MOTT MACDONALD

Llanwern Rail Facilities - Phase 1 Planning

Dormouse Mitigation and Monitoring Strategy

October 2018

Transport for Wales

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1 Introduction

1.1 Project Description

Mott MacDonald Ltd has been commissioned by Transport for Wales (TfW), on behalf of Welsh Government, to prepare and submit a planning application, seeking full planning permission for the design and construction of a 1.6km long Major Events Stabling Line (MESL) on land adjacent to the existing Tata Steelworks Service Lines in Llanwern, South Wales. This is Phase 1 of the Llanwern Rail Facilities Programme.

The MESL will be used for stabling of rolling stock for major events in the area, to enable flexibility for future train requirements, and proving of trains prior to use on the rail network. The MESL will be electrified in a future phase of work. This proposed 1.6km length of MESL to the west of Monks' Ditch was formerly known as Option 6a.

The wider Llanwern Rail Facilities Programme will include an extension of the MESL by circa 2.4km east (to achieve a total length of circa 4.0km), electrification of the MESL, a new Llanwern railway station and passenger line (including Park & Ride and footbridge), and connections to the South Wales Main Line (Relief Lines). The further phases of the project will be the subject of a subsequent planning application.

The key parameters for the scheme are listed below:

- Whole site area is 3.1 hectares. This land is contained within the red line boundary shown on the Site Location Plan (Drawing number 367590-MMD-48-XX-DR-C-0001); and
- The site length is approximately 1.6km long and 19.0m wide.

1.2 Scope of Works

The General Arrangement drawings (Drawing numbers 367590-MMD-48-XX-DR-C-0002 to 367590-MMD-48-XX-DR-C-0005) demonstrate the project scope which includes the design and construction of the following:

- A single track stabling line (MESL) circa 1.6km long;
- Associated earthworks and landscaping; and
- Drainage and other engineering works.

In order to obtain full planning permission for Phase 1, we have carried out the outline design and technical assessment of the above scope, as well as multiple assessments in terms of ecology, environment, heritage and archaeology.

1.3 Site Location

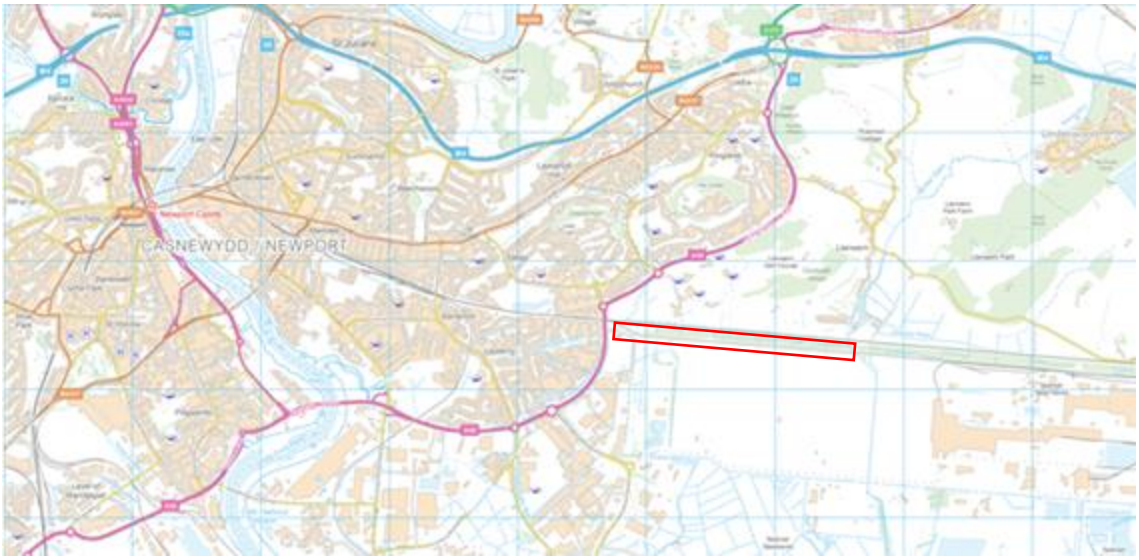
The proposed rail development Site is located approximately 8 miles east from the centre of Newport, South Wales (Figure 1.1).

The site is aligned roughly west – east and bordered by the existing South Wales Mainline to the north and the Tata Steelworks to the south. Along the southern boundary of the steelworks site runs the A4810 which links the M4 from junction 23A at Magor with the A48 at Liswerry (a predominantly residential suburb on the south-eastern side of Newport. The site is more widely bordered by the M4 which runs approximately two and a half miles to the north and the Severn

Estuary which lays approximately three miles to the south. The Gwent Levels to the south is a significant area of wetlands.

The existing South Wales Mainline passes north of the proposed site and provides opportunity for transport links for both passengers and freight.

Figure 1.1: Proposed Location Plan



Source: OS Open Data

The ecological survey work for this report has been undertaken in respect of the entire woodland (including the site and surrounds), this is shown by the dotted black line as detailed in Appendix A. The survey area was selected prior to the finalisation of Phase 1 of the Llanwern Rail Facilities Programme and is considered to provide important ecology context to the site-specific results. Phase 1 of the planning application is indicated by the red line boundary and is hereafter referred to as the 'site'.

1.4 Current situation for the proposed works

This document forms part of the detailed design planning application for the Scheme for Phase 1 of the works. TfW is in the process of appointing a contractor for the project. The contractor will undertake all works outlined in this document as part of their scope of works. TfW has made a commitment to ensure that all aspects of this mitigation strategy are adhered to and financial measures are in place until the commitments are completed. Future phases of work will be the subject of a subsequent planning application.

1.5 Programme for the proposed works

The proposed programme of works is as outlined in Table 1.1. These dates are in accordance with Transport for Wales' current high-level programme for the commission of the Phase 1 works.

Table 1.1: Programme of Proposed Works

Task	Dates
Vegetation clearance	TBC following approval from Natural Resources Wales
Site set up	Nov – Dec 2018
Start of construction works	Feb 2019
Railway line commission	July 2019

Source: Transport for Wales

1.6 Previous Survey Work

The Preliminary Ecological Assessment Report (PEAR) (Ref: 367590-WTD-CAR-2604, Mott MacDonald Ltd, 2018), identified the survey area as having potential to support a number of protected and notable species and the following reports were written to inform the design of the project design:

- Bat Survey Report (Report number: 367590-WTD-CAR-2616);
- Dormice Survey Report (Report number: 367590-WTD-CAR-2614);
- Badger Survey Report (Report number: 367590-WTD-CAR-2624);
- Reptile Survey Report (Report number: 367590-WTD-CAR-2617); and
- Great Crested Newt Survey Report (Report number: 367590-WTD-CAR-2615).

1.7 Site Habitat

The PEAR identified the majority of the survey area as being suitable for dormice. The survey area is dominated by woodland with reens running throughout. Scrub habitat lines the edges of the woodland with ephemeral/short perennial habitats running adjacent along the railway ballast. The woodland and scrub provide suitable habitat for dormice.

2 Dormouse Ecology

2.1 Identification

Hazel dormice have golden-brown fur and distinctively, they are the only British rodent with a furry tail (see Photograph 1). Adult dormice reach a head-body length of approximately 65 - 80mm and weigh approximately 20g (although this can increase substantially prior to hibernation). They are nocturnal, arboreal rodents spending almost all their time in the branches of trees during summer months, rarely coming to the ground. They weave their own, distinctive nests from strips of bark surrounded by a layer of fresh leaves. When conditions are cold or wet, or if food is scarce, dormice curl up into a ball and go into a state similar to hibernation for a short time (called torpor) in order to save energy (see Photograph 2). Between October and May dormice hibernate in nests beneath the leaf litter on woodland floor or in the base of hedgerows (Bright *et al*., 2006).

Photograph 1: Hazel Dormouse

Source: Mott MacDonald Ltd

Photograph 2: Hazel Dormouse

Source: Mott MacDonald Ltd

2.2 Breeding

Females give birth to (usually) four or five young, from early June until September (but mainly in July or August). The young remain with their mother for up to two months, delaying the production of a second litter. If young are born too late in the summer they may be unable to reach a viable weight of 15g by late October before hibernation. It is unlikely that such small juveniles will survive the winter, having run out of fat reserves before effective feeding becomes possible again in the spring. Although some females may breed twice in a season, it is unlikely that they will raise more than one litter per year. Sometimes females may aggregate their families into a crèche, with up to nine young present at once. Individual males may share the same nest box with the same female in two successive years, implying a long-term pair bond and perhaps more complex social behaviour than is normal for small rodents (Bright *et al*., 2006).

2.3 Hibernation

During the winter, when little food is available, dormice save energy by going into hibernation. Having spent all the summer in trees and shrubs, they descend to the ground and stay there all winter. A small tightly woven nest is constructed and the animals usually spend the winter there alone. They hibernate under logs, under moss and leaves or among the dead leaves at the

base of coppice stools and thick hedges. Dormice choose a moist place to hibernate, where the temperature will remain cool and stable and the humidity high. Cool conditions are vital as metabolic processes are slowed at lower temperatures and fat reserves will then last longer. Damp conditions are also necessary because water vapour is lost during the animal's breathing. Hibernating in a moist place will ensure the animals do not desiccate during the winter, as they do not wake up and drink regularly.

Hibernation begins when the nights become cool in the autumn and there is little food left in the trees. Larger dormice (weighing up to 40g) appear to enter hibernation earlier, while smaller animals continue to feed until later in the autumn. In milder winters they may remain active until December. Once in hibernation, dormice do not usually leave their nests until the following spring. Dormice do not normally hibernate successfully in nest boxes because the temperature inside is too variable (Bright *et al*., 2006).

2.4 Dormouse Longevity

Dormice live for a surprisingly long time for rodent species, they are often found living for five years or more. This is based on the life strategy of the dormouse which is low fecundity balanced with living longer (Morris, 2004).

2.5 Species Status

2.5.1 Status of Dormice at the National Level

Dormouse populations have undergone a significant decline (approximately 72%) in the United Kingdom between 1993 and 2014 (Goodwin *et al*., 2017). The population decrease is considered to be associated with changes in woodland configuration and quality and due to climate change (Goodwin *et al*., 2018). The UK dormice population is currently unknown but there is a slowing long-term decline in number and range which is currently Southern England, South Wales and the English/Welsh border (PTES, 2017).

However, even where dormice are considered present their distribution is patchy. Overall, they are considered to be rare and vulnerable to extinction in the UK.

2.5.2 Status of Dormice at the Local/Regional Level

In Newport, an important area for dormice is the river valley of the Usk and its associated woodlands and species-rich hedgerows. Dormice have been recorded along the M4 and the A449 corridor as well as around Wentwood in the north-eastern part of the county and also in the far west of the county (Newport City Council, 2017).

The Newport Biodiversity Action Plan vision for the species, is to maintain and increase the population, to gather data on their distribution and status, to raise awareness of the importance of dormice and to ensure that surveys are undertaken to inform decision making.

3 Previous Dormouse Survey Results

Desktop Survey Results

There are four records of dormice within 2.0km of the survey area. The closest record is located approximately 1.5km away from the survey area and was submitted in 2011 (SEWBReC, 2017). In 2014-2015, dormice were confirmed within the footprint of the M4 Corridor around Newport scheme (Arup 2014; RPS 2015). In relation to the Llanwern Site, a dormouse nest was confirmed to be present 1.3km south of the survey area (RPS, 2015). After the dormouse nest was discovered, further nest tubes were installed as an extension to the survey area and a likely dormouse nest was recorded within scrub along the access track within the Tata Steelworks owned land.

3.1.1 Dormouse Presence/Likely Absence Survey Results

Four dormouse nests have been confirmed within the survey area by a dormouse licensed ecologist. The first was observed during the October 2017 dormouse survey in box 30 (Table 3.1). In November, it was observed to be taken over by wood mice. The second was observed during the May 2018 dormouse survey in box M43 (a mitigation box installed under development licence 78049d: OTH: EPS: 2018). This box is in very close vicinity to box 30. In June 2018 it was observed that this nest had also been taken over by wood mice. The third and fourth were observed during the September 2018 dormouse survey in box 13 and M69 (a mitigation box installed under development licence 78049d: OTH: EPS: 2018). Box 13 was located further east than the first two nests recorded whereas box M69 was located west of Monks' Ditch.

A suspected dormouse nest was observed in box 6 during the September and October surveys. In November, wood mice were observed using box 6. A second suspected dormouse nest was observed in box 26 during the October survey which is in close proximity to box 30 (location of confirmed dormouse nest).

Based on the results to date, dormice are considered present in higher numbers east of Monks' Ditch, around box 30 and box M43, but have been recorded in both the east end of the survey area; boxes 6 and 13 and west end of the survey area; box M69. Therefore, it is considered that dormice are present throughout the woodland.

Following the Dormouse Conservation Handbook (Bright et al., 2006), optimal habitat is likely to support between 4 and 10 adult dormice per hectare in spring. It is considered that the habitat within the survey area is not optimal for dormice, with some sections lacking understorey, fruiting species and areas subject to flooding. Dormice are known to live at low population densities; due to low population densities dormice are vulnerable to habitat loss, fragmentation and loss of resources which could occur as a result of the Scheme. Dormouse European Protected Species Licence and amendments

A dormouse development licence was in place (valid until 28 September 2018) (with amendments) for vegetation clearance on-site and to enable clearance for fenceline installation as outlined in Table 3.1.

Table 3.1: Dormouse licence history

Dormouse licence number	Date issued	Purpose of licence
78049:OTH:EPS:2018	06/02/2018	Vegetation clearance for pathways to undertake surveys and for fenceline installation
78049a:OTH:EPS:2018	21/02/2018	Additional accredited agents added
78049b:OTH:EPS:2018	12/03/2018	Additional accredited agents added
78049c:OTH:EPS:2018	Rejected request 18/05/2018	Extension of vegetation clearance period – application rejected and all clearance works ceased on May 31st 2018
78049d:OTH:EPS:2018	09/07/2018	Initial GI works – no works undertaken after approval of licence

Source: Mott MacDonald Ltd

4 Vision of the Strategy

The main vision of the mitigation and compensation strategy detailed within this document is to ensure that there will be no detriment to the maintenance of dormice population within the area at favourable conservation status. From the outline design there will be is 1.8ha permanent loss and 1.1ha of temporary loss of suitable habitat for the construction of Phase 1. The vision is to:

- Avoiding the killing and injury of dormice during vegetation clearance operations and construction by the implementation of a sensitive works method;
- Minimising temporary disturbance to the dormouse population from the proposed works and by maintaining habitat of equal value (no net loss) to that in existence for the population;
- Implementing activities that ensure a gain of dormouse habitat within the locality in conjunction with the proposed works; and
- To ensure that the mitigation and compensation is complimentary to other species present.

This will be achieved by implementing the following measures:

- The provision of increased foraging and refuge capacity of existing habitat within the locality of the works by supplementary planting which will increase the quality and abundance of food sources for dormice;
- The creation of new dormouse suitable habitat for the benefit of dormice at a site located to the north of the existing Site and through the different phases of the Scheme ensuring that connective habitat is strengthened and enhanced for dormice;
- The installation of dormice boxes in the woodland at Routes Wood (subject to the owner's agreement); and
- The development of an awareness regime for maintenance contractors regarding the presence of dormouse populations on both sites, so that subsequent maintenance regimes can be amended accordingly, if appropriate, to take into account the presence of dormice.

4.1 Rationale for the maintenance of the woodland

The existing woodland was planted approximately 60 years ago in order to provide screening for Llanwern village from the steelworks. This has been allowed to mature without any management (apart from general maintenance by Tata Steel) since planting and as such trees are shallow rooted with an understorey dominated in areas by Himalayan balsam (*Impatiens glandulifera*). It is considered that the habitat is not optimal for dormice, with some sections lacking understorey, fruiting species and areas subject to flooding through a high-water table.

Management of the woodland if proposed for 30 years, during this time the prescriptive measures for both existing and new woodland as outlined in the Llanwern On-site and Off-site Mitigation and Monitoring Plan (367590-WTD-CAR-2650). The proposed measures will allow the woodlands to mature to a favourable condition for dormice. This would aim to ensure that the dormice are given the maximum opportunity to increase their numbers and achieve a sustainable population.

5 On-Site Mitigation

At present there is 1.8ha of permanent loss and 1.1ha of temporary loss for the construction of Phase 1, this equates to 12 adult dormice displaced (4 to 10 adult dormice displaced per hectare in optimal habitat Bright *et al*., 2006). The dormice numbers have been calculated on the basis that the habitat is not optimal and unmanaged. Therefore, the lower value of the estimation has been used of 4 dormice displaced per hectare.

The design of the proposed works has taken into consideration ecological impacts and been designed to keep these impacts to a minimum. The design for Phase 1 does not sever any habitat and has been kept to the edge habitat of the woodland. As such, there will be approximately 11.9ha of habitat left undisturbed to the north of the construction of the new railway line to enable dormouse dispersal. Phase 2 of the Scheme will not proceed until quarter four in 2019 (at the earliest) as it will depend upon the planning route that is followed. Some of the initial design for Phase 2 does encroach the Phase 1 habitat that will remain so any displacement and mitigation in this area will be avoided.

5.1 Construction Mitigation

The following construction mitigation measures have been developed to ensure the protection of dormice during the proposed works:

- A sensitive winter and summer clearance method to be supervised by an experienced dormouse worker as prescribed within a European protected species dormice development licence;
- Due to the change of the scheme design compared to the conceptual design, the dormouse boxes currently installed in the south of the Scheme will need to be relocated out of the area of the Phase 1 scheme;
- Maintenance of connective dormouse habitat through the retention of vegetation to the north west of the Site during Phase 1 or other features to ensure no dormouse populations become isolated as a result of the proposed works. Phase 2 early stage proposals demonstrates encroachment into Phase 1 areas in order to allow access to the mainline. This will be assessed as part of the Phase 2 works; and
- The creation of habitat through the introduction of supplementary planting and woodland management on-site as outlined in the Llanwern On-site and Off-site Mitigation and Monitoring Plan (367590-WTD-CAR-2650).

5.1.1 Toolbox Talk

Prior to works affecting dormouse habitat commencing all relevant personnel will receive a toolbox talk from the licensed ecologist or their accredited agents. The toolbox talk will highlight the specific measures required at all locations in relation to dormice, and other protected species. Tool box talk sheets can be found in Appendix B of this document. All Site personnel will be advised that certain elements of the proposed works (as detailed within the licence application) are being undertaken subject to the requirements of a dormouse licence and that it is imperative that the measures specified as a condition of the licence are employed. They will also be advised of the requirement to report any suspected breaches of the licence to the licence holder or licensed ecologist immediately so that they may be rectified.

5.1.2 Supervision of winter clearance works

The licensed ecologist will be responsible, along with the licence holder, for monitoring the works method and they will report any breaches/potential breaches of the approved works method to the licence holder for immediate rectification.

The licensed ecologist and accredited agents will also be responsible for conducting a check of the works area subject to vegetation clearance within all potential or known dormouse habitat for dormice and their nests in accordance with the measures detailed in the text below. Prior to the provision of this supervision the licensed workers will be fully briefed regarding the necessity to be vigilant for both hibernation and summer/spring nests by the licence holder. The licensed ecologist (or their accredited agent) will also complete a daily monitoring form of licensable actions undertaken.

- Prior to any works commencing, the ecologist will perform a careful search of all vegetation to be affected for dormice or their nests. In the hibernation season this search will focus on likely hibernation features, whilst in the spring period this search will focus on the more arboreal nesting opportunities;
- Vegetation will be cleared from south of the Site to the north using a two-phased approach with an initial cut of vegetation to leave 300mm of stumps. The remainder 300mm will be cut during the active season (avoiding the breeding period June to September). This approach should ensure that hibernating dormice are left to over winter but also avoid impacts to breeding birds;
- There should be no hibernating (November to March inclusive) dormice found on-site due to the phased vegetation clearance approach. However, in the unlikely event that they are found, Natural Resources Wales (NRW) should be contacted; and
- No works will be undertaken between June and September during the dormouse breeding season.

5.1.3 Sensitive Vegetation Clearance Methodology (Summer (April to November inclusive)

As well as the measures detailed above with respect to winter clearance the following measures will be used to clear dormouse habitat during the summer months:

- In areas where canopy clearance is required this check will be undertaken with the support of a qualified tree climber who will focus on the more arboreal nesting opportunities;
- Only areas of less than 50.0m in length and 18.0m width will be cleared at any one location in one day in a south to north direction; and
- Vegetation will be cleared by removing small areas of vegetation on successive days.

5.1.4 Supervision of summer clearance works

Prior to clearance works commencing the licensed ecologist and accredited agents will conduct a check of the works area subject to vegetation clearance within all potential or known dormouse habitat for dormice and their nests.

If any dormice or nests found they will be carefully moved to an area of suitable dormouse habitat, within 100.0m of where they were found. The animals or nests will be placed in a standard pre-erected dormouse box with free access to the external environment.

5.2 Post-Construction On-Site Mitigation

To ensure the long-term maintenance of the conservation status of dormice affected by the works the mitigation will involve the following measures:

- Enhancement of existing dormouse habitat within the locality of the works on the Llanwern Site during Phase 1 by coppicing or pollarding of retained woodland in a systematic manner to promote habitat structure for the benefit of dormice (please refer to the Llanwern On-Site and Off-Site Mitigation Plan: 367590-WTD-CAR-2650). A drawing outlining the proposed planting scheme for the on-site works is outlined in Appendix C.1;
- Existing dormouse habitat will be protected during construction by installing protective fencing between retained dormouse habitat and the works footprint (18.0m width and 1.6km length). No works will be undertaken to the north of the boundary fence during the Phase 1 construction. All contractors will be made aware of this boundary;
- The creation of windrows using brash wood will be undertaken by the contractor who is appointed by TfW. Deadwood would also be left in place in the woodland. The windrows and deadwood should be placed in a variety of habitats but mainly in areas to encourage dormice to provide optimum hibernation conditions such as damp areas with cool stable temperatures and high humidity (Bright, P et al. 2006);
- The provision of increased foraging and refuge capacity of existing habitat within the locality of the works by supplementary planting (as specified in the Llanwern On-Site and Off-Site Mitigation Plan: 367590-WTD-CAR-2650) which will increase the quality and abundance of food sources for dormice; and
- The development of an awareness regime for maintenance contractors regarding the presence of dormouse populations, so that subsequent maintenance regimes can be amended accordingly, and if appropriate to take into account the presence of dormice.

5.3 On-site summary

Table 5.1: Summary of on-site mitigation, responsible party and compliance required

Action	Responsible party	Compliance required
Dormouse licence	Contractor	Licence needs to be submitted after planning and before the start of construction.
Installation of dormouse boxes	Contractor's ecologist	Installation of 50 dormouse boxes and move the existing boxes to suitable locations outside of the construction zone.
Clearance of woodland according to dormouse licence	Contractor	Clearance needs to be supervised by a dormouse licenced or accredited ecologist.
Installation of the windrows and leaving the deadwood *in-situ*	Contractor	Under the supervision of the licenced or accredited ecologist install windrows in suitable locations.
Once construction is complete, the planting plan will need to be implemented	Contractor	Planting plan to be implemented and planted according to the percentages specified in the Llanwern On-Site and Off-Site Mitigation and Monitoring Plan (367590-WTD-CAR-2650).
Monitoring of the dormice boxes for		
Management of the on-site woodland in subsequent 30 years	Transport for Wales	Management of the woodland according to Llanwern On-Site and Off-Site Mitigation and Monitoring Plan (367590-WTD-CAR-2650) and any subsequent amendments.

Source: Mott MacDonald Ltd.

6 Off-Site Mitigation Strategy

The Sff-Site Mitigation Strategy involves the creation of dormouse suitable habitat to the north of the proposed Site on land owned by Tata Steel Ltd. The current site is a mixture of marshy, improved and semi-improved grassland and it is proposed to connect the broad leaved woodland habitats to ensure that there is no net dormouse habitat loss in the long-term. The existing Site is used to graze sheep and horses. Future phases of the Scheme includes mitigation on the remainder of the Site to the north and additional planting of hedgerows just to the north of the South Wales Mainline to further enhance connective features.

Further to meetings with NRW on (31 May 2018 and 6 September 2018), the minimum ratio of replacement habitat required will be 2:1 (i.e. for every 1.0ha lost there should be 2.0ha planted). For Phase 1, it is anticipated that there will be 2.9ha lost (1.8ha of permanent loss and 1.1ha of temporary loss), which will be replaced on a 2:1 basis resulting in the creation of 5.8haof woodland and glade habitat which has been designed for the habitat currently present on-site. The baseline conditions have been outlined in the Technical Note in Appendix D.

This will be undertaken through the implementation of the measures outlined in the Llanwern On -Site and Off-Site Mitigation Plan (document number 367590-WTD-CAR-2650) which includes a planting plan to create a mixed broadleaved woodland with woodland edge planting and dry and wet grassland glades. Stock proof fencing will also be installed to ensure that the new planting is protected. The propose planting plan for the compensation site is outlined within Drawing 367590-MMD-48-XX-DR-C-0201 in Appendix C.2.

It is proposed that 100 dormouse boxes will be installed at the Routes Wood directly north of the proposed compensation land (subject to the land owners permission).

The development of an awareness regime for maintenance contractors regarding the presence of dormouse populations, so that subsequent maintenance regimes can be suitably informed. This will be undertaken according to the Llanwern On-Site and Off-site Mitigation and Monitoring Plan (document number 367590-WTD-CAR-2650) and the toolbox talk in Appendix B.

6.1 Off Site

Table 6.1: Summary of off-Site Mitigation, Responsible Party and Compliance Required

Mitigation	Responsible party	Compliance required
Planting of the off-Site mitigation area during winter 2018/2019	TfW and Contractor	Plant the off-Site mitigation during the winter of 2018/2019 as outlined in the drawings in Appendix B, subject to land owner agreement.
Install 100 dormouse boxes in the Routes Wood	TfW and Contractor	Installation of the dormouse boxes
Management of the off-Site for the subsequent 30 years	TfW	Management of the woodland according to Llanwern Off-Site and Off-site Mitigation and Monitoring Plan (367590-WTD-CAR-2650) and any subsequent amendments.

Source: Mott MacDonald Ltd.

7 Monitoring

The monitoring outlined below outlines measures for the mitigation measures for planting and for dormice and bats. The aim of the on-site monitoring is to demonstrate an improvement on the current condition of the woodland and to improve the species diversity and abundance. The aim of the off-site monitoring is to check if the mitigation is successful and that dormice are using the site.

7.1 Dormice monitoring

Dormouse boxes will be installed in both on-site and off-Site (Routes Wood) areas by the licensed ecologists or their accredited agent before any clearance is undertaken on-site. The boxes will be checked within the active season (April-November) on a bi-monthly basis between May and September inclusive in years 1, 2, 3, 5 and 10. Once the planting vegetation is established on the north mitigation area, dormice boxes will be installed and monitored to gauge the success of the planting. The boxes will be checked for the presence of dormice and, if dormice are found, they will be weighed and gender assessed before being replaced in the box. Weighing of dormice will use a suitable holding bag and a Newton meter. The number, distribution and physical health of the dormice present will be used to identify if any supplementary mitigation is required.

Before the start of each monitoring season all boxes will be cleaned out (if necessary) along with any box maintenance such as new attachment to the tree or box replacement. All nests, including dormouse, will be removed from the boxes during the pre-monitoring period.

If during the breeding season, a box is found to contain a mother with young, the lid will be replaced and no further data capture for monitoring will be undertaken on that box for that month. Recording will also note if other species have utilised the box other than dormice and, if another species' nest is found to be abandoned, it will be removed from the box. Only dormouse nests will be left in boxes during the season regardless of presence of dormice.

The above on-site measures will aim to demonstrate an overall increase in numbers and distribution of dormice throughout the site.

The off-site monitoring will be undertaken when there is evidence of fruiting hazel, nut searches for characteristic dormice chewed nuts should be undertaken for 5 years after this time.

7.2 Planting

The newly planted areas will be inspected annually in early September of each year and all plants which are missing, damaged, have died, or are failing to make satisfactory extension growth shall be replaced in the next planting season immediately following the inspection. Replacement plants shall, in all aspects, be the same as the original stock at the time of planting, except that it shall be an additional year older for each year that has elapsed since the original stock was first planted. Replacement planting will be undertaken in accordance with the planting conditions detailed within this document. All plants removed shall be taken off-Site and disposed of at a suitably licenced facility. Diseased plants shall be appropriately disposed of in a similar manner. Following replacement planting, any stakes, ties, tubes or guards shall be re-fixed/replaced to the original specification. Plants and planting areas shall be maintained and reviewed for 30 years after planting.

7.3 Reporting

An annual report summarising the data collected as part of the monitoring measures prescribed will be provided to NRW for 10 years following the completion of the original works. The report will include the data from the monitoring and any further recommendations for assisting the populations for both of the on-site and off-site mitigation and compensation works.

7.4 Criteria for Success

The criteria for the success for the mitigation will include the following indicators:

- Evidence of dormice moving in to the woodland to the west of Monks' Ditch;
- Evidence of dormice moving in to the north mitigation new woodland once it is established; and
- Annual review of woodland management, rectify any issues identified and any improvements required.

8 References

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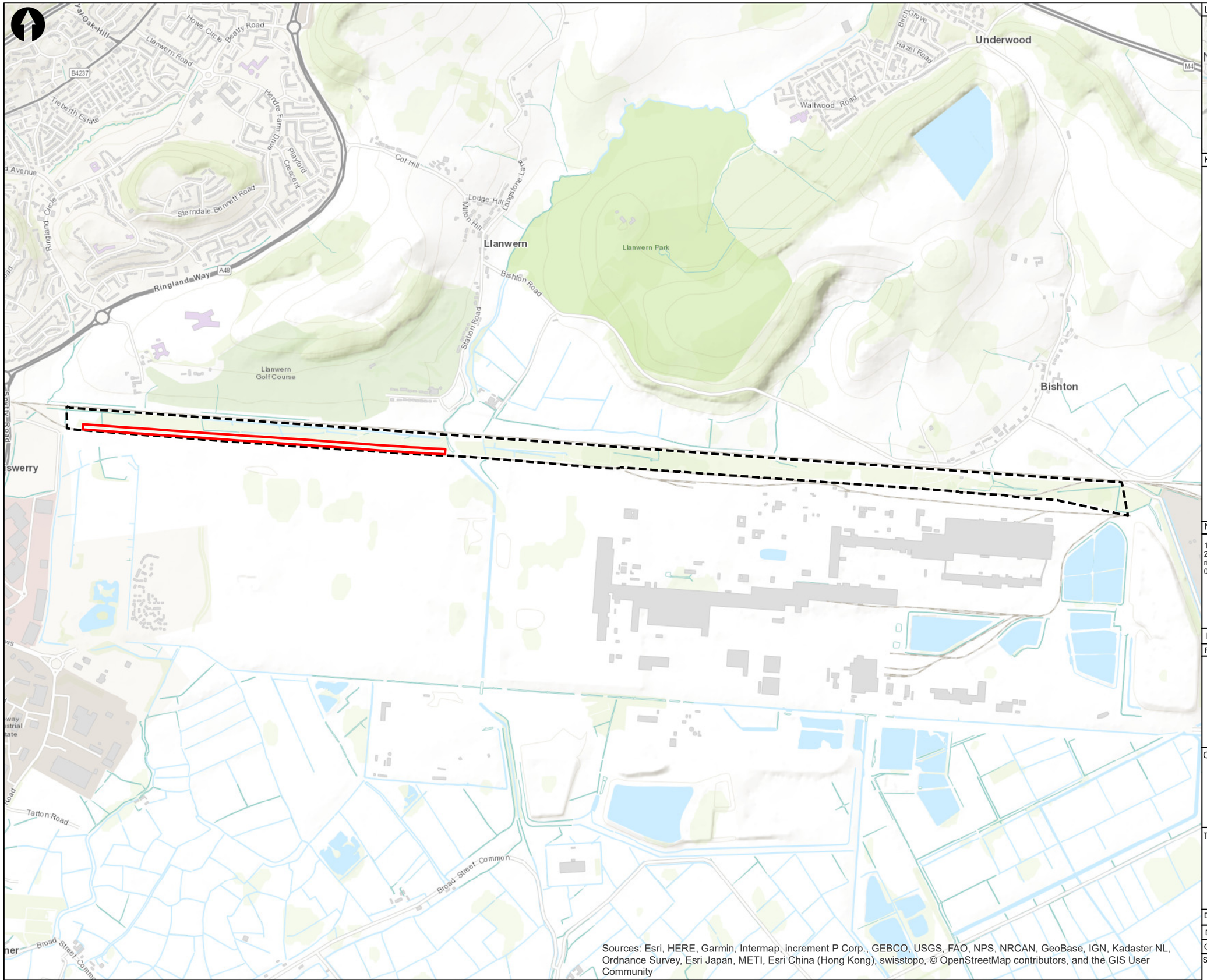
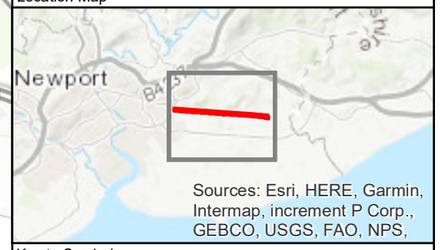
Appendices

A. Llanwern Site and Survey Drawing 18
B. Toolbox Talk 19
C. Landscape Mitigation Drawings 20
D. Compensatory Land: Ecological Assessment Technical Note 24

A. Llanwern Site and Survey Drawing



Location Map



Key to Symbols

Site extent

Survey area

Notes

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Rev	Date	Drawn	Description	Ch'k'd	App'd
P1	24/09/18	TR	For information	ZCM	XX

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Title

South Wales Metro - Task Order 26
Llanwern Site Location Plan

Designed	Z Costas	ZC	Eng. Check	Z Costas	ZCM
Drawn	T Ruff	TR	Coordination	L Woolley	LKW
GIS Check	G O'Donovan	GO	Approved	XX	XX

Scale at A3	Status	Rev	Security
1:25,000	INF	P1	STD

Drawing Number
367590-MMD-26-XX-DR-C-0509

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0 300 600 900 1,200 1,500 Metres

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B. Toolbox Talk

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TOOLBOX TALK: DORMICE

Dormice live in woodland, hedgerows, scrub and tall vegetation.

Evidence suggests that dormice may be present within the vicinity of the proposed works.

LEGISLATION

Under UK law (*Wildlife and Countryside Act, 1981, Conservation Natural Habitats &c Regulations, 2010)* it is an offence to:

- Intentionally kill, take or injure a dormouse.
- Possess or control a dormouse.
- Intentionally or recklessly cause damage, destruction or obscure access to any structure or place used by dormice for shelter or protection.
- Intentional or reckless disturbance of dormice.

Penalties for breaking the law can include **large fines, imprisonment** and the **seizure of equipment.**

If there is any suspicion that dormice are present within the works area, STOP ALL WORKS and contact the Ecologist IMMEDIATELY

DO NOT RISK BREAKING THE LAW

WHAT TO DO IF YOU SEE A DORMOUSE

If at any time during the works a dormouse or dormouse nest is seen, all works should halt (when safe to do so) and Ecologist must be contacted immediately. If there is any doubt contact the Ecologist.

Call the Ecologist. Leaving a message is insufficient - you must speak directly to an Ecologist. The Ecologist will then be able to advise on a legal and appropriate course of action

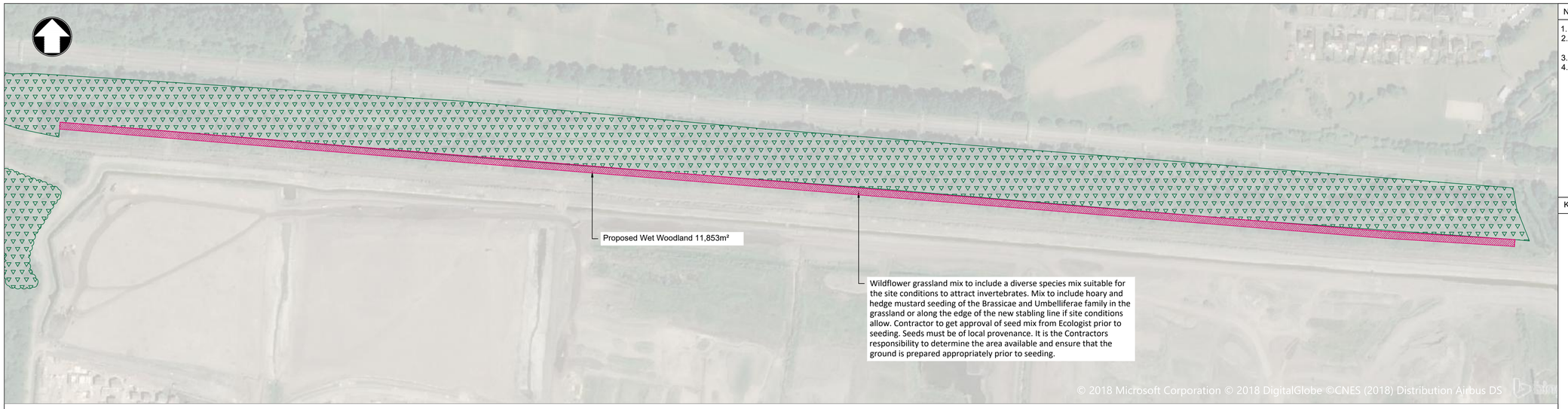
Dormice are nocturnal animals so you are unlikely to see them during the day unless they have been disturbed. You may see a dormouse nest which looks similar to a birds nest with the exception that the entrance is restricted to a small thumb sized hole. **At no time should you attempt to handle a dormouse or cause any disturbance to a nest. Dormice are fragile animals and incorrect handling can cause injury/death.**

DORMICE AND NESTS

MOTT MACDONALD

C. Landscape Mitigation Drawings

C.1 On-Site mitigation drawing



Llanwern Planting Schedule

Species	Size	Location	%Mix	Number
Acer campestre	1+1 40/60cm height, bare root, notch planted, cut back to 30cm height***	Woodland Core	3	1030
	1+2 175/200cm height, feathered, bare root*/**/***	Woodland Core	1	343
	6-8cm girth, feathered, bare root*/**/***	Woodland Core	1	343
Acer pseudoplantus	1+1 60/80cm height, bare root, notch planted ***	Woodland Core	1	343
	6-8cm girth, feathered, bare root*/**/***	Woodland Core	1	343
Betula pendula	1+1 125/150cm height, transplant, bare root*/**/***	Woodland Core	2	686
	1+2 200/250cm height, transplant, feathered, bare root*/**/***	Woodland Core	1	343
	6-8cm girth, 25 Litre container, feathered*/**/***	Woodland Core	1	343
Carpinus betulus	1+2 80/100cm height transplant, bare root*/***	Woodland Core	4	1375
	6-8cm girth, feathered, bare root*/**/***	Woodland Core	2	686
Castanea sativa	1+1 60/80cm height, bare root, notch planted ***	Woodland Core	5	1717
	6-8cm girth, feathered, bare root*/**/***	Woodland Core	1	343
Corylus avellana	40/60cm height, bare root, notch planted, cut back to 30cm height***	Woodland Core	18	6180
	1+1 80/100 height transplant, bare root, cut back to 30cm height*/***	Woodland Core	2	686
Crataegus monogyna	40/60cm height, bare root, notch planted, cut back to 30cm height***	Woodland Core	18	6180
Hedera helix	15/20cm height, 9cm container, notch planted	Woodland Core	1	343
Ilex aquifolium	40/60cm height, 2 Litre container*/***	Woodland Core	2	686
Lonicera periclymenum	40/60cm bare root, notch planted, cut back to 30cm height	Woodland Core	1	343
Malus sylvestris	1+2 80/100cm height, transplant, bare root*/***	Woodland Core	6	2060
	6-8cm girth, feathered, bare root*/**/***	Woodland Core	4	1375
Prunus avium	1+1 60/80cm height, bare root, notch planted ***	Woodland Core	3	1030
	1+2 125/150cm height, transplant, feathered, bare root*/**/***	Woodland Core	2	686
	6-8cm girth, standard, bare root*/**/***	Woodland Core	1	343
Pinus sylvestris	2+2 40/60cm height, bare root, notch planted***	Woodland Core	4	1375
	125 - 150cm height, feathered, hessian root balled*/**/***	Woodland Core	3	1030
Quercus robur	1+2 100/125cm height, transplant, bare root*/**/***	Woodland Core	7	2403
	1+2 150/175cm height, transplant, bare root */**/***	Woodland Core	2	686
	6/8cm girth, feathered, hessian root balled*/**/***	Woodland Core	1	343
Taxus baccata	2+2 30/40cm height, bare root, notch planted***	Woodland Core	2	686
Total			100	34330

Species	Size	Location	%Mix	Number	Location	%Mix	Number
Acer campestre	1+1 40/60cm height bare root, notch planted, cut back to 30cm height***	Woodland Edge	3	538	Low Density Planting	3	86
	1+2 175/200cm height, feathered, bare root*/**/***	Woodland Edge	1	180	Low Density Planting	1	28
Betula pendula	1+1 125/150cm height, transplant, bare root*/**/***	Woodland Edge	4	718	Low Density Planting	4	115
	1+2 200/250cm height, transplant, feathered, bare root*/**/***	Woodland Edge	2	359	Low Density Planting	2	57
Corylus avellana	40/60cm height, bare root, notch planted, cut back to 30cm height***	Woodland Edge	30	5380	Low Density Planting	30	859
	1+1 80/100cm height, transplant, bare root, cut back to 30cm height*/***	Woodland Edge	20	3587	Low Density Planting	20	573
Crataegus monogyna	40/60cm height, bare root, notch planted, cut back to 30cm height***	Woodland Edge	10	1794	Low Density Planting	10	287
Cytisus scoparius	40/60cm height, bare root, notch planted, cut back to 30cm height***	Woodland Edge	5	896	Low Density Planting	5	143
Rosa canina	40/60cm height, bare root, notch planted, cut back to 30cm height	Woodland Edge	1	180	Low Density Planting	1	28
Malus sylvestris	1+2 80/100cm height, transplant, bare root*/ ***	Woodland Edge	5	896	Low Density Planting	5	143
	6-8cm girth, feathered, bare root*/**/***	Woodland Edge	2	359	Low Density Planting	2	57
Prunus spinosa	40/60cm height, bare root, notch planted, cut back to 30cm height	Woodland Edge	10	1794	Low Density Planting	10	287
Salix caprea	1+1 60/80cm height, bare root, notch planted, cut back to 30cm height***	Woodland Edge	2	359	Low Density Planting	2	57
Viburnum lantana	40/60cm height, bare root, notch planted, cut back to 30cm height	Woodland Edge	5	896	Low Density Planting	5	143
Total			100	17936		100	2863

Species	Size	Location	%Mix	Number
Alnus glutinosa	1+1 40/60cm height, bare root, notch planted, cut back to 30cm height***	Wet woodland	20	2370
	1+2 125/150cm height, transplant, feathered, bare root*/**/***	Wet woodland	15	1778
	6-8cm girth, feathered, bare root*/**/***	Wet woodland	5	593
Acer pseudoplatanus	1+1 60/80cm height, bare root, notch planted***	Wet woodland	6	712
	6-8cm girth, feathered, bare root*/**/***	Wet woodland	2	237
Hedera helix	15/20cm height, 9cm container, notch planted	Wet woodland	1	118
Lonicera periclymenum	40/60cm height, bare root, notch planted, cut back to 30cm height	Wet woodland	2	237
Salix alba	0/1 60/80cm height, bare root, notch planted, cut back to 30cm height***	Wet woodland	4	474
	0/1 150/175cm height, bare root***	Wet woodland	2	237
	200-250cm height, feathered, bare root*/**/***	Wet woodland	2	237
Salix caprea	1+1 60/80cm height, bare root, notch planted, cut back to 30cm height***	Wet woodland	30	3555
Sambucus nigra	40/60cm height, bare root, notch planted, cut back to 30cm height***	Wet woodland	6	712
Viburnum lantana	40/60cm height, bare root, notch planted, cut back to 30cm height***	Wet woodland	5	593
Total			100	11853

Species	Size	Location	%Mix	Number
Salix alba	0/1 60/80cm height, bare root, notch planted, cut back to 30cm height***	Low Density Salix woodland	20	214
	0/1 150/175cm height, bare root***	Low Density Salix woodland	20	214
	200-250cm height, feathered, bare root*/**/***	Low Density Salix woodland	20	214
Salix caprea	1+1 60/80cm height, bare root, notch planted, cut back to 30cm height***	Low Density Salix woodland	40	428
Total			100	1070

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LLANWERN PLANTING NOTES

General

Prior to planting and/or excavation, the Contractor must establish the position and nature of all services. Carefully hand dig in the vicinity of underground service runs. The Contractor must apply for and obtain all consents and licences from statutory undertakers as necessary. Any damage caused to service runs by the Contractor shall be made good at his own expense.

All bare root and rootballed material shall be planted between 31st October and 31st March, or in accordance with the Supervising Officer's instructions.

All container grown material shall be planted between 30th September and 30th April, or in accordance with the Supervising Officer's instructions.

The Supervising Officer reserves the right to suspend any preparatory or planting work during adverse weather conditions or when the ground is waterlogged or frozen, avoiding frosts and excessively dry, cold and windy conditions. Ensure soil is sufficiently dry when excavating and moving to avoid damaging its' structure. Plant material delivered in a frozen condition will not be accepted. Roots are to be protected at all times, from lifting in the nursery until planting out on site.

Plant supply

All plants shall be supplied to the relevant parts of BS 3936 Parts 1 (1992) and 4 (1984). Stock shall be materially undamaged, sturdy, healthy and vigorous, of good shape and without elongated shoots, and free from pests and diseases, discolouration, weeds and physiological disorders. Plants shall have been grown in a suitable environment and hardened off. The root system shall be to the requirements of the National Plant Specification and balanced with the branch system.

All container grown material shall have been grown in the container at least one full growing season prior to delivery and show substantial new root growth, holding the planting material in place but without signs of being pot-bound or waterlogged.

Lifting, packaging and transporting shall be to CPSE (Committee for Plant Supply and Establishment) 'Handling and Establishing Landscape Plants' (obtainable from the Horticultural Trades Association) Part I, Part II, and Part III, Paragraphs 1.3.3 - 1.3.6, 3.0 and 4.0.

The Contractor shall identify, reject and replace with suitable material, any plants misshapen or struggling to survive because of damage prior to, or at planting.

Tree and shrub planting

Planting shall be carried out between November and March, but not during periods of frost or drying winds.

Prior to planting cut all brambles, on site and on boundaries, to ground. Do not apply herbicide to the existing plants. Remove the arisings and dispose of all material off-site.

Spread granular slow release fertiliser over all woodland planting areas prior to planting at the manufacturer's recommended rates. Do not apply fertiliser to retained grassland areas.

Plant numbers should be calculated at a density of 1 plant per 1m2 for woodland and woodland edge, and 1 plant per 5 m2 for low density planting. Plant locations are to be offset by 1,500mm from all boundaries and adjacent features.

Planting shall be undertaken in a random manner, avoiding equal spacings and grids. All plants are to be planted in species groups of 3 apart from Hedera helix and Lonicera periclymenum which should be planted immediately adjacent to trees that are staked to provide a structure for the plant to climbing.

Prior to removal from containers, all container plants shall be thoroughly watered and allowed to stand for a minimum of 30 minutes.

All roots of bare rooted material shall be thoroughly immersed in an anti-desiccant solution such as Alginure Root Dip or similar.

Planting shall be either in pits or via notches as specified. Where notch planted, the entire root system must be covered, and completely firmed and consolidated at planting.

Where plants are to be pit planted, holes shall be dug of sufficient size to take the entire root system without excessive bending of the roots. The base of each pit shall be broken up to a depth of 500mm.

Single tree stakes are to be provided for all feathered trees. Stakes shall be whole sections of softwood timber peeled and pressure treated in accordance with BS 4072, 50-75mm top dia., and of sufficient length to extend to 300mm above ground when driven firmly into the ground. Position on the windward side of the plant, and drive into the base of the pit after breaking up the bottom of the pit and before planting. Secure each plant using a single heavy-duty tree tie and spacer approximately 50mm from the top, secured with a nail if necessary. The tie should hold the tree in position securely enough to allow wind movement, but not so tightly it chaffs the bark.

All plants shall be centrally positioned and upright, with finished soil level matching that of the nursery, adequately firmed but not compacted. Damaged top or root growth shall be carefully cut back to live wood.

Pits shall be backfilled with 80% excavated topsoil and 20% organic material, not containing peat or peat-based material. Slow release fertiliser shall be incorporated into the mix, at the manufacturer's recommended ratios.

All plants must be watered to field capacity on completion, ensuring soil is completely firmed and consolidated, but not compacted, around roots.

Securely fix a 600mm grey or black spiral rabbit guard around every stem post planting, firmly rammed into the soil to prevent dislodging. Do not cut off excess guard on plants cut back to 300mm.

Apart from in glades, treat an area of, 1,000mm radius around the base of each staked plant with a selective herbicide developed to treat grass, following the manufacturer's instructions.

Remove all arisings including tags, poles, containers, wrappings, tapes and other packaging and dispose of off-site.

Stock proof fencing

Fencing should be constructed in straight lines and be strained between strainer posts.

Strainer posts should be used at each end of the fence and at least every 100m (2 nets), at all changes of direction and sudden changes of gradient (especially at the bottom of dips/hollows).

Straining posts are to be dug in to a depth of at least 900mm, properly rammed, firmed (using stones where necessary) and strutted in the line of the fence. Two struts per post should be used on changes of direction except on acute corners of under 90 degrees where a single strut bisecting the angle of turn may be used.

The point end of the strut should be housed approximately 75-100mm deep into the straining post at a height of 750mm above ground level. The bottom end should be dug into the ground and rest tight on a half stake driven into the ground or a large stone well bedded below ground level.

Intermediate stakes are to be driven into the ground to a minimum depth of 550mm at 2,700mm intervals, in line with the posts.

Netting should be properly strained and stapled. Staples to be placed on top, 3rd, 5th and bottom wires of the netting on each post. Staples must not be driven fully home on the intermediate posts in order to allow future repair and retensioning work. They are to be positioned diagonally to the grain of the wood.

Single strand wire should be barbed and be properly strained and stapled to the outside of the posts and stakes 125mm above the top of the netting. A second barbed wire above the first may also be used (optional). Use plain wire if adjoining a public right of way.

Fix an additional single strand wire or piece of netting to the bottom of the fence in hollows and dips. Alternatively gaps below the fence should be filled with site stone or soil to ensure that it is fully stock proof.

Fencing should not be strained or attached to gate posts, trees, shrubs or other structures.

Materials

- Timber must be round peeled softwood (not spruce) and pressure tanalised to BS 4072, or timber of equivalent quality and durability;
  - Straining posts 2,000mm x 120mm top diameter;
  - Struts 2,000mm x 100mm top diameter;
  - Intermediate stakes 1700mm x 65mm top diameter, pointed; and
  - Longer stakes may be needed in soft or uneven ground conditions.
- Wire must comply to BS 4102 and be galvanised to BS EN 10244-2:2001.
  - Line wire: 4mm (8 swg) plain mild galvanised wire;
  - Barbed wire: Two strand 2.5mm (12½ swg) mild steel galvanised 4-point barbed wire; and
  - Staples: 40mm x 4mm galvanised wire staples.

Netting: C8/80/15 galvanised pig netting. Where horses are present use HT 13/122/8 horse netting.

Planting maintenance 60 months post planting

Undertake maintenance visits as necessary to maintain the works in a tidy and healthy condition.

Maintain an area of 1m radius grass free around the base of each staked plant with a selective herbicide developed to treat grass, following the manufacturer's instructions during the course of 60 months following planting.

Maintain planted areas free from rubbish and debris.

Water as necessary, without damaging or displacing plants or soil to promote healthy growth.

Where wind rocking or soil heave has occurred, straighten plant and lightly firm soil around without compacting.

Remove plant growth overhanging public access ways and weak, dead or damaged material. Prune back to healthy and strong buds or growth points between November and March. Prune healthy overhanging arisings in long lengths and leave neatly piled across the area. Remove all other arisings and dispose of off site.

Plants that have failed to thrive should be replaced with equivalent plants during the next planting season, between November and March. Replacements should match either size of adjacent or nearby plants of same species or match original specification, whichever is the greater size.

Check tree stakes, ties and guards, remove and replace as necessary those broken or damaged to maintain plant stability and protection. Remove stakes and ties if tree is self-supporting and in any case after five years. Remove rabbit guards after five years. Remove redundant stakes and tags and guards and dispose of off site.

Leave the works in a clean tidy condition.

1:2500 0 125m 250m

Notes

1. Do not scale any information from this drawing.
2. The drawing has been developed to meet the extent of landscape mitigation as per the NRW requirements.
3. Print in colour.
4. See drawing number 367590-MMD-48-XX-DR-C-0201 for additional planting areas.

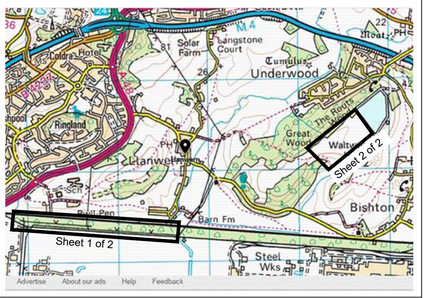
*	Pit planted
**	Single softwood stake
***	Spiral rabbit guard

Key to symbols

Existing vegetation to be retained

Proposed wet woodland mix

Location Plan NTS



Reference drawings

367590-MMD-48-XX-DR-C-0001 - Site Location Plan
367590-MMD-48-XX-DR-C-0002 - General Arrangement Plan Sheet 1 of 4
367590-MMD-48-XX-DR-C-0003 - General Arrangement Plan Sheet 2 of 4
367590-MMD-48-XX-DR-C-0004 - General Arrangement Plan Sheet 3 of 4
367590-MMD-48-XX-DR-C-0005 - General Arrangement Plan Sheet 4 of 4
367590-MMD-48-XX-DR-C-0006 - Cross Sections
367590-MMD-48-XX-DR-C-0201 - Landscape Mitigation Plan Sheet 2 of 2
367590-MMD-48-XX-DR-C-0300 - Proposed Track Drainage Sheet 1 of 2
367590-MMD-48-XX-DR-C-0301 - Proposed Track Drainage Sheet 2 of 2
367590/WTD/CAR/2650 - Llanwern On and Off Site Mitigation and Monitoring Plan

Rev	Date	Drawn	Description	Ch'k'd	App'd
P2	02.10.2018	RT	Pre-Application Consultation	RM	DF
P1	28.09.2018	HW	First Issue	MB	DF

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South Wales Metro - Task Order 048
Llanwern Rail Facilities - Phase 1
Landscape Mitigation Plan
Sheet 1 of 2

Designed	H Wilcox	HW	Eng check	M Brewster	MB
Drawn	H Wilcox	HW	Coordination	J Bates	JB
Dwg check	M Jones	MAJ	Approved	D Francis	DF

Scale at A1	Status	Rev	Security
As Shown	PRE	P2	STD

Drawing Number
367590-MMD-48-XX-DR-C-0200

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C.2 Off-Site mitigation drawing

Great Wood

The Routs Wood

Hartridge Fields SINC

Waltwood Hill

Remove existing access gate and posts and replace to match. Retain existing style and repair if damaged

Existing grassland to be retained and planted with low density woodland edge 1,808m²

Existing fence and gate retained

Low density planting in existing grassland to be retained 1,055m²

Native woodland core 5,705m²

Retain a 5m easement between the proposed woodland and the existing reservoir fence line for maintenance

Existing wet grassland to be retained and planted with low density Salix caprea 3,209m²

Proposed stock proof fencing 346m

Proposed access gate

3m easement retained for access in to the (SINC)

Proposed stock proof fencing 454m

Native woodland core 29,255m²

Woodland edge 17,936m²

Existing fence and gates retained

Existing fence and gate retained

1:1250 0 50m 125m

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Notes

1. Do not scale any information from this drawing.
2. The drawing has been developed to meet the extent of landscape mitigation as per the NRW requirements.
3. Print in colour.
4. See drawing number 367590-MMD-48-XX-DR-C-0200 for Planting notes.

Key to symbols

- Existing vegetation to be retained
- Proposed native woodland core mix
- Proposed native woodland edge mix
- Existing dry grassland retained
- Existing wet grassland retained
- Existing fence to be retained
- Proposed stock proof fence
- Llanwern Hill Circular PROW
- Proposed access and maintenance route to access Site of Importance for Nature Conservation (SINC) and proposed woodland planting
- Proposed access gate and gate posts to match existing, 7 bar tubular galvanised steel
- Existing access gate retained

Reference drawings

367590-MMD-48-XX-DR-C-0001 - Site Location Plan
367590-MMD-48-XX-DR-C-0002 - General Arrangement Plan Sheet 1 of 4
367590-MMD-48-XX-DR-C-0003 - General Arrangement Plan Sheet 2 of 4
367590-MMD-48-XX-DR-C-0004 - General Arrangement Plan Sheet 3 of 4
367590-MMD-48-XX-DR-C-0005 - General Arrangement Plan Sheet 4 of 4
367590-MMD-48-XX-DR-C-0006 - Cross Sections
367590-MMD-48-XX-DR-C-0200 - Landscape Mitigation Plan Sheet 1 of 2
367590/WTD/CAR/2650 - Llanwern On and Off Site Mitigation and Monitoring Plan

Rev	Date	Drawn	Description	Ch'k'd	App'd
P2	02.10.2018	RT	Pre-Application Consultation	RM	DF
P1	28.09.2018	HW	First Issue	MB	DF

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Title
South Wales Metro - Task Order 048
Llanwern Rail Facilities - Phase 1
Landscape Mitigation Plan
Sheet 2 of 2

Designed	H Wilcox	HW	Eng check	M Brewster	MB
Drawn	H Wilcox	HW	Coordination	J Bates	JB
Dwg check	M Jones	MAJ	Approved	D Francis	DF

Scale at A1	Status	Rev	Security
1:1250	PRE	P2	STD

Drawing Number
367590-MMD-48-XX-DR-C-0201

D. Compensatory Land: Ecological Assessment Technical Note

MOTT MACDONALD

Technical Note

Project:	Llanwern Rail Facilities		
Our reference:	367590-WTD-CAR-2659	**Your reference:**	
Prepared by:	Z Costas-Michael	**Date:**	26/09/2018
Approved by:	E C Probert	**Checked by:**	L Woolley
Subject:	Compensatory Land: Ecological Assessment and Recommendations		

1 Introduction

1.1 Background and Site Location

Mott MacDonald Ltd have been commissioned by Transport for Wales, on behalf of Welsh Government to undertake a baseline ecological assessment of land to the north of the Llanwern Steelworks site. This site is proposed for compensatory woodland planting for the Llanwern Rail Facilities scheme near to the village of Llanwern, South Wales (Ordnance Survey Grid Reference ST 36907 87302).

The purpose of this technical note is to document the baseline conditions of the land and identify any ecological constraints to inform the planting scheme and the viability of the area as a 'compensation site' (to which it is referred throughout the remainder of the note).

The compensation site covers an area of approximately 20.0ha and is located 0.8km north of the Llanwern Steelworks at OS Grid Reference ST 38496 88269 adjacent to the existing Tata Steel owned reservoir. The Llanwern Rail Facilities scheme is split into 5 phases and for Phase 1 the loss of woodland is anticipated to be a quantum of an approximately of 2.8ha.

A compensation ratio of 2:1 was agreed with Natural Resources Wales, and on that basis it is proposed to compensate for this loss with approximately 5.6ha of new woodland planting (some on site and some off-site; see Llanwern On-site and Off-site Long-term Management Plan and Llanwern On-site and Off-site Mitigation Plan, Report Ref: 367-590-WTD-CAR-2649 and 367-590-WTD-CAR-2648, Mott MacDonald 2018 for more details). The proposed compensation site is indicated as the red lined area within the site location plan provided in Figure 1 below:

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Figure 1: Compensation Site Location Plan

Source: DoBH, OS, Esri, HERE, Garmin, INCREMENT P, USGS, METI/NASA | DigitalGlobe, Microsoft

2 Methodology

2.1 Field Survey

An initial field survey was undertaken by an experienced ecologist on the 13 September 2018. All habitats within the site, where accessible, were identified and mapped in compliance with the 'Handbook for Phase 1 Habitat Survey: a technique for environmental audit' (Joint Nature Conservation Committee guidelines (JNCC), 2010). Dominant plant species were noted, as were any protected, uncommon or invasive species listed in Schedule 9 of the Wildlife and Countryside Act (WCA)1981. An assessment was also undertaken of the likely presence or absence of protected and notable species within the Zone of Influence (ZoI) of the proposed works (i.e. areas within or adjacent to the site boundary that may be impacted by the proposed works). This was based on the known distribution of species, habitat suitability and/or direct evidence such as field signs or observations. The methodologies and assessment criteria used were based on current published guidance.

2.1.1 Identification of Waterbodies

The relevant 1:25,000 scale Ordnance Survey (OS) sheet and aerial photography were searched to check for waterbodies within 250m of the site boundary as recommended in the Great Crested Newt (GCN) Conservation Handbook (Langton *et al.,* 2001).

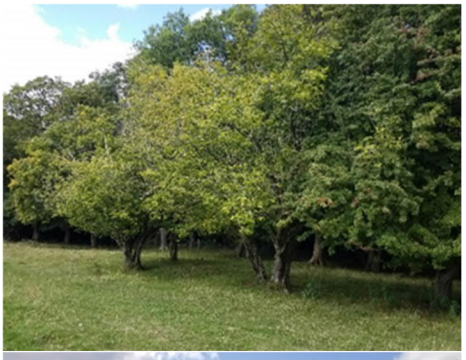
3 Survey Results

3.1 Habitats

The Extended Phase 1 Habitat Map is provided in Appendix A with associated target notes in Appendix B. Target notes are referred to as TN1, TN2 etc. in Table 1 below.

Table 1: Habitats as described in the Handbook for Phase 1 Habitat Survey (JNCC, 2010)

Habitats	Descriptions	Photo
Marshy Grassland	The majority of the site is marshy grassland which extends across the hillside to the south-west. The habitat is dominated by hard rush (*Juncus inflexus*) with frequent creeping thistle (*Cirsium arvense*). Grass species present include crested dog's tail (*Cynpsurus cristatus*), perennial rye-grass (*Lolium perenne*), Yorkshire fog (*Holcus lanatus*) and red fescue (*Festuca rubra*). Occasional quaking grass (*Briza media*) was also recorded. As the site slopes to the south, a larger diversity and coverage of rush species were recorded including soft rush (*Juncus effusus*) and compact rush (*Juncus conglomeratus*). Glaucous sedge (*Carex flacca*) and false fox sedge (*Carex vulpina*) were occasionally recorded within the grassland. Other ground flora recorded on site include agrimony (*Agrimonia eupatoria*), tormentil (*Pontentilla erecta*), meadow buttercup (*Ranunculus acris*), white clover (*Trifolium repens*) and stinging nettle (*Urtica dioica*).	
Semi-improved Grassland (Neutral)	To the south west of the reservoir lies an area of semi-improved grassland. The habitat is dominated by crested dog's tail, with abundant creeping thistle. Red fescue, Yorkshire fog and false-oat grass (*Arrhenatherum elatius*) were also recorded. Broad-leaved dock (*Rumex obtusifolius*) was abundant throughout the grassland. Occasional species recorded includes autumn hawkbit (*Leontodon autumnalis*), mouse-ear hawkweed (*Pilosella officinarum*), common daisy (*Bellis perennis*), cock's foot (*Dactylis glomerata*), red clover (*Trifolium pretense*), creeping buttercup (*Ranunculus repens*) and occasionally small patches of hard rush. Along the edge of the grassland, near the fenceline for the reservoir, the species diversity increased to include agrimony, common centuary (*Centrurium erthraea*), common mouse-ear, quaking grass, dove's-foot cranesbill (*Geranium molle*) and lesser trefoil (*Trifolium dubium*). Scattered scrub and trees were recorded to the west of the grassland which comprised native species such as hazel (*Corylus avellana*), hawthorn (*Crataegus monogyna*), oak (*Quercus robur*), silver birch (*Betula pendula*) and dog rose (*Rosa canina*).	

Habitats	Descriptions	Photo
		
Improved Grassland	To the east of the reservoir, there is an area of improved grassland grazed by sheep. It largely comprises perennial rye-grass, crested dog's tail and red fescue. Creeping thistle, greater plantain (*Plantago major*), knotgrass (*Polygonum aviculare*), nettle, common daisy, mouse-ear hawkweed and common dandelion (*Taraxacum officinale* agg.) were also recorded in this habitat.	
Species Poor Hedgerow	To the south of the reservoir lies a species-poor hedgerow. The hedgerow was heavily managed and comprised hawthorn (*Crataegus monogyna*) and bramble.	N/A
Earth Bank	An earth bank was recorded in the semi-improved grassland, largely colonised by tall ruderal vegetation. Species recorded on the earth bank include great willowherb (*Epilobium hirsutum*), nettle, ground ivy (*Glechoma hederacea*), creeping thistle, cock's-foot, Yorkshire fog and low growing bramble.	
Fence	A number of fences were recorded along field margins to separate livestock currently using the fields.	N/A

Source: Mott Macdonald Ltd

On the basis of the above results, the majority of habitats within the site are considered to be of negligible to low ecological value, comprising a limited range of common and widespread species. Nonetheless, the marshy grassland and the semi-improved grassland have been assessed against local Site of Importance for Nature Conservation (SINC) criteria (see Table 2 below).

Outside of the compensation site, woodland is present to the north and west of the reservoir which connects to further areas of woodland and hedgerows to the south and wider landscape. The adjacent woodland was surveyed from the site boundary and was noted to mostly comprise native species such as oak, silver birch (*Betula pendula*), ash (*Fraxinus excelsior*), beech (*Fagus sylvatica*) as well as sycamore (*Acer pseudoplatanus*). The visible understorey comprises hazel, hawthorn and holly (*Ilex aquilifolium)* with ground flora present including woodruff (*Galium odoratum*), dog's mercury (*Mercurialis perennis*), ivy (*Hedera helix*) and lord's-and-ladies (*Arum maculatum*). This adjacent habitat is an ancient semi-natural woodland referred to as 'The Routes Wood' which is designated as a SINC (see Appendix A).

3.2 Identification of Waterbodies

The desk study identified the reservoir within 250m of the compensation site. The reservoir is a concrete structure approximately 300m in width which is used as a water source by Tata Steel Llanwern works to the south.

3.3 Species

Evidence of any protected or notable species was noted during the survey, along with an assessment of the suitability of the site to support such species and whether these would pose a constraint to proposed works. This is summarised below.

3.3.1 Breeding Birds

Gull species were recorded flying over the site during the species survey. The marshy grassland provides suitable habitat for ground nesting birds whilst the scattered scrub and trees also provide suitable nesting opportunities for birds. The adjacent woodland and reservoir also provide suitable habitat for breeding and overwintering birds.

3.3.2 Bats

No evidence of bats was observed during the survey. However, the grasslands are considered to provide suitable foraging and commuting habitats for bats. Scattered trees on site were noted to contain potential roost features (PRFs) such as knot holes and lifted bark, although these were not individually assessed for their roost suitability. The adjacent woodland also provides roosting, foraging and commuting habitat for bats.

3.3.3 Badgers

No evidence of badger was observed during the survey. The grasslands are considered suitable foraging habitat for badger. The adjacent woodland is also suitable for sett creation and foraging badgers.

3.3.4 Great Crested Newt

No evidence of great crested newt was observed during the survey. There is suitable terrestrial habitat for great crested newts in the form of semi-improved and marshy grassland. The stream is flowing and is deemed unsuitable to support great crested newts. The reservoir lacks any aquatic vegetation and has a high presence of water fowl. Therefore, it is considered that there are no suitable waterbodies within 250m of the site to support great crested newt and therefore this species is not considered to represent a constraint to the proposals.

3.3.5 Reptiles

No evidence of reptiles was observed during the survey. There is suitable habitat within the grasslands to support common reptile species.

3.3.6 Invertebrates

Large white butterfly (*Pieris brassicae*) and grasshoppers were recorded within the marshy grassland. The semi-improved and marshy grassland provide suitable habitat for common invertebrate species.

4 Assessment of Ecological Constraints and Recommendations

The planting included in the Llanwern On-site and Off-site Long-term Management Plan and Llanwern On-site and Off-site Mitigation Plan (Report Ref: 367-590-WTD-CAR-2649 and 367-590-WTD-CAR-2648, Mott MacDonald 2018) would link the hedgerows and woodland south to The Routes Wood SINC providing connectivity to the wider landscape and a larger footprint of woodland in the local area (once established).

On the basis of the survey results, the below table identifies potential ecological constraints to the proposed planting from the current habitats and species that could potentially be using the site along with appropriate recommendations:

Table 2: Assessment of Constraints and Recommendations

Ecological Features	Assessment	Recommendations
Marshy Grassland	The species present have been compared to the Guidelines for Selection of Wildlife Sites in South Wales (Gwent Wildlife Trust, 2004). According to the guidance, a marshy grassland should be considered species-rich if 12 or more of the species listed in this document are recorded on site. A total of four of these species were recorded within the marshy grassland, including; quaking grass, tormentil, compact rush and glaucous sedge. The grassland is therefore not considered to be of SINC quality whilst based on the overall species assemblage and structure, this grassland is not considered to be of particular ecological value at a local level.	N/A
Semi-improved Grassland (Neutral)	The species present have been compared to the Guidelines for Selection of Wildlife Sites in South Wales (Gwent Wildlife Trust, 2004). According to the guidance, a semi-improved neutral grassland should be considered species-rich if eight or more species or more of the species listed in this document are recorded on site. A total of four of these species were recorded on site, including, red clover, agrimony, quaking grass and mouse-ear hawkweed. The grassland is therefore not considered to be of SINC quality whilst based on the overall species assemblage and structure, this grassland is not considered to be of particular ecological value at a local level.	N/A

Ecological Features	Assessment	Recommendations
Improved Grassland	The improved grassland is of low ecological value with limited grasses and few common herb species.	N/A
Other Habitats	The remaining habitats within the site comprise species which are common and widespread at a local level and therefore do not pose a constraint.	
Breeding Birds	The marshy grassland may be suitable to support ground nesting birds. Planting within this habitat may disturb or destroy nests.	All planting works should be undertaken outside the nesting season. This is widely considered to be from March to August inclusive, but can vary depending on the species and / or seasonal conditions. It is unlikely that planting will be undertaken outside of the above time period due to the constraints of the planting season. In the unlikely event that planting is undertaken within the nesting period, pre-clearance check must be undertaken by an experienced ecologist to identify if any birds are nesting within or close to the vegetation due to be disturbed. If a bird nest is found, it must be left in-situ and protected from works. No works can be undertaken in that area until the young birds have fledged from the nest site, which may take up to 6 weeks depending on the species. All planting should be restricted where possible to daylight hours to prevent disturbance of roosting and nesting birds at dusk and dawn. A site-specific toolbox talk should be given to all site staff prior to works commencing. If evidence of breeding birds is found, work should cease until advice has been obtained from the site ecologist.
Bats	The grassland is likely to provide habitat for foraging and commuting bats. Scattered trees may also provide roosting opportunities. Planting will increase the available habitat for roosting bats in futures years whilst still retaining suitable for foraging and commuting bats.	Retained trees should be protected in accordance with BS5837:2012.
Badgers	There is suitable habitat in the form of semi-improved grassland for foraging badgers. Planting within this habitat may extend the area available for sett creation whilst still retaining suitable for foraging badgers.	A site-specific toolbox talk should be given to all site staff prior to works commencing.
Reptiles	The semi-improved and marshy grasslands provide suitable habitat for reptiles. Reptiles may be killed or injured during planting works within the site.	A site-specific toolbox talk should be given to all site staff prior to works commencing. Planting works are likely to be undertaken in the winter period. Any hibernacula suitable for reptiles should be avoided. If hibernacula cannot be avoided, it should be dismantled by hand by a supervising ecologist and re-instated along the edge of the new planting area. Any reptiles will be carefully moved by the supervising ecologist outside of the planting zone. Any clearance of vegetation to allow for planting should be conducted in a phased manner under the supervision of an experienced ecologist. If evidence of reptiles is found, work should cease until advice has been obtained from the site ecologist.
Invertebrates	The semi-improved and marshy grasslands provide suitable habitat for common and widespread invertebrates. No food plants for protected or notable invertebrates were recorded during the survey	N/A

Ecological Features	Assessment	Recommendations
	and the surrounding habitat in the form of Craig-y-Perthi Field South SINC and Craig-y-Perthi Field North SINC provides greater plant species diversity for this species group.	

Source: Mott MacDonald Ltd

5 Conclusions

A Phase 1 survey was undertaken to assess the baseline condition of the land to the north of the Llanwern Steelworks site for its suitability for use as compensatory land for the Llanwern Rail Facilities scheme.

No significant ecological constraints to the proposed planting works have been identified. Marshy grassland, semi-improved grassland, improved grassland, scattered trees, scattered scrub and an earth bank were recorded on site. The grasslands on site failed to meet the criteria for SINC selection according to current guidance (South Wales Wildlife Sites Partnership, 2004) whilst remaining habitats are considered of low ecological value. The site provides habitat for breeding birds, foraging and commuting bats, foraging badgers, reptiles and common invertebrates. Recommendations are provided in Section 4 to avoid impacting on these species during planting works whilst new planting will provide continued or enhanced opportunities for many of these species in the long-term.

6 References

Gwent Wildlife Trust (2004). Guidelines for Selection of Wildlife Sites in South Wales. South Wales Wildlife Sites Partnership. Available URL: http://www.sewbrec.org.uk/content/attachments/SouthWalesWildlifeSitesCompleteDoc.pdf

Joint Nature Conservation Council (JNCC) (2010). H*andbook for Phase 1 habitat survey – a technique for environmental audit*. Peterborough: JNCC Publications;

Langton, T.E.S., Beckett, C.L., and Foster, J.P. (2001). *Great Crested Newt Conservation Handbook*, Froglife, Halesworth.

Mott MacDonald Ltd (2018). Llanwern On-site and Off-site Long-term Management Plan (Report Ref: 367-590-WTD-CAR-2649)

Mott MacDonald Ltd (2018). Llanwern On-site and Off-site Mitigation Plan (Report Ref: 367-590-WTD-CAR-2648)