

Welsh Government

M4 Corridor around Newport

Environmental Statement Volume 3:
Appendix 10.35

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 (M4CaN, known as the Scheme), located between Castleton and Magor.

1.1.2 The new section of motorway 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.

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 is low lying with an elevation typically of between 5 – 6 m above ordnance datum (AOD) and is drained by an extensive network of tide-locked freshwater watercourses, known locally as reens.

1.2.3 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 following:

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

1.2.4 The Welsh Government is under a duty imposed by Section 28G of the Wildlife and Countryside Act 1981 to take reasonable steps to further the conservation and enhancement of the features for which the Gwent Levels SSSIs are designated. More generally, the Welsh Government is also under a duty to conserve biodiversity under Section 40 of the Natural Environmental and Rural Communities (NERC) Act 2006. Both duties would be strengthened by the Environment (Wales) Bill once that has received Royal Assent (anticipated during 2016).

1.2.5 The special features of each of these SSSIs include the following.

- Reen and ditch habitat, which support 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 invertebrates (aquatic), 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.

- Shril 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*.

1.2.6 The reens and ditches also provide habitat for protected species including otter, water vole *Arvicola amphibius*, grass snake *Natrix natrix* and amphibians.

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

1.2.8 The land within the Gwent Levels 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 (or ridge and furrow), which connect to a system of interconnected ditches, the largest of which are known as reens, which eventually flow into the Severn Estuary.

1.2.9 Pumps and water control structures, including sluices and penstocks, are used to control water levels. In the summer, water levels are kept high to provide drinking water for stock and in winter the boards are removed to allow floodwater to drain into the Severn Estuary. The reens and ditches are also periodically weeded and cast (cleared out). The watercourses are managed by farmers and Natural Resources Wales (NRW).

1.2.10 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.

- 1.2.11** 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 consequent 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 Reen Mitigation Strategy (Chapter 2 of the M4CaN Environmental Statement (ES)), which includes the replacement of 2,568 m of reens with 2,657 m of new reens and 9,136 m of field ditches with 9,771 m of new field ditches) and provision of suitable habitat for shrill carder bee, principally in the form of species diverse meadow grassland along the embankments of the new section of motorway (as shown on the Environmental Management Plan, Figure 2.6 of the ES).

- 1.3.3** However, in addition to the loss of reen habitat it is also the case that some 124.20 hectares (ha) of land within the Gwent Levels SSSIs (between the reens) would be affected by the proposed new section of motorway. The land affected is summarised in Table 1.1.

Table 1.1: Land within the Gwent Levels SSSIs Affected

Land Affected	West of River Usk (ha)	East of River Usk (ha)	Total (ha)
Temporary / easement loss			
Grazing Marsh/grassland	8.30	17.48	25.78
Other land	3.69	15.78	19.47
Permanent Loss			
Grazing Marsh	22.05	38.60	60.65
Other land	5.83	12.47	18.30
Total			
Grazing Marsh	30.35	56.08	86.43
Other land	9.52	28.25	37.77

- 1.3.4** 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, Whiston, and Redwick and Llandeenny SSSIs.

- 1.3.5** Grazing marsh includes 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.

1.3.6 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.

1.3.7 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.

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 as a result of the Scheme 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: Maerdy Farm, Tatton Farm and Caldicot Moor. The total area covered by the three sites is approximately 154 hectares.

1.4.3 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 potential 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 Maerdy Farm Mitigation Area

2.1.1 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 28538 83244. The site covers approximately 24 ha.

2.1.2 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 1a shows the habitats located within and surrounding the site.

2.1.3 The Mitigation Area forms part of the Gwent Levels - St Brides SSSI. Features of ecological interest within the wider St Brides SSSI include the following.

- **Reens, which support a number of interesting plant species** most notably thread-leaved water-crowfoot *Ranunculus trichophyllus* and small pondweed *Potamogeton berchtoldii*.
- **Reen banks and green lane habitats, which are host to relict meadow plant species** such as the regionally notable grass vetchling *Lathyrus nissolia* and common meadow-rue *Thalictrum flavum*.
- **A rich invertebrate community** with a number of nationally notable and notable marshland species, e.g. the true fly *Chrysogaster macquarti* and the beetle *Hydaticus transversalis*. The site is the only area on the Gwent Levels where the rare fly *Stenomicrogaster cogani* has been recorded.

2.1.4 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 1a. Further details are provided in Volume 3 (Appendices 10.2-10.33) of the ES.

2.1.5 Signs of water vole and otter activity were recorded along a 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 the northern boundary reen to be of high quality with regard to plant species diversity and rarity (see R5, R6 and R7 on Figure 3b).

2.2 Tatton Farm Mitigation Area

2.2.1 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 35477 86123. The site covers approximately 17 hectares.

2.2.2 The farm is a Welsh Government owned and tenanted grassland farm. The farm house does not form part of the current farm tenancy and is currently vacant and derelict. The grassland farm 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.

2.2.3 Figure 1b shows the habitats located within and surrounding the Tatton Farm Mitigation Area. The Mitigation Area largely comprises species-poor semi-improved grassland fields bordered by reens, ditches and hedgerows.

2.2.4 Tatton Farm forms part of the Gwent Levels - Nash and Goldcliff SSSI. Features of ecological interest within the wider Nash and Goldcliff SSSI include the following.

- **A rich diversity of aquatic plants associated with reens and ditches**, including many rare or scarce species. The interesting plant community includes two species of hornwort, *Ceratophyllum submersum* and *C. demersum*, which grow together. The site is one of only two sites in Wales (the other being the Gwent Levels - Whitson SSSI) where Least Duckweed can occasionally be found.
- **Over 350 species of insects and other invertebrates**, many of which are very rare, including the great silver water beetle, which is found only on a few other sites in southern England.

2.2.5 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.

2.2.6 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 1b. Further details are provided in Volume 3 (Appendices 10.2-10.33) of the ES.

2.2.7 Water vole activity was recorded along watercourses on the site and in the surrounding area. Great crested newts were 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.

2.3 Caldicot Moor Mitigation Area

2.3.1 Caldicot Moor Mitigation Area is located to the west of Undy, south of the M4 and is centred around OS grid Reference ST 45253 86806. The site covers approximately 113 ha.

2.3.2 Figure 1c shows the habitats located within and surrounding the Caldicot Moor Mitigation Area. The Mitigation Area 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 Mitigation Area is located outside the Gwent Levels SSSI but immediately adjacent to the Gwent Levels – Magor and Undy SSSI. Features of ecological interest within the wider Magor and Undy SSSI that are highlighted in the NRW citation for the site include the following.

- **An invertebrate community including 43 nationally rare and notable invertebrate species**, such as the soldier fly *Stratiomys furcata*, the snail-killing fly *Pherbellia brunnipes* and the water beetle *Haliphus mucronatus*.
- **A number of rare and notable aquatic plant species**, including the pondweed species *Potamogeton trichoides* and *P. berchtoldii*, and the narrow-leaved water plantain *Alisma lanceolatum*.

2.3.4 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.

2.3.5 Lapwings were observed breeding on site in 2015.

3 Objectives of the SSSI Mitigation Strategy

3.1.1 The ecology and nature conservation objectives of this Mitigation Strategy have been developed in consultation with NRW and take into account the results of baseline ecology surveys undertaken in order to inform the EIA of the M4CaN Scheme and the features of known ecological interest in the Gwent Levels SSSIs. 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.

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 main reens and watercourses, 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 grips;** and
 - **creating scrapes.**

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.**

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 Scheme. 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 the objectives of NRW (NRW, 2008) and inform ongoing management.

3.2 Area-specific Mitigation Objectives

Maerdy Farm Mitigation Area

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

3.2.2 Due to ongoing pollution concerns relating to ditches located alongside the adjacent railway line, these will remain unconnected to other watercourses and in-field grips on the Maerdy Farm Mitigation Area in order to help prevent the spread of contamination.

- Continue the current **NRW water level management regime**.
- **Enhance existing watercourses** (see Wi-Wvii on Figure 2a) 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 (see fields marked RG on Figure 2a); and
 - creating scrapes in wetter parts of the site, ensuring no physical connection is created between the scrapes and watercourses located adjacent to the railway line (see scrapes marked Si and Sii on Figure 2a for indicative locations that may be suitable for scrapes due to the fact they typically lie wet).
- **Arable reversion** to species diverse grassland using an appropriate grass seed mix (see fields marked AR, on Figure 2a).
- **Manage grassland in order to encourage the establishment and spread of a diversity of plant species** (see fields marked GE on Figure 2a) through:
 - **no(/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.
- **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 H1i-H1iii 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 (see Bi and Bii on 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.

Tatton Farm Mitigation Area

3.2.3

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

- **Continue the current NRW water level management regime** as described above.

- **Enhance existing watercourses in order to benefit a diversity of species of ecology and nature conservation interest** (see Wi-Wxii on Figure 2b), including aquatic plants and invertebrates, by:
 - **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;
 - establishing a **rotational management plan in order to remove silt build-up and thin aquatic vegetation** of potential value to a diversity of habitats with varying degrees of ground cover and varying opportunities;
 - **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 lost field ditches and/or grips and creating scrapes and/or ponds (see fields marked RG, and scrapes marked Si-Siii, on Figure 2b).
- **Enhance the plant species diversity in grassland fields (see fields marked GE on Figure 2b) through:**
 - the introduction of an **appropriate grass seed mixes**;
 - use of **no (/very low) fertiliser input**;
 - **hay cut**; and/or
 - **low intensity grazing/aftermath grazing**.
- **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 2b).
- **Install bat roost boxes** of potential value to the species recorded on site and in the surrounding area (see Bi and Bii on Figure 2b).
- **Establish a monitoring regime** in order to assess the effectiveness of the Mitigation Strategy and inform the ongoing management.

Caldicot Moor Mitigation Area

3.2.4

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

- **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.
- Caldicott 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 Caldicott Moor do not support the SSSI invertebrate and plant species and diversity of interest. Therefore, measures to reduce field drainage (including

potentially significant engineering works to remove 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 Wi-Wxxiv 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 in-field ditches shown on first edition OS maps (to be located across fields marked RG on Figure 2c); and
 - creating scrapes in wetter parts of the site (the exact location will be informed by an assessment of site conditions in order to identify appropriate, wet lying areas located away from overhanging trees and hedgerows).
- **Arable reversion** to species diverse grassland using an appropriate grass seed mix (see fields marked AR, on Figure 2c).
- **Enhance the plant species diversity in existing grassland fields** (see fields marked GE on Figure 2c) through:
 - the introduction of an **appropriate grass seed mix**;
 - use of **no (/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.
- **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 H1 and H2 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.

4.2 Protected Species Requirements

Breeding Birds

- 4.2.1** 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).
- 4.2.2** 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 9.00 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).
- 4.2.3** No habitat containing an active nest will be disturbed, and appropriate measures to protect any active nest will be set in place as directed by an appropriately experienced ecologist. Measures could include the establishment of works-free buffer zones of approximately 5 m in width around the nest (depending on the species; ground-nesting species are likely to need larger buffers). Smaller buffer zones may be considered acceptable under certain conditions, i.e. if the nest is located within dense vegetation that provides a good screen from the works and movement of personnel. However, exceptions will be pre-approved by the advisory ecologist. Buffer zones will exclude all works and storage areas (including vehicles, machinery and equipment). Access by construction workers to buffer zones for active bird nests will be kept to the minimum necessary and where practicable will be excluded, as birds can be disturbed by the movement of people.
- 4.2.4** Buffer zones will be retained until it can be confirmed that any young have fully fledged and left the nest.

Barn Owls

- 4.2.5** 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 Caldicott Moor Mitigation Areas (at least one nest box would be installed in each Mitigation Area).

- 4.2.6** The next boxes would be located at least 50 m from working areas and would be installed under the on site direction of an appropriately experienced ecologist.

Bats

- 4.2.7** 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 could 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

- 4.2.8** Prior to the commencement of any works described below that could directly or indirectly affect a watercourse (i.e. any works located within 8 m of a watercourse), 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, as necessary, an NRW licence would be obtained prior to the commencement of works so as to minimise the potential impact on water voles.

4.3 Management of Existing Watercourses

- 4.3.1** The following rotational management of reens and ditches will be set in place in order 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.

- **Every 12-18 months** – rotational de-weeding of vegetation along reens and other watercourses.
- **Every 12-18 months** - rotational selective thinning of vegetation along reens and other watercourses in order to control more competitive species and open up areas in order to help enable a greater diversity of plant species to become established, including less competitive species.
- **Every 7-10 years** - rotational casting of reens in order to remove leaf litter and silts that could otherwise adversely impact upon water flow and quality.
- **Every 2-3 years** - rotational casting of ditches/drains (e.g. to clear a half/third of the ditches within a Mitigation Area) in order to remove leaf litter and silts.

- 4.3.2** The final timing for management will be informed by monitoring surveys, focusing on water flow and quality, plant species diversity and the presence of invasive plant species. Larger reens may require casting on an annual basis so as to ensure they can carry out their water storage and carrying requirements.

- 4.3.3** Wherever practicable, works will be undertaken between (late August/)/September and December(/January), so as to reduce impacts on species present, including invertebrates, and to enable plants to gain full advantage of the summer months and set seed.

- 4.3.4** However, where the above timing of works is not practicable, works will take into account the potential presence of notable species, including water voles and breeding birds, and measures described in Section 4.3 will be set in place.
- 4.3.5** 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.
- 4.3.6** Excavated silts and vegetation will be spread across the banks of watercourses so as 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 at least 10 m from the banks of the watercourse in order to prevent run-off from carrying the material back to the channel.

4.4 Enhancement of Existing Watercourses

Remedial Works

- 4.4.1** 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; however, works may be required during other times of the year to maintain required flow rates.
- 4.4.2** Natural regeneration of ground vegetation will be the preferred method of regeneration of remediated banks; however, where 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.
- 4.4.3** Where stock access to watercourses for drinking is resulting in the erosion of banks, stock fencing could be installed along the banks of the watercourse in order to prevent access throughout the year or at certain times of the year. A water trough may be required as an alternative drinking source.

Re-profiling

- 4.4.4** Reens across the Gwent Levels vary in width (up to 9 m in width). Measures to enhance watercourses in the Mitigation Areas could include widening of channels to no less than 2 m in width and up to 9 m in width. The wider the watercourse the more sunlight will reach banks and channel, promoting plant growth and potentially benefitting a diversity of invertebrates.
- 4.4.5** The angle of bank slope will also affect the amount of sunlight that reaches the banks and channel and, therefore, a diversity of slope angles from 1:1 to 1:5 will be created.
- 4.4.6** In addition, ledges will be created along the banks of re-profiled watercourses at just above summer and/or winter high water levels, in order to create a diversity of microhabitats of potential value to invertebrates, plants and water voles.
- 4.4.7** The final width and profile of each watercourse to be widened will be pre-approved by NRW so as to ensure there are no adverse impacts on water levels.
- 4.4.8** Works will be undertaken between September/October and February, with preference for between September and December. Heavy machinery will not be tracked across waterlogged soils.

- 4.4.9** Works will be completed in accordance with detailed method statements that will be pre-approved by NRW. Part of the method statement will include how soils containing a diverse seed bank, without invasive plants, will be stored for re-spreading along the re-profiled banks in order to help ensure the establishment of a species-diverse grassland cover and prevent dominance by weed species. Pre-works surveys will be undertaken in order to identify watercourses with good plant species diversity and rarity (as defined in Winder *et al.*, 1991).

Invasive or Weed Species

- 4.4.10** 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.

4.5 Recreation of Historic Field Boundaries and In-field 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. Boundaries could be re-created as drainage ditches.
- 4.5.2** 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-constructed.
- 4.5.3** 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** Grip construction will be undertaken between late August/September and December inclusive 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.
- 4.5.5** Works will not be undertaken on waterlogged soils.
- 4.5.6** 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.
- 4.5.7** The methodology for ditch and grip construction will be pre-approved by NRW. The methodology for grip construction is likely to include a simple method of plough construction in order to construct grips to a:
- maximum depth of approximately 50 cm; and
 - width of approximately 1 m.

4.5.8 The design of new boundary ditches will take into account the design details provided in Section 4.5 above with regard to the re-profiling of existing watercourses.

4.5.9 Excavated/ploughed soils will be spread across the immediately adjacent land.

4.5.10 Although the initial profile of a grip would be relatively steep, over time grazing stock and tractors would result in the compression and slumping of banks.

4.5.11 In order to prevent grips becoming over grown and drying up, they will be re-cut or cleaned every five years, or as necessary, and on a rotational basis so as to ensure some grips remain undisturbed each year.

4.5.12 Management of new boundary ditches will follow the management prescription described in Section 4.4.

4.6 Water Levels

4.6.1 The existing NRW management of water levels by pens ("stanks"), in which wooden planks are used to raise water levels in summer and reduce them in winter, will be maintained so as to continue to benefit invertebrates, wetland plants and stock through the summer months.

4.6.2 Watercourse (including grip) creation and enhancement will be pre-approved by NRW and will take into account the need to maintain water levels in existing watercourses.

4.7 Scrapes

Construction of Scrapes

4.7.1 Scrapes can provide habitat of value to a diversity of species including semi-aquatic plants, invertebrates, amphibians, wetland birds and foraging bats.

4.7.2 Scrape construction will be undertaken between late August/September and December inclusive 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.

4.7.3 Works will not be undertaken on waterlogged soils.

4.7.4 Scrape designs will incorporate the following:

- where practicable, several scrapes located close together (ideally groups of three scrapes) will be preferred over one large scrape (where mowing is to be undertaken, a simpler combined shape may be preferred);
- each scrape to have a minimum footprint of approximately 20 m²;
- very gently sloping, shallow muddy edges;
- irregular shaped margins;
- shallow and not of uniform depth or profile – a maximum depth in the centre of approximately 50 cm, with humps and hollows created across the base of the scrape; and
- located in naturally wetter standing parts of a field.

- 4.7.5** An ideal density of scrapes for wetland birds could be three per hectare. However, the final number of scrapes to be constructed will be affected by ground water levels and the presence of re-created grips (see Section 4.6), as these would provide similar habitat to scrapes and, therefore, could be considered in place of scrapes.

Management of Scrapes

- 4.7.6** In order to be of maximum benefit to wetland birds and their chicks, scrapes should hold water from March through to the end of June. However, scrapes that dry out earlier in the year can provide habitat of value to invertebrates that would otherwise be predated on by invertebrates associated more with waterbodies that contain water for a longer period of time. In addition, scrapes that dry out more often, or earlier in the year, will provide long term opportunities on site for early colonising species, including plants that tend to be lost as scrapes become more established and more competitive plants take over.
- 4.7.7** In order to prevent scrape margins from becoming over grown with vegetation that will deter waders and their chicks, and in order to create poached, unvegetated areas of value to early colonising/specialist plants and a diversity of invertebrates, access for grazing stock will be provided and/or margins will be mowed on an annual basis (at the same time as the remaining parts of the fields).
- 4.7.8** Where shallow and dry enough, the entire basin of a scrape could be mowed on an annual basis in order to manage the spread of more competitive plant species and prevent drying out.

4.8 Boundary Hedgerow and Scrub

- 4.8.1** 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 4.3.
- 4.8.2** Management of hedgerows along the outer boundaries of Mitigation Areas and roads will apply to the internal side of the hedgerow only; flexibility for alternative management will be maintained for road-side and external edges of hedgerows. However, where practicable, management of these sides of a hedgerow will follow the management regime for internal sides of hedgerows, described below.
- 4.8.3** 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.
- 4.8.4** Where practicable, the preferred option will be to retain hedgerows and scrub and manage overhanging/over-shading branches, as hedgerows and scrub provide

valuable habitat and resources for a diversity of species, including hedgerow plants, invertebrates, nesting and foraging birds and foraging or commuting bats.

4.8.5 When cutting back overhanging/over-shading branches, management will be undertaken on a 1-2 year rotation, as necessary. The preferred option would be for a 2 year rotation so as to enable hawthorn to fruit, although the reduction of leaf litter build-up and over-shading will be the governing factor.

4.8.6 The above will only apply to the side of the hedgerow or area of scrub that overhangs/over-shades a watercourse, and the remaining side of hedgerows/scrub will be managed as described below.

4.8.7 Where practicable, the long-term objectives of management of all other hedgerows and linear areas of boundary scrub, will be to encourage the development of tall “A” shaped, wide hedgerows (at least 2 m in height and 1.5 m in width), with a dense base cover. In order to achieve this, management will be undertaken on a 2-3 year rotational basis (i.e. no more than one third of hedgerows within a Mitigation Area will be cut in any one year) so as to enable the fruiting of hawthorns and other shrub species, and ensure the provision of hedgerow resources each year and throughout the year.

4.8.8 Where scrub is encroaching the banks of watercourses, the scrub will be mowed short, and long-term management of the banks will include mowing of rough grassland areas between September and February inclusive (in order to avoid the bird breeding season). This will be undertaken every three to five years and on a rotation basis so as to ensure some rough grassland areas of value to a diversity of species, including long-lived over-wintering insects, are provided across the site each year.

4.8.9 All cuttings will be removed from site or stacked on site as long-term dead wood habitat. Arisings from mowing of banks will be removed from the banks of the watercourses and could be piled along the base of hedgerows, in field margins as habitat of potential value to reptiles, including grass snakes.

4.9 Management of Trees

4.9.1 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 4.3.

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

4.9.3 At least some timber and felled branches will be stacked as close to the retained tree as practicable in areas of scrub of 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. Brash could be stacked tightly; however, timber stacks will be stacked loosely so as to enable air flow between timber sections.

4.10 Grassland

Arable Reversion

- 4.10.1** In order to increase the grassland habitat within the SSSI, arable fields within the Mitigation Areas will be reverted to species-diverse wet grassland.
- 4.10.2** 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).
- 4.10.3** Soil analysis will be carried out in order to identify pH levels, soil nitrate and phosphate levels.
- 4.10.4** Where the aim is to create a species-rich grassland site, a Phosphorous (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 Phosphorous Index could be acceptable. In addition, a moderate Phosphorous Index could be acceptable where regular removal of plant matter is proposed (e.g. as a hay cut), since a reduction in soil phosphorous could result over time as phosphorous will be removed in the plant matter.
- 4.10.5** The pH of a soil can also impact upon the Phosphorous Index of a soil; phosphorous 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 Phosphorous uptake by plants. Therefore, the removal of plant matter can have a greater impact with more alkaline soils with regard to reducing soil Phosphorous Index.
- 4.10.6** 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.

Timing of Works

- 4.10.7** 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

- 4.10.8** 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.
- 4.10.9** Weeds will be treated using herbicides in the preceding arable crop. Where weeds are a serious problem, more than one year of treatment could be advisable. 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.
- 4.10.10** 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 so as 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.

Site Preparation for Arable Reversion

- 4.10.11** 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 fine tilth with a firm and level seedbed.

Site Preparation for Grassland Enhancement

- 4.10.12** 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).

Seed Mix

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

Sowing of Seed

- 4.10.14** Once an appropriate seedbed has been established, a wet grassland seed mix, pre-approved by NRW, will be broadcast across the field and rolled in.
- 4.10.15** The seed mix will 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.
- 4.10.16** 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 will not be the preferred option.
- 4.10.17** 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.
- 4.10.18** Seed rates for arable reversion will be in the range of 15-25 kg/hectare, 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.

Post sowing

- 4.10.19** As necessary, any soil capping or frost lift post sowing may be remedied by rolling.

Pests

- 4.10.20** Historic records of pest problems on each mitigation farm will be obtained in order to inform management requirements, in particular during the establishment phase of arable reversion and grassland enhancement.
- 4.10.21** Potential pests of newly sown grassland include slugs, fruit fly larvae, chafer grubs, leatherjackets, wireworms, moles, birds and rabbits. Regular monitoring throughout the establishment period is advisable to ensure that problems can be dealt with at an early stage. Slugs can be a particular concern with regard to wildflower seeds. Slug pellets may be applied with the seed, in accordance with manufacturer and supplier guidelines, if considered necessary, or broadcast later.
- 4.10.22** Professional advice will be sought from an agronomist before treating pests.
- 4.10.23** Rough grassland habitat will be retained on site where practicable as habitat of potential value to long-lived predatory insects.

Green Hay

- 4.10.24** If considered necessary, and will a suitable donor site become available in agreement with NRW, additional seed could be spread as green hay. The green hay will be collected when the seed is ready (around mid-July).
- 4.10.25** Spreading hay may be a good method where there is archaeological interest and disturbance to the ground needs to be minimised.
- 4.10.26** Although bare ground is necessary, there is no need to create a fine seed bed prior to spreading hay.
- 4.10.27** Green hay will 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.
- 4.10.28** 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 will be spread thinly so as to allow light to reach the soil and so as not to inhibit germination and establishment.
- 4.10.29** The green hay will 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.
- 4.10.30** Fields will then be rolled and the hay removed in order to prevent matting and nutrient enrichment of soils. Heavy machinery will have low ground pressure tyres and will not be tracked across waterlogged soils.
- 4.10.31** If more competitive or weed species begin to dominate the sward, additional cuts may be taken between spring and autumn; however, this will affect the ability of some wildflowers to set seed and, therefore, this will only be practised if absolutely necessary and on a rotational basis so as to maximise plant species diversity.

4.10.32 Arisings will then be removed from site.

Management – establishment phase (1-6 years following initial sowing)

4.10.33 The sward will be cut or grazed in the first year so as to encourage the grasses to tiller and control annual weeds.

4.10.34 Grassland will be cut every year between late July and September. In addition, during the establishment period, a late autumn and/or spring cut could be taken in order to create a more competitive environment at the start of the growing season, with a sward height of no less than 5 cm, which would encourage a greater diversity of plant species to become established. A second cut could be taken if more competitive or weed species begin to dominate. This second cut will be taken no earlier than the latter half of June in order to allow some plants to flower and set seed.

4.10.35 Management of field margins will be undertaken as described below.

4.10.36 Where several short cuts are required in a year, a judgement will be taken as to whether or not the cut requires removal. Where growth is considerable, arisings will be removed after each cut so as to prevent matting and smothering of new growth and a return of nutrients to the soil, which could encourage the dominance of more competitive or weed species. Arisings removed prior to the hay cut could be composted on site. The hay cut will be removed each year.

4.10.37 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.

4.10.38 In general, annual weeds will be controlled by taking an annual hay cut. No pesticides or fertilisers will be used; however, where necessary to manage the spread of perennial weeds that are dominating small areas of the sward, spot-spraying with Glyphosate could be undertaken. Glyphosate will be used only under suitable weather conditions and in accordance with supplier and manufacturer guidelines. No spray will be used within 10 m of a watercourse/waterbodies.

Long-term management

4.10.39 Once established, arable reversion and enhanced grassland areas will be maintained as described below.

Hay Cut

4.10.40 During suitable weather conditions (i.e. avoiding periods of heavy or prolonged rain and temperature extremes) a hay cut will be taken ideally between late July and September, after flowers have set seed and when the majority of ground-nesting birds will have finished nesting. The hay cut will be to a sward height of approximately 5 cm. The cut will be left on the ground for two days to enable seeds to fall to the ground before then being removed from site.

4.10.41 Where necessary, an additional cut will be taken in autumn and/or spring in order to create a more competitive short sward (of no less than approximately 5 cm height) for the start of the growing season.

- 4.10.42** Where several short cuts are required in a year, a judgement will be taken as to whether or not the cut requires removal. Where growth is considerable, arisings will be removed after each cut. Arisings removed prior to the hay cut could be composted on site. The hay cut will be removed each year.
- 4.10.43** Undesirable perennial weed species will be spot-sprayed with Glyphosate in accordance with supplier and manufacturer guidelines. In general, annual weeds will be controlled by taking an annual hay cut. No other pesticides or herbicides will be used.
- 4.10.44** Ploughing, sub-surface cultivation, reseeding, topping, rolling or harrowing will not be permitted unless required as a means to enhance the grass sward, and if this is required no more than 1/3 of the area will be affected in any one year. Rough grass areas/field margins will not be disturbed by these works. Works will be completed between late August/September and February inclusive.
- 4.10.45** If aftermath grazing is not possible, where necessary, the grass sward will be broken up mechanically (i.e. by harrowing after the hay cut has been removed) on a rotational basis (e.g. no more than 1/3 of a Mitigation Area will be treated in any year). The aim will be to create frequent patches of bare ground at least 10 cm in diameter so as to mimic hooves of stock and provide opportunities for early colonising and less competitive plant species.
- 4.10.46** Areas where scrub encroachment is a concern will be mowed on a 3-5 year rotational basis or as required to control the spread of scrub. This less frequent cutting regime in some areas on site will ensure the provision of rough grass habitat each year, which will be of value to a diversity of species including long-lived insects and small mammals, which in turn will be of benefit foraging species such as bats and barn owls. These areas will include field margins, which will be extended to at least 4 m from the centre of a hedgerow or boundary ditch, and between 4 m and 10 m in width from the banks of reens.
- 4.10.47** All arisings will be removed from the area so as to prevent matting and nutrient enrichment.

Grazing

- 4.10.48** Should grazing be introduced, 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. Soils within the three Mitigation areas are currently considered likely to be acidic to neutral; however, pH analysis will be undertaken prior to the commencement of management. A general guideline for stocking density based on grazing throughout the year would be 1 livestock unit (LSU)/hectare for neutral grasslands and 0.4 LSU/hectare for acid grasslands. For alkaline/calcareous grassland, 0.5 LSU/hectare will be considered (1 LSU = 1 cow or 6 medium-sized sheep). However, this density will be used as a guideline only and will be altered as required according to the time of year, soil conditions and duration of grazing.
- 4.10.49** Supplementary in-field feeding will be avoided wherever practicable as this can lead to localised poaching and enrichment from dunging, which in turn can have an impact on the sward cover and result in a decrease in plant species diversity and increase in weed species. Feed concentrates provided in troughs, or creep feeding of calves,

could be permitted if considered essential; however, troughs and feeders will be moved regularly so as to prevent over-poaching and soil enrichment.

4.10.50 The condition of the grassland will be monitored regularly so as to ensure that changes to the grazing regime are made within a suitable timescale so as to prevent long-term negative impacts. Signs of under-grazing or over-grazing to be monitored for include:

- an increase in the amount of uneaten grass, accumulations of litter, increases in rank and unpalatable grasses and decreases in low-growing herbs all indicate under-grazing; and
- a reduction in diversity of plants, excessive poaching, increases in the area covered by bare soil and weed invasion indicate over-grazing.

4.10.51 Taking into account the results of breeding bird surveys completed in 2015, which confirmed the presence of breeding lapwing on the Maerdy Farm and Caldicot Moor Mitigation Areas, grazing will be managed in order to provide favourable conditions for breeding lapwing on these two farms, i.e. to include the following:

- From early March until late June, to maintain a short sward of approximately 5 cm height or less with scattered tussocks of up to 15 cm in height.
- From late June onwards, to maintain a short sward (5 - 10cm). Maintain scattered tussocks across the field up to 15 cm in height.
- From late October to late February, to graze sward (where practicable) so as to create the optimal spring sward height by the start of the following year's grazing season.
- Recreate and/or maintain scrapes, grips and ditches of foraging value.

4.10.52 In order to promote good soil invertebrate populations for feeding birds, the following will be undertaken:

- Farmyard manure will be applied to the grassland, preferably direct from grazing stock or in solid form.
- Once grassland has been established, ploughing and reseedling will be avoided where practicable.
- Stock treated with ivermectins will not be put out to graze; ivermectins are powerful insecticides that can remain active in dung for a considerable period of time. Where ivermectin is to be used, pour-on or injected formulations will be the preferred method of application.

Rough grass buffer strips associated with hedgerows, watercourses and significant areas of scrub

4.10.53 Rough grass margins of value to a diversity of species, including long-lived, over-wintering insects, ground-nesting birds, and small mammals, will be maintained adjacent to hedgerows and areas of scrub (at least 2 m in width), alongside watercourses (at least 4 m in width and preferably 6-8 m in width) and in field corners and/or areas where it is difficult to take a hay cut or where crop growth is poor.

4.10.54 No pesticides or fertilisers will be applied to areas of rough grass, and care will be taken to prevent spray drift. Fertiliser- and pesticide-free buffer zones of at least 8 m in width will be maintained around the banks of waterbodies.

4.10.55 As necessary, margins will be mown on a 3-5 year rotation, with no more than 1/3 of the Mitigation Area to be mown each year, in order to control encroaching scrub.

4.10.56 Mowing will be undertaken between September and February so as to avoid the bird breeding season.

4.10.57 Arisings will be removed from site and/or piled in small piles in retained hedgerow margins as habitat of value to various species, including grass snakes.

4.11 Stock Fencing

4.11.1 In agreement with NRW, stock fencing could be installed along field boundaries, watercourses or in selected areas of the Mitigation Areas where grazing is undertaken in order to:

- protect banks of watercourses from erosion and watercourses from heavy silting due to stock accessing watercourse drink; and
- provide some rough grass areas throughout the winter for the benefit of over-wintering species including long-lived invertebrates and small mammals.

4.11.2 Fencing could be located:

- at least 2 m from the edge of hedgerows, significant areas of scrub and minor field ditches;
- at least 4 m (and preferably 6-8 m) from the banks of reens and main drains;
- around awkward field corners; and
- around particularly wet parts of the site, which would also help to protect against soil erosion.

4.11.3 Where water troughs are not provided in a field, access points along fence lines adjacent to watercourses will be provided so as to enable stock to drink direct from watercourses at select locations only (i.e. at locations where banks are sloped gently and erosion is less of an issue, or where an area of hard-standing could be installed in accordance with an NRW approved method statement).

4.12 Fly-tipping

4.12.1 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.

4.13 Monitoring and Reporting

4.13.1 Prior to undertaking measures described in the final Mitigation Strategy, Mitigation Areas will be surveyed in order to:

- assess the condition of habitats present and identify requirements for management in order to achieve the aims and objectives of the final Mitigation Strategy; and
- identify watercourses with interesting plant species/communities that could be potential donors for new watercourse establishment.

- 4.13.2** Annual monitoring surveys will then be carried out in order to assess the effectiveness of mitigation and management measures and inform on-going management requirements.

Grassland Monitoring

- 4.13.3** The grassland sward will be monitored in June/July in order to help determine the level of success of establishment and the potential need for additional seed or changes to management. Indicators of success will be monitored for as below.

- 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%.
- Scrub encroachment should be rare or absent.

Monitoring of Watercourses

- 4.13.4** Monitoring surveys of existing and constructed watercourses will be undertaken as agreed in advance with NRW and with regard to the guidelines published by the Countryside Council for Wales (now NRW) (1996).

- 4.13.5** Surveys will be undertaken between mid-May and the end of July, with the optimum period being between late June and early July.

- 4.13.6** In accordance with the NRW guidance, results will be presented in an annual report, for a period agreed with NRW, and will be provided to NRW annually. Reports will 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.

4.14 Archaeological Interest

- 4.14.1** No known features of archaeological interest are located within the boundaries of the Mitigation Areas; however, an area of archaeological interest is located adjacent to the southern boundary of the Tatton Farm Mitigation Area, to the north of the new road (as shown on Figure 2b). The feature of interest is a small moated enclosure, likely to be an abandoned medieval farmstead and perhaps a precursor to Tatton Farm itself. Due to the fact the feature is located outside the Tatton Farm Mitigation Area, management practices described in this strategy would have no direct impact on the feature. However, due to the proximity of the feature to the Mitigation Area and the potential for

unknown buried features of interest to be present in any of the Mitigation Areas, the precautionary measure of an archaeological watching brief would be provided to oversee the creation of scrapes and in-field grips that could result in damage to shallow buried features.

- 4.14.2** 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 could 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 so as 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 Welsh Government 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 South Wales Trunk Road Agent (SWTRA) but in practice is likely to be undertaken by farm tenants or 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** The Welsh Government is the existing owner of Tatton Farm Mitigation Area and would purchase the freehold of Maerdy Farm and Caldicott Moor (through Compulsory Purchase Order or other means agreed with existing land owners) so as to ensure the undertaking of works described in this Mitigation Strategy.

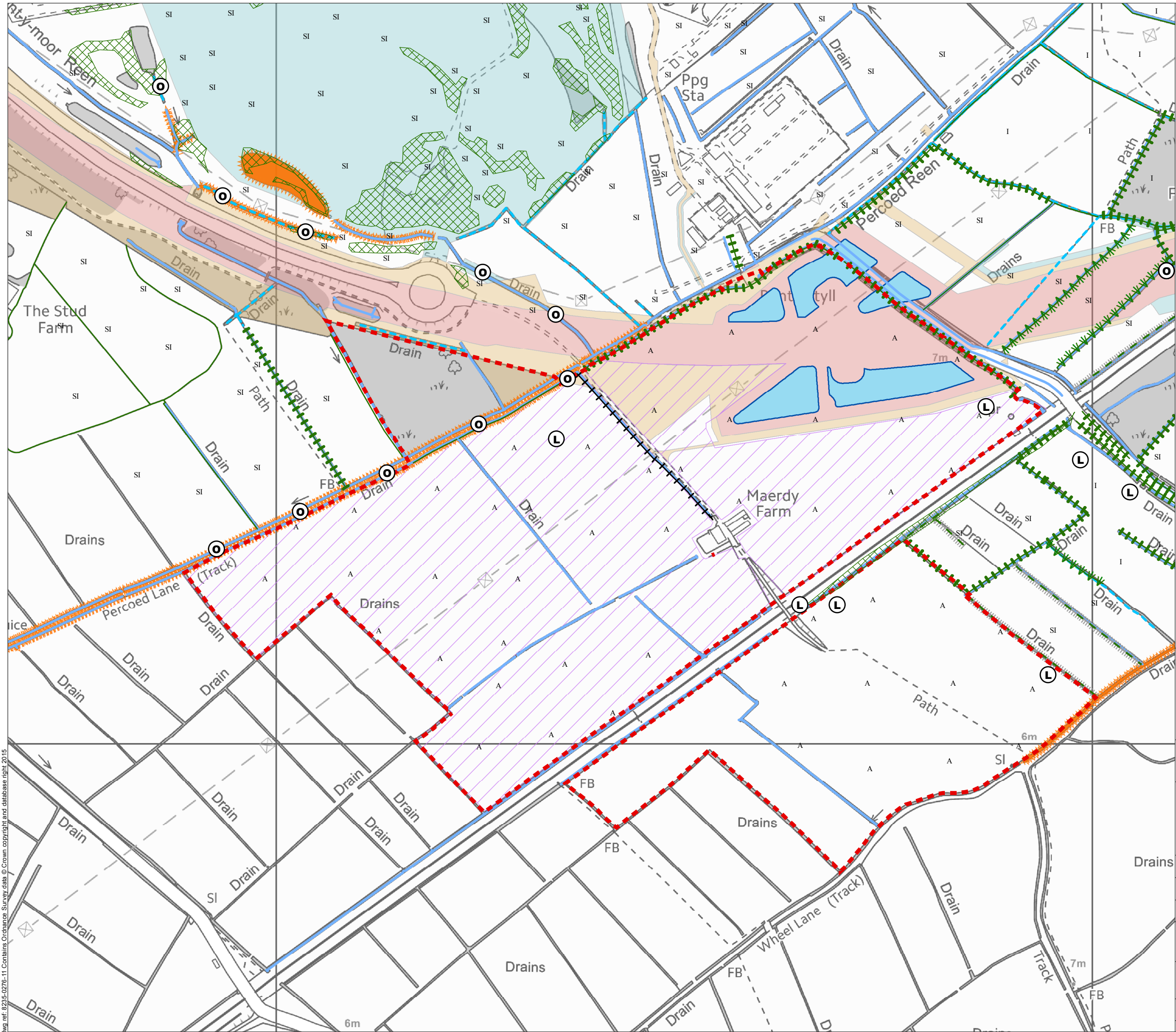
5.3 Auditing and Reporting

- 5.3.1** A record of all works undertaken as described in the final SSSI Mitigation Strategy will be produced by the supervising professional and maintained by the Welsh Government. It will be made available to NRW and/or the Local Planning Authority on request.
- 5.3.2** Regular progress updates will be provided by the supervising professional to the Developer or future successor and, as requested or required, to NRW. Regular meetings could be held between the Welsh Government, the supervising professional and NRW, as requested by NRW.

6 References

- Boyce, D. C. (2013) Monitoring invertebrate features on Sites of Special Scientific Interest: aquatic invertebrates on the Gwent Levels: Magor and Undy SSSI, Nash and Goldcliff SSSI, Newport Wetlands SSSI, Rumney and Peterstone SSSI. CCW Regional Report No: CCW/SEW/13/3. 160pp. Countryside Council for Wales, Cardiff.
- Collins, J. (ed.) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn). The Bat Conservation Trust, London.
- Countryside Council for Wales (1996) Guidance Note One General Guidance Monitoring Of Physical Developments within The Gwent Levels Sites Of Special Scientific Interest (SSSI) Draft
- Countryside Council for Wales (1996) 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 and Snowdonia National Park Authority (2012) Draft Provisional Joint Ecological Compliance Audit Guidance Note Version 6.
- Countryside Council for Wales (1996) Guidance Note Four Water Quality Monitoring On The Gwent Levels Sites Of Special Scientific Interest Countryside Council For Wales Draft
- Winder J., Spencer J. and Wood A. (1991) A Botanical Survey of Reens in the Gwent Levels. Countryside Council for Wales.

Figures



- Legend**
- Permanent highway land within fenceline, including water treatment areas
 - Other permanent land take e.g. mitigation planting.
 - Temporary construction land
 - Reed bed; Storage lagoons; Water treatment areas
- Mitigation Area**
- Potential mitigation area
 - Farm outline
- 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
 - Scattered scrub
- Protected Species**
- Common Pipistrelle bat roost
 - Watercourses/waterbodies with signs of water vole activity
 - Watercourses/waterbodies with signs of other activity
 - Lapwing – breeding bird survey, 2015

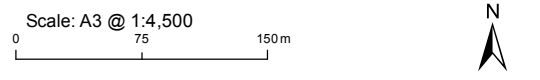


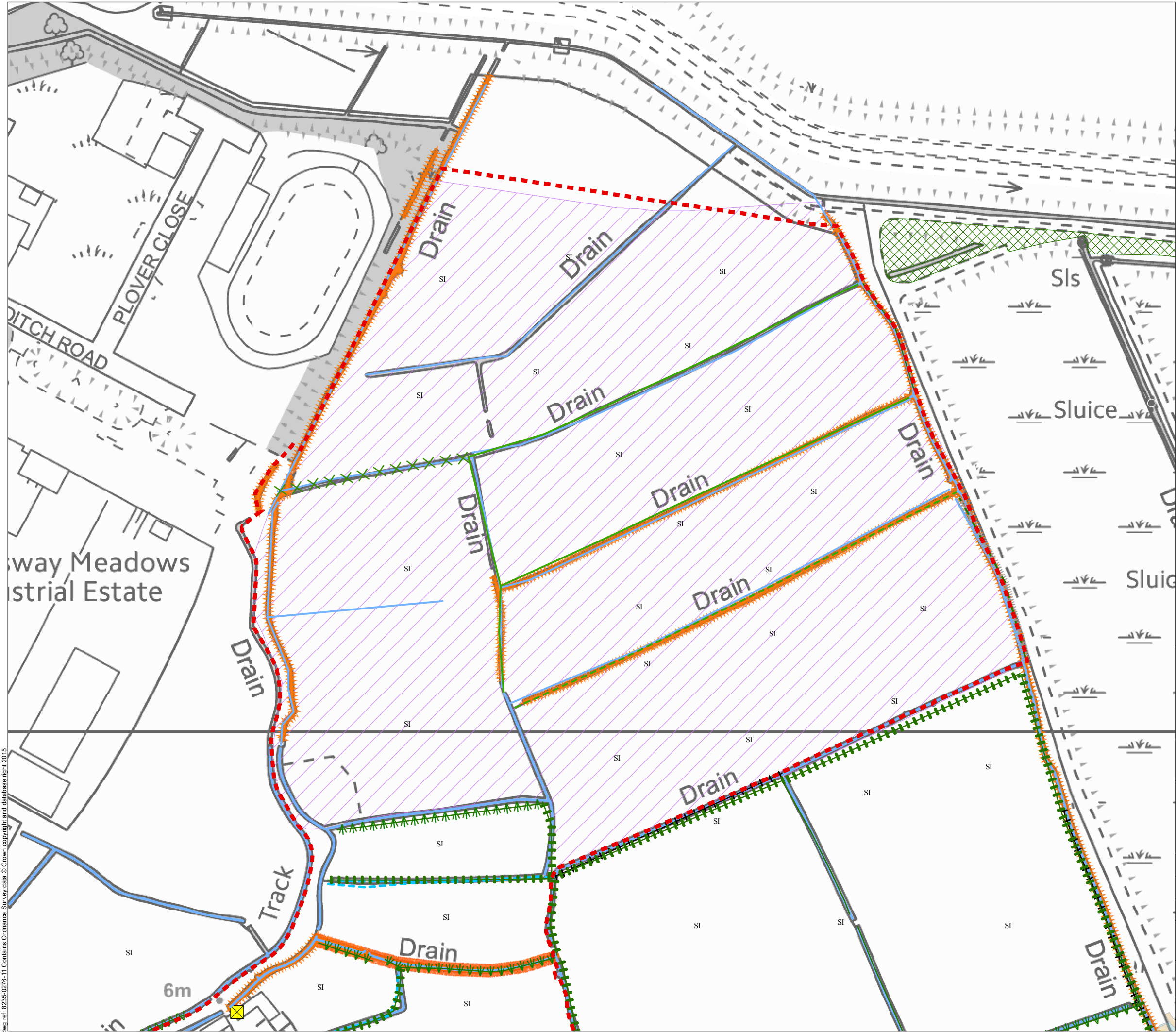
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Appendix 10.35 SSSI Mitigation Strategy

SSSI Mitigation Area:
Maerdy Farm

Figure: 1a	Revision:
Date: March 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
- Reed bed; Storage lagoons; Water treatment areas

Mitigation Area


- Potential mitigation area
- Farm outline

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
- 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 10.35 SSSI Mitigation Strategy

SSSI Mitigation Area:
Tatton Farm

Figure: 1b	Revision:
Date: March 2016	Status: AT ISSUE
Drawn: CR	Checked: JW

Scale: A3 @ 1:2,500

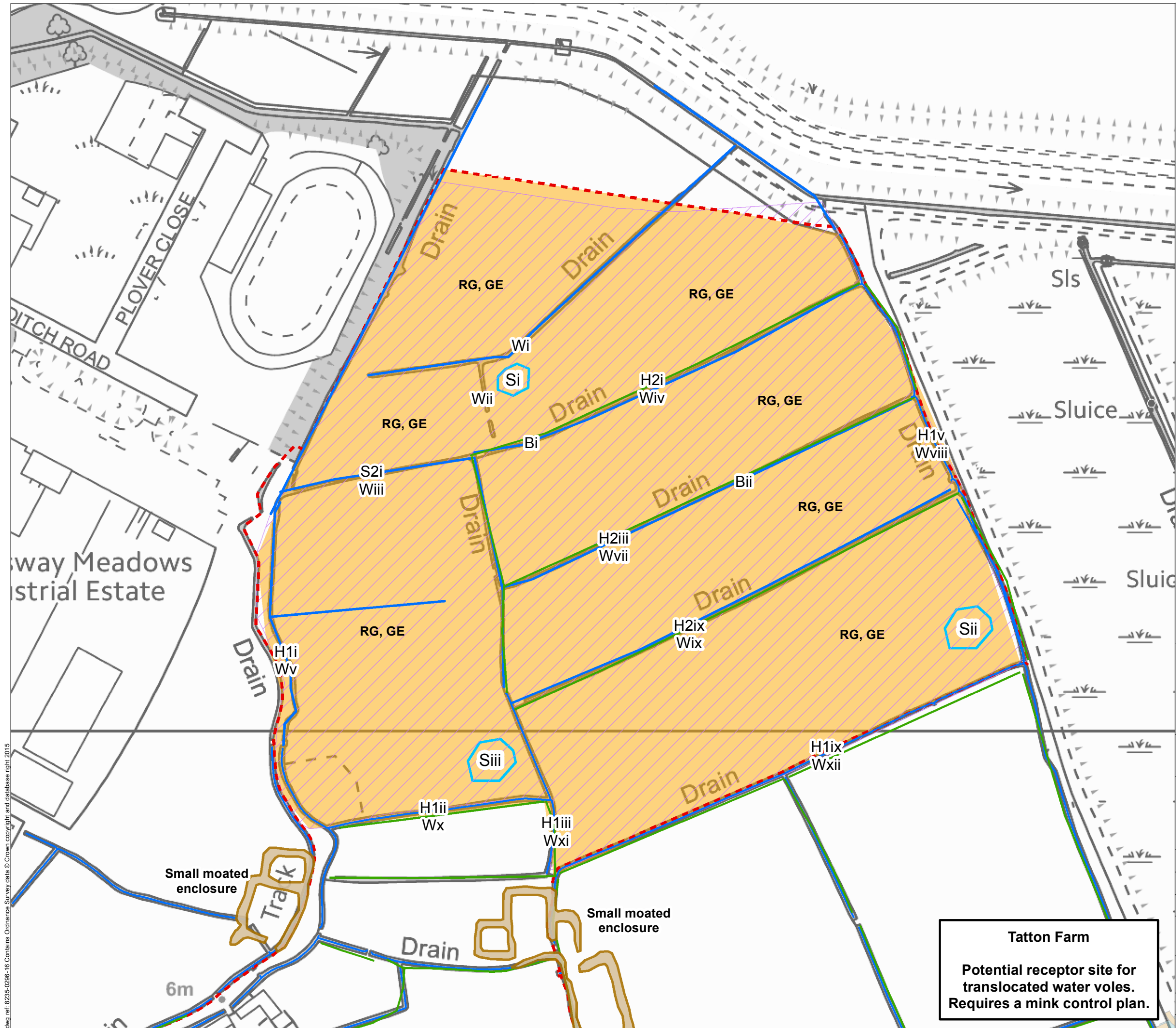
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dwg ref: 8235-0276-11





Legend

- Permanent highway land within fenceline, including water treatment areas
- Other permanent land take e.g. mitigation planting.
- Temporary construction land
- Reed bed; Storage lagoons; Water treatment areas
- Archaeological Feature
- Mitigation Area**
 - Potential mitigation area
 - Farm boundary
- Mitigation Measure**
 - Replacement field drains/boundaries
 - RG** Potential replacement/creation of in-field grips
 - AR** Arable reversion to species diverse grassland
 - GE** Grassland enhancement
 - Hedgerow
 - H1 Hedgerow management- 1 sided
 - H2 Hedgerow management- 2 sided
 - S Scrub management
 - Watercourse
 - W Watercourse enhancement and/or management
 - Scrapes – indicative locations
 - B Bat roost boxes/ Barn owl nest boxes
 - i Habitat references



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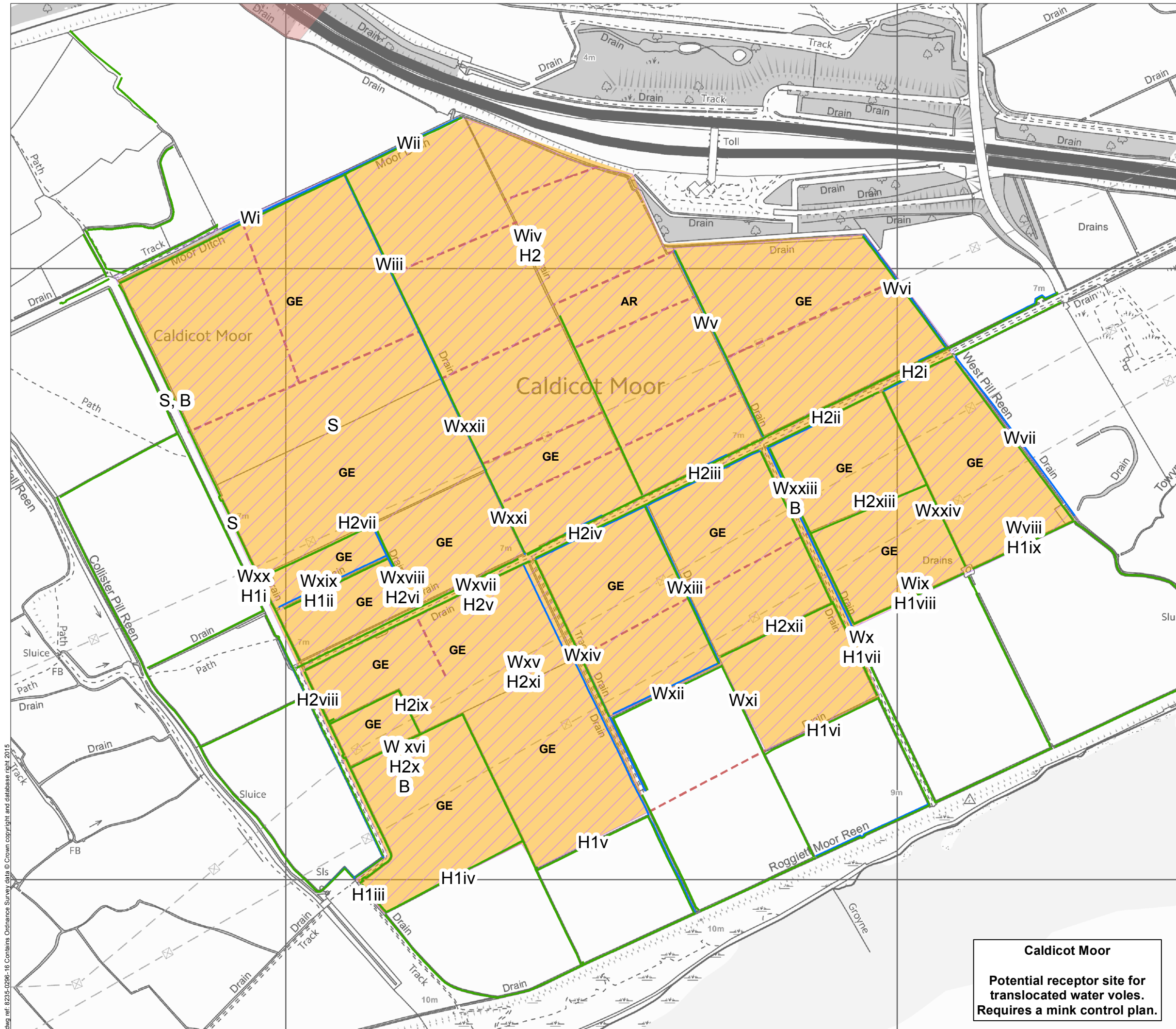
Appendix 10.35 SSSI Mitigation Strategy

**SSSI Mitigation Measures:
Tatton Farm**

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

Scale: A3 @ 1:2,500
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Legend

Permanent highway land within fenceline, including water treatment areas

Other permanent land take e.g. mitigation planting.

Temporary construction land

Reed bed; Storage lagoons; Water treatment areas

Archaeological Feature

Mitigation Area

Potential mitigation area

Farm boundary

Mitigation Measure

Replacement field drains/boundaries

RG Potential replacement/creation of in-field grips

AR Arable reversion to species diverse grassland

GE Grassland enhancement

Hedgerow

H1 Hedgerow management- 1 sided

H2 Hedgerow management- 2 sided

S Scrub management


Watercourse

W Watercourse enhancement and/or management

Scrapes – indicative locations

B Bat roost boxes/ Barn owl nest boxes

i Habitat references



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Appendix 10.35 SSSI Mitigation Strategy

SSSI Mitigation Measures:
Caldicot Moor

Figure: 2c

Revision:

Date: March 2016

Status: AT ISSUE

Drawn: CR

Checked: JW

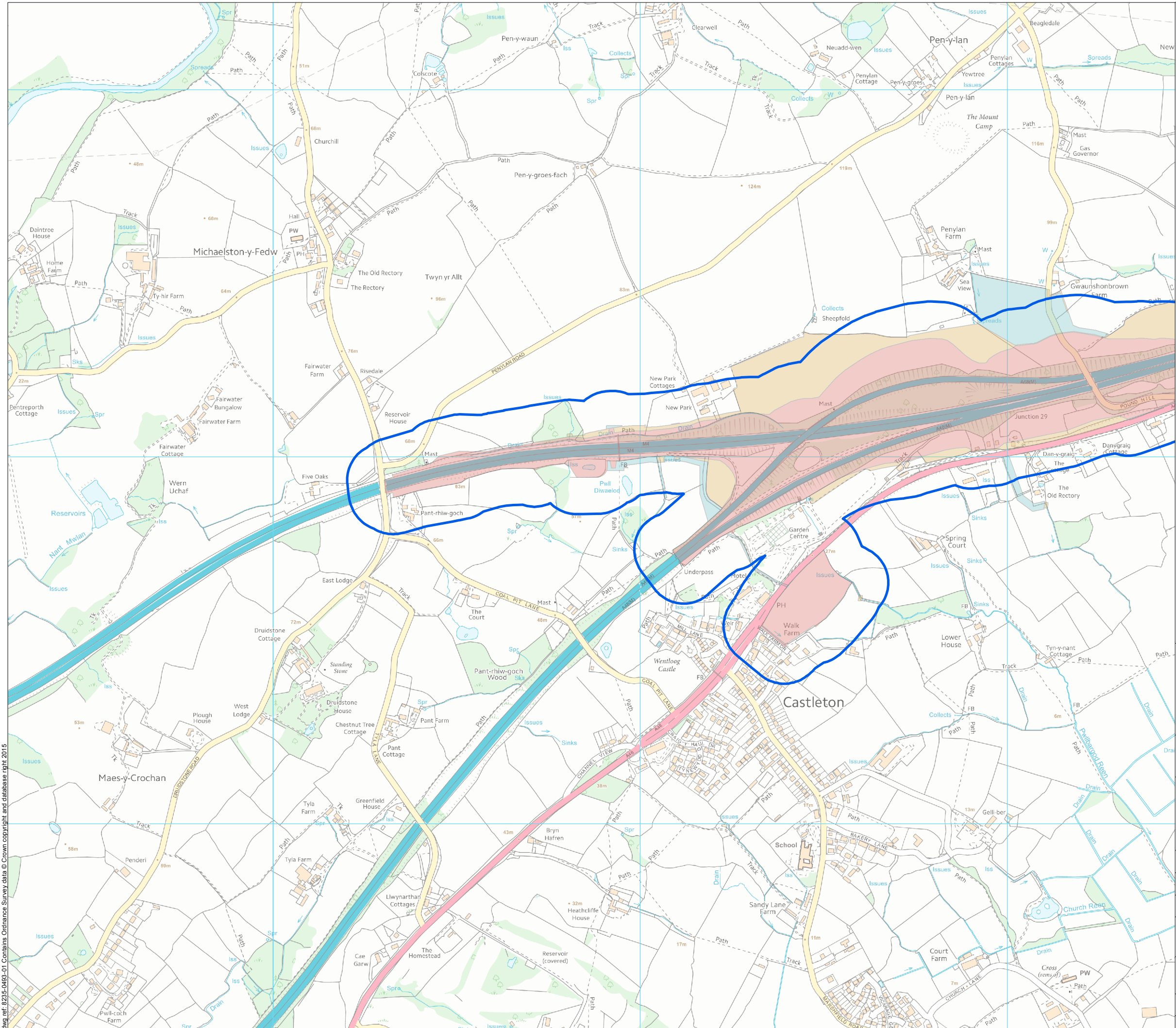
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dwg ref: 8235-0296-16



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 10.35 SSSI Mitigation Strategy

2015 Aquatic Macrophytes Survey

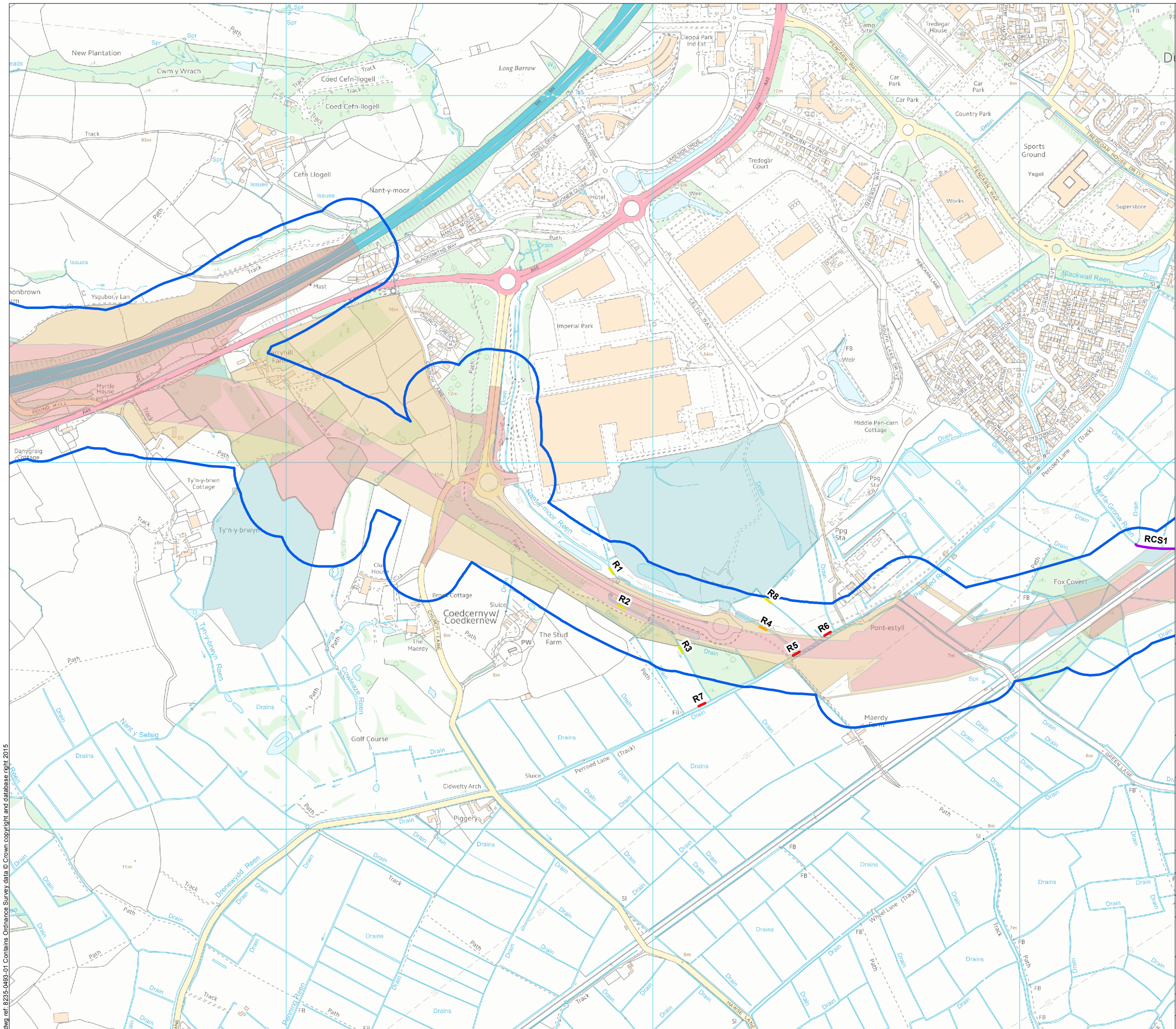
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Date: March 2016	Status: AT ISSUE
Drawn: CR	Checked: JW

Scale: A3 @ 1:10,000

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dwg ref. 8235-0493-01 Contains Ordnance Survey data © Crown copyright and database right 2015



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 10.35 SSSI Mitigation Strategy

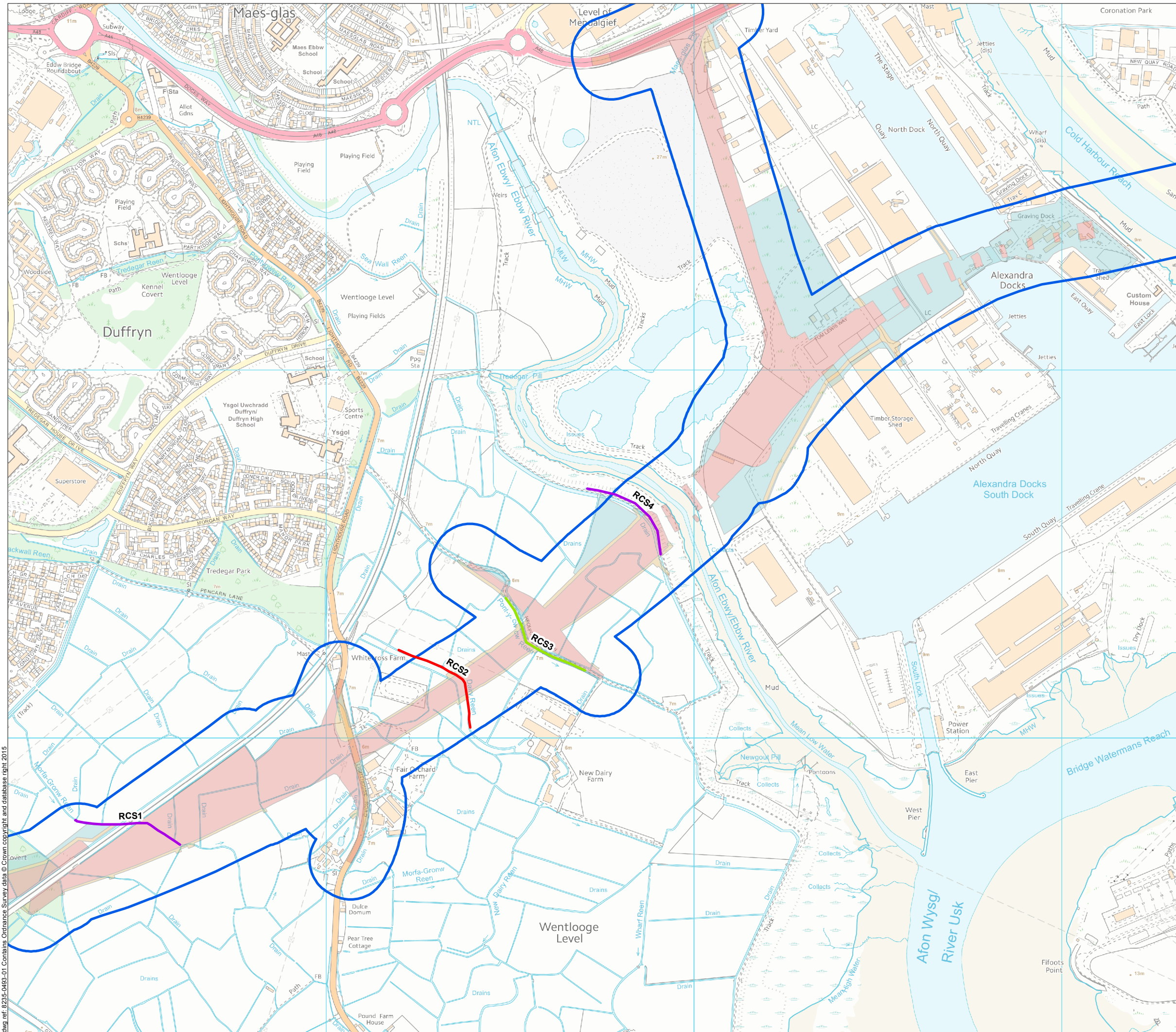
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Figure: 3b	Revision: -
Date: March 2016	Status: AT ISSUE
Drawn: CR	Checked: JW

Scale: A3 @ 1:10,000

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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 10.35 SSSI Mitigation Strategy

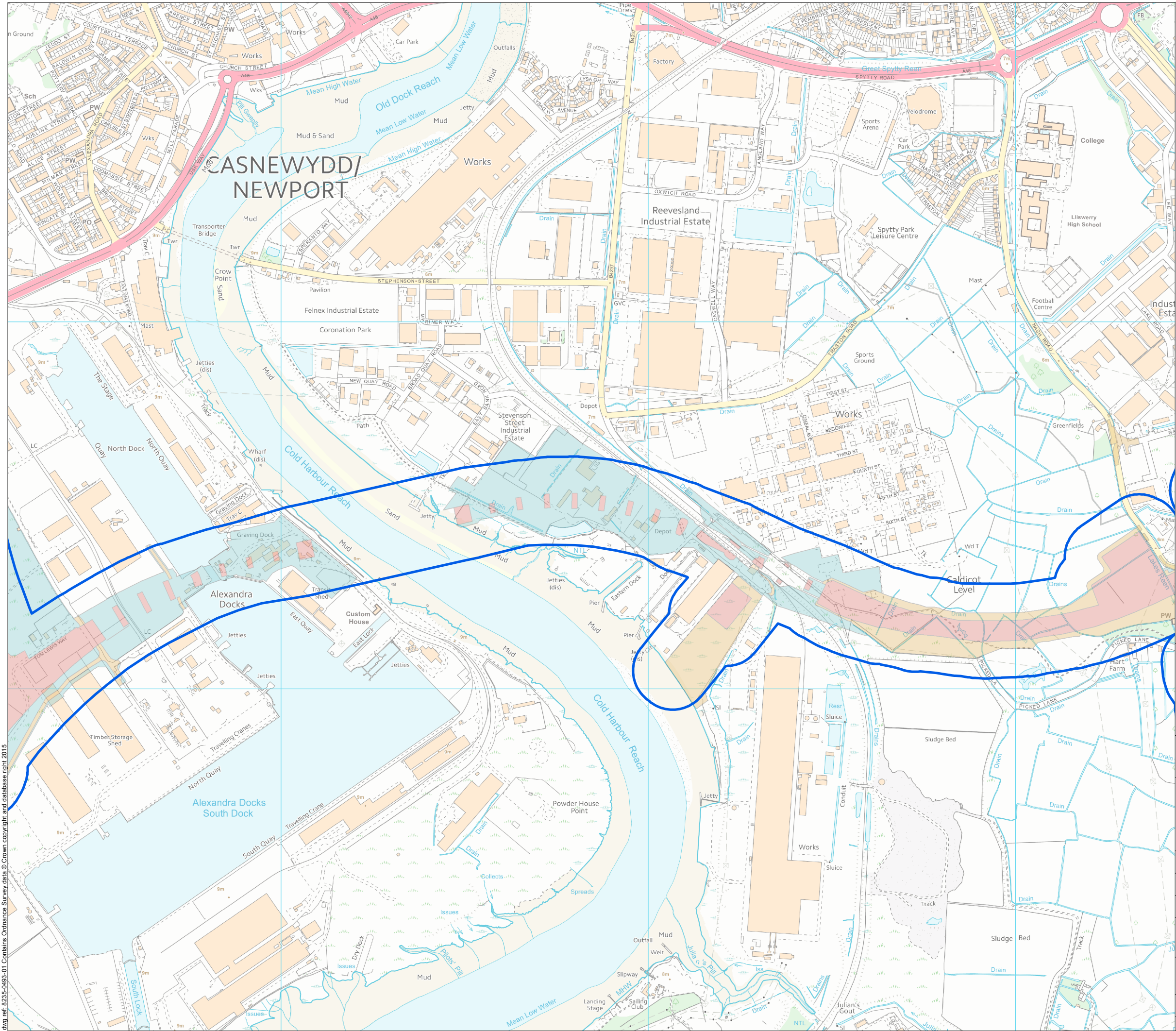
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Figure: 3C	Revision: -
Date: March 2016	Status: AT ISSUE
Drawn: CR	Checked: JW

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0250500m

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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



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Appendix 10.35 SSSI Mitigation Strategy

2015 Aquatic Macrophytes Survey

Figure: 3d

Revision: -

Date: March 2016

Status: AT ISSUE

Drawn: CR

Checked: JW

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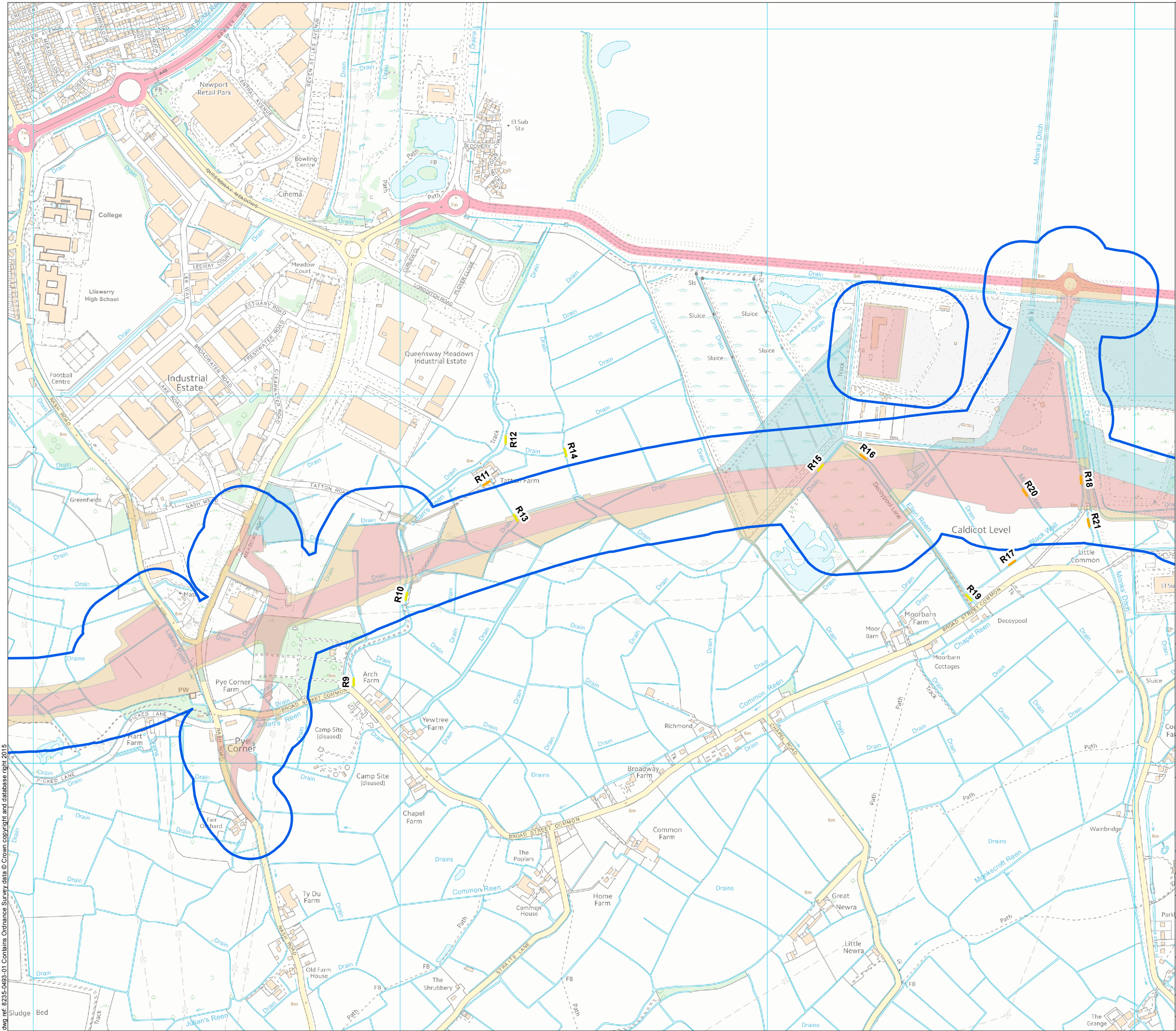
250

500m

N

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dwg ref. 8235-0493-01



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 10.35 SSSI Mitigation Strategy

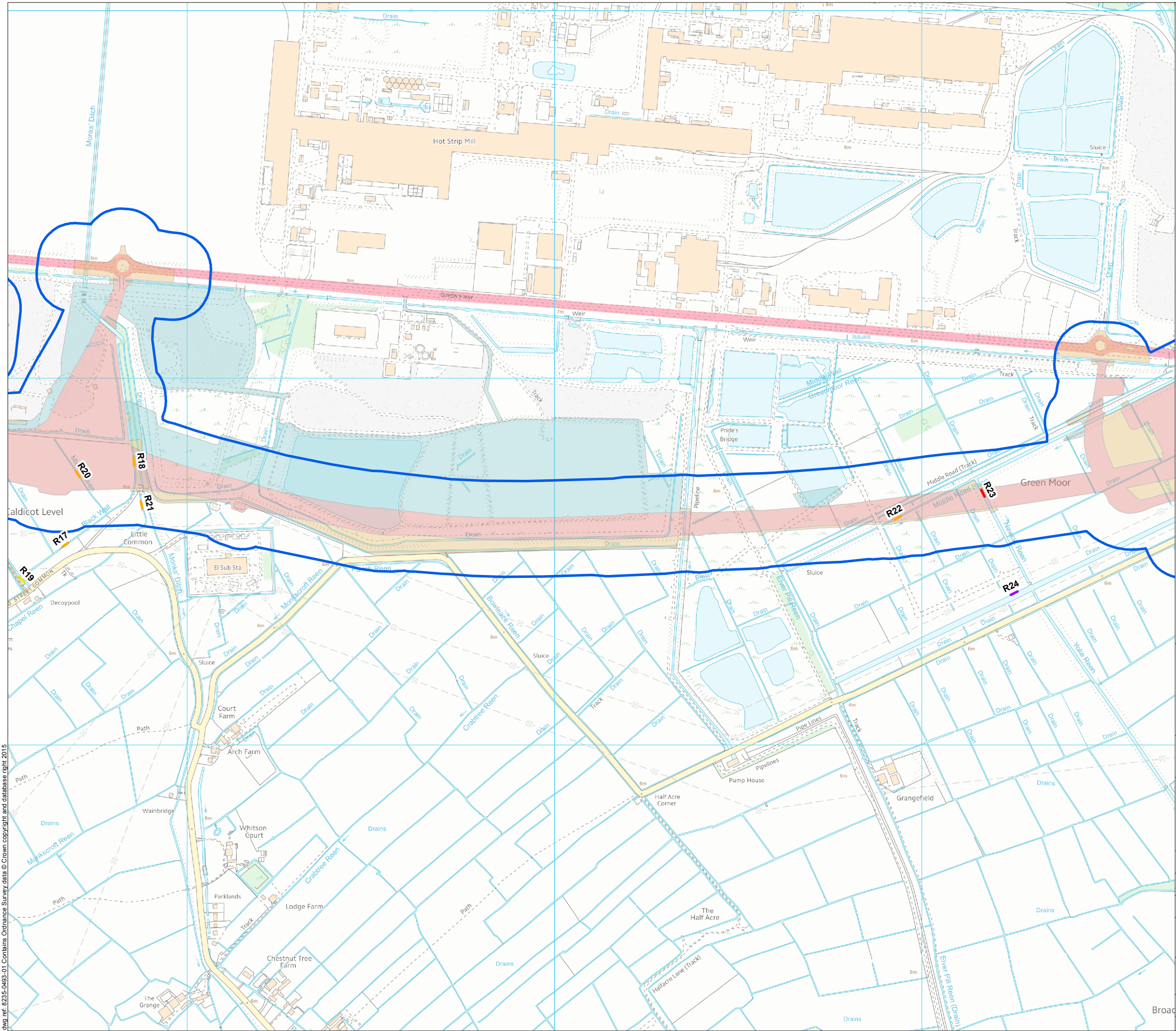
2015 Aquatic Macrophytes Survey

Figure: 3e	Revision: -
Date: March 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



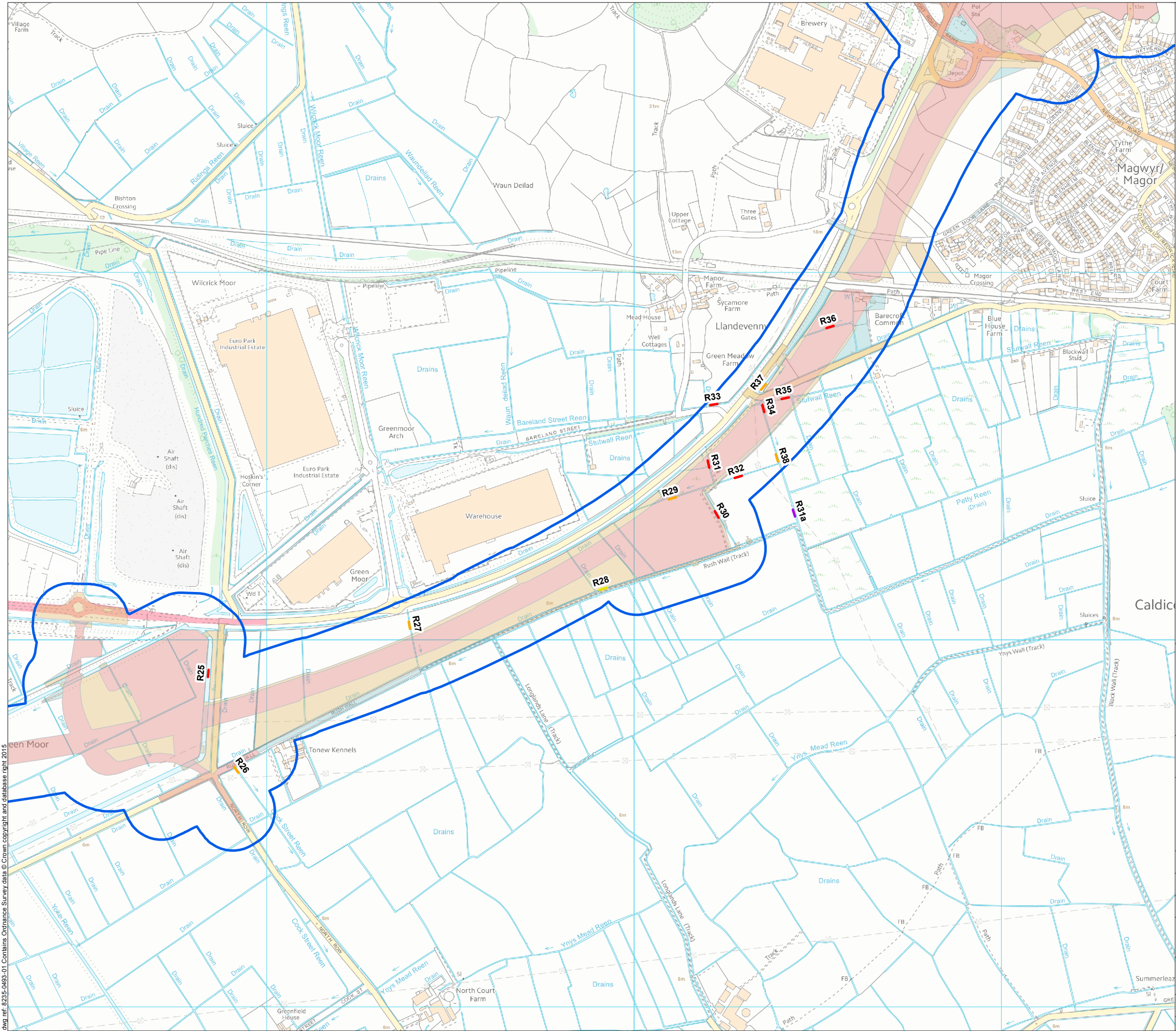
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Appendix 10.35 SSSI Mitigation Strategy

2015 Aquatic Macrophytes Survey

Figure: 3f	Revision: -
Date: March 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 10.35 SSSI Mitigation Strategy

2015 Aquatic Macrophytes Survey

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

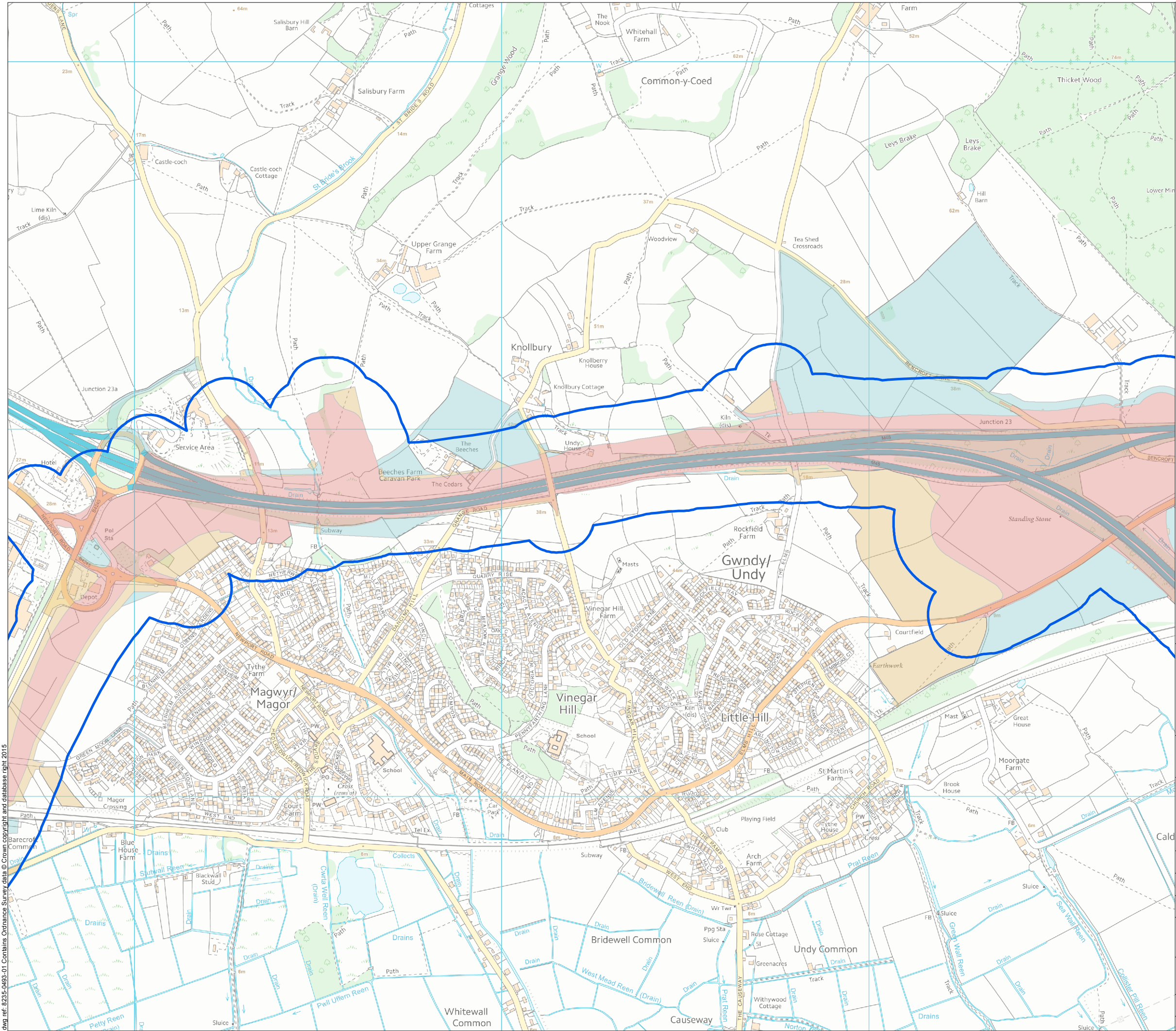
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0 250 500m

N

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dwg ref. 8235-0493-01



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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Welsh Government

Appendix 10.35 SSSI Mitigation Strategy

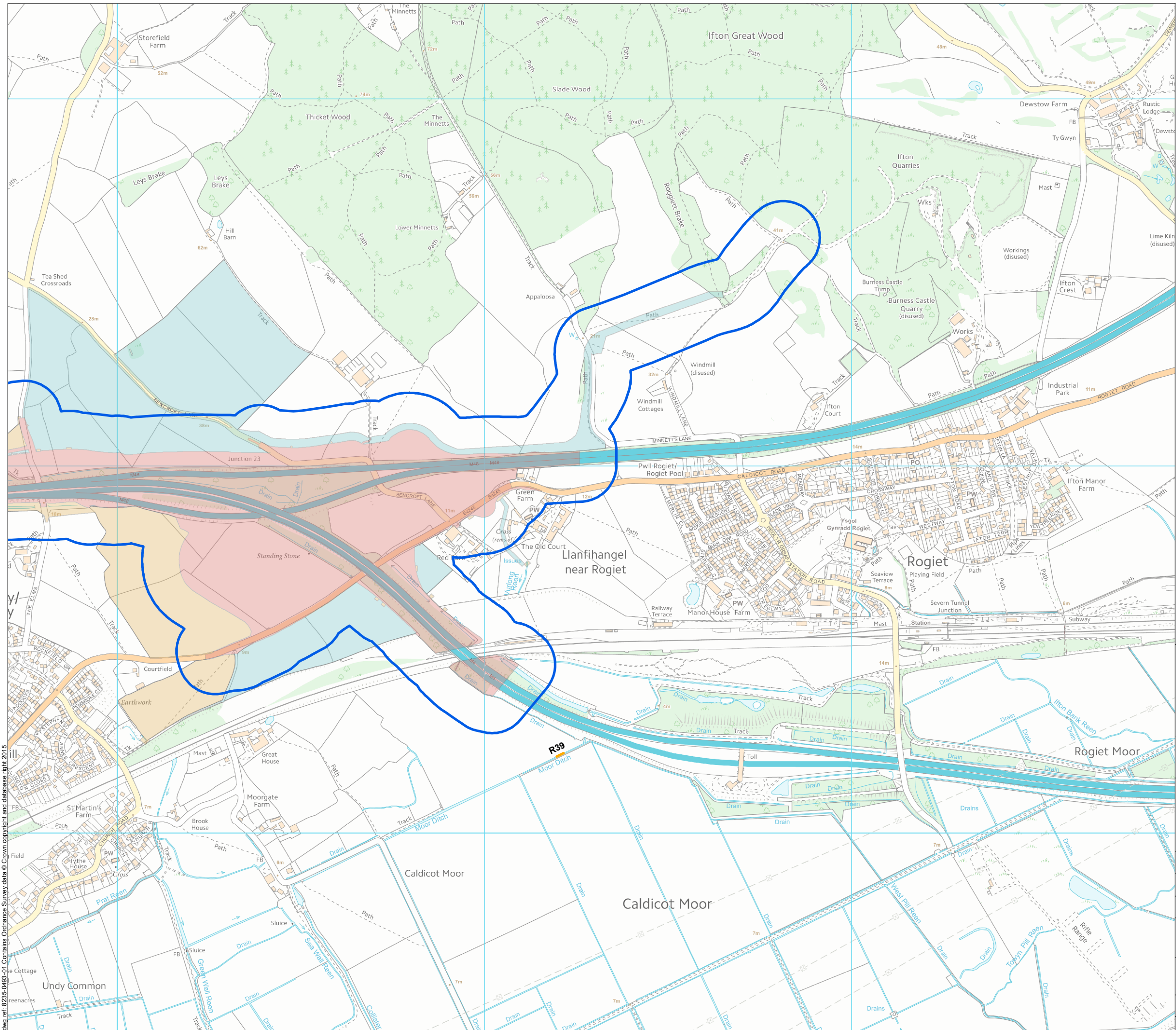
2015 Aquatic Macrophytes Survey

Figure: 3h	Revision: -
Date: March 2016	Status: AT ISSUE
Drawn: CR	Checked: JW

Scale: A3 @ 1:10,000

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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



Appendix 10.35 SSSI Mitigation Strategy
2015 Aquatic Macrophytes Survey

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

