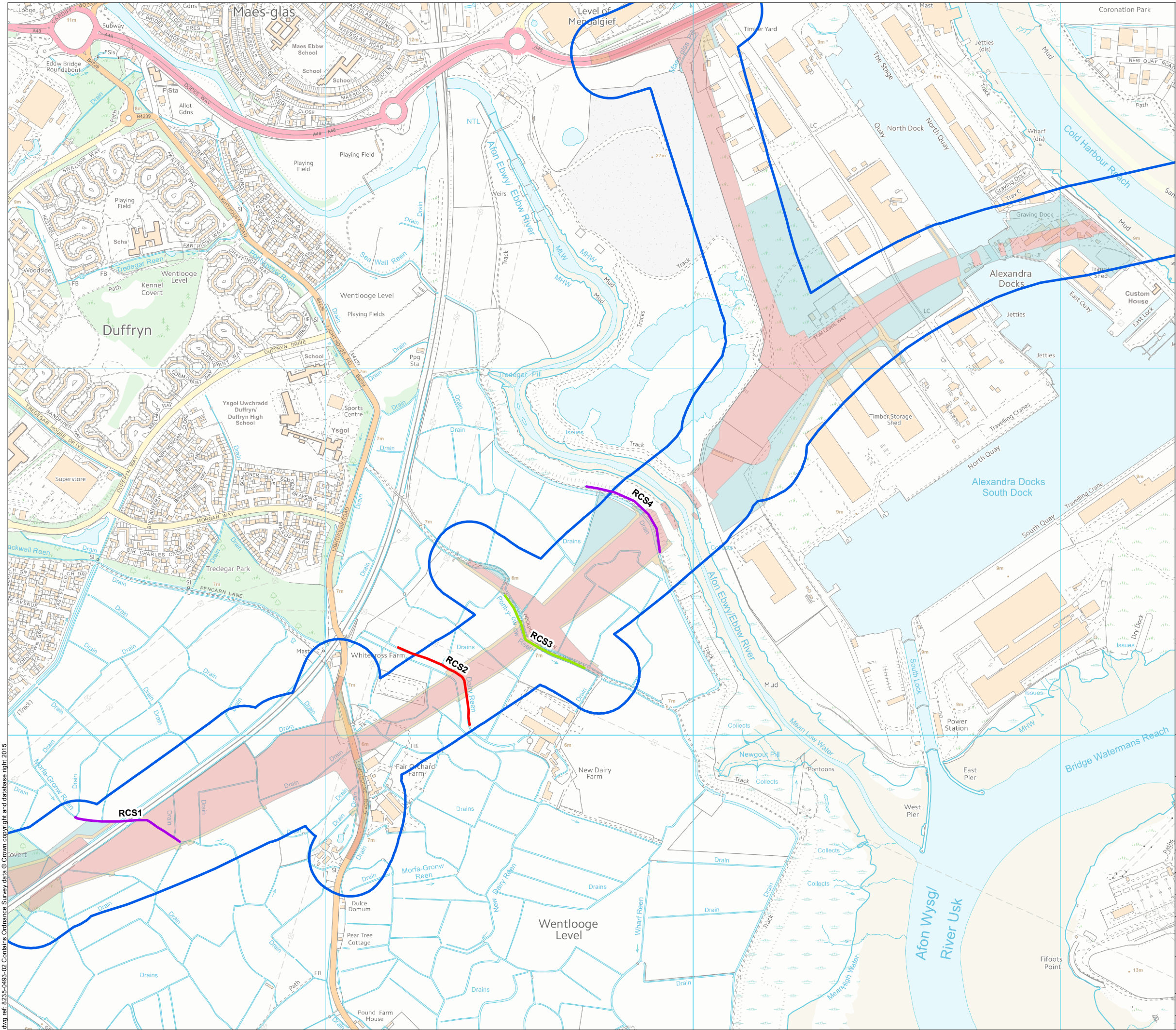
2015 Aquatic Macrophytes Survey

Figure: 3b	Revision: -
Date: December 2016	Status: AT ISSUE
Drawn: CR	Checked: JW

Scale: A3 @ 1:10,000

0250500m

N



Legend

Permanent highway land within fenceline, including water treatment areas

Other permanent land take e.g. mitigation planting.

Temporary construction land

100m Study area

Aquatic Macrophyte 20m Sample

Low

Moderate

Moderate-High

High

Very High

Study area shown reflects the scheme design at the time of the survey



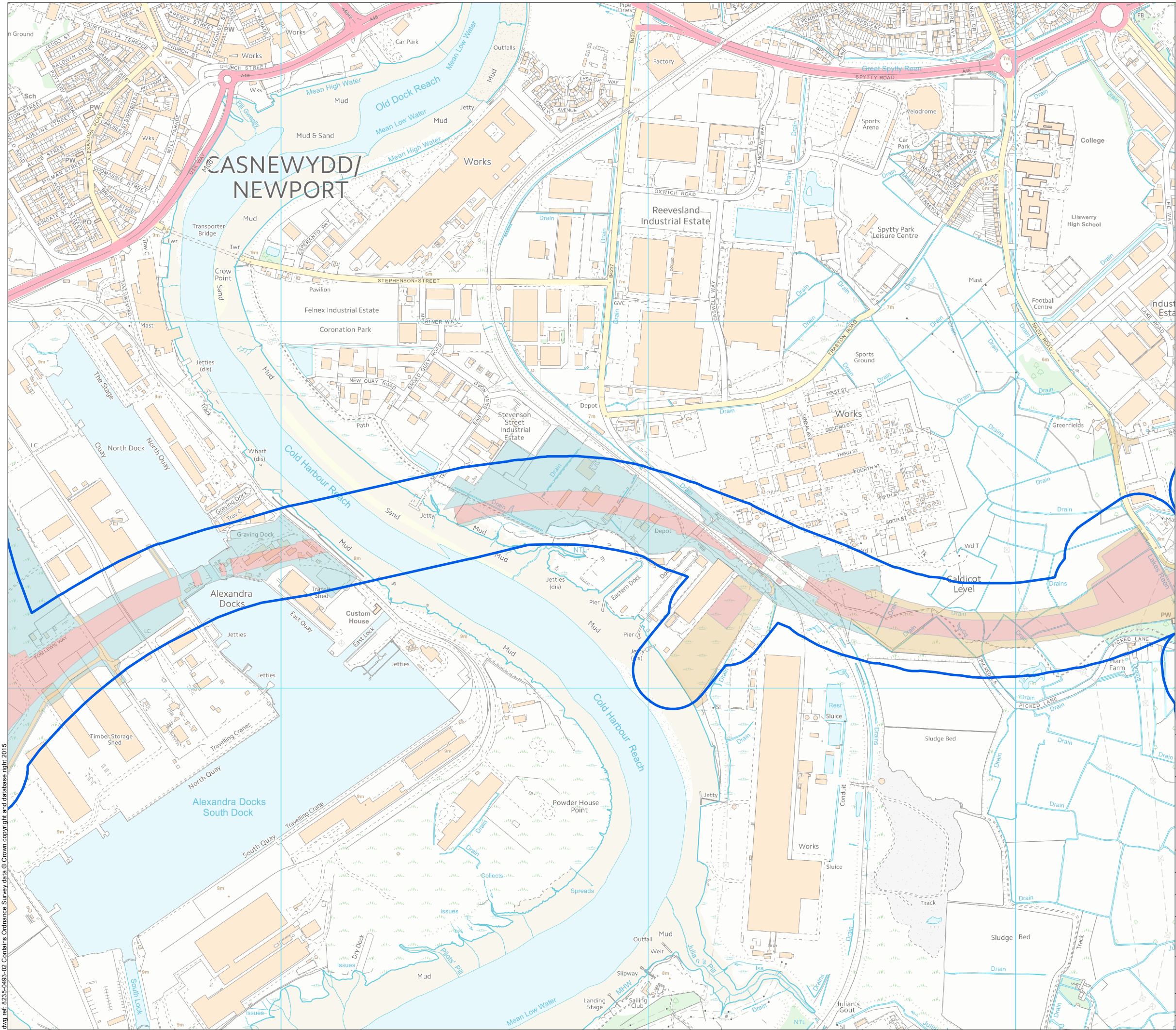
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Appendix SR10.35 SSSI Mitigation Strategy

2015 Aquatic Macrophytes Survey

Figure: 3C	Revision: -
Date: December 2016	Status: AT ISSUE
Drawn: CR	Checked: JW





Legend

Permanent highway land within fenceline, including water treatment areas

Other permanent land take e.g. mitigation planting.

Temporary construction land

100m Study area

Aquatic Macrophyte 20m Sample

Low

Moderate

Moderate-High

High

Very High

Study area shown reflects the scheme design at the time of the survey



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Appendix SR10.35 SSSI Mitigation Strategy

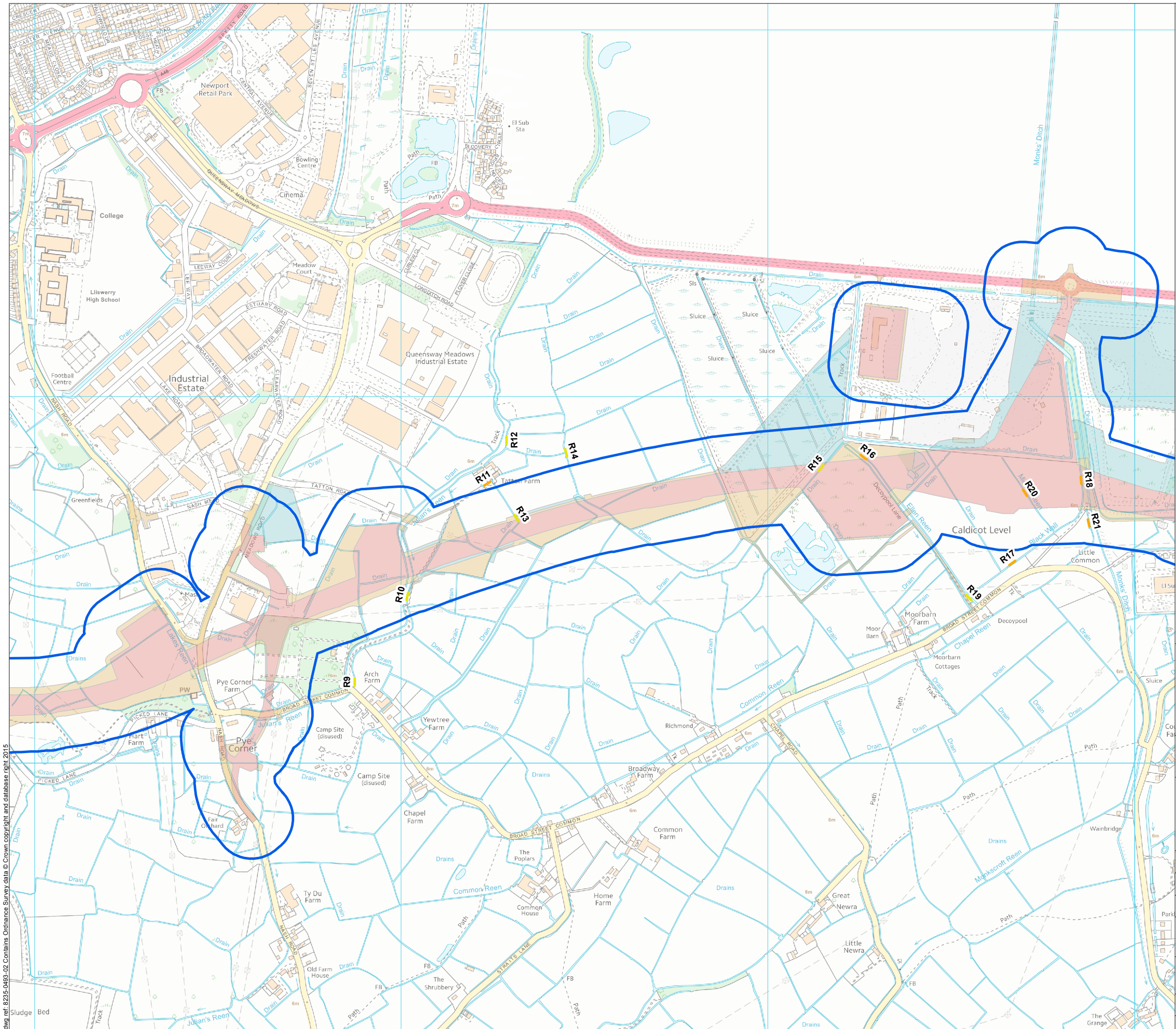
2015 Aquatic Macrophytes Survey

Figure: 3d	Revision: -
Date: December 2016	Status: AT ISSUE
Drawn: CR	Checked: JW

Scale: A3 @ 1:10,000

0250500m

N



Legend

Permanent highway land within fenceline, including water treatment areas

Other permanent land take e.g. mitigation planting.

Temporary construction land

100m Study area

Aquatic Macrophyte 20m Sample

Low

Moderate

Moderate-High

High

Very High

Study area shown reflects the scheme design at the time of the survey



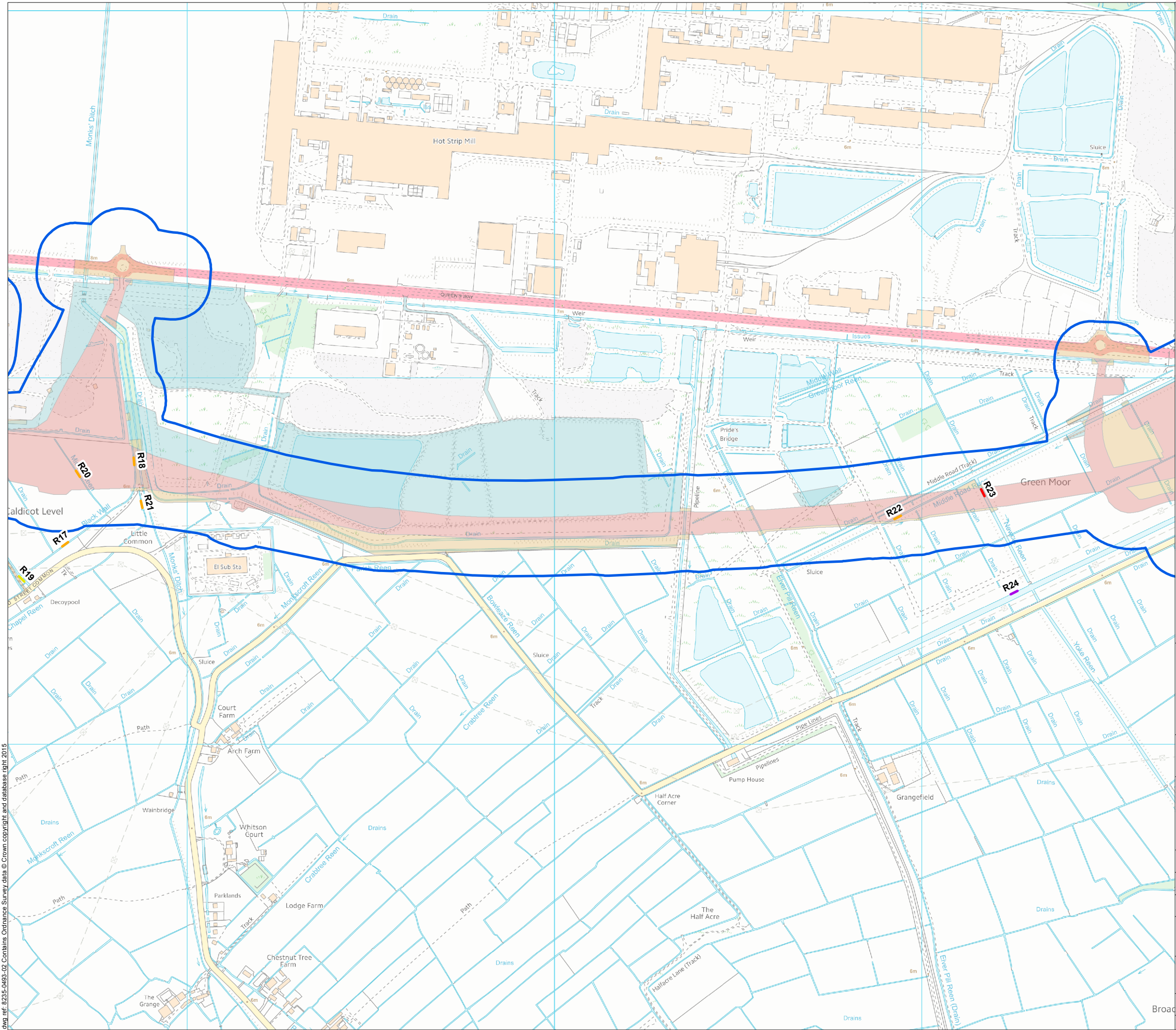
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Appendix SR10.35 SSSI Mitigation Strategy

2015 Aquatic Macrophytes Survey

Figure: 3e	Revision: -
Date: December 2016	Status: AT ISSUE
Drawn: CR	Checked: JW





Legend

Permanent highway land within fenceline, including water treatment areas

Other permanent land take e.g. mitigation planting.

Temporary construction land

100m Study area

Aquatic Macrophyte 20m Sample

Low

Moderate

Moderate-High

High

Very High

Study area shown reflects the scheme design at the time of the survey



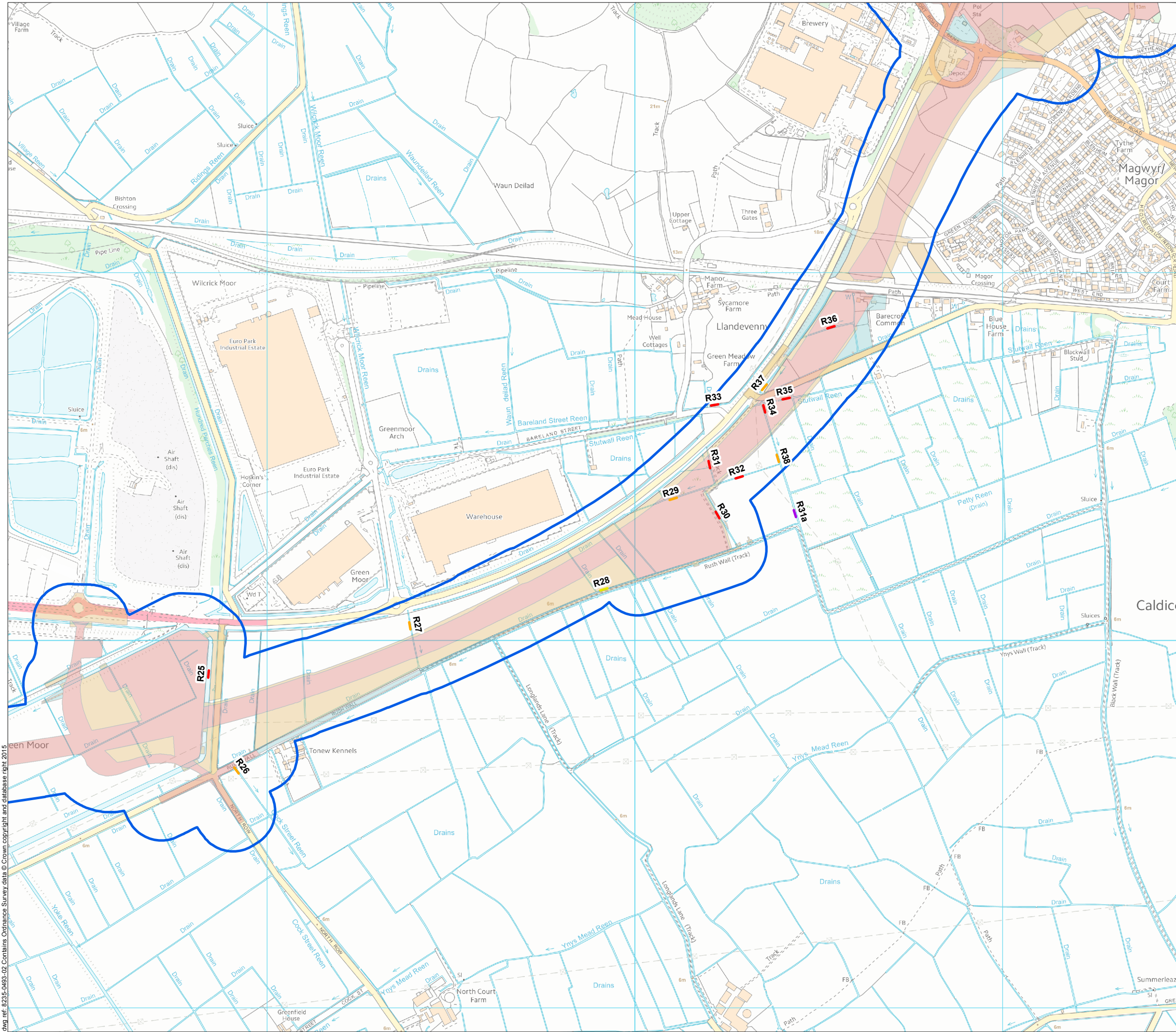
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Appendix SR10.35 SSSI Mitigation Strategy

2015 Aquatic Macrophytes Survey

Figure: 3f	Revision: -
Date: December 2016	Status: AT ISSUE
Drawn: CR	Checked: JW





Legend

- Permanent highway land within fenceline, including water treatment areas
- Other permanent land take e.g. mitigation planting.
- Temporary construction land
- 100m Study area

Aquatic Macrophyte 20m Sample

- Low
- Moderate
- Moderate-High
- High
- Very High

Study area shown reflects the scheme design at the time of the survey


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Appendix SR10.35 SSSI Mitigation Strategy

2015 Aquatic Macrophytes Survey

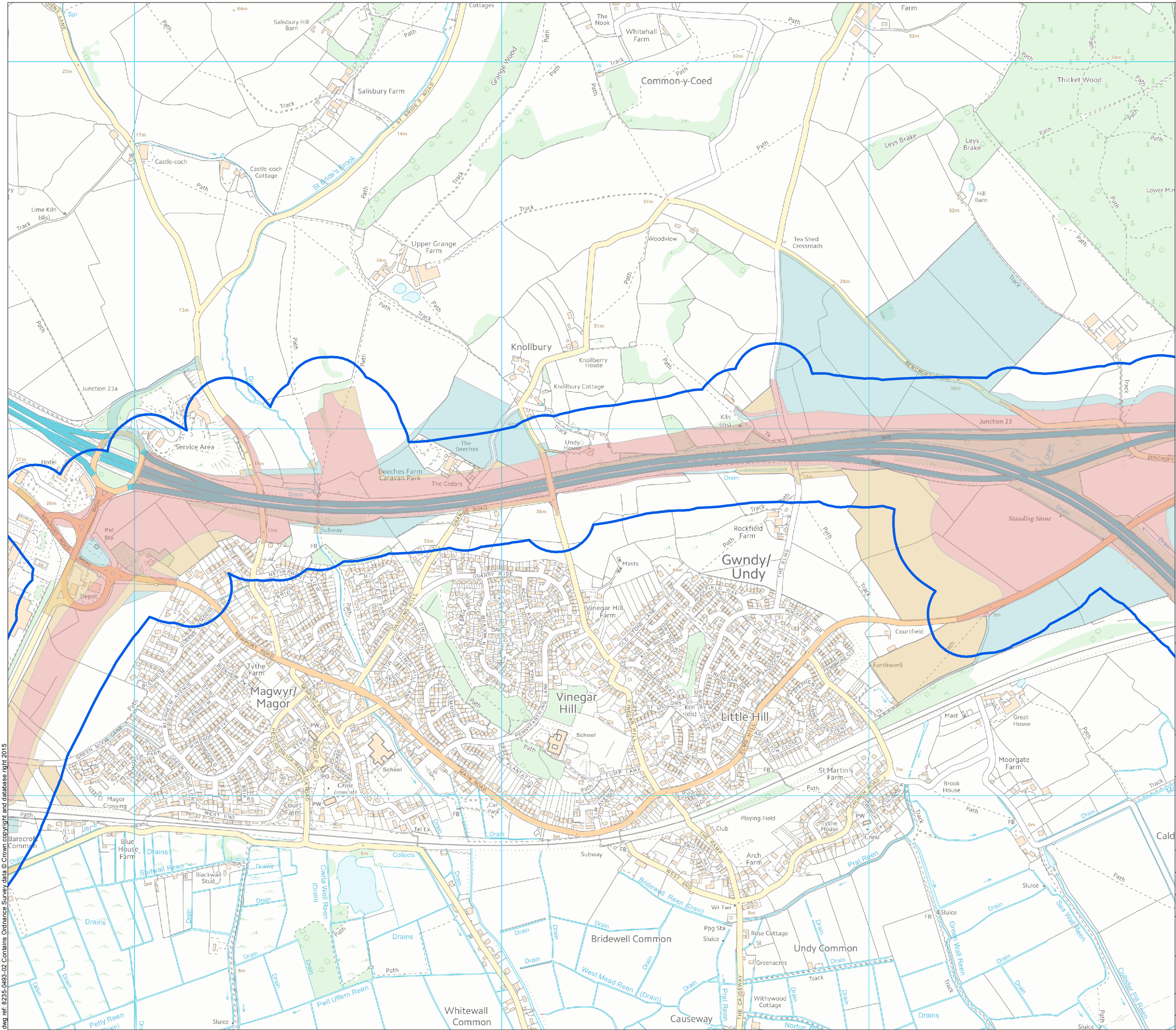
Figure: 3g	Revision: -
Date: December 2016	Status: AT ISSUE
Drawn: CR	Checked: JW

Scale: A3 @ 1:10,000

0 250 500m

N

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dwg ref. 8235-0493-02



Legend

- Permanent highway land within fenceline, including water treatment areas
- Other permanent land take e.g. mitigation planting.
- Temporary construction land
- 100m Study area
- Aquatic Macrophyte 20m Sample**
 - Low
 - Moderate
 - Moderate-High
 - High
 - Very High

Study area shown reflects the scheme design at the time of the survey



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Appendix SR10.35 SSSI Mitigation Strategy

2015 Aquatic Macrophytes Survey

Figure: 3h

Revision: -

Date: December 2016

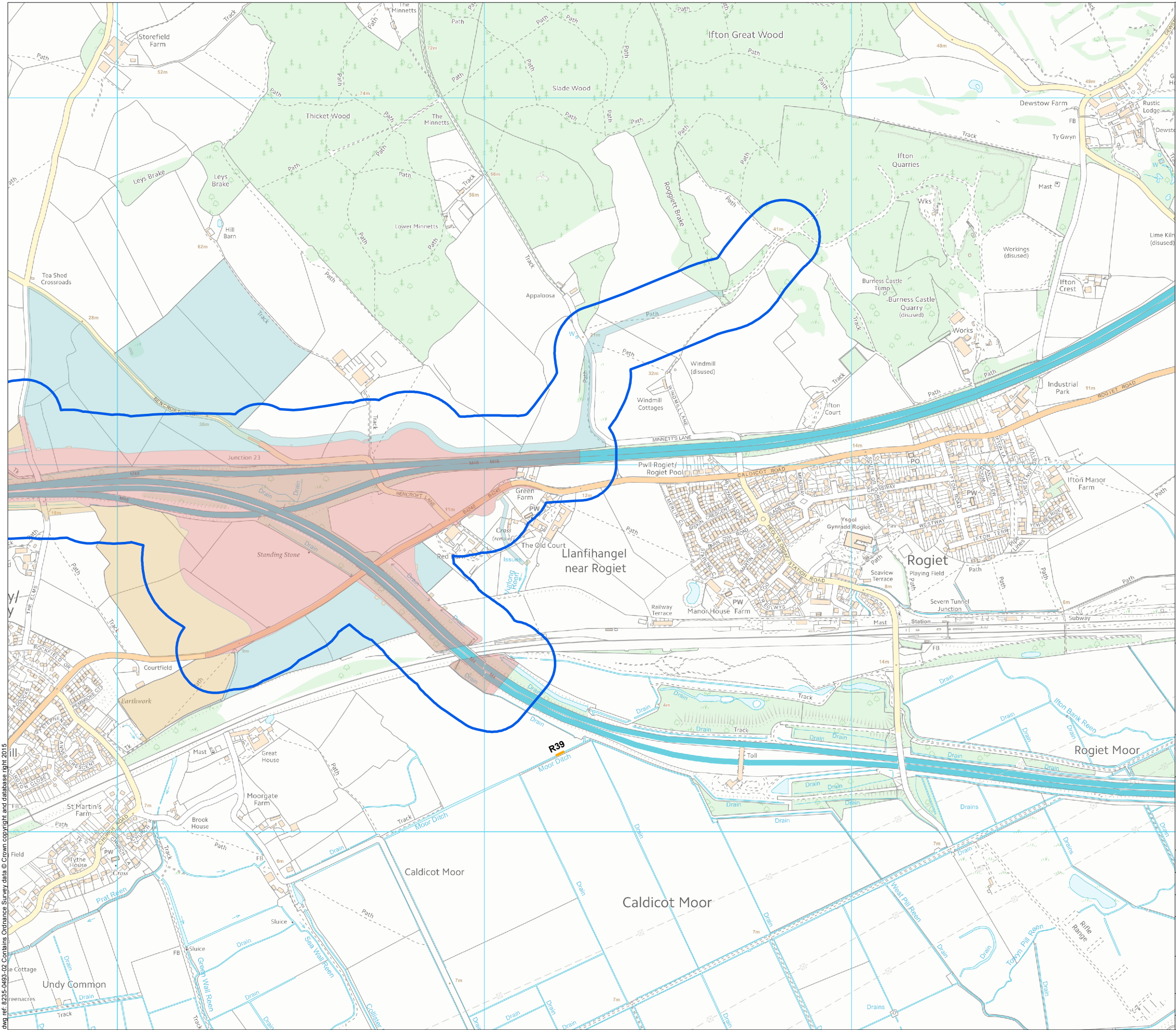
Status: AT ISSUE

Drawn: CR

Checked: JW

Scale: A3 @ 1:10,000
0 250 500m





Legend

- Permanent highway land within fenceline, including water treatment areas
- Other permanent land take e.g. mitigation planting.
- Temporary construction land
- 100m Study area

Aquatic Macrophyte 20m Sample

- Low
- Moderate
- Moderate-High
- High
- Very High

Study area shown reflects the scheme design at the time of the survey



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Appendix SR10.35 SSSI Mitigation Strategy

2015 Aquatic Macrophytes Survey

Figure: 3i	Revision: -
Date: December 2016	Status: AT ISSUE
Drawn: CR	Checked: JW

Scale: A3 @ 1:10,000
0 250 500m



Appendix

Appendix A Summary of SSSI Features & Feature Sheets

Welsh Government

M4 Corridor around Newport

SSSI Mitigation Strategy
Appendix A

Summary of SSSI Features &
Feature Sheets

Contents

	Page
1	Summary of SSSI Features and Feature Sheets
	1

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- Annex A – St Brides SSSI Feature Sheets
- Annex B – Nash and Goldcliff SSSI Feature Sheets
- Annex C – Whitson SSSI Feature Sheets
- Annex D – Redwick and Llandeenny Feature Sheets

1 Summary of Gwent Levels SSSI Features and Feature Sheets

1.1 Summary of Gwent Levels SSSI Features

Features as Described in ES Chapter 10	SSSI Features Sheet
Gwent Levels – St Brides SSSI	
Reen and ditch habitat	A. Terrestrial: Standing Water Ditch/ditches Other
Plant species including: <i>Ranunculus trichophyllus</i> <i>Potamogeton berchtoldii</i> <i>Lathyrus nissolia</i> <i>Thalictrum flavum</i>	B. Plant <i>Potamogeton trichoides</i> D. Assemblage Assemblage of Aquatic and Marginal RDB & Nationally Scarce Vascular Plants: <i>Hydrocharis morsus-ranae</i> <i>Potamogeton trichoides</i> <i>Oenanthe fistulosa</i> <i>Sagittaria sagittifolia</i>
Insects and other invertebrates (aquatic) including: <i>Chrysogaster macquarti</i> <i>Hydaticus transversalis</i> <i>Stenomicroa cogani</i>	C. Animal <i>Coenagrion pulchellum</i> <i>Odontomyia ornata</i> <i>Hydrophilus piceus</i> <i>Plateumaris braccata</i> <i>Hydaticus transversalis</i> D. Assemblage Grazing Levels Invertebrate assemblage (See list at Annex A)
Shrill carder bee	C. Animal Shrill carder bee
Gwent Levels – Nash and Goldcliff SSSI	
Reen and ditch habitat	A. Terrestrial Standing water Ditch/ditches Swamp Other
Plant Species including: <i>Wolffia arrhiza</i> <i>Ceratophyllum submersum</i> <i>Ceratophyllum demersum</i>	B. Plant <i>Wolffia arrhiza</i> <i>Potamogeton trichoides</i> D. Assemblage Assemblage of Aquatic and Marginal RDB & Nationally Scarce Vascular Plants: <i>Wolffia arrhiza</i> <i>Hydrocharis morsus-ranae</i> <i>Oenanthe fistulosa</i> <i>Potamogeton trichoides</i> <i>Ceratophyllum submersum</i>
Insects and other invertebrates (aquatic): <i>Odontomyia ornata</i> <i>Oplodontha viridula</i> <i>Hydaticus transversalis</i>	C. Animal <i>Hydaticus transversalis</i> <i>Hydrophilus piceus</i> <i>Odontomyia ornata</i> D. Assemblage Grazing levels invertebrate assemblage (See list at Annex B)
Shrill carder bee	

Features as Described in ES Chapter 10	SSSI Features Sheet
Gwent Levels – Whitson SSSI	
Reen and ditch habitat	A. Terrestrial Standing water Ditch/ditches Swamp Other
Plant species including: <i>Potamogeton trichoides</i> <i>Carex elata</i> <i>Sagittaria sagittifolia</i>	B. Plant <i>Potamogeton trichoides</i> <i>Carex elata</i> D. Assemblage Assemblage of Aquatic and Marginal RDB & Nationally Scarce Vascular Plants: <i>Wolffia arrhiza</i> <i>Hydrocharis morsus-ranae</i> <i>Potamogeton trichoides</i> <i>Oenanthe fistulosa</i> <i>Sagittaria sagittifolia</i>
Insects and other invertebrates (aquatic) including: <i>Anthomyza bifasciata</i> <i>Coptophlebia volucris</i> <i>Hydrophilus piceus</i> .	C. Animal <i>Coenagrion pulchellum</i> <i>Hydaticus transversalis</i> <i>Hydrophilus piceus</i> <i>Limnoxenus niger</i> <i>Odontomyia ornata</i> D. Assemblage Grazing levels invertebrate assemblage (See list at Annex C)
Shrill carder bee	C. Animal Shrill carder bee
Gwent Levels – Redwick and Llandeenny SSSI	
Reen and ditch habitat	A. Terrestrial Standing water Ditch/ditches Other
Plant species including: <i>Myriophyllum verticillatum</i> <i>Ranunculus baudotii</i>	B. Plant <i>Potamogeton trichoides</i> D. Assemblage Assemblage of Aquatic and Marginal RDB & Nationally Scarce Vascular Plants: <i>Wolffia arrhiza</i> <i>Hydrocharis morsus-ranae</i> <i>Oenanthe fistulosa</i> <i>Sagittaria sagittifolia</i> <i>Potamogeton trichoides</i>
Insects and other invertebrates (aquatic) including: <i>Chalcis sispes</i> <i>Scirtes orbicularis</i> <i>Pharhelophilus consimilis</i> .	C. Animal <i>Hydaticus transversalis</i> <i>Hydrophilus piceus</i> <i>Odontomyia ornata</i> <i>Limnoxenus niger</i> D. Assemblage Grazing levels invertebrate assemblage (See list at Annex D)
Shrill carder bee	

Annexes

Annex A – St Brides SSSI Feature Sheets

SSSI Feature Sheet**Gwent Levels - St. Brides(SSSI)****A. Terrestrial****Area of Search: GWENT**

CCW phase 1	CCW NVC	Feature Description	Hectares	Guidelines/Reference
Terrestrial - Independent				
G.1		Standing water()(Dwr llonydd)	74	6.5.2.1;6.5.2.2;6.5.2.3
	XG07	Ditch/ditches		6.5.2.1;6.5.2.2;6.5.2.3
Total Terrestrial - Independent			74	
Terrestrial - Other				
J.5		Other: Others()(Arall: Arall)	1248	Boundary
Total Terrestrial - Other			1248	
Total Terrestrial - GWENT			1322	
Total Terrestrial			1322	

B. Plant

Feature Description	Number	Guidelines/Reference
Plant - Independent		
Potamogeton trichoides(Hairlike Pondweed)(Dyfrllys blewynnaidd)		11.3.6
Total Plant - Independent	0	
Total Plant -	0	
Total Plant	0	

C. Animal

Feature Description	Number	Guidelines/Reference
Animal - Independent		
Coenagrion pulchellum(Variable Damselfly)(Coenagrion amrywiol)		19.2.2.2
Odontomyia ornata(a soldierfly)(pryf soldiwr)		17.3.4.5
Hydrophilus piceus(Great Silver Water Beetle)(Chwilen ddwr fawr arian)		17.3.4.5
Plateumaris braccata(a leaf beetle)(chwilen y dail)		17.3.4.6
Bombus sylvarum(Shrill Carder Bee)(Cardwenynen fain)		17.3.4.6
Hydaticus transversalis(a water beetle)(chwilen ddwr)		17.3.4.5
Total Animal - Independent	0	
Total Animal -	0	
Total Animal	0	

D. Assemblage

Feature Description	Amount	Guidelines/Reference
Grazing levels invertebrate assemblage()(Casgliad o greaduriaid di-asgwrn-cefn s y'n gysylltiedig a lefelau pori)		17.3.1
Assemblage of Aquatic and Marginal RDB & Nationally Scarce Vascular Plants()()		6.5.2.2
Hydrocharis morsus-ranae		6.5.2.2
Potamogeton trichoides		6.5.2.2
Oenanthe fistulosa		6.5.2.2
Sagittaria sagittifolia		6.5.2.2
Total Assemblage	0	

F. Geology**G. Data Source**

H. Notes	
Notes	
Area of ditch derived from measured map of ditch length, assuming standard width , as follows: 41523m of reen at 7m width = 29ha 151939m of ditch at 3m width = 45ha Ditch width can vary depending on rainfall, state of tide and method of measurement. Other habitats added to bring area up to site area, includes a range of non-qualifying habitats such as roads, buildings, improved grassland etc. This land is included within the SSSI because its management can have a significant impact on the conservation status of the ditches and reens. Invertebrate data added on advice of CCW invertebrate specialists. Bombus is not a notified feature, but does qualify. Potamogeton trichoides added as an independently qualifying feature on CCW specialist advice. Wolfia arrhiza has not been recorded on this SSSI, but if it were, it would form part of the plant assemblage. It has been recorded at other sites on the Gwent Levels In addition, the following county and regional rarities have been recorded at this site: Bidens cernua, Carex pseudocyperus, Catabrosa aquatica, Ceratophyllum demersum, Impatiens capensis, Lemna polyrrhiza, Oenanthe aquatica, Potamogeton berchtoldii, P. pusillus, Ranunculus trichophyllus, Sparganium emersum and Zannichellia palustris.	

Annex B – Nash and Goldcliff SSSI Feature Sheets

SSSI Feature Sheet**Gwent Levels - Nash and Goldcliff(SSSI)****A. Terrestrial****Area of Search: GWENT**

CCW phase 1	CCW NVC	Feature Description	Hectares	Guidelines/Reference	Notified	Qualified
Terrestrial - Independent						
G.1		Standing water()(Dwr llonydd)	49.5	6.5.2.1;6.5.2.2;6.5.2.3	Y	Y
	XG07	Ditch/ditches	49.5	6.5.2.1;6.5.2.2;6.5.2.3		
Total Terrestrial - Independent			49.5			
Terrestrial - Complementary						
F.1		Swamp()(Siglen)	17.2	Part B 6.3		
Total Terrestrial - Complementary			17.2			
Terrestrial - Other						
J.5		Other: Others()(Arall: Arall)	887.3	Boundary		
Total Terrestrial - Other			887.3			
Total Terrestrial - GWENT			954			
Total Terrestrial			954			

B. Plant

Feature Description	Number	Guidelines/Reference	Notified	Qualified
Plant - Independent				
Wolffia arrhiza(Rootless Duckweed)(Llinad di-wraidd)		11.3.6		Y
Potamogeton trichoides(Hairlike Pondweed)(Dyfrllys Blewynnaidd)		11.3.6		Y
Total Plant - Independent	0			
Total Plant -	0			
Total Plant	0			

C. Animal

Feature Description	Number	Guidelines/Reference	Notified	Qualified
Animal - Independent				
Hydaticus transversalis(a water beetle)(chwilen ddwr)		17.3.4.5	Y	Y
Hydrophilus piceus(Great Silver Water Beetle)(Chwilen Ddwr Fawr Arian)		17.3.4.5	Y	Y
Odontomyia ornata(a soldierfly)(pryf soldiwr)		17.3.4.5	Y	Y
Total Animal - Independent	0			
Total Animal -	0			
Total Animal	0			

D. Assemblage

Feature Description	Amount	Guidelines/Reference	Notified	Qualified
Grazing levels invertebrate assemblage(Grazing levels invertebrate assemblage)(C asgliad o greaduriaid di-asgwrn-cefn sy'n gysylltiedig a lefelau pori)		17.3.1	Y	Y
Assemblage of Aquatic and Marginal RDB & Nationally Scarce Vascular Plants(Assemblage of Aquatic and Marginal RDB & Nationally Scarce Vascular Plants)(Casgliad o Blanhigion Fasgwlaidd Dyfrol ac Ymylol a restrwyd yn yr RDB ac a		6.5.2.2		Y

gofnodwyd yn Anfynych yn Genedlaethol)				
Wolffia arrhiza			6.5.2.2	
Hydrocharis morsus-ranae			6.5.2.2	
Oenanthe fistulosa			6.5.2.2	
Potamogeton trichoides			6.5.2.2	
Ceratophyllum submersum			6.5.2.2	
Total Assemblage		0		
F. Geology				
G. Data Source				
H. Notes				
Notes				
The areas of the ditch habitat have been calculated from the lengths of ditch and reens, and multiplying by an estimated average width. Actual area of ditch habitat will depend on rainfall, state of tide and method of calculating ditch width. The figures used were: 26455m of reens at 7m width = 18.5ha 104789m of ditch at 3m width = 31ha Ditch lengths come from mapinfo layer, and do not take account of ditches shared between neighbouring SSSIs. 'Other' habitat includes a range of non-qualifying habitats such as roads, buildings, improved grassland etc. This is included because the management of this land can have a significant impact on the conservation status of the ditches and reens. The SSSI formerly had lapwing, redshank, Cetti's warbler and avocet as independently qualifying features, but these now fall within the Newport Wetlands SSSI, following boundary amendments in 2010. Invertebrate qualifying species taken from list supplied by CCW invertebrate specialists Wolffia arrhiza added as feature following CCW specialist advice. The species qualifies as an independent feature here because it is a particularly good population. The following species occur at this site, that are part of the of the Severn estuary SPA bird assemblage: gadwall, wigeon, shoveler, pochard, shelduck, dunlin, redshank and curlew.. These do not occur in sufficient numbers to qualify as SSSI features on this SSSI. In addition, a number of county and regional rarities have been recorded at this site: Bidens cernua, Butomus umbellatus, Carex pseudocyperus, Ceratophyllum demersum, Lemna polyrrhiza, Potamogeton bertholdii, P. pusillus, Ranunculus circinatus and Zannichellia palustris. Otter are known to occur regularly. They are not considered an SSSI feature, because breeding on the SSSI has not been proved.				

Annex C – Whitson SSSI Feature Sheets

SSSI Feature Sheet**Gwent Levels - Whitson(SSSI)****A. Terrestrial****Area of Search: GWENT**

CCW phase 1	CCW NVC	Feature Description	Hectares	Guidelines/Reference	Notified	Qualified
Terrestrial - Independent						
G.1		Standing water()(Dwr llonydd)	49	4.3.1;4.3.2;6.5.2.1;6.5.2.2;6.5.2.3	Y	Y
	XG07	Ditch/ditches	49	6.5.2.1;6.5.2.2;6.5.2.3		
Total Terrestrial - Independent			49			
Terrestrial - Other						
J.5		Other: Others()(Arall; Arall)	877.4	Boundary		
Total Terrestrial - Other			877.4			
Total Terrestrial - GWENT			926.4			
Total Terrestrial			926.4			

B. Plant

Feature Description	Number	Guidelines/Reference	Notified	Qualified
Plant - Independent				
Potamogeton trichoides(Hairlike Pondweed)(Dyfrllys Blewynnaidd)		11.3.6		Y
Carex elata(Tufted Sedge)(Hesgen Duswog)		11.3.6		Y
Total Plant - Independent	0			
Total Plant -	0			
Total Plant	0			

C. Animal

Feature Description	Number	Guidelines/Reference	Notified	Qualified
Animal - Independent				
Bombus sylvarum(Shrill Carder Bee)(Cardwenynen Fain)		17.3.4.6	N	Y
Coenagrion pulchellum(Variable Damselfly)(Coenagrion Amrywiol)		19.2.2.1	Y	Y
Hydaticus transversalis(a water beetle)(chwilen ddwr)		17.3.4.5	Y	Y
Hydrophilus piceus(Great Silver Water Beetle)(Chwilen Ddwr Fawr Arian)		17.3.4.5	Y	Y
Limnoxenus niger(a scavenger water beetle)(chwilen)		17.3.4.6	Y	Y
Odontomyia ornata(a soldierfly)(pryf soldiwr)		17.3.4.5	Y	Y
Total Animal - Independent	0			
Total Animal -	0			
Total Animal	0			

D. Assemblage

Feature Description	Amount	Guidelines/Reference	Notified	Qualified
Grazing levels invertebrate assemblage(Grazing levels invertebrate assemblage)(C asgliad o greaduriaid di-asgwrn-cefn sy'n gysylltiedig a lefelau pori)		17.3.1	Y	Y
Assemblage of Aquatic and Marginal RDB & Nationally Scarce Vascular Plants(Assem)		6.5.2.2		Y

blage of Aquatic and Marginal RDB & Nationally Scarce Vascular Plants)(Casgliad o Blanhigion Fasgwlaidd Dyfrol ac Ymylol a restrwyd yn yr RDB ac a gofnodwyd yn Anfynych yn Genedlaethol)				
<i>Wolffia arrhiza</i>		6.5.2.2		
<i>Hydrocharis morsus-ranae</i>		6.5.2.2		
<i>Potamogeton trichoides</i>		6.5.2.2		
<i>Oenanthe fistulosa</i>		6.5.2.2		
<i>Sagittaria sagittifolia</i>		6.5.2.2		
Total Assemblage	0			

F. Geology

G. Data Source

H. Notes

Notes

The areas of ditch habitat were calculated by using the length of ditch multiplied by an estimated average width, as follows: Reens - 28388m at 7m width = 20ha Ditches - 98207, at 3m width = 29ha The actual area will depend on rainfall, state of tide, how ditch width is measured etc. This figure includes ditches that may form boundaries with adjacent SSSIs. This SSSI formerly had a standing water (brackish) feature, but this was transferred to the Newport Wetlands SSSI following boundary amendments in 2010. The 'other' habitat includes a range of non-qualifying habitats such as roads, improved grassland, buildings etc. It also includes an unknown area of marshy grassland, thought to be a complementary feature. This land is included within the SSSI because its management can have a significant impact on the conservation status of the ditches and reens. Invertebrate species are included on the advice of CCW invertebrate specialists. *Bombus* is not a notified feature, but is qualifying. *Potamogeton trichoides* and *Carex elata* added as features following CCW specialist advice. This SSSI formerly had several independently qualifying bird features, but these were transferred to the Newport Wetlands SSSI following boundary amendments in 2010. The following species that form part of the Severn Estuary SPA all occur at this site: Bewick's swan, gadwall, wigeon, shoveler, pochard, shelduck, dunlin, redshank and curlew. They do not occur in sufficient numbers to qualify as features on this SSSI. Otter occur regularly on the SSSI, but have not been proved to breed. If breeding was proved, this species would become an SSSI feature. The following regional and county rarities have been recorded on this SSSI: *Catabrosa aquatica*, *Ceratophyllum demersum*, *Lemna polyrrhiza*, *Potamogeton berchtoldii*, *P. pusillus*, *Ranunculus circinatus*, *R. trichophyllus*, *Rumex palustris*, *Samolus valerandi* and *Zannichellia palustris*.

Annex D – Redwick and Llandevenny SSSI Feature Sheets

SSSI Feature Sheet**Gwent Levels - Redwick and Llandeenny(SSSI)****A. Terrestrial****Area of Search: GWENT**

CCW phase 1	CCW NVC	Feature Description	Hectares	Guidelines/Reference
Terrestrial - Independent				
G.1		Standing water()(Dwr llonydd)	52	6.5.2.1;6.5.2.2;6.5.2.3
	XG07	Ditch/ditches		6.5.2.1;6.5.2.2;6.5.2.3
Total Terrestrial - Independent			52	
Terrestrial - Other				
J.5		Other: Others()(Arall: Arall)	888	Boundary
Total Terrestrial - Other			888	
Total Terrestrial - GWENT			940	
Total Terrestrial			940	

B. Plant

Feature Description	Number	Guidelines/Reference
Plant - Independent		
Potamogeton trichoides(Hairlike Pondweed)(Dyfrllys blewynnaidd)		11.3.6
Total Plant - Independent	0	
Total Plant -	0	
Total Plant	0	

C. Animal

Feature Description	Number	Guidelines/Reference
Animal - Independent		
Hydaticus transversalis(a water beetle)(chwilen ddwr)		17.3.4.5
Hydrophilus piceus(Great Silver Water Beetle)(Chwilen ddwr fawr arian)		17.3.4.5
Odontomyia ornata(a soldierfly)(pryf soldiwr)		17.3.4.5
Limnoxenus niger(a scavenger water beetle)(chwilen)		17.3.4.6
Total Animal - Independent	0	
Total Animal -	0	
Total Animal	0	

D. Assemblage

Feature Description	Amount	Guidelines/Reference
Grazing levels invertebrate assemblage()(Casgliad o greaduriaid di-asgwrn-cefn s y'n gysylltiedig a lefelau pori)		17.3.1
Assemblage of Aquatic and Marginal RDB & Nationally Scarce Vascular Plants()()		6.5.2.2
Wolffia arrhiza		6.5.2.2
Hydrocharis morsus-ranae		6.5.2.2
Oenanthe fistulosa		6.5.2.2
Sagittaria sagittifolia		6.5.2.2
Potamogeton trichoides		6.5.2.2
Total Assemblage	0	

F. Geology**G. Data Source**

H. Notes	
Notes	
The areas for the ditch habitats have been calculated by multiplying the length by an estimate of average width, as follows: Reens 33674m at 7m width = 23.5ha Ditches 98207m at 3m width = 29ha Ditch area will vary depending on rainfall, state of tide and how ditch width is measured. 'Other' habitats include a range of non-qualifying habitats such as roads, buildings, improved grassland etc. This is included within the SSSI because the management of this land can have a significant impact on the conservation status of the ditches and reens. Invertebrate species are those suggested by CCW invertebrate specialists. Freshwater plant assemblage included on CCW Freshwater specialist advice. Gwent Levels - Redwick and Llandeenny also supports the following county and regional rarities: <i>Alisma lanceolatum</i>, <i>Bidens cornua</i>, <i>Carex pseudocyperus</i>, <i>Catabrosa aquatica</i>, <i>Ceratophyllum demersum</i>, <i>Lemna polyrrhiza</i>, <i>Potamogeton berchtoldii</i>, <i>P. pusillus</i>, <i>Ranunculus circinatus</i> and <i>Zannichellia palustris</i>. <i>Myriophyllum verticillatum</i> has not been recorded on this SSSI, but has been noted on the adjacent Magor Marsh SSSI. If this species were to be discovered at Gwent Levels - Redwick and Llandeenny, it would be part of the plant assemblage.	