



NORTHAMPTON
GATEWAY
STRATEGIC RAIL FREIGHT INTERCHANGE

**LANDSCAPE & ECOLOGICAL MANAGEMENT PLAN
(V.2) (CLEAN)**

**APPENDIX 5.12 TO ENVIRONMENTAL
STATEMENT (DOCUMENT 5.2)**

The Northampton Gateway Rail Freight Interchange Order 201X

LANDSCAPE & ECOLOGICAL
MANAGEMENT PLAN (V.2) (CLEAN) | 30 NOVEMBER 2018

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ROXHILL



Roxhill (Junction 15) Limited

Northampton Gateway, Northampton

LANDSCAPE AND ECOLOGICAL MANAGEMENT PLAN (LEMP)

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1.0 INTRODUCTION

- 1.1 The following Landscape and Ecological Management Plan (LEMP) has been prepared by FPCR Environment and Design Ltd. on behalf of Roxhill (Junction 15) Ltd. and provides a conservation-led plan of objectives and management prescriptions to be undertaken within the strategic on-site Green Infrastructure.
- 1.2 The LEMP has been produced to accompany an Environmental Statement of the development proposals and Construction Environmental Management Plan (CEMP) and should be read in conjunction with these documents.
- 1.3 The purpose of the LEMP is to set out the general principles for management during establishment and operation of both the existing conserved landscape / planting / habitats and new landscape / planting / Habitats as depicted in the Habitat Creation and Ecological Mitigation Measures – Main Site (FPCR Drg. No. 5772-L-47), Habitat Creation and Ecological Mitigation Measures – Roade Bypass (FPCR Drg. No. 5772-L-50) and Habitat Creation and Ecological Mitigation Measures – Roade Bypass (FPCR Drg. No. 5772-L-51), in order that these perform their intended ecological and landscape functions during operation. These functions are in three parts:
- to ameliorative (e.g. to screen views from sensitive receptors);
 - to mitigate/compensate (e.g. to provide alternative habitat for species displaced by the development); and
 - to provide enhancement (e.g. providing greater habitat connectivity, securing management of sensitive existing or proposed habitat).
- 1.4 Management measures required to minimise effects prior to and during construction will be outlined in the Phase Construction Environmental Management Plan (P-CEMP) for each phase which are required to comply with the CEMP.
- 1.5 Further information is provided in ES Chapters 4.0 and 5.0. Compliance with the LEMP will be a requirement of the DCO.

Development Proposals

- 1.6 In brief, the Proposed Development consists of the following:
- An intermodal freight terminal including container storage and HGV parking, rail sidings to serve individual warehouses, and the provision of an aggregates facility as part of the intermodal freight terminal, with the capability to also provide a 'rapid rail freight' facility;
 - Up to 468,000 sq m (approximately 5 million sq ft) (gross internal area) of warehousing and ancillary buildings, with additional floorspace provided in the form of mezzanines;
 - A secure, dedicated, HGV parking area of approximately 120 spaces including driver welfare facilities to meet the needs of HGVs visiting the site or intermodal terminal;
 - New road infrastructure and works to the existing road network, including the provision of a new access and associated works to the A508, a new bypass to the village of Roade, improvements to Junction 15 and to J15A of the M1 motorway, the A45, other highway improvements at junctions on the local highway network and related traffic management measures;

- Strategic landscaping and tree planting, including diverted public rights of way;
- Earthworks and demolition of existing structures on the SRFI site.

Site Location and Context

- 1.7 The 'Main Site' area is bound to the north by Collingtree Road, to the east by the M1, to the south by the A508 / Northampton Road and to the west by arable fields. The site itself comprises arable fields bisected by hedgerows, woodland and tree belts, and incorporates grassland, ponds, wet ditches and several abandoned buildings (central grid reference SP 748 547). Two Public Rights of Way (PROW) cross the Main Site.
- 1.8 The Bypass Corridor south of the 'Main Site' encompasses the majority of the Highway Mitigation Works. This area is bound to the north by arable fields and woodland, to the east by Roade and to the south and west by a mix of arable and grazed field compartments. The site itself comprises areas of grassland, arable, scrub, hedgerows and standard trees, running water, and dry ditches. The surrounding landscape consists of arable farmland with woodland blocks, pasture and scattered urban areas. PROWs cross the bypass route in three locations.
- 1.9 Additional sections encompassed by the 'Highway Mitigation Works' are located to the north and south of the main site and Roade Bypass.

2.0 ECOLOGICAL AND LANDSCAPE FEATURES

- 2.1 The baseline condition of the retained features of ecological interest is described in detail within ES Chapter 5: Ecology and Nature Conservation and set out in the associated Figures and Appendices. Features of landscape interest are defined within the ES Chapter 4: Landscape and Visual and associated Figures and Appendices.
- 2.2 A strong landscape framework will be established as part of the Proposed Development, comprising the conservation of existing woodland and other hedgerows and trees, reinforced by significant new tree, hedgerow and shrub planting and other habitats. The formation of new earthworks and mounding proposals to most of the Main Site's perimeter will include much of this new native planting and will be important in mitigating and screening views of the Proposed Development from beyond the boundary. These are as illustrated on the Illustrative Landscape Plan – Main Site (Drg no 5772-L-30 rev M) and Illustrative Landscape Plan – Roade Bypass (Drg no 5772-L-30 rev P).
- 2.3 The Order limits encompass a number of non-statutory ecological designations and a range of terrestrial habitat and landscape features that will be retained through the construction and operation of the development including:
- Woodland and Scrub – including, Highgate Woodland pLWS, Churchills Woodland and other undesignated or smaller areas of woodland and scrub
 - Hedgerows - including both retained and newly created hedgerows.
 - Grassland – including extensive areas of created grassland habitat and translocated elements of Roade Meadow pLWS

- Wetland habitats – incorporating existing ponds and water-courses, new amphibian mitigation ponds and drainage basins and other SUDs features.

2.4 The following avoidance measures will be incorporated into this management plan to avoid or minimise impacts to fauna:

- Retention of pond P1 (located within Churchills woodland), which supports a large great crested newt (GCN) population;
- Retention of grassland adjacent to Highgate Wood, which supports a small common lizard population;
- Incorporation of an artificial badger sett within the Highgate Woodland
- Retaining boundary features, including woodland, hedgerows and RW1, within the Main Site will ensure that habitat connectivity to the surrounding area is maintained for fauna, including badgers, bats and otters.

Legislation and Policy

2.5 All relevant EU and UK nature conservation law will be adhered to in relation to the protection of ecological features and ecological enhancement. This will primarily include the protection afforded to nesting birds under the Wildlife and Countryside Act 1981 (as amended) and also with reference to the protection of great crested newts and bats and their roosts under the Conservation of Habitats and Species Regulations 2010 (as amended). Regard has also been given to the Local Biodiversity Action Plan (LBAP) and 'Habitats of Principal Importance' (HPI) as listed within Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006.

2.6 This management plan will have regard to the presence of protected species and related legislation summarised in the table below.

Table 1: Relevant Protected Species Legislation

| Species/group | Legislation | Level of Protection |
|-------------------------------|---|---|
| Nesting birds | Wildlife and Countryside Act 1981 (amended) Section 1 part 1 (a) – (c) and part 2. | <ul style="list-style-type: none"> • kill, injure or take a bird, take damage or destroy a nest in use or being built • take or destroy an egg • possession or control of wild bird or any part or object derived from, or egg or part of one |
| Common Lizard and Grass Snake | Wildlife and Countryside Act 1981 (amended) (Schedule 5) Section 9 part 1 and 5. | <ul style="list-style-type: none"> • intentional killing or injury, sale or possession or publishing/advertising for such purposes. |
| Bats | Wildlife and Countryside Act 1981 (amended) (Schedule 5) part 4 (b) and (c) and 5. The Conservation of Habitats and Species Regulations 2017. | <ul style="list-style-type: none"> • intentional or reckless acts which: damage, destroy a place of rest or shelter • disturbing the animal whilst occupying such as place obstructing access to such a place • deliberately disturb bats or damage/destroy a breeding site or resting place |
| Badgers | Protection of Badgers Act 1992 | <ul style="list-style-type: none"> • protection from killing, injury and taking • protection from interference including damage or blocking a sett or disturbance to a badger whilst occupying a sett |

| Species/group | Legislation | Level of Protection |
|---------------|---|---|
| GCN | Wildlife and Countryside Act 1981 (amended) (Schedule 5) Section 9 part 4 (b) and (c) and part 5. | <ul style="list-style-type: none"> • intentional or reckless disturbance whilst occupying a place of rest or shelter • obstruction of access to place of rest or shelter • sale or possession or publishing/advertising for such purposes • deliberate capture, injury, killing, deliberate disturbance deliberate taking or destroying of eggs, damage or destruction of breeding or resting place • disturbance includes impairment of ability to survive, reproduce, rear young, hibernate or migrate, affect significantly the local distribution or abundance of the species • possess, sale, exchange, transport or offer for sale/exchange |

3.0 FUTURE MANAGEMENT AND MONITORING

General Considerations

- 3.1 The success of on-site mitigation and compensation for both landscape effects and ecological effects will be dependent not just on aftercare and management, but also on ensuring the value of retained and created habitats is not compromised by negative influences arising due to proximity to the operational development.
- 3.2 The requirement for non-obtrusive lighting and minimal overspill into peripheral habitats and areas adjoining the operational site is also set out in Chapters 4 and 5 of the ES and similarly reflected in the lighting designs. Again, for the purpose of this document it is assumed that a lighting scheme in general accordance with the Preliminary Lighting Strategy is in place as is required by the DCO and that maintenance of embedded mitigation (such as cowls) will fall within standard operational management of the site.
- 3.3 The following management plan should be considered as a draft/iterative document due to the necessity, particularly in the early years of implementation, to review and modify in order to take account of the development of created/retained habitats, whose response to management may not be fully understood or predicted.
- 3.4 The following section provides the management objectives and prescriptions of the proposed and retained habitats. All habitat creation will comprise native species appropriate to the Bugbrooke, Rothersthorpe & Collingtree Cropped Claylands Biodiversity Character Area.
- 3.5 The objectives set out here will focus on the effective management of all retained semi-natural and newly created habitats, including those that contribute to the aims of the River Nene Regional Park (RNRP) Biodiversity Strategy & Guidelines. The LEMP will also ensure that the Proposed Development contributes aspirations and targets of the Northamptonshire Biodiversity Action Plan (BAP), in particular the Hedgerow, Lowland Mixed Deciduous Woodland, Lowland Meadow and Ponds Habitat Action Plans.

Access

- 3.6 No formal public access to the majority of the Main Site is currently available, although two footpaths cross the site from the northern boundary, extending to the west and east. The development proposals seek to increase public access to the peripheral Green Infrastructure through the diversion of the existing footpath network specifically by way of the provision of a circular walk around the main site.

Strategic Management Objectives

- 3.7 The main objectives for the site are based on the requirement to maintain and enhance the nature conservation value of the retained habitats and assimilate them and the development into the landscape, mitigating for any effects on the landscape and the loss of ecological features, whilst contributing to objectives of the Local BAP.
- 3.8 New and retained habitat corridors and sympathetic management will aim to encourage the natural dispersal of wildlife throughout the site and surrounding habitats and contribute to the maintenance of ecologically-valuable habitat in the long-term. Management efforts will in particular focus on the establishment of complementary native habitats to create a species-rich

mosaic of habitats to enhance floral biodiversity and support a wide range of local fauna throughout the site.

- 3.9 The Management Plan promotes the following aims and objectives for the site's management:

Objective 1 – Ensuring early establishment and links to other local green infrastructure (GI) networks.

- 3.10 This will involve linking the habitat creation areas and those of existing retained habitats (to be managed) within a network with links to GI in the locality, including Northampton to Salcey (Milton Keynes) Link and the areas that form part of the Upper Nene Valley NIA. This will feed into a key objective of the RNRP Strategic Plan – to improve and encourage access.

Objective 2 – Provide net gain for biodiversity across the proposed development.

- 3.11 This will be achieved through provision of new varied habitat areas and maximising the structural and species diversity of new and existing (retained) habitats by applying appropriate traditional and generally low intensity management techniques. The purpose is to comply with the relevant targets of the Northamptonshire BAP and the National Planning Policy Framework.

Objective 3 – Providing features of benefit to specific species or groups

- 3.12 Landscape and habitat creation seeks to provide a habitat for a range of wildlife displaced from the built development plateau. This include but is not limited to:
- the necessity to provide terrestrial and aquatic habitat for great crested newts and provide additional habitats that will reduce the isolation of the on-site population;
 - Provide alternative foraging and roosting habitat for bat populations;
 - Ensure a range of habitats are available for a range of breeding and overwintering birds;
 - Provide an alternative location for badgers with enhanced foraging habitat in the long-term;
 - Ensure that a range of habitats is provided in close juxtaposition that can be used by reptiles for dispersal and range expansion

Objective 4 – Ensuring effectiveness of mitigation and enhancement

- 3.13 As stipulated in the Northamptonshire BAP this will be ensured through application of SMART (Specific, Measurable, Attainable, Relevant & Timely) targets enabling straight forward monitoring of management performance and where necessary adjustment of management to ensure targets are met.

4.0 MANAGEMENT PRESCRIPTIONS

4.1 Aftercare and establishment works are to be carried out by an approved landscape contractor in accordance with good horticultural practice or the current British Standard with reference to the BS 4428: Code of practice for general landscape operations; BS 7370: Grounds maintenance and BS 8545: Trees: from nursery to independence in the landscape – recommendations.

4.2 Three broad aftercare and establishment periods for new planting are identified below, these are not mutually exclusive and a programme of monitoring will be necessary to ensure the landscape objectives are met.

- Short term (years 1-5). The initial establishment period following creation may require more frequent maintenance operations. Replacement planting and remedial works would be carried out during this period.
- Medium term (years 5-10). As the planting establishes, maintenance could be expected to reduce, although this is dependent on the success of establishment which can be affected by a number of unpredictable factors. During this period additional species may colonise or interesting habitats can develop unexpectedly that may deserve consideration.
- Long term (>10 + years). As the planting matures, continual monitoring will inform a rolling maintenance programme, to ensure that effective maintenance is carried out at the appropriate time.

4.3 During the Short Term (initial establishment) period, inspections shall take place annually in October/November to assess the establishment of habitats and the effectiveness of the Landscape and Ecological Management Plan and aftercare prescriptions, paying particular attention to:

- a) The success of establishment including disease, damage or death of planting;
- b) Inappropriate use or vandalism;
- c) General appearance and condition;
- d) The presence of invasive or non-native species that may require treatment;
- e) Any evidence of protected species that could have implications for future management

4.4 If required following these annual visits, the LEMP can be revised and forthcoming maintenance operations adjusted accordingly.

4.5 Reviews will continue to take place beyond the initial 5-year period subject to an assessment of the prevailing conditions on site as part of the 5-year LEMP review. These shall also identify any necessary remedial works on planting affecting publicly accessible areas. Safety issues reported by the public shall also be investigated as soon as practically possible and remedial works undertaken as necessary.

4.6 The table below provides a summary of habitats to be retained/created.

Table 2: Habitats to be Retained and Created

| Landscape Area/ Habitat/ Feature | Unit | Existing | Removed (or part removed) | Conserved/ Retained | Proposed | Net Gain/ Loss |
|----------------------------------|------|----------|---------------------------|---------------------|----------|----------------|
| | | | | | | |

| Landscape Area/ Habitat/ Feature | Unit | Existing | Removed (or part removed) | Conserved/ Retained | Proposed | Net Gain/ Loss |
|--|------|----------|---------------------------|---------------------|----------|----------------|
| Woodland/ tree groups/ structural/ scrub planting | Ha | 14.60 | 3.90 | 10.70 | 29.05 | 25.15 |
| Hedgerows | m | 11,700 | 7,900 | 3,800 | 13,000 | 5,100 |
| Water Features/ Wetlands/ Ponds (excl watercourse/ ditches) | Ha | 0.10 | 0.00 | 0.10 | 3.00 | 3.00 |
| Semi improved / species rich/ meadow/ non-agricultural grassland | Ha | 9.10 | 4.40 | 4.70 | 26.60 | 22.20 |

Habitat Management – Retained Habitats

Existing Woodland - Churchills and Highgate (Ref 4, Drg. no. 5772-L-47)

Targets

- Increase light levels to ground flora by a minimum of 20% by year five and 30% by year 10;
- Creation of 0.2 hectares of graded scrub habitat by year 10.

4.7 The existing established woodland blocks of Highgate Wood (236/Unnamed pLWS) and Churchills comprise largely even-aged plantation with a correspondingly species-poor ground flora. The woodlands will be subject to the following management to increase light levels to ground flora and limit the influence of non-native species such as sycamore *Acer pseudoplatanus* and Scot's pine *Pinus sylvestris*:

- Thinning selecting non-native species;
- Retention of deadwood in windrows including at woodland boundaries to help deter human access and provide hibernation and refuge opportunities for amphibians; and
- Retention of standing deadwood by ring-barking selected sycamore trees where they will not cause a hazard to people.

4.8 In addition to the above the southern boundary of Churchills Wood adjacent to grassland supporting common lizard *Zootoca vivipara* will be subject to cutting to provide a graded edge habitat and areas of dense scrub. This will be achieved by cutting vegetation (scrub and trees) within a 10m margin from 200mm (at the outer edge) to 1m on rotation 1/3 each year. To avoid harm to any reptiles that may be present this work will be undertaken in the autumn period (September to mid-November) during suitable weather for reptile activity (daytime temperatures 9°C or above).

Hedgerows

Targets

- Shape hedges to form a bushy, continuous, flat-topped A-shape at least 2m high;
- Maintaining existing standard trees noticeably extending above the hedge line;
- Maintaining a strip of coarse vegetation and the base extending a minimum of 2m from the hedgerow centre.

Method

- Planting-up any gappy sections using planting mix in Appendix A, Table 4 as necessary (replace plants if less than 75% establishment of original planting);
- Trimming half of each length annually on rotation to a minimum height of 2m;
- Cutting in the dormant season (October to March ideally after January) and avoiding heavy frost;
- Leaving standard trees uncut except for minimal trimming as necessary; and
- Leaving 2m wide hedgerow base unmanaged except for a single cut of 50% on rotation every two years.

4.9 Hedgerow translocation of hedges of County importance (as identified in Chapter 5: para 5.7.30 to 5.7.32) will be undertaken. The receptor locations for specific lengths will be agreed as part of the detailed landscape proposals secured by requirement. Translocation will take place in the dormant season from the end of November to the end of February and as far as possible re-establish hedgerows in a form that matches their original, with the key principals being to transfer as much of the hedgerow material, shrubs and desirable ground flora as possible and minimise disturbance of the soil and damage to roots.

4.10 The size and species composition of the hedgerow to be translocated may allow larger sections to be moved through the use of specialist machinery however in principal hedgerow translocation is generally undertaken as follows:

- To prepare for translocation and to achieve a higher guarantee of success, where timescales allow (i.e. such as in phase 2 of the development) it is advised that root pruning and undercutting 1m from the hedgerow should be undertaken over two growing seasons prior to moving. This has the effect of stimulating growth of a fibrous network of roots from the cut sections thereby better preparing the roots for uptake of water and nutrients when it is replanted in the receptor site.
- The hedgerow to be translocated will be marked on site by a suitably qualified individual before being reduced in height to between 1.0m and 1.25m in order stimulate new shoot and root growth once moved.
- The new location of the hedgerow (receptor site) will be prepared in advance of receiving the translocated material by excavating a trench 1.0m deep and 2.0m wide, and the excavated soil being piled along the length of the trench so that it is easily accessible for backfilling.
- The hedgerow to be translocated should then be excavated to a depth of at least 1.0m and a width of 1.0m on either side to allow it to be lifted complete along with as much of the intact

soil profile and ground flora as possible to maximise the volume of rooting material being translocated. Sections of the hedgerow will be translocated, lengths of sections being dictated by the machinery being used.

- 4.11 It is paramount that the time taken between lifting the hedge and establishing it in its new location should be as short as practicably possible as this is when the roots are at their most susceptible to damage. The time roots are out of the ground should be kept to an absolute minimum. Sections of the translocated hedgerow should be planted in the same order that they were removed. Soil from the excavated receptor trench as well as combining with soil from the original hedge location can then be backfilled around the roots and firmed in by foot to ensure that there are no air gaps or pockets in which frost can penetrate, where possible, leaving the ground flora uncovered.
- 4.12 New hedgerow planting of whips will be incorporated within the translocated hedgerow using species suitable to the site and to the translocated hedge as outlined for created hedgerow habitat below. Tree standards can also be planted into the translocated hedges to match the variation found in the original hedgerow, if present to become the mature trees of the future.
- 4.13 The translocated hedgerow may need to be watered periodically during the first summer particularly, during prolonged periods of dry weather to promote root development and maximise the chances of successful establishment.

Grassland

Targets

- Maintain scrub cover less than 10% by year five and the same in year 10;
- Pernicious herb cover of less than 5% by year five and less than 2% by year 10.

Method

- 4.14 The retained semi-improved and neutral grasslands will be managed by annual cutting in late summer (mid-July to late August) with cuttings removed from the grassland after 24-48 hours to allow seed to fall. The aim should be to create a varied mosaic of vegetation heights with c.20% left uncut in small c.100m² patches to provide cover for reptiles.
- 4.15 The species composition of these grasslands will be monitored in subsequent years and if an increase of cover from pernicious herbs such as common nettle *Urtica dioica* and broadleaved dock *Rumex obtusifolius* is noted early cutting (mid-June) may be necessary.
- 4.16 Cutting of grassland south of Highgate Wood to be done during the reptile active season (March to mid-November, day-time temperatures 9°C or higher) to minimise harm to common lizard.

Grassland Translocation – Roade Field (Ref 2, Drg. no 5772 – L – 50)

Targets

- 10% or less cover of pernicious weeds by year five;
- 15 target neutral grassland species at least occasional within sward by year five;
- 5 target neutral grassland species at least frequent within sward by year five.

Method

- 4.17 The Roade Field pLWS grassland translocation methods will focus on removing the seed-bearing surface, which is particularly successful where the grassland is of relatively recent origin and will not possess a well-developed soil profile characteristic of an ancient long-established grassland.
- 4.18 Normal soil transfer or blading methods require that the soil is stripped off in layers in order to re-create a soil profile as similar as possible to the one being lost. In this case, the donor site will not support a typical soil profile being derived from a former arable field. The donor site substrates are also of a similar nature to those within the receptor area and as such it is not considered necessary.
- 4.19 Due to the grassland current location on the bypass route it will be necessary to conduct the translocation at the initial phase of bypass construction.
- 4.20 Construction methods for the translocation of grassland are outlined below:

Preparation

- Prior to start of the translocation from the donor site the receptor site will be prepared. This would involve the removal of the top 100-150mm of topsoil, alleviation of compacted ground, deposition of appropriate substrate and profiling to provide the appropriate drainage and slope characteristics
- The receptor area would be subject to either light rotovation or through disturbance with a toothed bucket, such that it develops a fine loose consistency

Translocation Methods

- Prior to the start of the translocation the grassland will be cut to a height of 10mm or less and the arisings removed immediately. Donor material will then be scraped to a depth of 100 mm with a grader bucket, transported across to the receptor site and spread onto the prepared receptor area. The depth of the scrape may be altered on site under the supervision of an experienced ecologist if the grassland is more deeply rooted in areas. The majority of the seedbank will lie in the top 4-6mm of material and it is important that this is not diluted by scraping too thick a layer.
- Translocation operations should ideally be undertaken during August – April when ground conditions are optimal, following seed set and prior to the onset of the following growing season. The storage of material would not therefore be necessary.
- Topsoil from the donor area would be moved either using excavators and dump-trucks or front-loading shovels and dump-trucks with, all machinery running only on the exposed soil.
- The topsoil can then be spread by tipping in loose heaps and either blading out over the prepared subsoil with a light-weight bulldozer running only over the topsoil, or by an excavator standing on a pad of topsoil, which may be preferable where the topography is to be varied. Larger areas can be dealt with by so-called “peninsula method” in which a heap of topsoil is progressively built out across the area by dump-trucks running only over this heap and tipping at the end of it. Topsoil in this heap can then be spread by bulldozer or excavator as required.

- Any compaction of the delivered or spread topsoil will either be removed during the spreading process or can be alleviated by a light surface cultivation at the end of operations.

Interim Site Management and Aftercare

- Following translocation the grassland would be fenced to prevent inadvertent encroachment during ongoing construction.
- Subsequent management of the grassland during the construction period will comprise one cut once the vegetation reaches 100 mm and subsequent removal of arisings. Management of grassland in subsequent years will include a single cut in late July with subsequent removal of arisings.
- Given the current nature of the area that is to be subject to soil transfer, vigorous ruderal species such as thistles *Cirsium* spp. ragwort *Senecio jacobaea* and docks *Rumex* spp. would be similarly controlled by spot treatment or hand-pulling prior to flowering.

Churchill's Pond (Ref 11, Drg. no. 5772 -L - 47)

Targets

- 60% open water by year five and maintained to year 10;
- 20% to 30% scrub and tree cover at pond margins by year five;
- 20% to 30% macrophyte cover (including reedmace) by year five and maintained to year 10.

Methods

- 4.21 This retained pond is known to support GCN and will be managed to maximise suitability for this species. Achieving the above targets will require annual rotational cutting and regular monitoring/adjustment as necessary.
- 4.22 Specific timings and management will be subject to agreement through the Natural England licencing process (above targets subject to change in accordance) but can be expected to broadly include the following:
- 1/3 of marginal vegetation will be cut annually between late August and mid-November and whilst day-time temperatures are consistently 9°C or higher. Timing to be agreed as part of the licence to ensure risk to breeding and hibernating GCN is minimised;
 - Cuttings removed from pond to a designated composting area; and
 - Tree/scrub cover removed from 25% to 50% of the bank to allow access for management.

Riparian Habitat

Target

- No more than 25% scrub cover by year five and the same by year 10

Methods

- 4.23 The riparian corridor of retained habitat RW1 will be subject to annual cutting of c.25% of its length to maintain an open channel and varied mosaic including areas of dense and scattered scrub.
- Trimming of existing scrub to between 200mm and 2m to create some dense bushy stands;
 - Cutting of ruderal vegetation to the ground; and
 - Removing cuttings to a designated composting area.

Created Habitats

- 4.24 During any necessary preparation/construction works careful consideration must be given to avoid compaction of earth (on land to be subject to habitat creation) as heavily compacted soil will lead to poor establishment and slow growth. Any unnecessary tracking over the habitat management/creation zones should be avoided and where necessary such trackways should be marked out in advance, and where feasible appropriate ground protection used.
- 4.25 In line with Objective 1 early establishment would occur on a phased basis, with habitats created in the first available season following earthworks and land forming within that phase.

New Broadleaved Woodland (see Appendix A, Table 4 for planting mix)

- 4.26 New areas of native woodland planting will be established on the bund around the Main Site and along the Road Bypass extension corridor and along the western boundary adjacent to existing trees to enhance the existing habitat. Planting will also be provided within the central area of open space. Inclusion of a range of fruit/flower/seed-bearing species within the planting scheme will provide foraging opportunities for a wide range of vertebrate and invertebrate wildlife, furthermore the inclusion of species of varied size and form will provide amenity interest and screening throughout the year.

Targets

- Distinct understorey, including thicket (dense scrub) at least occasional throughout by year six;
- Graded coppiced/pollarded woodland margins created by year 10;
- Retained deadwood providing at least 10% ground cover by year five and 20% by year 10.

Planting

- Planting in the dormant season (November to February);
- Planting in random single species groups of 5 – 20 plants at centres varying between 1.4 – 2.5m;
- Planting in single species clumps to avoid excessive overcrowding and shading out problems; and
- Planting will be done on a ratio of roughly 40% to 50% canopy trees, 20% to 30% understorey trees and scrub, and c.30% open space.

- 4.27 Due to the potential risk of spreading ash dieback *Chalara fraxinea*, no ash trees will be planted (Statutory Instrument No. 2707 – The Plant Health (Forestry) (Amendment) Order 2012 effectively prohibits the internal movement of plants or seeds of ash). Instead, the planting ratios can include extra open space, to allow for natural colonisation by ash seedlings from nearby woodland where appropriate.

Establishment (short-term)

- Regular checks will be made during the first five years of establishment to replace dead or diseased specimens, control weeds, re-stake plants as necessary and check deer/rabbit fencing. Thereafter checks will be made once every two years;
 - Any re-planting will be undertaken November to February; and
 - All weed growth will be controlled using mechanical means, such as strimming. Chemical treatments are to be used only as a last resort and should not be used in areas accessible to the public.
- 4.28 A minimum period of 5 years will be required for the woodland planting to establish. Any trees that die, are removed, or become damaged or diseased will be replaced in the next planting season with others of similar size and species.
- 4.29 Once fully established the planted trees will form part of the ongoing woodland management.

On-going Management

- Managing the shrub layer by regular cutting to create woodland thicket and increase flowering/fruiting;
- The use of coppicing and pollarding should seek to promote the diversity of 'edge' habitat at some woodland boundaries; cutting up to 20m continuous sections from 0.5m to canopy height on rotation every 3 – 5 years;
- Thinning operations will be minimal including annual winter checks from year six onwards, and retention of ash seedlings within extra spaces as detailed above; and
- Unless diseased, deadwood created through management should be retained either as standing or fallen boughs in situ or made into habitat piles.

New Tree Groups

- 4.30 New tree planting will be undertaken throughout the proposals, including along the Roade Bypass. Trees will be planted in accordance with BS 8545:2014.
- 4.31 Planted in single species groupings of three or five in otherwise open areas to include tree species from Table 3 (Appendix A) and the following:
- *Fagus sylvatica* – Beech
- 4.32 Specimens will be planted as whips or heavy standards and will be provided with protection from grazing and structural support (stakes) as appropriate. General maintenance will follow the methods set out for woodland planting above.

New Hedgerows (See Appendix A, Table 5 for planting mix)

- 4.33 New hedgerows will be created as part of the Main Site development, along sections of the site perimeter and Highway Mitigation measures with infilling to existing hedgerows as required.

Targets

- Continuous lengths of hedgerow supporting five shrub species per 30m by year five and the same by year 10;
- Bushy 2m high A-section continuous hedge sections by year 10.

Planting

- 4.34 New hedgerows will be planted in staggered double rows and establishment will proceed in accordance with methods set out for woodland planting above and the landscape management schedules including:

- Prepare vegetation-free planting strip.
- Plant using staggered double row, 500mm between rows at a rate of 6 plants/m.
- Plant 60-90cm bare root whips.
- Planting mix to reflect species composition of existing hedges
- Regular checks of stock health and protection including weed control in first five years;
- Regularly controlling weed growth by mechanical means and using chemicals only as a last resort; and
- Dead specimens replaced during the winter.

- 4.35 Planting using the below mix will be undertaken so that each 30m length supports a minimum of five shrub species.

On-going Management

Establishment years (until hedges reach a height of 2m)

- Replace plants if less than 75% establishment of original planting
- After year one a single cut to remove terminal growth will be undertaken
- Check mulch mats, replace if damaged missing during first two growing years

When hedges are 2.5m high – implement biannual management:

- Trim biannually, cutting one half of hedges each year. Shape hedges to form a flat-topped A-section
- Cut during the period October - March (inclusive) to avoid disturbance to breeding birds.
- A 2m strip adjacent the base of each hedgerow will be cut on rotation 50% every two years to promote tussocky structure as cover for fauna.

New Neutral Grassland (see Appendix A, Table 6 for species mix)

- 4.36 New grassland habitats will be created along the route of the Roade Bypass and extensively within the main site. Peripheral grassland habitats will support species-rich areas of grassland in

association with woodland and scrub habitats. This intention is to create a network of small glades and areas of more open grassland among areas of more developed woodland habitat, which are linked by a sinuous network of grassland 'rides'. This will provide the structural and microhabitat diversity required by a range of species including a number of the invertebrates, grass snake and scrub specialist birds known to be present locally or recorded within the site.

Targets

- Pernicious weeds comprising less than 10% cover by year five;
- Dead leaf litter cover of less than 25% cover by year five;
- Grassland supporting a minimum of 15 neutral grassland indicator species as assessed in year five and eight;
- No more than 10% scrub cover by year five; and
- c.1/3 of each grassland area excluded from above targets to support 50-100mm of dead thatch/leaf litter.

Methods

4.37 The below will be followed in accordance the landscape management schedule with one exception: from year two onward c.1/3 of new grassland areas (including hedgerow/woodland/scrub margins) will be cut on rotation once every three years to create a dense tussock structure that will benefit wildlife, including voles and therefore foraging barn owl.

- No artificial fertilizers/herbicides will be applied to the ground and ideally low nutrient subsoils should be used;
- Sow grassland during April/May when daytime temperatures are in the range 10-25°C and nights are frost-free;
- The grassland will be sown by machine or broadcast by hand at a rate of 40 kg per hectare;

Establishment

- Year one: cut up to four times once sward established (down to 30-50mm) to control pernicious weeds and remove cut material immediately;

On-going management

- From year two annual cutting will be instigated following flowering in late July/August;
- Cuttings will be left in-situ for 24-48 hours to allow for seed drop and then removed from site or composted in a single designated location (the same areas to be used each year);
- Regular monitoring both in the establishment period and annually thereafter is important to enable early intervention for weed control and determine annual cutting after flowering/seeding of herbs; and
- Spot treatment with a contact herbicide such as Glyphosate may be necessary following the establishment period to treat pernicious weeds such as broadleaved dock *Rumex obtusifolius* and common nettle *Urtica dioica* if patches persist.

Wet Grassland (see Appendix A Table 7 for species mix)

- 4.38 Wet grassland will be created around drainage basins where conditions could be expected to be waterlogged for at least the winter period. The establishment and management of wet grassland will be undertaken in accordance with the methods set out for semi-improved grassland above once levels have been reduced to ensure damp conditions for much of the year. Again, to reduce competition for pernicious weeds no artificial fertilizers should be used and the seed should be applied to a low nutrient topsoil/sub-soil.

Targets

- Pernicious weeds comprising less than 10% cover by year five
- Dead leaf litter cover of less than 25% cover by year five
- Grassland supporting a minimum of 15 herb species as assessed in year five and eight
- No more than 10% scrub cover by year five

Waterbodies – Ponds, Lakes and Ditches

- 4.39 The creation of new wetlands will occur between Churchills and Highgate woodlands to provide a as part of the drainage infrastructure will include some ponds that support water throughout the year. Waterbodies will be buffered from proposed development or farmland by a minimum of five to 10m of wetland mosaic such as wet woodland or scrub.
- 4.40 Management of the habitat aims to establish newly-created ponds and maintain these and existing ponds as suitable breeding habitat by ensuring that they:
- are unpolluted;
 - are well vegetated (with submerged plants providing cover throughout 40-60% of the below-surface area, emergent or floating plants providing cover over up to 40% of the surface area);
 - include areas with minimal vegetation and cover;
 - provide appropriate emergent plants along the pond margins to provide appropriate egg-laying habitat (see Appendix A, Table 8 for planting mix);
 - provide variable depths;
 - have variable aspects including open sunny ponds and more shaded woodland pools;
 - are free from invasive plant species that spread rapidly and over-shade ponds;
 - small ponds do not hold fish;
 - provide continuity of habitat over time;
 - are linked together by suitable terrestrial habitat.

Wetland Mosaic Establishment Methods

- During the establishment period, new ponds will be checked, to determine the need for replacement planting.
- Additional habitat to be established includes new marginal/emergent vegetation around the ponds and drainage basins.
- Landscaping works to achieve varied levels from 100mm to 500mm and sloping margins (adjacent terrestrial habitats/other land uses);
- The above to be undertaken during wet autumn/spring periods and water levels measured followed by re-profiling as necessary to achieve desired conditions;
- Planting of various mixes, as plug plants (see Appendix A, Tables 9 & 10), within appropriate zones in the dormant season (November – February) during frost free periods;
- Planting will be done in single species groups of approximately five to eight plants (30cm apart) clustered together in mixed species groups to achieve approximately 50%-60% coverage. The gaps will be filled through natural colonisation over time; and
- Plant health and survival will be monitored as for broadleaved woodland above (regular checks for first five years).

On-going Management

- 4.41 The commencement of annual cutting will depend on depth of leaf litter and cover of scrub or undesirable ruderals such as broadleaved dock and common nettle (see target threshold above) and cutting of some areas may be required by year three.
- Annual cutting of marsh and swamp areas will be undertaken in the autumn/late winter period while the water level is high to ensure cut stems are not flooded;
 - Cutting of swale/scrape areas can be undertaken from late summer onward once seed has shed; and
 - Cuttings will be removed and composted in designated areas (the same areas to be used each year) away from standing water and on the margin of the wetland mosaic habitat or removed from site.
 - Cutting back and removing short sections of vegetation, amounting to no greater than 1/3rd every 2-3 years in rotation to retain approximately 70% open water;
 - Vegetation removed between September and November when disruption to wildlife is least likely;
 - All arisings will be left on the bank of the pond for a 2 day 'creep back' period, allowing any invertebrates or insects time to return to the water prior to the removal of arisings to a designated composting area or off-site; and
 - Where ponds become enclosed by tree/shrub cover this will be removed from approximately 25% of the pond bank to allow greater light levels into the pond and provide access for management.
- 4.42 Areas of rough grassland will be retained around the banks of water bodies. Grass will be cut in September in order to minimise the disturbance to nesting wildfowl and other wildlife. Areas

would be cut every three years to prevent the encroachment of scrub. Areas selected for cutting each year will be no more than 50% of the bankside, rotated around ponds lakes to ensure the retention of some cover throughout the year. Cuttings will be retained, to prevent scrub and encourage a build-up of litter.

Faunal Enhancement

Bats

- 4.43 A range of bat boxes will be sited in the retained woodland with good links to the proposed GI network and away from artificial lighting. In addition to replacement roost mitigation required for the loss of identified roosts a further 12 bat boxes including Schwegler 2F, 1FF and 2FN designs will be installed in accordance with the below method.

Method

- Attached to trees using aluminium nails placed 5 m – 6 m above ground level;
 - Two to three boxes per tree on south, east and west aspects;
 - Maintained free of clutter with clear flight lines;
 - Away from artificial light.
- 4.44 Bat boxes will be checked by a licenced bat worker in years two, four and eight.

Birds

- 4.45 Bird boxes suitable for a variety of common species including those known to occur in the locality will be installed. Boxes should be located with advice from a suitably qualified ecologist. Fifty bird boxes will be provided including two barn owl nest boxes and the following (or similar) additional types:
- Schwegler 1B Nest Box;
 - 2H Schwegler Robin Box (suitable for spotted fly-catcher);
 - 1N Schwegler Deep Nest Box.
- 4.46 At least four 2H Schwegler (or similar) boxes will be provided and sited where the following features are available (suitable for spotted fly-catcher):
- Sheltered location on mature tree (such as south-east boundaries of retained woodland);
 - Adjacent open habitats such as grassland;
 - Climbing plants such as ivy present to conceal nest boxes;
 - Between 2m and 4m high.
- 4.47 The two barn owl boxes will be provided in accordance with Barn Owl Trust specifications: located within 500m of each other and at least 1km from the M1 Motorway. The condition of bird boxes will be checked in years four, eight and twelve and replaced/repared as necessary. A licenced and suitably experienced ecologist will check the barn owl boxes.

Public Access Management

- 4.48 New diverted PROW footpath routes will be constructed be linked to the existing network, extending beyond the Main Site, creating sustainable access routes to and from the surrounding areas and around the mains site itself. These routes will be a mix of more formal gravel or mulch accessible cycle and pathways, hardwearing short mown grass and informal mown pathways through the grassland areas dependent on the nature of the surrounding habitats and route.
- 4.49 In addition to additional planting, access routes would be used to encourage/direct access away from more sensitive areas such as artificial badger setts or herpetofauna refuges.
- 4.50 Information boards will be placed at appropriate locations close to landscape/ecological features. These will detail the importance and value of the habitats and help inform users on how to reduce their impact on the surrounding wildlife, encouraging a sense of ownership and understanding.

5.0 MONITORING AND REVIEW MECHANISM

- 5.1 The monitoring of landscape and ecological features is of fundamental importance and necessary to determine whether the objectives are being met and to take account of the development or colonisation of desirable or undesirable species.

Annual walkover (short-term)

- 5.2 The site would be visited annually by a suitably qualified ecologist. The objective of the annual walkover will be to assess the condition of retained and created habitats against target objectives and where relevant the requirements of protected species licences and mitigation strategies.
- 5.3 Following the walkover inspection, an annual monitoring report will be produced detailing any remedial actions or interventions determined to be necessary in order to meet the relevant species or habitat objectives.

Five-year survey and Review

- 5.4 More specific monitoring will also include botanical surveys of open grassland habitats and wetland features in year 5 following implementation. The following surveys, at minimum, will be included in the five-year reviews:
- Botanical surveys - The species diversity of open grassland will be assessed with species and assessment of their cover recorded along with tussock cover (estimate of cover assessed within 1m radius of 20 random sample points) and sward height, using a sward stick. Botanical monitoring of wetland should include species cover and an assessment of overall cover of emergent, floating and submerged vegetation.
 - Protected species surveys: bats, badger, great crested newts, reptiles;
- 5.5 The results of the surveys will be reviewed in order to identify any revisions to the management prescriptions deemed to be required in order to meet the objectives for the medium and long-term. Revised prescriptions would then be produced to guide the next five years. This information would be presented as a 'Five Year Monitoring Report' to be shared with relevant stakeholders.

6.0 WORKS SCHEDULE

- 6.1 The Works Schedule (Table 3) provides a timetable for the tasks/methods detailed above. Monitoring of habitat conditions against the set targets will be undertaken every two years by a suitably experienced botanist to ensure these targets are met. After five years the schedule will be reviewed and any refinements incorporated into a revised schedule for the following five years. The party responsible for implementing this management plan is to be agreed in consultation with the local authority.

Table 3: Works Schedule

| Habitat / Feature | Regular operations/works | Anticipated/potential month of occurrence of annual works | | | | | | | | | | | | Frequency and notes |
|---|--------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | J | F | M | A | M | J | J | A | S | O | N | D | |
| Habitat Management Prescriptions | | | | | | | | | | | | | | |
| Woodland/ Groups | Planting | | | | | | | | | | | | | Year one |
| | Tree Establishment | | | | | | | | | | | | | First five years |
| | Management | | | | | | | | | | | | | Year one onward (existing retained); Year six onward (new planting) |
| Hedgerows | Planting/Re-planting | | | | | | | | | | | | | Year one & checks / replacement annually for five years |
| | Management | | | | | | | | | | | | | Year one onward (existing retained); Year one cut terminal growth (new hedgerows); Year four onward cut annual 1/3 on 3 year rotation (new hedgerows) |
| | Hedge bottom | | | | | | | | | | | | | Cut on rotation ½ every two years |
| Grassland/Wet Grassland | Creation | | | | | | | | | | | | | Year one |
| | Management – year one | | | | | | | | | | | | | Cut to control pernicious weeds. Remove cuttings immediately |
| | Management – year two | | | | | | | | | | | | | Remove cuttings after 24-48 hours. Spot treatment with |

| Habitat / Feature | Regular operations/works | Anticipated/potential month of occurrence of annual works | | | | | | | | | | | | Frequency and notes |
|----------------------------------|--|---|---|---|---|---|---|---|---|---|---|---|---|--|
| | | J | F | M | A | M | J | J | A | S | O | N | D | |
| Habitat Management Prescriptions | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | herbicide as necessary to control pernicious weeds. 1/3 of total new grassland cut on rotation every three years (tussock areas) |
| Grassland Translocation | Creation | | | | | | | | | | | | | Year one |
| | Management – year one | | | | | | | | | | | | | Up to four cuts, cuttings removed immediately |
| | Management – year two onward | | | | | | | | | | | | | Single cut, cuttings removed after 24-48 hours. Spot treatment of pernicious weeds June/July as necessary |
| Ponds/Swale/Marsh | Creation | | | | | | | | | | | | | Year one |
| | Marginal/aquatic/marsh/swale vegetation management | | | | | | | | | | | | | Year two onward (new features); Year one onward (retained pond) –management to P1 including timings subject to agreement with Natural England through licencing. Rotational cutting |
| Bat Boxes | Installation | | | | | | | | | | | | | Year one |
| | Checking | | | | | | | | | | | | | Year two, four & eight by licenced bat worker |

| Habitat / Feature | Regular operations/works | Anticipated/potential month of occurrence of annual works | | | | | | | | | | | | Frequency and notes |
|----------------------------------|----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|--|
| | | J | F | M | A | M | J | J | A | S | O | N | D | |
| Habitat Management Prescriptions | | | | | | | | | | | | | | |
| Bird Boxes | Installation | | | | | | | | | | | | | Year one |
| | Checking | | | | | | | | | | | | | Year four, eight & 12 – outside the bird breeding season. Licenced person to check barn owl boxes |
| Recreation | Installing interpretation boards | | | | | | | | | | | | | Year one |
| | Maintenance | | | | | | | | | | | | | Year two, four & eight |

Appendix A: Planting Mixes**Table 4: Woodland Planting Mix**

| Trees (canopy) | Shrubs (understorey) |
|--|--|
| <i>Quercus robur</i> – Pedunculate Oak | <i>Cornus sanguinea</i> – Dogwood |
| <i>Betula pendula</i> – Silver Birch | <i>Rhamnus catharticus</i> – Buckthorn |
| <i>Acer campestre</i> – Field Maple | <i>Rosa canina</i> – Dog-rose |
| <i>Prunus avium</i> – Wild Cherry | <i>Corylus avellana</i> – Hazel |
| | <i>Cornus sanguinea</i> – Dogwood |
| | <i>Salix caprea</i> – Goat Willow |
| | <i>Prunus spinosa</i> – Blackthorn |
| | <i>Crataegus monogyna</i> - Hawthorn |

Table 5: Hedgerow Planting Mix

| Species to comprise 70-75% of planting mix | Species to comprise remaining 25-30% of planting mix |
|--|--|
| <i>Crataegus monogyna</i> – Hawthorn | <i>Acer campestre</i> – Field Maple |
| <i>Prunus spinosa</i> – Buckthorn | <i>Cornus sanguinea</i> – Dogwood |
| | <i>Rhamnus catharticus</i> – Buckthorn |
| | <i>Quercus robur</i> – Pedunculate Oak |
| | <i>Rosa canina</i> – Dog-rose |
| | <i>Corylus avellana</i> – Hazel |

Table 6: Standard General Purpose Meadow Mixture (Emorsgate EM2 or similar)

| % | Herbs (20% of total mix) | |
|-----|--------------------------|--|
| 0.5 | Yarrow | <i>Achillea millefolium</i> |
| 0.6 | Betony | <i>Betonica officinalis</i> - (<i>Stachys officinalis</i>) |
| 2.5 | Common Knapweed | <i>Centaurea nigra</i> |
| 0.8 | Greater Knapweed | <i>Centaurea scabiosa</i> |
| 1 | Wild Carrot | <i>Daucus carota</i> |
| 0.6 | Meadowsweet | <i>Filipendula ulmaria</i> |
| 0.6 | Hedge Bedstraw | <i>Galium album</i> - (<i>Galium mollugo</i>) |
| 2 | Lady's Bedstraw | <i>Galium verum</i> |
| 0.4 | Field Scabious | <i>Knautia arvensis</i> |
| 0.3 | Rough Hawkbit | <i>Leontodon hispidus</i> |
| 0.6 | Oxeye Daisy | <i>Leucanthemum vulgare</i> |
| 0.5 | Birds-foot Trefoil | <i>Lotus corniculatus</i> |
| 0.1 | Wild Marjoram | <i>Origanum vulgare</i> |
| 0.5 | Hoary Plantain | <i>Plantago media</i> |
| 1 | Salad Burnet | <i>Poterium sanguisorba</i> - (<i>Sanguisorba minor</i>) |

| % | Herbs (20% of total mix) | |
|-----|-----------------------------|--|
| 0.4 | Cowslip | <i>Primula veris</i> |
| 2 | Selfheal | <i>Prunella vulgaris</i> |
| 2.5 | Meadow Buttercup | <i>Ranunculus acris</i> |
| 1 | Yellow Rattle | <i>Rhinanthus minor</i> |
| 0.6 | Common Sorrel | <i>Rumex acetosa</i> |
| 1.2 | Red Campion | <i>Silene dioica</i> |
| 0.2 | Ragged Robin | <i>Silene flos-cuculi</i> - (<i>Lychnis flos-cuculi</i>) |
| 0.1 | Wild Red Clover | <i>Trifolium pratense</i> |
| % | Grasses (80% of total mix) | |
| 8 | Common Bent | <i>Agrostis capillaris</i> |
| 40 | Crested Dog's-tail | <i>Cynosurus cristatus</i> |
| 28 | Slender-creeping Red-fescue | <i>Festuca rubra</i> |
| 4 | Smaller Cat's-tail | <i>Phleum bertolonii</i> |

Table 7: Wet Grassland Mix

| % | Herbs (20% of total mix) | |
|-----|--|----------------------------|
| 0.5 | <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 |
| 1.5 | <i>Galium verum</i> | Lady's Bedstraw |
| 0.4 | <i>Geum rivale</i> | Water Avens |
| 0.5 | <i>Leucanthemum vulgare</i> | Oxeye Daisy |
| 0.6 | <i>Lotus pedunculatus</i> | Greater Birds-foot Trefoil |
| 1 | <i>Plantago lanceolata</i> | Ribwort Plantain |
| 1 | <i>Primula veris</i> | Cowslip |
| 1 | <i>Prunella vulgaris</i> | Selfheal |
| 2 | <i>Ranunculus acris</i> | Meadow Buttercup |
| 1.5 | <i>Rhinanthus minor</i> | Yellow Rattle |
| 1 | <i>Rumex acetosa</i> | Common Sorrel |
| 2 | <i>Sanguisorba officinalis</i> | Great Burnet |
| 0.5 | <i>Silaum silaus</i> | Pepper Saxifrage |
| 0.2 | <i>Silene flos-cuculi</i> - (<i>Lychnis flos-cuculi</i>) | Ragged Robin |
| 0.6 | <i>Succisa pratensis</i> | Devil's-bit Scabious |

| Grasses (80% of total mix) | | |
|----------------------------|---|-----------------------------|
| 10 | <i>Agrostis capillaris</i> | Common Bent |
| 2 | <i>Alopecurus pratensis</i> | Meadow Foxtail (w) |
| 2 | <i>Anthoxanthum odoratum</i> | Sweet Vernal-grass (w) |
| 2 | <i>Briza media</i> | Quaking Grass (w) |
| 32 | <i>Cynosurus cristatus</i> | Crested Dog's-tail |
| 1 | <i>Deschampsia cespitosa</i> | Tufted Hair-grass (w) |
| 24 | <i>Festuca rubra</i> | Slender-creeping Red-fescue |
| 1 | <i>Hordeum secalinum</i> | Meadow Barley (w) |
| 6 | <i>Schedonorus pratensis</i> - (<i>Festuca pratensis</i>) | Meadow Fescue (w) |

Table 8: Pond Planting Mix

| Aquatic / Submerged | |
|--------------------------------|-----------------------|
| <i>Callitriche stagnalis</i> | Common Water-starwort |
| <i>Nymphaea alba</i> | White Water-lily |
| Marginal / Waters edge | |
| <i>Caltha palustris</i> | Marsh-marigold |
| <i>Glyceria maxima</i> | Reed Sweet-grass |
| <i>Phalaris arundinacea</i> | Reed Canary-grass |
| <i>Lythrum salicaria</i> | Purple Loosestrife |
| <i>Phragmites australis</i> | Common Reed |
| <i>Sparganium erectum</i> | Branched Bur-reed |
| <i>Sagittaria sagittifolia</i> | Arrowhead |
| <i>Lycopus europaeus</i> | Gypsywort |
| <i>Veronica beccabunga</i> | Brooklime |
| <i>Iris pseudocorus</i> | Yellow iris |
| <i>Juncus inflexus</i> | Hard-rush |
| <i>Juncus effusus</i> | Soft-rush |

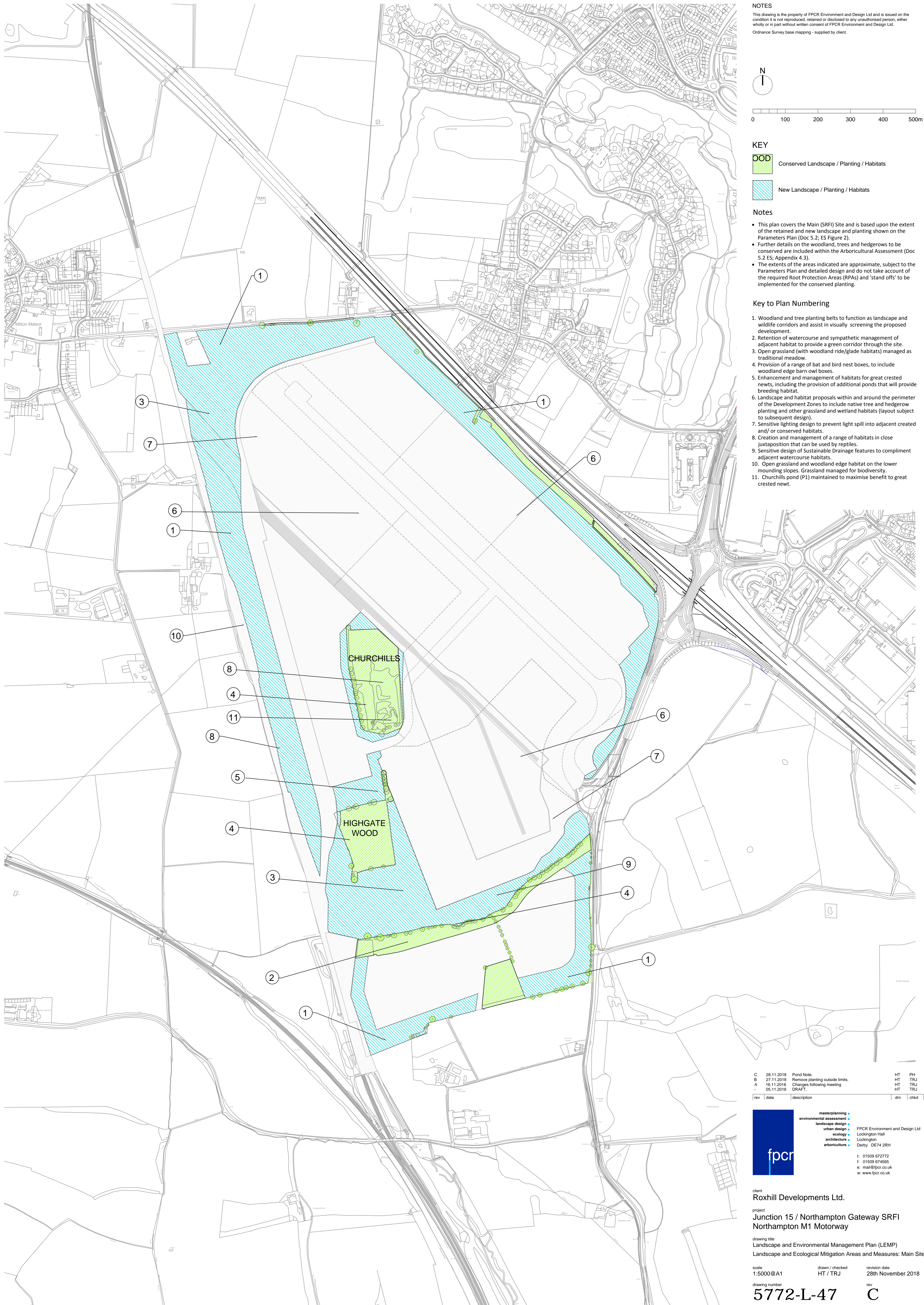
Table 9: Swale/Scrape Planting Mix

| | |
|-----------------------------|--------------------|
| <i>Caltha palustris</i> | Marsh-marigold |
| <i>Ranunculus flammula</i> | Lesser Spearwort |
| <i>Phalaris arundinacea</i> | Reed Canary-grass |
| <i>Lythrum salicaria</i> | Purple Loosestrife |

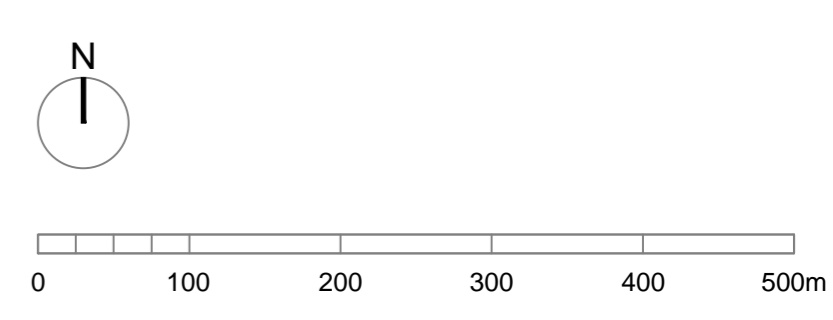
| | |
|-----------------------------|-------------------|
| <i>Eupatoria cannabinum</i> | Hemp-agrimony |
| <i>Sparganium erectum</i> | Branched Bur-reed |
| <i>Lycopus europaeus</i> | Gypsywort |
| <i>Veronica beccabunga</i> | Brooklime |
| <i>Iris pseudocorus</i> | Yellow Iris |
| <i>Juncus articulatus</i> | Jointed Rush |
| <i>Juncus inflexus</i> | Hard Rush |
| <i>Juncus effusus</i> | Soft-rush |

Table 10: Marsh/Swamp Planting Mix

| | |
|---------------------------------|--------------------|
| <i>Phragmites australis</i> | Common Reed |
| <i>Ranunculus flammula</i> | Lesser Spearwort |
| <i>Schoenoplectus lacustris</i> | Common Club-rush |
| <i>Carex acutiformis</i> | Lesser Pond-sedge |
| <i>Carex riparia</i> | Greater Pond-sedge |
| <i>Carex otrubae</i> | False Fox-sedge |
| <i>Sparganium erectum</i> | Branched Bur-reed |
| <i>Lycopus europaeus</i> | Gypsywort |
| <i>Eupatoria cannabinum</i> | Hemp-agrimony |
| <i>Serratula tinctoria</i> | Saw-wort |
| <i>Lychnis flos-cuculi</i> | Ragged Robin |
| <i>Mentha aquatica</i> | Water Mint |
| <i>Scrophularia aquatica</i> | Water Figwort |
| <i>Achillea ptarmica</i> | Sneezewort |



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 Ordnance Survey base mapping - supplied by client.



KEY
 Conserved Landscape / Planting / Habitats
 New Landscape / Planting / Habitats

Notes

- This plan covers the Main (SRFI) Site and is based upon the extent of the retained and new landscape and planting shown on the Parameters Plan (Doc 5.2; ES Figure 2).
- Further details on the woodland, trees and hedgerows to be conserved are included within the Arboricultural Assessment (Doc 5.2 ES; Appendix 4.3).
- The extents of the areas indicated are approximate, subject to the Parameters Plan and detailed design and do not take account of the required Root Protection Areas (RPAs) and 'stand offs' to be implemented for the conserved planting.

Key to Plan Numbering

- Woodland and tree planting belts to function as landscape and wildlife corridors and assist in visually screening the proposed development.
- Retention of watercourse and sympathetic management of adjacent habitat to provide a green corridor through the site.
- Open grassland (with woodland ride/glade habitats) managed as traditional meadow.
- Provision of a range of bat and bird nest boxes, to include woodland edge barn owl boxes.
- Enhancement and management of habitats for great crested newts, including the provision of additional ponds that will provide breeding habitat.
- Landscape and habitat proposals within and around the perimeter of the Development Zones to include native tree and hedgerow planting and other grassland and wetland habitats (layout subject to subsequent design).
- Sensitive lighting design to prevent light spill into adjacent created and/or conserved habitats.
- Creation and management of a range of habitats in close juxtaposition that can be used by reptiles.
- Sensitive design of Sustainable Drainage features to compliment adjacent watercourse habitats.
- Open grassland and woodland edge habitat on the lower mounding slopes. Grassland managed for biodiversity.
- Churchills pond (P1) maintained to maximise benefit to great crested newt.

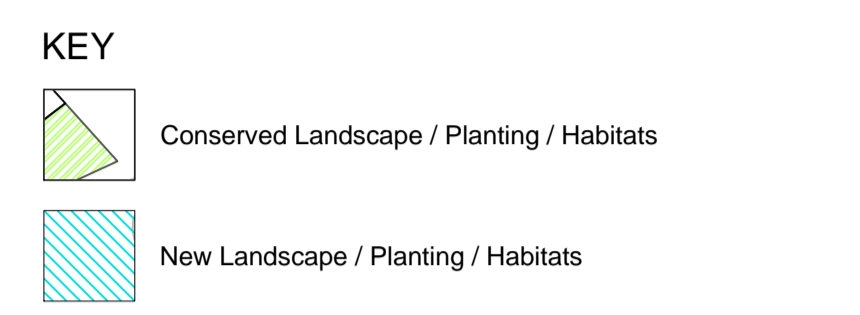
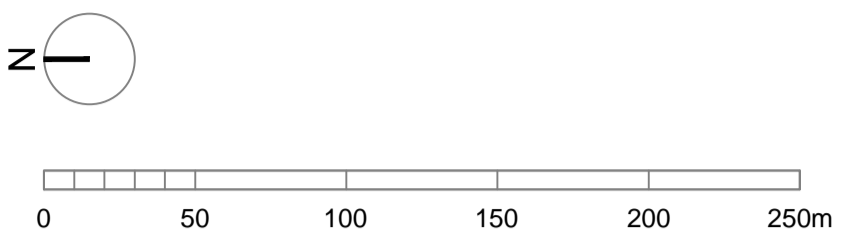
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|---|------------|---------------------------------|----|-----|
| C | 28.11.2018 | Pond Note. | HT | PH |
| B | 27.11.2018 | Remove planting outside limits. | HT | TRJ |
| A | 16.11.2018 | Changes following meeting | HT | TRJ |
| - | 05.11.2018 | DRAFT. | HT | TRJ |

| rev | date | description | dm | chkd |
|-----|------|--------------------------|---------------------------------|------|
| | | masterplanning | | |
| | | environmental assessment | | |
| | | landscape design | | |
| | | urban design | | |
| | | ecology | FPCR Environment and Design Ltd | |
| | | architecture | Lockington Hall | |
| | | arboriculture | Lockington | |
| | | | Derby DE74 2RH | |

fpcr
 client: Roxhill Developments Ltd.
 project: Junction 15 / Northampton Gateway SRFI Northampton M1 Motorway
 drawing title: Landscape and Environmental Management Plan (LEMP) Landscape and Ecological Mitigation Areas and Measures: Main Site
 scale: 1:5000@A1
 drawn / checked: HT / TRJ
 revision date: 28th November 2018
 drawing number: 5772-L-47
 rev: C
 CAD file: J:\57005772LANDS\Plan\5772-L-47-C Landscape and Ecological Mitigation Areas and Measures



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- Notes**
- This plan covers the Road Bypass and is based upon the Highway Plans included at Doc 2.4.
 - Further details on the woodland, trees and hedgerows to be conserved are included within the Arboricultural Assessment (Doc 5.2 ES; Appendix 4.3).
 - The extents of the areas indicated are approximate, subject to the detailed design and do not take account of the required Root Protection Areas (RPAs) and 'stand offs' to be implemented for the conserved planting.

- Key to Plan Numbering**
1. Woodland and tree planting belts to function as landscape and wildlife corridors and assist in visually screening the proposed development.
 2. Translocation of Roade Field grassland soils and traditional meadow management of grassland habitat.
 3. Sensitive design of Sustainable Drainage features to compliment adjacent watercourse habitats (where present) and maximise biodiversity interest.
 4. Creation and management of a range of habitats in close juxtaposition that can be used by reptiles.
 5. Native hedgerow and hedgerow tree planting.

| rev | date | description | dm | chkd |
|-----|------------|--------------------------------|----|------|
| B | 27.11.2018 | Remove planting outside limits | HT | TRJ |
| A | 16.11.2018 | Changes following meeting | HT | TRJ |
| - | 05.11.2018 | DRAFT | HT | TRJ |

fpcr

- masterplanning
- environmental assessment
- landscape design
- urban design
- ecology
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client
Roxhill Developments Ltd.

project
**Northampton Gateway SRFI
 Northampton**

drawing title
**Landscape and Environmental Management Plan (LEMP)
 Landscape and Ecological Mitigation Areas and Measures: Road Bypass**

scale
 1:2500 @ A1

drawn / checked
 HT / TRJ

revision date
 27th November 2018

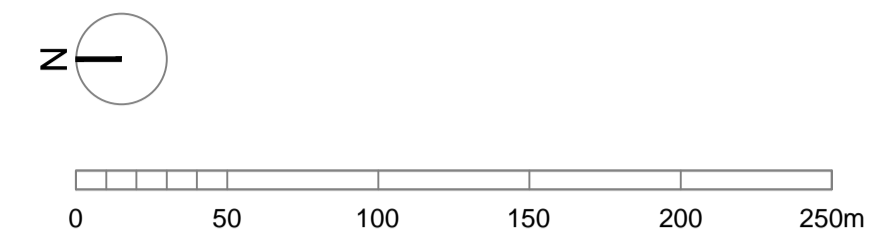
drawing number
5772-L-50

rev
B

CAD file: J:\57005772\LANDS\Plans\5772-L-50-51-A Landscape and Ecology Areas and Measure



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KEY

- Conserved Landscape / Planting / Habitats
- New Landscape / Planting / Habitats

Notes

- This plan covers the Roade Bypass and is based upon the Highway Plans included at Doc 2.4.
- Further details on the woodland, trees and hedgerows to be conserved are included within the Arboricultural Assessment (Doc 5.2 ES; Appendix 4.3).
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Key to Plan Numbering

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| rev | date | description | dm | chkd |
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client
Roxhill Developments Ltd.

project
**Northampton Gateway SRFI
 Northampton**

drawing title
**Landscape and Environmental Management Plan (LEMP)
 Landscape and Ecological Mitigation Areas and Measures: Roade Bypass**

scale
 1:2500 @ A1

drawn / checked
 HT / TRJ

revision date
 27th November 2018

drawing number
5772-L-51

rev
B

CAD file: J:\57005772\LANDSI\Plans\5772-L-50-51-A Landscape and Ecology Areas and Measure