

NETHERMAYNE: OUTLINE OFF-SITE
MITIGATION AND COMPENSATION
STRATEGY

Redrow Homes Ltd

286858A

Live

Nethermayne: Outline Off-Site Mitigation and Compensation Strategy

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SECTION 1

INTRODUCTION

1 INTRODUCTION

1.1 Overview

1.1.1 Parsons Brinckerhoff Ltd. was commissioned by Redrow Homes Ltd to design an Off-site Mitigation and Compensation Strategy (OMCS) for the proposed residential led development at Nethermayne following the completion of an Outline Biodiversity Strategy¹.

1.1.2 Off-site mitigation was proposed within the Environmental Statement for the Nethermayne project² to address the adverse ecological impacts which could not be mitigated for on-site within the proposed development.

1.1.3 An Options Appraisal³ of three sites considered suitable for the purposes of an off-site mitigation area was undertaken, following which, the site at Runwell was identified as the preferred option, hereafter referred to as 'the site' (Figure 1, Appendix A identifies the site red-line boundary).

1.1.4 The Phase 1 Habitat Survey and Options Appraisal highlighted the potential of the site to support notable and protected habitats and species; these have informed the mitigation and compensation strategy within this report.

1.2 Planning and Assessment Context

1.2.1 The Decision Notice issued on 13 December 2013 to approve the Nethermayne Planning application (12/0108/OUT) is subject to 37 conditions and seven informatives. Condition 18 specifically relates to off-site biodiversity matters.

1.2.2 In accordance with Condition 18 set out by Basildon Borough Council, the OMCS details procedures for the enhancement of an off-site area to mitigate for the ecological losses that cannot be compensated for on-site.

1.2.3 *Prior to commencement of the development hereby permitted, an Off-site Mitigation and Compensation Strategy (OMCS) shall be submitted to, and approved in writing by, the local planning authority. The OMCS shall:*

(a) provide full details of new off-site habitat(s) to be created, to compensate for loss of habitat on the development site, and new habitat to be provided for the translocation of protected species displaced from the development site;

(b) be in accordance with the findings and recommendations of the Environmental Statement² (dated October 2012) and Outline Biodiversity Strategy¹ (dated April 2013), submitted to support the application;

(c) provide a programme for works to be undertaken, including a timetable for remediation, introduction of species and monitoring (as necessary); and

¹ Parsons Brinckerhoff (2013) Nethermayne Outline Biodiversity Strategy. Prepared on behalf of the Homes and Communities Agency and South Essex College

² Parsons Brinckerhoff (2012) Nethermayne Environmental Statement. Prepared on behalf of the Homes and Communities Agency and South Essex College

³ Parsons Brinckerhoff (2013) Options Appraisal Report. Nethermayne Off-site Mitigation Areas. Prepared on behalf of the Homes and Communities Agency and South Essex College

(d) state the arrangements to secure the long term maintenance/management of the habitat(s) and translocated species. The OMCS shall be implemented in accordance with the approved timetable under (c) above and no development shall commence until all pre-commencement requirements of the OMCS have been implemented to the written satisfaction of the Local Planning Authority.

1.2.4 This report will seek to satisfy the above planning condition to ensure that off-site mitigation and compensation is undertaken to a satisfactory standard in the interest of nature conservation and to ensure the provision of suitable new locations for the protected species.

1.3 Aims and Objectives

1.3.1 The OMCS does not form a final or detailed design but will aim to demonstrate the type of layout, habitats and features that will be required in order to achieve the appropriate mitigation and compensation. It will also aim to identify monitoring tasks to ensure that any management on site is appropriate and directed towards these objectives. This can also be used to clarify the need for resources. As such, this document will be updated and revised in line with detailed design, as it develops (an indicative programme is shown in Appendix C).

1.3.2 Furthermore, this strategy will be reviewed every two years to ensure the site fulfils its objectives, and that the management practices are effective and targeted. A full review will also be undertaken at the end of the ten year plan. This Plan should therefore be viewed as a working (live) document to allow for updates and corrective variations in management requirements as further information becomes available.

1.3.3 The objectives of the OMCS are:

- To provide mitigation for the losses of the Dry Street Pastures Local Wildlife Site (LWS), and Lowland Meadow habitats;
- To provide mitigation for breeding birds;
- To provide mitigation for invertebrates;
- To provide mitigation for badgers;
- To provide a suitable receptor site for translocated reptiles from the Nethermayne site. The site will be enhanced to offer basking, foraging and hibernation opportunities (assess the presence of mosaic of different habitats – scrub cover, piles of dead wood, general presence of invertebrates, and presence of cracks, crevices and holes); and
- To provide suitable habitat conditions for the establishment of notable flora, specifically the green-winged orchid (*Orchis morio*) and adder's-tongue fern (*Ophioglossum vulgatum*).

1.3.4 The overall broad long-term management objectives for the off-site mitigation area are as follows:

- Management and maintenance of species-rich lowland meadow habitats to include appropriate cutting and / or grazing regimes;

- Management and maintenance of habitat connectivity across the site and to the wider surrounding area, inclusive of a detailed planting scheme;
- Management and maintenance of hedgerows, scrub and woodland areas to maximise structural diversity and ecological value;
- Management and maintenance of habitat features such as earth banks, dry ditches and hibernacula to ensure long-term ecological value; and
- Contribution to local conservation efforts, this may include annual updates / consultations regarding the management effectiveness to the local relevant bodies such as Essex Wildlife Trust (EWT), Natural England (NE), and Essex County Council (ECC).

1.4 Structure of the OMCS

1.4.1 Following the Introduction (Section 1), the OMCS is divided into three main sections numbered 2-4:

Section 2 On-site Valued Ecological Receptors

Summary description of the ecological features of interest affected by the development, including any important flora and fauna to be translocated and existing habitats and features requiring mitigation.

Section 3 Runwell Baseline Conditions

Overview of the importance and protection of the existing baseline ecological conditions for the proposed off-site mitigation area.

Section 4 Mitigation and Compensation Plan

Overview of the off-site objectives of protection and mitigation measures to be implemented prior to, during, and following construction of the main site, and provides details of the proposed techniques where possible. For each objective, this describes the factors which will affect management towards that objective and provides guidance on management activities.

Monitoring throughout the initial management period and in the longer term is necessary to assess the success of the mitigation measures and determine whether the habitats and species are being maintained and managed in favourable status. Monitoring data would be used to inform future revisions of this OMCS.

SECTION 2

ON-SITE VALUED ECOLOGICAL RECEPTORS

2 ON-SITE VALUED ECOLOGICAL RECEPTORS

2.1 Background

2.1.1 The Environmental Statement and the Outline Biodiversity Strategy identify a number of 'Valued Ecological Receptors' (VERs) associated with the proposed development at Nethermayne site. The VERs were identified in accordance with guidelines provided within the Chartered Institute of Ecology and Environmental Management (CIEEM) 'Guideline for Ecological Impact Assessment'⁴ (EclA). The guidance provides a framework for the evaluation of features, which takes into account the following:

- Direct biodiversity value of habitats and species;
- Indirect value of features that help support the ecological integrity of the receptors;
- Legal protection for both sites and species; and
- Evaluation against local planning guidance and objectives.

2.1.2 The 'Value' is assigned according to a geographic frame of reference that consists of the following categories: international, national, regional, county, district, local, context of the site, negligible. Sites, species populations, species assemblages and habitats are considered to be VERs if they are of at least Local value.

2.1.3 Ecological mitigation and compensation must be considered if it is assessed that there will be significant effects to VERs due to construction and / or operation of the development. Additional ecological mitigation and compensation methods such as the provision of an off-site area is required in order to ensure compliance with wildlife legislation for VERs where it has not been possible to fully address the adverse impacts on-site. The focus of this document is on the VERs for which the on-site mitigation is insufficient or not possible¹².

2.1.4 Further to legislative requirements and in accordance with planning policy guidance, every opportunity for enhancement of the biodiversity and landscape resource of the site has been considered within the OMCS. This also includes the VERs for which on-site mitigation is considered sufficient to ensure the residual impact is acceptable.

2.2 Valued Ecological Receptors

2.2.1 The proposed development at Nethermayne will result in a number of impacts on VERs whereby on-site mitigation is not sufficient or suitable. As such, off-site mitigation is required to reduce the residual impacts of the proposed development. A summary assessment of the VERs requiring further off-site mitigation is provided in Table 2.2.1. The following sections describes the VERs in more detail and highlights the likely effects of the proposed development and thus the requirement for further mitigation and compensation measures.

2.2.2 It should be noted that significant adverse impacts on great crested newt (GCN) were identified by the Environmental Statement, however, all mitigation and compensatory habitat creation for GCN will be carried out within the Nethermayne development site and land directly adjacent to it.

⁴ Institute of Ecology and Environmental Management (IEEM) Guidelines for Ecological Impact Assessment 2006

Table 2.2.1: Summary of VERs requiring further off-site mitigation

VER	Value	Type of Impact	Magnitude and Significance of Impact (Pre Mitigation)	Magnitude and Significance of Impact (Post Mitigation)
Dry Street Pastures Local Wildlife Site	County	Direct – Adverse Loss of LWS	Large Significant at County Level	Moderate Significant at County Level
		Direct and indirect – Adverse	Moderate Significant at County Level	Moderate Significant at County Level
Lowland Meadows HPI, LBAP	Local - County	Direct – Adverse	Large Significant at County Level	Moderate Significant at County Level
		Direct and indirect - Adverse	Slight Significant at Local Level	NA Not Significant
Reptiles	County	Direct – Adverse	Large Significant at County Level	Slight Significant at County Level
Badgers	Local	Direct – Adverse	Large Significant at Local Level	Moderate Significant at Local Level
Breeding Birds	Local	Direct – Adverse	Large Significant at Local Level	Slight Significant at Local Level
		Direct and indirect -Adverse	Moderate Significant at Local Level	Slight Significant at Local Level
Invertebrates	County	Direct - Adverse	Large Significant at County Level	NA Not Significant
		Indirect - Adverse	Moderate Significant at County Level	NA Not Significant
Plant Species	County	NA – Included as part of the LWS mitigation	NA	NA

Dry Street Pastures Local Wildlife Site (LWS)

- 2.2.3 This LWS represents a series of flower rich pastures and other grassland habitats. Most of the grassland qualifies as Habitat of Principle Importance (HPI) and comprises good quality hedgerows. The site has been known to support populations of adder’s-tongue fern (*Ophioglossum vulgatum*) and green-winged orchid (*Orchis morio*), both of which are rare in Essex.
- 2.2.4 The Dry Street Pastures LWS is located within the proposed development site, and approximately 10.22 ha of the LWS will be lost as a result of the proposed works. Additional to the direct losses, the LWS will be subject to increased disturbance impacts due to increased noise, pollution and access by the public.
- 2.2.5 The 10.22 ha area of land is dominated by MG5 *Cynosurus cristatus-Centaurea nigra* grassland, *Lathyrus pratensis* sub-community as defined under the National

Vegetation Classifications⁵. This community is the major grassland type included within the popular, but often loosely applied, category of 'Old Meadows'⁶. Typical MG5 *Cynosurus cristatus-Centaurea nigra* grassland, *Lathyrus pratensis* sub-communities require infertile / moderately fertile, well-drained or moist brown soils such as clay loams with pH ranges from neutral to slightly acidic⁷.

2.2.6 The area of land required for compensation of the loss of habitat is at a 1:1 ratio or above. As such, a minimum of 10.22 ha of land that is not already managed as grassland is required to mitigate for the permanent loss that will result from the proposed development.

2.2.7 LWSs are listed as non-statutory designated sites; they are protected under the National Policy Planning Framework (NPPF).

Lowland Meadows (Including Improved and Semi-improved grassland) HPI, EBAP

2.2.8 Flower-rich grasslands generally dominated by crested dog's tail (*Cynosurus cristatus*) and common knapweed (*Centaurea nigra*), with a meadow vetchling sub-community (*Lathyrus pratensis*). The habitat type is the same as specified within Dry Street Pastures LWS, although it is located outside of the LWS boundary.

2.2.9 A total of 3.25 ha of Lowland Meadow habitat is to be lost as part of the proposed development at Nethermayne. The habitat requirements for neutral lowland meadows are the same as those specified for Dry Street Pastures LWS. As such, the minimum area of land required to compensate for the loss of habitat is 3.25 ha of land that is not already managed as grassland.

Plant Species

2.2.10 Two notable plant species adder's tongue fern (Nationally Scarce) and green-winged orchid (Near threatened) were historically recorded within the proposed development site and Dry Street Pastures LWS.

2.2.11 Adder's-tongue fern is a native rhizomatous, deciduous fern found on mildly acidic to base rich soils in open woodland, meadows and damp pastures. Although widespread it has a localised distribution, it is relatively uncommon and is declining mainly due to disturbance / destruction of habitats due to the intensification of agriculture, grazing, drainage and development. The requirement for this species is typically similar to that of MG5 *Cynosurus cristatus-Centaurea nigra* grassland detailed above.

2.2.12 Green-winged orchids favour unimproved grassland, ancient undisturbed hay meadows, and pastures of the heavy boulder clay lands. It is difficult to compensate for the loss of habitat that supports green-winged orchid, due to the length of time required for newly created habitats to become suitable for the species. It is however possible to create habitat that upon maturation will be suitable for the species. The requirement for this species is typically similar to that of MG5 *Cynosurus cristatus-Centaurea nigra* grassland detailed above.

⁵ Rodwell, J.S. (2006) *National Vegetation Classification User's Handbook*. Joint Nature Conservation Committee, Peterborough.

⁶ Rodwell, J.S. (1991) *British Plant Communities Volume 3: Grasslands and Montane Communities*. Cambridge University Press, Cambridge.

⁷ Rodwell, J. S., Morgan, V., Jefferson, R. G., and Moss, D., (2007). *The European Context of British Lowland Grasslands*. Joint Nature Conservation Committee, Peterborough

Badger

- 2.2.13 Two active badger (*Meles meles*) setts within the development site boundary are likely to be lost as a result of the proposed works (an annex sett and subsidiary sett); these setts will require closure. The baseline conditions for badger on-site may be subject to updates following completion of the 2014 bait-marking surveys.
- 2.2.14 The proposed development works will also result in the loss of foraging and commuting habitat across the site; however green infrastructure comprising green corridors and spaces, have been incorporated in the landscape design and masterplan for the site. The site is known to be well used by badgers with high levels of activity recorded throughout the spring and summer of 2012. The habitat losses across the site will significantly reduce the foraging resource for badgers within the area. Off-site habitat creation would therefore aim to provide compensation for badgers where this cannot be achieved on-site at Nethermayne.
- 2.2.15 Although the species is vastly adaptable, optimal badger habitat is considered to be where a mosaic of habitat types is available, such as, woodland, open grassland meadows, scrub, and hedgerows with fruit bearing trees. This allows access to adequate and varied food supplies throughout the year.
- 2.2.16 Badgers are protected under the Protection of Badgers Act (1992) and the Wildlife and Countryside Act (1981, as amended).

Breeding Birds

- 2.2.17 A total of 42 species of bird was recorded within the proposed development site, 19 species (approximately 44% of the species assemblage) are subject to some level of protection or conservation criteria. Of these protected and / or notable species twelve were confirmed breeding within the survey area. No species listed on Schedule 1 of the Wildlife and Countryside Act (1981, as amended) were recorded within the survey area.
- 2.2.18 The proposed development will result in a loss of approximately 24 ha of grassland, hedgerows, trees and scrub nesting and foraging habitat. Losses of habitats from the site are likely to affect both nesting and foraging birds. Such habitat loss could, in turn, result in the indirect reduction in certain bird territories and the fragmentation of their habitats.
- 2.2.19 Ground nesting birds such as skylarks (*Alauda arvensis*) require large open grassland fields that have a low intensity management scheme. The other species of birds typically found within the proposed development site such as song thrush (*Turdus philomelos*), whitethroats (*Sylvia communis*), and dunnocks (*Prunella modularis*) require thick hedgerows associated with arable or pasture fields that are managed under a low-intensity regime.
- 2.2.20 All birds, their nests and eggs are protected by the Wildlife and Countryside Act (1981, as amended).
- 2.2.21 A combination of on-site and off-site mitigation will be used to reduce the impact on breeding birds. The OMCS will be targeted at the species recorded in and around the site where applicable.

Reptiles

- 2.2.22 The proposed development site at Nethermayne is known to support all four common species of reptile at differing population size classes. The four common species of reptiles are adder (*Vipera berus*), grass snake (*Natrix natrix*), common lizard (*Lacerta vivipara*) and slow worm (*Anguis fragilis*).
- 2.2.23 The proposed development will result in the permanent loss of optimal foraging reptile habitat and habitat used for sheltering/hibernating. The extent of which cannot be fully mitigated for on-site, compensatory measures are proposed (see Table 2.2.4). Reptiles present within the proposed development site will be translocated into an off-site translocation area (the site). This report details the off-site compensatory measures proposed for reptiles.
- 2.2.24 Reptiles require a mosaic of habitats that offer refuge, hibernation, basking and foraging habitat. Typical basking and foraging habitat consists of tussocky grassland and woodland edges, whereas woodland and scrub provide suitable refuge and hibernacula habitats. The site should also contain habitat suitable to support small mammals and aquatic habitat that attract amphibians; these offer a good source of food for grass snakes and adders.
- 2.2.25 The four common reptile species, adder, grass snake, common lizard, and slow worm, are protected under Schedule 5 of the Wildlife and Countryside Act (1981, as amended) against deliberate and/or intentional killing, injuring and trade.

Invertebrates

- 2.2.26 A total of 384 species were recorded within, and immediately surrounding the development site. No species were recorded that are afforded direct protection under European or UK legislation, or are listed as a UK SPI. The survey recorded one Red Data Book (RDB) species, the ground beetle (*Polistichus connexus*). A total of eight Nationally Scarce⁸ species (formally Nationally Notable) and 23 Nationally Local species⁹ were recorded across various habitat types including verges, meadows and woodland edges.
- 2.2.27 The proposed development will result in the loss of a large area of habitat suitable for a wide range of locally common invertebrate species. This report details the compensation measures for the associated habitat loss for this species group.
- 2.2.28 The majority of invertebrate species identified within the proposed development site were generally associated with open grassland habitats, hedgerows, or the transitional zone between tall woodland and low, open grassland. These habitats provide complex, multi-structured features that supports, and facilitates migration, of invertebrates within the local area.

⁸ Nationally Scarce: Species, which are not included within the IUCN threat categories and are estimated to occur in less than 100 hectares of the Ordnance Survey national grid in Great Britain. It should be noted that Lower Risk (Nationally Scarce) is not a threat category, but rather an estimate of the extent of distribution of these species

⁹ Nationally Local: Species which, whilst fairly common, are evidently less widespread than truly common species, but also not qualifying as Nationally Notable having been recorded from over one hundred, but less than three hundred, ten-kilometre squares of the UK National Grid

SECTION 3

RUNWELL BASELINE CONDITIONS

3 RUNWELL BASELINE CONDITIONS

3.1 Overview

3.1.1 The Runwell site (Appendix A, Figure 1) is located approximately 1.5 km north-east of Runwell village centre. The site extends approximately 40 ha, with an approximate central grid reference of TQ 765 962.

3.1.2 A number of surveys were undertaken to determine the baseline condition to inform the options appraisal¹⁰. These included:

- Extended Phase 1 Habitat Survey and Habitat Suitability Assessment¹¹; and
- Soil surveys¹².

3.1.3 An initial Extended Phase 1 Habitat survey was undertaken by Adonis Ecology on behalf of Parsons Brinckerhoff on 18th September 2013. The survey encompassed all areas located within the red-line boundary (Appendix A, Figure 2).

3.1.4 The site is dominated by large intensively managed arable fields and associated field boundaries. Rettendon Shaw, broad-leaved woodland runs through the centre of the site; the woodland is designated as a Local Wildlife Site (LWS).

3.1.5 The site is considered suitable to support a number of notable and protected species, including bats, badgers, dormice, breeding and nesting birds, reptiles, and GCN (when in terrestrial phase).

3.2 Baseline Conditions for VERs

Local Wildlife Site / Lowland Meadow HPI / Plant Species

3.2.1 No National Vegetation Classification survey was undertaken for the site, as all habitats considered of high ecological value, such as woodland, semi-improved grassland, scrub and trees will be retained. Only arable fields are likely to be impacted by the proposed works and as such, no botanical surveys were considered necessary.

3.2.2 The site comprises large intensively managed arable fields, associated grassland verges, areas of broad-leaved and plantation woodland, scrub and hedgerows (Figure 2, Appendix A). The arable fields and verges are not considered to be of high conservation value, with low species diversity levels recorded throughout.

3.2.3 The soil survey¹² identified a number of fields across the site that had low phosphorus levels (less than 10mg/l) that would be suitable to convert into species-rich neutral grassland / lowland meadows. The area of land available for conversion into species-rich neutral grassland / lowland meadows totals approximately 17.8 ha (Figure 3, Appendix A). As identified within the Nethermayne Outline Biodiversity Strategy¹ the minimum area required to compensate for the loss of the LWS and Lowland Meadow habitats is 13.47 ha, calculated at a ratio of 1:1. The area currently available for compensation is 17.8 ha, the conversion of this area will result in a 32% net gain of species-rich neutral grassland / lowland meadows conversion.

¹⁰ Parsons Brinckerhoff (2013) Options Appraisal Report. Nethermayne Off-site Mitigation Areas. Prepared on behalf of the Homes and Communities Agency and South Essex College

¹¹ Parsons Brinckerhoff (2013) Extended Phase 1 Habitat Survey: Runwell, Essex. Prepared on behalf of Redrow Homes Ltd.

¹² ADAS (2013) Soil Survey for Potential Habitat Sites in Essex. Prepared on behalf of Parsons Brinckerhoff.

3.2.4 The varying topography / aspect, pH, and drainage within the site provide further opportunities to create a wide range of habitats. A field to the east of the site (not included within the 17.8 ha) was found to exhibit low pH levels; potentially suitable for the creation of acid grassland. This variation in habitat type would create a desirable mosaic of grassland habitats that would be beneficial for a range of invertebrate species.

Badger

3.2.5 No setts or conclusive evidence of badger was recorded within the boundaries of the site. Mammal paths were observed along the south-east boundary of the site.

3.2.6 The site is dominated by arable fields that are considered to be sub-optimal foraging habitat for badgers. The remaining areas of the site contain suitable foraging habitat for badgers such as woodland, hedgerows, and grassland. These all provide optimal foraging and burrowing habitat for the species.

3.2.7 Based on the suitability of habitats present and the potential signs of presence, it is likely that badgers are using the site. As such, a targeted badger survey will be undertaken to identify any badger setts within, and in close proximity, to the site. This will inform the detailed landscape design and highlight any areas within the site that should be avoided and / or protected during the proposed habitat creation / enhancement works. The badger survey will be undertaken during 2014 and any amendments to the baseline and mitigation design, pending the results of this survey, will be made in future revisions of this Strategy.

Breeding Birds

3.2.8 The arable fields that dominate the site are considered to provide suitable, albeit limited, habitat for ground nesting birds such as skylarks. The ancient and plantation broad-leaved woodland, scrub, scattered trees and hedgerows located throughout the site offer suitable habitat for nesting / breeding birds.

3.2.9 No suitable aquatic habitat such as ponds or lakes, were located within the site boundary.

Reptiles

3.2.10 The majority of the site is dominated by arable fields (c.30 ha), which are considered to provide sub-optimal habitat for reptiles. The remaining habitats (c.10 ha) comprises a mosaic of plantation and deciduous woodland, unimproved grassland, hedgerows and scrub, considered to provide optimal habitat for reptiles. Deadwood is located throughout the woodland areas, which provides suitable hibernacula for reptiles.

3.2.11 A reptile survey was undertaken in 2014 with checks of deployed artificial refugia undertaken on the following dates, by suitably experienced ecologists, during suitable weather conditions:

- 5th June 2014
- 9th June 2014
- 20th June 2014
- 26th June 2014

- 28th June 2014
- 1st July 2014
- 2nd September 2014

3.2.12 Very small populations (maximum count of one of each species recorded) of the four common reptile species (grass snake, slow worm, common lizard and adder) were recorded during the survey in and around woodland edges, field margins and motorway verges.

3.2.13 Therefore, the site is known to support small populations of reptile species and capable of supporting the translocated individuals once suitable remediation and habitat creation works is undertaken. This will result in a net gain of suitable reptile habitat and with existing [small] populations already present; this would likely increase the residual viable breeding population on site following translocation.

Great Crested Newts

3.2.14 The site does not contain any aquatic habitat considered to be suitable for GCN. Four water bodies are located within 500 m of the site that are considered suitable to support GCN¹³. Of these, two are considered to be isolated from the site by a busy main road, which is likely to be a significant barrier to dispersal.

3.2.15 The site contains optimal terrestrial habitat for GCN, such as woodland edges, hedgerows, scattered trees, scrub, and plantation woodland. It is considered to be well connected to the surrounding habitat by areas of planted woodland, scrub and hedgerows.

GCN presence / likely absence surveys¹³ were undertaken in spring 2014 for two water bodies that are directly connected to the site by suitable terrestrial habitat; however no GCN were recorded and therefore the species is not considered to be a constraint to the habitat creation works.

Invertebrates

3.2.16 The intensively managed arable fields and fields of improved grassland used as pasture land are considered suitable for widespread and common species. The woodland, hedgerows, and scrub contained within the site provides optimal habitat for a number of locally common invertebrate species.

3.3 Other Protected / Notable Species and Habitats

Bats

3.3.1 The woodland, mature scattered trees and World War II pill boxes provide suitable roosting opportunities for bats, whilst the hedgerows and vegetated field boundaries are likely to provide commuting and foraging habitat for the species. Should any suitable roosting habitats be affected by the habitat creation works, further targeted bat surveys may be required.

Dormice

¹³ English Nature (2001). *Great Crested Newt Mitigation Guidelines* Version: August 2001. English Nature, Peterborough

- 3.3.2 The semi-natural and plantation woodland, hedgerows and scrub contained within the site are considered to provide optimal habitat for dormice (*Muscardinus avellanarius*). The site lies within the geographic range of dormice and Essex is known to support existing populations of the species. As such, a precautionary approach has been adopted whereby dormice are assumed present within all suitable habitats.
- 3.3.3 All suitable habitats such as woodland, hedgerows and scattered trees and scrub are to be retained, protected and enhanced in order to ensure no adverse effects on dormice occur. As such, it is not considered necessary to undertake further detailed dormouse surveys. Should the mitigation works affect any habitat suitable to support dormouse (resting or breeding site), further survey effort will be required. If dormouse is found to be present, it may be necessary to apply for a Natural England Licence to permit any activities that could otherwise cause an offence under the current legislation protecting this species.

SECTION 4

MITIGATION AND COMPENSATION PLAN

4 MITIGATION AND COMPENSATION PLAN

4.1.1 This section outlines the long-term habitat creation and enhancement measures to be implemented as part of the OMCS. The measures presented within this document are consistent with the Biodiversity Strategy¹ and Environmental Statement². These measures will ensure the maintenance and enhancement of the site for the VERs identified within Section 2, and where possible / feasible, the enhancement of the site for other VERs that may be using the site such as bats or dormice.

4.1.2 Figure 3 (Appendix A) illustrates the habitat creation and enhancement measures to be implemented and is therefore only indicative based on current baseline information. It should be noted that this is an outline strategy and is subject to modification following the completion of further surveys and the development of detailed design.

4.2 Pre-Work Surveys / Applications

4.2.1 Further surveys will be required to determine the baseline conditions of the specific VERs the OMCS is targeting. Below is a table summarising the further detailed surveys required prior to the commencement of works and the seasonal constraints for undertaking such surveys.

4.2.2 It should be noted that further bat and dormouse surveys will not be necessary based on current proposals, as existing habitats suitable to support these species will be retained and/or enhanced in a sensitive manner. However, it is likely that dormice and bats are present within the site and should any works result in the destruction / clearance / disturbance of suitable habitats for these species, further surveys will be required.

Table 4.2: Summary Table of Pre-work Surveys Required

Species	Reason Required	Survey requirement and timing
Bats (Aerial tree surveys)	Tree surveys will only be required if felling or pruning of trees with bat potential is necessary.	No timing constraints.
Badger	The surveys will establish a baseline and inform the detailed design.	To be undertaken during Autumn/Winter 2014.
Dormouse	Surveys will only be required if suitable habitat is to be impacted – this is considered unlikely as all habitat is to be retained and enhanced.	To be undertaken April – October inclusive.
Reptiles	The surveys will establish the baseline reptile population and inform the translocation programme.	Survey to determine reptile presence / population size class were undertaken between April – September 2014.

4.3 Habitat Creation / Enhancement

Dry Street Pasture LWS / Lowland Meadows / Plant Species

4.3.1 The mitigation and creation measures recommended for the loss of Dry Street Pastures LWS would also compensate for the loss of lowland meadow habitat and associated plant species. As such, the mitigation and compensation measures for these VERs have been presented together.

4.3.2 A total of 17.8 ha of arable fields had suitable substrate composition for conversion into species-rich neutral grassland / lowland meadows (Figure 3). The soils currently contain relatively high levels of nutrient within the top 250 mm of soil, due to the previous land use as arable fields. Artificially high nutrient levels favour aggressive species of grasses and weeds, which outcompete slower growing, herbaceous plants. Conversely low nutrient levels are associated with higher numbers of different species¹⁴. As such ground preparation work is required to achieve the desired species-rich grassland.

4.3.3 The ground preparation required prior to the grassland creation will involve soil inversion, a process which involves 'deep ploughing,' whereby the high nutrient topsoil is ploughed into the ground and low nutrient subsoil is brought to the surface. The exposed low nutrient subsoil thus provides the ideal growing medium for species-rich grassland to propagate. As the plough depth will be over 1 m, a desk-top search of the Essex Historic Environment Record was undertaken to highlight any areas of archaeological interest within the area, only the pill boxes located within the site were listed as non-statutory monuments. As the site has been subject to intensive land management practices in the past, including ploughing, it is unlikely that archaeology will be a constraint.

4.3.4 Approximately 14 days prior to the 'ploughing' all existing vegetation will be flailed and treated with a translocating herbicide such as glyphosate (see Table 4.3 for programme). A machine suitable to be used in clay conditions will then be required to 'deep plough' the land. The direction of the plough will be parallel to the contour of the land to minimise any potential soil erosion. Following the ploughing, the site will be harrowed in dry conditions. A second application of herbicide will be undertaken approximately twenty-eight days following the ploughing (late August) if necessary (should weeds start to appear). As soon as the herbicide has taken effect, or if no weeds were noted, the site will be sown with suitable wildflower seed using standard calibrated agricultural combination seed drill. Annuals will be sown at 2-5g/m² and biennials / perennials at 0.5-1g / m². The seed mix will comprise approximately 70% grass and 30% broad-leaved species and will reflect the species composition of the grasslands being lost.

4.3.5 The species to be included within the wildflower seed mix will be suitable for the soil substrate and conditions on-site and where possible replicate the typical composition (dominated by MG5 *Cynosurus cristatus*) of the habitat lost within the proposed development site. As such, the wildflower seed mix will replicate the MG5 *Cynosurus cristatus* NVC community where possible and include:

- Common bent – *Agrostis capillaries*
- Crested dog's tail – *Cynosurus cristatus*

¹⁴ Walker, K. J., Stevens, P. A., Stevens, D. P., Mountford, J. O., Manchester, S. J., Pywell, R. F. (2004), *The restoration and re-creation of species-rich lowland grassland on land formerly managed for intensive agriculture in the UK*. Biological Conservation 119

- Sweet vernal-grass *Anthoxanthum odoratum*
- Red fescue – *Festuca rubra*
- Selfheal – *Prunella vulgaris*
- Cat's-ear – *Hypochoeris radicata*
- Meadow vetchling – *Lathyrus pratensis*
- Yellow rattle – *Rhinanthus minor*
- Lesser Knapweed – *Centaurea nigra*
- Pignut - *Conopodium majus*
- Narrow-leaved Bird's-foot-trefoil – *Lotus glaber*
- Common bird's-foot trefoil – *Lotus corniculatus*
- Salad Burnet - *Sanguisorba minor*
- Field scabious – *Knautia arvensis*
- St. John's Wort – *Hypericum perforatum*

4.3.6 Yellow rattle detailed within species to include within the wildflower mix is of particular importance as the plant tends to restrict grass growth, thereby allowing other less-competitive species to thrive.

4.3.7 It is also possible to translocate turf from Dry Street LWS to the site such that any active or dormant species can be transferred. Translocation would employ macro-turfing techniques using specialist plant, such as plate or fork with guillotine attached to a tracked loading shovel or similar approved machine.

4.3.8 Turves will be neatly and vertically cut along their edges and be as large as practically possible, typically 2.30m x 1.30m. The turves will be cut to a consistent depth and will include the whole soil profile as a single turf. The depth of cut will be dependent upon site conditions. Depths will be approximately 250mm but will be dependent on existing soil depth. This will enable the retention of the plant roots, organic layer, seed bank and soil invertebrates. Turves will be cut to the same depth as far as possible. Turves will be placed in the receptor site on the day of removal from the donor sites to minimise risk of drought affecting the turves. The feasibility and methodology of turf translocation will be developed further during detailed design and will also be set out in a Habitat Management Plan for the development site.

4.3.9 Other techniques such as littering, whereby species-rich hay from a donor site is spread on a receptor site, will also be investigated as an alternative to turf translocation¹⁵.

Table 4.3: Timetable of Grassland Establishment

Month	Works
May - June	Flail site and apply glyphosate based herbicide
July	Deep plough and harrow
August	Re-apply glyphosate based herbicide

¹⁵ Edwards A.R., Mortimer S.R., Lawson C.S., Westbury D.B., Harris S.J., Woodcock B.A. & Brown V.K. (2007) Hay strewing, brush harvesting of seed and soil disturbance as tools for the enhancement of botanical diversity in grasslands. *Biological Conservation*, 134, 372-382

Month	Works
September	Sow annual and perennial wildflower seed ¹⁶

4.3.10 The 6.3 ha of arable land located within the eastern fields is suitable for conversion to acid grassland (Figure 3, Appendix A). The ground preparation required for the creation of grassland would be the same as for species-rich neutral grassland; however different species will be included within the seed mix:

- Heath bedstraw - *Galium saxatile*
- Sheep`s sorrel *Rumex acetosella*
- Wavy hair-grass *Deschampsia*
- Tormentil *Potentilla erecta*

Breeding Birds

4.3.11 The creation of lowland meadow (as detailed above) will be beneficial for ground nesting birds such as skylarks, which require large open fields.

4.3.12 Enhancement of suitable bird foraging and breeding habitat will include the enhancement of features such as hedgerows and woodland edge through targeted shrub and tree planting schemes. The species planted will be selected to enhance the site for foraging birds (fruit bearing) and invertebrates; these will be of local provenance and will include:

- Hawthorn – *Crataegus monogyna*
- Hazel - *Corylus avellana*
- Blackthorn – *Prunus spinosa*
- Dog rose – *Rosa canina*
- Elder - *Sambucus nigra*
- Field maple – *Acer campestre*
- Dogwood – *Cornus sanguinea*
- Spindle - *Euonymus europaea*
- Crab apple – *Malus sylvestris*
- Pedunculate oak - *Quercus robur*
- Field maple - *Acer campestre*
- Wild cherry – *Prunus avium*
- Downy birch – *Betula pubescens*
- Sweet Chestnut - *Castanea sativa*
- Alder buckthorn - *Frangula alnus*

¹⁶ Natural England (2010), Technical Information Note TIN067: Arable Reversion to Species-rich Grassland: Establishing a sown sward.

- Goat willow – *Salix caprea*
 - Grey willow - *Salix cinerea*
- 4.3.13 The understory areas will be planted with a wildflower meadow mix suitable for shaded areas, to include the following species:
- Agrimony - *Agrimonia eupatoria*
 - Cow Parsley - *Anthriscus sylvestris*
 - Lesser knapweed
 - Foxglove – *Digitalis purpurea*
 - Nettle-leaved bellflower - *Campanula trachelium*
 - Hedge bedstraw – *Galium mollugo*
 - Hedge woundwort – *Stachys sylvatica*
 - Red campion – *Silene dioica*
 - Tufted vetch – *Vicia cracca*
 - Upright hedge parsley – *Torilis japonica*
 - Common bent
 - Salad Burnet
 - Tormentil - *Potentilla erecta*
 - Wood Avens - *Geum urbanum*
 - Crested dog's tail
 - Tufted hair grass – *Deschampsia cespitosa*
- 4.3.14 It is also recommended that an area to the east of the woodland is planted with hazel and other fruit bearing trees from the list above (Figure 3, Appendix A). This will increase the area of woodland edge habitat, improve the structure of the woodland by incorporating younger trees, provide further nesting habitat and enhance the foraging habitat for birds, bats, dormice, invertebrates and badger.
- 4.3.15 The new hedgerows and tree planting will create new habitat for breeding birds and enhance the area for target and non-target species such as bats, badgers, amphibians, dormice and reptiles. The species of trees and shrubs to be planted are detailed above. The hedgerows will be sited to maximise connectivity between areas (Figure 3, Appendix A) and to break up extensive, exposed fields into smaller sized fields with higher variability in micro-climate, suitable for a wider range of species.
- 4.3.16 The planting phase will be undertaken between October and March; the optimum period is before January when the soil has retained warmth and moisture. The soil will be prepared prior to planting by ploughing (as described above) and shrubs will be planted in staggered rows at a density of 4-5 shrubs per metre (Figure 1 Appendix B). Trees will be incorporated approximately every 10 – 20 m¹⁷.
- 4.3.17 To mitigate for the time delay between the loss of the suitable breeding habitat on development site and the establishment of the new habitat creation off-site, 20 bird

¹⁷ Essex Biodiversity Partnership, Hedgerows Leaflet: Available at - <http://www.essexbiodiversity.org.uk/species-and-habitats/hedgerows>: Accessed 3rd December 2013

boxes will be installed in the woodland to increase the breeding opportunities. According to the British Trust of Ornithology guidance, 10 assorted small boxes per hectare is a typical density (<http://www.bto.org/notices>). Boxes will be obtained from a suitable supplier and be Schwegler boxes made from woodcrete. This material has increased durability compared to wooden boxes, therefore reducing the need for future maintenance. The following boxes will be installed in locations determined by an ecologist (the letters in inverted commas are the Schwegler model numbers and box name).

- “1B Bird box” (entrance 26 mm);
- “1B Bird box” (entrance 32 mm);
- “2H Open fronted robin box”;
- “2HW Open fronted bird box”;
- “3S Starling and woodpecker box”; and
- “No. 5 Owl box”.

Badger

- 4.3.18 The habitat creation undertaken for breeding birds will also enhance the site for badgers. The targeted planting (specifically of fruit and nut bearing trees) will also provide suitable food resources throughout the year.
- 4.3.19 Additionally, the conversion of arable land to species-rich neutral and acidic grassland is likely to result in a higher density of earthworms (a major part of the badger diet) and small mammals within the site¹⁸. As the density of food resources determines the number of animals within a territory¹⁹, the enhancement of foraging areas within the site is likely to increase its carrying capacity for badgers.
- 4.3.20 No further specific habitat creation / enhancement measures are considered necessary to compensate for the loss of foraging habitat associated with the proposed development.

Reptiles and Amphibians

Aquatic Habitats

- 4.3.21 Subject to local ground conditions, consideration will be given to creation of new water bodies to provide additional aquatic habitat as indicated in Figure 2, Appendix B. The water bodies will seek to enhance the site for a range of species including reptile and amphibian groups.
- 4.3.22 All of the water bodies will be located within close proximity to each other (within 20 - 100 m) to form a pond complex (Figure 3, Appendix A). Figure 3 (Appendix A) highlights indicative water body locations only; the final location of the water bodies will be confirmed following trial pits and consultation with the Local Planning Authority.

¹⁸ Smith, R. G., McSwiney, C. P., Grandy, A. S., Suwanwaree, P., Snider, R. M., and Robertson, G. P. (2008) *Diversity and abundance of earthworms across and agricultural land-use intensity gradient*. Soil & Tillage Research, 100, 83 - 88

¹⁹ Hofer, H. (1988). Variation in resource presence, utilisation and reproductive success within a population of European Badgers *Meles meles*. Mammal Review 18, No.1, 25-36

- 4.3.23 The underlying soil substrate is London Clay, which is considered to be slowly permeable, seasonally wet, slightly acid but base-rich and loamy²⁰. The soil is considered to have impeded drainage, as such, it is seasonally waterlogged and often holds water. This is considered suitable for water body / wetland creation, as they are described as 'naturally wet'. However, in the unlikely event that the site conditions are not suitable to retain water, or where groundwater-fed pond creation is not possible, the water bodies may require an artificial lining²¹. Where pond lining is required, the installation of land drains, comprising perforated terracotta or plastic pipes running underneath the soil / field, will be considered to collect permeated water to recharge the water body.
- 4.3.24 Should lining be required, a bentonite geosynthetic clay liner will be used. Bentonite geosynthetic clay liner is 'dynamic' as it has a limited ability to 'heal' where small rips occur within the lining. As such, it is more durable than typical plastic liners and it also has a natural appearance unlike typical plastic lining.
- 4.3.25 The ideal water body location will be where water collects naturally, away from any potential pollutant run-off such as busy roads or intensively managed arable fields and close to suitable terrestrial habitats such as woodlands and hedgerows, to aid dispersal to suitable hibernacula. Locating the water bodies within close proximity of woodland / hedgerow will provide a certain amount of protection from wind, which is optimal for grass snakes.
- 4.3.26 The water bodies will be hydrologically separate and have varying depths between 1.5 – 4 m to provide a mixture of permanent open water, and semi-permanent pools (dry approximately once every three years). The larger water bodies will provide suitable habitat for wildlife throughout the year as the water has a higher thermal mass and is more buffered from extreme high or low temperatures. The smaller ephemeral water bodies will reduce the likelihood of predators of invasive species becoming dominant.
- 4.3.27 The surface area of the water bodies will range from 100 – 300 m² as per current best practice recommendations²². The margins of the water bodies will be of a shallow gradient (less than 5°) to provide a large drawdown zone to allow marginal vegetation to grow. The pond will be of an irregular shape with gently shelving margins and varying profiles created throughout to ensure maximum diversity of aquatic habitat within the water bodies (Figure 2, Appendix B)²³.
- 4.3.28 In summary, the final design of the water bodies will include the following features:
- Be of varying depths between 1.5 -4 m;
 - The individual water bodies will be a minimum of 20 m apart to ensure they are hydrologically separate;
 - The surface area of water bodies to range from 100 – 300 m²;
 - The margins will be shallow, with a gradient less than 5°; and

²⁰ <https://www.landis.org.uk/soilscapes>: - Accessed on 3rd December 2013

²¹ Baker, J., Beebee, T., Buckley, J., Gent, T., and Orchard, D. (2011). *Amphibian Habitat Management Handbook*. Amphibian and Reptile Conservation, Bournemouth

²² English Nature (2001). *Great Crested Newt Mitigation Guidelines*. English Nature, Peterborough

²³ Pond Conservation Organisation (2011) *Species Dossier: Creating Ponds for Amphibians and Reptiles*. Million Ponds Project

- Dependant on the findings of the topography surveys the water bodies may require lining.

4.3.29 Marginal areas will be planted with tall and dense vegetation to encourage colonisation by a diverse range of invertebrate species and to offer shelter for grass snake. Reedmace (*Typha latifolia*) and common reed (*Phragmites australis*) will be excluded from the planting schedule due to the invasive and highly competitive nature of these species. Emergent / submerged species will be planted at a density of approximately 35% to ensure areas of open water are also present. Species used in the marginal planting will include:

- Marsh marigold – *Caltha palustris*
- Lesser pond sedge – *Carex acutiformis*
- Water forget-me-not - *Myosotis scorpioides*
- Floating sweet-grass – *Glyceria* spp.
- Flag iris – *Iris pseudocorus*
- Branched bur reed – *Sparganium erectum*
- Brooklime – *Veronica beccabunga*
- Greater pond sedge – *Carex riparia*
- Water plantain - *Alisma plantago aquatica*
- Water crowfoot – *Ranunculus aquatilis*
- Fools water cress – *Apium nodiflorum*
- Water parsnip – *Rorippa nasturtium aquaticum*
- Broad-leaved pondweed – *Potamogeton natans*
- Meadowsweet – *Filipendula ulmaria*
- Water mint – *Mentha aquatica*

4.3.30 The marginal habitat will grade into bank side grassland that may be subject to temporary inundation at certain times of the year. Species to be used in these areas will reflect species present in neutral/wet grassland and will include:

- Creeping bent – *Agrostis stolonifera*
- Common bent
- Meadow foxtail – *Alopecurus pratensis*
- Crested dog's tail
- Tufted hair grass
- Red fescue
- Lesser knapweed
- Ox-eye daisy – *Leucanthemum vulgare*
- Soft rush – *Juncus effusus*
- Hard rush – *Juncus inflexus*

- 4.3.31 Emergent / submerged species will be planted, initially at a density of 35% and managed so that vegetation covers no more than 60% of the open water.

Terrestrial Habitats

- 4.3.32 The surrounding habitat will be enhanced for amphibians and reptiles. This will include the provision of six purpose-built hibernacula, three of which will be located within 50 m of the newly excavated water bodies. This will create areas for foraging and shelter and compensate for areas lost within the development footprint.
- 4.3.33 The creation of artificial hibernacula would increase the quality of terrestrial habitat for reptiles and amphibians. They will be sited in sheltered locations that are not prone to flooding. The hibernacula will follow the standard design¹³ and be connected to the newly excavated water bodies by tussocky grassland, or planted trees.
- 4.3.34 A mosaic of suitable terrestrial foraging, basking, and refuge habitat will be created and enhanced throughout the site. This will include hedgerow enhancement, tree and shrub planting and the creation of suitable grassland areas, which will increase the terrestrial foraging areas and improve connectivity with surrounding suitable features (Figure 3 Appendix A). Species to be included within the tree, shrub and hedgerow planting are listed under the breeding bird section. The species-rich grassland areas will be sown, during the spring or autumn, with a wild flower meadow mix suitable for neutral soil types (as detailed within the above sections).

Invertebrates

- 4.3.35 The habitat creation proposals for protected species / habitats will also compensate for the loss of invertebrate habitat within the development site.
- 4.3.36 Earth banks will be created throughout the site. These will be created as linear earth banks running east – west so as to increase the area of land on a south facing aspect. The areas of steeper south facing slopes tend to heat up rapidly; this is beneficial for invertebrates that may use the banks for egg-laying and burrowing purposes.
- 4.3.37 The conversion of arable fields into species rich grassland / lowland meadows will provide suitable habitat for locally common invertebrates, whilst the soil inversion and pond creation techniques will provide ample spoil that could be used for creating topographical variation. The hedgerows will provide wildlife corridors throughout the site, in particular retaining connectivity between areas of habitat adjacent to the north and south of the site. The tree / shrub planting round the edges of the woodland will provide suitable edge habitat, considered to be optimal for invertebrate species. In addition, the new water body complex created for amphibians and reptiles will also provide valuable aquatic habitat for invertebrates.
- 4.3.38 The inclusion of agrimony, salad burnet, tormentil, and wood avens will be particularly beneficial for the grizzled skipper (*Pyrgus malvae*) known to occur within Dry Street Pastures LWS. The provision of the above mentioned mitigation and compensation will mitigate for the loss and degradation of the suitable invertebrate habitats within the proposed development site.

4.4 Management

Dry Street Pasture LWS / Lowland Meadows / Plant Species

Grazing

- 4.4.1 Management of the neutral and acidic grassland areas through low-intensity grazing is highly recommended, although a hay-cut / mowing regime would also be a suitable management option. Any grazing stock will be cattle as cattle grazed grasslands tend to have a higher diversity of species present²⁴ specifically for MG5 grasslands. Horse grazing would not be considered suitable for the site, as horses tend to graze very close to the ground producing a uniform short sward. They also defecate in distinct areas, which cause localised high nutrient levels, which are colonised by nutrient-demanding competitive species resulting in a lower conservation value of the sward²⁵.
- 4.4.2 Grazing will be excluded from the area where the water body complex is to be located. Cattle can cause irreversible damage to water bodies from poaching. As such, cattle-proof fencing will be installed along fields intended to be grazed by cattle (Figure 3, Appendix A).
- 4.4.3 There are three major components of the grazing process²⁵: defoliation, trampling and manuring. Defoliation is the removal by animals of some or all of the above ground parts of plants, which may be dead or alive. Except at high stocking densities, grazing is a gradual form of vegetation removal. Grazing is selective, and affects the species composition and structure of the sward. The quantity of more palatable species is reduced, while grazing resistant plants like rosette forming herbs and unpalatable forbs and grasses become more frequent. At higher stocking rates grazing is often less selective and older tougher plant material and coarse grasses are also eaten, which can be useful during restoration management. Grazing prevents dominance of competitive species by continually removing their additional biomass. Extensive grazing creates and / or maintains a varied vegetation structure consisting of a mosaic of different grassland types and heights.
- 4.4.4 Grazing also creates physical disturbance to the vegetation and soil, which is important in providing suitable conditions for seedling germination and for invertebrates that require small areas of bare, sparsely vegetated or disturbed ground. Most of the nutrients removed by grazing are returned to the grassland through urine and dung; the distribution of which will determine where these nutrients are returned. As well as causing local nutrient enrichment, the avoidance of grazing around these areas results in local patches of taller vegetation. Long-term grazing is thought to have no net enrichment effect beyond these localised latrines²⁶. The grazing season is a crucial factor in managing grassland sites, as grazing at different times of year has varying impacts on the type of sward / species for which the site is managed. Grazing the site during spring and winter are likely to have a deleterious impact for this particular site. Spring grazing can cause local extinctions of early flowering plants such as green-winged orchids; it can also damage a range of invertebrates that are using the sward to over-winter. Winter grazing can also lead to damage through poaching, particularly on clay soils (as present within the site).
- 4.4.5 Any grazing stock will be placed on site from May through to October.
- 4.4.6 This light summer and autumn grazing will ensure that the plants have the chance to flower and seed but also that the coarse and woody vegetation is kept low. There is also less nutrient build-up from animal dung due to greater microbial processes.

²⁴ Gibson, C. W. D., (1997) *The effects of horse and cattle grazing on English species-rich grasslands*, Research Report Number 210: English Nature Research Reports available from Natural England website. English Nature available from Natural England website.

²⁵ Crofts, A., and Jefferson, R. G., (1999) *The Lowland Grassland Management Handbook: 2nd edition*, English Nature available from Natural England website.

- 4.4.7 No supplementary feeding stations will be provided for the stock within the northern two fields, as localised trampling would occur around the feeding stations and damage the grassland. It might be the case that the number of grazing animals needs to be reduced as the grazing pressure is too high and there is not enough food, this will need to be monitored and adjustments made as necessary.
- 4.4.8 Inappropriate stocking rates can be seen as one of the main factors leading to poor management of semi-natural grassland, as it influences the quantity of the vegetation removed, which influences the species composition of the sward and its structure. Conservation objectives generally require stocking levels that are lower than the carrying capacity of the grassland. This makes a significant proportion of the biomass available to other food chains like invertebrate herbivores and decomposer communities, and also enhances the structured diversity of the habitat²⁵.
- 4.4.9 Stocking levels are often expressed in Livestock Units per hectare (LU / ha), a system that takes the quantity of vegetation removed for different types of stock into account. In this case each individual cattle animal is considered to be 0.5 LU. Different animal species differ in their grazing behaviour and selectivity and this grazing behaviour and selectivity influences both the species composition and structure of the sward. As such, it is possible to adjust the stock levels specifically for the type of grassland managed, in this case MG 5 and acid grassland.
- 4.4.10 The area of the grassland to be covered by this management plan is approximately 24.1 ha (excluding the areas of grassland already present within the site). As previously discussed, the site will only be grazed during the spring and summer period comprising a maximum of 24 weeks. The area of grassland would require a stock density of 0.5 LU / ha / year, this estimate has been lowered slightly due to the enhancement focus to include invertebrates and ground nesting birds such as skylarks. This equates to approximately 35 - 40 cattle grazing for six months of the year within the summer – autumn (May – October inclusive) period²⁵.

Scrub cutting

- 4.4.11 Periodic scrub control will be needed on the site to prevent scrub invasion under low grazing levels. Some scattered scrub is beneficial to provide cover for different species. Rotational scrub clearance will take place every year between October-February (outside the breeding bird season). The scrub cutting will aim to maximise the amount of grassland within the fields. The scrub found around the edge of the grassland will be retained as this will offer good connectivity around the site. Works will be undertaken using hand-tools only such as brush cutters and strimmers.
- 4.4.12 Although no surveys have been carried out, the site presents some potential to support dormice. This must be taken into account during scrub clearance. During late autumn and winter when scrub clearance is due to take place, dormice may be hibernating within vegetation on the ground, therefore the scrub clearance is not likely to cause disturbance. However, care will be taken when bringing machinery onto the site as the wheels could crush the hibernating dormice. Therefore all machinery such as vehicles will keep to existing tracks and to ground where there is little or short vegetation present in order to minimise the risk of disturbing dormice.
- 4.4.13 On a yearly rotation, one of the grazed grassland fields will be identified for scrub clearance and scrub removal. Each area will therefore be cleared once every four years. The aim of this rotational clearance is to allow for a more manageable area for scrub clearance and also to provide some cover for the wildlife whilst the desired woodland-grasslands ratio is achieved.

4.4.14 If in any year the scrub cutting has not been undertaken and the woodland (including scrub)-grassland ratio has changed significantly then the total grazing area will be calculated and the number of grazing stock recalculated accordingly or the length of the grazing period reduced.

4.4.15 To ensure that the site remains suitable for reptiles and amphibians it is recommended that all cut / removed scrub is retained and used for building up the newly created hibernacula within the site (Figure 3, Appendix A) around the edge of the woodland but off the grassland. This will offer suitable basking opportunities and refuge from predators.

Reptiles and Amphibians

Translocation

4.4.16 A trapping strategy and associated methodology for reptiles and amphibians will be outlined in the HMP.

4.4.17 As the site currently supports very low populations of all four common species of reptiles, and capable of supporting more given the suitable remedial and habitat creation works, any translocated animals should be placed under suitable refuge within the newly created habitats.

4.4.18 Translocation of reptiles will be undertaken during suitable weather conditions (above 10°C) typically between March and September when the species are active, easily captured and able to disperse.

4.4.19 When transporting animals between sites, certain articles of legislation apply (Welfare of Animals during Transport Order 1994 and Animal Health Act 1981). These stipulate certain conditions such as the need for containers to be secure, escape proof, safe from extremes of weather and vibration, and suitable for the species concerned.

Aquatic Habitat

4.4.20 Marginal vegetation will be managed to ensure it does not engulf the open water (managed to no more than 60% cover). If clearance is required only one-third or less of marginal areas will be cleared annually on a rotational basis during autumn, leaving sections of unaffected habitat surrounding the water body. Clearance will be undertaken by hand-pulling where safe to do so.

4.4.21 The condition of the water bodies within the water body complex will be monitored yearly (see Section 4.5). These surveys will inform the maintenance required for the water bodies. The required management may include the removal of silt, removal of excess leaf litter, re-excavation, and / or additional planting.

4.4.22 Scrub encroachment will be monitored along with the biennial grassland monitoring, and scrub will be removed as required. No more than 25% of the banks of the water bodies should be covered by scrub.

Terrestrial Habitat

4.4.23 To ensure the hibernacula remain fit for purpose, they will be managed (as required) for the first two years. Any additional materials required to bolster the refuge piles can be supplied from various scrub / hedgerow management activities.

4.4.24 Management of grassland habitats around the water body complex is essential, for any translocated reptiles, to ensure a viable food source is maintained. By managing the grasslands to support invertebrate species, this will provide secondary support value for amphibians, common lizards and slow worms. The grassland will also support small mammals that are an important food source for grass snakes and adders. It is recommended that the grassland around the water bodies is managed to increase botanical diversity and control scrub encroachment. This will include targeted strimming of approximately 20% of the retained grassland (the scrub edges and hedgerows are to be avoided) within the water body complex areas annually (in late summer) and on rotation. This regime aims to create tussocky grassland, with scattered scrub accounting for less than 5 % total cover.

4.4.25 This maintenance method will be adopted for the existing grassland that is to be retained at the south-west of the site (see Figure 3 Appendix A), where access is unlikely to accommodate cattle.

Hedgerows / Woodland

4.4.26 The tree and shrubs will be monitored on a biennial basis and pruned as required to maintain the health and structure of the habitat. The hedgerows will be managed as per current best practice²⁶, whereby the hedgerows will be cut-back in sections on rotation with no more than half of each hedgerow cut in any one year. This will allow a diverse structure to develop but prevent the hedgerows from becoming tall and woody. This will promote development of wider hedgerows with a greater production of fruits, flowers and nuts (particularly beneficial for dormice, bats, and breeding birds).

4.4.27 The hedgerow / tree management will be undertaken annually within the winter months (outside of breeding bird season and when dormice are hibernating), however periods of heavy frost will be avoided (see Schedule, Appendix C). During the winter management, ground cover at the hedge base will be retained for ground nesting birds.

4.5 Monitoring

4.5.1 This Mitigation and Compensation Strategy is a working document and monitoring at different stages will be required in order to ensure the plan is effective. The aim of any management and monitoring programme for the site is to establish and maintain the created habitats such that their composition and condition closely approximates to that of the original habitats they are compensating for. The broad objectives of the monitoring programme are to:

- Address any undesirable effects of the grazing programme; and,
- Ensure that the habitat is maintained at a favourable status.

4.5.2 It can take several years for vegetation communities to establish following translocation or creation. Over time, there can be a natural flux in a community's species assemblage. This can be due to, for example, changes in climatic conditions, management or predation. Therefore, in a natural system species can be lost and gained over time. It is for this reason that objectives are not species lead but nevertheless translocation, management and monitoring will focus efforts on the protection of notable species. Species diversity can also be a misleading trait for

²⁶ Bar, C. J., Britt, C. P., Sparks, T. H., and Churchward, J. M., (2005). *Hedgerow Management and Wildlife: A review of research on the effect of hedgerow management and adjacent land on biodiversity*. Contract report to Defra. 113

assessing the health of the ecosystem, as diversity can increase due to an influx of undesirable species. Therefore, Specific, Measurable, Achievable, Realistic and Time-bound objectives have been developed to ensure the habitats are managed and maintained effectively.

Dry Street Pasture LWS / Lowland Meadows / Plant Species

- 4.5.3 Monitoring will take place on a biennial rotation (every other year) commencing the second year following the habitat creation (see Schedule, Appendix C), two site visits are undertaken during the six months (May – October) of the year when grazing stock are present within the site. This would include one visit towards the start of the grazing period (June - July), to assess the effectiveness of grazing and make adjustments to achieve the desired effect. The second visit would inform the grazing regime / stock number for the next two years. The second visit will occur towards the end of the end of the grazing programme (September). The monitoring visits will assess the condition of the sward within the areas managed as lowland neutral grassland.
- 4.5.4 In order to ensure the monitoring is carried out in a consistent manner, the methodology will follow Natural England's guidance²⁷ to determine whether grassland is achieving, or progressing towards strategy objectives.
- 4.5.5 A total of three random 2 m² will be surveyed within each field (Figure 3). Within each sample square, estimates will be made for:
- Cover and frequency of wild flowers and sedges (excluding white clover, creeping buttercup and injurious weeds); and,
 - Total number of species.
- 4.5.6 From the above estimates it will be possible using the frequency of indicator species²⁷ to identify the type of grassland and whether it is achieving the desired status. This may be used in future years to determine whether the created grassland can be categorised as a Local BAP Priority Habitat²⁷.
- 4.5.7 Further conditions such as, sward height, ground conditions, and shrub coverage will also be assessed as part of the monitoring scheme. These parameters additional to those detailed above will inform the stock density contained within the site and the scrub management regime.
- 4.5.8 Sward height will be varied with longer and shorter patches of vegetation from 8 – 25 cm approximately. During the first of the two surveys the sward height may be generally uniform; however during the second visit differences in sward heights should be easily distinguishable. Should large patches of sward be very short during the second visit, the number of stock will be reduced for the following two years.
- 4.5.9 Ground condition monitoring will involve assessing humidity and the degree of trampling by stock. The soil should not be too wet and soil disturbance from sampling should be moderate (with minimal broken up soil). This parameter is very difficult to define in a quantifiable measurement. The assessment will be left to the discretion of the person implementing the long-term management. If the soil is too wet, the trampling by stock will create terrain difficult to walk on (heavily poached water-

²⁷ Natural England (2012) *Assessing whether created or restored grassland is a BAP Priority Habitat*. Natural England Technical Information Note TIN110

logged) and the stock will be removed immediately to allow the field to regenerate until the next grazing season.

4.5.10 An assessment of the scrub coverage will be carried out during the second site visit for all grassland fields. The baseline scrub cover used for this assessment is represented in Figure 3, Appendix A. The aim is to maximise the areas of lowland and acidic grassland, which will be beneficial for invertebrates, reptiles and badgers. Only scrub present at the boundaries of the grasslands shown in Figure 3, Appendix A, will be retained. If it is found that scrub is regenerating at a quicker rate and becomes unmanageable under the current regime, then the method will be adapted and all areas cut as required.

4.5.11 The results are to be recorded using the set monitoring form found in Appendix D. This will be completed after each site visit. This will assist in monitoring the site conditions and allow the implementation of any required changes in the management practices to suit the site conditions. This information will then be passed on to the relevant bodies such as the Essex Wildlife Trust.

Overall Management

4.5.12 At the end of the ten year programme the success of the previous years' management will be reviewed in detail by an externally appointed ecologist, or, an appointed suitably qualified person. The review will inform the management of the site for the following ten years, subject to further discussion and agreement.

4.6 Safeguarding the Site

4.6.1 It is recommended that consultation with Essex Wildlife Trust is undertaken regarding the OMCS to ensure the measures recommended within this document are sympathetic to the aims and objectives of Rettendon Shaw LWS / ancient woodland. Engaging relevant bodies within the initial stages of the process will assist in ensuring the recommendations provided within this document are effective.

4.6.2 The site is a freehold currently owned by the HCA and it is also within a greenbelt, this offers a level of safeguarding and protection from development and changes in management practices.

4.6.3 As the HCA are the freehold owners, they will have management control of the site. As such, the site may be eligible to enter into the Higher Level Stewardship Scheme

4.6.4 Entry into an Environmental Stewardship scheme is not considered to be viable, as the land owner is required to enter 'all eligible farmland managed'²⁸. This would not be possible as the mitigation and compensation strategy is designed at the site level only.

4.6.5 The Section 106 agreement is relevant to the off-site compensation, safeguarding land and ecology at the selected off-site area:

4.6.6 The Fifth Schedule to the S106 Agreement (Dated 13/12/13) states:

1.1 The Owners covenant with the Council as follows:

²⁸ Natural England (2010). *Entry Level Stewardship; Environmental Stewardship Handbook* Third Edition

- Off-site compensation for ecological impacts will be undertaken in accordance with the Off-site Mitigation and Compensation Strategy approved pursuant to Condition 18 of the Planning Permission:
 - a) The Owners will make provision for the management in Perpetuity of selected off-site area
 - b) The off-site compensation sites in accordance with the Off-site Mitigation and Compensation Strategy.
 - c) No development in respect of any Phase requiring off-site compensation for ecological impacts shall be commenced unless the relevant part of the Off-Site Mitigation and Compensation Strategy has been complied with.
 - d) No development shall take place on any part of the Site requiring off-site compensation of ecological impacts until the Owners have received written confirmation from the Council that they have complied with paragraph 1.1(a) above.

4.6.7 Further revisions will clarify details of management review and responsibilities, persons responsible for implementation, payment, reporting, landowners and any information on subsequent agreements relevant to the management and maintenance of the site.

4.7 Implementation

4.7.1 The HCA is responsible for the implementation and continual updating of the Mitigation and Compensation Strategy, details of which will be subject to further discussion and agreement. The HCA will ensure the habitat will be created as detailed within this report and will appoint suitably qualified persons to fulfil the mitigation and compensation requirements.

4.7.2 Table 4.7.1 outlines agents responsible for implementation.

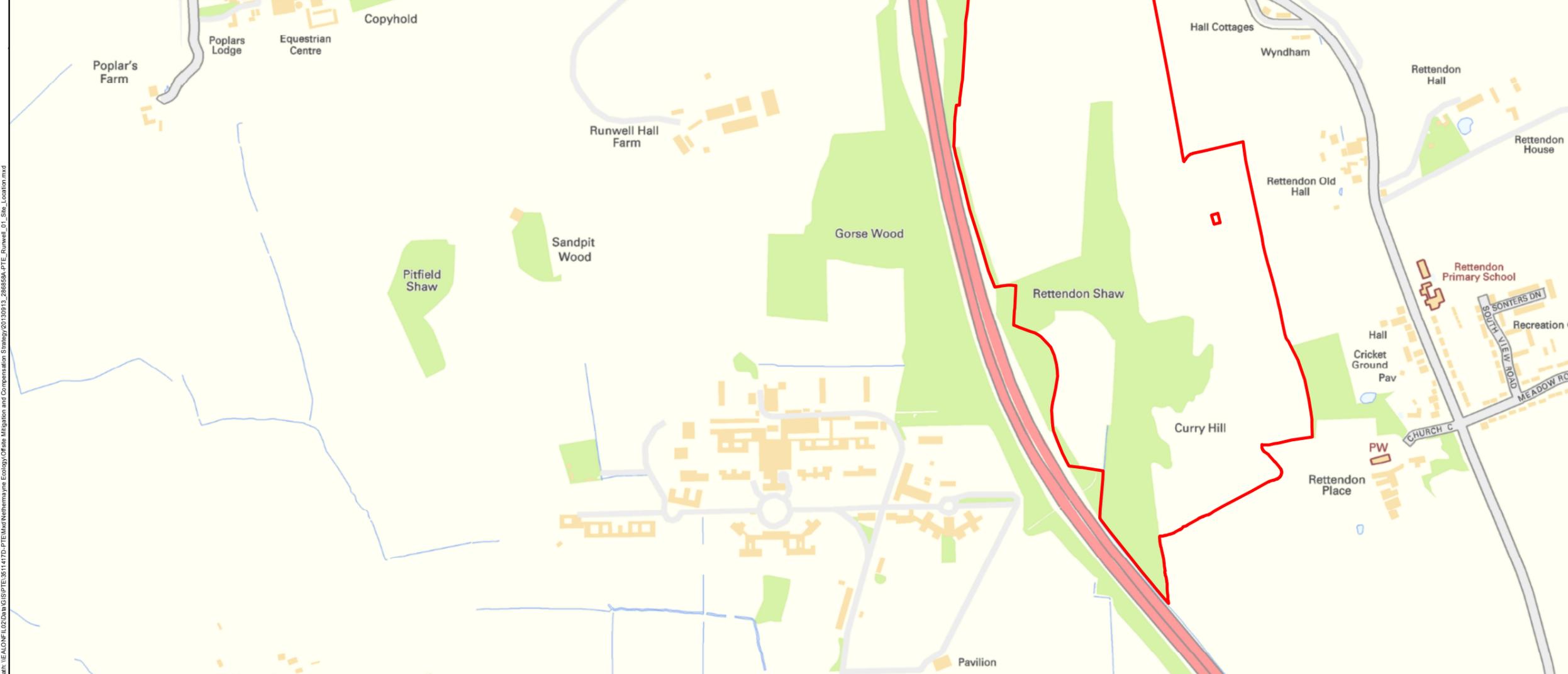
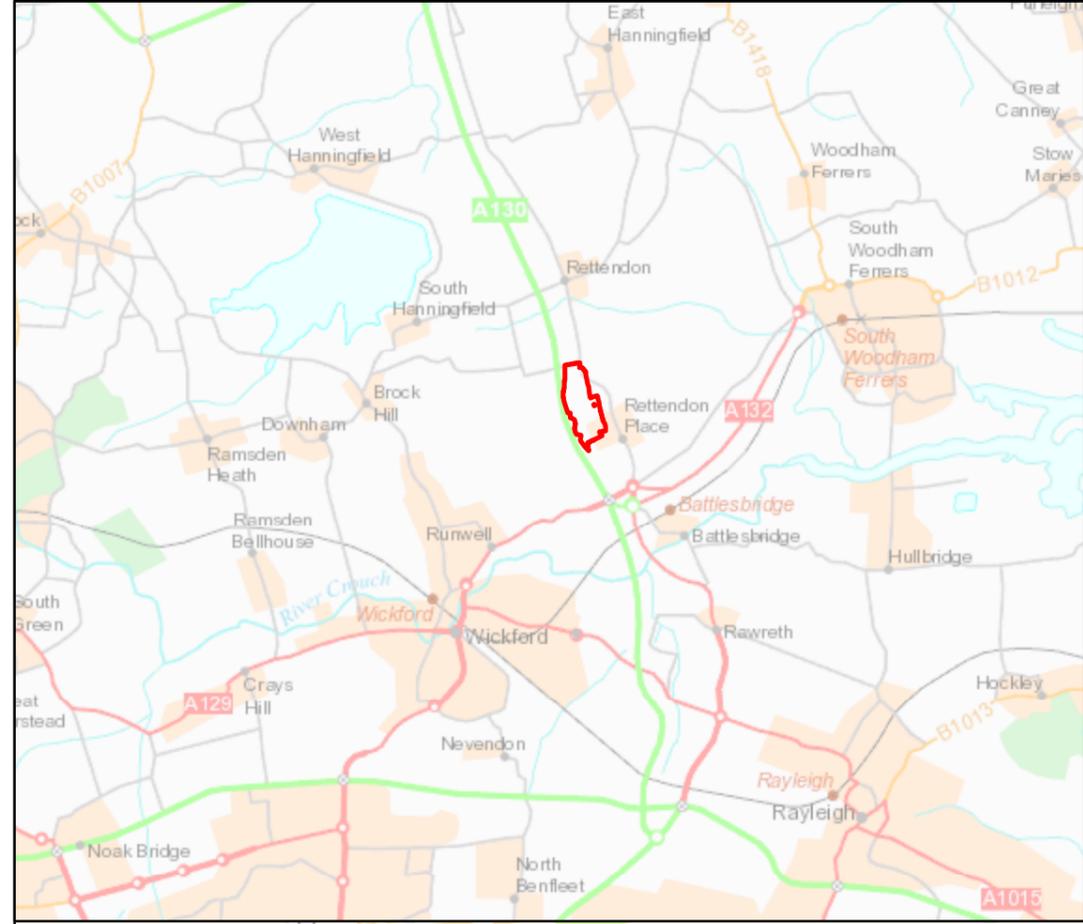
Table 4.7.1: Implementation of Ecological Measures

Ecological Measure	Responsibility for Implementation
Pre-construction Badger Survey	Appointed Ecologist
Pre-construction Reptile Survey	Appointed Ecologist
Water body Creation	Appointed Ecologist/ Appointed Contractor
Grassland Habitat Creation	Appointed Ecologist / Appointed Contractor
Planting Scheme	Appointed Landscape Architect
Grassland / Scrub Monitoring	Appointed Ecologist
Grazing Control / Stock Levels	Client / Appointed Ecologist

Ecological Measure	Responsibility for Implementation
Site Management	Client / Appointed Contractor
Liaison with interested parties	Client
10 Year management Review	Appointed Ecologist

APPENDIX A

APPENDIX A: FIGURES



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Redline Boundary

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Revision Details	By	Date	Scale
	Check		

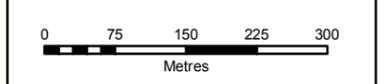
Drawing Status: **FINAL**

Job Title: **Nethermayne (Runwell)**

Drawing Title: **Figure 1 Site Location**

Scale at A3: **1:7,500**

Drawn	CD	Stage 1 check	Stage 2 check	Originated	Date
		JL	MC	CD	16/12/2013



PARSONS BRINCKERHOFF
 6 Devonshire Square,
 London, EC2M 4YE
 Tel: 020 7337 1700 Fax: 020 7337 1701

Drawing Number	Rev
20130913_286858A_PTE_01	A

Path: \\E:\AL\DW\GIS\GIS\PE\51147D-PTE\Nethermayne Ecology\Office Migration and Compensation Strategy\20130913_286858A_PTE_Runwell_01_Site_Location.mxd



- THIS DRAWING MAY BE USED ONLY FOR THE PURPOSE INTENDED AND ONLY WRITTEN DIMENSIONS SHALL BE USED
-  Proposed hazel coppice
 -  Proposed hazel plantation
 -  Proposed stock-proof fencing
 -  Proposed hedge
 -  Proposed neutral grassland
 -  Proposed acid grassland
 -  Proposed managed grassland
 -  Proposed waterbody complex
 -  Proposed earth bank
 -  Proposed hibernacula
 -  Individual trees

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Revision Details	By	Date	Staff
	Check		

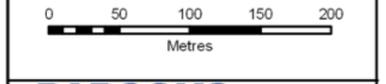
Drawing Status: **FINAL**

Job Title: **Nethermayne (Runwell)**

Drawing Title: **Figure 3
Indicative Off-Site Mitigation**

Scale at A3: **1:5,000**

Drawn	CD		
Stage 1 check	Stage 2 check	Originated	Date
JL	MC	CD	17/12/2013



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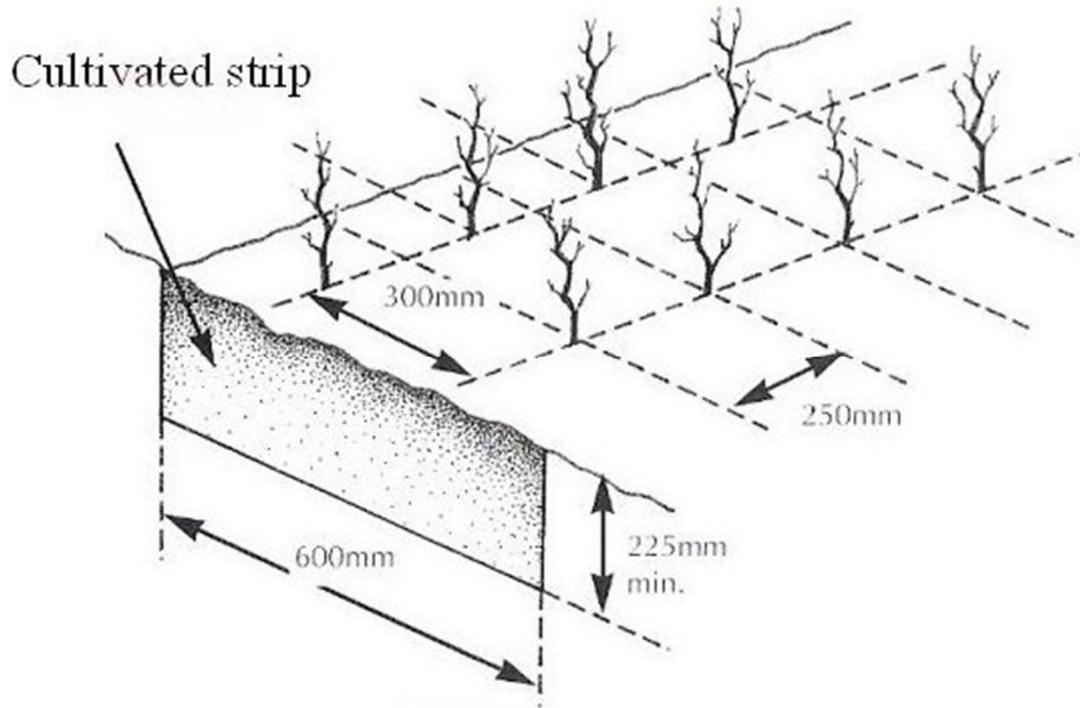
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APPENDIX B

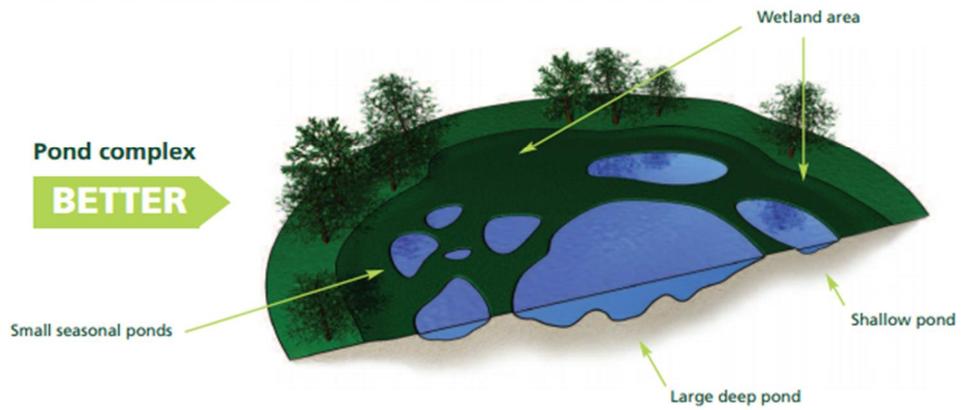
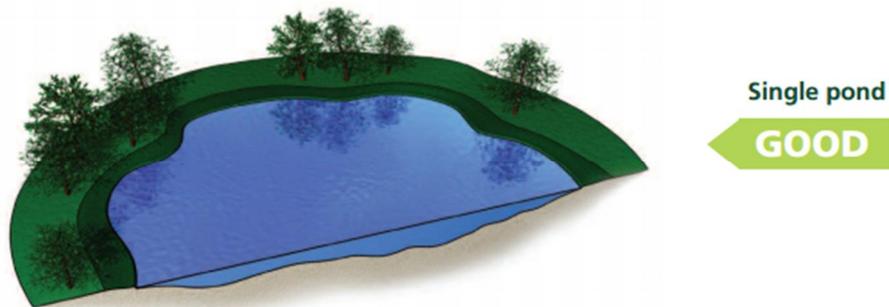
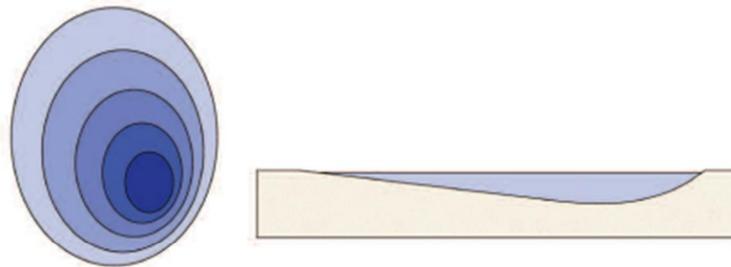
APPENDIX B: SPECIFICATIONS

Hedgerow Planting Density



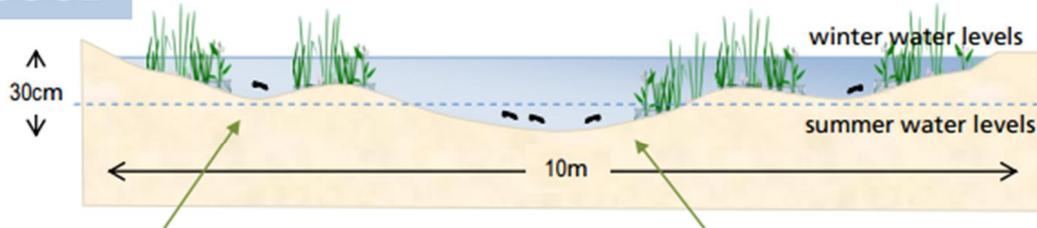
Water Body Creation

Asymmetric profile – useful to combine shallow water areas with greater depth



In large ponds a complex profile with separate basins can be very good for wildlife as it will add to the variety of the site. In small ponds, created for amphibians, create one basin which is likely to hold water throughout the breeding season.

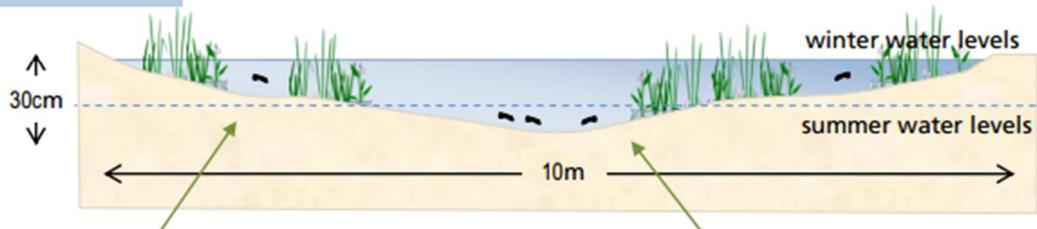
GOOD



Side basins will dry out. Tadpoles easily become trapped as water levels recede.

Central pond basin holds water throughout the year.

BETTER



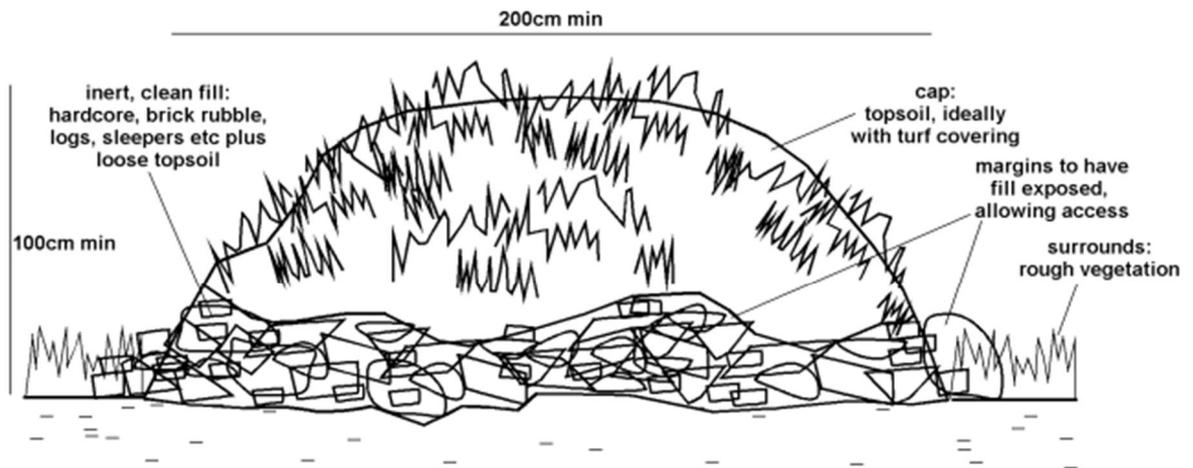
Water levels still fluctuate, resulting in a broad drawdown zone. Tadpoles are not trapped and move to the pond centre as water levels drop.

Central pond basin holds water throughout the year in most years – occasional drying (about every 5 years) can be beneficial because it removes fish.

(www.pondconservation.org.uk/Resources/Pond%20Conservation/Documents/PDF/Amphibians.pdf)

Suggested Hibernaculum Design

This design mimics artificial and natural conditions in which great crested newts have frequently been found overwintering. Dimensions should not be below 2m length x 1m width x 1m height. The illustrated design would be suitable for locating on an impermeable substrate. On free-draining substrates, the design is largely similar but the bulk of the fill is sited in an excavated depression in the ground. Hibernacula should ideally be positioned across a site, both close to and distant from breeding ponds, always in suitable terrestrial habitat and above the flood-line.



(English Nature, 2001. Great Crested Newt Mitigation Guidelines. ISBN1 85716568 3)

APPENDIX C

APPENDIX C: SCHEDULE OF WORKS

APPENDIX D

APPENDIX D: MONITORING PROFORMA

**MONITORING FORM
Runwell**

Date of survey

Name of surveyor(s)

Company/organisation

Parameters recorded in this form are described in the Mitigation and Compensation Strategy document.

1. Location of survey squares

Please mark on the map the approximate location of the three 2 m² survey squares. Choose squares that are representative of the present habitat conditions.



2. Sward height

Please observe variation in the sward height within the three chosen survey squares and describe if evidence of grazing is present and sward height between 8 and 25 cm.

SURVEY SQUARE 1	SURVEY SQUARE 2	SURVEY SQUARE 3

Actions to be undertaken if inadequate grazing occurred and variation in sward height not achieved. Make assessment of potential causes of target not being met and identify actions required (e.g increase / decrease stock levels).

3. Frequency of wildflowers and sedges

Identify the plant species present within the site and the frequency at which they occur. This has been split into three categories.

- Dominate – Species that comprise > 30 % of vegetation
- Frequent – Species that comprise 10 – 30 % vegetation
- Rare – Species that occur individually (at a very low level)

Frequency	SURVEY SQUARE 1 SPECIES	SURVEY SQUARE 2 SPECIES	SURVEY SQUARE 3 SPECIES
Dominant			
Frequent			

Frequency	SURVEY SQUARE 1 SPECIES	SURVEY SQUARE 2 SPECIES	SURVEY SQUARE 3 SPECIES
Rare			

4. Ground conditions

Observe soil humidity (water level) on site and degree of trampling (broken up topsoil, holes) by grazing stock. Note down the areas preferred for grazing by the animals.

SURVEY SQUARE 1	SURVEY SQUARE 2	SURVEY SQUARE 3

Actions to be taken if ground conditions are too wet or too much disturbance has occurred on site (ground broken up and difficult to walk on, vegetation trampled down and soil exposed due to wet conditions) from the grazing stock. Actions could reduction in the number of grazing stock, or moving the stock into different fields.

5. Scrub cover

Scrub cover to be observed in all four areas (as described in Mitigation and Compensation Strategy) during the second survey and compared to scrub cover found on site at the following the creation of the habitat (predicted 2014)

Acid Grassland	Lowland Meadow	Water Body Complex	Retained Grassland

Area(s) to be subject to scrub clearance this year

Has the objective to maintain the site's suitability as Lowland Meadow been achieved (based on the previous 5 targets)? (*This question to complete after second survey*).

YES NO

7. Site suitability for reptiles Observe and note the presence of mosaic of different habitats, piles of dead wood for basking and refuge and hibernation opportunities (holes, cracks and crevices). Record any reptiles noticed during the site walkover.

Has the objective to keep the site suitable for reptiles been achieved? (*This question to complete only after survey undertaken at end of grazing period*)

YES NO

Actions to be taken if the objective to keep the site suitable for reptiles has not been achieved.

Other ground observations (e.g. unusual ground conditions, any species noticed):

Summary recommendations for next year's management:

Has awareness of the project been raised with the local conservation groups?

YES NO

Have records of findings been supplied to local record centre?

YES NO

Have the relevant bodies been informed of the outcome of the management plan on a biennial basis?

YES NO

Has the objective to compensate for the (*This question to be complete only after survey undertaken at end of grazing period, end of August/Septmeber*)? If you have answered with yes to the above three question then objective has been achieved.

YES NO

