The Network Rail (East West Rail Bicester to Bedford Improvements) Order

Title of Report: Development Stage 2A2 Ecological Management Plan

Development Stage: 2A2

Discipline: Ecology

Document Number: 133735-EWR-ASS-EEN-000108

Rev B01

East West Rail Phase 2

Development Stage 2A2 Ecological Management Plan

February 2020

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This document does not purport to provide legal advice.

Document History

Project Number: 133735		**DOCUMENT REF: 133735-EWR-ASS-EEN-000108 (eB no.)**				
Revision	**Purpose and description**	**Originated**	**Checked**	**Reviewed**	**Authorised**	**Date**
B01	For Approval	E Welbourn	P J Wakelin/ J Girgis	S Wray/ L Gorman	R Voigt	20/02/2020

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1. Introduction

1.1. Terms of Reference

1.1.1. The East West Rail (EWR) Alliance has produced this Ecological Management Plan (EcMP) to detail the creation and ecological management of both the lineside vegetation within Network Rail's operational boundary, as well as linear vegetation alongside the railway, for the environmental landscaping of development stage 2A2 for Phase 2 of the EWR project (EWR2) on behalf of Network Rail. The environmental landscaping design is detailed in the Environmental Design Drawings in Volume 4 of the EWR2 Environmental Statement[1] (EWR2 ES).

1.1.2. This EcMP is submitted to discharge Condition 12(a) attached to the deemed planning consent, which accompanies the Network Rail (East West Rail Bicester to Bedford Improvements) Order for development stage 2A2 of EWR2. Stage 2A2 is within the Cherwell District Council. Condition 12(a) reads as follows:

No stage of the development is to commence within the area of a local planning authority until, for that stage, a written ecological management plan comprising the management of ecology compensation sites and replacement habitats alongside the railway within that route section, reflecting the survey results and ecological mitigation and enhancement measures included in the Environmental Statement (and Further Environmental Information) has been submitted to and approved in writing by the local planning authority with responsibility for any area within each stage.

The ecological management plan must include:

(i) a programme of implementation, management and maintenance;

(ii) mitigation measures as required in accordance with the register of commitments contained within Appendix A to these conditions updated annually based on the results of the survey; and

(iii) a programme of monitoring with thresholds for action, setting out, if required, a remedial plan of alternative ecological actions.

The requirements of the ecological management plan must be carried out as approved.

1.1.3. Specifically, this document addresses both the project-wide commitments and the commitments specific to development stages 2A2. The full scope of this document is detailed in Section 1.3.

1.1.4. The environmental design, detailing the in-line habitats and environmental landscaping to be created (as outlined in the Environmental Design Drawings in Volume 4 of the EWR2 ES[1]), has been informed by the Environment Impact Assessment in an iterative design process, as described in Chapter 3 Volume 2i of the EWR2 ES[1] and updated by the EWR2 Further Environmental Information[1] (FEI). The process sought to first avoid, then reduce, mitigate (if retention is not possible) and finally compensate (if mitigation is not an option).

1.1.5. The environmental design has also been informed by factors such as: ongoing ecological survey results, the health and safety and operational requirements of the railway, location and wayleaves around services, drainage, public rights of way (PRoW) and public and private access, land ownership, existing designated sites for nature conservation and climate change projections.

1.1.6. The environmental design, in conjunction with retained vegetation (refer to Section 2.2), creates a linear green infrastructure along both sides of the rail corridor as compensation for impacts on the

[1] Network Rail (2018) *Environmental Statement: The Network Rail East West Rail (Bicester to Bedford) Order* [Available at: https://www.networkrail.co.uk/running-the-railway/railway-upgrade-plan/key-projects/east-west-rail/east-west-rail-western-section/]

existing lineside habitats during construction. Once established and with ongoing management, this linear green infrastructure will provide ecological connectivity for species along the route and will link up Ecological Compensation Sites (ECSs) that have been (or will be) created adjacent to the rail corridor to compensate for impacts of EWR2.

1.2. The Site

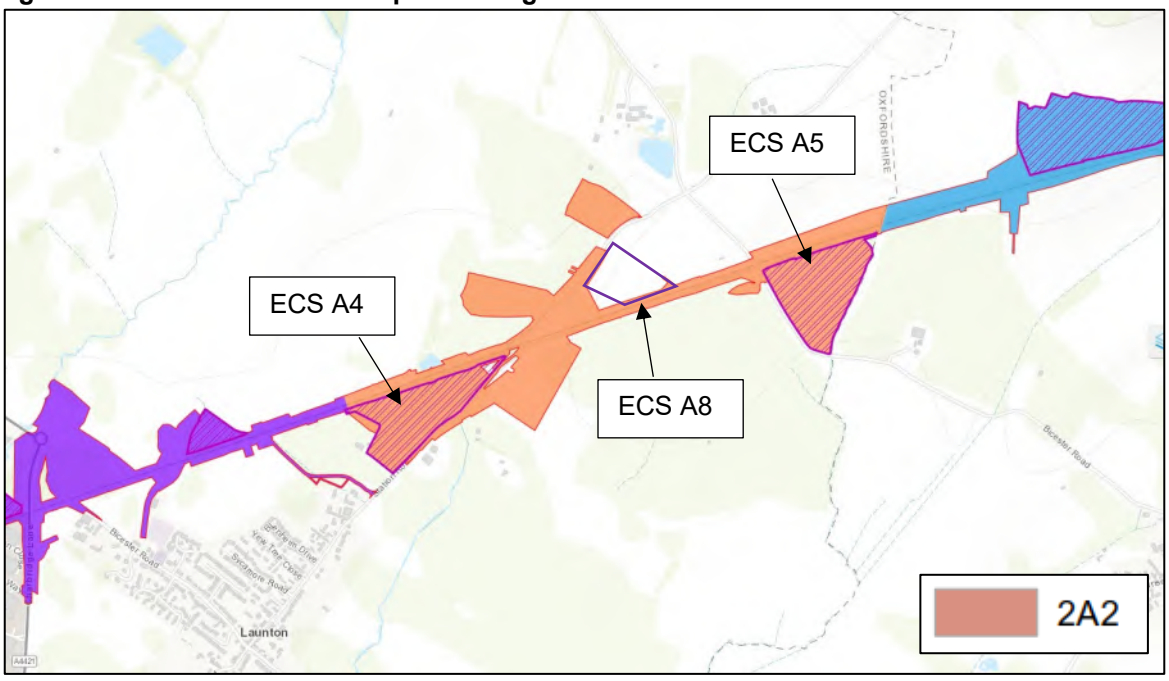
1.2.1. Development stage 2A2 is located within Route Section 2A (Bicester to Charndon Main Street). This document details the creation and management of the habitats alongside the railway in development stage 2A2, to discharge Condition 12(a) for each development stage. The lineside habitat prescriptions are fundamentally the same for all development stages within route section 2A (with the exception of the ECSs). Table 1-1 below lists the coordinates of the start and end points, along the proposed EWR2 railway, for development stage 2A2.

Table 1-1 EWR2 Development Stage Extents.

Development Stage	Stage Start Coordinates (easting, northing)	Stage End Coordinates (easting, northing)
2A2	461259, 223340	463168, 224007

1.2.2. The Site (Figure 1-1) is situated along an existing railway and associated infrastructure, the majority of which runs through agricultural land primarily comprising arable and pasture field compartments bound by hedgerows.

Figure 1-1 Overview of Development Stage 2A2



1.3. Scope of the EcMP

1.3.1. There are two principal categories of landscape/ecological mitigation and compensation provided within the environmental design for EWR2:

- In-line: Lineside vegetation within Network Rail's boundary and linear vegetation on the outside of Network Rail's boundary - where environmental design is associated with the rail corridor providing visual screening, provision of linear habitat, assimilation of earthwork features in to the landscape; and,
- Off-line: ECSs - providing receptor sites and compensatory habitat for specific protected and notable species.

1.3.2. This document comprises the management plan for the in-line landscape and ecological mitigation provided in development stage 2A2. This EcMP incorporates the following:

- Program of implementation, management and maintenance (Section 2, 3, and 4);
- Responsibilities for implementing the EcMP (Section 1.4);
- Details for habitat creation and retention measures (Sections 2);
- Details for maintenance and aftercare of the scheme including both retained and newly created habitats (Sections 3, 4, and 6); and,
- Details for monitoring and reporting of the scheme (Section 5).

1.3.3. There are three ECSs within development stage 2A2(ECS A4, ECS A5 and ECS A8), as described in Table 1-2 (and displayed on Figure 1-1). This EcMP does not cover the management of ECS A4 or A5, which have been previously authorised under planning permissions 17/00622/F and 18/02183/APP. The ECS A8 EcMP is included in **Appendix I.**

1.3.4. In addition to this EcMP, general ecological mitigation required during the construction phase of works is managed in line with Code of Construction Practice (CoCP[2]) for the scheme.

Table 1-2 ECSs included within development stage 2A2

Ecological Compensation Site	Site Location	Ecological Management Plan Document reference number	Authorisation
ECS A4	Land North of Station Road, Launton	133735-EWR-ASS-EEN-000006	Authorised prior to Transport and Works Act Order (TWAO) (Ref: 17/00622/F)
ECS A5	Land East of Bicester Road, Marsh Gibbon	133735-EWR-ASS-EEN-000007	To be implemented under the TWAO (Ref: 18/02183/APP)
ECS A8	Land South of Station Road, Launton	133735-EWR-ASS-EEN-000078	Constructed by agreement with land owner, no planning approvals required

1.4. EcMP Responsibility

1.4.1. The EWR Alliance is responsible for the establishment, initial maintenance, aftercare and habitat management up until the point of completion of construction of EWR2, at which point Network Rail (specifically the route asset manager) will remain responsible for the maintenance of habitats.

1.4.2. Upon completion of the construction phase of the EWR2 scheme, agreements will be sought with third parties where, in appropriate situations, they will take ownership of and manage land outside of the permanent works boundary to maintain the habitats following the requirements of this EcMP.

1.4.3. A log will be kept to record all changes to this EcMP (for a maximum of 30 years, see Section 5), to ensure that the prescribed measures are most effective for long-term biodiversity gains within the Site.

[2] The Code of Construction Practice is submitted under Planning Condition 10.

2. The Scheme – Habitat Creation and Retention

2.1. Habitat Creation

2.1.1. The areas of habitat creation and retention in development stage 2A2 are shown on the Environmental Design Drawings in Volume 4 of the EWR2 ES[3], and are summarised below. Details of specific habitat management measures are provided in Section 3, while general measures are provided in Section 4.

2.1.2. Table 2-1 below summarises the schedule of quantities, for the route section, of each in-line habitat to be created. An Environmental Design Schedule is available in the EWR ES Volume 3, Chapter 2, Appendix 2.3. For the purpose of this section, development stages have been grouped by route section.

Table 2-1 Schedule of habitat areas to be created within route section 2A.

Habitat type	Quantities to be created in Route Section 2A
Grassland	48 discrete areas creating a total area of 25.67 ha
Scrub	92 discrete areas creating a total area of 2.47 ha
Woodland	8 discrete areas creating a total area of 1.61 ha
Hedgerows	30 discrete sections creating a total length of 3.90 km
Hedgerows with trees	69 discrete sections creating a total length of 8.36 km
Trees and shrubs (linear belts)	5 discrete sections creating a total area of 0.55 ha
Species-rich grassland	3 discrete areas creating a total area of 0.49ha

2.1.3. The environmental landscaping will be implemented as presented in the Environmental Design Drawings. As the detailed design progresses and further surveys are undertaken, opportunities are being identified to retain more vegetation than previously identified. The detailed landscaping design and further opportunities for retention are captured in the 'Landscape Detailed Construction Plans'. This process will also continue through construction, with further retention opportunities being taken advantage of where practicable.

2.1.4. Network Rail standards, requirements and guidance apply to all land within the security fence or land owned by Network Rail. Additionally, requirements apply to vegetation outside of the rail corridor and Network Rail ownership where falling leaves from trees or the potential of falling trees or branches provide a threat to the safe operation of the railway. Further details of these requirements are listed in the Network Rail Lineside Vegetation Management Manual[4].

[3] Network Rail (2018) *Environmental Statement: The Network Rail East West Rail (Bicester to Bedford) Order* [Available at: https://www.networkrail.co.uk/running-the-railway/railway-upgrade-plan/key-projects/east-west-rail/east-west-rail-western-section/]
[4] Network Rail (2018). *Lineside Vegetation Management Manual*. Network Rail. Accessed: 04/10/2019 [https://cdn.networkrail.co.uk/wp-content/uploads/2018/05/Lineside-Vegetation-Management-Documentation.pdf]

2.1.5. Where EWR2 interfaces or includes the public highway (roads, bridge embankments, footpaths and verges) planting design is in line with the Highways England Design Manual for Roads and Bridges (DMRB)[5].

2.1.6. Ground preparation and planting methods will be undertaken in accordance with the EWR2 Design Specification[6].

2.1.7. The function of the planting within the EWR2 Environmental Design for the scheme will have, once established, various functions including:

- Ecological: provision of habitat required to compensate vegetation clearance associated with construction of the main works which will provide foraging and commuting routes for wildlife; and,
- Landscape: provision of a green corridor of vegetation along the scheme which will:
  - Screen certain views of the railway from sensitive receptors;
  - Soften the structure of the railway and contribute to assimilation of the scheme into the landscape;
  - Maintain or reinstate vegetation that contributes to cultural heritage;
  - Provide auditory amenity; and,
  - Provide visual context to structures and features such as Public Right of Way (PRoW).

2.1.8. Table 2-2 below outlines the programme of implementation for the creation of habitats for route section 2A. This programme of implementation for the landscaping works is determined by the construction programme. The landscaping habitats within each development stage are planned to be established from the first planting/seeding window following the completion of the earthworks within the respective development stage. Table 2-2 indicates the point at which the habitats will begin to be created, however, the exact time of year that specific habitats are to be planted/seeded is detailed within the corresponding habitat sections below. Where opportunities are available to plant earlier than programmed, these opportunities will be taken advantage of to allow earlier establishment of habitats.

Table 2-2 Programme of implementation for landscape planting.

Development Stage	Commencement of initial planting/seeding season	Commencement of follow-up planting/seeding season
2A2	September 2021	September 2022

Grassland

2.1.9. Areas in the Environmental Design Drawings identified as 'Open Grassland - new verge areas' (within the rail corridor), areas of woodland planting (where ground is exposed, between newly planted woodland) and all other grass areas with no other ecological or landscape designation will be sown with general low maintenance grass mix, Emorsgate EM1 or similar (to be approved by EWR Alliance Landscape Clerk of Works). In more urban areas, where visibility needs maintaining (such as visibility splays), a fescue dominated grass mix to provide a slow growing shorter sward will be used, such as ESG1 or similar. For an indicative species list, refer to **Appendix II.**

[5] Highways England (2019). *Design Manual for Roads and Bridges*. Highways England. Accessed: 04/10/2019 [http://www.standardsforhighways.co.uk/ha/standards/dmrb/]
[6] EWR Document Reference: 133735-EWR-SPE-EEN-000007

2.1.10. Grassland comprising native species of grasses and wildflowers will provide, and be managed to ensure, valuable habitat for a variety of wildlife including great crested newt (GCN), common species of reptile, ground-nesting birds and terrestrial invertebrates.

2.1.11. Grassland habitats will be sown, where practicable, in the months of March - May and September - October inclusive, and will be created in accordance with the Landscape Specification[6].

Scrub

2.1.12. Dense stands of native scrub species of local provenance will be planted in blocks along the railway embankments and habitats at grade[7] within the scheme. Scrub will be dominated by blackthorn, the larval food plant of the black and brown hairstreak butterflies; these rare butterflies have been recorded in the wider landscape. The inclusion of wych elm within the planting scheme will provide the larval food plant for the white-letter hairstreak butterfly (refer to **Appendix II** for an indicative list of scrub and tree species to be planted).

2.1.13. New trees and shrubs will be planted into established grass areas (either existing or newly seeded as part of the works). The programme for works will allow newly grassed areas to establish prior to planting where possible.

2.1.14. Dense scrub habitat will be planted, where practicable, between October and March (inclusive), and will be created in accordance with the Landscape Specification[6].

Woodland

2.1.15. The scheme also includes the creation and management of an area of broadleaved deciduous woodland comprising native species of local provenance. These woodlands will be of high value for a variety of wildlife, including GCN, reptiles, bats, otter, badger, breeding and wintering birds and terrestrial invertebrates, and will contribute towards the Oxfordshire Biodiversity Action Plan 2015-2020[8].

2.1.16. The design of the scheme includes the creation of areas of woodland for ecological benefits, through a combination of the following approaches:

- Creation of native woodland to compensate for loss of woodland habitat; and,
- Creation of woodland to address impacts on specific species (for example bats), to provide and improve habitat connectivity, and to integrate the works associated with EWR2 into the surrounding landscape.

2.1.17. Bare-rooted or root-balled conifers or evergreens will be planted, where practicable, during November and March. The planting season for all other bare-rooted and container-grown tree and shrub plants will be, where practicable, November to March inclusive. Woodland habitat will be created in accordance with the Landscape Specification. All planting stock will be obtained from designated UK forestry seed zones 402 and 405 (and 403 and 404 if not available) to ensure stock of local provenance. Refer to **Appendix II** for an indicative list of woodland species to be planted[9].

Hedgerows and Hedgerows with trees

2.1.18. Native, species-rich hedgerows will be planted to provide nesting, foraging and commuting habitat for wildlife as well as contributing towards national, regional and local initiatives for

[7] At 'grade' refers to lineside habitats that are level at the height of the railway. i.e. not an embankment or cutting.
[8] Oxfordshire City Council. Biodiversity Action Plan 2015-2020. Accessed via: https://www.oxford.gov.uk/downloads/download/618/biodiversity_action_plan (on 07/02/20)
[9] This list has been devised using the Phase 1 habitat and NVC data from woodland surveys across the scheme, undertaken to inform the EWR2 ES, so the woodlands would be in keeping with the local landscape.

hedgerows (the Oxfordshire Biodiversity Action Plan[7]). Hedgerows provide refuge habitat and corridors along which faunal species such as GCN, birds and bats can disperse.

2.1.19. Where reasonably practicable, where programme timings permit, where the quality of the hedgerow is suitable and there is ecological value in doing so, the new hedgerows will include material translocated from local hedgerows due for removal as part of the main works associated with EWR2.

2.1.20. Native species hedgerows, and hedgerows with trees will be planted - between November and March where weather conditions are suitable for the planting to establish, under advice from the EWR Alliance Landscape Clerk of Works and in accordance with the Landscape Specification[10].

2.1.21. At locations where bats have been identified to be at risk of collision mortality, existing and/or new rail infrastructure such as overbridges, underbridges and footbridges will be used to guide bats away from the rail corridor. Vegetation will be planted, managed and maintained to guide bats towards such infrastructure and away from the rail corridor to reduce collision risk, except where it contravenes with the Network Rail Lineside Vegetation Management Manual[4]. If no infrastructure is present at the locations identified, existing vegetation will be retained and will be maintained at a height of 5 m, except where it contravenes with the Network Rail Lineside Vegetation Management Manual[4].

2.1.22. Blackthorn and Wych elm will be included within the mitigation planting scheme to support the black and brown hairstreak butterfly, and white-letter hairstreak butterflies respectively, which have been recorded within in the wider landscape. Occasional standard trees will provide further habitat for these rare butterflies. For an indicative species list, refer to **Appendix II.**

Trees and Shrubs (Linear Belts)

2.1.23. Linear belts of trees and shrubs will be provided as detailed for dense scrub and woodland in Section 2.1.

2.1.24. See **Appendix II** for an indicative list of tree and shrub species to be planted.

Watercourse Realignment

2.1.25. One watercourse realignment is required at the unnamed tributary of Launton Brook at Station Road (AF041). This will result in improved watercourse habitat through the creation of more sinuous planforms compared to existing channels. Channel banks shall be seeded with a grass mixture for wet soils, such as Emorsgate EG8 seed mix at a rate of 5g/m2 (refer to **Appendix II** for an indicative seed mixes). Moreover, it is expected that through the creation of realigned channels, there will be opportunities for a range of aquatic plant species to establish due to the clearing of dense scrub which is currently limiting the establishment and growth of aquatic plant species.

Drainage ditches and attenuation ponds

2.1.26. The drainage ditches and attenuation ponds, planted with damp-tolerant native species of grasses and wildflowers will provide valuable habitat for a variety of wildlife including GCN, common species of reptile, ground-nesting birds and terrestrial invertebrates.

2.1.27. Both the drainage ditches and attenuation ponds will be ephemeral, and likely to be dry for the majority of the year. These areas will be planted with a damp tolerant wildflower grass mix, such as Emorsgate EM8 or similar (refer to **0 I** for an indicative wet grassland seed mix).

[10] This list has been devised using the Phase 1 habitat and NVC data from woodland surveys across the scheme, undertaken to inform the EWR2 ES, so the woodlands would be in keeping with the local landscape

2.1.28. Drainage ditches and attenuation pond habitats will be sown, where practicable, in the months of April - May and August - October (inclusive) and will be seeded in accordance with the Landscape Specification.

Species Rich Grassland

2.1.29. Areas in the Environmental Design Drawings identified as 'Species rich grassland' will be sown with a species rich seed mix.

2.1.30. Species rich grassland comprising native species of grasses and wildflowers (of local provenance) will provide, and be managed to ensure, valuable habitat for a variety of wildlife including GCN, common species of reptile, ground-nesting birds and terrestrial invertebrates.

2.1.31. Species rich grassland habitat will be sown during the months of April - May and August - October (inclusive) and will be created in accordance with the Landscape Specification[6]. Species rich grassland will be managed in the same manner as the grassland described in Section 2.1. Refer to **Appendix II** for an indicative species rich grassland seed mix.

2.2. Existing Ecological Features to be Retained

2.2.1. Areas of trees and hedgerows within the Site are to be retained and protected during the construction of the scheme, following BS 5837:2012 (British Standard for trees in relation to design, demolition and construction)[11], and will continue to provide refuge habitat and corridors along which species such as GCN, birds and bats can disperse. Hedgerows and their margins will be maintained and monitored to ensure that the habitat continues to provide an effective wildlife corridor.

2.2.2. In some instances, existing hedgerows will be enhanced by thickening the hedgerow and increasing the species diversity through planting. This will benefit a range of invertebrates such as black and brown hairstreak butterflies through the addition of blackthorn, their larval food plant.

2.2.3. Veteran trees and native black poplars within the Site have been identified for retention; during detailed design all reasonably practical efforts will be made to ensure their retention and to provide a root protection zone. Tree protection measures will be applied, including the production of Tree Protection Plans, as set out in the EWR Code of Construction Practice (CoCP)[12]. If the need to remove black poplar or veteran trees becomes unavoidable, their hulks will be incorporated into nearby ECS. Where black poplar need to be replanted, these will be replaced at a 2:1 ratio. The relevant ECS EcMPs will be updated to include specific management measures.

[11] British Standards Institution (2012). *Guide for Trees in relation to design, demolition and construction: recommendations.* BS 5837:2012.
[12] EWR Document Ref: 133735-EWR-EMP-EEN-000004, Code of Construction Practice.

3. Habitat Maintenance and Aftercare

3.1. Maintenance and Aftercare of Habitats

3.1.1. All habitats to be created along the railway in development stage 2A2, as detailed in Section 2.1, are to be managed and maintained as detailed below. In addition to the management detailed below, the areas that will eventually lie within the security fence (Network Rail Managed Infrastructure) are to be managed in accordance with the Network Rail Lineside Vegetation Management Manual[4]. The habitat management will be managed in accordance with the EWR2 Landscape Specification[66]. In addition, lineside habitats will be managed with adherence to the Network Rail Lineside Vegetation Management Manual[4].

3.1.2. This management plan will be implemented, for 30 years (unless otherwise stated), for each newly created habitat once each discrete section of habitat referred to in Section 2.1 has been created within the Site.

3.2. Grassland including Species-rich Grassland

3.2.1. Grassland areas on highway boundaries will be maintained to a maximum height of 65 mm, in accordance with the Highways England Design Manual for Roads and Bridges[5]. All other open grassland areas excluding verges, visibility areas and all grass areas not covered by another landscape element will be maintained to a maximum height of 150 mm.

3.2.2. All grassland within the lineside planted areas will be cut once (either late June or September). Where practicable, and safe to do so in adherence to Network Rail Lineside Vegetation Management Manual[4], vegetation will be cut using a rotary bladed mower to produce varying sward heights, in order to produce habitat suitable for reptiles and GCN. Where this is not possible, vegetation will be cut, producing an even sward height across the whole area, whilst avoiding damage to the trees and shrubs.

3.2.3. The minimum distance of cutting around individual plants will be a 500 mm radius. This area will be maintained weed-free through herbicide treatment.

3.3. Scrub

3.3.1. All lineside scrub will be maintained to remain clear from the vegetation immediate action and alert zones, as detailed in the Network Rail Lineside Vegetation Management Manual[4].

3.3.2. Scrub will be managed to encourage a dense stand of blackthorn (or similar species) at a height of 3-4 m where practicable.

3.3.3. If browsing by animals inhibits the growth of newly planted scrub, animal-proof protection will be installed where practicable, taking care not to shade any of the area. This may be in the form of individual shelters or fencing. Shelters will be removed in Year 5 once the planting has fully established and matured and the shelters will be removed from site and disposed of by recycling, if possible.

3.3.4. For the first five years following establishment, an area clear of competing vegetation from each plant station will be maintained. Whilst herbicide may be used, residual action herbicide will not be used.

3.3.5. During the establishment period for newly planted scrub (first 3 years), any plants that, in the opinion of an EWR Landscape Clerk of Works or other appointed surveyor, by Network Rail or third party, may interfere or otherwise damage or impede the free growth of planted tree or shrub, will be removed.

3.3.6. All broken, dead, dying, damaged, crossing or diseased branches will be pruned by cutting back in accordance with good horticultural practice, BS7370 and BS3998. Formative pruning will take place upon planting and in years 3 and 5 to encourage the desired growth habit.

3.3.7. During the first five years after planting, annual monitoring of planted scrub will take place each growing season in September to ensure that the planted whips are being maintained and are establishing well. Any plants that have failed or failed to thrive in the first five years will be re-introduced via planting. If plants fail after five years, the wider environmental issues and management regime will be reviewed.

3.4. Woodland

3.4.1. The proposed planted woodlands will be managed to promote biodiversity and provide habitat for badgers, bats, nesting birds and other wildlife. First-year management of the newly planted woodland will depend on the rate of growth of the young planting standards which are slow to grow. Any growth of common persistent weeds will be controlled through spot-treatment during the first five years.

3.4.2. Cutting of grassland within the newly planted woodlands within the Site will be carried out annually to a minimum height of 150 mm from years 2-5 in late spring and mid-summer. Cutting at this time will prevent flowering to encourage the establishment of grassland within the woodland. In addition, cutting to a minimum height of 150 mm will reduce the risk of harm to amphibians, reptiles and small mammals which may be utilising the grassland. A hand strimmer will be used to prevent damage to the planting, risks to amphibians, reptiles and small mammals by more intrusive machinery (such as a tractor and flail mower). Experienced and qualified operators will be used (appointed by EWR Alliance during the construction phase of EWR2, and by Network Rail following completion of EWR2) to ensure care is taken to avoid damaging the tree stock using this method.

3.4.3. Annual monitoring of woodlands will take place each growing season in April to ensure that the planted trees are maintained in years 2-5. Any planted trees that have been unsuccessful in the first five years will be replaced via planting and the management will be reviewed.

3.4.4. Tree planting within existing plantation woodland will also occur to provide greater species diversity and more complex vegetation structure. Suitable plant species include wild cherry, which is a food plant of black hairstreak butterflies, crab apple, which is a food source to badgers, and common hawthorn. These will be planted October to February and checked at the end of each growing season at the same time as the created native woodlands.

3.4.5. Any failed stock will be replaced from years 2-5.

3.4.6. Woodlands will be created through planting of native tree species. Plants will be replaced if they have failed to grow over a season or have been damaged by local wildlife (such as deer) during years 2-5. In addition, the existing plantation woodland will be improved through planting additional native trees. The success of these will be monitored at the same time by an arboriculturist appointed by EWR Alliance or Network Rail and remedial action will be taken when required. Once established, the tree guards will be removed.

3.4.7. The encroachment of scrub and grassland will be managed to reduce competition and increase successful establishment. Grasses will be cut to a minimum height of 150 mm from years 2-5 in late spring and mid-summer. Herbicide treatment of common persistent weeds will also be undertaken. This will allow better establishment, eventually creating a shaded canopy that will prevent grassland or scrub from becoming the dominant habitat type along with occasional long-term management.

3.5. Hedgerows and Hedgerows with Trees

3.5.1. Hedgerows will be inspected on an annual basis (during winter months when visibility is not obscured by leaves) during the establishment period. The inspection will include maintaining weed-free areas around the base of new hedgerows and hedgerows with trees, to check and adjust any stakes, to remove any litter and prune to promote healthy, desirable growth.

3.5.2. At the edges of planted areas, branches and stems will be cut back to maintain a minimum of 300 mm behind the kerb line, fence, wall or other edge demarcation. Planted stock will be trimmed

upon planting and at Years 3 and 5 to encourage desirable form (allowing hedgerow standard trees to develop untrimmed). There will be an annual check during winter months to ensure that the hedgerows develop into an 'A' shape with a good structure and containing occasional standard trees. Care will be taken to ensure that each hedgerow is trimmed on a staggered, rotational basis, once every three years, thus avoiding all hedgerows being cut at once so that only a proportion of any laid black and brown hairstreak eggs are lost, and irregular heights / depths create sheltered areas within the blackthorn for basking butterflies[13].

3.5.3. Any plants that, in the opinion of an EWR Alliance or Network Rail appointed Landscape Clerk of Works, may interfere or otherwise damage or impede the free growth of planted hedgerows and hedgerows with trees, will be removed.

3.5.4. Annual monitoring of hedgerows will take place each growing season in September to ensure that the planted standards and whips are maintained in years 2-5. Any planted species that have been unsuccessful in the first five years will be replaced and environmental factors and the management regime will be reviewed.

3.5.5. Dead or moribund sections of hedge will be cut down to ground level and will be replaced by an appropriate native hedgerow species. All mature trees over 40 cm diameter at breast height (1.5m) will be retained standing, alive or dead where practicable, unless they pose a health and safety hazard. Replaced sections of new planting will be fenced or guarded to protect against browsing by rabbits or deer, taking care not to shade any of the area. Plug plants associated with the hedgerow will be replaced in autumn.

3.5.6. Watering and other establishment requirements, e.g. addition of ameliorants, will also occur, as required to allow successful establishment. The requirement for this will be determined by the EWR Alliance or Network Rail appointed Landscape Clerk of Works. Watering will be the responsibility of EWR (Network Rail upon completion of EWR2) or those who undertakings are transferred to, by Agreement, during the hedgerow establishment period.

3.5.7. Upon completion of the construction phase of the EWR2 scheme, where Agreements will be made, the possession and long term management of some of these hedgerows will be transferred to third party landowners, where they will undertake to maintain the hedgerows following the above maintenance and aftercare schedule which will be supported by a written Agreement.

3.6. Trees and Shrubs (Linear Belts)

3.6.1. Trees and shrubs will be managed to maximise the chances of successful establishment and vigour. Initially this will require regular maintenance, during establishment, to maintain weed-free areas around the base of new trees and shrubs, to check and adjust any stakes and guards, and to remove any litter. Pruning will be undertaken of any damaged, dying or diseased and crossing branches to promote healthy growth and structure. Once established after a five year period, trees and shrubs will also be given annual health and safety inspections by a suitably qualified arboriculturist, with recommendations made for any tree works required to remove or make safe, any individual trees or limbs in a hazardous condition, or to promote healthy growth.

3.6.2. Annual monitoring of trees and shrubs will take place each growing season in September to ensure that the young planting is maintained during years 2-5. Any planted specimens that have died or failed to thrive during the first five years will be replaced and, if considered necessary, the reasons for lack of establishment will be reviewed by the Landscape Clerk of Works.

[13] Thomas, J. A. (1975). *The black hairstreak, conservation report*. Unpublished report ITE/NCC.

3.6.3. Any replanting will be undertaken in the next planting season between October and March, annually for the first five years. Replacement planting will be of the same age as the original planting. All plants which have been replaced shall be removed from site and disposed of.

3.6.4. If browsing by deer or other animals inhibits the growth of newly planted trees, protective measures such as guards or fencing will be installed around the trees, taking care not to shade any of the area.

3.6.5. The individual trees will be inspected annually during the growing season and shall be managed as per the EWR 2 Landscape Specification[6].

3.7. Watercourse Realignment

3.7.1. Given the scale of the realignment and watercourse typology there is considered to be limited management options for habitat maintenance. It is anticipated that limited ongoing intervention will be required, in part due to the channel design being more sustainable.

3.8. Drainage Ditches and Attenuation Ponds

3.8.1. The banks of all new and existing ditches and attenuation ponds will be cut on four occasions per year to a height of 150 mm between June and September.

3.8.2. Weed control in the vicinity of ditches and attenuation ponds will only be carried out with the approval of the Landscape Clerk of Works (appointed by EWR Alliance or Network Rail) or the third-party landowner/manager, and only when vegetation growth poses a threat to the engineering function of the drainage feature, is invasive in nature or is presenting a health and safety risk.

3.9. Invasive Non-Native Plant Species

3.9.1. An annual inspection by an Ecologist or Landscape specialist appointed by the EWR Alliance or Network Rail to check for any invasive non-native plant species or other inappropriate plant species (see Section 4.6) on Network Rail land only. This will be undertaken in June/July (when identification of invasive plant species is easiest) during the first three years, and every three years from years 3-30. If invasive non-native plant species are identified, an appropriate action plan will be drawn up by a suitably licensed contractor.

4. General Maintenance Operations

4.1. General Activities

4.1.1. The general activities that will be undertaken during management visits include vegetation clearance (e.g. cutting / pruning), replacement of failed planting stock and weed control.

4.2. Vegetation Management

4.2.1. All vegetation will be cleared and maintained clear from the vegetation immediate action and alert zones, as detailed in the Network Rail Lineside Vegetation Management Manual[4].

4.2.2. During the three-year establishment period for trees and shrubs, pruning is to be carried out with sharp secateurs, hedge-cutters or hand saws in a way that does not tear or damage the stem in accordance with good horticultural practice. Pruning is to be in accordance with BS7370: Grounds maintenance and BS3998: Tree works. All dead, dying, diseased, crossing or damaged material will be promptly removed and taken off the Site.

4.3. Replacement Planting

4.3.1. Network Rail will ensure that the contractors who undertake the planting make allowances for replacing and replanting any tree/ shrub/ plant that may fail to thrive during the initial five years of the establishment period. Failing, dead or moribund plants will be identified during the annual site checks, and a schedule for replacement planting agreed with Network Rail. Replacement planting will be of the same native species with regional provenance where possible. If a large proportion of trees/ shrubs/ plants are failing as determined by the landscape specialist an investigation will be carried out to determine the cause and develop an appropriate solution.

4.4. Plant Protection

4.4.1. The requirement for individual plant protectors will be determined on a risk-based approach and if there are multiple pests guards which protect against multiple pests will be used. The use of spiral and open net guards is not acceptable.

4.4.2. Where required, as detailed in Sections 2 and 3, protective fencing, e.g. stockproof fencing, will be installed around the newly created habitats (*e.g.* hedgerows, scrub and trees) to prevent damage to the young planting. Care will be taken to ensure that the fencing does not shade the newly created habitats.

4.5. Weed Control

4.5.1. Network Rail shall be responsible for removing all noxious weeds by means of herbicide treatment. The weeds should be removed in May and June, once they are large enough to treat, but before they are able to set seed. The Site will then be kept clear of such weeds.

4.5.2. Arisings from weed control will be collected and removed from the Site and shall be disposed of in line with the relevant waste legislation.

4.6. Invasive Non-Native Plant Species

4.6.1. It is an offence to plant or otherwise cause invasive of non-native plant species[14] to grow in the wild. If any non-native invasive plant species are recorded within the Site, Network Rail (or the third-party land manager/owner where it will be written in to the Agreement) will follow an appropriate management regime to control these species in accordance with the legislation.

[14] Non-native invasive plant species are those listed on Schedule 9 of the Wildlife & Countryside Act 1981 (as amended). This includes (but is not limited to): Japanese knotweed, giant knotweed, hybrid knotweed, Himalayan balsam, cotoneaster sp., giant hogweed, New Zealand pygmyweed and rhododendron.

5. Monitoring and Reporting

5.1. Monitoring

5.1.1. Monitoring by EWR, Network Rail and those who the undertakings within this EcMP have transferred to, will occur until habitats are fully established (up to a maximum of 30 years), the results of which will be used to inform changes to the EcMP post construction. Monitoring of mitigation requirements covered by this EcMP will take place following each growing season up to and including year 5 to ensure that the mitigation is implemented during years 2-5. Any planted species that have been unsuccessful in the first five years will be replaced and if it is considered that there are a large number of failures, the cause will be investigated. Upon completion of the development stage, the habitats and mitigation measures within Network Rail land will be monitored at an appropriate frequency, for up to 30 years, by a suitably qualified environmental specialist appointed by Network Rail. A similar commitment will be written into the Agreements for transferred, third party land. The environmental specialist carrying out the monitoring will consider triggers for action that may be required as a result of the monitoring such as additional blackthorn coppicing; replacement hedgerow planting or remediation work to ponds.

5.1.2. Thresholds for action, where relevant, are outlined throughout Sections 3 and 4 within individual habitat sections.

5.1.3. The monitoring prescriptions provided here may be altered if required by a suitably qualified Ecologist during the post-construction period.

5.2. Reporting

5.2.1. The management proposals provide a basis for management of existing and created habitats within the Site. To a certain extent, natural processes will dictate appropriate management practices for the habitats, both those newly created and retained. Therefore, a log will be kept recording any changes required to ensure that the prescribed measures are most effective for ensuring long-term biodiversity gains within the Site.

6. Ecological Management Summary

Table 6-1 Ecological Management Summary

Ecological Feature	Prescription	Timing	Years									Comments
			Annual	Every 2 Years	Year 1	Year 2	Year 3	Year 4	Year 5	Every 3 Years (from 6 to 30)	Every 5 Years (from 10 to 30)	
Grassland (including banks of drainage ditches and attenuation ponds)	Seed sowing	March to May or September to October			X							See Sections 2.1 and 3.2 and 3.7 for further details.
	Grassland cutting to a minimum height of 150 mm (65 mm on highway boundaries, 100 mm next to drainage features)	June or September – four times next to water bodies between April and September	X (Not in Year 1)									
	Watering	As required – determined by Landscape CoW			X	X	X					
	Replacement over-sowing	August to October or March to May			X	X	X	X				
Scrub, Hedgerows and hedgerows with Trees	Scrub Planting, hedgerow planting and/or gapping up existing hedge	October - March			X							See Sections 2.1 and 3.3 - 3.5 for further details.
	Replacement of failed stock (if required)	September - February	X (for the first 5 years)									
	Clearing base of competing vegetation and weeds	May - June	X (for the first 5 years)									
	Watering	As instructed by the Arboriculturist			X	X	X					
	Inspections / safety checks of established trees	September – February	X									
	Scrub and hedgerow cutting/pruning to encourage desired form	September – February and as instructed following inspections by the Landscape CoW					X		X	X		
	Inspect guards, stakes etc.	September - February			X	X	X	X	X	X		
	Removal of guards	As required							X			
	Slow-release fertiliser/ ameliorant for trees	March – May				X	X					
Invasive non-native plant species	Inspection and control	June - July			X	X	X	X	X	X		See Section 3.9 for further details.
Plant Protection	Stock / pest-proof fencing/ guards' installation and maintenance	As required	X									See Section 4.4 for further details.
Weeds/ non-invasive plant control	Control	May - June	X									See Section 4.5 for further details.
Monitoring and reporting	Site check (review of habitat management measures)	May to mid-June	X									See Section 5 for further details.
	Review of EMP	End of year or as required	X									

Appendices

Appendix I. **ECS A8 EcMP**

East West Rail Alliance

Ecological Management Plan

Land South of Station Road, Launton (ECS A8)

Section: 2A (Bicester to Claydon Junction)

Development Stage: 2A1

Discipline/Grip Stage: Ecology/GRIP5

Ordnance Survey Grid Reference: SP 62254 23810

Document Number: 133735-EWR-ASS-EEN-000078 (eB no.)

Rev P01

East West Rail Phase 2

Ecological Management Plan

Land South of Station Road, Launton (ECS A8)

October 2019

Notice

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The information which EWR Alliance has provided has been prepared by an environmental specialist in accordance with the Code of Professional Conduct of the Chartered Institute of Ecology and Environmental Management. EWR Alliance confirms that the opinions expressed are our true and professional opinions.

This document does not purport to provide legal advice.

EWR Alliance

Document History

QR Code

Project Number:			**DOCUMENT REF:** 133735-EWR-ASS-EEN-000078 (eB no.)			
Revision	**Purpose Description**	**Originated**	**Checked**	**Reviewed**	**Approved**	**Date**
P01	Draft for Client Comment	E Davies	J Hicks/ J Girgis	L Gorman	R Voigt	16.01.2020

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1. Introduction

1.1. Terms of Reference

The East West Rail (EWR) Alliance has produced this 30-year Ecological Management Plan (EcMP) in connection with Land South of Station Road, Launton (ECS A8) ecological compensation site (hereafter referred to as 'the Site') on behalf of Network Rail. The Site has been designed to provide established compensatory habitat for notable species[1] including great crested newts, black hairstreak butterfly and common species of reptile (hereafter referred to as 'the Scheme') prior to construction works commencing on Phase 2 of the EWR project (hereafter referred to as EWR2).

The Scheme is shown on Drawing No. 133735_2A-EWR-OXD-XX-DR-L-012081 in **Appendix A**.

1.2. The Site

The Site, as shown by the purple boundary on Drawing No. 133735_RW-EWR-XX-XX-DR-LE-012562 in **Appendix B**, is 3.9 ha located approximately 1.1 km north east of the village of Launton, Oxfordshire at site central Ordnance Survey Grid Reference SP 62254 23810.

The Site, in its existing condition (see **Appendix B**), comprises one field bounded by the OXD railway corridor to the south and Station Road and arable fields to the north west. To the east it is bounded by an arable field and to the west a ridge and furrow pasture. Mature hedgerows with scattered trees are present around the northern, eastern and western Site boundaries, with dense scrub with trees associated with the OXD railway bordering the southern boundary of the Site. The Site is situated in a rural context comprising mainly arable land interconnected by hedgerows with mature, broadleaved trees, arable land and boundary ditches.

Access to the Site is obtained from Station Road via a gate in the northern corner.

1.3. Scope of the EcMP

The construction of the Scheme is planned to commence in late 2020

This EcMP incorporates the following:

- sets out the responsibilities for implementing the EcMP (section 1.4);
- details habitat creation and retention measures (sections 2 and 5);
- provides a programme of implementation (sections 2 and 7);
- provides details for maintenance and aftercare of the Scheme including both retained and newly created habitats and thresholds for remedial action (sections 3, 4 and 5);
- provides details for monitoring and reporting of the Scheme (section 6).

[1]Notable species are taken as principal species for the conservation of biodiversity listed under Section 41 of the Natural Environment and Rural Communities Act 2006; any species listed under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended); any species listed under Annex II or Annex IV of the Habitats Directive (1992); any species listed in an IUCN Red Data Book; and any other species listed under the Forward to 2020: Buckinghamshire and Milton Keynes Biodiversity Action Plan' (Buckinghamshire and Milton Keynes Natural Environment Partnership, 2000).

1.4. EcMP Responsibility

Network Rail (one of the constituent companies forming the EWR Alliance) are responsible for the long-term maintenance, aftercare and habitat management of the Scheme. The Site is under Network Rail ownership.

Upon completion of the construction phase of the EWR2 scheme, agreements will be sought with third parties where, in appropriate situations, they will take back ownership of land to manage, for land outside of the permanent works boundary to maintain the habitats following the requirements of this EcMP.

A log will we kept to record all changes to this EcMP (for a maximum of 30 years, see Section 6), to ensure that the prescribed measures are most effective in delivering long-term biodiversity gains within the Site.

2. The Scheme - Habitat Creation and Retention

2.1. Habitat Creation

Prior to works taking place on the Site, a heritage assessment is required. The Site design, installation processes and maintenance techniques may be subject to change following this assessment. However, high-quality habitat for great crested newts, common species of reptiles and black hairstreak butterfly will still be provided within the Site.

This management plan will be implemented once the Scheme becomes operational; i.e. once all habitat referred to below has been created within the Site.

The habitat creation and retention are shown on Drawing No. 133735_2A-EWR-OXD-XX-DR-L-012081 (**Appendix A**) and are summarised below. Details of specific habitat management measures are provided in section 3 while general measures and species-specific measures are provided in sections 4 and 5, respectively.

2.1.1. Dense Scrub

Five pockets of dense scrub (combined area of 0.2 ha) will be included within the mitigation planting scheme (**Appendix A**). Blackthorn will be included as it is the larval food plant of the black and brown hairstreak butterflies; two rare butterflies which have been recorded in the wider landscape. The inclusion of wych elm also will provide the larval food plant for the white-letter hairstreak butterfly. See **Appendix C** for a list of scrub and tree species to be planted.

2.1.2. Open Mosaic Habitat

Two areas of open mosaic habitat will be created in the form of two shallow rubble areas (see **Appendix A** for their location and specification) whose combined area will be 380 m^2. They will provide suitable refuge within the grassland for common species of reptile and for amphibians. The will also facilitate basking behaviour for reptiles.

The rubble areas will be created by digging down to a depth of 50-200 mm. The depressions will be filled with large, non-smooth material (75:40 crushed limestone) to allow crevices and gaps for species to enter the features. The construction of rubble areas will be conducted with an Ecological Clerk of Works present. These areas will also be seeded with a mix of low growing grasses and wildflowers to combat weed growth (see **Appendix C.2** for the species list).

These areas may also provide habitats of value for some species of birds and invertebrates.

2.1.3. Hedgerows

A total of length of 319 m of native, species-rich hedgerows will be planted within the Site. A section will be planted along the northern border of the Site to compensate for the loss of the existing northern boundary hedgerow during the main EWR2 works. This hedge will be part of the wider EWR2 Scheme design and will be planted once the neighbouring overbridge has been constructed. A hedgerow along the southern boundary of the Site will also be planted as part of the wider EWR2 Scheme design post EWR2 construction works.

These hedgerows will provide additional: nesting and foraging habitat, refuge opportunities and commuting corridors for wildlife as well as contributing towards the Oxfordshire Biodiversity Action Plan[2] for Hedgerows.

Where possible, the new hedgerows will comprise material translocated from local hedgerows due for removal as part of EWR2. Any new hedgerows will be planted in double staggered rows, with 300 mm spacing between each plant within each of the two rows (no less than six shrubs per linear metre). The hedgerows will be planted during the period October through to March (dependent on season variation) to allow for optimal establishment of the hedgerow. A 250 mm gap will be left between the two rows to allow the hedgerow to establish successfully and tree-guards will be placed around any newly planted whips to protect them from grazing. If browsing by deer inhibits the growth of newly planted hedge, deer-proof fencing will also be installed as required.

Blackthorn and Wych elm will be included within the mitigation planting scheme (**Appendix A**) to support the black and brown hairstreak butterfly, and white-letter hairstreak butterflies respectively, which have been recorded outside of the Site but within in the wider landscape. Occasional standard trees will provide further habitat for these rare butterflies. For a full species list, please see **Appendix D**.

A small gap (approximately 5 m) in the north-eastern hedgerow will be planted ahead of the EWR2 works following the parameters above.

2.2. Existing Ecological Features to be Retained and Enhanced

2.2.1. Grassland

Existing areas of poor semi-improved grassland, outside of the new habitat creation areas, will be retained and managed to provide suitable terrestrial habitat for great crested newts and reptiles.

2.2.2. Trees

All trees within and bordering the Site, that do not fall within the EWR2 boundary (shown in **Appendix B**), will be retained and protected during the construction phase of the Scheme, following 'BS 5837:2012, Guide for Trees in relation to design, demolition and construction work: recommendations'.

2.2.3. Scrub

Existing areas of dense scrub and existing areas of scattered scrub within the Site, that do not fall within the EWR2 boundary (shown in **Appendix B**), will be retained and managed for butterflies (in particular black and brown hairstreak butterflies) as per section 3.2.

2.2.4. Hedgerows

The intact species-poor hedgerows along the north-eastern and south-western boundaries of the Site, that do not fall within the EWR2 boundary (shown in **Appendix B**), will be retained. These hedgerows will be protected during the construction phase of the Scheme, following 'BS 5837:2012, Guide for Trees in relation to design, demolition and construction work: recommendations' and so will continue to provide refuge habitat and corridors along which faunal species such as great crested newts, birds and bats can disperse.

[2] Oxfordshire Biodiversity Action Plan (Oxfordshire Nature Conservation Forum, 2010)

3. 30-Year Habitat Maintenance and Aftercare

3.1. Grassland

The grassland will be managed using the following techniques to provide habitat specifically suited for utilisation by great crested newts and common species of reptile.

The grassland will be divided into three sections (1, 2 and 3) to allow the grassland to be cut on a three-year rotational basis to form differing sward heights creating transitional zones which provide useful habitat for great crested newts and common species of reptile. The three sections are shown in Figure 1 below and on the Site will be marked with white posts on the northern-eastern and south-western boundaries. The posts are indicated by the blue arrows in Figure 3-1.

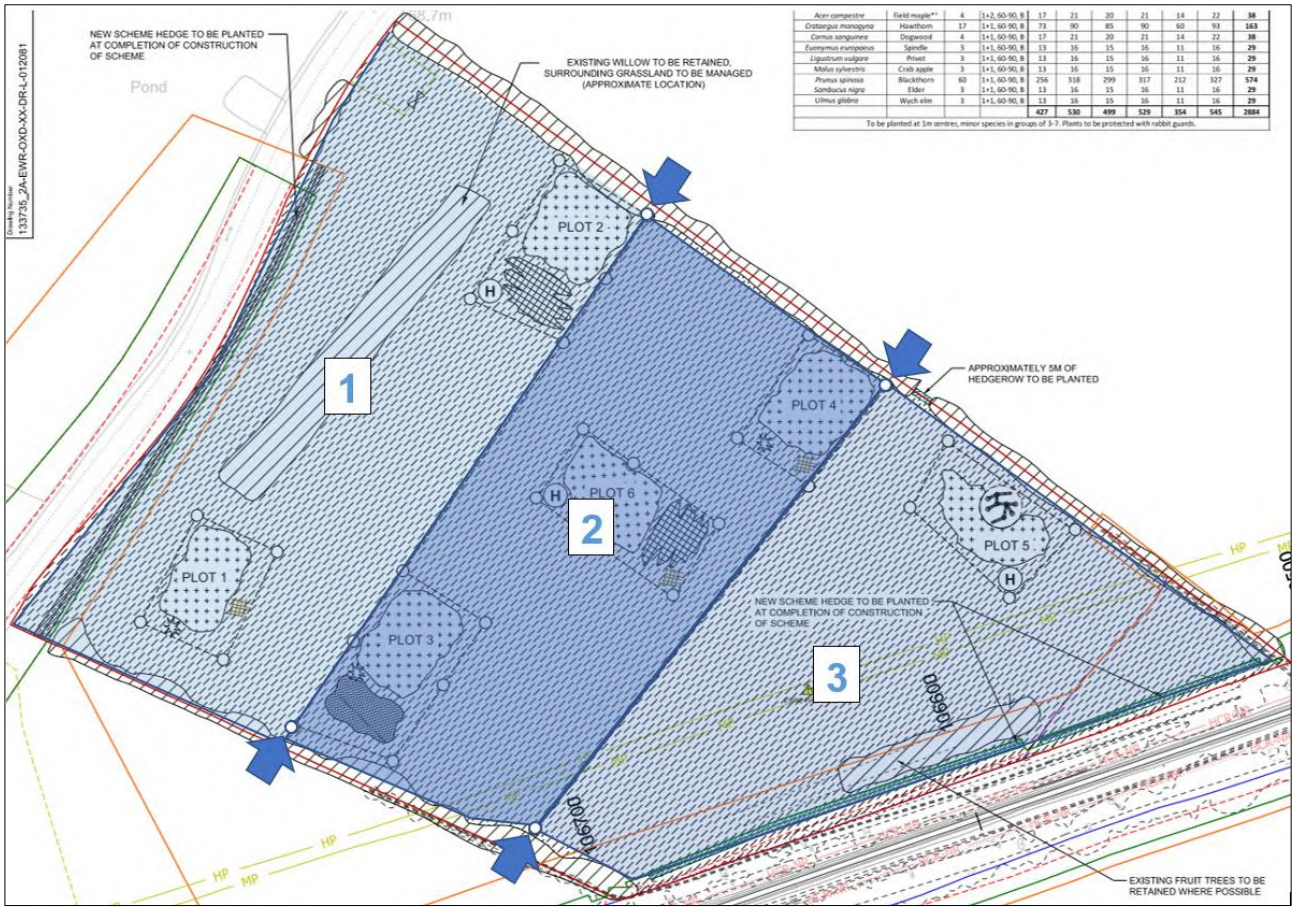


Figure 1 Grassland Management – Rotational Cut (each section will be cut once every 3 years)

Cutting should take place between November and January (to avoid active periods for all species, including adder) and should be cut to a minimum of 150 mm above ground level.

Cutting will be undertaken by tractor mounted forage harvester, hand-operated reciprocating cutter, brush-cutter or finger bar cutter. Care must be taken not to damage the existing ridge and furrow system[3]. Cutting by strimmer should be implemented around hibernacula, log piles, compost heaps, rubble areas, trees and along the edges of scrub and hedgerows. Cutting of the grass in these areas must be carried out by hand as individual animals (who are more likely to be taking refuge in these areas) can be more easily avoided and cutting can be moderated more easily to accommodate reptile habitat.

The grassland around the base of trees within the Site should be cut.

If the hand cutting becomes a problem (i.e. features are likely to be damaged) then advise should be sought from a suitably qualified and experienced ecologist.

Pockets containing a mix of: scrub, hibernacula, log piles, compost heaps, rubble areas and scrapes are demarcated on Site with white posts (see **Appendix A**). Grassland cutting should not take place within these areas.

All cuttings from the grassland management will placed within the compost heap (see **Appendix A** for their locations) which will provide grass snake egg laying habitat. See section 5.4 for further information of compost heap creation and maintenance.

No fertilisers will be used on the grassland as this enriches the soil nutrients, allowing grasses to easily outcompete wildflowers. Similarly, the use of chemical herbicides will be avoided where feasible as wildflowers are more susceptible than grasses and weeds. Spot-treatment of competitive weeds will be allowed due to its localised nature.

3.2. Dense Scrub

The blackthorn dominated scrub will be managed to encourage a dense stand of blackthorn at a height of 3-4 m. Once scrub has established in year 5, it will be cut every two years to prevent overgrowth in to neighbouring habitats. A maximum of 25% of the scrub will be cleared by hand every three years in September to February, inclusive, so that only a proportion of any laid black hairstreak eggs are lost, with irregular (i.e. at different heights / depths) annual cutting to create sheltered areas within the blackthorn for basking butterflies[4].

If browsing by deer inhibits the growth of newly planted scrub, deer-proof fencing will be installed around the area of scrub, taking care not to shade any of the area.

3.3. Hedgerows

Hedgerows within the Site will be inspected on an annual basis (during winter months when visibility is not obscured by leaves) to maintain weed-free areas around the base of new trees, to check and adjust any stakes, to remove any litter and prune to promote healthy growth. Hedgerow trees will also be given annual health and safety inspections by a suitably qualified arboriculturist with recommendations made for any tree works required to remove or make safe any individual trees or limbs in a hazardous condition, or to promote healthy growth.

Dead or moribund sections of hedge will be coppiced and re-stocked. All mature trees over 40 cm diameter at breast height (DBH) will be retained standing, alive or dead unless they pose a health and safety hazard.

[3] 'On ridge and furrow fields, modern cutters do not perform very well as they tend to "scalp" the ridges and "undercut" the furrows. Finger bar cutters are better for cutting grasslands on ridge and furrow systems. Side mounted cutters are best used at right angles to the ridge crests whereas back-mounted cutters are better running along the line of the ridges and furrows'. Extract from Crofts, A. and Jefferson R,G. (1999) *The Lowland Grassland Management Handbook.* English Nature / The Wildlife Trusts. Chapter 6:10

[4] Thomas, J. A. (1975). *The black hairstreak, conservation report*. Unpublished report ITE/NCC.

Restocked and coppiced sections will be fenced or guarded to protect against browsing by rabbits or deer, taking care not to shade any of the areas.

Weed free areas will be maintained 1 m either side of the hedgerows by hand-weeding where necessary.

Hedgerows will be managed to encourage a tall dense hedgerow providing habitat for breeding birds, commuting and foraging bats, great crested newts, common species of reptile and invertebrates. Existing hedgerows, and once the planted section of hedgerow has established (after five years), will be cut in September to February every two years, alternating sides of the hedgerow every two years, to a height and width of 2-3 m. Cuts should be rotational, thus avoiding all hedgerows being cut at once. Arisings from hedgerow management should be collected and removed from the Site. Following the establishment period (first five years), all stakes and ties will be removed from planted stock.

Any re-planting, if required, will be undertaken in the next planting season between October and March (dependent on seasonal variation), annually for the first five years, and then following an inspection every five-years for the remainder of the 30 years management plan. All dead wood will be removed and stacked locally within the Site adjacent to the retained hedgerows and / or dense scrub or used to enhance the hibernacula within the Site.

Watering of the hedgerow will also occur, as required. Watering will be the responsibility of Network Rail or its nominated agent for the 30-year management period.

3.4. Trees

Trees will be managed to ensure growth success and health. Initially this will require regular maintenance as part of the 30-year management plan to maintain weed-free areas around the base of new trees, to check and adjust any stakes, and to remove any litter (see section 7).

Pruning will be undertaken of any broken or damaged branches to promote healthy growth and structure. Trees will also be given annual health and safety inspections by a suitably qualified arboriculturist, with recommendations made for any tree works required to remove or make safe, any individual trees or limbs in a hazardous condition, or to promote healthy growth.

Any replanting, if re-planting is identified as required, will be undertaken in the next planting season between October and March (dependent on seasonal variation), annually for the first five years, and then following an inspection every five-years for the remainder of the 30 years management plan. All dead wood will be removed and stacked locally within the Site adjacent to the retained hedgerows and / or dense scrub or used to enhance the hibernacula within the Site.

If browsing by deer or grazing animals inhibits the growth of newly planted trees, deer/stock-proof fencing will be installed around the trees, taking care not to shade any of the areas.

3.5. Open Mosaic Habitat

The open mosaic habitats will be inspected on an annual basis to ensure the area is weed-free. As with the grassland no fertilisers on the area and the use of chemical herbicides will be avoided. Spot-treatment of competitive weeds will be allowed due to its localised nature, however, hand pulling weeds is the preferred method.

The seed mix used in the open mosaic habitats contains very low growing species which should not need to be cut. If other plant species start to grow in the open mosaic habitat causing the vegetation to increase in height, these species should be removed – following the procedure outlined above for weeds.

Any re-seeding, if re-seeding is identified as required, will be undertaken in the next most appropriate season (either between August – October or March – May) and in accordance with Section 4.2.

4. General Maintenance Operations

The general activities that will be undertaken during management visits include vegetation clearance (e.g. cutting / pruning), replacement of failed planting stock and noxious weed control. A visual representation of the different planting can be found in **Appendix A**.

4.1. Vegetation Clearance

Pruning is to be carried out with sharp secateurs, hedge cutters or hand saw in a way that does not tear or damage the stem. Any ragged edges or tears are to be trimmed off using a sharp knife (or other appropriate tool that will leave a clean cut). All dead, dying, diseased or damaged material shall be promptly removed and taken off the Site (except dead wood from trees which should be relocated close to the hedgerow bases or used to enhance hibernacula or log piles).

4.2. Replacement Planting

Network Rail will make allowances for replacing and replanting any tree/shrub/plant that may fail to thrive during the initial five years of the management period. Failing, dead or moribund plants will be identified during the annual site checks, and a schedule for replacement planting agreed with Network Rail. If a large proportion of trees/ shrubs/ plants are failing, as determined by the landscape specialist, an investigation will be carried out to determine the cause and develop an appropriate solution.

4.3. Fencing

Stock and deer proof fencing will not be installed initially around the newly created habitats (e.g. hedgerows, scrub and trees). However if, during the monitoring of the site, grazing on newly created habitats is noted an ecologist may recommend stock and deer proof fencing is installed to prevent suppression of growth. Care would need to be taken to ensure that the fencing does not shade the newly created habitats.

4.4. Weed Control

There are currently a substantial number of weeds covering the Site. Initially a broadleaf select herbicide (e.g. Depitox) will be broadcast over the Site where the weeds are growing. The Site will be left for 1-2 weeks and then the grassland and weeds will be cut, with the arisings being left in situ. Three weeks later the arisings will be flail cut. This process will be repeated several months later (see Section 7).

Several months after this, a suitably qualified ecologist will then be required to review the progress of the weed eradication. Another round of spraying, cutting and flail cutting may be recommended or the weeds may have been reduced to a number where the following process is now deemed appropriate.

Weeds are to be removed by hand, cutting down or spot treatment[5] (only if the method and herbicide is approved by an ecologist). Hand weeding means removing all parts of weeds including roots by hoeing, digging or forking, taking care to remove not more than a minimum amount of soil, and causing minimum disturbance to mulched surfaces or adjacent plants. The Site will then be kept clear of such weeds, identifying presence of such weeds will form part of the monitoring visits, annually. The following weed species shall be removed as soon as they appear anywhere on the Site:

- Ragworts

[5] Herbicides, including spot treatment, should not be used on the artificial badger sett

- Bindweed
- Couch/twitch grass
- Docks (broad-leaved, curled)
- Thistles (spear, common/creeping)
- Stinging nettles

This list of weeds will be subject to review and updated following site inspections by a suitably qualified ecologist.

4.5. Non-Native Invasive Plant Species

It is an offence to plant or otherwise cause non-native invasive plant species[6] to grow in the wild. If any non-native invasive plant species are recorded within the Site, Network Rail will need to engage with a specialist contractor to eradicate these species.

Special measures may be needed to remove non-native invasive plant species.

6 Non-native invasive plant species are those listed on Schedule 9 of the Wildlife & Countryside Act 1981 (as amended). This includes (but is not limited to): Japanese knotweed, giant knotweed, hybrid knotweed, Himalayan balsam, cotoneaster sp., giant hogweed, New Zealand pygmyweed and rhododendron.

5. Protected and Notable Species Habitat Creation

The following section provides details on additional habitat creation for great crested newts, common species of reptile, terrestrial invertebrates and badgers.

Great crested newts and common species of reptile will only be translocated into the Site once the relevant habitats below are considered sufficient to support populations of these species.

5.1. Artificial Badger Sett

The artificial sett was created in Spring 2019. It is now in place prior to closure of the associated existing main sett (sett 'S_15 2A' at SP 62354 23822) with enough time to ensure the badgers discover and can use the new sett. In order to increase the chances of uptake by badgers, and long-term occupation, the artificial sett has been positioned as close to the existing main sett as practicable (ideally within 150 m) within the known territory of the social group for which it is intended (see **Appendix A** for the artificial sett location). The sett construction has incorporated appropriate landscaping, good connectivity to foraging, access to neighbouring social groups and is in an area not subject to construction activity. Local vegetation clearance was required in order to install the artificial sett. Any vegetation was checked for any other protected species by an Ecological Clerk of Works (ECoW) prior to removal.

The artificial sett is a 'natural type' design constructed of wooden posts, plywood lids and plastic pipes incorporating features such as natural soil spoil heaps, well screened (vegetated) areas around entrance holes, tunnels with changes of direction and curved, off-set chambers (see the indicative artificial sett design in **Appendix D**). The sett is a bespoke design, tailored to the landscape and the known badger territory. The sett was not dug into the ground but was constructed on a cushion of earth to ensure the sett does not become flooded (as areas of the field contain wet ground). The sett was then covered with earth.

Figure 2 The artificial sett during its construction on the Site

The artificial sett has been monitored regularly following its installation. Monitoring has been carried out via camera traps with a suitably qualified ecologist looking for signs of badger activity. Badger were first recorded at the sett in November 2019.

Following closure of the existing main setts the artificial setts will be monitored quarterly throughout construction (where access is agreed for setts in third party land).

Any vegetation management directly on top of the artificial sett will be carried out by hand.

5.2. Scrape

One scrape/shallow depression in the ground will be created within the Site. **Appendix A** indicates its proposed location and the specification for its creation. The scrape will be 213 m^2 and 50 -150 mm deep. The scrape is likely to create a wetter environment, which will be used by great crested newts, common species of reptile (notably grass snakes), terrestrial invertebrates and birds. This area will be sown with a bespoke seed mix tolerant of both wet and dry wetter conditions (see **Appendix C** for the species list).

If the scrape is dry, the area should be managed like the poor semi-improved grassland, detailed in section 3.1. If the scrape is wet at the time of the cut, the scrape should not be managed.

5.3. Hibernacula

Three hibernacula (refugia) will be constructed within the Site (see **Appendix A** for their locations) as per the specification in **Appendix E** and in accordance with the Reptile Habitat Management Handbook[7] and the Great Crested Newt Mitigation Guidelines[8]. The hibernacula will be at least 4 m long, 2 m wide and 1 m high and constructed above ground, on a gentle slope to prevent flooding. They will be lined with gravel if the ground conditions require some form of drainage. The hibernacula will comprise free-draining materials (e.g. brash, inert hardcore, bricks, rocks) although topsoil and / or turf may be incorporated over the top. Access points will be inserted into the hibernacula through protruding timber or rubble to create crevices for reptiles to enter the bank. Hibernacula are to provide hibernation and refuge opportunities for amphibians and common species of reptile. They will also provide habitats of value for some species terrestrial invertebrates.

The hibernacula will be sited in a sunny, south-facing position adjacent to favourable habitat (e.g. scrub and hedgerows with basking opportunities within the grassland, scrapes and rubble areas).

The hibernacula will be checked annually with any remedial works carried out as required.

5.4. Compost Heaps

Three compost heaps will be constructed within the Site (see **Appendix A** for their location) as per the specification in **Appendix F**. The compost heaps will provide ideal foraging and refuge opportunities for amphibians and reptiles, as well as suitable habitat for grass snakes to lay eggs. They will also provide habitats of value for some species of birds and terrestrial invertebrates.

The heap will be created on logs and branches or pallets (to encourage aeriation and allow access for nesting females at the base), and should be at least 3-5 m^3, but ideally much larger. Pallets are a suitable substitution for the logs and branches detailed in the compost heap specification (**Appendix F)** when in consultation with a suitably qualified ecologist.

Cuttings from the grassland management will be placed onto the compost heap. To minimise disturbance, heaps will be added to by hand or care will be taken to ensure “forks” of machinery will not damage the

[7] Amphibian and Reptile Conservation (2010), Reptile Habitat Management Handbook
[8] English Nature (2001), Great Crested Newt Mitigation Guidelines

heap/arisings won't be dropped from a height. Replenishment of the heaps will be undertaken between November and January to coincide with when the grassland will be cut. Points of access and egress at the base of the heap should be left clear for use by reptiles and great-crested newts. Compost heaps will be fenced off and left undisturbed (except for new cuttings being placed on top) - in particular, heaps will not be interfered with between June and September if being used by grass snake.

Compost heaps will be sited in a sunny, south-facing positions adjacent to favourable habitat (e.g. scrub, open mosaic habitat and hedgerows with basking opportunities within the grassland).

Compost heaps will be checked annually with any remedial works carried out as required.

5.5. Log Pile

Three log piles will be constructed within the Site (see **Appendix A** for their location) as per the specification in **Appendix G**. The log piles will be partially buried into the ground and include branch sections of varying widths - no less than 30 mm in diameter. Log piles will be created with an ecologist present.

The log piles will provide refuge opportunities for amphibians (notably great crested newts), common species of reptile, terrestrial invertebrates and birds. They will also facilitate basking behaviour for common species of reptiles.

5.6. Nest Boxes

To compensate for the loss of nesting habitat in the short to medium term whilst habitats establish in the ECS and on the embankments of the railway, nest boxes of varying design will be included within each ECS where appropriate. The design and location of these nest boxes are detailed on the EWR2 WebGIS (https://eastwestrail2.atkinsgeospatial.com/). The maintenance of nest boxes will be undertaken within the first 5 years.

6. Monitoring and Reporting

6.1. Monitoring

Annual monitoring by Network Rail will occur of the newly created habitats, the results of which will be used to inform changes to the EcMP post construction. Mature trees will be inspected annually by a suitably qualified and experienced arboriculturist while the remaining habitats will be inspected annually by a suitably qualified and experienced ecologist. The ecologist or arboriculturist carrying out the monitoring will consider triggers for action that may be required as a result of the monitoring such as additional blackthorn coppicing or replacement hedgerow planting.

The monitoring prescriptions provided here may be altered if required by a suitably qualified ecologist during the post construction.

Monitoring of great crested newt terrestrial habitat will likely be a requirement of the route section-wide European Protected Species Licence (EPSL), which is being sought as part of the wider EWR2 project. The EcMP will be updated, if necessary, once the details of the required monitoring have been agreed with Natural England.

6.2. Reporting

The management proposals provide a basis for management of existing and created habitats within the Site. To a certain extent, natural processes will dictate appropriate management practices for the habitats, both those newly created and retained. Therefore, an annual review of habitat management measures will be undertaken with any outstanding issues reported back to Network Rail in a short-written document within that maintenance year.

The aim of this process will be to review progress on habitat management to date and set conservation management priorities for the forthcoming year, specifying in detail what tasks will be undertaken and how they will be timetabled and resourced. The review will also provide a feedback mechanism to report on the outcomes of conservation management undertaken on the Site.

Additionally, reporting may be required in relation to the route section-wide EPSL for great crested newts. In the event that issues with the establishment of terrestrial habitats or adverse impacts on any great crested newt populations are identified then remedial action will be undertaken to address such issues. Remedial actions will be agreed with Network Rail and/or Natural England, as required. The above will be reported annually in a written report of actions taken under the GCN licence and submitted to Natural England.

7. Ecological Management Summary

Table 7-1. Ecological Management Summary

Ecological Feature	Prescription		Years									Comments
		Timing	Annual	Every 2 Years	Year 1	Year 2	Year 3	Year 4	Year 5	Every 3 Years (from 6 to 30)	Every 5 Years (from 10 to 30)	
Grassland	Rotational cut in Areas 1, 2 and 3 (ensuring each area is cut only once every three years)	November - January	X*									See section 3.1 for further details. *This cutting regime should begin once the initial weed control has been completed (see below and section 4.4)
Trees, scrub and hedgerows	Hedgerow planting (gapping up existing hedge)	October - March			x							See sections 2.1 and 3.2 – 3.4 for further details. Please note the majority of hedgerow planting (and associated maintenance and monitoring) will take place once the EWR2 construction is complete (see section 2.1.3).
	Inspections / safety checks of trees	September – February	X									
	Watering of trees	As instructed following inspections by an arboriculturalist			X	X	X					
	Slow-release fertiliser for trees	March – May				X	X					
	Inspect guards, stakes *etc.*	September - February			X	X	X	X	X		X	
	Replacement of failed stock (if required)	September - February	X (for the first 5 years)								x	
	Removal of guards	As required							X			
	Scrub and hedgerow cutting/pruning	September – February and as instructed following inspections by an arboriculturalist		X (Once hedgerows and scrub have established)								
	Tree cutting/pruning	September – February as required (following inspection and instruction by an arboriculturalist)					X		X		X	
Open mosaic habitat	Seeding	Spring or autumn			x							See sections 2.1.2 and 3.5 for further details
	Re-seeding (if required)	Spring or autumn				x	x	x	x			
Weeds	Initial weed control; spray, cut and flail cut	Autumn then again in Spring, or Spring then again in Summer.			x							See section 4.4 for further details
	Subsequent weed control	May - June	X									

Fencing	Stock / deer-proof fencing installation and maintenance	As required	X									See section 4 for further details.
Features for protected and notable species	Remedial works (as required)	Consult with ecologist	X									See section 5 for further details.
	Nest box maintenance	October - February			X	X	X	X	X			
Monitoring and reporting	Site check (review of habitat management measures)	May to mid-June	X									See section 6 for further details.
	Review of EcMP	End of year or as required	x									

Appendices

Appendix A. **Landscape Plan**

A.1. Drawing No. 133735_2A-EWR-OXD-XX-DR-L-012081

Revision & Version
C01.01.01

Drawing Number
133735_2A-EWR-OXD-XX-DR-L-012081

DENSE SCRUB PLANTING				PLANT NUMBERS PER PLOT						
Botanical name	Common name	%	Size	PLOT 1 427m²	PLOT 2 530m²	PLOT 3 499m²	PLOT 4 529m²	PLOT 5 354m²	PLOT 6 545m²	TOTAL 2,884m²
Acer campestre	Field maple**	4	1+2, 60-90, B	17	21	20	21	14	22	**38**
Crataegus monogyna	Hawthorn	17	1+1, 60-90, B	73	90	85	90	60	93	**163**
Cornus sanguinea	Dogwood	4	1+1, 60-90, B	17	21	20	21	14	22	**38**
Euonymus europaeus	Spindle	3	1+1, 60-90, B	13	16	15	16	11	16	**29**
Ligustrum vulgare	Privet	3	1+1, 60-90, B	13	16	15	16	11	16	**29**
Malus sylvestris	Crab apple	3	1+1, 60-90, B	13	16	15	16	11	16	**29**
Prunus spinosa	Blackthorn	60	1+1, 60-90, B	256	318	299	317	212	327	**574**
Sambucus nigra	Elder	3	1+1, 60-90, B	13	16	15	16	11	16	**29**
Ulmus glabra	Wych elm	3	1+1, 60-90, B	13	16	15	16	11	16	**29**
				427	**530**	**499**	**529**	**354**	**545**	**2884**
To be planted at 1m centres, minor species in groups of 3-7. Plants to be protected with rabbit guards.										

EHV
68.7m
NEW SCHEME HEDGE TO BE PLANTED AT COMPLETION OF CONSTRUCTION OF SCHEME
Pond
EXISTING WILLOW TO BE RETAINED, SURROUNDING GRASSLAND TO BE MANAGED (APPROXIMATE LOCATION)
A
PLOT 2
H
APPROXIMATELY 5M OF HEDGEROW TO BE PLANTED
PLOT 4
PLOT 6
PLOT 5
PLOT 1
PLOT 3
HP
MP
HCR-NR
NEW SCHEME HEDGE TO BE PLANTED AT COMPLETION OF CONSTRUCTION OF SCHEME
EWR2-HAZ-03078
106900
106700
106800
EXISTING FRUIT TREES TO BE RETAINED WHERE POSSIBLE

Safety, Health and Environmental Information
The works are to be undertaken by a competent contractor, and therefore only exceptional risks relating to the works associated with this drawing are identified below. For further details and proposed safety measures refer "EWR CDM PHASE 2 HAZARD LOG" eB doc. Ref: 133735-EWR-LOG-SSD-000004.

ID	Hazard description
EWR2-HAZ-03078	HIGH AND MEDIUM PRESSURE GAS MAINS RUNNING THROUGH SITE

⚠ INDICATES PROJECT RISKS (EWR2-DRIS- .....) ⚠ INDICATES H&S RISKS (EWR2-HAZ- .....)

KEY
- SITE BOUNDARY
- PERMANENT ENGINEERING LAND TAKE
- PERMANENT ENVIRONMENTAL LAND TAKE
- TEMPORARY ENVIRONMENTAL LAND TAKE

SOFT LANDSCAPE
- LIDAR DATA
- RETAINED GRASSLAND
- RETAINED VEGETATION
- DENSE SCRUB PLANTING
- PROPOSED HEDGEROW
- COMPOST HEAP

HARD LANDSCAPE
- RUBBLE AREA
- SCRAPE
- ARTIFICIAL BADGER SET
- HIBERNACULUM
- MARKER POSTS, DEMARCATION OF ROTATIONAL MOWING REGIME AND SCRUB OUTLINE
- LOG PILES
- STOCK PROOF FENCE
- PROPOSED GATE

NOTES:
1. FOR DETAIL OF HIBERNACULUM, SEE 133735 RW-EWR-XX-XX-DR-L-052021.
2. FOR DETAIL OF LOG PILE, SEE 133735_RW-EWR-XX-XX-DR-L-052031.
3. FOR DETAIL OF COMPOST HEAP, SEE 133735_RW-EWR-XX-XX-DR-L-052061.
4. TO CREATE RUBBLE AREAS: SCRAPE SURFACE FREE OF VEGETATION, SPREAD EXPOSED SURFACE WITH CLEAN STONE/ GRAVEL BETWEEN 50-150MM NOMINAL DIA TO A DEPTH OF 50-200MM DEEP, TAPERING OUT TOWARDS THE EDGES AND SEEDED WITH ER1.
5. ALL PLANTING SHOWN HERE IS INDICATIVE, FINAL POSITION TO BE AGREED WITH LCOW.
6. GRASSLAND TO BE MANAGED IN 3 SECTIONS, INDICATED BY MARKER POSTS.
7. WHERE PRACTICABLE, EXISTING SCRUB ADJACENT TO THE BORDERS OF THE SITE TO BE RETAINED AND MANAGED AS SCRUB.
8. TO CREATE THE SCRAPE: SCRAPE SURFACE FREE OF VEGETATION TO A DEPTH OF 50-200MM, TAPERING OUT TOWARDS THE EDGES. SEED WITH A SUITABLE WET/DRY SEED MIX - TO BE ADVISED.

APPROVED FOR CONSTRUCTION

Name	Title
Signed	Date
Status	

Rev	Date	Description of Revisions	Dsnd	Chkd	Appr
C01	04/10/19	FOR CONSTRUCTION	–	–	–

Status: WIP - Design
Suitability: S0

EWR Alliance
Connecting People

Project
East West Rail
(Western Section)
Phase 2

Drawing Title
LAND SOUTH OF STATION ROAD, LAUNTON
ECOLOGICAL MITIGATION
A8 SITE DESIGN

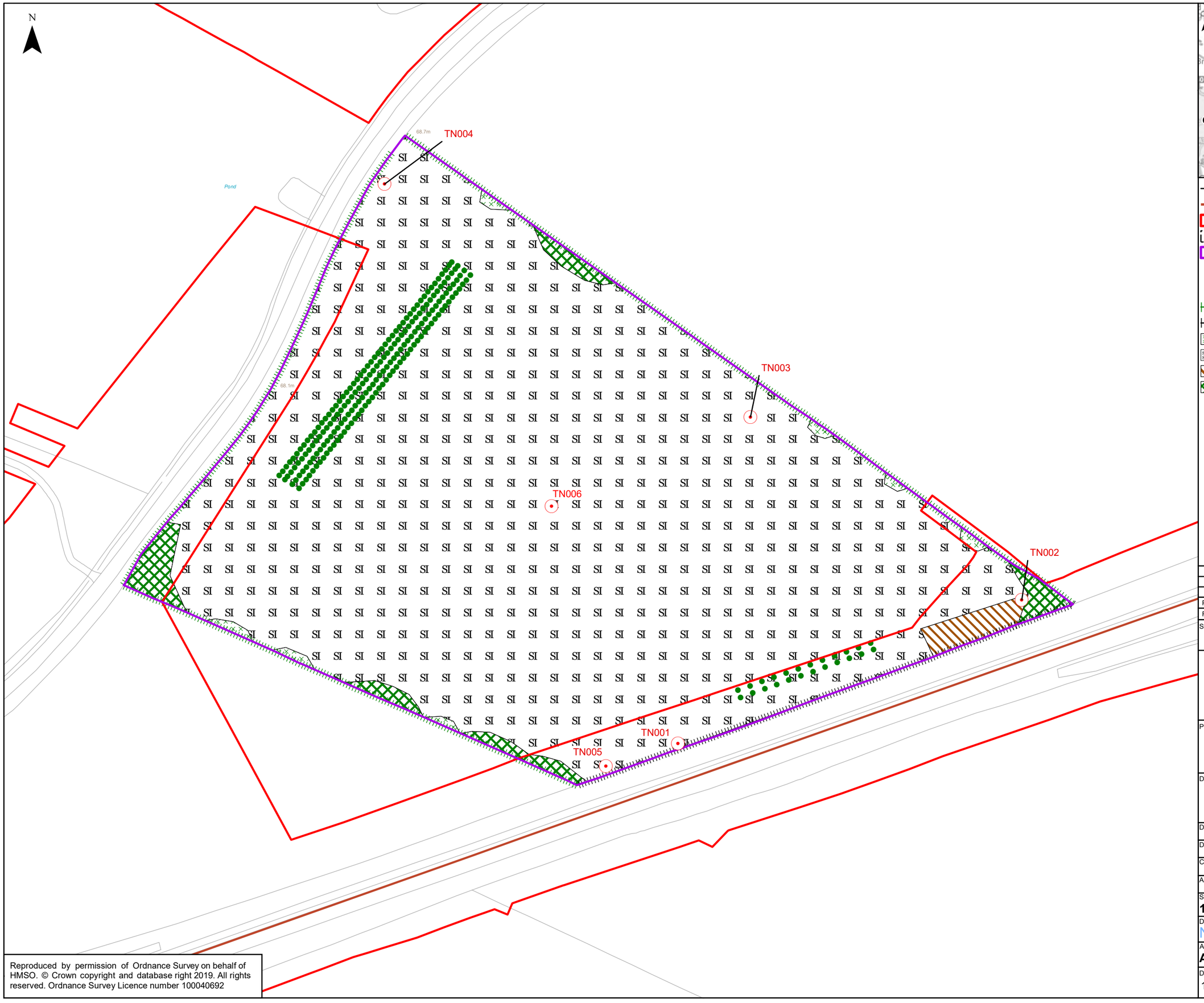
Designed	---	Signed ---	Date ---
Drawn	Mark Inglis	Signed M. Inglis	Date 20/09/19
Checked	---	Signed ---	Date ---
Approved	---	Signed ---	Date ---

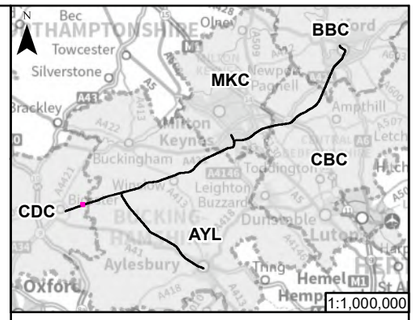
Scale(s): 1:500
ELR - Project Chainage (Miles Yards): OXD - 106600
Design Package Risk Classification: Normal
Sheet: 1 of 1
Alternative Reference:
Revision: C01
Drawing Number: 133735_2A-EWR-OXD-XX-DR-L-012081

Sheet Size A1 594 x 841

Appendix B. **Existing Habitat Map**

Drawing No. 133735_RW-EWR-XX-XX-DR-LE-012562





- PROJECT EXTENTS
- DEVELOPMENT STAGE 2A2
- SCHEME BOUNDARY
- LOCAL AUTHORITY BOUNDARY
- SITE BOUNDARY
- TARGET NOTE
- SCATTERED BROAD-LEAVED TREES
- HEDGES WITH TREES - SPECIES POOR
- FENCE
- SCATTERED SCRUB
- POOR SEMI-IMPROVED GRASSLAND
- TALL RUDERAL
- DENSE/CONTINUOUS SCRUB

0 10 20 30 40 50 Metres

Rev	Date	Description of Revisions	Dsnd	Chkd	Appr
P01	17/09/19	1ST ISSUE SCHEME BOUNDARY 31/07/2018	LA	KS	TO

Status: PUBLISHED - STAGE APPROVED

Suitability: A1

EWR Alliance
Connecting People

Project: THE NETWORK RAIL (EAST WEST RAIL BICESTER TO BEDFORD IMPROVEMENTS) ORDER

Drawing Title: PHASE 1 HABITAT SURVEY - LAND SOUTH OF STATION ROAD

Designed	Laura Armstrong	Signed	Date 18/09/2019
Drawn	Laura Armstrong	Signed	Date 18/09/2019
Checked	Kelvin Snell	Signed KRS	Date 18/09/2019
Approved	Tom Oliver	Signed	Date 18/09/2019

Scale(s): 1:1,250

ELR & Project Chainage: N/A

Design Package Risk Classification: NORMAL

Sheet: 1 of 1

Alternative Reference: Alternative_Ref

Revision: P01

Drawing Number: 133735_RW-EWR-XX-XX-DR-LE-012562

Sheet Size A3 297 x 420

Appendix C. **Seed Mixes**

C.1. Shrub, Hedgerow and Tree Species Mix

Table C-1 Plant species: Shrub, Hedgerow and Tree

Dense Scrub Species	
Blackthorn	*Prunus spinosa*
Crab apple	*Malus sylvestris*
Dogwood	*Cornus sanguinea*
Elder	*Sambucus nigra*
Field maple	*Acer campestre*
Hawthorn	*Crataegus monogyna*
Wych elm	*Ulmus glabra.*
Privet	*Ligustrum vulgare*
Spindle	*Euonymus europaeus*
EWR2 Standard Hedgerow Species Mix (trees and shrubs)	
Field maple	*Acer campestre*
Common dogwood	*Cornus sanguinea*
Common hazel	*Corylus avellana*
Hawthorn	*Crataegus monogyna*
Spindle	*Euonymus europaeus*
Common privet	*Ligustrum vulgare*
Crab apple	*Malus sylvestris*
Wild cherry	*Prunus avium*
Bird cherry	*Prunus padus*
Blackthorn	*Prunus spinosa*
Pedunculate oak	*Quercus robur*
Buckthorn	*Rhamnus cathartica*
Dog rose	*Rosa canina*
Rowan	*Sorbus aucuparia*
Additional Hedgerow Species for this ECS	
Wych elm	*Ulmus glabra*

C.2. Open Mosaic Habitat Species Mix

Table C-2 Plant species: Emorsgate ER1 (Turf Roof Mixture[9])

Wildflowers		
%	**Latin name**	**Common name**
0.6	Agrimonia eupatoria	Agrimony
0.5	Anagallis arvensis - (Lysimachia arvensis)	Scarlet Pimpernel
1	Anthyllis vulneraria	Kidney Vetch
0.2	Calluna vulgaris	Ling
1.5	Centaurea nigra	Common Knapweed
0.6	Filipendula vulgaris	Dropwort
2	Galium verum	Lady's Bedstraw
0.2	Helianthemum nummularium	Common Rock-rose
0.7	Hippocrepis comosa	Horseshoe Vetch
1	Hypericum perforatum	Perforate St John's Wort
0.5	Knautia arvensis	Field Scabious
1	Leontodon hispidus	Rough Hawkbit
1.5	Leucanthemum vulgare	Oxeye Daisy
0.3	Ononis spinosa	Spiny Restharrow
1.2	Origanum vulgare	Wild Marjoram
1	Plantago media	Hoary Plantain
1	Primula veris	Cowslip
0.5	Prunella vulgaris	Selfheal
0.5	Ranunculus bulbosus	Bulbous Buttercup
0.1	Reseda lutea	Wild Mignonette
0.5	Rumex acetosella	Sheep's Sorrel
Grasses		
4	Briza media	Quaking Grass (w)
0.2	Carex flacca	Glaucous Sedge
20	Cynosurus cristatus	Crested Dogstail
24	Festuca ovina	Sheep's Fescue
24	Festuca rubra	Slender-creeping Red-fescue
2	Koeleria macrantha	Crested Hair-grass (w)
4.6	Phleum bertolonii	Smaller Cat's-tail (w)

[9] A mix that grows in shallow, low nutrient substrates (i.e. rubble areas)

C.3. Scrape Species Mix

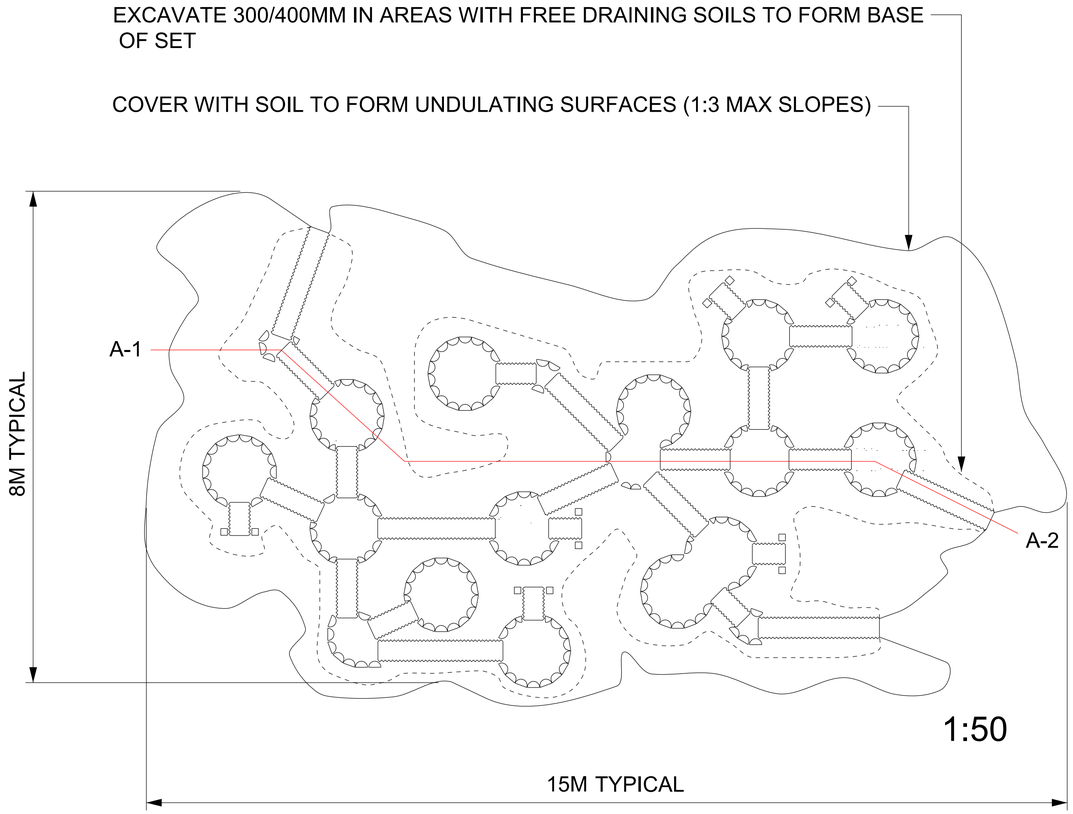
Table C-3 Plant species: Bespoke Wet/Dry Grassland Mixture

Grasses	
Common bent	*Agrostis capillaris*
Meadow foxtail	*Alopercurus pratensis*
Sweet vernal-grass	*Anthoxanthum odoratum*
Quaking grass	*Briza media*
Crested dogstail	*Cynosurus cristatus*
Tufted hair-grass	*Deschampsia cespitosa*
Slender-creeping red-fescue	*Festuca rubra*
Meadow barley	*Hordeum secalinum*
Meadow fescue	*Festuca pratensis*
Bitter-vetch	*Vicia ervilia*

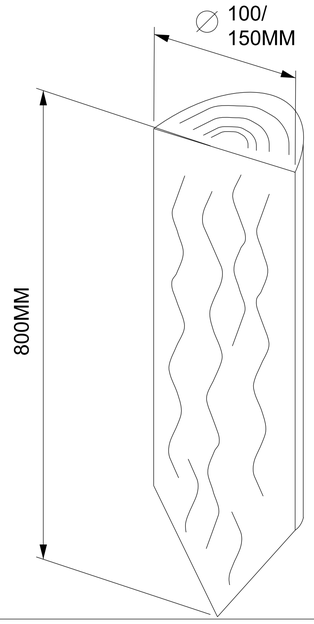
Appendix D. **Artificial Sett Design**

Revision & Version
C01.03

Drawing Number
133735_RW-EWR-XX-XX-DR-L-052041



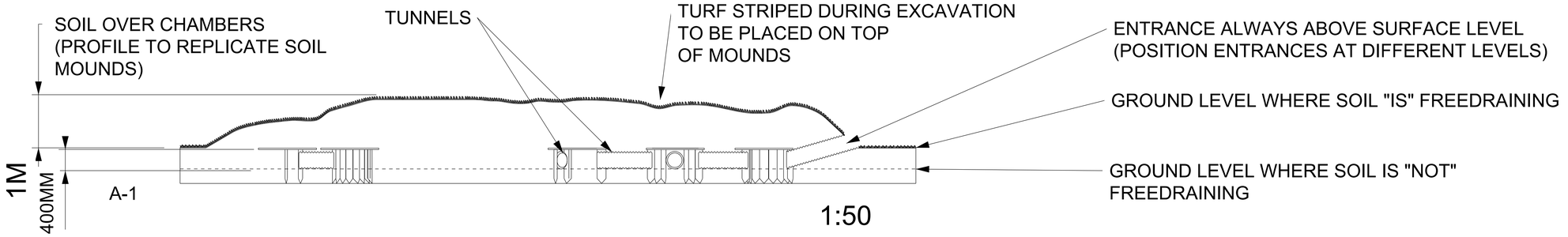
TYPICAL STAKE:



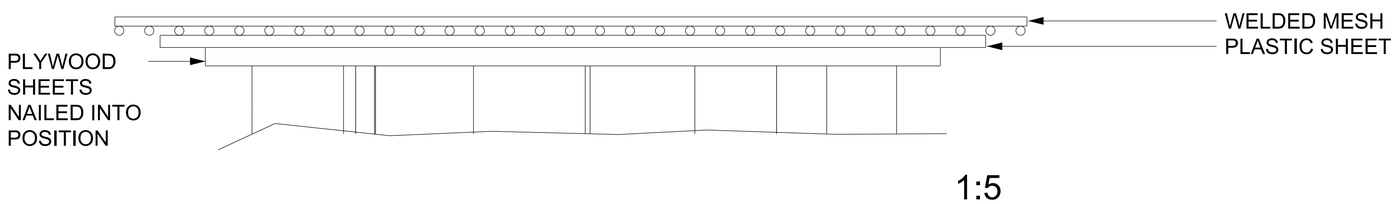
*TEST AREA FOR SOIL PERMEABILITY AND GROUND WATER LEVELS BEFORE CONSTRUCTION.
IF LAND IS NOT FREEDRAINING AND IF GROUND WATER LEVELS ARE ABOVE 600MM DEEP, CONSTRUCT SETT ABOVE EXISTING GROUND LEVEL*

NOTES:

- CHAMBERS CREATED USING WOODEN STAKES APPROXIMATELY 700MM LONG
- CHAMBERS 400-500MM HIGH
- COVER EACH CHAMBER WITH 1200X1200MM PLYWOOD SHEETS
- TUNNELS CREATED WITH 300MM PLASTIC INTERNAL DIAMETER TWIN WALL PIPE
- MINIMUM 3 ENTRANCES
- 10-12 CHAMBERS
- INCLUDES SOME BLIND TUNNELS
- TYPICAL CHAMBER DIAMETER 600MM (DOES NOT NEED TO BE ROUND)
- INCLUDE SOME OFF-SET CHAMBERS
- GRASS SEED SURFACE AFTER MOUNDING
- POSITION ENTRANCES TO AVOID SOUTH WESTERN ASPECT
- IF POSSIBLE COVER FLOOR OF CHAMBERS WITH BEDDING FROM THE ORIGINAL SETT
- PLUG GAPS BETWEEN TUNNELS AND CHAMBERS WITH SOIL ON STONES TO RETAIN LOOSE EARTH
- EXACT LAYOUT TO BE CONFIRMED ON SITE BY ALLIANCE ECOLOGIST



DETAIL OF CHAMBER ROOF



Safety, Health and Environmental Information
The works are to be undertaken by a competent contractor, and therefore only exceptional risks relating to the works associated with this drawing are identified below. For further details and proposed safety measures refer "EWR CDM PHASE 2 HAZARD LOG" e8 doc. Ref: 133735-EWR-LOG-SSD-000004.

ID	Hazard description
EWR2-HAZ-__	NO HAZARDS IDENTIFIED RELATIVE TO THIS DETAIL HOWEVER, PLEASE REFER TO SITE LAYOUTS FOR SITE SPECIFIC HAZARDS

⚠ INDICATES PROJECT RISKS (EWR2-DRIS- .....)
⚠ INDICATES H&S RISKS (EWR2-HAZ- .....)

APPROVED FOR CONSTRUCTION

Name Julien Green	Title
Signed J. Green	Date 08/08/19
Status **CURRENT**	

Rev	Date	Description of Revisions	Dsnd	Chkd	Appr
C01	08/08/19	Fit for Construction	M.I.	M.P.	J.G.

Status: Accepted for Implementation
Suitability: A6

EWR Alliance
Connecting People

Project
East West Rail
(Western Section)
Phase 2

Drawing Title
ENVIRONMENTAL MITIGATION
ARTIFICIAL BADGER SETT

Designed	Mark Inglis	Signed M. Inglis	Date 30/05/19
Drawn	Mark Inglis	Signed M. Inglis	Date 03/04/19
Checked	Mike Podmore	Signed M. Podmore	Date 31/05/19
Approved	Julien Green	Signed J. Green	Date 08/08/19

Scale(s): As Stated
ELR - Project Chainage (Miles Yards): XX -
Design Package Risk Classification: Normal
Sheet: 1 of 1
Alternative Reference:
Revision: C01
Drawing Number: 133735_RW-EWR-XX-XX-DR-L-052041

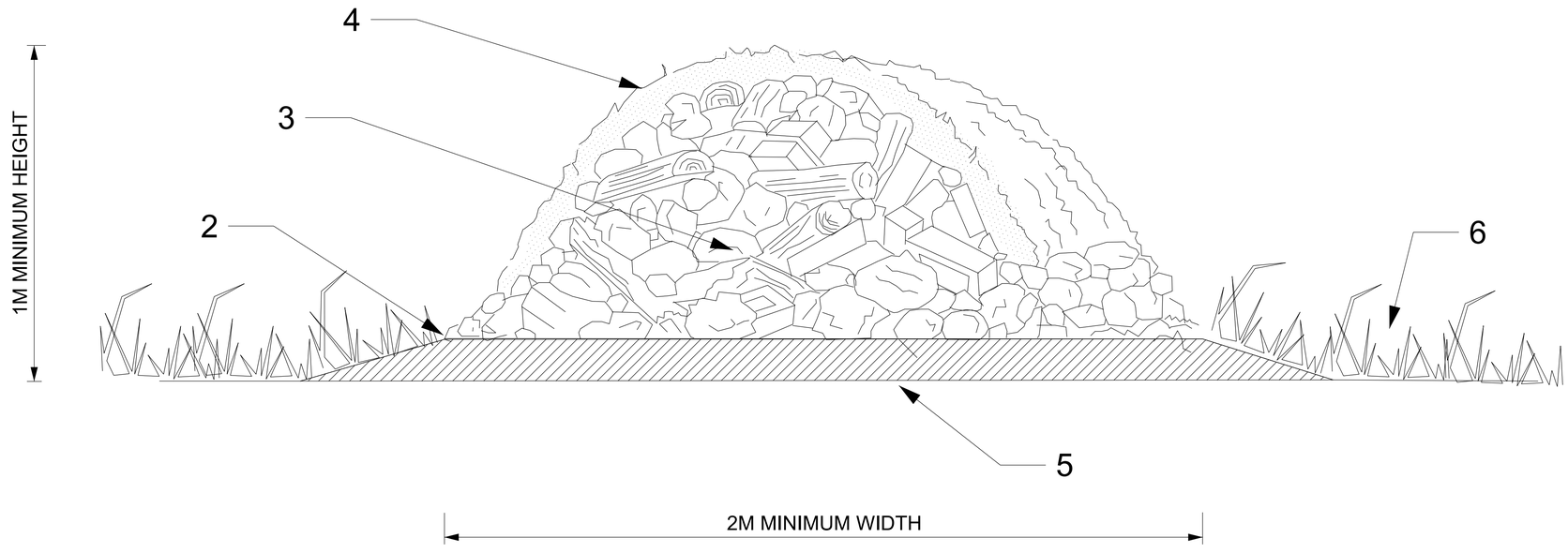
Sheet Size A1 594 x 841

Appendix E. **Hibernaculum Design**

Drawing No. 133735_RW-EWR-XX-XX-DR-L-052021

Revision & Version
C01.03

Drawing Number
133735_RW-EWR-XX-XX-DR-L-052021



NOTES:

1. EXTENTS SHOULD NOT BE LESS THAN 4M LENGTH X 2M WIDTH X 1M HEIGHT.

2. MARGINS TO HIBERNACULUM TO HAVE FILL EXPOSED, ALLOWING ACCESS.

3. INERT CLEAN FILL (HARDCORE, BRICK, RUBBLE, LOGS, SLEEPERS, ETC) OVERLAID WITH LOOSE SUBSOIL / TOPSOIL SOURCED FROM SITE.

4. GRADED TOPSOIL TO CAP CONSTRUCTION - IDEALLY WITH SITE WON TURF COVERING.

5. BUILD UP BASE TO MINIMUM OF 150MM ABOVE GROUND LEVEL TO ENSURE BASE OF HIBERNACULUM SITS ABOVE WINTER GROUND WATER LEVELS.

6. SURROUNDING ROUGH VEGETATION.

7. ILLUSTRATED DESIGN SUITABLE FOR LOCATION ON IMPERMEABLE SUBSTRATE. WHERE HIBERNACULA IS LOCATED ON FREE-DRAINING SUBSTRUCTURE, THE BULK OF THE FILL SHALL BE SITED IN AN EXCAVATED DEPRESSION IN THE GROUND.

Safety, Health and Environmental Information

The works are to be undertaken by a competent contractor, and therefore only exceptional risks relating to the works associated with this drawing are identified below. For further details and proposed safety measures refer "EWR CDM PHASE 2 HAZARD LOG" eB doc. Ref: 133735-EWR-LOG-SSD-000004.

ID	Hazard description
EWR2-HAZ-__	NO HAZARDS IDENTIFIED RELATIVE TO THIS DETAIL HOWEVER, PLEASE REFER TO SITE LAYOUTS FOR SITE SPECIFIC HAZARDS.

⚠ INDICATES PROJECT RISKS (EWR2-DRIS- .....)

⚠ INDICATES H&S RISKS (EWR2-HAZ- .....)

APPROVED FOR CONSTRUCTION

Name Julien Green	Title
Signed J. Green	Date 08/08/19
Status **CURRENT**	

Rev	Date	Description of Revisions	Dsnd	Chkd	Appr
C01	08/08/19	Fit for Construction	M.I.	M.P.	J.G.

Status: Accepted for Implementation | Suitability: A6

EWR Alliance
Connecting People

Project
East West Rail
(Western Section)
Phase 2

Drawing Title
ENVIRONMENTAL MITIGATION
HIBERNACULUM

Designed	Mark Inglis	Signed M. Inglis	Date 30/05/19
Drawn	Mark Inglis	Signed M. Inglis	Date 08/04/19
Checked	Mike Podmore	Signed M. Podmore	Date 31/05/19
Approved	Julien Green	Signed J. Green	Date 08/08/19

Scale(s): 1:10 | ELR - Project Chainage (Miles Yards): XX -

Design Package Risk Classification: Normal | Sheet: 1 of 1

Alternative Reference | Revision: C01

Drawing Number: 133735_RW-EWR-XX-XX-DR-L-052021

Sheet Size A1 594 x 841

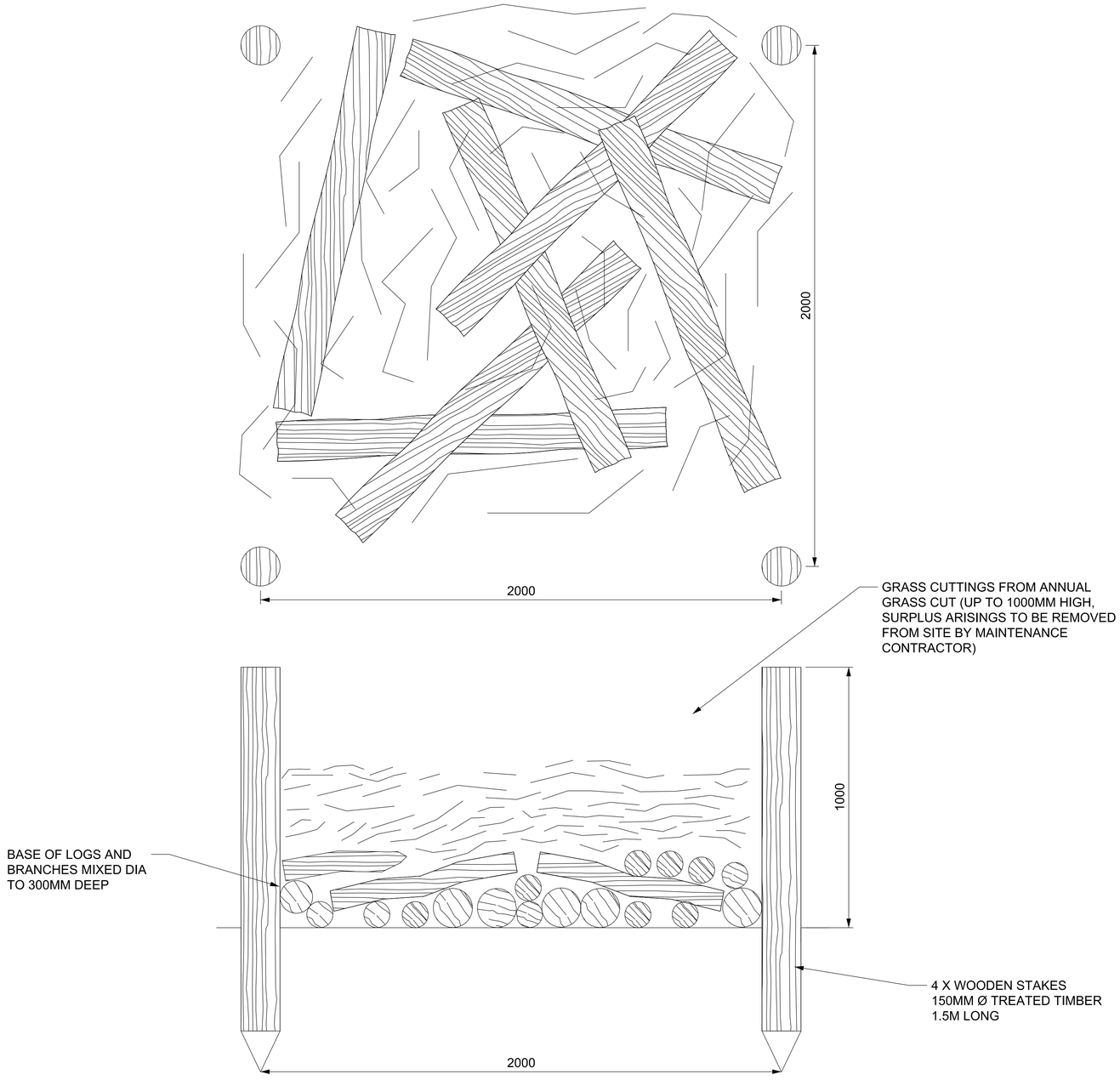
Appendix F. **Compost Heap Design**[10]

Drawing No. 133735_RW-EWR-XX-XX-DR-L-052061

[10] Pallets are a suitable substitution for the logs and branches detailed in the compost heap specification.

Drawing Number
133735_RW-EWR-XX-XX-DR-L-052061

Revision & Version
C01.03



Safety, Health and Environmental Information

The works are to be undertaken by a competent contractor, and therefore only exceptional risks relating to the works associated with this drawing are identified below. For further details and proposed safety measures refer "EWR CDM PHASE 2 HAZARD LOG" eB doc. Ref: 133735-EWR-LOG-SSD-000004.

ID	Hazard description
EWR2-HAZ-___	NO HAZARDS IDENTIFIED RELATIVE TO THIS DETAIL HOWEVER, PLEASE REFER TO SITE LAYOUTS FOR SITE SPECIFIC HAZARDS.

⚠ INDICATES PROJECT RISKS (EWR2-DRIS- .....)

⚠ INDICATES H&S RISKS (EWR2-HAZ- .....)

APPROVED FOR CONSTRUCTION

Name Julien Green	Title
Signed J. Green	Date 08/08/19
Status **CURRENT**	

Rev	Date	Description of Revisions	Dsnd	Chkd	Appr
C01	08/08/19	Fit for Construction	M.I.	M.P.	J.G.

Status: Accepted for Implementation
Suitability: A6

EWR Alliance
Connecting People

Project
East West Rail
(Western Section)
Phase 2

Drawing Title
ENVIRONMENTAL MITIGATION
COMPOST HEAP

Designed	Mark Inglis	Signed M. Inglis	Date 30/05/19
Drawn	Mark Inglis	Signed M. Inglis	Date 15/04/19
Checked	Mike Podmore	Signed M. Podmore	Date 31/05/19
Approved	Julien Green	Signed J. Green	Date 08/08/19

Scale(s): 1:10
ELR - Project Chainage (Miles Yards): XX -
Design Package Risk Classification: Normal
Sheet: 1 of 1
Alternative Reference:
Revision: C01
Drawing Number: 133735_RW-EWR-XX-XX-DR-L-052061

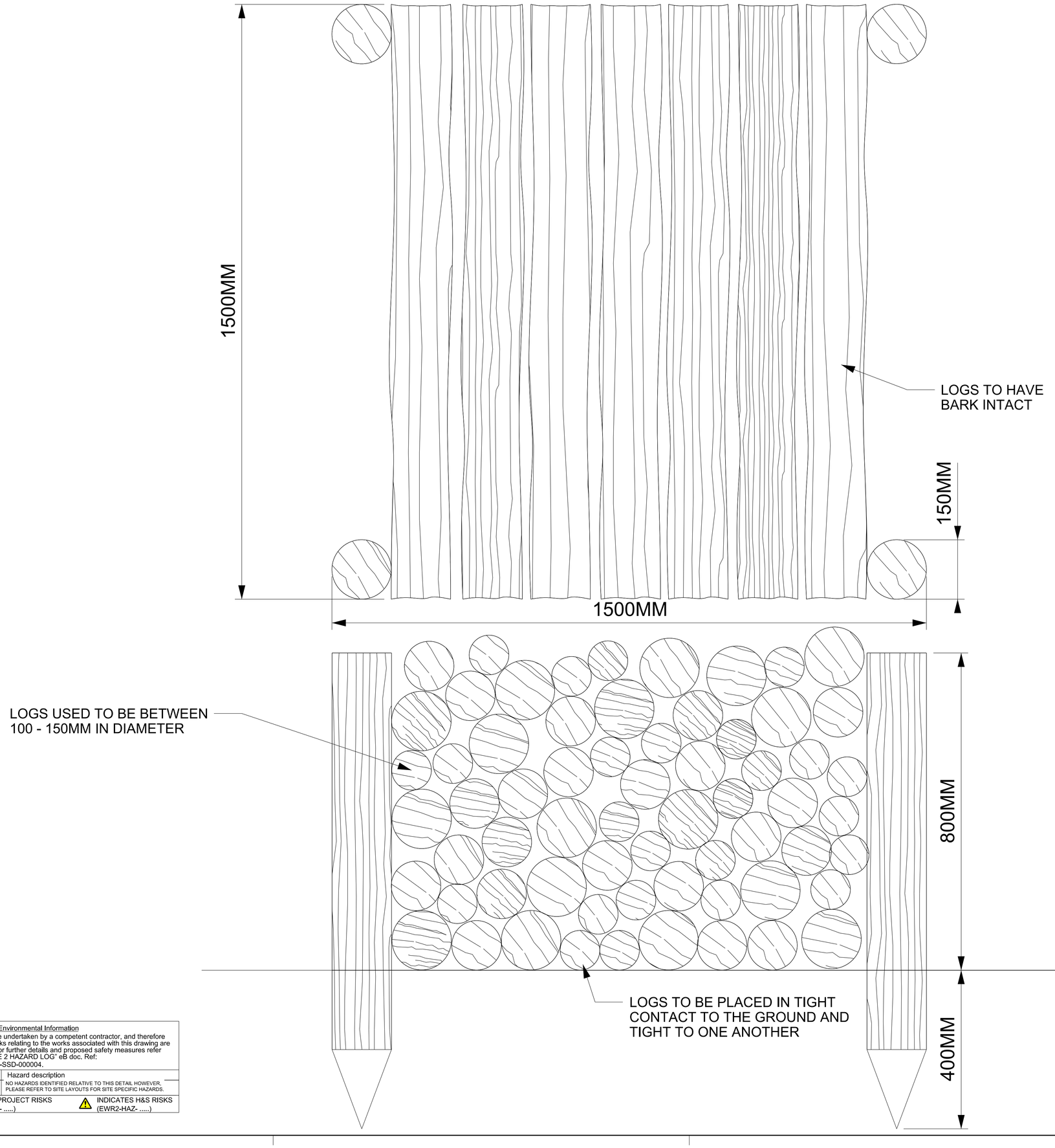
Sheet Size A1 594 x 841

Appendix G. **Log Pile Design**

Drawing No. 133735_RW-EWR-XX-XX-DR-L-052031

Revision & Version
C01.03

Drawing Number
133735_RW-EWR-XX-XX-DR-L-052031



NOTES:

- CONSTRUCTED ON GROUND LEVEL
- STAKED AT 4 CORNERS TO KEEP TIMBERS IN PLACE
- LOGS TO BE FROM SITE WON MATERIALS; IF NOT FROM SITE, FROM SITE PROJECT VEGETATION REMOVAL; IF NOT, FROM LOCAL SOURCE
- MIX OF DIFFERENT TIMBERS TO BE USED

Safety, Health and Environmental Information

The works are to be undertaken by a competent contractor, and therefore only exceptional risks relating to the works associated with this drawing are identified below. For further details and proposed safety measures refer "EWR CDM PHASE 2 HAZARD LOG" eB doc. Ref: 133735-EWR-LOG-SSD-000004.

ID	Hazard description
EWR2-HAZ-___	NO HAZARDS IDENTIFIED RELATIVE TO THIS DETAIL HOWEVER, PLEASE REFER TO SITE LAYOUTS FOR SITE SPECIFIC HAZARDS.

⚠ INDICATES PROJECT RISKS (EWR2-DRIS- .....)

⚠ INDICATES H&S RISKS (EWR2-HAZ- .....)

APPROVED FOR CONSTRUCTION

Name Julien Green	Title
Signed J. Green	Date 08/08/19
Status **CURRENT**	

Rev	Date	Description of Revisions	Dsnd	Chkd	Appr
C01	08/08/19	Fit for Construction	M.I.	M.P.	J.G.

Status: Accepted for Implementation
Suitability: A6

EWR Alliance
Connecting People

Project
East West Rail
(Western Section)
Phase 2

Drawing Title
ENVIRONMENTAL MITIGATION
LOG PILE

Designed	Mark Inglis	Signed M. Inglis	Date 30/05/19
Drawn	Mark Inglis	Signed M. Inglis	Date 08/04/19
Checked	Mike Podmore	Signed M. Podmore	Date 31/05/19
Approved	Julien Green	Signed J. Green	Date 08/08/19

Scale(s): 1:5
ELR - Project Chainage (Miles Yards): XX -
Design Package Risk Classification: Normal
Sheet: 1 of 1
Alternative Reference
Revision: C01
Drawing Number: 133735_RW-EWR-XX-XX-DR-L-052031

Sheet Size A1 594 x 841

East West Rail Alliance

2nd Floor
Phoenix House
Elder Gate
Milton Keynes
MK9 1AW

Appendix II. Indicative Seed Mixes

II.I. Grassland (Emorsgate EM1 Basic General Purpose Meadow Mixture or similar)

Wildflowers		
%	**Latin name**	**Common name**
5	*Centaurea nigra*	Common knapweed
1.5	*Daucus carota*	Wild carrot
4	*Galium verum*	Lady's bedstraw
0.5	*Leucanthemum vulgare*	Oxeye daisy
2	*Malva moschata*	Musk mallow
2	*Poterium sanguisorba - (Sanguisorba minor)*	Salad burnet
1.5	*Prunella vulgaris*	Selfheal
1.5	*Ranunculus acris*	Meadow buttercup
2	*Silene dioica*	Red campion
Grasses		
8	*Agrostis capillaris*	Common bent
40	*Cynosurus cristatus*	Crested dogstail
28	*Festuca rubra*	Slender-creeping red-fescue
4	*Phleum bertolonii*	Smaller cat's-tail
*The above gives percentages of EM1 seed mixture. This will be supplemented by seed stock of Meadow vetchling *(Lathyrus pratensis).*		

II.II. Grassland (Emorsgate ESG1 Basic Fine Grass Mixture or similar)

Grasses		
%	**Latin name**	**Common name**
20	*Cynosurus cristatus*	Crested dogstail
25	*Festuca rubra*	Slender-creeping red-fescue
35	*Festuca rubra ssp. commutata*	Chewing's fescue
20	*Poa pratensis*	Smooth-stalked meadow-grass
*The above gives percentages of ESG1 seed mixture. This will be supplemented by seed stock of Meadow vetchling *(Lathyrus pratensis).*		

II.III. Scrub Species

Latin name	Common name
Prunus spinosa	Blackthorn

Populus nigra	Black poplar
Malus sylvestris	Crab apple
Cornus sanguinea	Dogwood
Rosa canina	Dog rose
Sambucus nigra	Elder
Acer campestre	Field maple
Crataegus monogyna	Hawthorn
Ulmus glabra	Wych elm
Euonymus europaeus	Spindle

II.IV. Species-rich Grassland (Emorsgate EM3 Special General Purpose Meadow Mixture or similar)

Wildflowers		
%	**Latin name**	**Common name**
0.3	*Achillea millefolium*	Yarrow
2	*Centaurea nigra*	Common knapweed
1	*Centaurea scabiosa*	Greater knapweed
1	*Daucus carota*	Wild carrot
0.5	*Echium vulgare*	Viper's bugloss
0.5	*Filipendula ulmaria*	Meadowsweet
0.5	*Galium album - (Galium mollugo)*	Hedge bedstraw
2	*Galium verum*	Lady's bedstraw
0.8	*Knautia arvensis*	Field scabious
0.3	*Leontodon hispidus*	Rough hawkbit
0.5	*Leucanthemum vulgare*	Oxeye daisy
0.5	*Lotus corniculatus*	Birdsfoot trefoil
1.5	*Malva moschata*	Musk mallow
0.2	*Origanum vulgare*	Wild marjoram
0.5	*Plantago media*	Hoary plantain
1.5	*Poterium sanguisorba - (Sanguisorba minor)*	Salad burnet
1	*Primula veris*	Cowslip
1	*Prunella vulgaris*	Selfheal
1.2	*Ranunculus acris*	Meadow buttercup
1	*Rhinanthus minor*	Yellow rattle
1	*Silene dioica*	Red campion
0.2	*Silene flos-cuculi - (Lychnis flos-cuculi)*	Ragged robin
0.5	*Silene latifolia*	White campion
0.5	*Vicia sativa ssp. segetalis*	Common vetch
	Grasses	

8	*Agrostis capillaris*	Common bent
40	*Cynosurus cristatus*	Crested dog's-tail
28	*Festuca rubra*	Slender-creeping red-fescue
4	*Phleum bertolonii*	Smaller cat's-tail
*The above gives percentages of EM3 seed mixture. This will be supplemented by seed stock of Meadow vetchling *(Lathyrus pratensis)* and additional Birdsfoot trefoil (*Lotus corniculatus).*		

II.V. Hedgerow with Trees

Trees and shrubs		
%	**Latin name**	**Common name**
3	*Acer campestre*	Field maple
5	*Cornus sanguinea*	Common dogwood
5	*Corylus avellana*	Common hazel
30	*Crataegus monogyna*	Hawthorn
3	*Euonymus europaeus*	Spindle
3	*Ligustrum vulgare*	Common privet
2	*Malus sylvestris*	Crab apple
3	*Prunus avium*	Wild cherry
2	*Prunus padus*	Bird cherry
30	*Prunus spinosa*	Blackthorn
3	*Quercus robur*	Common oak
2.5	*Rhamnus cathartica*	Buckthorn
2	*Rosa canina*	Dog rose
3	*Sorbus aucuparia*	Rowan
3	*Viburnum opulus*	Guelder rose
Standard trees		
n/a	*Acer campestre*	Field maple
n/a	*Betula pubecens*	Downy birch
n/a	*Malus sylvestris*	Crab apple
n/a	*Quercus robur*	Common oak

II.VI. Woodland Species

Latin name	Common name
Quercus robur	Pedunculate oak
Malus sylvestris	Crab apple
Acer campestre	Field maple
Ulmus glabra	Wych elm
Sambucus nigra	Elder
Sorbus aucuparia	Rowan

Vibernum opulus	Guelder rose

II.VII. Wet Grassland (Emorsgate EM8 Meadow Mixture for Wetlands or similar)

Wildflowers		
%	**Latin name**	**Common name**
0.2	*Achillea millefolium*	Yarrow
0.2	*Achillea ptarmica*	Sneezewort
1	*Betonica officinalis - (Stachys officinalis)*	Betony
2.5	*Centaurea nigra*	Common knapweed
2	*Filipendula ulmaria*	Meadowsweet
2	*Galium verum*	Lady's bedstraw
0.5	*Leontodon hispidus*	Rough hawkbit
0.5	*Leucanthemum vulgare*	Oxeye daisy
0.7	*Lotus corniculatus*	Birdsfoot trefoil
0.5	*Lotus pedunculatus*	Greater birdsfoot trefoil
1	*Plantago lanceolata*	Ribwort plantain
1	*Primula veris*	Cowslip
1.5	*Prunella vulgaris*	Selfheal
2	*Ranunculus acris*	Meadow buttercup
1.5	*Rhinanthus minor*	Yellow rattle
1.5	*Sanguisorba officinalis*	Great burnet
0.5	*Silaum silaus*	Pepper saxifrage
0.4	*Silene flos-cuculi - (Lychnis flos-cuculi)*	Ragged robin
0.5	*Succisa pratensis*	Devil's-bit scabious
	Grasses	
10	*Agrostis capillaris*	Common bent
1	*Alopecurus pratensis*	Meadow foxtail
3	*Anthoxanthum odoratum*	Sweet vernal-grass
2	*Briza media*	Quaking grass
24	*Cynosurus cristatus*	Crested dogstail
1	*Deschampsia cespitosa*	Tufted hair-grass
32	*Festuca rubra*	Slender-creeping red-fescue
1	*Hordeum secalinum*	Meadow barley
6	*Schedonorus pratensis - (Festuca pratensis)*	Meadow fescue
*The above gives percentages of EM8 seed mixture. This will be supplemented by seed stock of Bitter vetch (*Vicia ervilia).*		

East West Rail Alliance

2nd Floor
Phoenix House
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MK9 1AW