



## **Thurrock Flexible Generation Plant**

**Outline Ecological Management Plan**

**Application document number A8.7**

**APFP Regulations reference 5(2)(q)**

**Date:** February 2020

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Report Number: OXF10872

Version: Final

Date: February 2020

This report is also downloadable from the Thurrock Flexible Generation Plant website at:  
<http://www.thurrockpower.co.uk>

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## Summary

The document describes the ecology and nature conservation mitigation measures that will be implemented prior to, during and post construction of Thurrock Flexible Generation Plant, and the long-term management measures to be set in place for reinstated and enhanced habitats. This document sets out the principles which will be used to produce the detailed Ecological Management Plan prior to construction. This document supports the assessment in Volume 3, Chapter 9: Ecology.

## Qualifications

This document has been prepared by Matthew Fasham, a Chartered Environmentalist and full Member of the Chartered Institute of Ecology and Environmental Management, who has fifteen years' experience of ecological impact assessment.

This document has been checked by Mike Barker, a Fellow of the Chartered Institute of Ecology and Environmental Management and a Chartered Environmentalist, who has over twenty-five years' experience of ecological impact assessment.

## Glossary

Unit	Description
AILs	Abnormal Indivisible Loads
ALC	Agricultural Land Classification
BAP	Biodiversity Action Plan
BPM	Best Practicable Means
BRE	Building Research Establishment
BS	British Standard
BSI	British Standards Institution
CLO	Community Liaison Officer
CoCP	Code of Construction Practice
CTMP	Construction Traffic Management Plan
CWTP	Construction Workers Travel Plan
DCO	Development Consent Order
Defra	Department of Environment, Food and Rural Affairs
DMMP	Dust Management and Monitoring Plan
EA	Environment Agency
ECoW	Ecological Clerk of Works
EHO	Environmental Health Officer
EMP	Ecological Management Plan
EPDs	Environmental Product Declarations
ES	Environmental Statement
GHG	Greenhouse Gas
GCN	Great Crested Newts
HGV	Heavy Goods Vehicles
IEF	Important Ecological Features
LWS	Local Wildlife Site
MHWS	Mean High-Water Springs

Unit	Description
MMO	Marine Management Organisation
MW	Mega Watt
NERC Act	Natural Environment and Rural Communities Act
PPE	Personal Protective Equipment
Q	Quarter
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
SuDS	Sustainable Drainage System

# 1. Introduction

## 1.1 Background

1.1.1 This document is the Outline Ecological Management Plan (Outline EMP) for Thurrock Flexible Generation Plant (i.e. the proposed development).

1.1.2 This Outline EMP applies to the proposed development described in full in Volume 2, Chapter 2: Project Description of the Environmental Statement (the ES, application document A6).

1.1.3 The proposed development comprises the construction and operation of:

- reciprocating gas engines with rated electrical output totalling 600 MW;
- batteries with rated electrical output of 150 MW and storage capacity of up to 600 MWh;
- gas and electricity connections;
- creation of temporary and permanent private access routes for construction haul and access in operation, including a permanent causeway for the delivery of abnormal indivisible loads (AILs) by barge; and
- designation of exchange Common Land and habitat creation or enhancement for protected species translocation and biodiversity gain.

1.1.4 The minimum construction period for a single-phase development, after the advance works in 2020, is expected to be 12–24 months with a programme generally as follows:

- 2020 and Q1 2021: provision of exchange common land and habitat creation / enhancement outside main development site, potential protected species relocation;
- Q3-Q4 2021: main development site preparation and ground works, construction of causeway and construction access roads, start of gas pipeline trenching;
- Q1 2021: construction/installation of gas engines, batteries and associated equipment; connection of gas supply pipeline and electricity export cables;
- Q3 2022 – Q1 2023: commissioning and energisation; completion of landscaping and permanent access road; and
- end of Q1 – Q3 2023: facility is available for operation.

1.1.5 If the proposed development is constructed in three phases, each phase may last up to 18 months and the overall construction programme may last four and a half to six years, i.e. each phase may be back to back or there may be a gap of around nine months between phases.

1.1.6 References to zones in the following sections of this document are to the areas of land illustrated and described in ES Volume 6, Appendix 9.1: Ecological Desk Study and Surveys and reproduced in Figure 1.1, below. The land within the Order Limits for the proposed development has been divided into zones for the purpose of description in the ES, ecology baseline surveys and in other supporting documents including this Outline EMP.

## 1.2 Purpose of the Outline EMP

1.2.1 The purpose of the Outline EMP is to provide a document that describes the ecology and nature conservation mitigation measures that will be implemented prior to, during and post construction of Thurrock Flexible Generation Plant, and the long-term management measures to be set in place for reinstated and enhanced habitats.

1.2.2 The objective of this Outline EMP is to ensure the protection and appropriate management of Important Ecological Features (IEFs) located within the areas of permanent and temporary land take for Thurrock Flexible Generation Plant. This Outline EMP also aims to ensure adherence to legislative requirements relating to ecology and nature conservation.

## 1.3 Implementation of the EMP

1.3.1 This Outline EMP is a 'living' document that will be updated as required post-submission of the application for development consent, during the Examination Period and during the detailed design process as necessary prior to implementation. The detailed EMP will be based on the principles set out in this Outline EMP and will set out the measures that the applicant and its contractors will be required to adopt. The detailed EMP will be prepared in consultation with Thurrock Council.

1.3.2 This Outline EMP should be read in conjunction with the Code of Construction Practice (CoCP, application document A8.6).

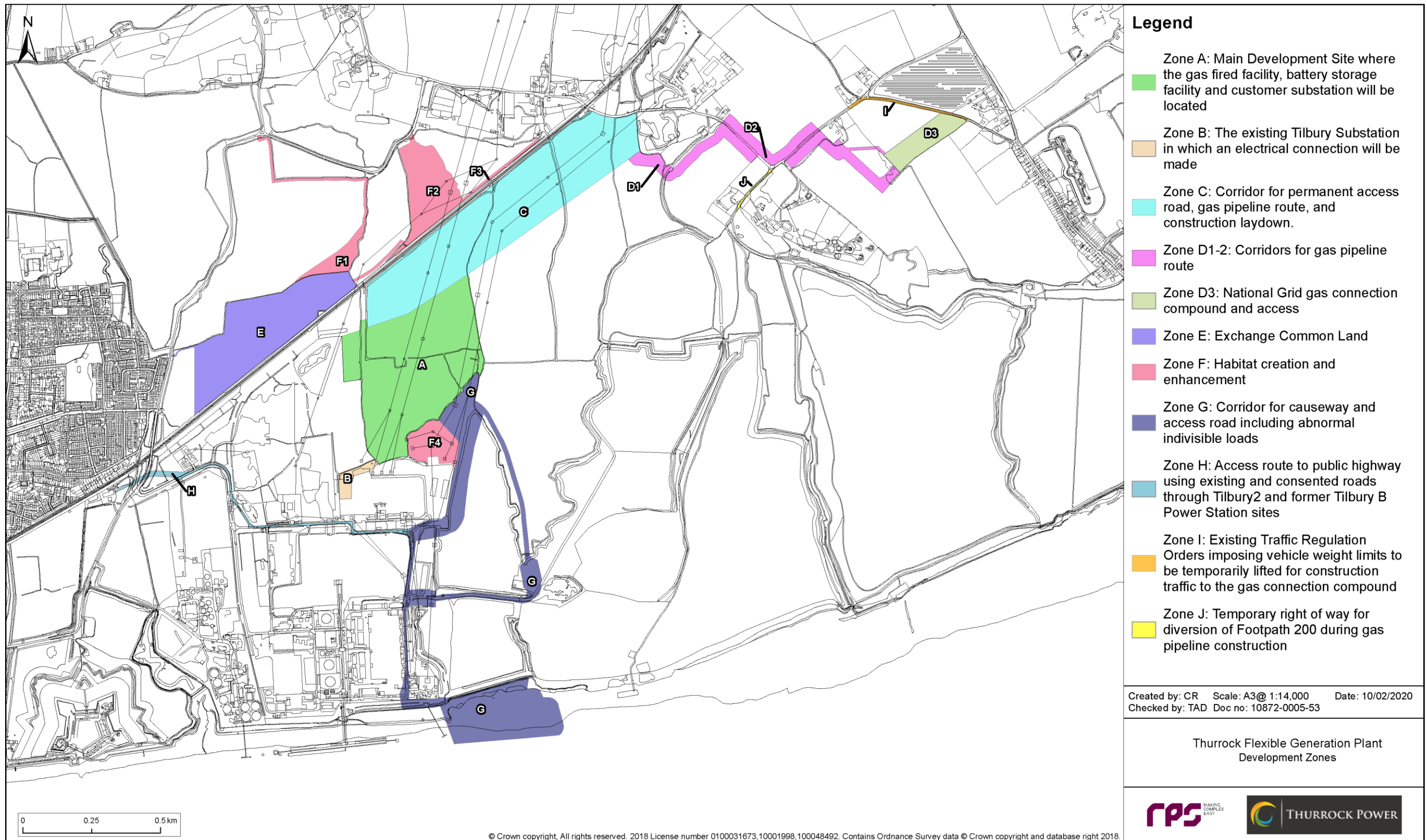


Figure 1.1: Spatial zones within the Order Limits

## 2. Ecological and Nature Conservation Features

### 2.1 Introduction

2.1.1 This section describes the IEFs located within or adjacent to the permanent and temporary land take for the Thurrock Flexible Generation Plant, which could be affected by the proposed development. The locations of the IEFs are shown in the constraints plan provided in Figure 2.1.

### 2.2 Designated sites and habitats

#### Thames Estuary and Marshes Special Protection Area and Ramsar

2.2.1 Thames Estuary and Marshes Special Protection Area (SPA) is a European designated site, which comprises of extensive areas of grazing marsh as well as flooded clay and chalk pits, while the Thames Estuary and Marshes Ramsar site is designated for its internationally important waterfowl assemblage.

2.2.2 The Thames Estuary and Marshes SPA and Ramsar site is located just over 1 km east of the site boundary.

#### Mucking Flats and Marshes SSSI

2.2.3 The Mucking Flats and Marshes SSSI is located 0.77 km from the site boundary. It is a component Site of Special Scientific Interest of the SPA.

#### Local Wildlife Sites

2.2.4 Several non-statutory sites are located within the 2 km search radius of the site. However, the only LWS close enough to the construction area to require consideration in this document is Low Street Pit LWS, which is immediately adjacent to Zone D. This LWS supports a diverse invertebrate fauna and GCN.

#### Hedgerows

2.2.5 The Hedgerow Regulations 1997 protect hedgerows from removal, with particular protection for 'important' hedgerows. 'Important' hedgerows are defined in the Regulations. The Regulations apply to any hedgerow growing in, or adjacent to, any common land, protected land, or land used for agriculture (including dairy farming and the breeding and keeping of livestock), forestry or the breeding or keeping of horses, ponies or donkeys, if it: (a) has a continuous length of, or exceeding, 20 m; or (b) it has a continuous length of less than 20 m and, at each end, meets another hedgerow.

2.2.6 Hedgerows are highlighted as Priority Habitats under the UK Biodiversity Action Plan (BAP) and are listed under Section 41 of the Natural Environment and Rural Communities (NERC) Act. Ancient hedgerows are an Essex BAP habitat. However, none of the hedgerows on site were recorded as ancient.

2.2.7 Hedgerows: There are no significant hedgerows within the parts of the Thurrock Flexible Generation Plant where permanent infrastructure will be constructed. Hedgerows are present on the verges of Station Road and on field boundaries within Zone D. Overall the hedgerows are not considered to be of more than district value although they are UK BAP habitat.

#### Grassland

2.2.8 Grasslands are an Essex Biodiversity Action Plan habitat.

2.2.9 The grassland areas affected by the proposed development are not considered to have particularly high intrinsic value – the grassland is relatively homogenous and does not comprise an example of UK BAP grassland.

#### Ditches

2.2.10 Drainage ditches are present within or on the boundaries of the majority of zones. The ditches on site are considered to be of value for the protected and other species they support, and for the ecological habitat connectivity they provide.

### 2.3 Protected or otherwise notable species

#### Survey information

2.3.1 The sections below summarise surveys carried out for the Thurrock Flexible Generation Plant development for habitats and species relevant to this Outline EMP. The full survey reports can be found in Volume 6, Appendix 9.1: Ecological Desk Study and Survey Report in the ES.

#### Plants

2.3.2 No particularly rare or scarce plant species were identified. Analysis of the quadrat data found that the plant communities present in Zone A were a mixture of two National Vegetation Classification (NVC) communities:

- MG1b (*Arrhenatherum elatius* grassland, *Urtica dioica* sub-community); and
- OV24b (*Urtica dioica-Gallium aparine* community, *Arrhenatherum elatius-Rubus fruticosus* agg. sub-community).

2.3.3 MG1 grassland is a mesotrophic grassland community characteristic of semi-improved neutral soils. It is a very widespread community throughout the British lowlands of England, Wales and southern and eastern Scotland.

2.3.4 OV24 is a tall herb open habitat characteristic of more elevated nutrient levels, and which occurs widely throughout lowland Britain.

### **Invertebrates**

2.3.5 An invertebrate scoping survey was undertaken in 2018 to appraise the invertebrate habitats present on the main site (Zone A) part of Zone C.

2.3.6 The southern section of Zone A comprises a uniform area of semi-improved grassland bordered by hedgerows and ditches to the north and east. The lack of structural variation within the grassland, combined with its low floristic diversity, predicts a species-poor invertebrate assemblage dominated by those with more generalist ecological requirements, which are usually of lower conservation value.

2.3.7 The hedgerows consist mainly of hawthorn and a narrow zone of bramble. Some of the hawthorns are becoming mature and these provide a large number of potential niches for invertebrates. The ditches are steep-sided and lacking in marginal vegetation with the exception of some common reed. They are likely to be subject to considerable fertiliser run-off and support an impoverished invertebrate fauna.

2.3.8 It is acknowledged that the presence of Zone A close to the adjacent Lytag Brownfield LWS (which is known to be of considerable importance for invertebrate populations) means that it was likely to contribute to the overall diversity of invertebrate populations in the surrounding area. However, the construction of Tilbury2, now consented and under way, will result in the loss of the majority of the Lytag Brownfield site and therefore the contribution of Zone A towards diversity of invertebrate populations associated with the LWS will be reduced.

### **Great Crested Newts**

2.3.9 Great crested newts (GCNs) are protected under the Habitats Regulations and section 9 of the Wildlife and Countryside Act (WCA) 1981 (as amended), which make it an offence to intentionally or recklessly capture, kill, or disturb GCNs, deliberately take or destroy GCN eggs, and damage or destroy a breeding site of GCNs. The legislation applies to all life stages of GCNs. The GCN is also a UK BAP Priority Species.

2.3.10 GCN were identified in ponds within Low Street Pit LWS in surveys undertaken by RWE in 2018. The LWS is adjacent to Zones C and D.

### **Reptiles**

2.3.11 All reptile species native to Britain are protected under Sections 9(1) and (5) of the WCA 1981 (as amended), which makes it an offence to intentionally or recklessly kill or injure these species, or sell, barter, exchange, or transport reptiles or any part of them. Native reptiles are also Priority Species of the UK BAP.

2.3.12 The site as a whole supports populations of adder, grass snake, common lizard and slow-worm. All four species were present on Zone A and G. Populations in other areas where direct impacts would occur from habitat loss are found associated with ditches in Zone C, although habitat loss in these areas is relatively small.

### **Breeding birds**

2.3.13 Birds are protected at a European level under the EC Directive on the Conservation of Wild Birds 2009 (2009/147/EC), the codified version of Council Directive 79/409/EEC as amended. This gives general protection to wild birds from deliberate killing, taking from the wild, egg collecting, nest destruction and keeping in captivity, but allowances are made for game birds. Specially protected birds are listed in Annex 1 of the Directive.

2.3.14 All species of wild bird in the UK (other than a few pest species) are protected under Part 1 section 1(1) of the WCA Act 1981 (as amended) against intentional or reckless killing, injuring or taking. Taking, damaging or destroying nests in use or being built, and taking or destroying eggs are also prohibited.

2.3.15 In addition to general protection for birds, certain species are also afforded special protection and are listed in Schedule 1 of the WCA 1981, as amended. These bird species are rare, endangered, declining or vulnerable. In addition to the protection from killing or taking that all birds, their nests and eggs have under the Act, it is an offence to intentionally or recklessly disturb Schedule 1 birds and their young at, on or near an 'active' nest.

2.3.16 One confirmed breeding species, Cetti's warbler, is listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended), was recorded during the survey. Five pairs of this species were recorded, four on Zone Z (outside the Thurrock Flexible Generation Plant development area) and one in Zone A. Two other Schedule 1 species, red kite and marsh harrier, were recorded but confirmed not to be breeding on site.

### **Water voles**

2.3.17 Water voles are listed in Schedule 5 of the WCA 1981 (as amended) and protected under Section 9. The species is also a Priority Species of the UK BAP and Essex Local BAP.



### **2018 survey**

- 2.3.18 Field signs indicating the presence of water vole were recorded in seven of the 11 ditches surveyed in May 2018.
- 2.3.19 Water voles were present in five of the ditches on or adjacent to the Main Site in Zone A, and were also present in two ditches that cross Zone C.
- 2.3.20 The number of water vole signs recorded in the same ditches were found to fluctuate between the May and July surveys, which was typically linked to the presence of water in the ditches.
- 2.3.21 For example, during the May survey, low numbers of water voles were found in ditches around and within Zone A, in a ditch west of Zone I and two ditches in Zone C. In July, water vole signs had increased considerably in central Zone A ditches 7 and 8, with ditch 8 now supporting a medium population, and the boundary ditches of Zone A were dry.
- 2.3.22 The summer of 2018 was characterised by exceptionally low rainfall and the results indicate that the central Zone A ditches provide an important refuge habitat for water voles during periods when the boundary ditches dry out. Therefore, ditches 7 and 8 are likely to be of importance in ensuring that the water vole population in the surrounding area is maintained.

### **2019 survey**

- 2.3.23 Surveys in 2019, carried out in June and September, found that by September the majority of the surveyed ditches no longer held water, and water voles were absent from the ditches in Zones A and C. It is not known at this stage whether this trend will persist or whether water voles will re-establish from offsite population reservoirs if the ditches refill with water in 2020 and subsequent years. For the purposes of this document a precautionary approach has been adopted, and mitigation for water voles is considered based on the 2018 survey results. However, if water voles remain absent from the development area at the time of construction, no mitigation would be necessary.

### **Bats**

- 2.3.24 All species of bat in the UK are fully protected under the WCA 1981 (as amended). All species are listed in Schedule 5 of the Act and are therefore subject to the provisions of Section 9, which make it an offence to intentionally or recklessly kill, injure or take a bat; possess or control any live or dead specimen or anything derived from a bat; intentionally or recklessly damage, destroy or obstruct access to any structure or place used for shelter or protection by a bat; or intentionally or recklessly disturb a bat while it is occupying a structure or place which it uses for that purpose.

- 2.3.25 Prior to the commencement of hedgerow removal in Zone D, a survey of the hedgerows will be undertaken to ensure that the location for removal does not affect mature trees with bat roost potential. These daytime surveys can be undertaken at any time of year; however, where practicable, the surveys will be undertaken during the winter months, when leaves will not obscure features of potential value to bats.

### **Badgers**

- 2.3.26 Badgers are protected under the Protection of Badgers Act 1992. The protection is primarily for welfare rather than conservation, since badgers are not rare but are subject to cruelty. Actions prohibited under this legislation, unless covered by licence, include the intentional or reckless damage, obstruction or destruction of a badger sett and the wilful killing, injuring or taking of badgers.
- 2.3.27 No active badger setts were found during the survey that would be directly affected by construction.

## **2.4 Responsibilities**

- 2.4.1 All ecology works described in this Outline EMP will be carried out under the guidance of the Ecological Clerk of Works (ECoW). All site workers will be informed of the role of the ECoW. Contact details for the ECoW will be provided in the detailed EMP and will be made available to site workers and contractors as requested or required.
- 2.4.2 Site inductions for all site workers will include reference to the requirements of the approved detailed EMP and the approved detailed CoCP.
- 2.4.3 Toolbox talks provided to all contractors and site workers immediately prior to the commencement of activities on site, will include reference to the requirements of the detailed EMP and detailed CoCP. The toolbox talks will include the general principles and area-specific environmental measures that must be implemented
- 2.4.4 All site workers will be informed of the role of the ECoW. Contact details for the ECoW will be provided in the detailed EMP and will be made available to site workers and contractors as requested or required. A copy of the detailed EMP will be kept on site at all times and site workers will be made aware of its location and who to contact in order to obtain a copy of, or review the document as required.
- 2.4.5 Any known breaches of the requirements of the EMP by site workers will be reported to the ECoW or to the Site Manager appointed by the Principal Contractor (who in turn will advise the ECoW) as soon as practicable.

- 2.4.6 Where that breach is material (e.g. if conditions pertaining to a protected species licence are breached), the ECoW, or the applicant will report the breach to the relevant LPA and/or Natural England as soon as practicable.
- 2.4.7 Where a material breach requires a response, or has the possibility of re-occurring, the applicant will be responsible for developing an appropriate (ecology and nature conservation) response strategy and will apply lessons learnt to future construction method statements. Where longer term remedial measures are required, these measures will be discussed with the LPA and Natural England.
- 2.4.8 Contact details for the ECoW will be provided in the detailed EMP.

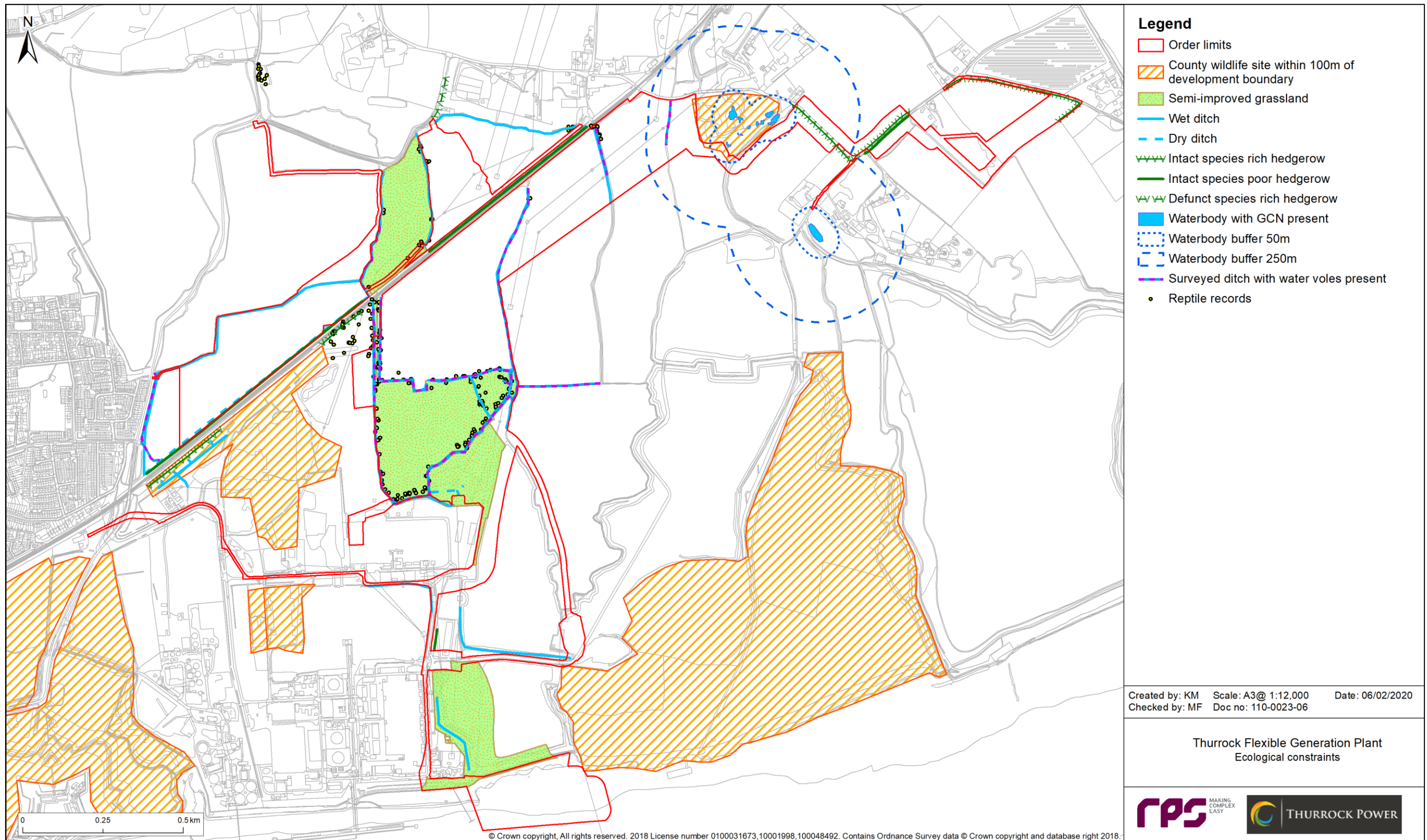


Figure 2.1: Ecological constraints.

## 3. Designed-in mitigation measures

### 3.1 Introduction

3.1.1 This section describes the designed-in ecology and nature conservation mitigation measures adopted as part of Thurrock Flexible Generation Plant design in order to ensure the protection of IEFs.

### 3.2 Designated sites and habitats

3.2.1 The Thurrock Flexible Generation Plant design has been developed to avoid designated sites and other ecologically sensitive habitats wherever practicable. Other IEF features such as watercourses (ditches) have been retained (e.g. around the Main Development Site in Zone A) where it has been practicable to do so.

3.2.2 Trenchless techniques such as horizontal directional drilling (HDD) under ditches for installation of the gas pipeline will be employed, which would reduce impacts on this habitat type.

3.2.3 Where practicable, existing highways or tracks, including existing ditch crossings, will be used for access to the construction site to minimise loss and disturbance of species and habitats.

### 3.3 Protected or otherwise notable species

3.3.1 Where practicable, areas identified as containing protected species have been protected by providing an appropriate buffer from construction and operation works.

## 4. Pre-construction mitigation measures

### 4.1 Introduction

- 4.1.1 This section describes the ecology and nature conservation mitigation measures adopted as part of Thurrock Flexible Generation Plant that will be undertaken prior to the commencement of construction in the vicinity of the IEF, in order to ensure the protection of IEFs.
- 4.1.2 Pre-construction surveys, informed by existing data for protected species, will be carried out to identify potential changes in baseline conditions. These surveys will be undertaken within 12 months prior to the commencement of construction works. Surveys may need to be undertaken over several months in order to collate sufficient data to inform a licence application and any associated mitigation strategy.
- 4.1.3 Should the 12 month survey/activity period lapse between pre-construction surveys and the commencement of works, the need to repeat surveys will be assessed by an appropriately experienced ecologist. Should surveys confirm a change in baseline conditions, which result in the need for a protected species licence, a licence will be obtained prior to the commencement of licensable works.
- 4.1.4 It is possible that additional IEF species activity may be recorded during pre-construction surveys described in this section. Where this occurs, the information will be updated and, where required, the mitigation strategy set out in this document will be amended as soon as practicable.
- 4.1.5 All pre-construction surveys described in this section will be undertaken by the ECoW or an otherwise appropriately experienced and, where necessary, licenced ecologist(s), who will be pre-approved by the ECoW and will work under the guidance of the ECoW.
- 4.1.6 All surveys will be carried out in accordance with biosecurity risk assessments and safe systems of works, which will be produced by the ECoW prior to the commencement of the survey.

### 4.2 Habitats

- 4.2.1 In order to minimise the likely impacts on ecology and nature conservation features of interest, pre-construction studies will be carried out to update information on sensitive habitats to minimise potential impacts.

### Protective buffer zones

- 4.2.2 Works-free protective buffer zones (see below) will be established around retained habitats of ecology and nature conservation concern where practicable, namely the retained grassland at the south of Zone A, and hedgerows and watercourses in Zone A and elsewhere. These buffer zones will be maintained throughout the works period.
- 4.2.3 Root protection zones around retained hedgerows and trees will be assessed by the ECoW.
- 4.2.4 Wherever practicable, buffer zones surrounding retained mature broadleaved trees will be 15 m in width or the width of the tree root protection zone, whichever is the greater, as advised by an appropriately qualified surveyor. Buffer zones around hedgerows and ditches will be at least 5 m in width where practicable.
- 4.2.5 All buffer zones will prohibit the tracking of heavy vehicles, and the storage of vehicles, machinery, equipment and soils.
- 4.2.6 The ECoW will inform the Site Manager of the locations and requirements of buffer zones in each working area prior to the commencement of construction in that area. Where necessary, locations will be discussed on site.

### Ditches

- 4.2.7 Ditches that are affected will require pre-construction surveys prior to the commencement of works in order to inform any mitigation strategy required, as described under species-specific impacts.
- 4.2.8 Works will be carried out in accordance with relevant legislative requirements and best practice guidelines, as set out in the CoCP. Measures will be set in place to minimise the potential for pollution from silt deposition into watercourses and from works vehicles, including measures to prevent transfer of invasive plant or animal species between watercourses. These will include the following.
- Management of construction works to comply with the necessary standards and consent conditions as identified by the Environment Agency.
  - A briefing highlighting the importance of water quality, the location of ditches and pollution prevention included within the site induction.
  - Areas with prevalent runoff to be identified and drainage actively managed if needed (e.g. through bunding and/or temporary drainage).
  - Vegetated strip to be left adjacent to the watercourse during construction.
  - For temporary construction impacts, bankside vegetation will be reinstated following the construction phase.

- Areas at risk of spillage, such as vehicle maintenance areas and hazardous substance stores (including fuel, oils and chemicals) to be bunded and carefully sited to minimise the risk of hazardous substances entering the drainage system.
- Additionally, the bunded areas will have impermeable bases to limit the potential for migration of contaminants into groundwater following any leakage/spillage. Bunds used to store fuel, oil etc. to have a 110% capacity.
- Excavated material to be placed in such a way as to avoid any disturbance of areas near to the banks of ditches and any spillage into the ditches.
- Construction materials to be handled and stored in such a way as to effectively minimise the risk posed to the aquatic environment.
- All plant machinery and vehicles to be maintained in a good condition to reduce the risk of fuel leaks.
- Consultation with Natural England where required during the construction period for implementation of mitigation measures.

### 4.3 Protected or otherwise notable species

4.3.1 Pre-construction surveys, informed by existing data for protected species, will be carried out to identify potential changes in distribution of protected species and hence any additional mitigation requirements arising as a result of presence of protected species. These surveys will be undertaken within twelve months prior to the commencement of construction works.

#### Invertebrates

- 4.3.2 In addition to retention and management of hedgerows and ditches around the boundary of Zone A, additional habitat for invertebrates will be created.
- 4.3.3 Flower-rich foraging habitat will be provided for continuity of habitat for invertebrates and greater area than permanently lost (seeded flower-rich mixed green manures).
- 4.3.4 A flower-rich grassland margin providing foraging habitat will be established early in the programme, prior to commencement of construction and loss of this habitat in the main development site (Zone A). This habitat will be provided as part of the new access road construction through Zone C and will be a permanent retained feature providing a permanent east/west habitat link connecting habitats south of the site (Zone A) with the new habitats in Zones E and F.

4.3.5 Additionally, a flower-rich grass margin will be provided following the route of the access road in Zone G where that crosses arable land, when that road has been constructed. The flower-rich grass margin will be retained for the duration of the construction phase for the Flexible Generation Plant (and thereafter revert to farming use), ensuring connectivity across the wider landscape is maintained in all areas that are influenced by the Thurrock FGP project through the construction phase.

4.3.6 A managed compensation area will be created to mitigate for permanent loss of pollinator habitat in Zone A. This will be provided in Zones F1-F2 (Figure 4.1). This should be sown with wildflower seed mixes to provide a continuity of nectar and pollen throughout the flight season. If soil fertility is high, the plant seed mix should include Yellow Rattle to reduce the competitive growth of grasses and maintain a more open and diverse sward.

4.3.7 Zone E (common land replacement) will also be restored with a meadow seedmix to provide additional feeding resources for invertebrates.

4.3.8 Construction of bee banks will also be undertaken. These can provide useful habitat for many thermophilic ground-nesting invertebrate species including solitary bees, solitary wasps, beetles and spiders and are best created in open, south-facing situations. Compacted soil and gravel should be shaped into a mound with various slopes, hollows and angles that may be utilised and favoured by different species. Vertical or very steep banks often take much longer to vegetate due to the greater heat stress they experience and provide bare ground that could be used for mining/burrowing invertebrate species.

#### GCN

4.3.8.1 Assuming access can be arranged, surveys of GCN populations in Low Street Pit LWS would be undertaken in 2020 to inform a licence application if this is necessary for gas pipeline installation. Surveys will be carried out by GCN licensed ecologists and will be completed in accordance with the methodology described in the Great Crested Newt Mitigation Guidelines (English Nature, 2001).

4.3.8.2 The licence application will be informed by pre-construction surveys and will contain a detailed method statement and mitigation plan.

4.3.8.3 Licensed works will be carried out in accordance with licence requirements and under the guidance of the an ECoW and the watching brief of a GCN licensed ecologist(s).

4.3.9 The majority of the habitat temporarily affected for gas pipe installation is arable land of low potential for terrestrial GCN, but some losses of terrestrial habitat might occur.

4.3.9.1 If required, amphibian exclusion fencing will be installed where it is necessary to exclude GCN from the works area and / or translocate animals from terrestrial habitat within the works area.

### Reptiles

4.3.10 Where necessary, pre-commencement surveys of areas of suitable habitat not covered in the 2018/19 surveys would be undertaken to update the baseline and inform requirements for reptile mitigation.

4.3.11 Given the high numbers of reptiles recorded in Zones A and G and the presence of reptiles along ditches in Zone C that would be affected by construction, a habitat creation and translocation mitigation plan is proposed.

### Habitat creation and enhancement

4.3.12 As any receptor site will need to be in a suitable condition to receive reptiles at the start of a translocation, and Zone A site preparation will be one of the first activities likely to commence at the start of construction, it is proposed to create a receptor area through the management and enhancement of 3 ha of retained habitat south of Zone A and the surrounding retained ditches. Habitat improvements will also be undertaken in the adjacent Zone F4, where habitat improvements to increase existing carrying capacity can be undertaken relatively easily through the clearance of dense tall ruderal / scrub and restoration of a more open sward more favourable to reptiles.

4.3.13 In addition, Zones F1 and F2, which are currently of no value to reptiles, will be used for creation of replacement reptile habitat to mitigate for Zone A losses. The survey found presence of reptiles on the adjacent Parsonage Common and therefore reptile populations should readily be able to expand into Zones F1 and F2.

4.3.14 Creation of reptile habitat in Zones F1 and F2 would provide approximately 6.4 ha of reptile habitat. The maximum amount of Zone A grassland that will be lost is approximately 7.7 ha. In addition, the Zone E common land replacement will also provide potential reptile habitat (11.6 ha) albeit this will not be its primary purpose.

4.3.15 Habitat creation in Zones F1 and F2 would comprise:

- scraping off agricultural topsoil over the majority of the field to provide a low-nutrient substrate suitable for seeding;
- wildflower meadow creation using an appropriate native species seed mix;
- scrub planting;
- construction of features to maximise habitat diversity, including hummocks / hollows, steep earth banks and a pond; and

- construction of features to provide shelter, basking sites and hibernation sites for reptiles, including a purpose-built Adder hibernaculum, rubble mounds and log piles.

### Translocation (Zone A)

4.3.16 Progressive and careful habitat clearance works such as the gradual strimming of above-ground vegetation such as brambles, rough grass and scrub, will be undertaken in select areas prior to construction, to deter reptiles from the working area where alternative habitat is available to them.

4.3.17 Uprooting of vegetation of potential value to hibernating reptiles will be undertaken prior to the commencement of the hibernation period (November to March) to deter reptiles from hibernating in the area.

4.3.18 Translocation of reptiles would be undertaken prior to construction. The construction site in Zone A and affected parts of Zone C would be fenced for the duration of construction to prevent reptiles from adjacent areas from entering. Internal drift fencing will be installed to divide Zone A into cells that will increase chances of capture. Reptile mats will be placed in the cells and checked regularly with all captured reptiles relocated to the receptor site.

4.3.19 The trapping effort required to capture all the reptiles is considered likely to be between 60-90 suitable days. If necessary, trapping in each cell will continue past a minimum of 60 days until five trapping days with no reptile captures have been completed. Trapping can be carried out between April and October.

### Relocation (Zones C and G)

4.3.20 Reptile habitat areas that require clearance in Zones C and G will be managed prior to the commencement of construction in order to deter or displace any reptiles which might be present from the working areas. Management will be advised by the ECoW.

4.3.21 Habitat management will involve the clearance of ground cover in order to create unfavourable conditions. Scrub and tall grasses will be cut, to between 5 cm and 10 cm in height. Arisings will be removed from site.

4.3.22 If habitat is cleared during the reptile hibernation period (November until February inclusive, dependent on local weather conditions), trees and scrub will be cut using brushcutters or chainsaws, to a height of approximately 30 cm above ground level, to minimise the potential for disturbance to root balls where hibernating reptiles may be located. Remaining rough grass cover will be mowed short (approximately 5 cm above ground level).

- 4.3.23 Arisings will not be stacked on site as this could later provide a habitat feature of potential value to nesting birds, reptiles or other species. Instead, arisings will be removed from site.
- 4.3.24 Areas will be maintained in a condition not favoured by reptiles (i.e. with minimal ground cover) until the commencement of construction, i.e. through regular mowing of ground vegetation.
- 4.3.25 Works will be carried out under the guidance of the ECoW.
- 4.3.26 A record of works will be maintained by the ECoW and will be provided to Thurrock Flexible Generation Plant and the Site Manager. A copy of this record will be made available to the LPA on request.

### Breeding birds

- 4.3.27 Pre-construction surveys for nesting birds with a focus on Cetti's warbler will be undertaken where construction overlaps with the breeding season, and measures will be set in place to protect active nests until the ECoW has confirmed that young have fully fledged and left the nest. These measures are documented in more detail below.
- 4.3.28 Impacts on breeding birds from habitat loss predominantly affect ground-nesting farmland birds in arable or grassland habitats, and hedgerow nesting birds.
- 4.3.29 Where trees, hedgerows or scrub, of potential value to nesting birds, are required to be cleared for construction, clearance will be undertaken outside of the bird breeding season (14 February to 31 August inclusive) to prevent disturbance to nesting birds where possible. However, if this is not practicable, habitat will be surveyed prior to clearance. No habitat containing an active nest will be removed or disturbed, and measures will be set in place to protect the nest until young have fully fledged and left the nest. Measures may include the establishment of 5 m wide buffer zones in which heavy vehicles will not be tracked and the storage of vehicles, equipment, machinery and soil storage will be prohibited. Works in the buffer zone will be delayed until the Ecological Clerk of Works (ECoW) has confirmed young have fully fledged and left the nest.
- 4.3.30 The clearance of any habitat of potential value to nesting birds, including semi-mature and mature trees, hedgerows and areas of scrub, will be undertaken outside the bird breeding season, so as to prevent disturbance or injury to nesting birds or their young.

- 4.3.31 However, where this is not practicable, immediately prior to the commencement of works, vegetation suitable for nesting birds which will be cleared to enable works or which is located within 5 m of working areas, and large (>5 ha) open flat fields of potential value to ground-nesting species in which works will be undertaken, will be surveyed for active bird nests.
- 4.3.32 Where it is not possible to carry out a thorough visual inspection of all parts of the habitat being surveyed, e.g. due to the density of the habitat, the area will be surveyed for at least two hours between dawn and 9.00 am to identify any bird activity that might indicate the presence of nesting birds, such as birds carrying nesting material or food into the habitat being surveyed.
- 4.3.33 No habitat containing an active bird's nest will be removed or disturbed. Works-free buffer zones of a minimum of 5 m width will be established around active nests until the ECoW has confirmed to the Site Manager or site workers that the young have fully fledged and left the nest. Where considered necessary by the ECoW, works-free buffer zones will be marked out on site using high-visibility Netlon fencing or coloured tape.
- 4.3.34 The ECoW will maintain a record of all pre-construction bird nest surveys undertaken. The record will be provided to Thurrock Flexible Generation Plant and a copy will be made available to the LPAs on request.

### Bats

- 4.3.35 Prior to the commencement of hedgerow removal in Zone D, a survey of the hedgerows will be undertaken to ensure that the location for removal does not affect mature trees with bat roost potential. These daytime surveys can be undertaken at any time of year; however, where practicable, the surveys will be undertaken during the winter months, when leaves will not obscure features of potential value to bats.

### Badgers

- 4.3.36 A pre-construction badger survey of the works area and 30 m buffer zone will be undertaken in order to locate any potential new active setts that could cause a constraint to construction. If mitigation cannot be carried out to protect any setts as required under legislation, then a Natural England licence to close or disturb the sett may be required and will be obtained prior to the commencement of works as necessary.
- 4.3.37 The ECoW will be responsible for ensuring the completion of pre-construction badger activity surveys of working areas and the surrounding buffer zone. Any such surveys would be undertaken sufficiently in advance of the commencement of works to enable a protected species licence(s) from Natural England to be obtained, should this be required.



- 4.3.38 A report of survey findings and implications for construction will be produced by the ECoW and provided to the client and the Site Manager as soon as practicable.
- 4.3.39 If new setts are identified within 30 m of the works area, micro-siting of working areas away from the setts will be undertaken where practicable and possible within the consented boundary of development. If this is not practicable, a licence for badgers will be obtained before works commence if it is considered that badgers using setts would be disturbed.
- 4.3.40 The ECoW will be responsible for ensuring a licence for badgers is applied for if necessary. The ECoW will inform the client and the Site Manager that a works-free buffer zone of 30 m should be set up around the active sett until a licence has been obtained, and that once the licence has been obtained works will need to be carried out in accordance with the requirements of the licence.
- 4.3.41 A licence application will be informed by the pre-construction survey and will include a detailed method statement and mitigation strategy.
- 4.3.42 If sett destruction cannot be avoided, a licence application will include the requirement to close the sett outside the badger breeding season (considered to be between 30 November and 1 July).
- 4.3.43 Licensable works will be carried out under the guidance of the ECoW and under a watching brief of the named licenced ecologist(s), which could be the ECoW or an appropriately experienced ecologist pre-approved by the ECoW.
- 4.3.44 A licence return form and report of the works undertaken will be completed by the licenced ecologist and approved by the ECoW. A copy of this form and report will be provided to the client, Natural England and the LPA as soon as practicable and as required under the conditions of the licence.
- Water voles**
- 4.3.45 Surveys in 2019, carried out in June and September, found that by September the majority of the surveyed ditches no longer held water, and water voles were absent from the ditches in Zones A and C. It is not known at this stage whether this trend will persist or whether water voles will re-establish from offsite population reservoirs if the ditches refill with water in 2020. For the purposes of this OEMP a precautionary approach has been adopted, and mitigation requirements have been determined based on the 2018 survey results which showed water vole presence. However, if water voles remain absent from the development area at the time of construction, no mitigation would be necessary.
- 4.3.46 Considering the mobile nature of water voles, pre-construction surveys will be undertaken to confirm the presence/absence of water voles along all ditches of potential value to water voles that would be affected by construction.
- 4.3.47 Water voles will be translocated from the central ditch that will be removed within Zone A in advance of construction, under licence from Natural England and in accordance with the measures set out below.
- 4.3.48 All works involving loss of water vole habitat and capture and translocation of water voles will need to be carried out under a licence from Natural England. The licence will be obtained prior to the start of any works affecting water vole habitat.
- 4.3.49 A detailed mitigation plan will be produced prior to commencement, but the outline mitigation proposals are provided below.
- 4.3.50 Construction of the Thurrock Flexible Generation Plant would result in the loss of approximately 569 m of ditch habitat that supported water voles in 2018. Approximately 1.6 km of boundary ditches around the edges of the development area would be retained, and advance improvements of these ditches will be undertaken in 2019/2020 if agreement can be obtained from the landowner. If not, then improvements will be undertaken as soon as possible following the DCO being made. Assuming that no advance works are possible, the proposed timeline for mitigation works would be as follows.
- Q2 2021: Construct new ditch in retained Zone A grassland (in the south of the main development site) with appropriate planting and fenced to prevent colonisation in advance of translocation. Aftercare watering of plants through to September if summer months are dry. Depending on final design of underground electricity cable route, duct to be provided under the ditch for cable installation to avoid later disturbance to the ditch for its installation.
  - September 2021: undertake improvement works on Zone A boundary ditches. Some marginal vegetation removed from ditches and translocated to new ditch. At this time, also establish connection points from retained boundary ditches to where the Flexible Generation Plant clean surface water drainage system will discharge.
  - Q2 to September 2021: commence construction in Zone A subject to exclusion zones to avoid impacts on existing and new ditches.

- September 2021: Capture water voles from central ditch and take to offsite captive holding facility. Central ditch infilled when translocation complete. If the construction programme has not progressed by September 2021 to a point where works affecting existing ditches must start, capture of water voles may be delayed until March 2022 to reduce the time spent in the holding facility.
- September 2022: Return water voles from holding facility to new ditches which will have had over a year for vegetation to mature and would therefore be in suitable condition to receive animals at this point.

4.3.51 Ditches in Zone A would be constructed or enhanced (as applicable) to maximise suitability for water voles. This includes the following principles, where ditches will:

- be of a sufficient depth to maximise likelihood of water retention all year round, at a slow stable flow rate;
- have friable banks for burrowing not liable to collapse;
- have a bank profile of 1:1 (45 degrees) to allow burrowing, and where possible a shallow bank to allow for marginal vegetation;
- include bank side and marginal vegetation of a suitable native herbaceous species mix to provide food and cover all year round, extending to over 2m back from the bank top; and
- include establishment of marginal and/or in-channel vegetation.

4.3.52 It is important to ensure that the revised ditch network post-construction includes ditches which retain water for the same length of time as ditches 7 and 8. This could be achieved by deepening retained boundary ditches in Zone A so that they hold water for longer during the summer.

4.3.53 This would provide replacement habitat at times of low water levels but does not address the overall loss of ditch habitat. It is therefore proposed to create additional ditches; approximately 976 m of new ditch will be created on the boundaries of Zones F1 and F2

4.3.54 Translocations would be undertaken in accordance with the methods set out in Dean *et al.* (2016), and any new habitats would be given sufficient time to mature and be suitable for water voles before any translocations occur. If habitats are not in suitable condition by the time translocation is required, it would be necessary to remove Water Voles to captivity, where they would be kept until such time as they can be released into new or restored ditch habitat.

4.3.55 Taken together, the measures identified above should allow for the existing water vole population to be maintained around Zone A, along with additional populations being established.

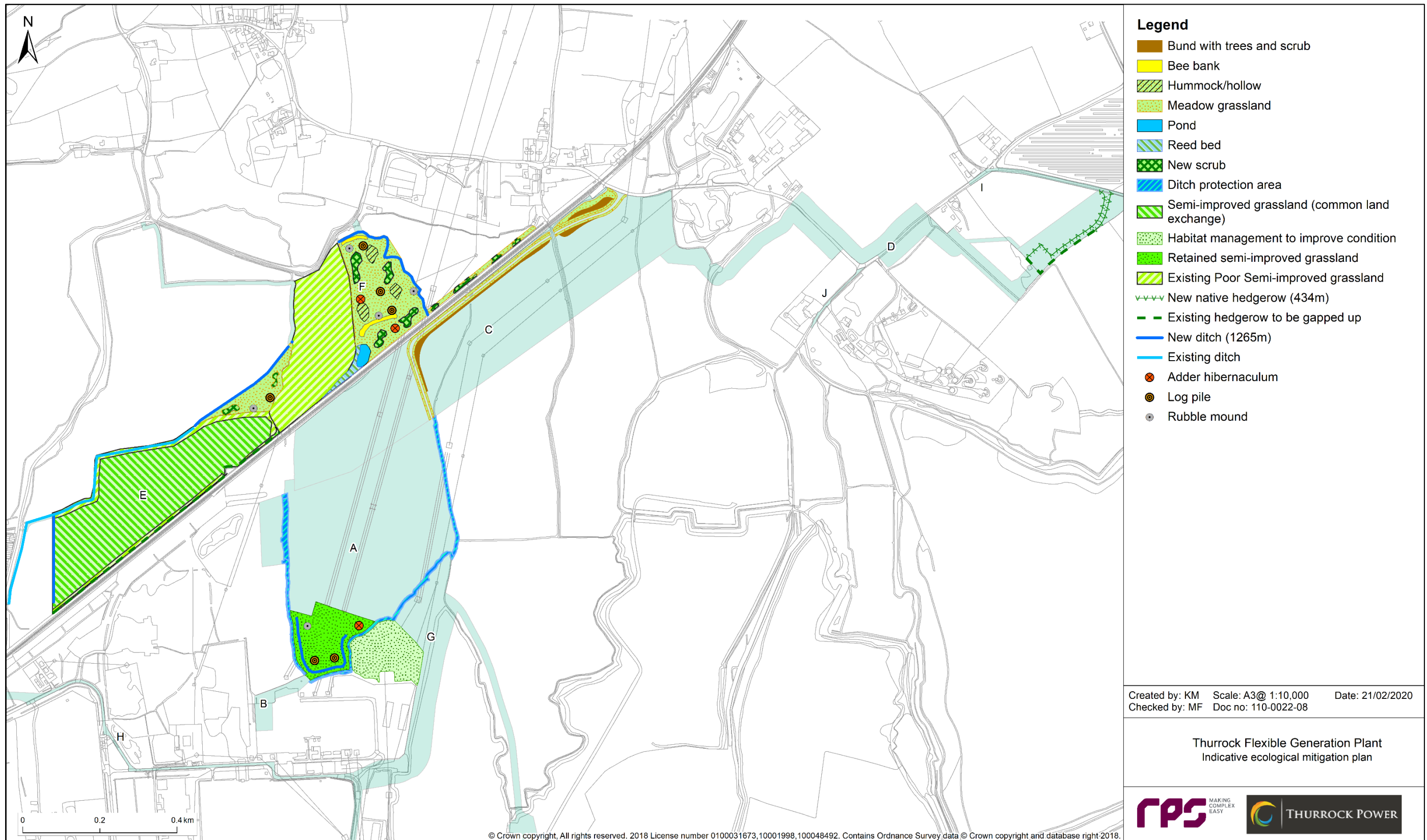


Figure 4.1: Ecological mitigation plan.

## 5. Construction mitigation measures

### 5.1 Introduction

5.1.1 This section describes the ecology and nature conservation mitigation measures adopted as part of Thurrock Flexible Generation Plant that will be undertaken during construction in order to ensure the protection of notable habitats and species.

### 5.2 General site-wide mitigation measures

5.2.1 Construction will be undertaken in accordance with the CoCP (application document A8.6). The CoCP includes the following requirements:

- all works will be carried out taking full account of legislative requirements and Environment Agency guidance;
- appropriate and adequate measures will be set in place to ensure appropriate levels of dust control so that no significant off-site dust effects will occur;
- heavy machinery will not be tracked on waterlogged soils or over stored soils;
- appropriate and adequate measures will be set in place to ensure good practice in soil handling and restoration;
- site induction and toolbox talks will include mitigation requirements;
- soil storage areas will be located at adequate distances so as to ensure the protection of the retained soils and to avoid potential run-off into watercourses;
- appropriate and adequate measures will be set in place to minimise surface water flooding and to control and limit the noise and vibration levels noise; and
- vehicle speeds will be restricted within the working corridor so as to reduce the likelihood of injury to species on site.

5.2.2 Site induction and toolbox talks will include mitigation requirements included in this appendix and in the CoCP.

5.2.3 Night working will be avoided where practicable. However, it may be necessary to carry out works during night time hours and where night working is unavoidable, light fixtures will be directed away from habitat of value to protected or otherwise notable species, in order to minimise likely disturbance effects of light spillage. Lighting will be kept to an absolute practicable minimum where located nearby to any active badger setts.

5.2.4 An ECoW will be present on site to oversee enabling works and construction where necessary. The ECoW will be a suitably experienced professional ecologist. The ECoW will review results of protected species surveys prior to the commencement of works and will contribute to all relevant construction method statements.

5.2.5 Further details of measures relating to pollution prevention are set out in ES Volume 3, Chapter 15: Hydrology and Flood Risk and are described in the CoCP. Measures will include the provision of a pollution incident response plan and a drainage management plan to minimise potential pollution effects.

5.2.6 A biosecurity protocol will be implemented to minimise risk of spreading invasive species. The main risks are associated with transfer of aquatic plants (including vectors for disease) between watercourses. Where working in or near water, control measures will be implemented. These are documented in the CoCP and include:

- ensuring vehicle tyres and wheel arches are cleared of mud, plants and other organic material before moving from one watercourse to another;
- leaving removed material on site; and
- cleaning boots and disinfecting (away from waterbodies to prevent potential pollutant incidents) all equipment that might come into contact with water.

5.2.7 Appropriate measures will also be adopted when working in the vicinity of invasive terrestrial plants, if any are found. Where necessary, works will be supervised by the ECoW. Known locations of invasive plant species will be marked on site and vehicle movements restricted in the vicinity of these locations. Any spoil containing or likely to contain invasive plant material to be stored separately from non-contaminated spoil, and treated as appropriate, with control measures adopted.

### 5.3 Habitat mitigation measures

#### Protective buffer zones

5.3.1 Where practicable, works-free protective buffer zones will be established around retained habitats of ecology and nature conservation concern, namely hedgerows and retained ditches. These buffer zones would be maintained throughout the construction period.

5.3.2 Root protection zones around retained hedgerows and trees will be assessed by the ECoW.

5.3.3 All buffer zones will prohibit the tracking of heavy vehicles, and the storage and refuelling of vehicles, machinery, equipment and soils. All protective buffer zones will be maintained throughout the construction period. The ECoW will regularly (at least once every two weeks) monitor adherence to the requirements of the buffer zones and will maintain a record of all site checks undertaken and findings.

5.3.4 Should any breach of the requirements become evident, the ECoW will inform the Applicant and the Site Manager as soon as practicable. The ECoW will inform the Site Manager of measures required to be undertaken as soon as practicable to rectify any potential impacts.

5.3.5 The Applicant will be responsible for notifying Natural England of any breaches to the buffer zones if necessary and as advised by the ECoW.

### **Trees and hedgerows**

5.3.6 Wherever practicable, a works-free buffer zone will be established around mature trees, of 15 m width or the width of the root protection zone, whichever is the greater, calculated on a tree-by-tree basis by an appropriately qualified surveyor.

5.3.7 Any tree felling works will be carried out in accordance with protected species requirements described below.

5.3.8 Where individual mature trees are to be felled, sections of dead or decaying wood will be soft-felled (felled in sections) and, where practicable, will be relocated to suitable locations as near to the source tree as practicable, as instructed by the ECoW.

5.3.9 The gas pipeline in Zone D crosses Station Road in two places, which will require a trenched crossing that will result in the removal of hedgerows in the pipeline working area. The Order Limits in Zone D along this section of Station Road allow flexibility for the most appropriate crossing location to be chosen under supervision of the ECoW, avoiding mature trees with bat roost potential, other mature trees and denser sections of hedgerow as far as is practicable. Nesting bird checks will also be undertaken if works take place during the breeding season.

5.3.10 The length of individual hedgerow sections to be removed will be reduced as far as reasonably practicable according to construction methods.

5.3.11 Where it is necessary to remove sections of hedgerow for pipeline installation, all sections of hedgerow temporarily removed to enable construction will be replanted as soon as practicable, with regard to appropriate planting months. Replacement planting will comprise a species-rich mix of native shallow-rooting hedgerow species typical of the area. In addition, enhancement planting to improve connectivity and/or native species diversity will be considered on a case by case basis. Enhancement planting could include the planting of native hedgerow trees, typical of the area. Temporary hedgerows will be installed to minimise the impacts of temporary hedgerow losses on foraging bats (see Section 5.4.6).

5.3.12 A replanting programme to compensate for habitat loss and provide screening will be implemented in conjunction with mitigation measures considered as part of the landscape and visual impact assessment. Detailed landscaping proposals will be developed in a final Landscape Management Plan. Planting will be undertaken as soon as practicable and once it could be confirmed that works will not significantly and adversely affect new planting. Where required, newly planted hedgerows will be protected by adequate fencing until the hedgerow has become established.

5.3.13 Hedgerow clearance, including tree felling works, will be carried out in accordance with species-specific requirements described below.

5.3.14 Arisings will be removed from site or, if necessary, temporarily relocated to a suitable site more than 5 m from working areas so as to ensure that any nesting birds (or other species) which might utilise the pile of cuttings are protected against likely impacts of construction.

### **Grassland**

5.3.15 Areas of grassland, grass margins and ditch banks that are used temporarily for construction and not ultimately incorporated into the permanent development or approved landscaping will be restored as soon as practicable after construction.

5.3.16 Detailed landscaping proposals will be developed in an accordance with the Landscape Management Plan.

5.3.17 The grassland seed mix to be used will comprise species appropriate to the local area and the nutrient levels of the substrate, full details of which will be determined when the full EMP is produced post-consent.

## 5.4 Terrestrial ecology

### Reptiles

- 5.4.1 The construction site in Zone A and affected parts of Zone C would be fenced for the duration of construction to prevent reptiles from adjacent areas from entering. The condition of fencing would be monitored on a regular basis by the ECoW.

### Breeding birds

- 5.4.2 The potential loss of active nests within in trees hedges and potentially also within arable areas, during construction would be mitigated by the following measures:

- undertaking clearance of potential bird nesting habitat outside the breeding season (March to August inclusive);
- inspection of any vegetation that needs to be removed between March and August by a professional ecologist;
- Cordoning off of any nest found during construction and protected until it has ceased to be active/young have fledged; and
- minimising disturbance from construction noise by the adoption of good working practice.

- 5.4.3 Mitigation measures for loss of breeding and foraging habitat will comprise habitat creation in Zones F1 and F2. Habitat creation will comprise meadow grassland and scrub planting on an existing area of arable land, hedgerow planting, ditch clearance and restoration and pond creation to provide alternative breeding habitats for the bird species affected, including the Cetti's warbler.

- 5.4.4 These habitat mitigation measures should compensate for any local negative impacts on the breeding and foraging habitat.

### Bats

- 5.4.5 Hedgerow restoration will take place in the planting season immediately after the works are completed. However, replacement planting will take time to mature. Therefore, artificial hedgerows will be provided to bridge gaps.

- 5.4.6 These will be constructed from brash derived from hedgerow removal fixed to sections of Heras fencing. They will be put in place at the end of each day whilst construction works are ongoing and then left on site until the replacement hedgerow planting has matured sufficiently to restore connectivity (5-7 years depending on speed of growth).

### Badgers

- 5.4.7 No active badger setts are currently known to occur within 30 m of the site. If any setts are identified during pre-commencement surveys, the following measures would be implemented:

- No construction works will be carried out within minimum distances of an active sett entrance. Works within 30 m of a badger sett entrance may require a Natural England licence for badgers. Protection zones will be marked out on site, such as with high-visibility fencing or coloured tape.
- Areas of high badger activity, if identified, will be cordoned off to ensure these are kept fully intact and with minimal interference from construction.
- Excavations more than 0.5 m deep will be fenced or covered overnight where practicable, or if this is not practicable, a method of escape (e.g. a plank to act as a ladder) will be provided.
- Large diameter pipes will be capped at the end of each working day to reduce the potential for badgers and other animals to enter them and become trapped.

- 5.4.8 If work within minimum distances of a sett and, therefore, sett closure or disturbance cannot be avoided, sett closures will need to be carried out outside the badger breeding season (defined as 30 November to 1st July) and in accordance with a Natural England approved method statement and, where relevant, a Natural England licence for badgers.

- 5.4.9 Toolbox talks on badgers will be provided by the ECoW to all construction staff on site and an emergency procedure protocol will be given to contractors in the event of encountering a badger or discovering a sett.

## 5.5 Aquatic ecology

### Biosecurity

- 5.5.1 A biosecurity protocol will be implemented to minimise risk of spreading invasive species, as noted above in 5.2.6.

### Ditches

- 5.5.2 Further details of measures relating to pollution prevention are described in the CoCP. Measures include the provision of a pollution incident response plan and a drainage management plan to minimise potential pollution effects.

- 5.5.3 Buffer zones surrounding ditches will be at least 5 metres in width.

5.5.4 Where it is not practical to establish a buffer zone from retained ditches of the stipulated width due to site working constraints, additional precautions to prevent e.g. run-off from soil stockpiles into ditches will be put in place, such as silt fencing.

5.5.5 Crossings of ditches by the underground gas pipeline and electricity export cables will be undertaken via trenchless techniques, which are anticipated to be horizontal directional drilling (HDD). Where ditches are crossed by permanent infrastructure (access roads in Zone C and G) or where temporary vehicular access across ditches is required during the construction period, culverts with mammal ledges will be installed.

5.5.6 Further design with method statements for each crossing location will be undertaken prior to commencement, as described in the CoCP, with input from the ECoW.

### Water voles

5.5.7 The access road in Zone C would be a permanent structure that in addition to habitat loss could also, in the absence of mitigation, result in a severance effect. It is not certain whether water voles currently cross under or over the railway line but there are pipes taking drainage water under the railway line which water voles could use. Therefore, it is considered important that the is designed to include a culvert of suitable width (minimum 1200 mm), with mammal ledges, so that water voles are able to access habitat on either side of the road.

5.5.8 Construction of the access road would result in habitat loss and therefore relocation of water voles under licence would be required in advance of construction, through phased clearance of suitable vegetation, if water voles are present in the ditches when construction is carried out.

5.5.9 Where considered necessary by the ECoW, high visibility fencing will be erected between the drains and the works areas to prevent access by workers and heavy machinery, and to prevent storage of equipment or materials within this zone. To prevent water voles from becoming trapped in the pipeline installation pits, exclusion fencing will be installed around pipeline installation pits where considered necessary by the ECoW.

5.5.10 Crossing method statements will include pre-construction measures to deter water voles from the working corridor and an adequate buffer zone (i.e. up to 15 metres where favourable habitat is present). Measures could potentially include:

- removal of vegetation from channel and bank-side vegetative cover, up to a minimum of 1.5 m inland from the top of the bank between mid-February and early April;

- the potential capture and translocation of water voles from working areas by an appropriately qualified and experienced ecologist;
- a destructive search of water vole burrows within the working corridor under the watching brief of an appropriately qualified and experienced ecologist; and
- measures to protect sections of watercourses which will not be directly impacted.

5.5.11 Works will be conducted in accordance with best practice guidelines published in Strachan *et al.* (2011) and Dean *et al.* (2016).

5.5.12 The installation of the gas pipeline and electricity export cables is to be undertaken beneath ditches supporting water voles. Crossings will be undertaken via trenchless techniques, which are anticipated to be horizontal directional drilling (HDD). Works-free buffer zones will be established around sections of the ditches that support water voles if this is practicable. Buffer zones will prohibit the tracking of heavy vehicles and storage of vehicles, machinery, equipment and soils and should be a minimum width of 15 metres.

## 6. Post-construction mitigation measures

### 6.1 Introduction

- 6.1.1 This section describes the mitigation measures adopted as part of Thurrock Flexible Generation Plant that will be undertaken as soon as practicable following the completion of construction in an area, in order to mitigate the impacts of development on features of ecological and nature conservation interest and to provide biodiversity benefit.
- 6.1.2 Works will be carried out under the guidance of the ECoW.
- 6.1.3 All post-construction monitoring surveys described in this section will be undertaken by the ECoW or an otherwise appropriately experienced and where necessary, licensed ecologist(s), who will be pre-approved by the ECoW and will work under the guidance of the ECoW.
- 6.1.4 All surveys will be carried out in accordance with biosecurity risk assessments and safe systems of works which will be produced by the ECoW prior to the commencement of a survey.

### 6.2 Habitats

- 6.2.1 Reinstatement of temporarily damaged or cleared terrestrial habitat will be carried out as soon as practicable. Habitat reinstatement will involve the replacement of stripped soils and the planting of native hedgerows, shrubs and trees, typical of the local area and of local provenance where possible. Habitat reinstatement and new planting will be undertaken in accordance with a pre-approved Landscape Management Plan (LMP). The scheme will include the retention and/or replacement of habitats of nature conservation value wherever practicable.
- 6.2.2 The Landscape Management Plan may be prepared as a separate document or may be combined to provide a Landscape and Ecological Management Plan (LEMP) if this is considered desirable to provide for the combined management of features that provide landscaping and ecological benefit.
- 6.2.3 The ECoW will be responsible for producing a report to confirm habitat reinstatement or enhancement requirements have been carried out in accordance with the requirements of this Plan and the Landscape Management Plan.

### Trees and hedgerows

- 6.2.4 Tree and shrub planting will comprise a diverse mix of native shallow-rooting broadleaved tree and understory species found in the area, with native shrub planting to provide a dense edge habitat, and an adjacent rough grass margin to add structural diversity, enhanced cover and shelter.

### Grassland

- 6.2.5 In summary, habitat creation would comprise:
- scraping off agricultural topsoil over the majority of the field to provide a low-nutrient substrate suitable for seeding;
  - wildflower meadow creation using an appropriate native species seed mix; and
  - scrub planting.

### Ditches

- 6.2.6 Ditches affected by temporary construction works will be restored to their previous bank profile following each phase of construction.
- 6.2.7 Works to ensure the integrity of the banks on either side of the watercourse will be undertaken. This may include geotextiles and reseeded/reinstatement of vegetation.
- 6.2.8 For watercourses where only a narrow width has been affected (e.g. where haul roads have been put in but the streams are otherwise unaffected), natural colonisation would be appropriate.

### 6.3 Protected or otherwise notable species

- 6.3.1 A detailed landscape and ecology management plan for would be produced that includes management regimes for ecological habitats and features as given on the indicative mitigation plan (Figure 4.1). This will be in accordance with the principles established in this Outline EMP and in the Landscape Management Plan.



## 7. Decommissioning mitigation measures

- 7.1.1 Measures to be adopted during decommissioning will be similar to those adopted during construction and will incorporate best practice guidance available at that time. These will be implemented through a decommissioning plan.

## 8. Operational and long-term ecology management

### 8.1 Introduction

8.1.1 This section describes ecology measures adopted as part of Thurrock Flexible Generation Plant that will be undertaken following the completion of post-construction mitigation described above (Section 6) and during the operational phase.

### 8.2 Habitats

8.2.1 Measures to be adopted for the avoidance of pollution of the environment during the operation of the Thurrock Flexible Generation Plant are set out in Volume 3, Chapter 15: Hydrology and Flood Risk.

8.2.2 A detailed landscape and ecology management plan would be produced that includes management regimes for ecological habitats and features as given on the indicative mitigation plan (Figure 4.1).

8.2.3 During the establishment phase (three to five years following the planting or spreading of seed) any failed plants will be replaced like-for-like as required to prevent any significant gaps in planting and as agreed with land owners (where the land is not in the ownership of the applicant).

8.2.4 Once established, new planting will be managed in accordance with a Landscape Management Plan and as described below.

8.2.5 The long-term management of Zone F and other landscaped areas will remain the responsibility of the applicant.

### 8.3 Protected or otherwise notable species

8.3.1 Should any licences for protected species be required, the ECoW will notify the applicant of any additional survey and habitat requirements and these will be carried out under the guidance of the ECoW.

8.3.2 The ECoW will maintain a record of all ecology works completed, which will be provided to the applicant, Natural England and the LPA as soon as practicable and as required under the conditions of any licence.

## 9. Monitoring and reporting

### 9.1 Monitoring

9.1.1 The ECoW will be responsible for monitoring adherence to the construction requirements of this Plan through:

- Weekly site inspections where works are active; and/or
- Weekly meetings with the Site Manager.

9.1.2 The ECoW will maintain a record of these site inspections and meetings, which will be provided to the Site Manager and the applicant and will be made available to the LPA and Natural England as required or requested.

9.1.3 The ECoW will regularly (at least once every four weeks) monitor adherence to the requirements of the protective buffer zones and fencing. Should any breach of these requirements become evident, the ECoW will inform the Site Manager as soon as practicable. The ECoW will inform the Site Manager of measures required to be undertaken as soon as practicable to rectify any potential impacts. If the breach is material, the ECoW, Site Manager or applicant will then be responsible for notifying Natural England of any breaches to the buffer zones.

9.1.4 New planting will be monitored during the establishment phase (up to three to five years post planting) by the applicant's landscape contractor (or land owner or farm manager if so agreed between those parties). Failed plants will be replaced on a like-for-like basis as required to prevent the development of a significant gap in planting. If plants or grassland areas are confirmed to be established after three years of planting, monitoring will cease.

9.1.5 Post-construction monitoring of protected species as required under any protected species licences will be undertaken by the ECoW or appropriately experienced and if necessary, licensed ecologist(s), who will be pre-approved by the ECoW.

### 9.2 Summary of reporting requirements

9.2.1 The ECoW will maintain a record of all pre-construction works undertaken as they relate to the protection of IEFs.

9.2.2 The ECoW will produce pre-construction survey reports listed below:

- invertebrates;
- reptiles;
- breeding birds; and

- water voles.

9.2.3 Survey reports, including advice regarding implications for construction, will be provided to the appointed Site Manager and the applicant. A copy will be made available to the LPA on request.

9.2.4 Should any Natural England licences be required, the ECoW will produce protected species licence applications which will be submitted to Natural England. Reports will support licence applications where required. The applicant reserves the right to review any application prior to submission but must not unreasonably delay its submission to the appropriate authority.

9.2.5 The LPA and Natural England will be invited to attend regular meetings (typically monthly where active works are about to or are occurring) during the pre-construction and construction phases. The need for and regularity of meetings will be held as requested or required by the LPA or Natural England during the operational phase. Meetings will be held to enable the ECoW, Site Manager or applicant to report on progress and the effectiveness of the implemented EMP and to provide an opportunity to discuss measures considered necessary to ensure adherence to the requirements of the Plan and relevant legislation.

9.2.6 Where necessary (i.e. where topics or work areas to be discussed are relevant) invitations to meetings will be extended to other relevant stakeholders including the Environment Agency. Frequent and ad hoc meetings will be held by the ECoW, Site Manager or applicant as considered necessary.

#### During construction

9.2.7 The ECoW will maintain a record of all ecology works undertaken during the construction period, including any ecological watching briefs or protected species surveys and findings of any site visits. Reports will be provided to the applicant and the Site Manager and, where appropriate, to Natural England and the LPA.

9.2.8 The ECoW will maintain a record of any breaches of the requirements of this Plan and any measures undertaken in order to mitigate potential impacts of a breach. Records will be provided to the applicant, Site Manager and if necessary the LPA and Natural England.

9.2.9 If any reasonable changes to the measures described in this EMP are considered necessary by the ECoW in order to achieve the objectives and adhere to the timetable of suitable work periods requirements of the EMP (Section 10) and any relevant legislation, the ECoW will produce a report of these proposed changes, detailing the reasons for them, and this report will be provided to the LPA for approval prior to the measures being carried out on site.

- 9.2.10 The ECoW and/or licence holder will be responsible for producing any required Natural England licence return forms and report of the works undertaken. A copy of the forms and reports will be provided to the applicant, Natural England and the LPA as soon as practicable and as required under the conditions of the licence.

**Post-construction**

- 9.2.11 Should any licences be required, the ECoW and / or Natural England licence holder will be responsible for producing and distributing any required licence return forms and report of the works undertaken as described above.
- 9.2.12 The ECoW will be responsible for producing a report to confirm habitat reinstatement or enhancement requirements have been carried out in accordance with this EMP and the Landscape Management Plan.

## 10. Timetable of suitable work periods

10.1.1 Table 10.1 provides optimal and optional months during which the works detailed in this Outline EMP could be undertaken.

Table 10.1: Timetable of suitable work periods.

	Key
	Ecology survey or mitigation period (optimal time).
	Optional ecology survey or mitigation period, as advised by the ECoW (sub-optimal time).
	Period where survey or mitigation cannot be carried out.

Works Description	January	February	March	April	May	June	July	August	September	October	November	December
<b>Pre-construction</b>												
Pre-construction survey for breeding birds.												
Pre-construction survey for reptiles.												
Pre-construction survey for badgers – sett locations.												
Pre-construction survey for badgers – badger activity.												
Pre-construction survey for water vole burrows.												
Pre-construction survey for signs of water vole activity.												
Habitat creation (up to 1 year prior to translocation)												
Reptile translocation												
Water vole translocation												
Habitat management to deter water voles from working areas.												
Up-rooting of vegetation or clearance of materials (e.g. piles of rubble) of potential value to hibernating reptiles.												

Works Description	January	February	March	April	May	June	July	August	September	October	November	December
Above ground habitat management to deter reptiles.												
Applications for Natural England licence(s)												
<b>Construction</b>												
Clearance of hedgerows, scrub and trees of potential value to nesting birds. NOTE: sub-optimal period requires immediately preceding survey to confirm no active nests.												
Reinstatement and enhancement planting in accordance with the Landscape Scheme and Management Plan, which will be submitted with the Environmental Statement.												
<b>Post-construction: Long-term Management</b>												
Replanting to replace failed plants during establishment period (3-5 years post planting).												

## 11. References

Dean, M., Strachan, R., Gow, D. & Andrews, R. (2016) The Water Vole Mitigation Handbook (The Mammal Society Mitigation Guidance Series). London, The Mammal Society.

Department for Environment, Food and Rural Affairs (2007) Hedgerow Survey Handbook. A standard procedure for local surveys in the UK. London, Department for Environment, Food and Rural Affairs.

Joint Nature Conservation Committee and the Department for Environment, Food and Rural Affairs (on behalf of the Four Countries' Biodiversity Group) (2012) The UK Post-2010 Biodiversity Framework. [Online] Available from: <http://jncc.defra.gov.uk/page-6189> [Accessed 22 January 2018].

Neal, E. and Cheeseman, C. (1996) Badgers. London, Poyser Natural History.

Strachan, R. Moorhouse, T. & Gelling, M. (2011) The Water Vole Conservation Handbook. Third Edition. Oxford, WildCRu.