

East West Rail Phase 2

Ecological Management Plan

Development Stage 2A1

Section: 2A

Discipline/Grip Stage: Ecology/GRIP5

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East West Rail Phase 2

Development Stage 2A1 Ecological Management Plan

February 2020

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Document History

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Table of Contents

Chapter	Pages
1. Introduction	5
1.1. Terms of Reference	5
1.2. The Site	6
1.3. Scope of the EcMP	7
1.4. EcMP Responsibility	7
2. The Scheme – Habitat Creation and Retention	9
2.1. Habitat Creation.....	9
2.2. Existing Ecological Features to be Retained.....	13
3. Habitat Maintenance and Aftercare.....	14
3.1. Maintenance and Aftercare of Habitats.....	14
3.2. Grassland including Species Rich Grassland.....	14
3.3. Scrub.....	14
3.4. Woodland.....	15
3.5. Hedgerows and Hedgerows with Trees	16
3.6. Trees and Shrubs (Linear Belts)	16
3.7. Drainage Ditches and Attenuation Ponds	17
3.8. Invasive Non-Native Plant Species	17
4. General Maintenance Operations.....	18
4.1. General Activities	18
4.2. Vegetation Management	18
4.3. Replacement Planting.....	18
4.4. Fencing	18
4.5. Weed Control.....	18
4.6. Invasive Non-Native Plant Species	19
5. Monitoring and Reporting.....	20
5.1. Monitoring.....	20
5.2. Reporting	20
6. Ecological Management Summary.....	21
Appendices	22
Appendix I. ECS A1 EcMP	23
Appendix II. Indicative Seed Mixes.....	24

Tables

Table 1-1	EWR2 Development Stage Extents.	6
Table 2-1	Schedule of habitat areas to be created within route section 2A.	9
Table 2-2	Programme of implementation for landscape planting.	10
Table 6-1	Ecological Management Summary.....	21

Figures

Figure 1-1	Overview of Development Stage 2A1.....	6
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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 (NR) operational boundary, as well as linear vegetation alongside the railway and Ecological Compensation Sites (ECS) ECS2A1 & ECS2A3, for the environmental landscaping of development stage 2A1 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 (EWR2 ES)¹.

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 2A1 of EWR2. Stage 2A1 is within 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, which are relevant to all development stages, and the commitments specific to development stage 2A1.

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 ES¹), has been informed by the Environment Impact Assessment in an iterative design process, as described in Chapter 3 Volume 2i of the EWR2 ES¹ and updated by the EWR2 Further Environmental Information¹ (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

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/>]

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 impacting the existing lineside habitats during construction. Once established, 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

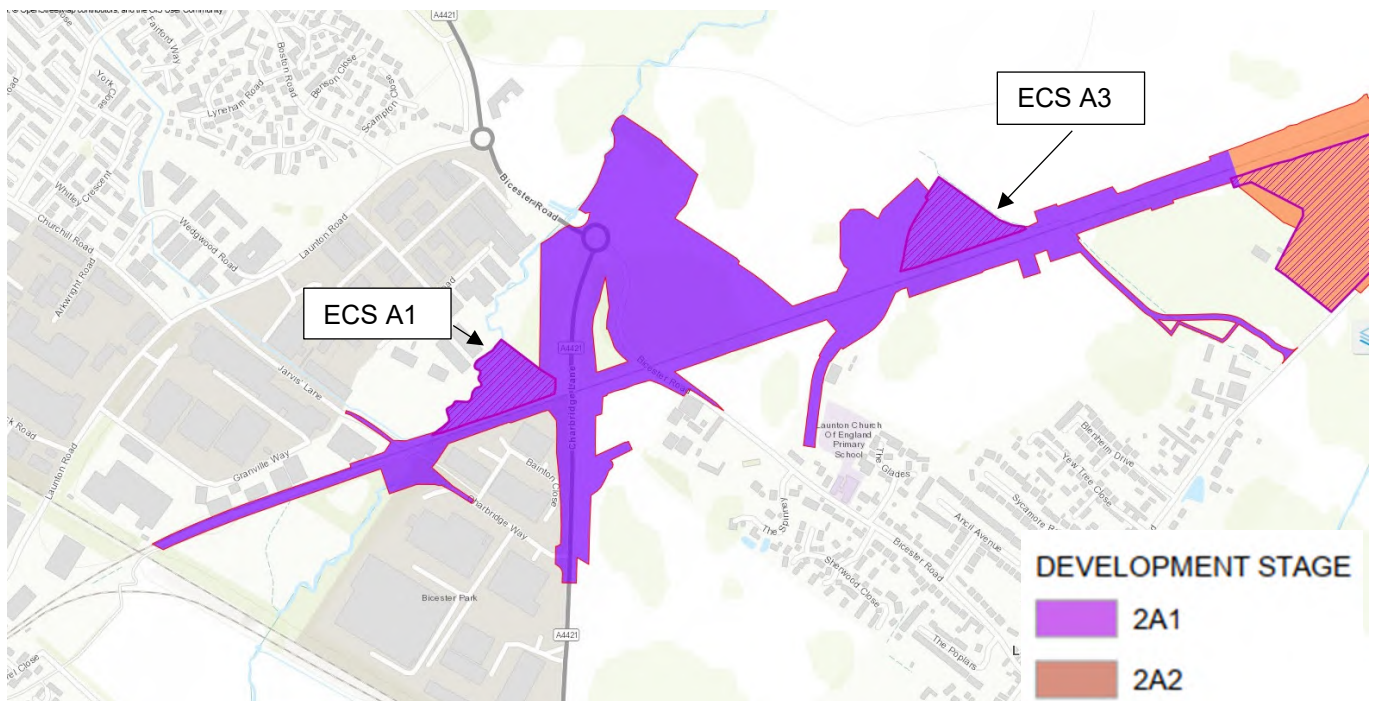
1.2.1. Development stage 2A1 is located within Route Section 2A (Bicester to Charndon Main Street). This document details the creation and management of the habitats alongside the railway in development stage 2A1 to discharge Condition 12(a) for each development stage. The lineside habitat prescriptions 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 2A1.

Table 1-1 EWR2 Development Stage Extents.

Development Stage	Stage Start Coordinates (easting, northing)	Stage End Coordinates (easting, northing)
2A1	459411, 222670	461268, 223346

The Site (Figure 1-1) follows an existing railway and associated infrastructure, which comprises residential, commercial, industrial and other urban land uses and eventually rural and agriculture.

Figure 1-1 Overview of Development Stage 2A1



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 operational 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 2A1. 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 two ECSs within development stage 2A1 (ECS A1 and ECS A3) described in Table 1-2 (with locations in Figure 1-1). This EcMP does not cover the management of ECS A3 as an EcMP has previously been authorised under planning permission: 17/00623/F approved 20/06/17. The ECS A1 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 (CoCP²) for the scheme.

Table 1-2 ECSs included within development stage 2A1

Ecological Compensation Site	Site Location	Ecological Management Plan Document reference number	Authorisation
ECS A1	Land East of Charbridge Lane, Bicester	133735-EWR-ASS-EEN-000080	To be implemented under the Transport and Works Act Order (TWAO)
ECS A3	Land North of Bicester Road, Launton	133735-EWR-ASS-EEN-000005	Authorised prior to TWAO (Ref: 17/00623/F – approved 20/06/2017)

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 become responsible for the maintenance of habitats.

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

- 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 back ownership of land to manage, for 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 in delivering long-term biodiversity gains within the Site.

2. The Scheme – Habitat Creation and Retention

2.1. Habitat Creation

- 2.1.1. The areas of habitat creation and retention in development stage 2A1 are shown on the Environmental Design Drawings in Volume 4 of the EWR2 ES¹, 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 development stage 2A1, of each inline habitat to be created. An Environmental Design Schedule is available in the EWR ES¹ Volume 3, Chapter 2, Appendix 2.3.

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 (verges)	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 Manual³.
- 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)⁴.

³ 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>]

⁴ Highways England (2019). *Design Manual for Roads and Bridges*. Highways England. Accessed: 04/10/2019 [<http://www.standardsforhighways.co.uk/ha/standards/dmrb/>]

- 2.1.6. Ground preparation and planting methods will be undertaken in accordance with the EWR2 Design Specification⁵.
- 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
2A1	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**.
- 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 Specification⁶.

⁵ EWR Document Reference: 133735-EWR-SPE-EEN-000007

⁶ EWR Alliance. Landscape Specification. 133735-EWR-SPE-EEN-000007. EWR Alliance, UK

Scrub

- 2.1.10. Dense stands of native scrub species of local provenance will be planted in blocks along the railway embankments and habitats at grade⁷ 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 **24Appendix II** for an indicative list of scrub and tree species to be planted).
- 2.1.11. 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.
- 2.1.12. Dense scrub habitat will be planted, where practicable, between October and March (inclusive), and will be created in accordance with the Landscape Specification⁶.

Woodland

- 2.1.13. The scheme also includes the creation and management of areas 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 Forward to 2020: Buckinghamshire and Milton Keynes Biodiversity Action Plan⁸ for Native Woodland, and the Oxfordshire Biodiversity Action Plan 2015-2020⁹.
- 2.1.14. 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.
- 2.1.15. Bare-rooted or root-balled conifers or evergreens will be planted, where practicable, during November or 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 Specification⁶. 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 planted¹⁰.

Hedgerows and Hedgerows with Trees

- 2.1.16. 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 hedgerows (including the Oxfordshire Biodiversity Action Plan⁹). Hedgerows provide refuge habitat and corridors along which faunal species such as GCN, birds and bats can disperse.

⁷ At 'grade' refers to lineside habitats that are level at the height of the railway. i.e. not an embankment or cutting.

⁸ Bucks Nature Conservation Forum (2000) *Forward to 2020: Buckinghamshire and Milton Keynes Biodiversity Action Plan*. Bucks Nature Conservation Forum, UK

⁹ 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)

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

- 2.1.17. 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.
- 2.1.18. 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 Specification⁵.
- 2.1.19. 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 Manual³. 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 Manual³.
- 2.1.20. 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 been recorded within in the wider landscape of the scheme. 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)

- 2.1.21. Linear belts of trees and shrubs will be provided as detailed for dense scrub and woodland in Section 2.1.
- 2.1.22. See **Appendix II** for an indicative list of tree and shrub species to be planted.

Drainage Ditches and Attenuation Ponds

- 2.1.23. 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.
- 2.1.24. Both the drainage ditches and attenuation ponds are 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 **Appendix II** for an indicative wet grassland seed mix).
- 2.1.25. 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 Specification⁵.

Species Rich Grassland

- 2.1.26. Areas in the Environmental Design Drawings identified as 'Species rich grassland' will be sown with a species rich seed mix.
- 2.1.27. 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.
- 2.1.28. 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 Specification⁵. 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 faunal 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.
- 2.2.4. 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 *Code of Construction Practice* (September 2019) EWR Document Ref: 133735-EWR-EMP-EEN-000004

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 2A1, 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 Manual³. The habitat management will be managed in accordance with the EWR2 Landscape Specification⁵. In addition, lineside habitats will be managed with adherence to the Network Rail Lineside Vegetation Management Manual³.
- 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 kept cut to a maximum height of 65 mm, in accordance with the Highways England Design Manual for Roads and Bridges⁴. 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) per year. Where practicable, and safe to do so in adherence to Network Rail Lineside Vegetation Management Manual³, 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 Manual³.
- 3.3.2. Scrub will be managed to encourage a dense stand of blackthorn at a height of 3-4 m where possible.
- 3.3.3. If browsing by deer inhibits the growth of newly planted scrub, deer-proof protection will be installed where practicable, taking care not to shade any of the area. If required, this will be in the form of individual shelters. If used, shelters will be removed in Year 5 once the planting has fully established and matured and 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, 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 or diseased branches will be pruned by cutting back in accordance with good horticultural practice, BS7370 and BS3998. Formative pruning will take place in 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 replaced 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 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 to maintain 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 tree species to develop untrimmed) following an annual check during winter months to ensure that the hedgerows develop into an 'A' shape with a good structure and in conjunction with occasional standard trees. Care will be taken to ensure that each hedgerow is trimmed on a cyclical basis, every three years. Cutting of hedgerows shall be staggered, thus avoiding all hedgerows being cut at once so that only a proportion of any laid black hairstreak eggs are lost, and irregular heights / depths create sheltered areas within the blackthorn for basking butterflies¹³.
- 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 planting is maintained during years 2-5. Any planted species identified during annual monitoring that have been unsuccessful during the first five years will be re-introduced via planting and the management 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

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

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.
- 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 Specification⁵.

3.7. Drainage Ditches and Attenuation Ponds

- 3.7.1. The banks of all new and existing ditches and attenuation ponds will be cut on four occasions per year to a minimum height of 150 mm between June and September.
- 3.7.2. 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.

3.8. Invasive Non-Native Plant Species

- 3.8.1. 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 clearance of competing vegetation, 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 Manual³.

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 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 and appropriate solution.

4.4. Fencing

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 species¹⁴ 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 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 150mm (65mm on highway boundaries, 100mm 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 3.8 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 0 for further details.	
	Review of EMP	End of year or as required	X										

Appendices

Appendix I. **ECS A1 EcMP**

East West Rail Phase 2

Ecological Management Plan

Land West of Charbridge Lane, Bicester (ECS A1)

Section: 2A (Bicester to Claydon Junction)

Development Stage: 2A1

Discipline/Grip Stage: Ecology/GRIP5

Ordnance Survey Grid Reference: SP 60028 22962

Document Number: 133735-EWR-ASS-EEN-000091 (eB no.)

Rev P01



East West Rail Phase 2

Ecological Management Plan, Land West of Charbridge Lane, Bicester (ECS A1)

February 2020

Notice

This Ecological Management Plan (EcMP) was produced by the East West Rail (EWR) Alliance for the specific purpose of the EWR Alliance.

This EcMP may not be used by any person other than the EWR Alliance without the EWR Alliance's express permission. In any event, the EWR Alliance accepts no liability for any costs, liabilities or losses arising as a result of the use of or reliance upon the contents of this EcMP by any person other than the EWR Alliance.

The information which the 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. The EWR Alliance confirms that the opinions expressed are our true and professional opinions.

This report is confidential as it discloses the location of an otter holt.

This document does not purport to provide legal advice.

Document History

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Table of Contents

Chapter	Pages
1. Introduction	5
1.1 Terms of Reference	5
1.2 The Site	5
1.3 Scope of the EcMP	5
1.4 EcMP Responsibility	6
1.5 Relevant legislation	6
2. The Scheme – Habitat Creation and Retention.....	7
2.1 Habitat Creation.....	7
2.2 Existing Ecological Features to be Retained.....	9
3. 30 Year Habitat Maintenance and Aftercare	11
3.1 Dense Scrub	11
3.2 Ponds	11
3.3 Trees.....	12
3.4 Backwater	13
3.5 Other Tall Herb and Fern – Ruderal.....	13
3.6 Improved Grassland.....	13
4. General Maintenance Operations	15
4.1 Vegetation Clearance	15
4.2 Replacement Planting	15
4.3 Fencing.....	15
4.4 Weed Control	15
4.5 Invasive Non-Native Plant Species.....	16
5. Protected and Notable Species Habitat Creation	17
5.1 Artificial Otter Holt.....	17
5.2 Hibernacula.....	18
5.3 Log Pile	18
5.4 Compost Heap	18
5.5 Gravel/rubble areas	19
5.6 Nest Boxes.....	19
6. Monitoring and Reporting.....	20
6.1 Monitoring.....	20
6.2 Reporting and Review of the EcMP.....	20
7. Ecological Management Plan Summary	21

Appendices 24

Appendix A. Landscape Plan 24

Appendix B. Existing habitat maps 27

Appendix C. Relevant legislation 29

Appendix D. Seed Mixes 32

Appendix E. Pond, Hibernacula, Log Pile and Compost Heap designs 35

Appendix F. Backwater design..... 40

Appendix G. Artificial Otter Holt Design/Photos 47

Tables

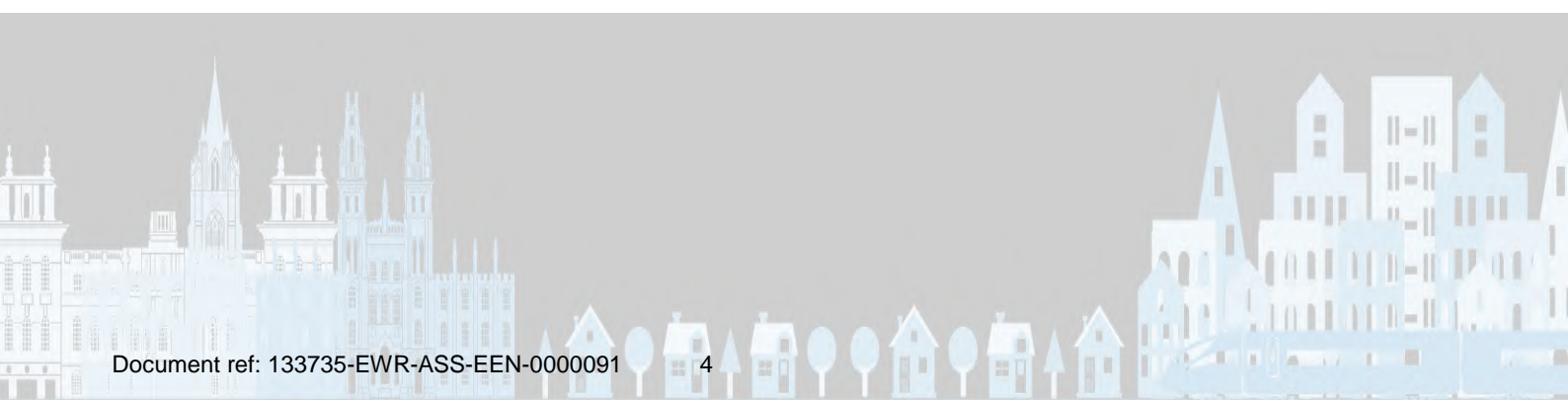
Table 7-1 Ecological Management Plan Summary21

Table D-1 Plant species: Suitable for inclusion in pond creation planting schemes32

Table D-2 Plant species: Emorsgate EM8 Wetland Mixture.....33

Table D-3 Woody shrub & tree species.....34

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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 the Land West of Charbridge Lane, Bicester (hereafter referred to as 'the Site' or 'ECS A1'). The Site is required to provide established compensatory habitat for notable species¹ including great crested newt, otter and reptiles (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_2B-EWR-OXD-XX-DR-L-019027 in **Appendix A**.

1.2 The Site

The Site, as shown on Drawing No. 133735_R-EWR-XX-XX-DR-LE-012658 in **Appendix B**, is approximately 1.42 ha in size and located on the eastern edge of Bicester and to the west of Charbridge Lane, at central national grid reference SP 60028 22962. The Site is an area of improved grassland with a field margin of tall ruderal vegetation varying between one and five metres in width. A narrow strip of dense scrub with trees lies around the edge of much of the Site. The Langford Brook runs the length of the western Site boundary and is approximately 1.2 m wide and <30 cm deep, very slow-flowing, with steep mud banks which are vegetated in places.

The Site is situated to the east of Bicester with industrial units directly to the north west and south of the Site. Charbridge Lane lies on the eastern border of the Site, with allotments and agriculture land in the wider landscape to north east. The disused OXD railway line is along the southern boundary of the Site and the town of Launton is situated south east of the Site.

The Site is accessed directly through an existing gateway beyond the Site boundary to the north of the field, located on Charbridge Lane.

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);

¹Notable 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).

- provides details for monitoring and reporting of the Scheme (section 6). Section 6 – Details the monitoring requirements; and

Section 7 – Provides the Action Plan which includes each management activity and timings.

This EcMP will be implemented once all habitat has been created within the Site.

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 Site. The Site is under Network Rail ownership.

The EcMP is an active document and will be reviewed annually (see **Section 6**), with additional reviews as required, to ensure that the prescribed measures are most effective for ensuring long-term biodiversity gains within the Site. No other management regime or deviations from the EcMP will be undertaken without the agreement of Network Rail. Any such deviations from the EcMP will be recorded, following which Network Rail will arrange for the EcMP to be updated by an ecologist.

1.5 Relevant legislation

Due to the protection afforded to certain species by legislation, the management needs to take into account the requirements of protected species present. A summary of legislation in relation to protected species that are known to be present within and/or adjacent to the Site or which may be present following habitat creation is provided in **Appendix C**.

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2. The Scheme – Habitat Creation and Retention

The primary objective of the Scheme is to provide high value habitat for great crested newts, otters, reptiles and other protected/notable species, such as nesting birds, bats and small heath, black and brown hairstreak butterflies so the Site can contribute to compensation for EWR2. The Scheme involves improving an area of agriculturally improved grassland for these species, through the creation, retention and enhancement of a variety of habitats. Specific protected and notable species habitat creation is detailed in **Section 5**.

2.1 Habitat Creation

The areas of habitat creation are shown on Drawing No. 133735_2B-EWR-OXD-XX-DR-L-019027 (**Appendix A**) and are summarised below.

2.1.1 Dense Scrub

Dense stands of native scrub dominated by blackthorn will be included within the mitigation planting scheme. Blackthorn 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 within the dense scrub planting will also provide the larval food plant for the white-letter hairstreak butterfly. Stands of scrub will provide habitat for great crested newts, birds and foraging bats, with peripheral scrub habitat of value to reptiles. See **Appendix D** for a list of scrub and tree species to be planted and Plots 1 and 2 in **Appendix A** Drawing No. 133735_2B-EWR-OXD-XX-DR-L-019027.

2.1.2 Ponds

Two new ponds (up to 300 m² area each) will be created in line with the guidance given in the Great Crested Newt Conservation Handbook², the Great Crested Newt Mitigation Guidelines³ and the Million Ponds Project⁴. These ponds will provide aquatic habitat for great crested newt, aquatic invertebrates and grass snake and will contribute towards the Forward to 2020: Buckinghamshire and Milton Keynes Biodiversity Action Plan for Ponds⁵.

One of the two ponds will be protected from grazing via the inclusion of deer-proof fencing. The ponds will incorporate scalloped edges in order to increase surface area for marginal vegetation and will also feature marginal shelves for the planting of emergent species (see Drawing No. 133735_2B-EWR-OXD-XX-DR-L-019028 in **Appendix E**).

Soil surveys have not yet been undertaken so it is currently unknown whether the lining of ponds will be necessary in order for them to successfully hold water. Once constructed (anticipated to be spring/summer 2020) and after the ponds have naturally filled with water, the waterbodies will be planted up in spring 2021 with a variety of native submerged, floating, emergent and marginal plants (an indicative species list is provided in **Appendix D**), ideally sourced from suitable donor sites in the local area.

² Froglife 2001, Great Crested Newt Conservation Handbook, Halesworth

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

⁴ <http://www.pondconservation.org.uk/millionponds/pondcreationtoolkit>

⁵ [Bucks Nature Conservation Forum \(2000\) Forward to 2020: Buckinghamshire and Milton Keynes Biodiversity Action Plan. Bucks Nature Conservation Forum, UK](#)

These areas are shown as Marginal, emergent and submergent plants to provide great crested newt habitat' in **Appendix A**. The indicative list within **Appendix D** is not exhaustive and as such, there are plant species not mentioned that may be used, equally not all species from this list will be used in planting. A selection of plants for each 'zone' of the pond (submerged/floating, emergent and marginal) will be used, and particular emphasis will be placed on those species most suitable as egg-laying material for great crested newt (indicated in [Table D-1](#) with an asterisk).

The spoil generated by excavating the ponds will be placed adjacent to the ponds to create refuge opportunities for amphibians and will be used, where feasible, within the construction of hibernacula for both great crested newts and reptiles (**see Section 5**).

The ponds will be over seeded with a native meadow mixture for wetlands/wet grassland (see **Appendix A**). This will create additional habitat for great crested newts. The indicative grassland species list within **Appendix D** is not exhaustive, and as such there are plant species not mentioned that may be used, equally not all species from this list will be used in planting.

2.1.3 Woodland

The Scheme includes the creation and management of two areas of broadleaved woodland (Plot A/B) comprising native species. These woodlands plots will be of high value for a variety of wildlife, including badger, great crested newt, bats, nesting birds and terrestrial invertebrates, and will contribute towards the Forward to 2020: Buckinghamshire and Milton Keynes Biodiversity Action Plan⁶ for Native Woodland.

The Scheme will incorporate the creation of native broadleaved woodland as shown on Drawing No. 133735_2B-EWR-OXD-XX-DR-L-019027 which will be bordered by an area of woodland edge species. The woodland areas will also be planted with woodland ground-flora. The creation of woodland habitat is detailed below:

- Wherever possible, local tree stock standards will be used to establish the woodland. This will ensure that the woodlands, once mature, are in keeping with the landscape character of the surrounding area and will also be more likely to comprise species which thrive in local conditions;
- See **Appendix D** for a list of all woodland, woodland edge and woodland ground species to be planted. While native plant species have been selected, hybrid elm has been included as, although non-native, it has an increased resistance to Dutch elm disease;
- New trees and shrubs shall be planted into established grass areas (either existing or newly-seeded as part of the works). Newly-seeded areas will be allowed to establish prior to planting where possible;
- For woodland planting, planting pits are to be excavated for all transplants, shrubs and container-grown plants, with any undesirable materials larger than 75 mm in any dimension to be removed from the Application Site or used elsewhere on the Application Site if applicable;
- Areas to be planted shall be cut to a short sward prior to planting, and arisings placed on a compost heap (where suitable) with the Application Site or removed from the Application Site. For transplants and shrubs to be planted, an area of between 600 mm and 800 mm will be voided of all live plant growth at each planting station. All vegetation clearance works will be agreed with an ecologist prior to commencement to ensure seasonal constraints are accommodated;

⁶ Buckinghamshire and Milton Keynes Natural Environment Partnership (2015) *Forward to 2020: Buckinghamshire and Milton Keynes Biodiversity Action Plan*. Buckinghamshire and Milton Keynes Natural Environment Partnership, UK

- Trees will be planted in groups at irregular spacing intervals between rows for a more natural appearance. This variable spacing also allows space for natural regeneration to supplement the planted trees⁷;
- The area will be planted in winter 2020/ 2021 (November to February), supported by additional planting in winter 2021/2022 (November to February) where required in areas designated for woodland creation as shown on Drawing No. 133735_2B-EWR-OXD-XX-DR-L-019027. Woodland areas will be over sown with woodland ground flora species in autumn of year 5 once woodland species have established. All areas with an existing sward, that will be over seeded with wildflower seed, shall have weeds spot treated with translocated herbicide in advance of the seeding season. Directly before over-seeding, the existing sward shall be cut to 50-70mm height to increase seed contact with ground.

2.1.4 Backwater

A backwater connected to the Langford Brook will be created as part of the Scheme, location shown shown in **Appendix A**, it will create additional habitat for otter, amphibians, aquatic invertebrates and reptiles. The backwater will comprise part of the mitigation package relating to the disturbance of two otter resting sites under licence along the Langford Brook caused by associated EWR2 works.

As shown on Drawing 133735-RW-EWR-XX-XX-DR-DR-011016, 133735-RW-EWR-XX-XX-DR-DR-031011 - 133735-RW-EWR-XX-XX-DR-DR-031014 and 133735-RW-EWR-XX-XX-DR-DR-041015 in **Appendix F**, there will be varying depths within the backwater ranging from 10 cm to 2 m. The backwater will be designed to start at the centre of the existing channel of the Langford Brook, there will be a steady incline to allow water to back fill from the watercourse into the backwater. The backwater will decline to a maximum depth of approximately 2 m, this will create an oval shaped body of water in the middle of the backwater which will hold water in both low and high flows. There will be a steeper incline to the end of the backwater which will eventually connect back to the Langford Brook. In high flows water will filter in from this side and flush out the backwater as well as acting as flood alleviation.

The backwater will be seeded with a native meadow mixture for wetlands/wet grassland (see **Appendix A**). This will create a wider suitable riparian corridor habitat within the backwater. The indicative grassland species list within **Appendix D** is not exhaustive, and as such there are plant species not mentioned that may be used, equally not all species from this list will be used in planting. In combination with the over seeding, the back water, once constructed will naturally fill with water and over time become colonised by a diverse range of marginal, emergent and submerged plant species. This will create a self-sufficient, undisturbed habitat that will be of value to a number of species, such as otter, reptiles, birds and invertebrates.

2.2 Existing Ecological Features to be Retained

2.2.1 Dense Scrub

Existing areas of dense scrub will be retained and protected during the construction phase. Where blackthorn is present, scrub will be managed for black hairstreak as per **Section 3.1**, below.

2.2.2 Other Tall Herb and Fern - Ruderal

Existing areas of tall herb (ruderal) habitat outside of the new habitat creation areas will be retained and managed to insure the habitat is maintained over time, as per **Section 3.5**. This habitat will be of value to great crested newts, reptiles and invertebrates.

⁷ https://www.nationalforest.org/document/creatingwoodland/create_farm.pdf (accessed 02/03/2018)

2.2.3 Improved Grassland

Areas of existing improved grassland within the Site will be retained where there are no plans to create new habitats (see **Appendix A**). This improved grassland will be managed to benefit common species of reptile and provide habitat for ground-nesting birds, great crested newts and invertebrates.

2.2.4 Running Water (mesotrophic)

Environment Agency pollution prevention guidelines⁸ guidance for pollution prevention⁹ and CIRIA guidance¹⁰, will be adhered to during the construction phase, to protect the watercourses within and in proximity to the Site.

2.2.5 Marginal and Inundation Vegetation

The marginal and inundation vegetation will not be directly impacted during the construction phase and indirect impacts will be mitigated through the implementation of Environment Agency pollution prevention guidelines¹¹, guidance for pollution prevention⁹ and CIRIA guidance¹⁰.

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⁸Pollution prevention guidelines (PPGs) with particular reference to PPG1 (general guide to the prevention of water pollution), PPG3 (use and design of oil separators in surface water drainage systems), PPG5 (works near or liable to affect watercourses) and PPG6 (working at construction and demolition sites). Pollution Prevention Guidelines (PPGs) are a series of documents developed by the Environment Agency for

⁹ Guidance for Pollution Prevention documentation can be found here: <http://www.netregs.org.uk/environmental-topics/pollution-prevention-guidelines-ppgs-and-replacement-series/guidance-for-pollution-prevention-gpps-full-list/> (Last accessed 11th November 2019)

¹⁰ The CIRIA documents are a series of publications developed by the Construction Industry Research and Information Association. Each document is targeted at a particular type of business or activity and covers environmental good practice to minimise pollution. Particular attention should be given to CIRIA C532 (Control of water pollution from construction sites, 2001). The CIRIA publications also make reference to environmental legal obligations and are available from:

http://www.ciria.org/CIRIA/Resources/Resource_overview/Resources_overview.aspx?hkey=a80608d2-a045-4d72-8bb9-5ecf23f8d761 (Last accessed 11th November 2019)

¹¹ England and Wales . Each PPG is targeted at a particular type of business or activity and covers environmental good practice to minimise pollution. N.B. The PPG's have recently been withdrawn and are currently being reviewed. The PPGs are available from <http://webarchive.nationalarchives.gov.uk/20140328084622/http://www.environment-agency.gov.uk/business/topics/pollution/39083.aspx>.

3. 30 Year Habitat Maintenance and Aftercare

A programme of management actions along with timings can be found in **Section 7**.

3.1 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 butterflies¹².

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.

3.2 Ponds

The habitat value of ponds is enhanced through a variety of vegetation structures, from dense tussock stands to bare and recently colonised mud. Ponds which appear to be choked with vegetation often support a greater diversity of plant and animal species¹³ and can provide food and shelter for wildlife such as great crested newts and various invertebrates. Management of marginal and submerged vegetation areas will therefore aim to create variation with minimum disturbance to animal populations.

To ensure that the ponds remain healthy, active management will entail the following:

- The ponds will be cleared annually of refuse, leaf litter and pollutants by hand/netting in September – November to maintain water quality, with any arising's removed from the Site.
- For the first five years, water levels of the newly created ponds will be checked twice a year in winter (November to February) and summer (May to July). A reduction in water levels is to be expected during summer. If any of the ponds remain dry for an entire season, investigations will take place as to the cause and subsequent remedial action will need to be taken to ensure they are suitable habitat the following season;
- Any planted species that have been unsuccessful in the first five years will be re-introduced via plug planting or over sowing (see **Section 4.2**);
- Overhanging scrub vegetation and trees surrounding the ponds will be cut back from September to November so that they do not overshadow the ponds or cause excessive leaf fall into the ponds (see **Section 4.1**);
- Dense stands of submerged and floating vegetation will be removed by hand / netting to leave a third of the pond surface free from vegetation. This vegetation will be spread out and left within 1 m of the pond for 24

¹² Thomas, J. A. (1975). *The black hairstreak, conservation report*. Unpublished report ITE/NCC.

¹³ <http://wildseed.co.uk/page/management-of-wetland-and-pond-margins> (last accessed 15 February 2017)

hours to allow any pond fauna to return to the water, and then will be relocated to a secluded area of the Site to provide terrestrial habitat for reptiles and other species;

- Annual cuts of the wetland grassland around the ponds will take place during the hibernation period for great crested newts and reptiles (November – February) and will be cut to a minimum height of 150 mm. Any tussocks that develop will be avoided during the cut. Also, one side of the vegetation around the ponds will remain uncut to maintain dense areas of vegetation over winter to support wildlife such as great crested newts, bumblebees¹⁴ and butterflies¹⁵. This would follow the B-Lines Pollinator initiative in Buckinghamshire¹⁶. The side of the pond being cut will alternate each year to maintain the quality the vegetation;
- Deer/stock-proof fencing will be installed around the ponds, taking care not to shade any of the surface area (see **Section 4.3**); and,
- An annual inspection for any invasive non-native plant species, fish presence or other inappropriate plant species (see **Section 4.4**) in June/July during the first five years, and every three years from years 5-30, when identification of invasive non-native plant species is easiest. If invasive non-native plant species, inappropriate plant species, or fish are identified, an appropriate action plan for their removal will be drawn up by a suitably licensed contractor.

3.3 Trees

Trees (including those planted as dense scrub habitat and the woodland areas) will be managed to ensure growth success and health. This will be carried out during the winter months when visibility is not obscured by leaves. 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. Bramble, broom, gorse and any other herb, tree or shrub that, in the opinion of a consulting ecologist, may interfere or otherwise damage or impede the free growth of planted tree or shrub, shall be removed.

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 and replace, or make safe, any individual trees or limbs in a hazardous condition, or to promote healthy growth. Inspections will be carried out September to February.

Dead or moribund sections will be coppiced and re-stocked. All mature trees over 40 cm in diameter at breast height will be retained standing, alive or dead unless they pose a health and safety hazard. Any replanting will be undertaken in the next planting season between November and February, annually for the first five years, and then following an inspection every five-years for the remainder of the 30 years management plan, if re-planting is identified as required. All dead wood from tree management will be removed and stacked locally within the Application Site adjacent to the retained hedgerows and / or areas of dense scrub or used to enhance the hibernacula or log piles within the Site.

Planted trees will be watered, as required and particularly in times of hot weather, in the first three years to ensure planted stock does not fail. If browsing by deer (or other grazing animals) inhibits the growth of newly planted trees, deer/stockproof fencing will be installed around newly planted trees within

¹⁴ Nowakowski, M. & Pywell, R.F. (2016) *Habitat Creation and Management for Pollinators*. Centre for Ecology & Hydrology, Wallingford, UK

¹⁵ http://www.suffolkwildlifetrust.org/sites/default/files/grassland_mangmnt_for_butterflies_0.pdf (last accessed 16th January 2017)

¹⁶ <https://www.buglife.org.uk/campaigns-and-our-work/habitat-projects/helping-create-b-lines#sthash.WLDAw7lj.dpuf> (last accessed 9th January 2017)

the Site. The monitoring prescriptions provided here may be altered, if required, by a suitably qualified arboriculturist post construction (see **Section 6**).

3.4 Backwater

The backwater will be managed to ensure it contains a diverse range of marginal, emergent and submerged plant species. The habitat will be inspected annually by a suitably qualified ecologist from year 1-5 and every five years thereafter, as part of the 30-year management plan. Any failed planted stock will be replanted within the first five years. Weed and scrub encroachment will be monitored annually from 1-5 years and every five years thereafter, any weeds/scrub will be removed by hand to limit disturbance to the artificial otter holt.

The backwater will be monitored to ensure it does not gradually fill in with silt. If the backwater is deemed to have filled with a level of silt that limits its function of a backwater, then the removal of silt will need to take place. Before the commencement of any works a suitable qualified ecologist will be consulted on the best way forward to proceed with this removal to limit any disturbance to otter. As recommended by the Environment Agency¹⁷, no more than a third of entire backwater will be cleared at any one time to prevent disturbance to resident aquatic flora and fauna and any works will be undertaken during autumn.

3.5 Other Tall Herb and Fern – Ruderal

The retained ruderal habitat will be managed to inhibit the eventual growth of coarse and scrubby vegetation. The habitat will be inspected annually by a suitably qualified ecologist from year 1-5 and every five years thereafter, as part of the 30-year management plan. As recommended by the Bumblebee Conservation Trust any areas that are being encroached on by coarse, woody and scrubby vegetation will be cut outside the nesting bird season (cut during October – February) to a minimum height of 150 mm by hand-held tools (strimmers). This will allow typical tall ruderal species to re-colonise these areas and therefore maintain a tall ruderal habitat which is beneficial to common species of reptile, birds and invertebrates.

3.6 Improved Grassland

The grassland will be managed, using the following techniques, to promote biodiversity and provide habitat for reptiles, great crested newts, ground-nesting birds, invertebrates and other wildlife.

This area has been divided into three sections (A, B and C, as shown in **Appendix A**) to allow the grassland to be cut on a three year rotational basis to form differing vegetation heights creating transitional zones which provide a variety of suitable habitat for reptiles. Cutting will take place between November and January (to avoid active periods for all common reptile species) and will be cut to a minimum height of 150 mm.

Cutting of the grass in all areas must be carried out using hand held tools (such as a strimmer). By using hand held tools, individual animals can be more easily avoided and cutting moderated to accommodate reptile habitat. If cutting using handheld tools becomes a problem (i.e. reptile features become damaged) then advice will be sought from a suitably qualified / experienced ecologist.

Any arisings will be left *in situ* and turned for 3 -5 days, before being removed, to allow the sown species an opportunity to set seed¹⁸. Any noxious and injurious weeds will be removed annually (as per **Section 4.4**).

¹⁷ Environment Agency: *Creation and restore backwater habitats*. <http://evidence.environment-agency.gov.uk/FCERM/en/SC060065/MeasuresList/M5/M5T1.aspx?pagenum=2> (Last accessed Feb 2020)

¹⁸ Natural England Technical Information Note (TIN63) *Sward enhancement: diversifying grassland by spreading species-rich green hay*

Cuttings from the grassland management will be placed within the compost heap which will provide grass snake egg laying habitat. Once the compost heap has reached capacity, all excess cuttings are to be removed from the Site.

No fertilisers will be used as this enriches the soil nutrients, allowing grasses to outcompete wildflowers. Similarly, the use of chemical herbicides will be avoided as wildflowers are more susceptible than grasses and weeds. Spot-treatment of noxious weeds will be undertaken and periodic monitoring (as per Section 6.1) of the grasslands will take place to ensure that species-diversity is maintained.

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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** while the hibernacula design can be found in **Appendix E**.

4.1 Vegetation Clearance

Cutting of hedgerows and scrub and pruning of trees (apart from emergency works) will be undertaken between September and February, outside of nesting bird season. All dead, dying, diseased or damaged material shall be promptly removed and taken off the Site.

4.2 Replacement Planting

Network Rail will make allowances for replacing and replanting any tree/shrub/plant that fails to establish 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 be installed around the newly-created habitats excluding the grasslands (e.g. water bodies, hedgerows and scrub) to prevent grazing and suppression of growth. Care will be taken to ensure that the fencing does not shade the newly-created habitats. The fencing will be checked for defects during the construction and repaired as necessary.

4.4 Weed Control

Network Rail shall be responsible for removing all noxious weeds detailed below by hand removal, cutting down or spot treatment (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 Application Site will then be kept clear of such weeds, identifying presence of such weeds will form part of the monitoring visits, annually for the first five years and then every three years. The following weed species shall be removed as soon as they appear anywhere on the Application Site:

- Ragworts;
- Bindweed;
- Couch/ twitch grass;
- Stinging nettles;
- Docks (curled and broad-leaved);
- Thistles (common/creeping and spear);
- This list of weeds will be subject to review and updated following site inspections by a suitably qualified ecologist.

4.5 Invasive Non-Native Plant Species

It is an offence to plant or otherwise cause non-native invasive plant species¹⁹ to grow in the wild. If any invasive non-native 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 invasive non-native plant species.

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¹⁹ 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 regarding additional habitat creation for great crested newt, common species of reptile, and notable species of invertebrates. Great crested newts and common species of reptile will only be translocated to the Site once the habitat is considered sufficiently mature to support populations of these species and the necessary great crested newt mitigation licence from Natural England is granted.

5.1 Artificial Otter Holt

An artificial otter holt will be constructed approximately 140 m North of an existing otter resting site along the Langford Brook. This artificial holt will comprise part of the mitigation package relating to the disturbance of two otter resting sites under licence along the Langford Brook caused by associated EWR2 works. It will be positioned (See **Appendix A** for the artificial holt location) next to and connecting with the backwater which is being created as part of the Scheme.

The artificial holt will be a 'natural type' design constructed of wooden posts, marine grade plywood lids and plastic pipes incorporating features such as well screened (vegetated) areas around entrance holes leading to the watercourse, two internal chambers and be as close to the watercourse as possible. The details of the proposed artificial otter holt are presented in **Appendix G**, an example of previously constructed artificial holt associated with the EWR2 can be also be seen in **Appendix G**. The holt will be a bespoke design, tailored to the landscape and the known otter territory.

During the construction phase of EWR2 the artificial holt will be capped prevent imminent uptake by otter until the main works are completed, this will help to ensure that otters won't be disturbed whilst in a resting place in relation to the necessary works of EWR2. The artificial holt will be opened once EWR2 construction works no longer risk the disturbance of otter in this area, this will be determined by a suitably qualified ecologist.

As outlined in the otter mitigation licence²⁰, otter surveys on the Langford Brook will be undertaken biannually during the active construction period of EWR2, and once per year for three years once EWR2 is operational. These surveys will include a detailed check of the watercourse and artificial holt for otter field signs, as well as a wider maintenance check of the artificial holts, safe mammal passages, and any associated otter proof fencing. If any repairs are deemed necessary following these checks, they will be carried as per the otter mitigation licence.

Any vegetation management directly on top of the artificial holt or the immediately surrounding area will be carried out by hand. The management of the ECS is unlikely to impact otters as any maintenance works will only occur a few times a year and therefore the need for an exclusion zone around the artificial holt won't be necessary. If any additional maintenance works outside of what is discussed within this EcMP are required, proposals will be reviewed by a suitably qualified ecologist on a case by case basis to determine whether the need for additional mitigation is required to prevent disturbance to otter.

²⁰ 133735-EWR-CNT-EEN-000022: Otter Licence Application (<https://central.ipss-hdms.co.uk/Central/Search/QuickLink.aspx?n=133735-EWR-CNT-EEN-000022&t=3&d=Main%5cCENTRAL-Production&sc=Global&r=A01&i=view>)

5.2 Hibernacula

Two hibernacula (winter refuges) will be constructed within the Site (see **Appendix A**) as per the specification detailed on Drawing No. 133735_RW-EWR-XX-XX-DR-L-052021 in **Appendix E** and in accordance with the Great Crested Newt Mitigation Guidelines³ and the Reptile Habitat Management Handbook²¹. The hibernacula will be created to support great crested newts and common species of reptile, and will have the following features incorporated into the design:

- The hibernacula will be at least 4 m long, by 2 m wide by 1 m high. The hibernacula will be sited in a sunny, south-facing position adjacent to favourable habitat (e.g. scrub edges) and will provide 'stepping stones' for the great crested newt population within habitat to the east of the Site into the ponds constructed within the Site.
- The hibernacula will be constructed on a gentle slope and situated in a well-drained area of the Site to prevent flooding. They will be lined with gravel if ground conditions require some form of drainage.
- Suitable, free-draining materials for construction include brush, inert hardcore, bricks, rocks, split logs and dead wood which will be loosely filled with topsoil. A layer of grass turf will be stripped from the footprint of the hibernacula and used as the top layer of the hibernacula.
- Access points will be inserted into the hibernacula through protruding timber or rubble to create crevices for great crested newts and reptiles to enter the bank.

The hibernacula will be checked annually with any remedial works carried out as required between March – September. Remedial work would need to be carried out under a licence due to the risk of great crested newts being present.

5.3 Log Pile

A log pile will be created as part of the Scheme, approximately 1.5 m long, by 1.5 m wide, by 0.8 m high as per the specification on Drawing No. 1 133735_RW-EWR-XX-XX-DR-L-052031 in **Appendix E**. The construction of the log pile will be supervised on site by an ecologist. The log pile will be partially buried into the ground and include branch sections of varying widths with branches no less than 30 mm in diameter. It will be situated in a sunny south-facing position, preferably adjacent to favourable habitat (e.g. scrub, hedgerows and the ponds with basking opportunities on the embankment). The log pile will provide refugia for common species of reptile, great crested newts and other amphibians, terrestrial invertebrates and small mammals. It will also facilitate basking behaviour for common species of reptiles.

Logs where possible, will be obtained from site won materials, or from site project vegetation removal; if this is not possible they will be locally sourced.

5.4 Compost Heap

A compost heap will be constructed within the Site (see **Appendix A**) as per the specification on Drawing No. 1 133735_RW-EWR-XX-XX-DR-L-052061 in **Appendix E**. The compost heap will provide ideal foraging and refuge opportunities for amphibians (notably great crested newts) and reptiles, as well as suitable habitat for grass snakes to lay eggs. It will also provide habitats of value for some species of birds and terrestrial invertebrates.

The heap will be created on logs and branches (to encourage aeration and allow access for nesting females at the base), and will be at least 3-5 m³, but over time will become larger. Pallets may be a suitable substitution for logs and branches, as detailed in the compost heap specification, however only when agreed in consultation with a suitably qualified ecologist.

²¹ Amphibian and Reptile Conservation (2010), Reptile Habitat Management Handbook

Cuttings from the grassland management will be placed onto the compost heap. To minimise disturbance, the heap will be added to by hand or care will be taken to ensure “forks” of machinery will not damage the heap/arising and won't be dropped from a height. Replenishment of the heap 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 will be left clear for use by reptiles and great-crested newts. The compost heap will be fenced off and left undisturbed (except for new cuttings being placed on top) - in particular, the heap will not be interfered with between June and September if being used by grass snake.

The compost heap will be sited in a sunny south-facing position, preferably adjacent to favourable habitat (e.g. scrub, hedgerows and the ponds).

The compost heap will be checked annually for the first 5 years with any remedial works carried out as required.

5.5 Gravel/rubble areas

An area of gravel/rubble will be constructed to provide suitable terrestrial habitat for common species of reptiles. This area may also provide habitats of value for some species of birds and invertebrates.

- The rubble area will be created with clean stone, between 50-150 mm nominal diameter, and not formed from smooth materials such as gravel, to allow crevices and gaps for species to enter the feature, providing suitable refuge within the meadow. This will be to a depth of 50 – 200 mm deep, tapering out towards the edges. Creation of the rubble area will be conducted with an Ecological Clerk of Works present.
- The rubble area will be checked annually with any remedial works carried out as required.

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 of the newly created habitats will be undertaken by Network Rail, 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 actions that may be required as a result of the monitoring such as additional blackthorn coppicing; replacement hedgerow planting or remediation work to the ponds. The monitoring prescriptions provided here may be altered, if required, by a suitably qualified ecologist during the post construction period, in agreement with NR and other stakeholders.

Monitoring of the great crested newt populations will be a requirement of the route-wide Natural England great crested newt mitigation licence, which is being sought as part of the wider EWR2 project. The EcMP will be updated once the details of the required monitoring have been agreed with Natural England.

A monitoring plan and record update table will be included as part of the EcMP updates.

6.2 Reporting and Review of the EcMP

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. An annual review of habitat management measures will be undertaken with any outstanding issues reported back to Network Rail in a 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.

The EcMP will be reviewed annually and amendments to the activities and methodology made as necessary. The EcMP will be updated and reviewed until the end of the 30-year management period.

7. Ecological Management Plan Summary

Table 7-1 Ecological Management Plan 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)		
Trees, woodland, scrub and hedgerows	Inspections / safety checks of trees	September – February	X										See section 3.1/3.3 for further details.
	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 <i>etc.</i>	September - February			X	X	X	X	X			X	
	Replacement of failed stock	September - February	X										
	Removal of guards	As required							X				
	Scrub and hedgerow cutting/pruning	September - February		X (Once hedgerows and scrub have established)								X	
	Addition of woodland ground flora species	September – November							X				

Ponds	Removal of litter, leaf litter etc.	September – November	X								See section 3.2 for further details.
	Water level maintenance	Twice a year in Nov – Feb and May – July until Year 5, then once a year in May - July	X								
	Wetland grassland around pond cut and collect	November – January	X								
	Scrub pruning around pond	September – November	X								
Backwater	Monitoring of weed/scrub encroachment and silt built up	May – August	X							X	
	Selective vegetation clearance (if required following monitoring)	October – February	X							X	
	Silt removal (if required following monitoring)	October – February	X							X	
Other Tall herb and Fern – Ruderal	Selective vegetation clearance	October – February	X						X	X	See section 3.5 for further details.
Grassland	Rotational cutting of sections A, B & C	November – February	X								Sesee sections 3.6 for further details.
Weeds	Control	May - June	X								

Pruning	Pruning of hedgerows, trees and scrub	As instructed following inspections by an arboriculturalist					X		X		X	See section 4 for further details.
Fencing	Stock/deer-proof fencing maintenance	As required	X									
Features installed for protected and notable species	Remedial works (as required)	Consult with ecologist	X									See section 5 for further details.
	Nest box checks	October – February				X	X	X	X	X		
Monitoring and reporting	Site check	May to mid-June	X									See section 6 for further details.
	Review of EcMP	End of year									X	

* This table sets out the ongoing management activities after habitats have been created, it isn't a full summary of every task in this document.

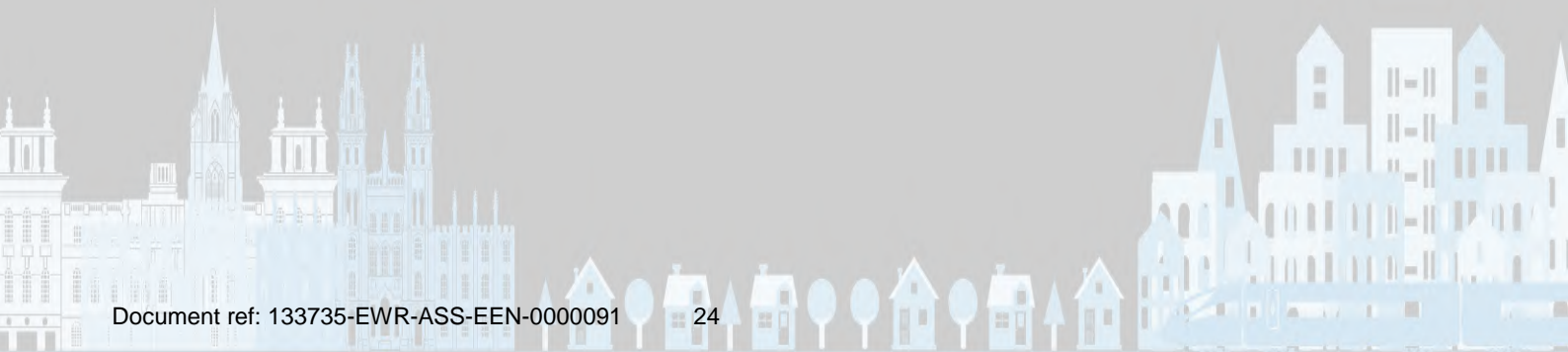
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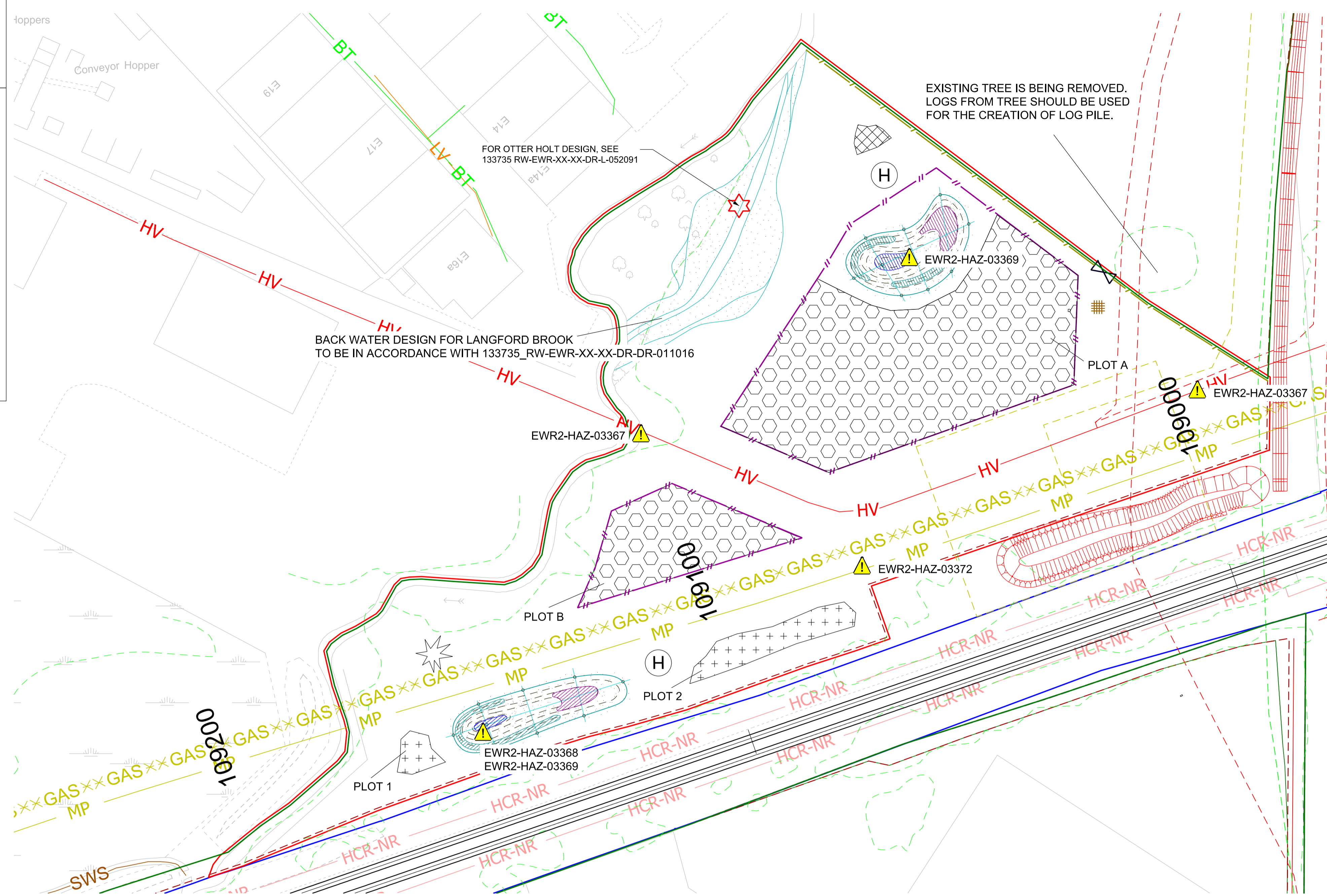
Appendices

Appendix A. Landscape Plan

A.1 Drawing No. 133735_2B-EWR-OXD-XX-DR-L-019027

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DENSE SCRUB PLANTING

Botanical name	Common name	%	Size	PLOT 1 50m ²	PLOT 2 175m ²	TOTAL 225m ²
<i>Acer campestre</i>	Field maple**	4	1+2, 60-90, B	2	7	9
<i>Crataegus monogyna</i>	Hawthorn	17	1+1, 60-90, B	9	30	38
<i>Cornus sanguinea</i>	Dogwood	4	1+1, 60-90, B	2	7	9
<i>Euonymus europaeus</i>	Spindle	3	1+1, 60-90, B	2	5	7
<i>Ligustrum vulgare</i>	Privet	3	1+1, 60-90, B	2	5	7
<i>Malus sylvestris</i>	Crab apple	3	1+1, 60-90, B	2	5	7
<i>Prunus spinosa</i>	Blackthorn	60	1+1, 60-90, B	30	105	135
<i>Sambucus nigra</i>	Elder	3	1+1, 60-90, B	2	5	7
<i>Ulmus glabra</i>	Wych elm	3	1+1, 60-90, B	2	5	7
				50	175	225

To be planted at 1m centres, minor species in groups of 3-7. Plants to be protected with rabbit guards.

- NOTES:
- SOILS TO BE MANAGED IN ACCORDANCE WITH ECOLOGICAL MANAGEMENT PLAN
 - ALL AREAS INCLUDING WOODLAND AND SCRUB PLANTING TO BE SEEDED WITH EMORSGATE EM1 OR SIMILAR UNLESS A SUITABLE GRASS SWARD IS ALREADY IN PLACE.
 - FOR HIBERNACULUM, REFER TO 133735_RW-XX-XX-DR-L-052021.
 - SPOIL FROM PONDS TO BE SPREAD ACROSS SITE IN LOCATIONS TO BE AGREED WITH LCoW DURING CONSTRUCTION AT A DEPTH NO DEEPER THAN 100MM
 - ALL WORKS TO BE COMPLETED ACCORDING TO LANDSCAPE SPECIFICATION 133735_RW-EWR-XX-XX-SP-L-000004
 - ALL PLANTING SHOWN HERE IS INDICATIVE, FINAL POSITION TO BE AGREED WITH LCoW.
 - 9 METRE EASEMENT ALONG WATER COURSE TO BE MAINTAINED CLEAR OF PLANTING OR CONSTRUCTION.
 - FOR LOG PILE REFER TO DRAWING: 133735_RW-EWR-XX-XX-DR-L-052031
 - FOR COMPOST HEAP REFER TO DRAWING: 133735_RW-EWR-XX-XX-DR-L-052061
 - TO CREATE GRAVEL / RUBBLE AREAS: SCRAPE SURFACE FREE OF VEGETATION, SPREAD EXPOSED SURFACE WITH CLEAN STONE / GRAVEL BETWEEN 50-150MM NOMINAL DIA TO A DEPTH OF 50 - 200 MM DEEP, TAPERING OUT TOWARDS THE EDGES.
 - ALL WETLAND PLANTING TO BE COMPLETED IN ACCORDANCE WITH WETLAND PLANTING SPECIFICATION 133735_RW-EWR-XX-XX-SP-L-000005
 - FOR POND CONSTRUCTION DETAILS REFER TO DRAWING 133735_2A-EWR-OXD-XX-DR-L-019028
 - FOR OTTER HOLT CONSTRUCTION DETAILS REFER TO DRAWING 133735_RW-EWR-XX-XX-DR-L-052091

Emorsgate EM8 Meadow Mixture for wetlands AREA: 1290M2

WILD FLOWERS

Latin name	Common name	%
<i>Achillea millefolium</i>	Yarrow	0.2
<i>Achillea ptarmica</i>	Sneezewort	0.2
<i>Betonica officinalis</i> (<i>Stachys officinalis</i>)	Betony	1
<i>Centaurea nigra</i>	Common Knapweed	2.5
<i>Filipendula ulmaria</i>	Meadowsweet	2
<i>Galium verum</i>	Lady's Bedstraw	2
<i>Leontodon hispidus</i>	Rough Hawkbit	0.5
<i>Leucanthemum vulgare</i>	Oxeye Daisy	0.5
<i>Lotus corniculatus</i>	Birdsfoot trefoil	0.7
<i>Lotus pedunculatus</i>	Greater Birdsfoot Trefoil	0.5
<i>Plantago lanceolata</i>	Ribwort Plantain	1
<i>Primula veris</i>	Cowslip	1
<i>Prunella vulgaris</i>	Selfheal	1.5
<i>Ranunculus acris</i>	Meadow Buttercup	2
<i>Rhinanthus minor</i>	Yellow Rattle	1.5
<i>Sanguisorba officinalis</i>	Great Burnet	1.5
<i>Silaum silaus</i>	Pepper Saxifrage	0.5
<i>Silene flos-cuculi</i> (<i>Lychnis flos-cuculi</i>)	Ragged Robin	0.4
<i>Succisa pratensis</i>	Devil's-bit Scabious	0.5
		20

GRASSES

Latin name	Common name	%
<i>Agrostis capillaris</i>	Common Bent	10
<i>Alopecurus pratensis</i>	Meadow Foxtail (w)	1
<i>Anthoxanthum odoratum</i>	Sweet Vernal-grass (w)	3
<i>Briza media</i>	Quaking Grass (w)	2
<i>Cynosurus cristatus</i>	Crested Dogstail	32
<i>Deschampsia cespitosa</i>	Tufted Hair-grass (w)	1
<i>Festuca rubra</i>	Red Fescue (w)	24
<i>Hordeum secalinum</i>	Meadow Barley (w)	1
<i>Schedonorus pratensis</i> (<i>Festuca pratensis</i>)	Meadow Fescue (w)	6
		80

Emorsgate EM1 General Purpose Meadow Mixture

WILD FLOWERS

Botanical name	Common name	%
<i>Centaurea nigra</i>	Common Knapweed	5
<i>Daucus carota</i>	Wild Carrot	1.5
<i>Galium verum</i>	Lady's Bedstraw	4
<i>Leucanthemum vulgare</i>	Oxeye Daisy	0.5
<i>Malva moschata</i>	Musk Mallow	2
<i>Poterium sanguisorba</i> (<i>Sanguisorba minor</i>)	Salad Burnet	2
<i>Prunella vulgaris</i>	Selfheal	1.5
<i>Ranunculus acris</i>	Meadow Buttercup	1.5
<i>Silene dioica</i>	Red Campion	2
		20

GRASSES

Latin name	Common name	%
<i>Agrostis capillaris</i>	Common Bent	8
<i>Cynosurus cristatus</i>	Crested Dogtail	40
<i>Festuca rubra</i>	Slender-creeping Red-fescue	28
<i>Phelip bertolonii</i>	Smaller Cat's-tail	4
		80

KEY

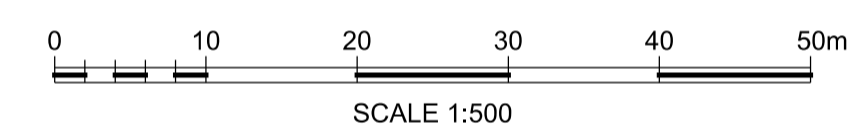
- APPLICATION SITE BOUNDARY
- NETWORK RAIL PROPERTY (CURRENT)
- PERMANENT ENGINEERING LAND TAKE
- PERMANENT ENVIRONMENTAL LAND TAKE
- EXISTING VEGETATION

SOFT LANDSCAPE

- WOODLAND
- EM8 GRASS SEEDING (OVERSEED PONDS)
- GCN POND
- MARGINAL PLANTING
- EMERGENT PLANTING
- SUBMERGED PLANTING
- LANGFORD BROOK BACK WATER- DESIGNED BY OTHERS

HARD LANDSCAPE

- OTTER HOLT
- HIBERNACULUM
- LOG PILE
- COMPOST HEAP
- GRAVEL/ RUBBLE REPTILE HABITAT
- DEER PROOF FENCE
- STOCK PROOF FENCE
- GATE



Rev	Date	Description of Revisions	Desd	Chkd	Appr	Suitability
B01	06/02/20	FOR CONSTRUCTION				

Rev Status: **SHARED - for Information** S2



Project: **East West Rail (Western Section) Phase 2**

Drawing Title: **ECOLOGICAL COMPENSATION A1 SITE DESIGN**

Design	Mark Inglis	Signed	M. Inglis	Date	05/02/20
Drawn	Jack Skellern	Signed	J. Skellern	Date	10/07/19
Checked	Mike Podmore	Signed	M. Podmore	Date	05/02/20
Approved	Mike Podmore	Signed	M. Podmore	Date	05/02/20

Scale(s): 1:500 (ELR - Project Chainage (Miles Yards))
OXD - 109100

Design Package Risk Classification: **Normal** Sheet 1 of 2

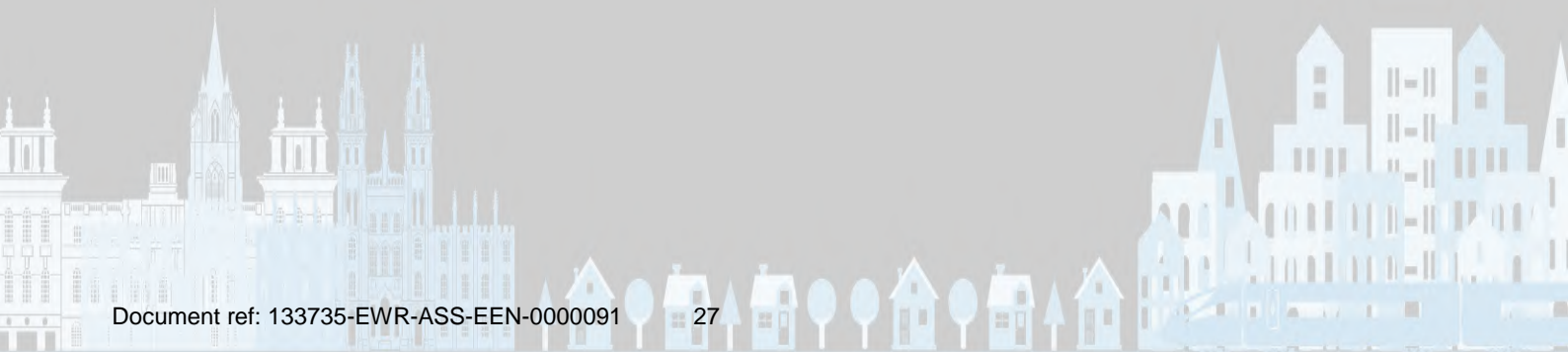
Alternative Reference: Revision B01

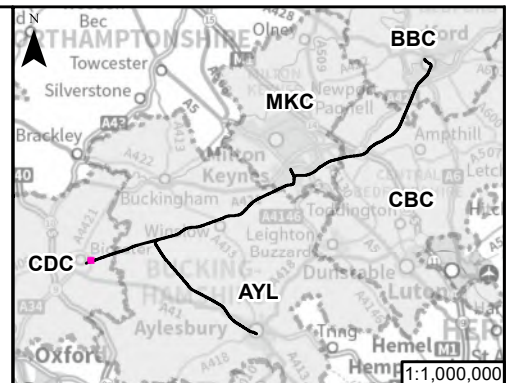
Drawing Number: 133735_2A-EWR-OXD-XX-DR-L-019027

Appendix B. Existing habitat maps

B.1 Drawing No. 133735_R-EWR-XX-XX-DR-LE-012658

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- PROJECT EXTENTS
- ▭ SCHEME BOUNDARY
- ▭ LOCAL AUTHORITY DISTRICTS
- ▭ SITE BOUNDARY
- TARGET NOTE
- - - J2.6 DRY DITCH
- A1.1.1 SEMI-NATURAL BROADLEAVED WOODLAND
- A2.1 SCRUB - DENSE/CONTINUOUS
- ▨ B4 IMPROVED GRASSLAND
- ▨ C3.1 OTHER TALL HERB AND FERN - RUDERAL
- ▨ F2.1 MARGINAL AND INUNDATION - MARGINAL VEGETATION
- G2 RUNNING WATER



Rev	Date	Description of Revisions	Dsnd	Chkd	Appr
P01	16/12/2019	FIRST ISSUE	SC	RS	TO

Status: **PUBLISHED - STAGE APPROVED** Suitability: **A1**



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

Drawing Title: **PHASE 1 HABITAT SURVEY - LAND WEST OF CHARBRIDGE LANE**

Designed	Syrena Chan	Signed		Date	16/12/2019
Drawn	Syrena Chan	Signed		Date	16/12/2019
Checked	Rich Shortridge	Signed		Date	16/12/2019
Approved	Thomas Oliver	Signed		Date	16/12/2019

Scale(s): **1:1,500** 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-012658**

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Appendix C. Relevant legislation

Species	Legislation	Offences	Licensing procedures and guidance
Bats <i>European protected species</i>	Conservation of Habitats and Species Regulations 2017 (as amended) Reg 43	Deliberately ²² capture, injure or kill a bat; deliberate disturbance ²³ of bats; or damage or destroy a breeding site or resting place used by a bat. [The protection of bat roosts is considered to apply regardless of whether bats are present.]	A Natural England (NE) licence in respect of development is required. Guidance documents: <i>NE Standing Advice for protected species 2013</i> <i>European Protected Species: Mitigation Licensing- How to get a licence</i> (NE 2013) <i>Bat Mitigation Guidelines</i> (English Nature 2004) <i>Bat Workers Manual</i> (JNCC 2004)
	Wildlife and Countryside Act 1981 (as amended) S.9	Intentionally or recklessly obstruct access to any structure or place used for shelter or protection or disturb ²⁴ a bat in such a place.	Licence from NE is required for surveys (scientific purposes) that would involve disturbance of bats or entering a known or suspected roost site.
Great crested newt <i>European protected species</i>	Conservation of Habitats and Species Regulations 2017 (as amended) Reg 43	Deliberately ²² capture, injure or kill a great crested newt; deliberate disturbance ²³ of a great crested newt; deliberately take or destroy its eggs; or damage or destroy a breeding site or resting place used by a great crested newt.	Licences issued for development by Natural England. Guidance documents: <i>NE Standing Advice for protected species 2013</i> <i>European Protected Species: Mitigation Licensing- How to get a licence</i> (NE 2013) <i>Great Crested Newt Mitigation Guidelines</i> (English Nature 2001)
	Wildlife and Countryside Act 1981 (as amended) S.9	Intentionally or recklessly obstruct access to any structure or place used for shelter or protection or	Licences issued for science (survey), education and conservation by Natural England.

²² Deliberate capture or killing is taken to include “accepting the possibility” of such capture or killing

²³ Deliberate disturbance of animals includes in particular any disturbance which is likely a) to impair their ability (i) to survive, to breed or reproduce, or to rear or nurture their young, or (ii) in the case of animals of hibernating or migratory species, to hibernate or migrate; or b) to affect significantly the local distribution or abundance of the species to which they belong.

²⁴ Lower levels of disturbance not covered by the Conservation of Habitats and Species Regulations 2017 (as amended) remain an offence under the Wildlife and Countryside Act 1981 (as amended) although a defence is available where such actions are the incidental result of a lawful activity that could not reasonably be avoided.

Species	Legislation	Offences	Licensing procedures and guidance
		disturb ²⁴ a great crested newt in such a place.	
Adder Common lizard Grass snake Slow worm	Wildlife and Countryside Act 1981 (as amended) S.9(1) and S.9(5)	Intentionally kill or injure any common reptile species.	<p>No licence is required.</p> <p>However an assessment for the potential of a site to support reptiles should be undertaken prior to any development works which have potential to affect these animals.</p> <p>Guidance documents: <i>NE Standing Advice for protected species 2013</i></p>
Birds	Wildlife and Countryside Act 1981 (as amended) S.1	<p>Intentionally kill, injure or take any wild bird; intentionally take, damage or destroy the nest of any wild bird while that nest is in use or being built; intentionally take or destroy the nest or eggs of any wild bird.</p> <p>Intentionally or recklessly disturb a Schedule 1 species while it is building a nest or is in, on or near a nest containing eggs or young; intentionally or recklessly disturb dependent young of such a species [e.g. most birds of prey, kingfisher, barn owl, black redstart, little ringed plover].</p>	<p>No licences are available to disturb any birds in regard to development.</p> <p>Licences are available in certain circumstances to damage or destroy nests, but these only apply to the list of licensable activities in the Act and do not cover development.</p> <p>General licences are available in respect of 'pest species' but only for certain very specific purposes e.g. public health, public safety, air safety.</p> <p>Guidance documents: <i>NE Standing Advice for protected species 2013</i></p>
Plants <i>Invasive species e.g.</i> Japanese knotweed, hybrid knotweed, giant knotweed, giant hogweed, rhododendron, Himalayan balsam	Wildlife and Countryside Act 1981 (as amended) S.14	It is illegal to plant or otherwise cause these species to grow in the wild.	<p>Any contaminated soil or plant material is classified as controlled waste and should be disposed of in a suitably licensed landfill site, accompanied by appropriate Waste Transfer documentation, and must comply with section 34 of the Environmental Protection Act 1990.</p> <p>Guidance documents: <i>The Knotweed Code of Practice</i> (Environment Agency, 2013 version 3) <i>Managing Invasive Non-native Plants</i> (Environment Agency 2010) <i>Guidance on Section 14 of the Wildlife and Countryside Act, 1981</i> (Defra 2010)</p>

Species	Legislation	Offences	Licensing procedures and guidance
Rabbits, foxes and other wild mammals	Wild Mammals (Protection) Act 1996	Intentionally inflict unnecessary suffering to any wild mammal.	Natural England provides guidance in relation to rabbits, foxes (which are also protected under the Wildlife and Countryside Act 1981 from live baits and decoys) and other wild mammals, on their website. Lawful and humane pest control of these species is permitted.

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Appendix D. Seed Mixes

Table D-1 Plant species: Suitable for inclusion in pond creation planting schemes	
Marginal Species	
Cuckoo flower	<i>Cardamine pratensis</i>
Hard rush	<i>Juncus inflexus</i>
Lesser pond sedge	<i>Carex acutiformis</i>
Ragged robin	<i>Lychnis flos-cuculi</i>
Common bistort	<i>Persicaria bistorta</i>
Soft rush	<i>Juncus effusus</i>
Emergent Species	
Amphibious bistort	<i>Persicaria amphibia</i>
Arrowhead	<i>Sagittaria sagittifolia</i>
Branched bur-reed	<i>Sparganium erectum</i>
Brooklime*	<i>Veronica beccabunga</i>
Celery-leaved buttercup	<i>Ranunculus sceleratus</i>
Frogbit	<i>Hydrocharis morsus-ranae</i>
Greater spearwort	<i>Ranunculus lingua</i>
Marsh cinquefoil	<i>Potentilla palustris</i>
Marsh marigold	<i>Caltha palustris</i>
Meadowsweet*	<i>Filipendula ulmaria</i>
Purple loosestrife	<i>Lythrum salicaria</i>
Water forget-me-not*	<i>Myosotis scorpioides</i>
Water mint*	<i>Mentha aquatica</i>
Yellow flag iris	<i>Iris pseudacorus</i>
Floating & Submerged Species	
Broad-leaved pondweed	<i>Potamogeton natans</i>
Common hornwort	<i>Ceratophyllum demersum</i>
Common water starwort	<i>Calitriche stagnalis</i>
Curled pondweed*	<i>Potamogeton crispus</i>
Duckweed	<i>Lemna minor</i>
Fennel pondweed	<i>Potamogeton pectinatus</i>
Water crowfoot	<i>Ranunculus aquatilis</i>
Water soldier	<i>Stratiotes aloides</i>
White water lily	<i>Nymphaea alba</i>
Willow moss	<i>Fontinalis antipyretica</i>

*most suitable as egg-laying material for great crested newts

Table D-2 Plant species: Emorsgate EM8 Wetland Mixture

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

*The above gives percentages of EM8 seed mixture. This will be supplemented by seed stock of Bitter vetch (*Vicia ervilia*).

Table D-3 Woody shrub & tree species

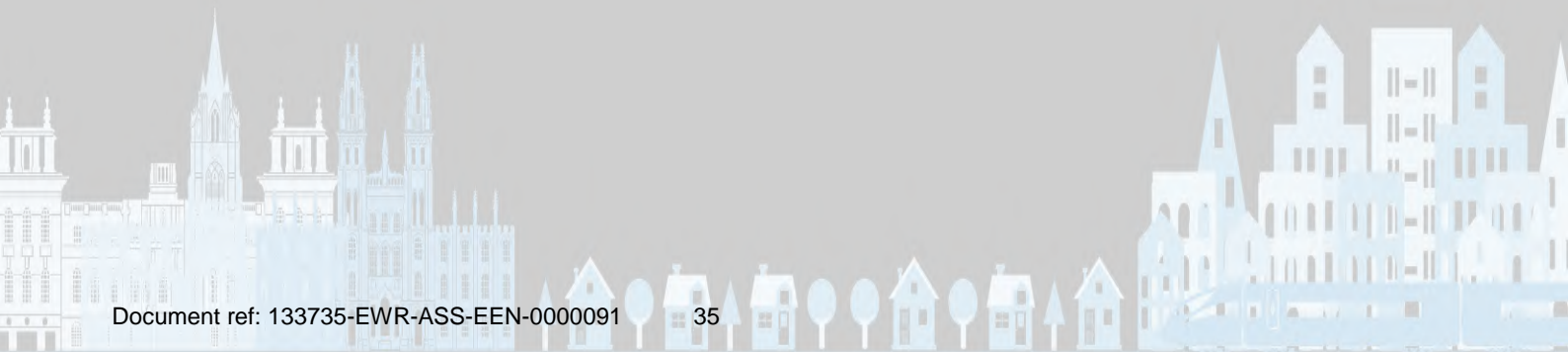
Dense Scrub Species	
Blackthorn	<i>Prunus spinosa</i>
Black poplar*	<i>Populus nigra ssp. betulifolia</i>
Crab apple	<i>Malus sylvestris</i>
Dogwood	<i>Cornus sanguinea</i>
Elder	<i>Sambucus nigra</i>
Field maple*	<i>Acer campestre</i>
Hawthorn	<i>Crataegus monogyna</i>
Wych elm	<i>Ulmus glabra</i>
Privet	<i>Ligustrum vulgare</i>
Spindle	<i>Euonymus europaeus</i>
Blackthorn	<i>Prunus spinosa</i>
Black poplar*	<i>Populus nigra ssp. betulifolia</i>
Crab apple	<i>Malus sylvestris</i>
Native Tree Species	
Black poplar	<i>Populus nigra ssp. betulifolia</i>
Crack willow	<i>Salix fragilis</i>
Downy birch	<i>Betula pubescense</i>
Field maple	<i>Acer campestre</i>
Pedunculate oak	<i>Quercus robur</i>

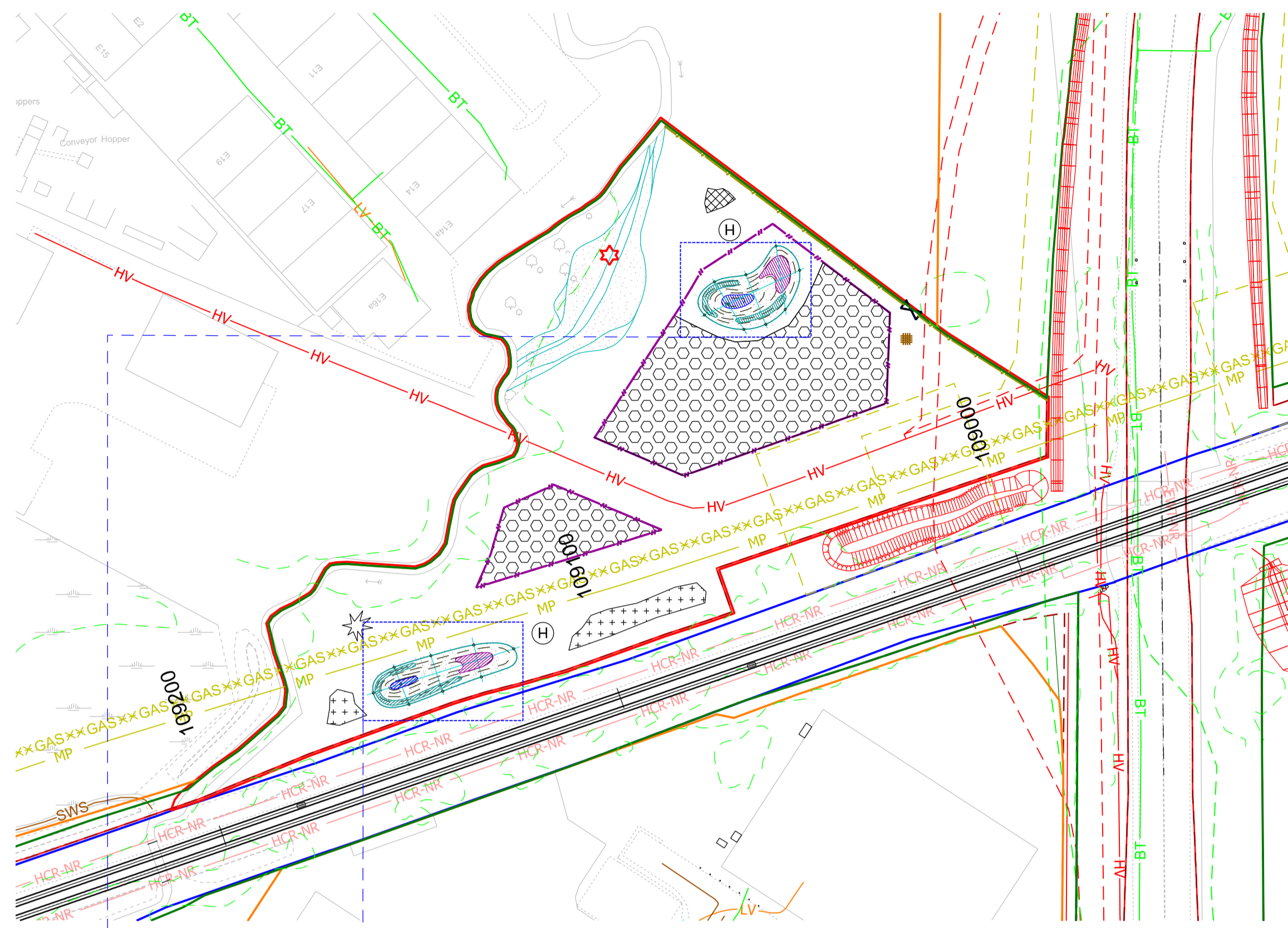
*Larger species to be placed a minimum of 10m from pond edge.

Appendix E. Pond, Hibernacula, Log Pile and Compost Heap designs

- E.1 Drawing No. 133735_RW-EWR-XX-XXDR-L-019028
- E.2 Drawing No. 133735_RW-EWR-XX-XX-DR-L-052021
- E.3 Drawing No. 133735_RW-EWR-XX-XX-DR-L-052031
- E.4 Drawing No. 133735_RW-EWR-XX-XX-DR-L-052061

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	Pond 1	Pond 2	
Total pond area m ² :	299	290	
Marginals			
Area for marginals m ² :	36	36	
Total no. marginal plants:	144	144	
Species	Size	Quantities	Totals
<i>Carex acutiformis</i>	1L	29	29
<i>Juncus effusus</i>	1L	29	29
<i>Juncus inflexus</i>	1L	29	29
<i>Ranunculus flammula</i>	1L	29	29
<i>Silene flos-cuculi</i>	1L	29	29
			288
Emergent			
Area for emergent:	35	30	
Total no. emergent plants:	140	120	
Species	Size	Quantities	Totals
<i>Apium nodiflorum</i>	1L	14	12
<i>Caltha palustris</i>	1L	14	12
<i>Filipendula ulmaria</i>	1L	14	12
<i>Iris pseudacorus</i>	1L	14	12
<i>Lythrum salicaria</i>	1L	14	12
<i>Mentha aquatica</i>	1L	14	12
<i>Myosotis scorpioides</i>	1L	14	12
<i>Ranunculus lingua</i>	1L	14	12
<i>Sparganium erectum</i>	1L	14	12
<i>Veronica beccabunga</i>	1L	14	12
			260
Floating and submerged			
Area for floating and submerged:	20	20	
Total no. floating and submerged plants:	80	80	
Species	Size	Quantities	Totals
<i>Callitriche stagnalis</i>	1L	13	13
<i>Ceratophyllum demersum</i>	1L	13	13
<i>Potamogeton crispus</i>	1L	13	13
<i>Potamogeton natans</i>	1L	13	13
<i>Ranunculus aquatilis</i>	1L	13	13
<i>Stratiotes aloides</i>	1L	13	13
			160
			708

Emorsgate EM8 Meadow Mixture for wetlands

Latin name	Common name	%
<i>Achillea millefolium</i>	Yarrow	0.2
<i>Achillea ptarmica</i>	Sneezewort	0.2
<i>Betonica officinalis - (Stachys officinalis)</i>	Betony	1
<i>Centaurea nigra</i>	Common Knapweed	2.5
<i>Filipendula ulmaria</i>	Meadowsweet	2
<i>Galium verum</i>	Lady's Bedstraw	2
<i>Leontodon hispidus</i>	Rough Hawkbit	0.5
<i>Leucanthemum vulgare</i>	Oxeye Daisy	0.5
		0.7
<i>Lotus corniculatus</i>	Birdsfoot trefoil	
<i>Lotus pedunculatus</i>	Greater Birdsfoot Trefoil	0.5
<i>Plantago lanceolata</i>	Ribwort Plantain	1
<i>Primula veris</i>	Cowslip	1
<i>Prunella vulgaris</i>	Selfheal	1.5
<i>Ranunculus acris</i>	Meadow Buttercup	2
<i>Rhinanthus minor</i>	Yellow Rattle	1.5
<i>Sanguisorba officinalis</i>	Great Burnet	1.5
<i>Silaum silaus</i>	Pepper Saxifrage	0.5
<i>Silene flos-cuculi - (Lychnis flos-cuculi)</i>	Ragged Robin	0.4
<i>Succisa pratensis</i>	Devil's-bit Scabious	0.5
		20
GRASSES		
<i>Agrostis capillaris</i>	Common Bent	10
<i>Alopecurus pratensis</i>	Meadow Foxtail (w)	1
<i>Anthoxanthum odoratum</i>	Sweet Vernal-grass (w)	3
		2
<i>Briza media</i>	Quaking Grass (w)	
<i>Cynosurus cristatus</i>	Crested Dogstail	32
<i>Deschampsia cespitosa</i>	Tufted Hair-grass (w)	1
<i>Festuca rubra</i>	Red Fescue (w)	24
<i>Hordeum secalinum</i>	Meadow Barley (w)	1
<i>Schedonorus pratensis - (Festuca pratensis)</i>	Meadow Fescue (w)	6
		80

KEY

- APPLICATION SITE BOUNDARY
- NETWORK RAIL PROPERTY (CURRENT)
- PERMANENT ENGINEERING LAND TAKE
- PERMANENT ENVIRONMENTAL LAND TAKE
- EXISTING VEGETATION

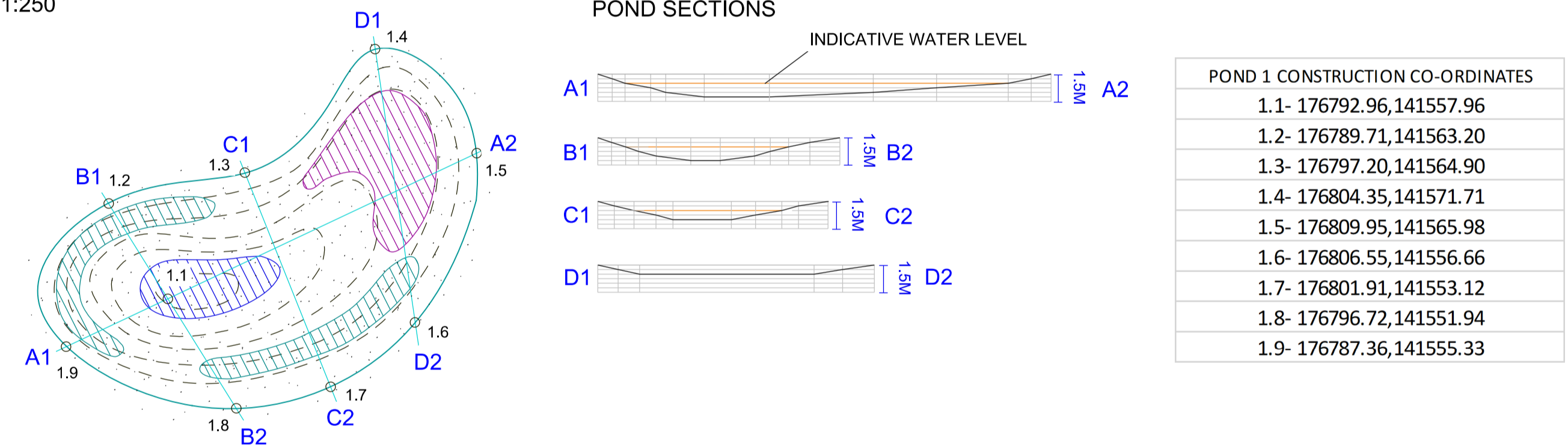
SOFT LANDSCAPE

- WOODLAND
- EM8 GRASS SEEDING (OVERSEED PONDS)
- GCN POND
- MARGINAL PLANTING
- EMERGENT PLANTING
- SUBMERGED PLANTING
- LANGFORD BROOK BACK WATER- DESIGNED BY OTHERS

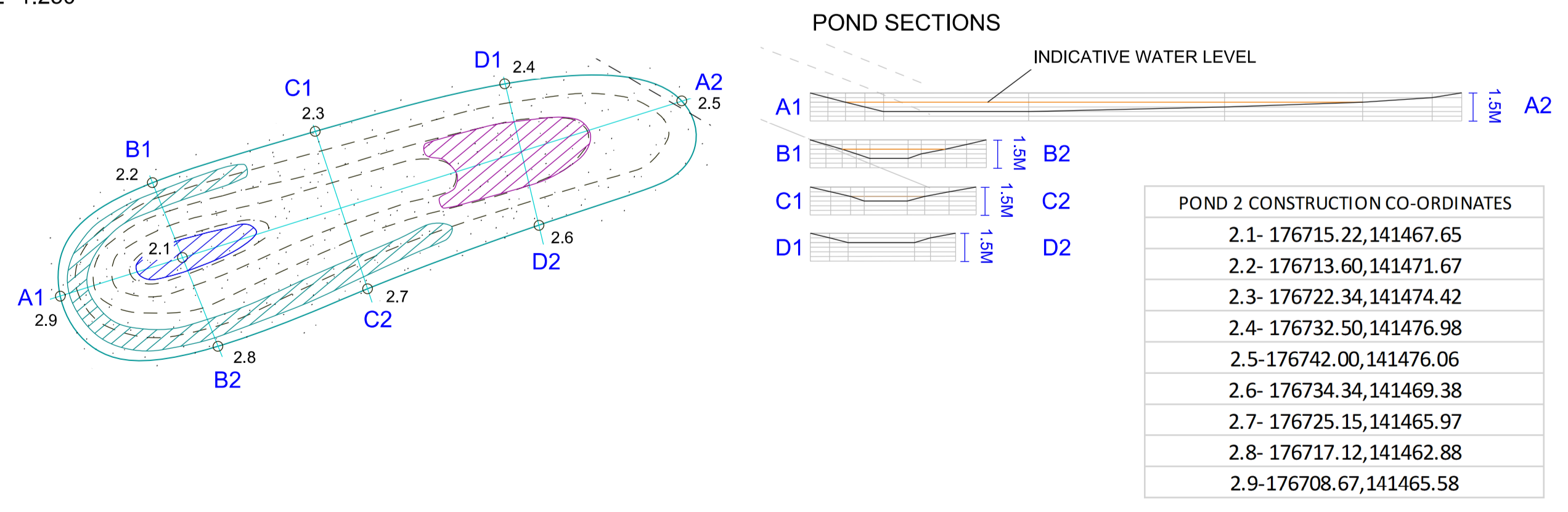
HARD LANDSCAPE

- OTTER HOLT
- HIBERNACULUM
- LOG PILE
- COMPOST HEAP
- GRAVEL/ RUBBLE REPTILE HABITAT
- DEER PROOF FENCE
- STOCK PROOF FENCE
- GATE

POND 1 INDICATIVE DETAIL
SCALE- 1:250



POND 2 INDICATIVE DETAIL
SCALE- 1:250



- PLANTING NOTES:**
- PONDS TO BE PLANTED UP USING THE SPECIES LISTED IN THE SCHEDULE.
 - THE ENTIRE FOOTPRINT OF THE POND AND THE SURROUNDING FRINGE SHALL BE SEEDED WITH EMORSGATE EM8 AT THE EARLIEST POSSIBLE OPPORTUNITY AFTER EXCAVATION, DURING THE SEEDING SEASON AND BEFORE THE PONDS FILL WITH WATER.
 - EMORSGATE EM8 MIX TO BE SOWN AT 4G/M² UNLESS OTHERWISE AGREED.
 - TO PREPARE THE GROUND AROUND THE PONDS FOR SEEDING ENSURE THAT THE SITE IS FREE FROM DEBRIS AND WEEDS. CULTIVATE/DIG TO REMOVE SURFACE VEGETATION AND HARROW TO PRODUCE A MEDIUM TILTH, AND ROLL TO PRODUCE A FIRM SURFACE. SEED SHOULD BE SOWN EITHER IN EARLY AUTUMN OR SPRING ONCE THE LAND HAS DRAINED.
 - PLANTING AREAS SHOWN ARE INDICATIVE ONLY AND BASED ON AN INDICATIVE WATER LEVEL OF 1M. FINAL POSITIONS TO BE AGREED ON SITE BETWEEN LCoW AND CONTRACTOR.
 - ALL WETLAND PLANTING SHOULD BE SET OUT ACCORDING TO TYPE, RELATIVE TO THE WATER LEVEL AT THE TIME OF THE SPRING PLANTING WINDOW, AS FOLLOWS:
- MARGINAL SPECIES TO BE PLANTED AT A DENSITY OF 4/M², IN BANDS OF 5-7 SPECIES, ON THE BANK BUT WITHIN 700MM OF THE WATERS EDGE.
-EMERGENT SPECIES TO BE PLANTED AT A DENSITY OF 4/M², IN BANDS OF 5-7 SPECIES ACROSS THE AREAS SHOWN, ALONG THE WATERS EDGE AND UP TO A DEPTH OF 700MM
-FLOATING AND SUBMERGED SPECIES TO BE PLACED AT A RATE OF 4/M², TO THE DEEPEST PARTS OF THE POND.
 - AFTER FORMATION ALL PONDS TO BE LINED WITH 150MM OF NUTRIENT POOR SOIL (NOT TOP SOIL).
 - IF PERMEABILITY TEST SUGGESTS THE NEED TO ARTIFICIALLY LINE THE POND A BENTONITE LINER SHOULD BE USED. REFER TO POND LINING DRAWING: 133735_RW-EWR-XX-XX-DR-L-052072
 - POND DETAILS SHOW FINALISED SIZE INCLUDING ARTIFICIAL LINER (IF REQUIRED) AND 150MM SOIL.
 - POND CONSTRUCTION CO-ORDINATES REFER TO EWR SNAKE GRID CO-ORDINATES
 - ALL WETLAND PLANTING TO BE COMPLETED IN ACCORDANCE WITH WETLAND PLANTING SPECIFICATION 133735_RW-EWR-XX-XX-SPL-000005
 - FOR SITE DESIGN REFER TO DRAWING 133735_2A-EWR-OXD-XX-DR-L-019027
 - INLETS ARE TO BE CLEARED AROUND AND SEALED WITH APPROX. 500MM DIAMETER OF CLAY, 100MM DEEP WHICH IS TO BE SITE WON. A CLEAN BREAK/CUT ON THE INLET WILL BE LEFT, SO THAT THE LAND DRAIN CAN FEED THE POND.
 - OUTLETS AND INLETS (WHERE PONDS ARE TO BE LINED) ARE TO BE LOCATED DURING THE CONSTRUCTION OF THE POND, THE EXCAVATION TEAM WILL TRACE THE LAND DRAIN 1M BACK FROM THE TOP OF THE POND BANK AND BREAK OUT/REMOVE APPROX. 1 FOOT OF THE CLAY PIPE. BOTH ENDS OF THE PIPE ARE TO BE CAPPED WITH SITE WON CLAY TO SEAL
 - ONE LIFE RING PER GROUP OF PONDS WITHIN A 50M RADIUS OF THE LIFE RING, UNLESS SCRUB PLANTING OR ANY ECOLOGICAL FEATURE MAY BLOCK SIGHT OF THE LIFE RING FROM THE POND.
 - LIFEBUOY 750 TO BE HOUSED IN A GUARDIAN 750 HOUSING ON A POST MOUNTING WITH A LID STAY FROM GLASDON OR SIMILAR APPROVED

Rev	Date	Description of Revisions	Desd	Chkd	Appr
B01	06/02/20	FOR CONSTRUCTION		M.L	M.P

Rev Status: **SHARED - for Information** Suitability: **S2**

EWR Alliance
Connecting People

Project
East West Rail (Western Section) Phase 2

Drawing Title
ECOLOGICAL COMPENSATION A1 GCN PONDS

Designed	Mark Inglis	Signed	M. Inglis	Date	05/02/20
Drawn	Jack Skellern	Signed	J. Skellern	Date	16/07/19
Checked	Mike Podmore	Signed	M. Podmore	Date	05/02/20
Approved	Mike Podmore	Signed	M. Podmore	Date	05/02/20

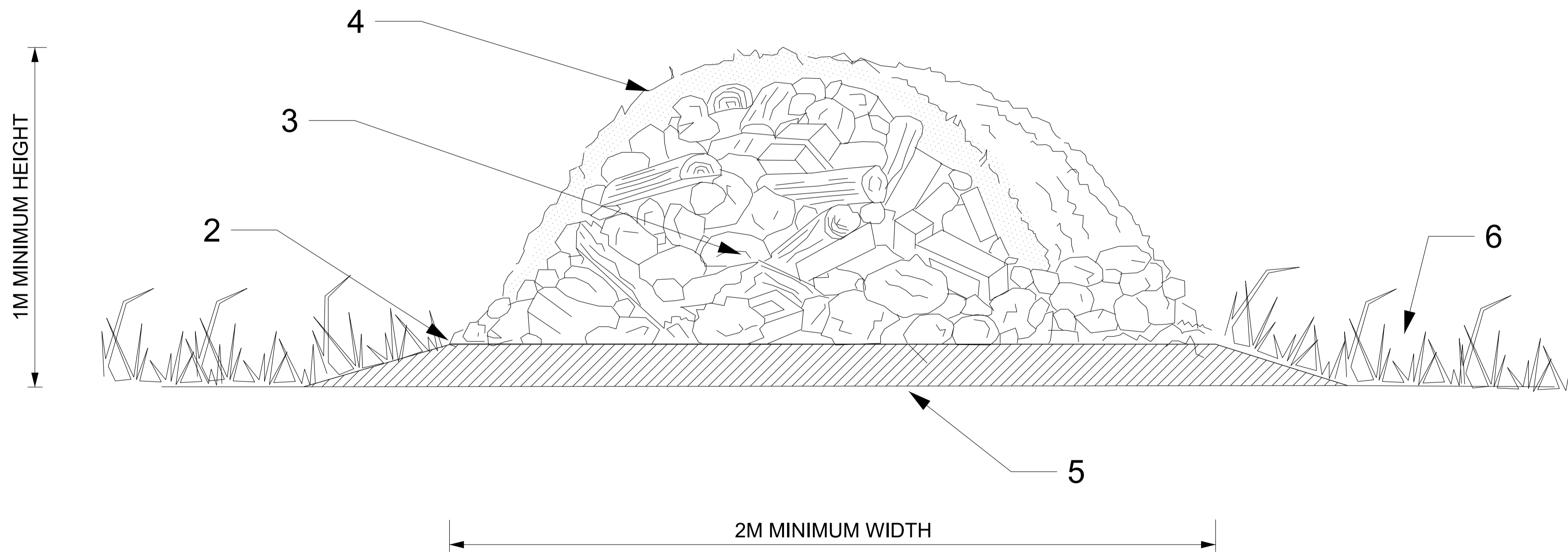
Scale(s)
AS STATED ELR - Project Chainage (Miles Yards)
OXD - 109100

Design Package Risk Classification
Normal

Alternative Reference
Revision
B01

Drawing Number
133735_2A-EWR-OXD-XX-DR-L-019028

Sheet **2 of 2**



- NOTES:
- EXTENTS SHOULD NOT BE LESS THAN 4M LENGTH X 2M WIDTH X 1M HEIGHT.
 - MARGINS TO HIBERNACULUM TO HAVE FILL EXPOSED, ALLOWING ACCESS.
 - INERT CLEAN FILL (HARDCORE, BRICK, RUBBLE, LOGS, SLEEPERS, ETC) OVERLAID WITH LOOSE SUBSOIL / TOPSOIL SOURCED FROM SITE.
 - GRADED TOPSOIL TO CAP CONSTRUCTION - IDEALLY WITH SITE WON TURF COVERING.
 - BUILD UP BASE TO MINIMUM OF 150MM ABOVE GROUND LEVEL TO ENSURE BASE OF HIBERNACULUM SITS ABOVE WINTER GROUND WATER LEVELS.
 - SURROUNDING ROUGH VEGETATION.
 - 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.

APPROVED FOR CONSTRUCTION

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

Rev	Date	Description of Revisions	Dsnd	Chkd	Appr	Suitability
CD1	08/08/19	Fit for Construction		M.L	M.P.	J.G
Accepted for Implementation						A6



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

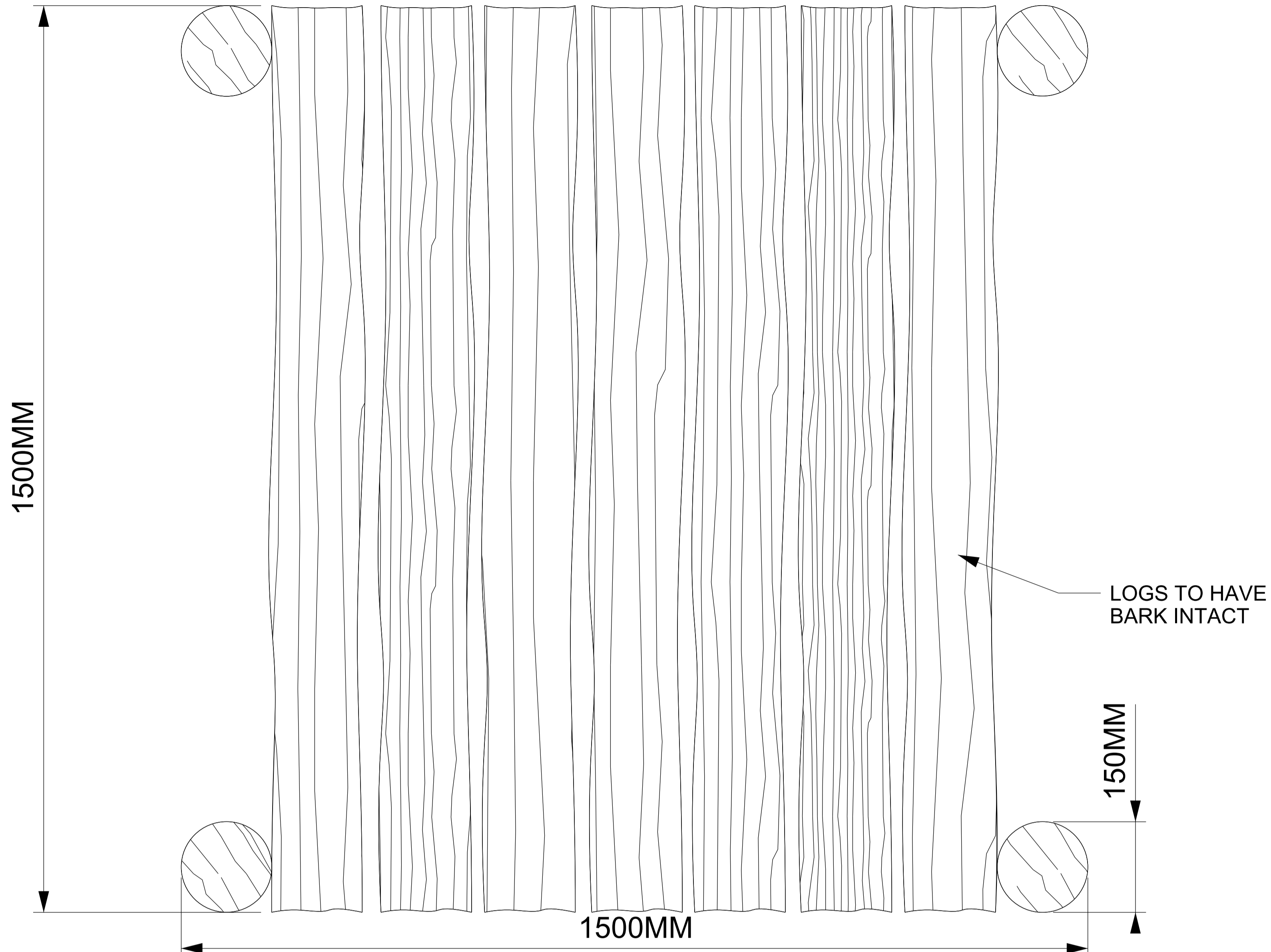
Sheet **1 of 1**

Alternative Reference

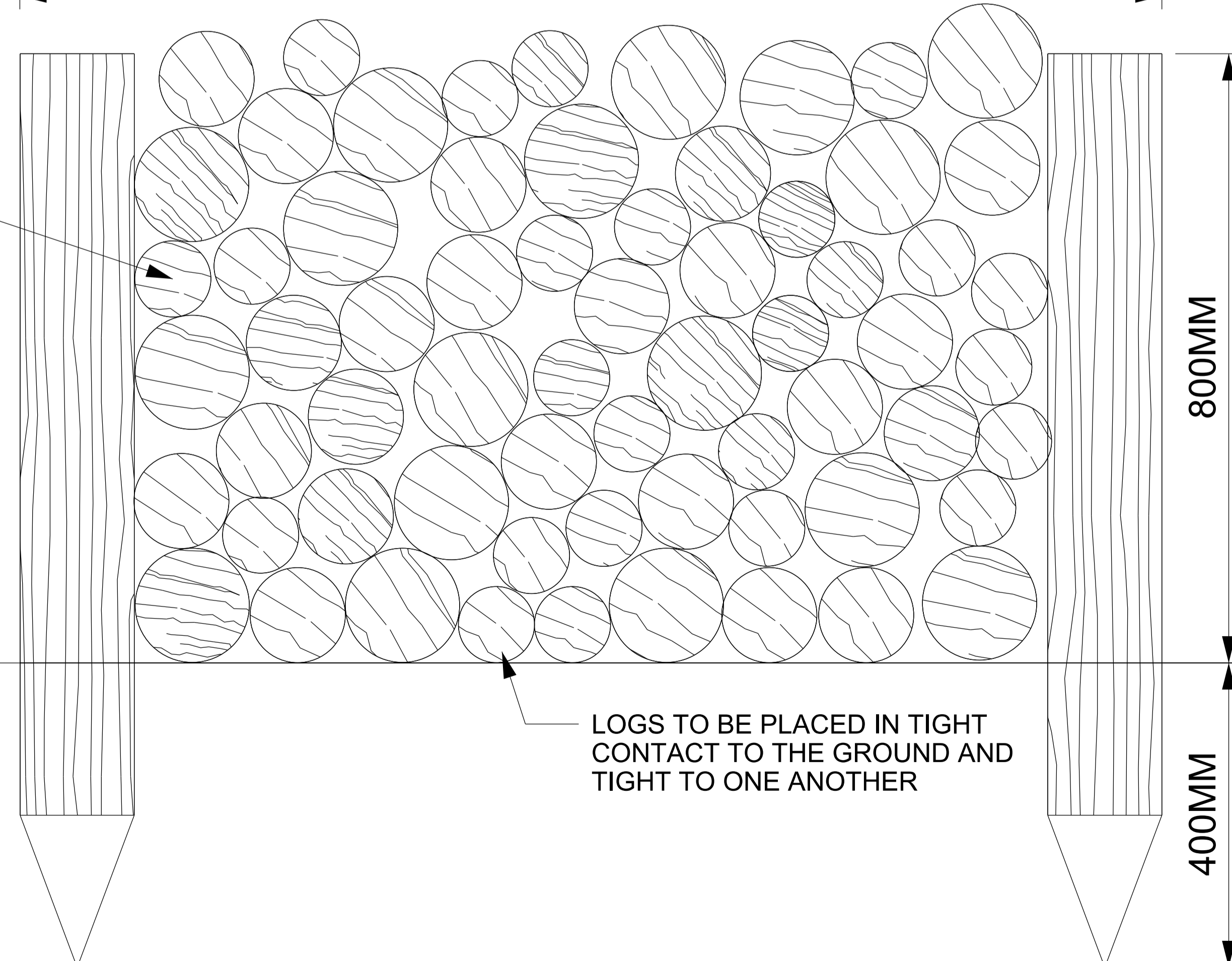
Revision **C01**

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

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-.....)



LOGS USED TO BE BETWEEN 100 - 150MM IN DIAMETER

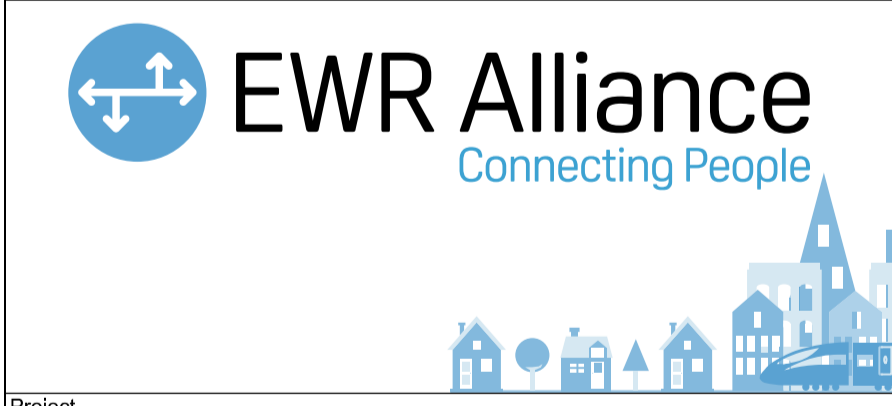


- NOTES:
- CONSTRUCTED ON GROUND LEVEL
 - STAKED AT 4 CORNERS TO KEEP TIMBERS IN PLACE
 - LOGS TO BE FROM SITE WON MATERIALS; IF NOT FROM SITE, FROM SITE PROJECT VEGETATION REMOVAL; IF NOT, FROM LOCAL SOURCE
 - MIX OF DIFFERENT TIMBERS TO BE USED

APPROVED FOR CONSTRUCTION

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

Rev	Date	Description of Revisions	Desd	Chkd	Appr	Suitability
C01	08/08/19	Fit for Construction		M.L	M.P.	J.G
Accepted for Implementation						A6



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

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 ODM PHASE 2 HAZARD LOG" eB doc. Ref: 133735-EWR-LOG-SSD-000004.

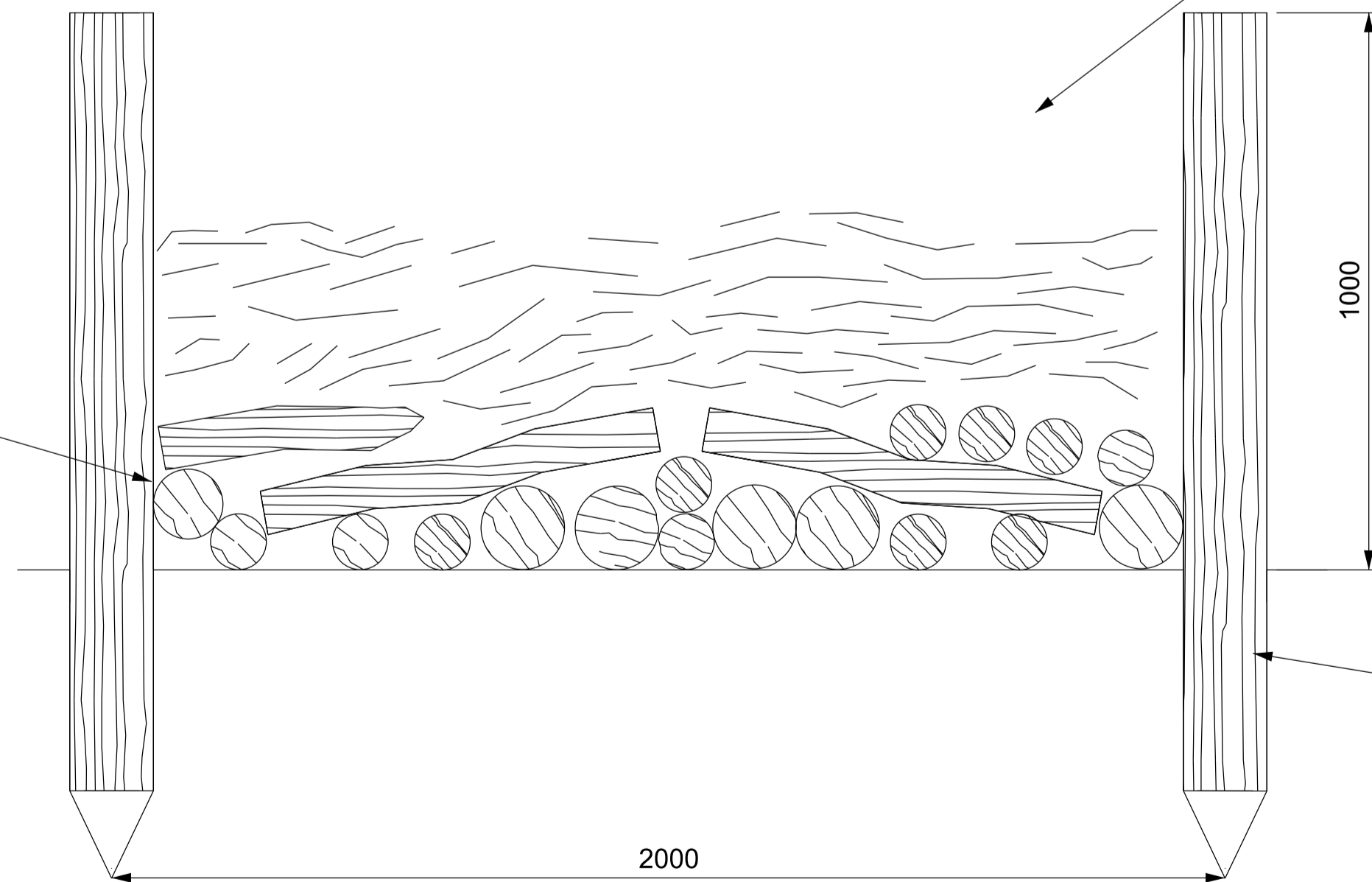
ID	Hazard description
EWR2-HAZ-....	NO HAZARDS IDENTIFIED RELATIVE TO THIS DETAIL HOWEVER, PLEASE REFER TO SITE LAYOUTS FOR SITE SPECIFIC HAZARDS.

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



GRASS CUTTINGS FROM ANNUAL GRASS CUT (UP TO 1000MM HIGH, SURPLUS ARISING TO BE REMOVED FROM SITE BY MAINTENANCE CONTRACTOR)

BASE OF LOGS AND BRANCHES MIXED DIA TO 300MM DEEP



4 X WOODEN STAKES
150MM Ø TREATED TIMBER
1.5M LONG

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	Desd	Chkd	Appr	Suitability
CD1	08/08/19	Fit for Construction		M.L	M.P.	J.G
Status						Accepted for Implementation
						A6



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

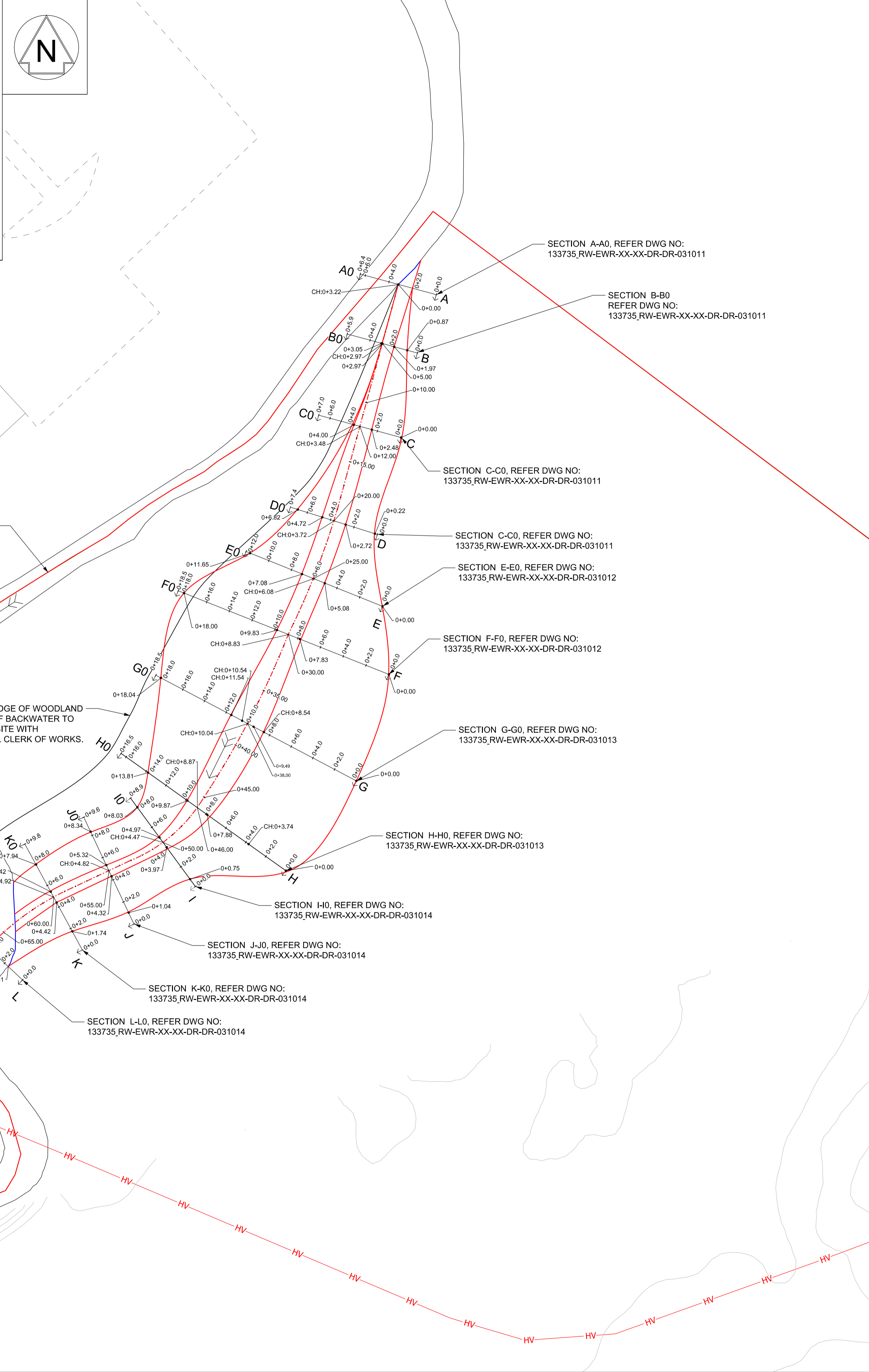
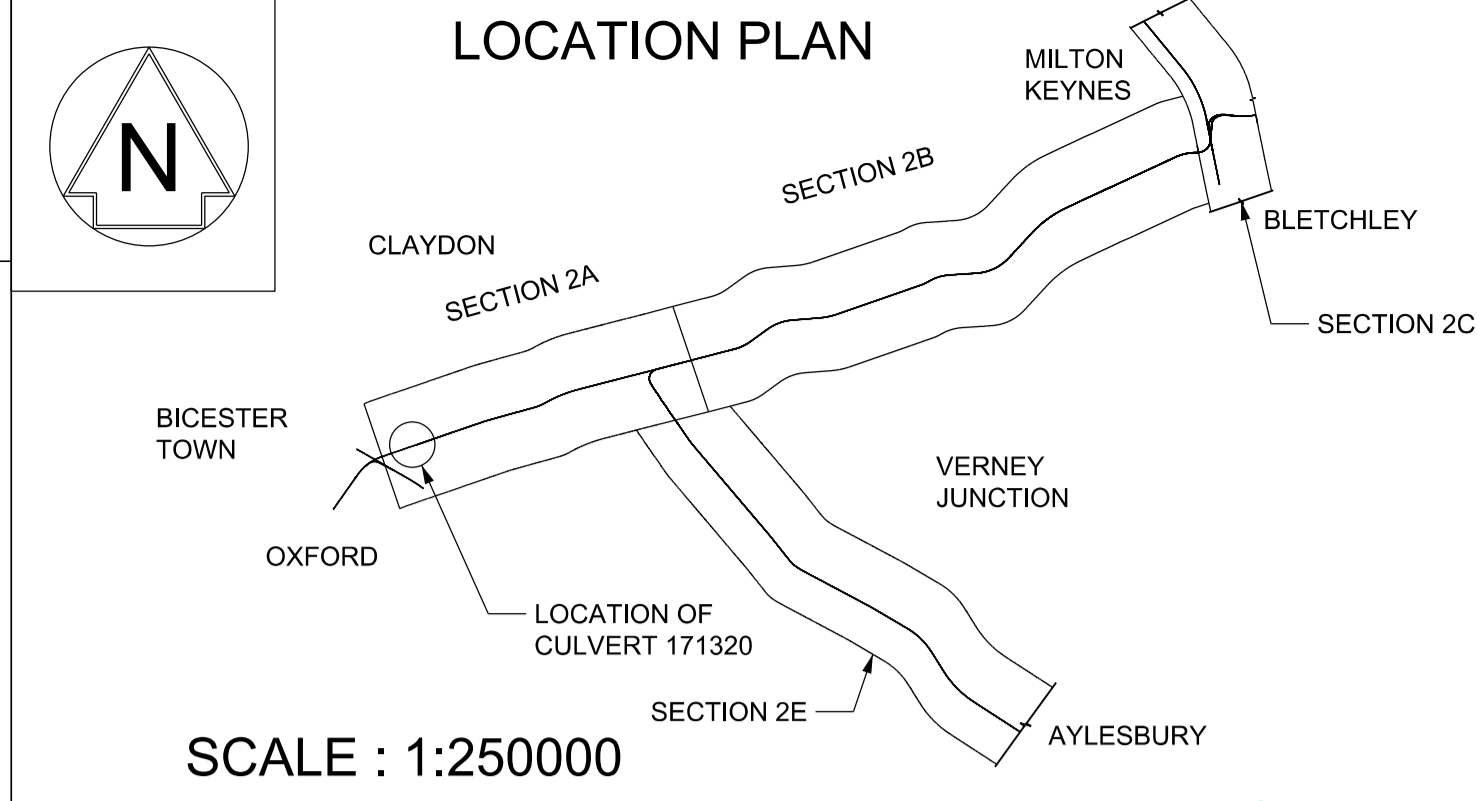
Scale(s)	1:10	ELR - Project Chainage (Miles Yards)	XX -
Design Package Risk Classification	Normal		Sheet
Alternative Reference			1 of 1
Drawing Number	133735_RW-EWR-XX-XX-DR-L-052061		Revision
			C01

Appendix F. Backwater design

- F.1 Drawing No. 133735-RW-EWR-XX-XX-DR-DR-011016
- F.2 Drawing No. 133735-RW-EWR-XX-XX-DR-DR-031011 - 133735-RW-EWR-XX-XX-DR-DR-031014
- F.3 Drawing No. and 133735-RW-EWR-XX-XX-DR-DR-041015

CONFIDENTIAL





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" ProjectWise doc. Ref: 133735-EWR-LOG-SSD-000004.

ID	Hazard description
EWR2-HAZ-03574	HIGH VOLTAGE MAIN

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

- GENERAL NOTES:**
- ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED.
 - PLEASE READ IN CONJUNCTION WITH DRAWING(S) 133735-RW-EWR-XX-XX-DR-DR-010116, 133735-RW-EWR-XX-XX-DR-DR-031011, 133735-RW-EWR-XX-XX-DR-DR-031012, 133735-RW-EWR-XX-XX-DR-DR-031013, 133735-RW-EWR-XX-XX-DR-DR-031014, 133735-RW-EWR-XX-XX-DR-DR-031014, 133735-RW-EWR-XX-XX-DR-DR-041015] AND THE WATERCOURSE REALIGNMENTS STATEMENT OF DESIGN INTENT REPORT REF: 133735_RW-EWR-XX-XX-RP-DR-000002.
 - AN APPROPRIATELY EXPERIENCED FLUVIAL GEOMORPHOLOGIST MUST BE PRESENT ON-SITE DURING CONSTRUCTION TO SUPERVISE AND ADVISE DETAILS OUTLINED WITHIN THE CEMP.
 - PRESENCE OF CONTAMINATION SHOULD BE CHECKED AND, IF PRESENT, REMEDIATION MEASURES PUT IN PLACE PRIOR TO CONSTRUCTION.
 - A SEDIMENT MANAGEMENT PLAN (ADHERING TO GOOD PRACTICE GUIDELINES) SHOULD BE ESTABLISHED TO PREVENT/REDUCE FINE SEDIMENT ENTERING OR BEING MOBILISED THROUGH THE CHANNEL REACH.
 - EXCAVATED MATERIALS MUST BE DISPOSED OF OUTSIDE THE ADJACENT FLOODPLAIN OR OFFSITE, OR OTHERWISE AGREED IN WRITING WITH THE ENVIRONMENT AGENCY, LLFA OR IDB.
 - AN ECOLOGICAL CLERK OF WORKS SHOULD BE CONSULTED PRIOR TO ANY WORKS PROGRESSING TO ENSURE THAT ANY MITIGATION FOR ANY NOTABLE AND PROTECTED SPECIES IS UNDERTAKEN PRIOR TO ANY CONSTRUCTION ACTIVITY. THIS SHOULD INCLUDE FISH RESCUE PLAN AND A PLAN FOR THE OTTERS WHICH ARE KNOWN TO FREQUENT THE SITE.
 - IT IS RECOMMENDED CHANNEL WORKS BE CARRIED OUT DURING SUMMER MONTHS WHEN FLOWS ARE LIKELY TO BE LOWER.
 - CHANNELS TO BE CUT TO BED LEVEL AND TIE-IN WITH CULVERTS UNLESS OTHERWISE STATED; CULVERTS DESIGNED WITH A DEPRESSED INVERT TO ENABLE A NATURAL BED TRANSITION.
 - LANDSCAPING WORKS TO BE UNDERTAKEN IN LINE WITH THE LANDSCAPE MANAGEMENT PLAN AND PLANTING PLAN; SEE DRAWING [C133735-2A-0XD-XX-DR-L-01927].
 - WATER EDGE WITHIN THE BACKWATER TO BE SEEDED WITH POND EDGE MIX USING EMORSGATE EP1 AT A RATE OF 4G/M2.
 - BACKWATER SLOPES AND AREA BETWEEN CROSS-SECTIONS B-B0 AND D-D0 TO BE SOWN WITH EMORSGATE EG8 AT A RATE OF 5G/M2.
 - STORM EVENTS FOR LANGFORD BROOK ARE FOLLOWS:
5-YEAR EVENT: 2.91 m³/s.
100-YEAR EVENT: 2.34 m³/s (NOTE REDUCED FROM 5-YEAR EVENT AS MORE FLOW IS NOW IN THE FLOODPLAIN).
100-YEAR PLUS CLIMATE CHANGE EVENT: 3.56 m³/s.

LEGEND:

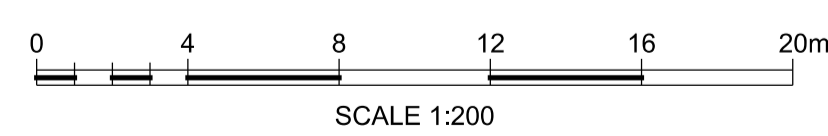
	TEMPORARY LAND TAKE BOUNDARY
	PROPOSED CHANNEL
	EXISTING CHANNEL TO BE MODIFIED
	TO BE MAINTAINED
	BRITISH TELECOM
	ELECTRIC LOW VOLTAGE MAIN
	ELECTRIC HIGH VOLTAGE MAIN
	EXISTING WOODLAND TO BE RETAINED
	HAZARD TRIANGLE

Rev	Date	Description of Revisions	Desd	Chkd	Appr
B01	27/01/20		--	--	--



Project
**East West Rail
(Western Section)
Phase 2**

Drawing Title
**CIVIL ENGINEERING
RIVER ALIGNMENT 1 SECTION 2A1
LANGFORD BROOK BACKWATER**



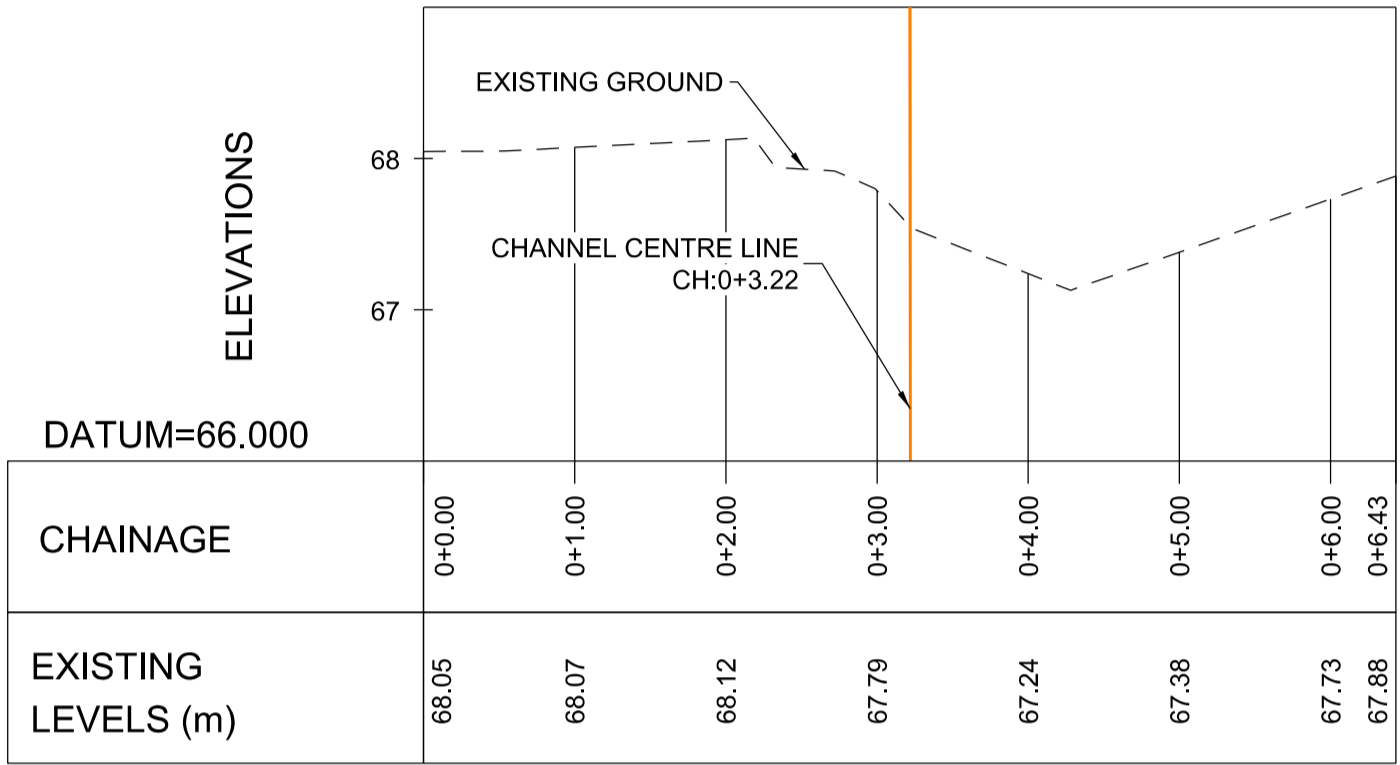
Designed	---	Signed	---	Date	---
Drawn	Vinay Kumar G	Signed	V. K. G	Date	23/12/19
Checked	---	Signed	---	Date	---
Approved	---	Signed	---	Date	---

Scale(s)	AS SHOWN	ELR - Project Chainage (Miles Yards)	XX - \$EDIT#PW_PROJECT_CHAINAGE
Design Package Risk Classification	Normal	Sheet	0 of 0
Alternative Reference		Revision	B01
Drawing Number	133735_RW-EWR-XX-XX-DR-DR-010016		

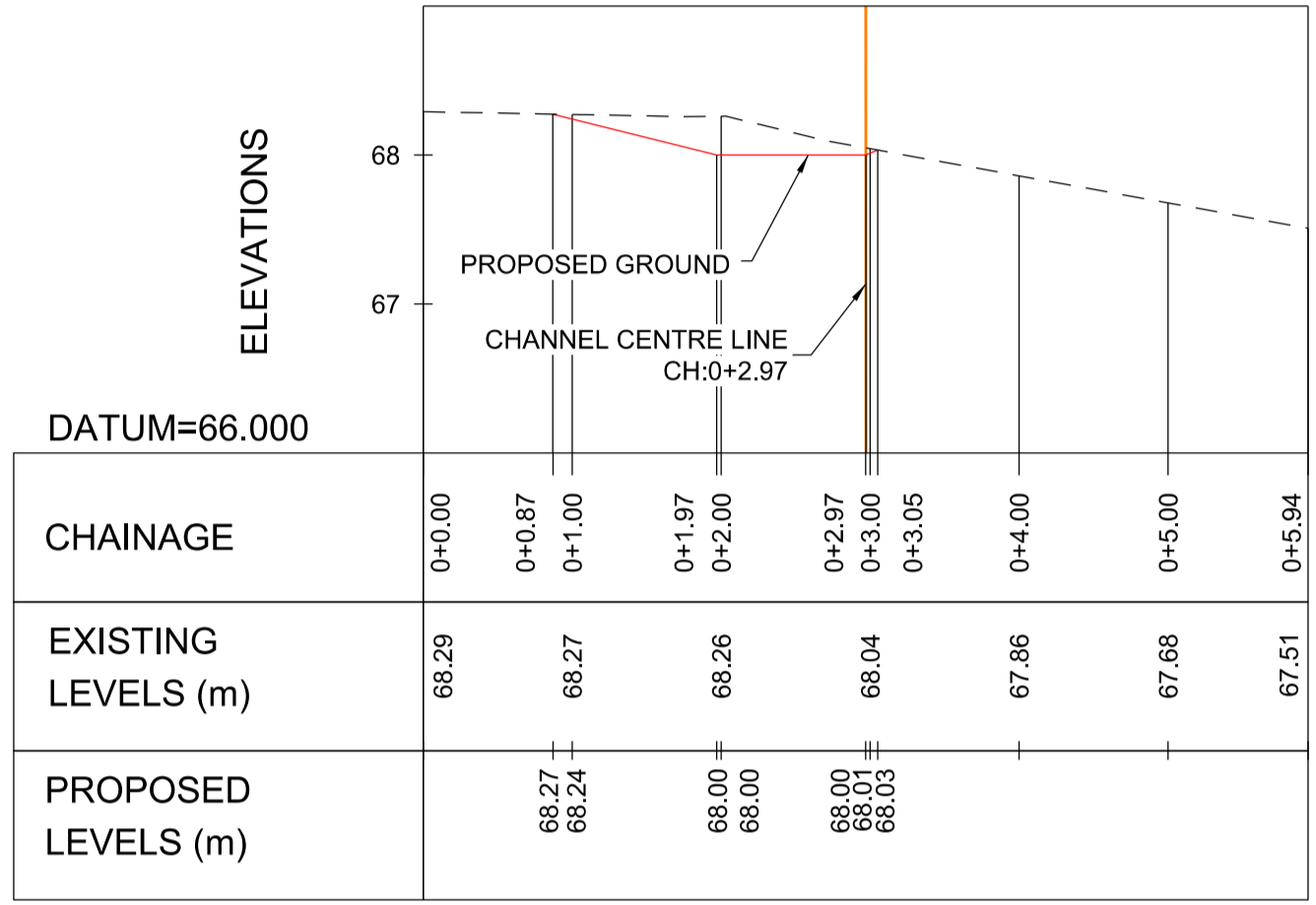
Safety, Health and Environmental Information
The works are to be undertaken by a competent contractor, and therefore only exceptional risks relating to the works associated with this drawing are identified below. For further details and proposed safety measures refer "EWR CDM PHASE 2 HAZARD LOG" ProjectWise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

ID	Hazard description
EWR2-HAZ_	-

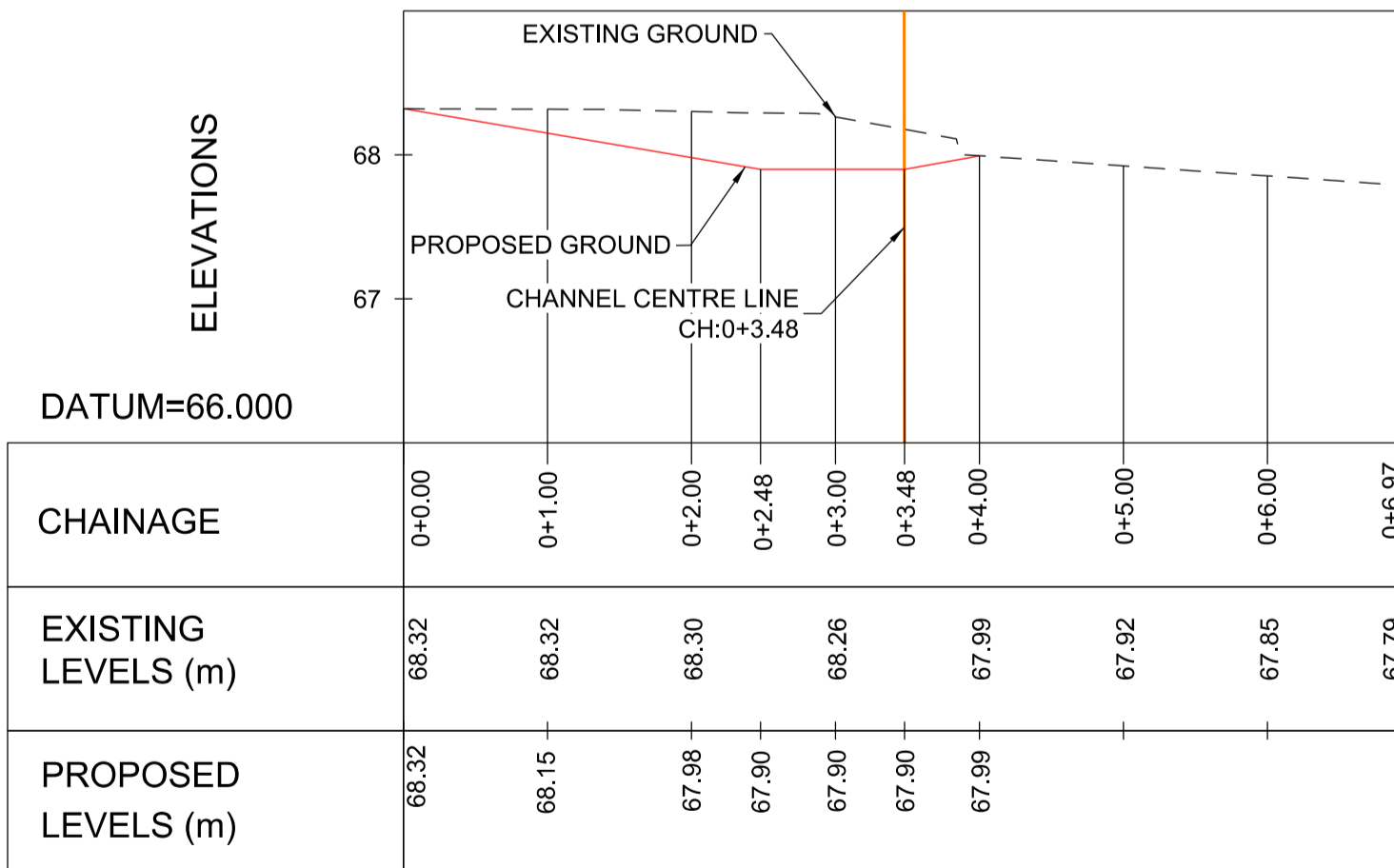
- GENERAL NOTES:**
- ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED.
 - PLEASE READ IN CONJUNCTION WITH DRAWING(S) [133735-RW-EWR-XX-XX-DR-DR-011016, 133735-RW-EWR-XX-XX-DR-DR-031011, 133735-RW-EWR-XX-XX-DR-DR-031012, 133735-RW-EWR-XX-XX-DR-DR-031013, 133735-RW-EWR-XX-XX-DR-DR-031014, 133735-RW-EWR-XX-XX-DR-DR-031014, 133735-RW-EWR-XX-XX-DR-DR-031014, 133735-RW-EWR-XX-XX-DR-DR-041015] AND THE WATERCOURSE REALIGNMENTS STATEMENT OF DESIGN INTENT REPORT REF: 133735_RW-EWR-XX-XX-RP-DR-000002.
 - AN APPROPRIATELY EXPERIENCED FLUVIAL GEOMORPHOLOGIST MUST BE PRESENT ON-SITE DURING CONSTRUCTION TO SUPERVISE AND ADVISE DETAILS OUTLINED WITHIN THE CEMP.
 - PRESENCE OF CONTAMINATION SHOULD BE CHECKED AND, IF PRESENT, REMEDIATION MEASURES PUT IN PLACE PRIOR TO CONSTRUCTION.
 - A SEDIMENT MANAGEMENT PLAN (ADHERING TO GOOD PRACTICE GUIDELINES) SHOULD BE ESTABLISHED TO PREVENT/REDUCE FINE SEDIMENT ENTERING OR BEING MOBILISED THROUGH THE CHANNEL REACH.
 - EXCAVATED MATERIALS MUST BE DISPOSED OF OUTSIDE THE ADJACENT FLOODPLAIN OR OFFSITE, OR OTHERWISE AGREED IN WRITING WITH THE ENVIRONMENT AGENCY, LLFA OR IDB.
 - AN ECOLOGICAL CLERK OF WORKS SHOULD BE CONSULTED PRIOR TO ANY WORKS PROGRESSING TO ENSURE THAT ANY MITIGATION FOR ANY NOTABLE AND PROTECTED SPECIES IS UNDERTAKEN PRIOR TO ANY CONSTRUCTION ACTIVITY. THIS SHOULD INCLUDE FISH RESCUE PLAN AND A PLAN FOR THE OTTERS WHICH ARE KNOWN TO FREQUENT THE SITE.
 - IT IS RECOMMENDED CHANNEL WORKS BE CARRIED OUT DURING SUMMER MONTHS WHEN FLOWS ARE LIKELY TO BE LOWER.
 - CHANNELS TO BE CUT TO BED LEVEL AND TIE-IN WITH CULVERTS UNLESS OTHERWISE STATED; CULVERTS DESIGNED WITH A DEPRESSED INVERT TO ENABLE A NATURAL BED TRANSITION.
 - LANDSCAPING WORKS TO BE UNDERTAKEN IN LINE WITH THE LANDSCAPE MANAGEMENT PLAN AND PLANTING PLAN; SEE DRAWING [C133735-2A-OXD-XX-DR-L-01927].
 - WATER EDGE WITHIN THE BACKWATER TO BE SEEDED WITH POND EDGE MIX USING EMORSGATE EP1 AT A RATE OF 4G/M2.
 - BACKWATER SLOPES AND AREA BETWEEN CROSS-SECTIONS B-B0 AND D-D0 TO BE SOWN WITH EMORSGATE EG8 AT A RATE OF 5G/M2.
 - STORM EVENTS FOR LANGFORD BROOK ARE FOLLOWS:
5-YEAR EVENT: 2.91 m³/s.
100-YEAR EVENT: 2.34 m³/s (NOTE REDUCED FROM 5-YEAR EVENT AS MORE FLOW IS NOW IN THE FLOODPLAIN).
100-YEAR PLUS CLIMATE CHANGE EVENT: 3.56 m³/s.



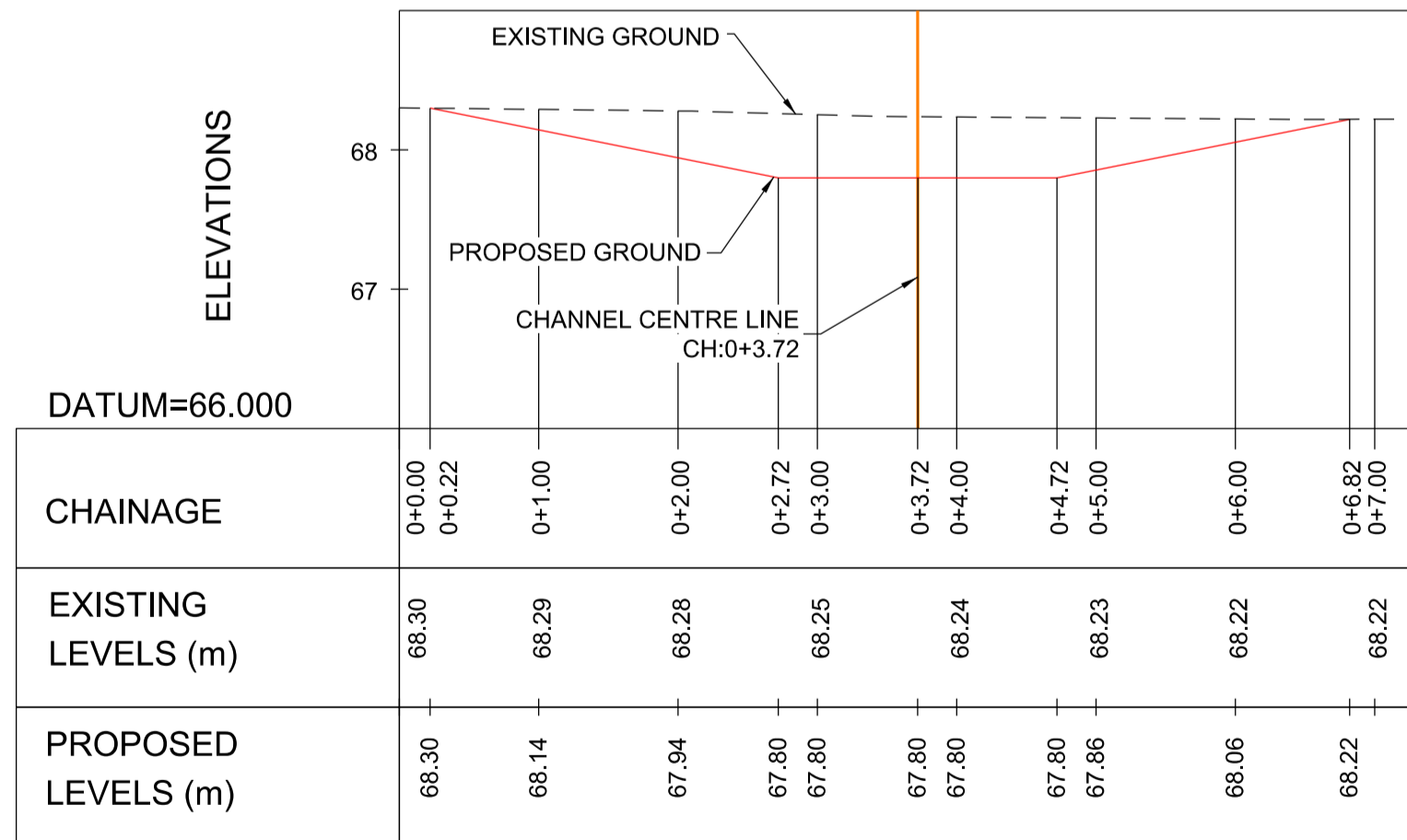
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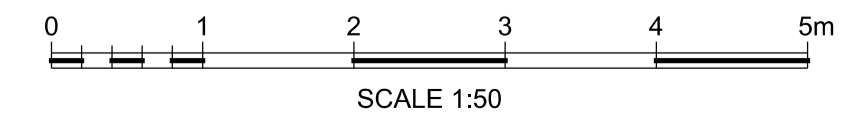
SECTION - B-B0 - CHAINAGE 0+5.0



SECTION - C-C0 - CHAINAGE 0+12.0



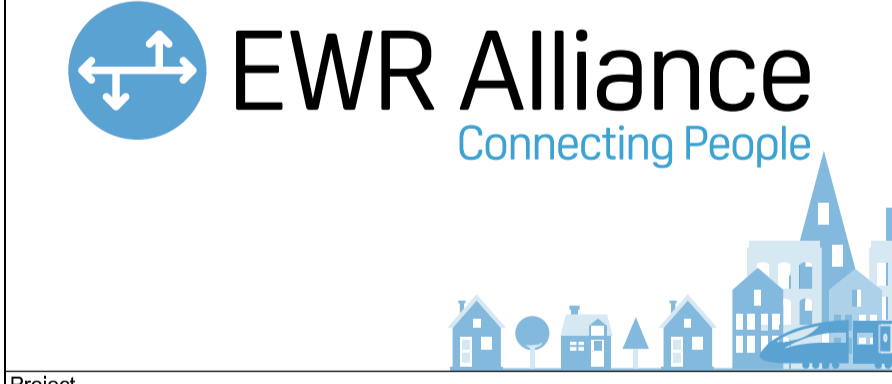
SECTION - D-D0 - CHAINAGE 0+20.0



REFERENCE DRAWING : (GENERAL PLAN)
133735_RW-EWR-XX-XX-DR-DR-011016

LEGEND:
--- EXISTING GROUND
--- PROPOSED GROUND

Rev	Date	Description of Revisions	Dsmd	Chkd	Appr	Suitability
B01	27/01/20		--	--	--	
WIP - Design						S0



Project
East West Rail (Western Section) Phase 2

Drawing Title
CIVIL ENGINEERING SECTION 2A1 LANGFORD BROOK CROSS SECTION A-A0 TO D-D0

Designed	---	Signed	---	Date	---
Drawn	Vinay Kumar G	Signed	V. K. G	Date	20/12/19
Checked	---	Signed	---	Date	---
Approved	---	Signed	---	Date	---

Scale(s)
1:50
ELR - Project Chainage (Miles Yards)
XX - \$EDIT#PW_PROJECT_CHAINAGE

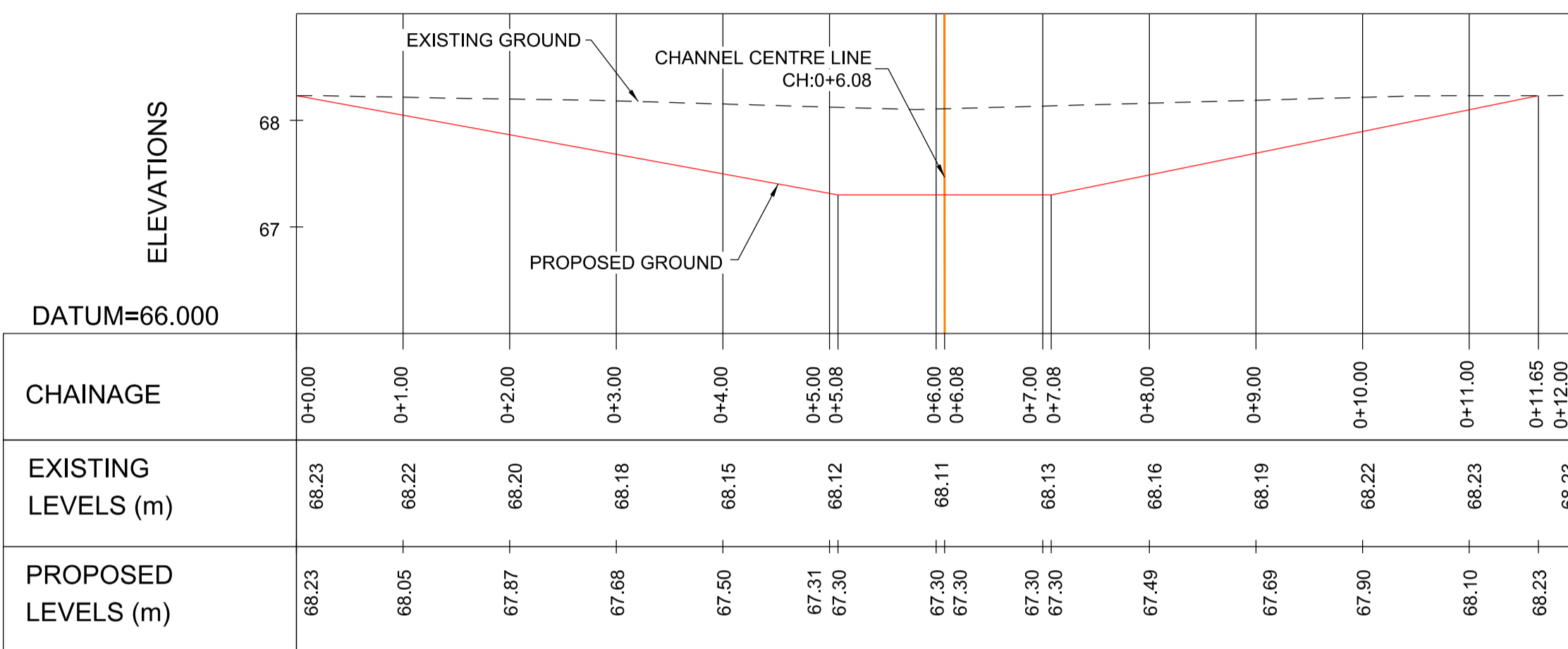
Design Package Risk Classification
Normal
Sheet
0 of 0
Revision
B01

Drawing Number
133735_RW-EWR-XX-XX-DR-DR-031011

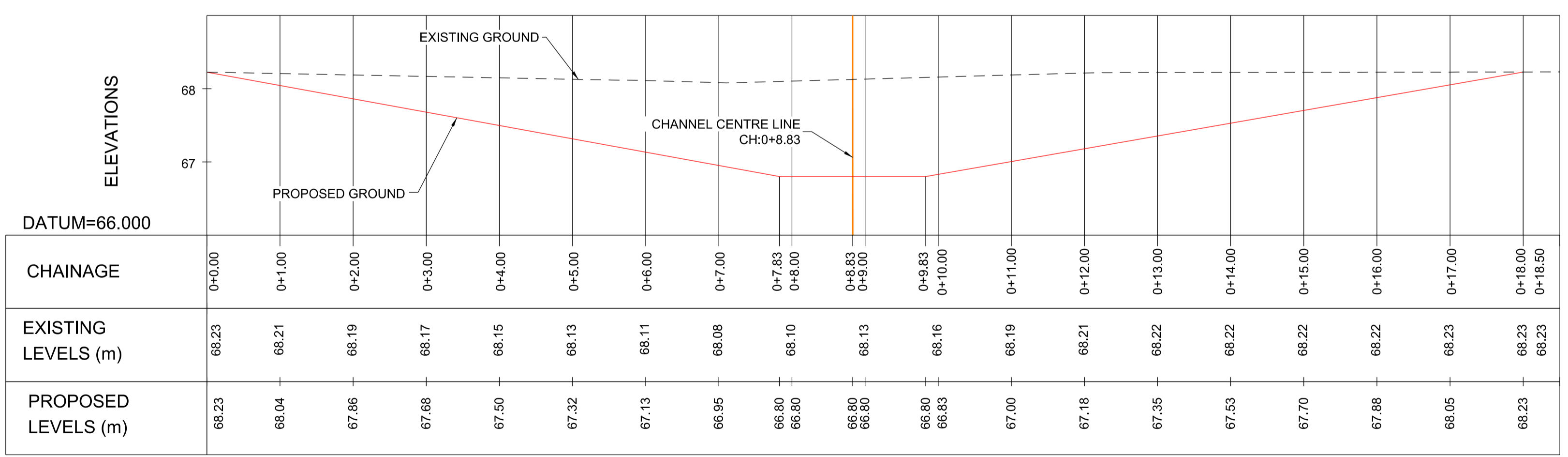
Safety, Health and Environmental Information
The works are to be undertaken by a competent contractor, and therefore only exceptional risks relating to the works associated with this drawing are identified below. For further details and proposed safety measures refer "EWR CDM PHASE 2 HAZARD LOG" ProjectWise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

ID	Hazard description
EWR2-HAZ_	-

- GENERAL NOTES:**
- ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED.
 - PLEASE READ IN CONJUNCTION WITH DRAWING(S) [133735-RW-EWR-XX-XX-DR-DR-011016, 133735-RW-EWR-XX-XX-DR-DR-031011, 133735-RW-EWR-XX-XX-DR-DR-031012, 133735-RW-EWR-XX-XX-DR-DR-031013, 133735-RW-EWR-XX-XX-DR-DR-031014, 133735-RW-EWR-XX-XX-DR-DR-031014, 133735-RW-EWR-XX-XX-DR-DR-031014, 133735-RW-EWR-XX-XX-DR-DR-041015] AND THE WATERCOURSE REALIGNMENTS STATEMENT OF DESIGN INTENT REPORT REF: 133735_RW-EWR-XX-XX-RP-DR-000002.
 - AN APPROPRIATELY EXPERIENCED FLUVIAL GEOMORPHOLOGIST MUST BE PRESENT ON-SITE DURING CONSTRUCTION TO SUPERVISE AND ADVISE DETAILS OUTLINED WITHIN THE CEMP.
 - PRESENCE OF CONTAMINATION SHOULD BE CHECKED AND, IF PRESENT, REMEDIATION MEASURES PUT IN PLACE PRIOR TO CONSTRUCTION.
 - A SEDIMENT MANAGEMENT PLAN (ADHERING TO GOOD PRACTICE GUIDELINES) SHOULD BE ESTABLISHED TO PREVENT/REDUCE FINE SEDIMENT ENTERING OR BEING MOBILISED THROUGH THE CHANNEL REACH.
 - EXCAVATED MATERIALS MUST BE DISPOSED OF OUTSIDE THE ADJACENT FLOODPLAIN OR OFFSITE, OR OTHERWISE AGREED IN WRITING WITH THE ENVIRONMENT AGENCY, LLFA OR IDB.
 - AN ECOLOGICAL CLERK OF WORKS SHOULD BE CONSULTED PRIOR TO ANY WORKS PROGRESSING TO ENSURE THAT ANY MITIGATION FOR ANY NOTABLE AND PROTECTED SPECIES IS UNDERTAKEN PRIOR TO ANY CONSTRUCTION ACTIVITY. THIS SHOULD INCLUDE FISH RESCUE PLAN AND A PLAN FOR THE OTTERS WHICH ARE KNOWN TO FREQUENT THE SITE.
 - IT IS RECOMMENDED CHANNEL WORKS BE CARRIED OUT DURING SUMMER MONTHS WHEN FLOWS ARE LIKELY TO BE LOWER.
 - CHANNELS TO BE CUT TO BED LEVEL AND TIE-IN WITH CULVERTS UNLESS OTHERWISE STATED; CULVERTS DESIGNED WITH A DEPRESSED INVERT TO ENABLE A NATURAL BED TRANSITION.
 - LANDSCAPING WORKS TO BE UNDERTAKEN IN LINE WITH THE LANDSCAPE MANAGEMENT PLAN AND PLANTING PLAN; SEE DRAWING [C133735-2A-0XD-XX-DR-L-01927].
 - WATER EDGE WITHIN THE BACKWATER TO BE SEEDED WITH POND EDGE MIX USING EMORSGATE EP1 AT A RATE OF 4G/M2.
 - BACKWATER SLOPES AND AREA BETWEEN CROSS-SECTIONS B-B0 AND D-D0 TO BE SOWN WITH EMORSGATE EG8 AT A RATE OF 5G/M2.
 - STORM EVENTS FOR LANGFORD BROOK ARE FOLLOWS:
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100-YEAR EVENT: 2.34 m³/s (NOTE REDUCED FROM 5-YEAR EVENT AS MORE FLOW IS NOW IN THE FLOODPLAIN).
100-YEAR PLUS CLIMATE CHANGE EVENT: 3.56 m³/s.



SECTION - E-E0 - CHAINAGE 0+25.0



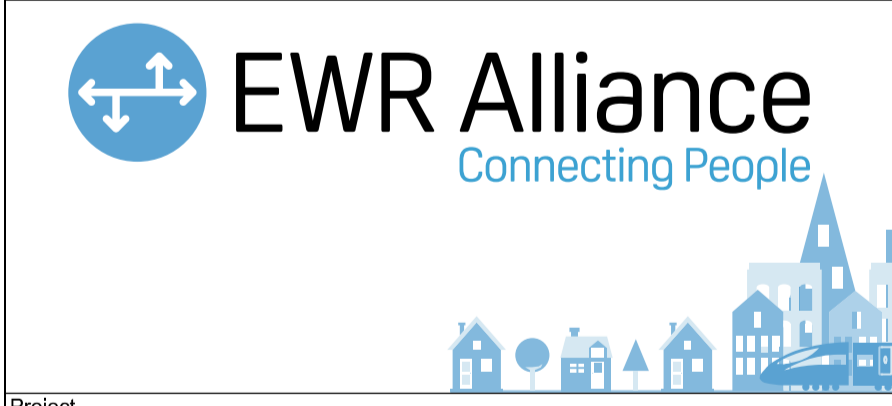
SECTION - F-F0 - CHAINAGE 0+30.0

REFERENCE DRAWING : (GENERAL PLAN)
133735_RW-EWR-XX-XX-DR-DR-011016

LEGEND:
 - - - - - EXISTING GROUND
 _____ PROPOSED GROUND

Rev	Date	Description of Revisions	Dsmd	Chkd	Appr
B01	27/01/20		--	--	--

Status: WIP - Design S0



Project
**East West Rail
(Western Section)
Phase 2**

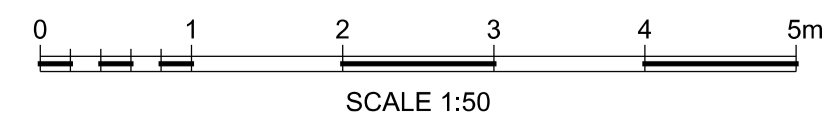
Drawing Title
**CIVIL ENGINEERING
RIVER ALIGNMENT 1 SECTION 2A1
LANGFORD BROOK
CROSS SECTION E-E0 TO H-H0**

Designed	---	Signed	---	Date	---
Drawn	Vinay Kumar G	Signed	V. K. G	Date	23/12/19
Checked	---	Signed	---	Date	---
Approved	---	Signed	---	Date	---

Scale(s)
1:50
ELR - Project Chainage (Miles Yards)
XX - \$EDIT#PW_PROJECT_CHAINAGE

Design Package Risk Classification
Normal

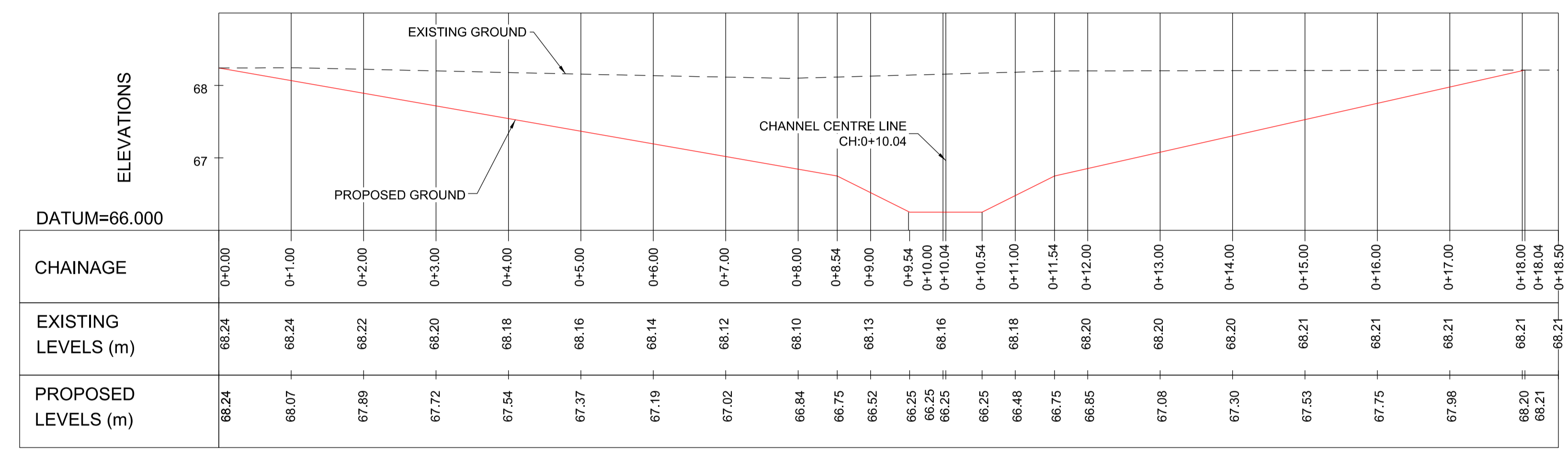
Alternative Reference
Sheet 0 of 0
Revision B01



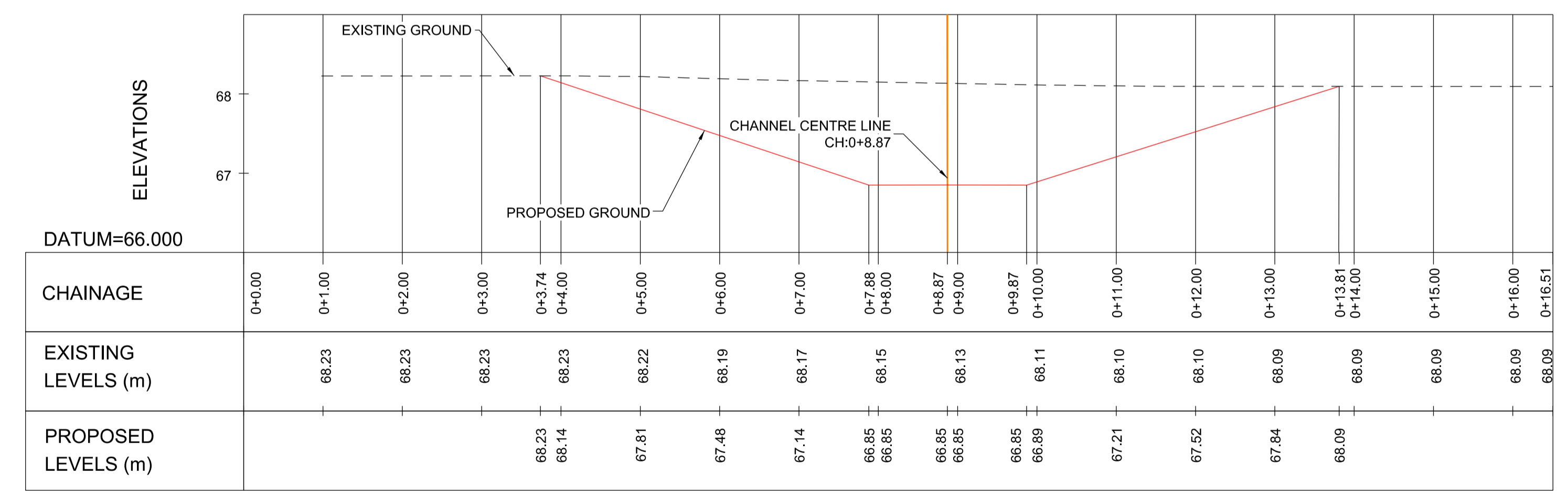
Safety, Health and Environmental Information
The works are to be undertaken by a competent contractor, and therefore only exceptional risks relating to the works associated with this drawing are identified below. For further details and proposed safety measures refer "EWR CDM PHASE 2 HAZARD LOG" ProjectWise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

ID	Hazard description
EWR2-HAZ_	-

- GENERAL NOTES:**
- ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED.
 - PLEASE READ IN CONJUNCTION WITH DRAWING(S)
[133735-RW-EWR-XX-XX-DR-DR-011016,
133735-RW-EWR-XX-XX-DR-DR-031011,
133735-RW-EWR-XX-XX-DR-DR-031012,
133735-RW-EWR-XX-XX-DR-DR-031013,
133735-RW-EWR-XX-XX-DR-DR-031014,
133735-RW-EWR-XX-XX-DR-DR-031014,
133735-RW-EWR-XX-XX-DR-DR-031014,
133735-RW-EWR-XX-XX-DR-DR-041015] AND THE WATERCOURSE REALIGNMENTS STATEMENT OF DESIGN INTENT REPORT REF: 133735_RW-EWR-XX-XX-RP-DR-000002.
 - AN APPROPRIATELY EXPERIENCED FLUVIAL GEOMORPHOLOGIST MUST BE PRESENT ON-SITE DURING CONSTRUCTION TO SUPERVISE AND ADVISE DETAILS OUTLINED WITHIN THE CEMP.
 - PRESENCE OF CONTAMINATION SHOULD BE CHECKED AND, IF PRESENT, REMEDIATION MEASURES PUT IN PLACE PRIOR TO CONSTRUCTION.
 - A SEDIMENT MANAGEMENT PLAN (ADHERING TO GOOD PRACTICE GUIDELINES) SHOULD BE ESTABLISHED TO PREVENT/REDUCE FINE SEDIMENT ENTERING OR BEING MOBILISED THROUGH THE CHANNEL REACH.
 - EXCAVATED MATERIALS MUST BE DISPOSED OF OUTSIDE THE ADJACENT FLOODPLAIN OR OFFSITE, OR OTHERWISE AGREED IN WRITING WITH THE ENVIRONMENT AGENCY, LLFA OR IDB.
 - AN ECOLOGICAL CLERK OF WORKS SHOULD BE CONSULTED PRIOR TO ANY WORKS PROGRESSING TO ENSURE THAT ANY MITIGATION FOR ANY NOTABLE AND PROTECTED SPECIES IS UNDERTAKEN PRIOR TO ANY CONSTRUCTION ACTIVITY. THIS SHOULD INCLUDE FISH RESCUE PLAN AND A PLAN FOR THE OTTERS WHICH ARE KNOWN TO FREQUENT THE SITE.
 - IT IS RECOMMENDED CHANNEL WORKS BE CARRIED OUT DURING SUMMER MONTHS WHEN FLOWS ARE LIKELY TO BE LOWER.
 - CHANNELS TO BE CUT TO BED LEVEL AND TIE-IN WITH CULVERTS UNLESS OTHERWISE STATED; CULVERTS DESIGNED WITH A DEPRESSED INVERT TO ENABLE A NATURAL BED TRANSITION.
 - LANDSCAPING WORKS TO BE UNDERTAKEN IN LINE WITH THE LANDSCAPE MANAGEMENT PLAN AND PLANTING PLAN; SEE DRAWING [C133735-2A-0XD-XX-DR-L-01927].
 - WATER EDGE WITHIN THE BACKWATER TO BE SEEDED WITH POND EDGE MIX USING EMORSGATE EP1 AT A RATE OF 4G/M2.
 - BACKWATER SLOPES AND AREA BETWEEN CROSS-SECTIONS B-B0 AND D-D0 TO BE SOWN WITH EMORSGATE EG8 AT A RATE OF 5G/M2.
 - STORM EVENTS FOR LANGFORD BROOK ARE FOLLOWS:
5-YEAR EVENT: 2.91 m³/s.
100-YEAR EVENT: 2.34 m³/s (NOTE REDUCED FROM 5-YEAR EVENT AS MORE FLOW IS NOW IN THE FLOODPLAIN).
100-YEAR PLUS CLIMATE CHANGE EVENT: 3.56 m³/s.



SECTION - G-G0 - CHAINAGE 0+38.0

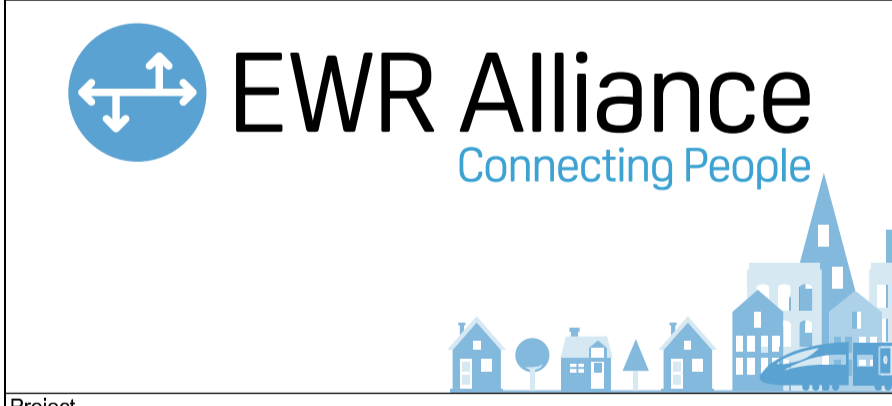


SECTION - H-H0 - CHAINAGE 0+46.0

REFERENCE DRAWING : (GENERAL PLAN)
133735_RW-EWR-XX-XX-DR-DR-011016

LEGEND:
- - - - - EXISTING GROUND
- - - - - PROPOSED GROUND

Rev	Date	Description of Revisions	Dsnd	Chkd	Appr	Suitability
B01	27/01/20					



Project
**East West Rail
(Western Section)
Phase 2**

Drawing Title
**CIVIL ENGINEERING
RIVER ALIGNMENT 1 SECTION 2A1
LANGFORD BROOK
CROSS SECTION G-G0 TO H-H0**

Designed	---	Signed	---	Date	---
Drawn	Vinay Kumar G	Signed	V. K. G	Date	23/12/19
Checked	---	Signed	---	Date	---
Approved	---	Signed	---	Date	---

Scale(s)
1:50

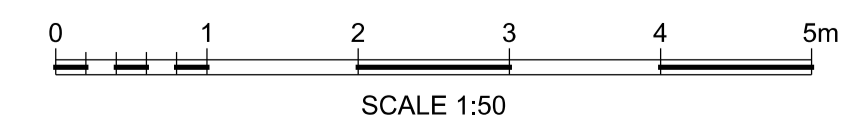
ELR - Project Chainage (Miles Yards)
XX - \$EDIT#PW_PROJECT_CHAINAGE

Design Package Risk Classification
Normal

Alternative Reference

Drawing Number
133735_RW-EWR-XX-XX-DR-DR-031013

Sheet 0 of 0
Revision B01



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" ProjectWise doc. Ref: 133735-EWR-LOG-SSD-000004.

ID	Hazard description
EWR2-HAZ_	-

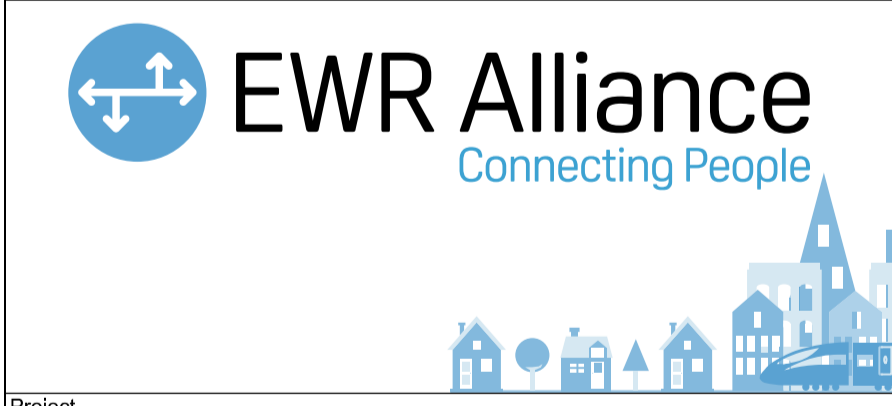
- GENERAL NOTES:**
- ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED.
 - PLEASE READ IN CONJUNCTION WITH DRAWING(S) [133735-RW-EWR-XX-XX-DR-DR-011016, 133735-RW-EWR-XX-XX-DR-DR-031011, 133735-RW-EWR-XX-XX-DR-DR-031012, 133735-RW-EWR-XX-XX-DR-DR-031013, 133735-RW-EWR-XX-XX-DR-DR-031014, 133735-RW-EWR-XX-XX-DR-DR-031014, 133735-RW-EWR-XX-XX-DR-DR-031014, 133735-RW-EWR-XX-XX-DR-DR-041015] AND THE WATERCOURSE REALIGNMENTS STATEMENT OF DESIGN INTENT REPORT REF: 133735_RW-EWR-XX-XX-RP-DR-000002.
 - AN APPROPRIATELY EXPERIENCED FLUVIAL GEOMORPHOLOGIST MUST BE PRESENT ON-SITE DURING CONSTRUCTION TO SUPERVISE AND ADVISE DETAILS OUTLINED WITHIN THE CEMP.
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 - LANDSCAPING WORKS TO BE UNDERTAKEN IN LINE WITH THE LANDSCAPE MANAGEMENT PLAN AND PLANTING PLAN; SEE DRAWING [C133735-2A-0XD-XX-DR-L-01927].
 - WATER EDGE WITHIN THE BACKWATER TO BE SEEDED WITH POND EDGE MIX USING EMORSGATE EP1 AT A RATE OF 4G/M2.
 - BACKWATER SLOPES AND AREA BETWEEN CROSS-SECTIONS B-B0 AND D-D0 TO BE SOWN WITH EMORSGATE EG8 AT A RATE OF 5G/M2.
 - STORM EVENTS FOR LANGFORD BROOK ARE FOLLOWS:
5-YEAR EVENT: 2.91 m³/s.
100-YEAR EVENT: 2.34 m³/s (NOTE REDUCED FROM 5-YEAR EVENT AS MORE FLOW IS NOW IN THE FLOODPLAIN).
100-YEAR PLUS CLIMATE CHANGE EVENT: 3.56 m³/s.

REFERENCE DRAWING : (GENERAL PLAN)
133735_RW-EWR-XX-XX-DR-DR-011016

LEGEND:
 EXISTING GROUND
 PROPOSED GROUND

Rev	Date	Description of Revisions	Dsmd	Chkd	Appr	Suitability
B01	27/01/20		--	--	--	
						S0

WIP - Design



**East West Rail
(Western Section)
Phase 2**

**CIVIL ENGINEERING
RIVER ALIGNMENT 1 SECTION 2A1
LANGFORD BROOK
CROSS SECTION I-I0 TO L-L0**

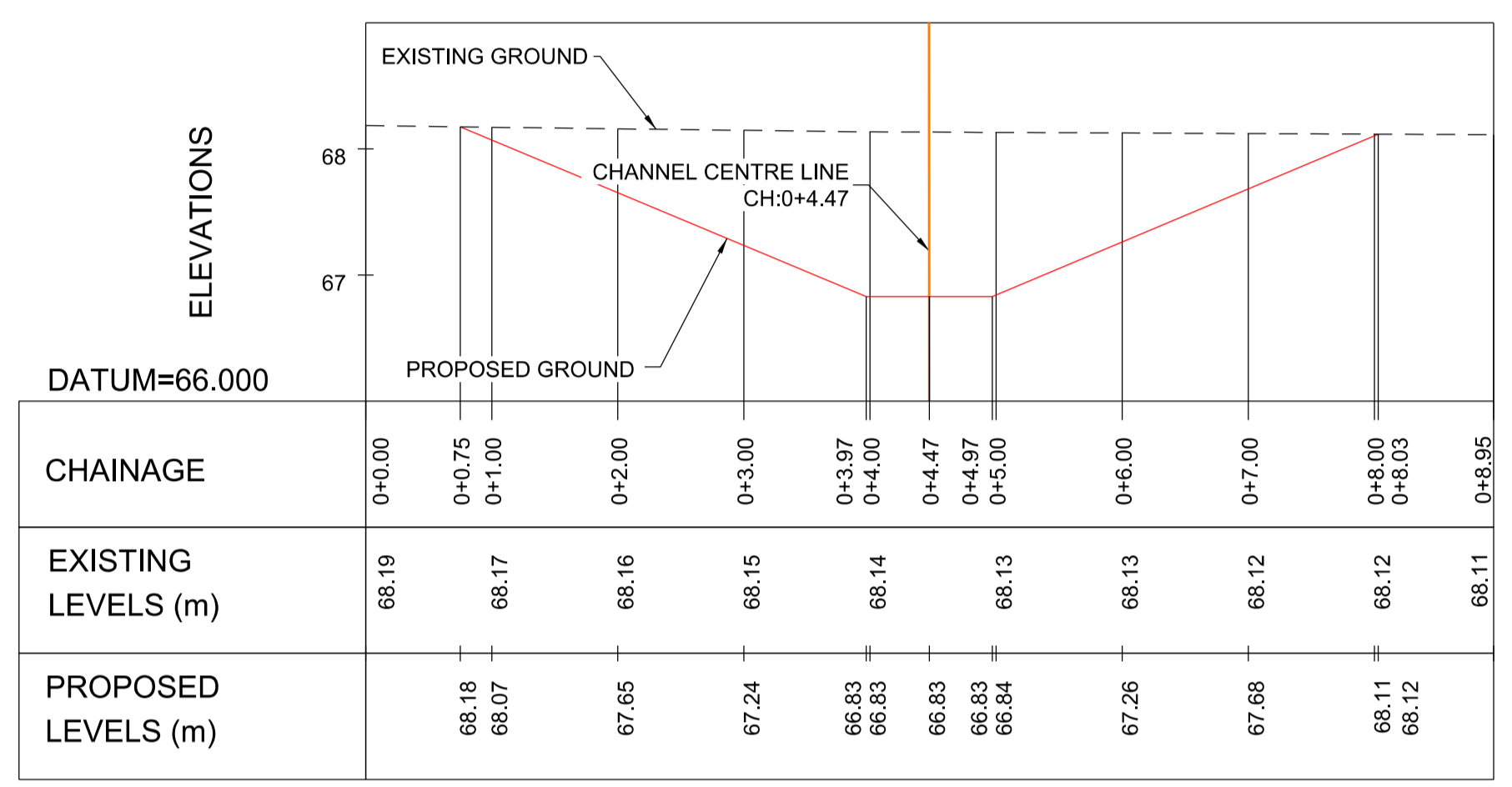
Designed	---	Signed	---	Date	---
Drawn	Vinay Kumar G	Signed	V. K. G	Date	23/12/19
Checked	---	Signed	---	Date	---
Approved	---	Signed	---	Date	---

Scale(s)
1:50
ELR - Project Chainage (Miles Yards)
XX - \$EDIT#PW_PROJECT_CHAINAGE

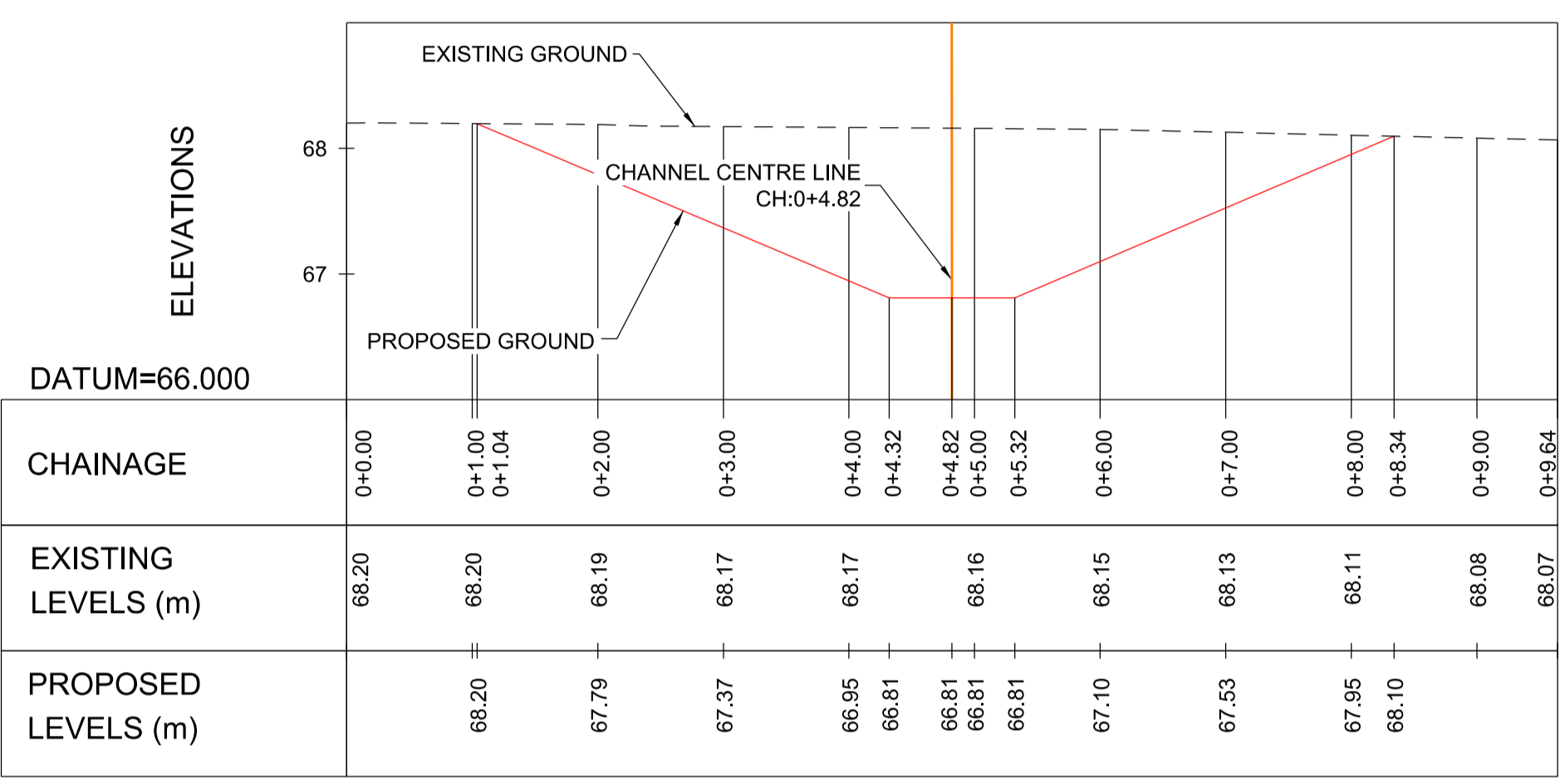
Design Package Risk Classification
Normal

Alternative Reference
Revision
B01

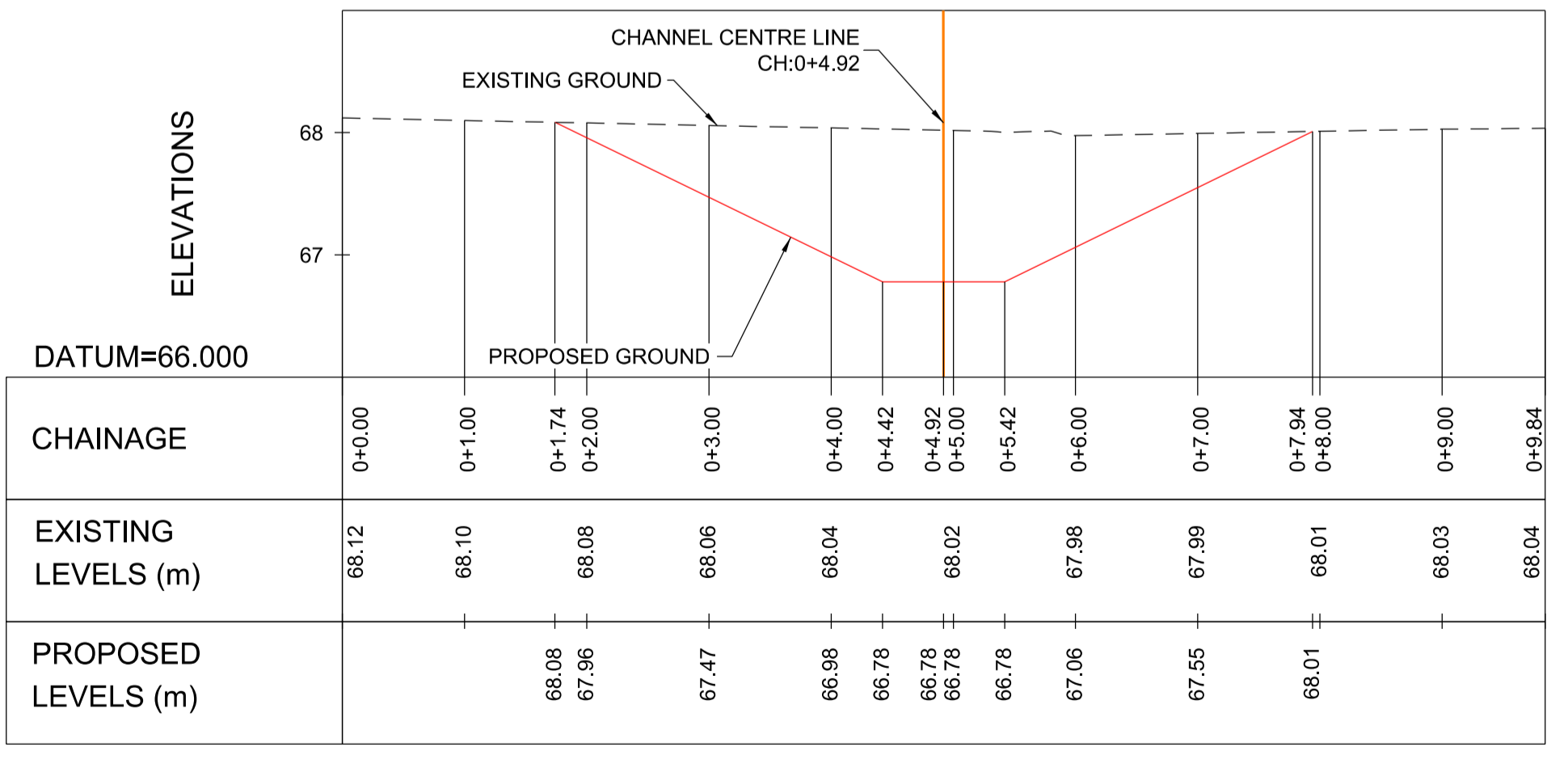
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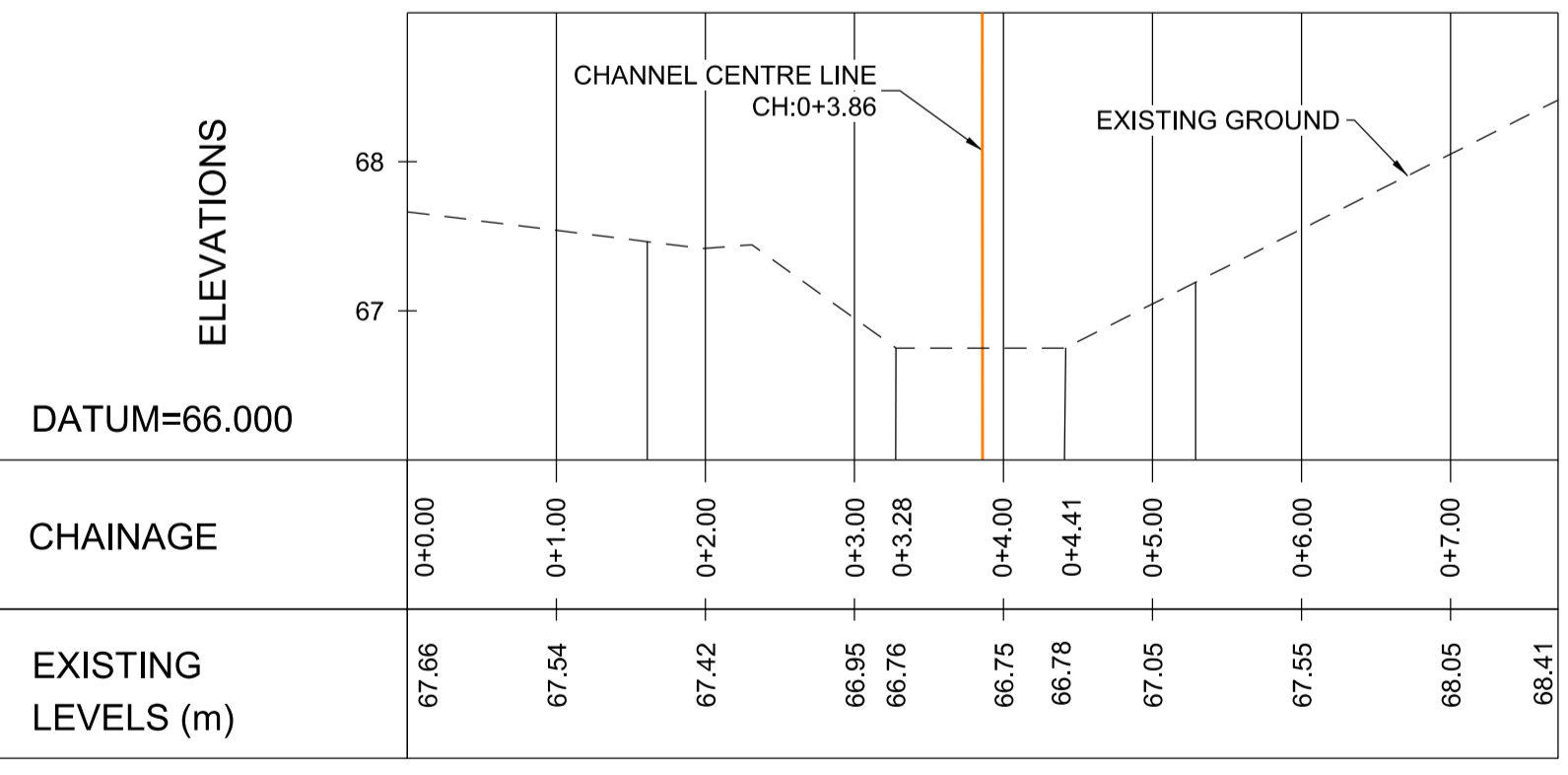
SECTION - I-I0 - CHAINAGE 0+50.0



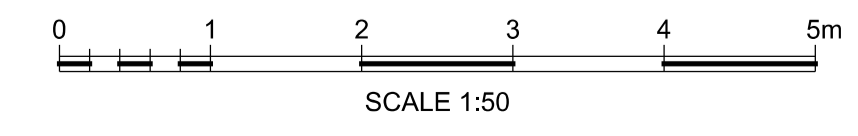
SECTION - J-J0 - CHAINAGE 0+55.0

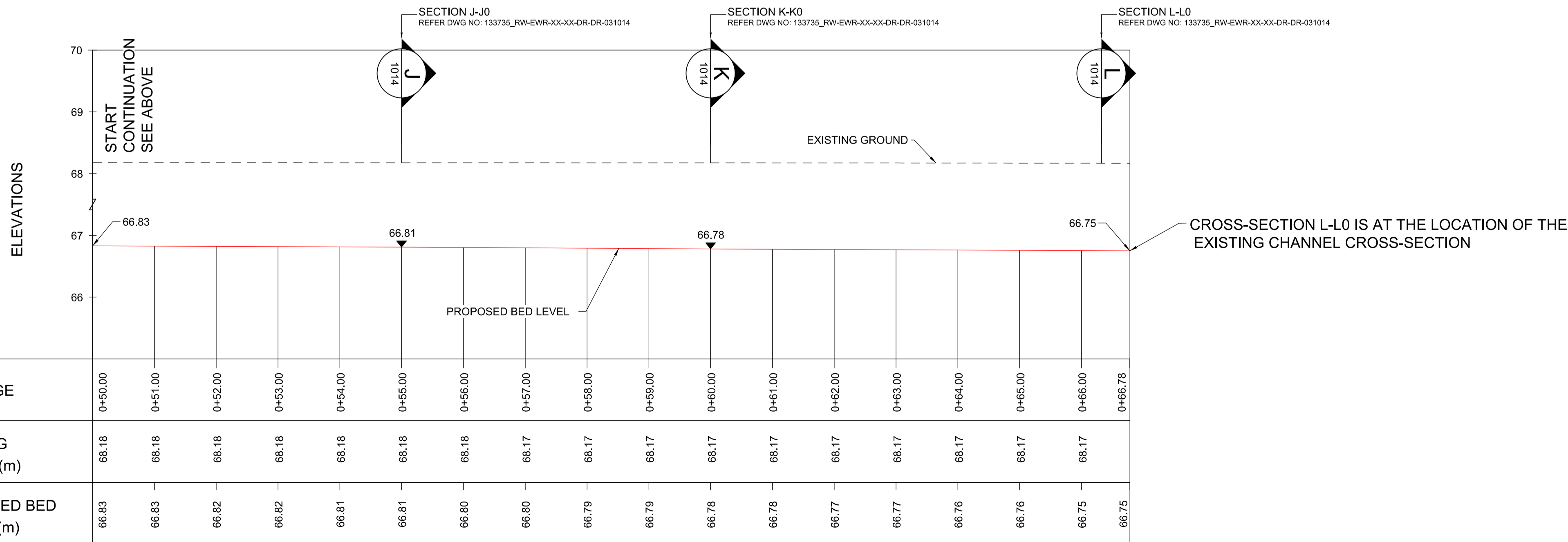
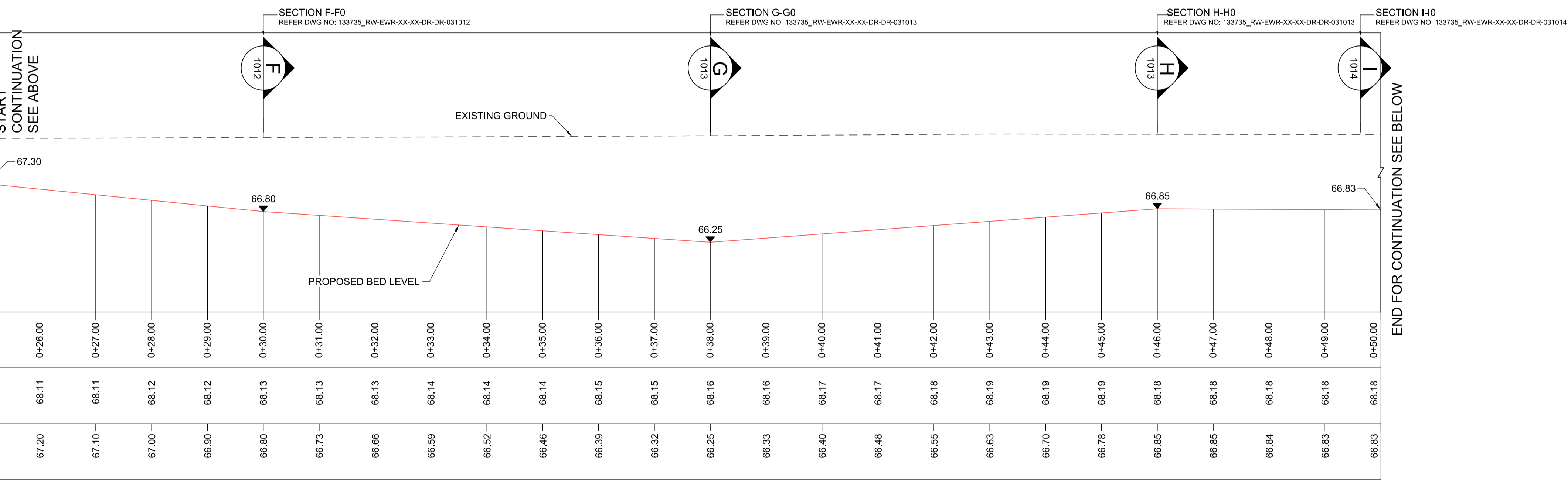
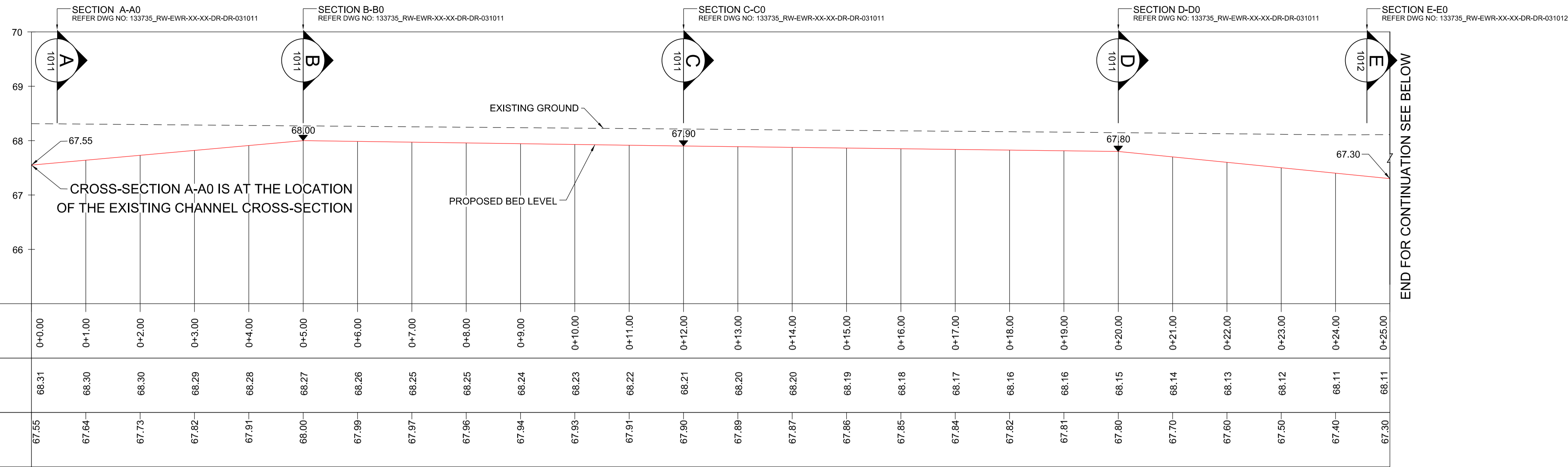


SECTION - K-K0 - CHAINAGE 0+60.0



SECTION - L-L0 - CHAINAGE 0+60.0





GENERAL NOTES:

- ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED.
- PLEASE READ IN CONJUNCTION WITH DRAWING(S) [133735-RW-EWR-XX-XX-DR-DR-011016, 133735-RW-EWR-XX-XX-DR-DR-031011, 133735-RW-EWR-XX-XX-DR-DR-031012, 133735-RW-EWR-XX-XX-DR-DR-031013, 133735-RW-EWR-XX-XX-DR-DR-031014, 133735-RW-EWR-XX-XX-DR-DR-031014, 133735-RW-EWR-XX-XX-DR-DR-041015] AND THE WATERCOURSE REALIGNMENTS STATEMENT OF DESIGN INTENT REPORT REF: 133735_RW-EWR-XX-XX-RP-DR-000002.
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- AN ECOLOGICAL CLERK OF WORKS SHOULD BE CONSULTED PRIOR TO ANY WORKS PROGRESSING TO ENSURE THAT ANY MITIGATION FOR ANY NOTABLE AND PROTECTED SPECIES IS UNDERTAKEN PRIOR TO ANY CONSTRUCTION ACTIVITY. THIS SHOULD INCLUDE FISH RESCUE PLAN AND A PLAN FOR THE OTTERS WHICH ARE KNOWN TO FREQUENT THE SITE.
- IT IS RECOMMENDED CHANNEL WORKS BE CARRIED OUT DURING SUMMER MONTHS WHEN FLOWS ARE LIKELY TO BE LOWER.
- CHANNELS TO BE CUT TO BED LEVEL AND TIE-IN WITH CULVERTS UNLESS OTHERWISE STATED; CULVERTS DESIGNED WITH A DEPRESSED INVERT TO ENABLE A NATURAL BED TRANSITION.
- LANDSCAPING WORKS TO BE UNDERTAKEN IN LINE WITH THE LANDSCAPE MANAGEMENT PLAN AND PLANTING PLAN; SEE DRAWING [C133735-2A-0XD-XX-DR-L-01927].
- WATER EDGE WITHIN THE BACKWATER TO BE SEEDED WITH POND EDGE MIX USING EMORSGATE EP1 AT A RATE OF 4G/M2.
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- STORM EVENTS FOR LANGFORD BROOK ARE FOLLOWS:
5-YEAR EVENT: 2.91 m³/s
100-YEAR EVENT: 2.34 m³/s (NOTE REDUCED FROM 5-YEAR EVENT AS MORE FLOW IS NOW IN THE FLOODPLAIN).
100-YEAR PLUS CLIMATE CHANGE EVENT: 3.56 m³/s.

REFERENCE DRAWING : (GENERAL PLAN)
133735_RW-EWR-XX-XX-DR-DR-011016

LEGEND:
--- EXISTING GROUND
--- PROPOSED BED LEVEL

Rev	Date	Description of Revisions	Dend	Chkd	Appr	Suitability
B01	27/01/20					

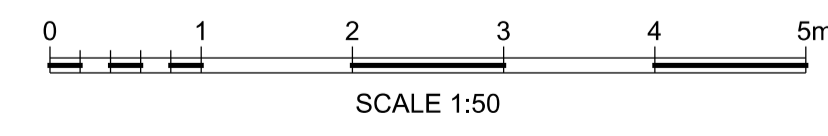


Project
**East West Rail
(Western Section)
Phase 2**

Drawing Title
**CIVIL ENGINEERING
LANGFORD BROOK BACKWATER
LONGITUDINAL PROFILE**

Designed	---	Signed	---	Date	---
Drawn	Vinay Kumar G	Signed	V. K. G	Date	26/12/19
Checked	---	Signed	---	Date	---
Approved	---	Signed	---	Date	---

Scale(s)
1:50
Design Package Risk Classification
Normal
Alternative Reference
Drawing Number
133735_RW-EWR-XX-XX-DR-DR-041015



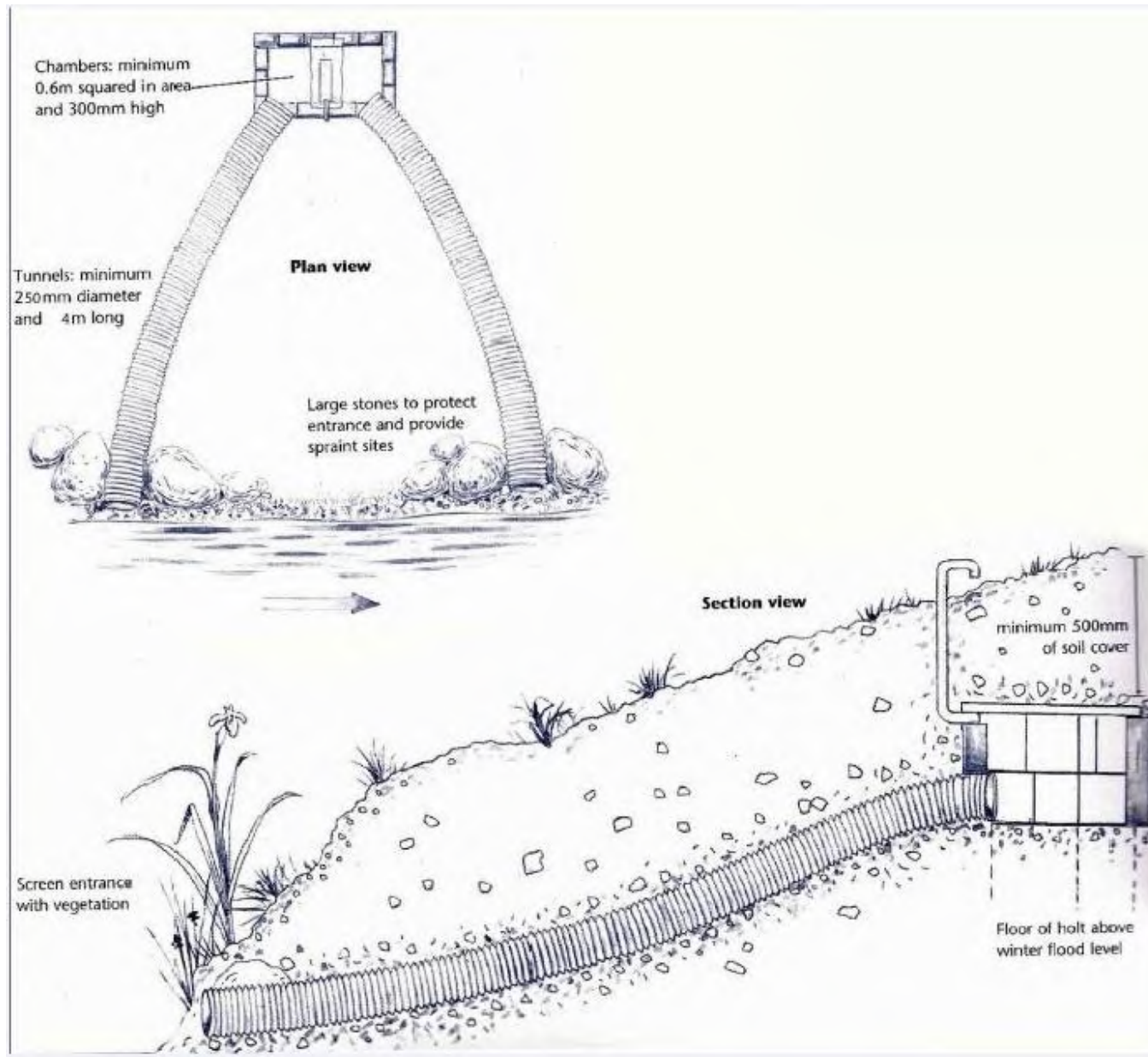
Safety, Health and Environmental Information
The works are to be undertaken by a competent contractor, and therefore only exceptional risks relating to the works associated with this drawing are identified below. For further details and proposed safety measures refer "EWR CDM PHASE 2 HAZARD LOG" ProjectWise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

ID	Hazard description
EWR2-HAZ-___	-

Appendix G. Artificial Otter Holt Design/Photos

CONFIDENTIAL









EWR Alliance

**East West Rail Alliance
Phoenix House
202 Elder Gate
Milton Keynes
MK9 1BE**

CONFIDENTIAL



Appendix II. Indicative Seed Mixes

II.I. Grassland (Emorsgate EM1 or Similar)

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

II.II. Grassland (Emorsgate ESG1 or Similar)

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

II.III. Scrub Species

Latin name	Common name
<i>Prunus spinosa</i>	Blackthorn
<i>Populus nigra</i>	Black poplar
<i>Malus sylvestris</i>	Crab apple
<i>Cornus sanguinea</i>	Dogwood

<i>Rosa canina</i>	Dog rose
<i>Sambucus nigra</i>	Elder
<i>Acer campestre</i>	Field maple
<i>Crataegus monogyna</i>	Hawthorn
<i>Ulmus glabra</i>	Wych elm
<i>Euonymus europaeus</i>	Spindle

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

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

4	<i>Phleum bertolonii</i>	Smaller cat's-tail
*The above gives percentages of EM3 seed mixture. This will be supplemented by seed stock of Meadow vetchling (<i>Lathyrus pratensis</i>) and additional Birdsfoot trefoil (<i>Lotus corniculatus</i>).		

II.V. Hedge with Trees

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

II.VI. Woodland Species

Latin name	Common name
<i>Quercus robur</i>	Pedunculate oak
<i>Malus sylvestris</i>	Crab apple
<i>Acer campestre</i>	Field maple
<i>Ulmus glabra</i>	Wych elm
<i>Sambucus nigra</i>	Elder
<i>Sorbus aucuparia</i>	Rowan
<i>Viburnum opulus</i>	Guelder rose

II.VII. Wetland Grassland (Emorsgate EM8 Wetland Mixture or similar)

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

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