Contents

Appendix 14
Ecological Mitigation and Enhancement

1.0 Introduction

This document is intended to provide additional detailed information in respect of the ecological mitigation and enhancement measures proposed to prevent, reduce or offset the predicted impacts on ecologically important receptors. The proposed development comprises a continuation of operations to extract minerals and the importation of waste at the Wingmoor Farm Integrated Waste Management Facility (IWMF) at Bishops Cleeve, Gloucestershire, and through the restoration of the site upon cessation of such operations. It should be read in conjunction with Chapter 14 of this ES which details the development proposals and provides an assessment of the potential ecological impacts.

1.1 Aims

Chapter 11 of the ES (Ecology), provides an outline of the mitigation strategy proposed to minimise the predicted impacts arising from the continuation of operations at Wingmoor Farm IWMF and through the restoration of the site. Further to that strategy, this document aims to:

- provide greater details of the individual mitigation measures to be implemented to prevent, reduce or offset predicted impacts;
- outline proposed enhancements to improve the ecological conditions at the site; and
- set a timescale and responsibilities for mitigation and enhancement measures to be employed.

Both mitigation and enhancement measures are focussed upon the ecologically important receptors identified in baselines studies, including protected and notable species and habitats occurring within the site and its vicinity. When fully implemented, this plan will also assist in achieving national and local Biodiversity Action Plan (BAP) targets for these species and habitats.

1.2 Ecological Receptors

Mitigation and enhancement measures are proposed for the following ecological receptors:

- habitats;
- badger;
- bats;
- birds;
- great crested newt (including other amphibian species); and
- reptiles;

The strategy for each of the above is fully described in the following sections, including timescales, locations and responsible parties for all elements.

2.0 Habitats

2.1 Introduction

The continuation of permitted operations will lead to a direct loss of approximately 21 hectares (ha) of semi-improved grassland, re-colonised topsoil and gravel, amenity planting, rough grassland/tall ruderal mosaic, un-vegetated shallow ditches, un-vegetated standing open water, and species-poor hedgerows of ecological value at the site level and approximately 0.02ha of broad-leaved woodland, vegetated pools, mature trees, lines of trees, hedgerows and several mature individual trees of up to parish ecological value.

In addition there will be a loss of the buildings at Wingmoor Farm, which are known to support bat roosts for at least three different species of bat that include common pipistrelle *(Pipistrellus pipistrellus)*, brown-long eared *(Plecotus auritus)* and whiskered bat *(Myostis mystacinus)*/Brandt's bat *(Myostis brandti)*.

2.2 Mitigation Strategy Summary Overview

The mitigation strategy will be based on three ecological principles: habitat retention, habitat creation and habitat enhancement. The three principles will be taken into account during the design stage of the development and throughout the restoration of the site upon cessation of quarrying/landfill operations.

2.3 Habitat Retention

Due to the location and scale of mineral reserves at Wingmoor Farm, the continuation of mineral extraction will not allow for the retention of the affected habitats within the landfill footprint.

The application site boundaries comprise of an existing active landfill and restored landfill to the north and east, open fields to the south and railway line to the west. The open fields and railway line, which provide suitable habitats for a range of species, are outside the development footprint and will be retained.

2.4 Habitat Creation and Enhancement – Site Clearance and Construction Phase

New habitats will be created where important habitats and features cannot be retained, wherever practically possible. Generally speaking, they will be of a similar nature to those which will be lost, with opportunities also taken to incorporate enhancements into retained habitats. The measures proposed will provide suitable alternative habitats for a range of individual and groups of species identified as being of importance in the context of the site and immediate surrounding area.

The habitat creation measures identified during the site clearance and construction phase include: woodland and scrub planting; the creation of two new ponds and the construction of a new building for bats. Without exception, habitat creation during the clearance and construction phase will be required as part of the mitigation for protected species. These works are described in more detail under specific recommendations for individual species in the following chapters

2.5 Habitat Creation and Enhancement– Restoration Phase

The restoration of the site will include the provision of a minimum of 1m, locally thickened to 1.5m for tree and hedge planting, of soil overlain the landfill clay capping which will enable a suitable substrate for the development of agricultural grassland and other habitats on the site.

Upon the cessation of operations, the site will be restored to the agreed restoration plan. This will result in the creation of agricultural grassland with hedgerow and broadleaved woodland planting along field boundaries. An area will also be retained to provide open, bare, ground, rough grassland and scrub for reptiles and invertebrates.

2.5.1 Woodland and Scrub

All woodland and scrub planting will be based on locally native lowland broadleaved woodland National Vegetation Classification (NVC) community types. The site lies in the Severn Avon Vales Natural Area where the most commonly occurring NVC woodland types are W8 ash-maple, W10 oak and W16 oak-birch woodlands.

The most suitable woodland community to be planted on the site will be NVC community W10. The principal native tree and shrub species that form the basis of this woodland community and which should represent a suitable mix for use on this site are listed in Table 1.

All trees will, wherever practically possibly, be of native provenance and locally sourced from native stock. Consideration will be made to the planting of the field and ground layers through the application of a suitable

Table 1: Recommended Tree and Shrub Species

Scientific Name	Common Name
Quercus robur	*Pedunculate Oak*
Betula pendula	*Silver Birch*
Fagus sylvatica	*Beech*
Sorbus aucuparia	*Rowan*
Ilex aquifolium	*Holly*
Alnus glutinosa	*Alder*
Fraxinus excelsior	*Ash*
Crataegus monogyna	*Hawthorn*
Corylus avellana	*Hazel*
Prunus spinosa	*Blackthorn*
Sambucus nigra	*Elder*
Prunus avium	*Wild Cherry*

seed-mix in accordance with the species typical of a W10 woodland type. Some areas will be planted with shrubs at high density, to ensure rapid establishment of dense cover to provide features suitable for wildlife benefit.

A minimum five-year maintenance programme will be implemented for all newly planted trees that will include the replacement of dead trees and shrubs, the replacement of damaged tree guards and the removal of vegetation growth around the stem of each planted tree and shrub.

2.6 Hedgerows

All hedgerows will be planted in accordance with BS4428:1989, Code of Practice for General Landscape Operations. Each hedgerow will use local native plant species that are representative of hedgerows in the local landscape. They will not only provide a dense and safe stockproof barrier, but also offer opportunities to wildlife (i.e. provide berries and fruit).

The species considered suitable for a hedgerow planting scheme include main components consisting of common hawthorn and blackthorn (70%) inter-planted with field maple, dog-wood *(Cornus sanguinea)*, hazel, spindle *(Euonymous europaeas)* and dog-rose *(Rosa canina agg.)*. Consideration will be made to plant trees in the line of the new hedges such as oak, ash and/or wild cherry. Additional species to be incorporated into hedgerows especially close to the new bat barn are those which are night scented and therefore offer increased foraging opportunities for bats i.e. honeysuckle.

2.6.1 Grassland

A neutral grassland seed-mix based on a mixture of 80% grasses and 20% herbs will be sown to provide agricultural

grassland. The seed mix used will be dependent upon the soil conditions after the restoration of the site but will, wherever practically possible ,include a mix of species that will be typical of a lowland, flower-rich, hay meadow. Such grasslands provide a habitat for a number of invertebrate and mammal species. Grassland swards will be managed by a combination of grazing and cutting for hay or silage. The grassland will be mowed annually in late summer/early autumn with cuttings removed in order to retain a diverse sward by minimising nutrient loading.

3.0 BADGERS

3.1 Introduction

A badger survey undertaken in 2008 recorded a total of 13 badger setts within and in close proximity to the application site. Four of the setts are situated within the proposed area to be worked during the continuation of mineral extraction and landfill operations.

Badgers are afforded protection under the Protection of Badgers Act 1992 (as amended) which makes it an offence to kill, injure, take or possess a badger; damage, destroy or obstruct access to any structure or place that a badger uses for shelter or protection (including setts); or to disturb a badger whilst it is occupying a structure or place which it uses for shelter or protection. The Act does not indicate what constitutes disturbance, however typically licences are required by Natural England when working:

- All work within 10m of the nearest sett must be licensed;
- All machinery work should be licensed within 10 and 20m however, hand digging can be undertaken unless sett tunnels are breached;
- Only the largest machinery is required to be licensed between 20 and 30m; and

3.2 Mitigation Strategy Summary Overview

Mitigation will be implemented to ensure the protection of badgers within the application site. This will include measures to minimise any disturbance, as far as is practically possible, to badgers through all phases of the proposed development and to enhance badger habitat during and post development.

Every effort will be made to ensure that badgers and their setts are retained on the site. However, should it become absolutely necessary to exclude badgers from one, or more sett, or operations will encroach within 30m of a sett then it will be necessary to obtain an appropriate licence from Natural England. In this event, it is likely that mitigation measures will become conditions attached to the granting of any licence.

3.3 Pre-Construction Survey

Badgers are highly capricious animals that will move between a number of setts within their territorial range,as well as creating new setts. In the survey season immediately prior to the commencement of any clearance works of areas which have been undisturbed or proposed disturbance to soil storage mounds the habitats will be subject to a further inspection for any signs of badger activity and in particular the establishment of setts.

Where the carrying out of operations which will contravene the Protection of Badgers Act 1992 (as amended) appropriate mitigation measures will be implemented, where necessary under an appropriate licence.

3.4 Habitat Enhancement Pre-site Clearance Phase

3.4.1 Artificial and Northern Sett Locations (Setts No.1 to 5)

Badgers will tend to use well established paths to travel between setts and feeding areas in their territory. It is proposed to enhance the strip of land connecting the artificial sett (No.5) to the four active setts on the northern boundary of the site (Nos 1 to 4). It is proposed that the corridor is planted with a mix of native local provenance broadleaved trees and some areas of scrub, together with the creation of some open areas of grassland. The grassed areas will consist of improved grassland managed through a regime regular cutting to improve the habitat for earthworms and provide optimum foraging opportunities for badgers.

Consideration will be made to importing stripped topsoil from the part of the site where mineral extraction is proposed to provide improved free-draining soils that will be able to better support earthworms and will be easy to dig into by badgers.

3.4.2 Southern Setts (Setts No.6 to 13)

Consideration will be made to provide an earth bank on the land south of the application site suitable for badgers to dig new setts, although this will depend on being able to provide a suitable location at the time of restoration.

3.5 Sett Closure

At this current time, a total of four outlier setts lie within the application area. The proposed continuation of operations is likely to require the exclusion of badgers from this area and closure of these setts, however, this will be considered only as a last resort. Where it is deemed necessary for a sett to be closed, this will be undertaken under licence from Natural England and in full accordance with any specific licence conditions.

Prior to any sett closure all appropriate methods will be employed to try to discourage badgers from using setts No.6 to 9 inclusive including the stripping of vegetation around these areas and through habitat enhancement detailed above.

At sett No.6, the exclusion will include the installation appropriate badger proofing around the entrance of the sett (i.e. an apron of heavy-duty chain-link fencing attached firmly to the ground) and the fitting of a badger gate across the sett entrance.

At setts Nos 7, 8 and 9, a trench will be dug around the perimeter of all the sett entrances, ensuring no damage to any tunnels. A heavy-duty chain-link fence will also be erected attached to wooden posts to enclose the entrances of these setts. The fence will descend below ground to a depth of 0.6m, with the mesh extending outwards at right angles for a further 0.6m to prevent badgers digging under the fence. The fence will extend above ground by 1.2m and at a slight angle leaning out from the excluded area to prevent badgers from climbing back into the enclosed area. Badger gates will be installed within the fencing opposite active entrances.

All fitted badger gates will initially be held open for a period of seven days in order to accustom any animals to the gates but after this period the gates will be altered to allow badgers access from the enclosed area only.

Badger exclusion will be carried out over a minimum of period of 21 days, monitored every three days to determine if badgers are still active in these setts using either sticks in front of the sett entrance or by sand smoothed out over the sett entrance to reveal badger footprints.

Once it has been ascertained that all badger have been excluded, the entrances to these setts will be closed under the direction of the licence holder.

3.6 Restoration of the Site

The restoration of the site to agricultural grassland and woodland planting should provide suitable habitat for badgers and increase foraging opportunities. The existing artificial sett will remain as part of the restoration scheme.

4.0 BATS

4.1 Introduction

As stated within the ES Chapter 14, the buildings at Wingmoor Farm are known to support roosts of common pipistrelle, brown-long eared and whiskered/Brandt's bats. These roosts will be lost following the demolition of these buildings.

All species of bat are fully protected under Wildlife and Countryside Act 1981 (as amended) and the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended). Under regulation 39 of the Habitat Regulations, subject to certain defences or in the absence of a licence (regulations 40 and 44), if it is unlawful to:

- Deliberately kill, capture, disturb or deliberately take or destroy the egos of a wild animal of a European protected species; or
- Damage or destroy a breeding site or resting place of a wild animal of a European protected species; or
- Keep, transport, sell or exchange any live or dead wild animal of a European protected species, or any part thereof.

Actions which may otherwise cause an offence to occur may be licensed under the provisions of Regulation 44 of the Habitats Regulations. A licence must not be issued unless there is no satisfactory alternative and unless the action authorised by the licence will not be detrimental to maintain the population of the species concerned at a favourable conservation status in its natural range.

Natural England is the licensing authority for granting licences for the purposes of regulation 44(2)(a)-(d), which includes "scientific or education purposes", e.g. surveying and for the purposes within regulations 44(2)(e)-(g). Regulation 44(2)(e) contains the purposes: "preserving public health or public safety, or for reasons of overriding public interest, including those of a social or economic nature and beneficial consequences of primary importance for the environment".

4.2 Mitigation Strategy Summary Overview

The mitigation strategy is designed to mitigate and compensate for the loss of known bat roosts at Wingmoor Farm and to ensure the protection of bats from being killed or injured. It will also ensure that there is no net reduction in the local distribution or abundance of any particular bat species and maintain the favourable conservation status of bat species in a regional and national context in the medium to long-term.
Due to the legal protection of bat species, it is expected that the details of mitigation scheme presented here will be prepared as a method statement to support a European Protected Species (EPS) licence and is based upon the following mitigation and compensation measures:

- the provision of alternative roosting sites;
- the protection of bats during the demolition of buildings at Wingmoor Farm; and
- habitat enhancement for bats.

4.3 Provision of Alternative Roosting Sites

Prior to any demolition of existing buildings, alternative roosting sites will be provided on the landfill site including the provision of a new, purpose-built, bat building. The structure will incorporate features suitable for hibernation and summer roosting opportunities for the range of bat species recorded at Wingmoor Farm. Other measures include the creation of additional features for bats at the retained buildings at the Lodge and the erection of bat boxes around the peripheries of the site.

4.3.1 Construction of a New Bat Barn

A single bat barn will be built to compensate for the loss of one brown long-eared, four common pipistrelle and one whiskered/brandt roost sites.

A number of factors will be taken into consideration with regards to the detailed design of the bat barn, including the individual species requirements, temperature, location, size and visual aesthetics. Design details will also be subject to approval by Natural England's Wildlife Licensing department, as a requirement of the necessary EPS licence to permit demolition of the existing roost structures. Roosting opportunities will be designed to be primarily suitable for the species affected but will also be broadly suitable for other species such as lesser horseshoe which are known to be present in the area.

The building will be a timber framed structure with gaps and hollow mortise joints within the roof timbers where bats can roost. Timber will be treated to protect it against the elements and extend the life of the barn, although only chemicals approved for use by Natural England (English Nature (2006) Remedial Timber Treatment Products Suitable for Use in Bat Roosts. Natural England, Peterborough) will be used. The roof voids will be of an open, uncluttered construction to allow bats to fly around within the roof space unobstructed prior to emergence, although they will be subdivided to reduce drafts and light intrusion, and to encourage the establishment of different microclimates within the roof space. The roof space will be accessible through a single cowled free flight access point on a gable end directly towards the tall vegetation (namely on the west), and a number of other crevice type opening around the eaves and apex of the roof through raised fascia boards and modified ridge tiles. Other gaps and crevices will be provided throughout the structure providing suitable roosting opportunities for a range of bat species; these features will be accessible to bats from both outside the building and within the roof void through modified 'bat slates', raised weather boarding and tears / gaps in underfelt and sarking. Other than the cowled gable opening, other external bat access points will not be visible. Externally the roof is covered with a dark coloured slate to improve absorption of solar energy and warm internal conditions within the void. Internally the roof will be lined with a combination of bituminous hessian underfelt and unfinished wooden sarking boards to provide a range of roosting opportunities and surfaces for bat to cling to.

The building will be designed to provide suitable thermal conditions for summer and winter roosting as well as areas that may be used for maternity purposes based on a L-shape design to enable the building to offer a wide variety of roosting temperatures with one south facing pitched roof tiled in dark roof slates to achieve high summer temperatures. Internal light, temperature and humidity conditions will be monitored for a minimum of twelve months after completion of building works and minor modifications carried out as necessary to make these as suitable and close to the original roost conditions as possible.

The location for the bat building will be near to Wingmoor Lodge which is close to existing roosts sites at the Wingmoor Farm and has been identified as the most suitable location to create a permanent building for bats. In all instances, droppings and any other material impregnated with odours from existing roosts will be added to the new buildings to encourage colonisation.

4.3.2 Additional Features at The Lodge

Additional features for bats will be incorporated into the retained buildings at Wingmoor Lodge to increase opportunities for roosting bats including the erection of two exterior bat boxes and a number of bat tiles on the roof of the building.

4.3.3 Bat Boxes

A number of bat boxes will be installed around the landfill boundary fixed to suitable trees and other appropriate features. The bat boxes will consist of a variety of types and materials to provide opportunities for a range of species.

4.4 Protection of Bats During the Demolition of Buildings

The demolition of buildings across the site will lead to the loss of six confirmed roosts within Wingmoor Farm (Building 11) and the wooden barn (Building 7) shown on Figure 14.3 of this ES. A Natural England EPS development licence will be applied for to cover the works to all known and suspected bat roosts at the site. This licence will need to be in place prior to any demolition or disturbance to buildings (including those of a preparatory nature) which are known to support roosting bats. Further survey work will be required to ascertain the exact nature of the use of the buildings at Wingmoor Farm to provide sufficient detailed information to support a Natural England EPS licence application.

It should be noted that the EPS licence method statement will be the definitive document for mitigation and those measures proposed here are subject to change following consideration of the EPS licence application by Natural England. In addition, it is possible for bats to establish new roosts within the existing buildings at Wingmoor Farm, including those which do not currently support bat roosts. Therefore, any alterations to existing buildings (such as re-roofing) or proposed demolitions) should only be undertaken after consultation with an appropriately qualified ecologist.

A three tier approach to the buildings requiring demolition has been devised, based on the likelihood of them supporting roosting bats. This approach is summarised below:

i. *No Special Provisions Required:* No signs of bat occupation and building has low suitability for bats. Building will be demolished without supervision and at any time of the year.

ii. *Precautionary Approach:* No signs of bat occupation, but building has moderate/high suitability for bats. An EPS licence is unlikely to be required, however, a precautionary approach to demolition will be taken. This may involve further inspections, survey prior to demolition or stripping certain areas of the buildings to check for signs of occupation by bats. Demolition or refurbishment will be undertaken in either the spring or autumn to further minimise the risks. All such works will be done following consultation with a suitably qualified ecologist.

iii. *EPS Licence Required:* Known bat roosts. Roosts will be monitored and bats excluded prior to demolition or significant disturbance. Buildings will be demolished in either the spring or autumn to minimise impacts on bats. All works will need to be undertaken once an EPS licence had been obtained. All work will need to be supervised by the licence holder or their accredited agents.

All demolition works will be undertaken during the summer months (preferably from May to September) to ensure no disturbance to potential hibernating bats. Immediately prior to demolition, a bat survey of all buildings will be undertaken to ensure that no bats are present. If any bats are found to be present within a building where an EPS licence was not previously considered necessary, then all works will cease until Natural England has been consulted and a decision made as to whether an EPS licence is necessary.

If bats were found immediately prior to demolition of a building for which an EPS licence had been granted then demolition will cease until the bats could either be encouraged to leave (i.e.: use of lighting). If this does not prove to be effectvie and there were less than 5 bats of a common species, then they will be removed by hand and placed into the new bat barn. The building from which they had been removed will be demolished immediately.

The demolition of all buildings will start from the top down with all roof tiles, guttering and window frames move by hand prior to the demolition of any walls. Particular care will be taken in the removal of ridge tiles.

Once the roofing of a building has been removed the building will be left for a minimum of 24hrs before any demolition of walls to allow any bats that may be present within the wall space the opportunity to leave the building and move to another roost site. A licensed bat worker will be present on site during the demolition process to supervise work and to stop works should any bats be found to be present in the structures until the bats can be safely removed or leave of their own volition.

4.5 Habitat Enhancement

Habitat enhancements to the areas south of the landfill site predominantly to provide suitable habitat for great crested newt and reptiles will also provide foraging opportunities for bats.

Across the site it has been agreed that external lighting will be restricted with any lighting required will be low-lux level lighting and will be directed away from areas of known foraging/commuting routes and around the site of the new bat barn.

In the long-term, the restoration of the site will provide opportunities to create woodland and hedgerow features providing increased opportunities for foraging/commuting for a range of bat species.

The new bat barn is to be located close to the Lodge, where it is known bat activity currently occurs. The restoration of the site (as detailed in Chapter 8 of this ES) is to be a mosaic of neutral grassland fields with boundaries of hedgerows and woodland planting. This offers increased opportunities for bat foraging/commuting along dark hedgerows north-south and also east-west once the site is restored. The hedgerows will be planted with a range of native species.

In addition, close to the entrance to the barn an area will be planted with a range of night scented flowering herbs and shrubs to attract insects and therefore to provide a foraging resource close to the barn itself. Species to be planted may include night scented stock, evening primrose, jasmine, honeysuckle, knapweed, ox-eye daisy and hawthorn. The precise location and planting regime will be confirmed and detailed in the Natural England EPS licence application.

4.6 Post Development Site Safeguard

4.6.1 Habitat Management and Maintenance

The maintenance and management of the bat barn, Wingmoor Lodge and bat boxes will be managed by Grundon Waste Management until such time as they discharge their responsibility for the quarry/landfill site. General maintenance of the bat barn, Wingmoor Lodge and bat boxes will be required to ensure that their structural integrity is maintained during and post the operational life of the site.

4.6.2 Population Monitoring

There shall be a requirement to assess annually whether the bat population has responded favourably to the mitigation and to inform on roost management for 5-year period following the construction of the bat barn and installation of bat boxes. After this initial five-year period a review will be undertaken to determine whether any further long-term monitoring is required.

The reporting of this monitoring will be undertaken through the Natural England licence return procedure.

4.6.3 Mechanisms for Ensuring Delivery

The site owners Grundon Waste Management will make a commitment to implement the measure detailed within any EPS licence application and to ensure compliance with current wildlife legislation relating to bats.

4.7 Timetable of Works

Grundon have agreed to the following timetable:

- Within 12 months of the grant of consent the bat mitigation building will be constructed and associated landscape planting will occur, and the office functions, vehicle depot and workshop functions moved to the MRF.

- Within 24 months of the grant of consent the farm house and associated buildings will be demolished, subject to approval of the NE EPS licence. In order to apply for the NE EPS licence then further surveys will need to be undertaken in the 12 months prior to the date when the farm house and associated buildings are to be demolished.

5.0 Birds

5.1 Introduction

Under the Wildlife & Countryside Act 1981 (as amended), the nests, eggs and young of wild bird species are protected from deliberate damage or disturbance during the bird breeding season (March to end of July inclusive).

The site is known to support a small population (one pair) of breeding little ringed plover *(Charadrius dubius)* and a pair of breeding barn owl *(Tyto alba)*, both of which are protected under Schedule 1 of the Wildlife and Countryside Act 1981 (as amended).

In addition, the site supports breeding, foraging and roosting populations of a number of UK and Local BAP species and Royal Society for the Protection of Birds (RSPB) red listed species of conservation concern including skylark *(Alauda arvensis)*, linnet *(Carduelis cannabina)*, herring gull *(Larus argentatus)*, house sparrow *(Passer domesticus)*, dunnock *(Prunella modularis)*, starling *(Sturnus vulgaris)* and song thrush *(Turdus philomelos)*.

5.2 Mitigation Strategy Summary Overview

Mitigation will be provided to ensure protection to nesting birds during the breeding season and through habitat creation and enhancement during and post development including the restoration of the site and the provision of nesting boxes.

5.3 Protection of Nesting Sites

Where operations within the application site require vegetation clearance of areas used, or with the potential to be used by nesting birds, all suitable nesting habitat will be removed from these areas outside the bird nesting season (i.e. removal permitted from beginning of August through to February inclusive). If necessary, any clearance or removal of features offering potential nesting sites (i.e. trees, hedgerows or artificial habitats) during the bird breeding season will only be permitted immediately following a check for nesting birds by a suitably qualified ecologist. Any nests found to be in current use will be left and until such time as any young have fledged.

Minimising impacts to breeding ground-nesting birds such as little-ringed plover will require careful consideration. The timing of pre-mining preparation of the site will become an important issue as their breeding habitat cannot be easily removed through vegetation stripping alone and should be undertaken outside the bird breeding season. Where this cannot be avoided consideration will be made to provide methods to deter birds from specific areas (i.e. use of bunting). If any nests are found within the bird breeding season an appropriate sized exclusion zone around all such nest sites will be established and no works within this zone will be allowed until such time as the young have fledged. It is not possible to obtain a licence to remove the breeding habitat of little ringed plover whilst they are breeding.

At the same time as deterring birds from establishing breeding territories within the application are other areas of the site will be managed to provide suitable habitat for ground-nesting species.

Commencing construction activity before the arrival of the birds in March and April, so that levels of human and vehicle activity are high on the construction site during the bird's territory establishment phase, is likely to be successful in deterring most birds and encouraging them to seek out alternative habitat nearby.

5.4 Habitat Creation and Enhancement

In the short-term and to compensate for the immediate loss of potential breeding habitat a number of bird boxes for passerine species will be placed on suitable trees around the perimeter of the site. The actual number of boxes to be provided will be dictated by the number and location of retained trees and the maturity of any trees planted. It is also thought that it will be possible to attach some bird boxes externally to the new bat barn to provide nesting opportunities for species such as sparrows and starlings.

In the long-term, the restoration of the site upon cessation of operations will provide an opportunity to create habitat suitable for nesting and foraging birds including the planting of broad-leaved woodland, the re-instatement of hedgerows and agricultural grassland. The proposed management scheme of grassland areas is important. It will be sensitively managed and left uncut for the duration of the bird breeding season (March – August) and benefit ground nesting species. In addition an area of grass/scrub/bare ground is to be created and retained and managed for its ecological value for such species as reptiles and invertebrates but will offer opportunities for ground nesting birds.

The planting scheme for woodland and hedgerows will include native fruit and nut bearing trees and shrubs of local provenance that will provide additional food sources for birds throughout the year but particularly during the winter months. The provision of scrub/woodland will provide opportunities for a range of UK BAP species such as dunnock and song thrush which could use the site.

6.0 Great Crested Newt

6.1 Introduction

Wingmoor IWMF supports a 'low' population of great crested newt that use Pond 9 for breeding purposes. In addition, the site supports populations (quantify) of smooth newt, palmate newt, common frog and common toad.

Great crested newt *(Triturus cristatus)* is protected under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) and the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended). In combination, these pieces of legislation fully protect great crested newt and their habitat. Offences relating to the great crested newt can be summarised as:

- intentionally or deliberately kill, injure or take a great crested newt;
- possess or control any live or dead specimen or anything derived from a great crested newt;
- intentionally or recklessly damage, destroy or obstruct access to any structure or place used for shelter or protection by a great crested newt; and
- intentionally or recklessly disturb a great crested newt while it is occupying a structure or place which it uses for shelter or protection.

A European Protected Species licence (EPS licence) from Natural England is required for any development works that will affect great crest newts or their habitat (i.e. breeding ponds and terrestrial habitat) where the species is known to be present.

6.2 Mitigation Strategy Summary Overview

The mitigation strategy is designed to mitigate and compensate for the loss of great crested newt breeding and terrestrial habitat through the continuation of operations at Wingmoor Farm IWMF. It will also ensure the protection of this species by avoiding great crested newts being killed or injured and ensuring there is not net reduction in the population to maintain the favourable conservation status of this species in a local, regional and national context in the medium to long-term.

Due to the legal protection of great crested newt, it is expected that the details of mitigation scheme presented here will be prepared as a method statement to support a European Protected Species (EPS) licence and is based upon the following mitigation and compensation measures:

- To avoid great crested newts from being killed or injured by the use of a capture and translocation strategy from areas of the site likely to contain great crested newts prior to areas being release for continued quarrying and landfill operations to safe areas;
- By ensuring there is no net reduction in the population size class within the site in the medium and long-term by retaining the population in the local vicinity by ensuring no net loss of potential breeding ponds and enhancement of habitats for great crested newts (ie, providing artificial refuges and hibernacula close to newly created ponds).

6.3 Receptor Site Selection

The receptor site has been selected on the basis that will be within the natural range of the population at this site, it provides suitable terrestrial habitat, provides opportunities to create new ponds and is safe from future development activities.

Two sites on the boundary of the landfill footprint have been chosen, an Enhancement Site based around the old orchard to the south-west of the site. This has an existing pond and is surrounded by rough grassland and occasional fruit trees. The receptor site for the captured great crested newt will be in a grass field to the south-east of the site which is under the under the ownership of Grundon Waste Management. This area currently supports species-poor semi-improved grassland and a waterbody has recently been created.

Surveys in 2006 and 2008 have indicated that great crested newts are not breeding in these ponds and therefore the release of captured animals into these areas will not impact upon any established great crested newt population.

The total area of the receptor site is 0.5ha and is considered to be more than adequate to support a 'low' population of great crested newt and to meet the needs of a larger population should this occur. There will be no barrier to the movement of newts to and from this area except along its northern boundary to prevent access to the landfill site,untill landfilling is completed.

6.4 Habitat Creation, Restoration and/or Enhancement

6.4.1 Aquatic Habitats

There is one pond currently within the enhancement site. The receptor site has recently had two waterbodies created in it, which currently do not support any vegetation. The pond in the enhancement site supports submerged Canadian pondweed within open water and reedmace, hard rush and sneezewort around its margins. The HSI criteria for this pond gives it a score as below average in its suitability to support great crested newts and no great crested newts have been recorded breeding in it.

This existing pond will be enhanced through management actions to improve the existing conditions by undertaking improvement works (i.e. increasing the surface water area) and by planting with a range of species that will be great crested newt friendly; these will be sourced locally where possible. Species to be included are the marginal and emergent species water forget-me-not, floating sweet-grass and water mint.

Two ponds are proposed to be constructed to provide new breeding habitats for great crested newt and to compensate for the loss of the breeding pond. This includes the pond already created in the receptor site and a further pond within the enhancement site. The newly constructed ponds have a surface area between 100 and 300 square metres with shallow margins and gently sloping sides with occasional shelved areas to provide growing platforms for submerged and emergent plants. Each pond will have a central deep section of up to 2m deep that will be designed to remain free of vegetation and provide open water for courtship displaying. The ponds will be planted with species suitable for egg laying and larval cover including water mint, water plantain, brooklime and water forget-me-not, where possible these will be sourced locally.

The location of the ponds to be created is shown in Figure 14.3 of this ES.

It is proposed that modification of the existing ponds and creation of the new ponds will begin during late summer-early autumn 2009 in order to allow time for some planting and natural plant re-growth before the onset of winter.

6.4.2 Terrestrial Habitats

The existing terrestrial habitat in the receptor site will be enhanced to specifically benefit great crested newt. This will include:

- The creation of coarse grassland and scrub mosaic by the planting of native, locally sourced shrub and tree species in discrete blocks within the grassland but away from the ponds and through the exclusion of grazing of these areas to allow coarse tussocky grassland to develop from the existing sward;
- The creation of artificial hibernation sites consisting of loose piles of uncontaminated bricks and/or stone covered with earth leaving open the base of the rubble facing the nearest pond. A minimum of one artificial hibernaculum will be constructed per pond and will be a minimum size of 3m long x 2m wide and 1m high; and

- Artificial refuge sites will be created using natural materials such as logs.

The restoration of the landfill site will be restored to agricultural grassland that will provide some additional terrestrial habitat to the north of the receptor site in the long-term.

6.4.3 Integration with Roads and Other Hard Landscapes

No new roads or hard landscaped areas are planned outside the proposed exclusion area where quarrying and landfilling operations will continue. Suitable exclusion fencing will be erected prevent integration between the receptor site and the working areas of the quarry/landfill site.

6.4.4 Integration with Other Species/Habitat Requirements

The creation and enhancement of habitats in the receptor site for the benefit of great crested newt will not conflicted with any other species or nature conservation issues at the site.

Grass snake and slow worm were confirmed to be using the site in 2008. Amphibian exclusion fencing will restrict reptile movement across the site but by its nature will exclude reptiles from the working areas of the site where there risks of increased mortality and injury. The habitat creation and enhancement measures implemented to benefit great crested newt will also benefit grass snakes. Badgers are known to present on the site and the amphibian fencing has the potential to disturb the movement of this species. To minimise the potential disturbance to badgers the fencing will have a number of crossing points at key locations but will be designed to exclude great crested newts from the working area.

6.5 Capture, Exclusion and Transportation

6.5.1 Timing, Effort and Method

The exclusion of great crested newt from areas to be developed will be achieved through the use of temporary or semi-permanent newt-proof fencing. The fencing design will be broadly in line with current standard guidelines (English Nature, (2001). Great Crested Newt Mitigation Guidelines. English Nature, Peterborough.) and will consist of 1m wide polythene with a high resistance to ultra-violet light degradation supported with wooden stakes at approximately 1.2m intervals. The fence will form a barrier standing approximately 600mm above ground, with 300mm buried vertically below ground, and the 100mm forming an overlap on top of the fence facing away from the area to be cleared to prevent animals climbing over.

All temporary and permanent exclusion and drift fencing will be inspected and maintained weekly by the licence holder or appointed ecological accredited agent during

periods when great crested newts are most likely to be active (1st February to 31st October inclusive) and monthly outside this timeframe throughout the EPS licence period.

Great crested newt will be captured by a combination of methods including pitfall trapping, hand searches of placed artificial refuges, hand searches of terrestrial habitat, bottle trapping and netting of ponds and the destructive searching of terrestrial and aquatic habitats. Prior to installation of fencing, areas of thick vegetation, which will be disturbed during the installation process and which could provide cover will be strimmed/brush-cut several days in advance to 'displace' animals. Likewise, hand searches of potential areas of refuge will also be undertaken to prevent harm to any animals seeking shelter in these areas.

Pitfall traps will be installed at strategic locations along exclusion and drift fences. The pitfall traps will be comprised of plastic buckets with snap-on lids and with a minimum depth of 300mm. Pitfall traps will be buried into the ground so that the top of the bucket is flush with the ground and the newt proof fencing and will contain some fresh vegetation to cover in the base to avoid desiccation or predation of captured animals and a suitable 'mammal ladder' such as a stick or garden cane.

The traps will be placed at 5m intervals for optimal capture, providing a minimum density for the capture area which exceeds the recommended density of 50 traps per hectare as specified in the guidelines for a 'small' sized population. Based upon the assessment of habitats within and around the site and the experiences of SLRs' previous capture schemes, it is considered more important to increase trapping effort in key areas of habitat and reduce capture duration than it is to retain the recommended (lower) trapping rates and (longer) durations.

All traps left open overnight will be checked each following morning. If pitfall traps are not to be in operation for any period of time they will be closed by means of the snap-on lids.

As a supplementary technique to pitfall trapping, artificial refuges consisting of carpet tiles, roofing felt or similar materials will be placed within the areas to be cleared. Refuges will be searched by hand and any newts found removed.

Where the areas to be cleared include waterbodies, bottle trapping and hand netting will be used as a supplementary technique to pitfall trapping. Standard 2-litre bottle-traps will be set at a density of 1 trap per 2m of shoreline within each waterbody to be cleared before sunset and will be checked the following morning. Hand netting will also be used to capture adult and larval great crested newts during the day or at night by torchlight.

Following an appropriate level of search effort by means of pitfall trapping, refuge searching and other supplementary techniques areas of terrestrial habitat may be subject to hand and destructive searches of terrestrial habitats prior to the release of an area of the site to quarrying/landfill operations that will include the removal by hand of vegetation, loose materials and substrates, other debris, mammal burrows and the draining of ponds and searches made of vegetation and silt.

Based upon our assessment of a low population size class, the nature of the habitats at the site and the increased rate of trapping we propose to undertake the capture of great crested newts based upon 30 suitable days (suitable being defined by the mitigation guidelines). At the end of the 30 suitable days no further capture effort will be deemed necessary when there has been at least 5 suitable capture days with no great crested newts being trapped or found through hand searches.

All captured great crested newts will be transported to the receptor sites as soon as practically possible. All animals will be transported in suitable plastic containers which will provide an adequate air supply and protection from the elements and containing damp vegetation. Any other species of amphibian will be transported to the receptor site in different containers. Amphibians capture on land will be released at the site of suitable artificial refugia near to the ponds within the receptor site.

Where animals are captured in aquatic habitats, these will be transported to the receptor site in containers along with water from where they were taken. Adults, juveniles and larvae will be transported in separate containers with the larvae additionally separated into large and small size classes to minimise the risk of cannibalism during the period held. All other amphibians will be separated from the great crested newt and transported to the receptor site. Amphibians capture in water will be released directly into the ponds in the receptor site. These ponds will have been in place for a minimum of 12 months prior to receiving any translocated animals.

All captured amphibians will be handled with wet hands. Additional precautions will be taken to prevent the spread of amphibian related diseases.

On completion of development, the exclusion fence will be removed.

6.6 Post Development Site Safeguard

6.6.1 Habitat Management and Maintenance

The maintenance and management of the habitats created and enhanced in the receptor site will be managed by Grundon Waste Management until such time as they discharge their responsibility of the quarry/landfill site. More specific management of the aquatic and terrestrial habitats will be highlighted through ecological monitoring of these features. Regular monitoring and maintenance of the exclusion fencing and ponds will be undertaken during the operational life of the site.

6.6.2 Population Monitoring

As per the mitigation guidelines there shall be a requirement for population size class assessment for a four year period following translocation. Combined with this annual monitoring regime will be a habitat suitability assessment including:

- recording of water levels;
- recording of species composition and coverage in the ponds;
- visual assessment of water quality within the ponds; and
- assessment of the percentage cover of grassland and scrub in terrestrial habitats.

The reporting of this monitoring will be undertaken through the Natural England licence return procedure.

6.6.3 Mechanisms for Ensuring Delivery

The site owners Grundon Waste Management will make a commitment to implement the measure detailed within any EPS licence application and to ensure compliance with current wildlife legislation relating to great crested newt.

6.7 Timetable of Works

Grundon have agreed to the following timetable:

- New breeding ponds, modifications to existing ponds and planting of terrestrial habitat will occur during 2009.
- The works associated with the EPS licence will be undertaken as soon as possible, ideally so that the translocation works were completed by the autumn of 2010.
- As per the licence requirements the population and created/enhanced habitats will be monitored for a period of 4 years.

7.0 REPTILES

7.1 Introduction

As stated within the ES Chapter 14, habitat within the site which is known to support a good population of slow worm and is likely to form part of the territory for a small population of grass snake that will be lost due to the proposed development.

All terrestrial native reptiles are protected under the Wildlife and Countryside Act 1981 (as amended), making it an offence to intentionally, deliberately or recklessly kill or injure any British reptile. The more common species comprising grass snake *(Natrix natrix)*, adder *(Vipera berus)*, slow worm *(Anguis fragilis)*, and common lizard *(Lacerta vivipara)* are protected under Section 9 (Parts 1 and 5) against intentional killing and injury, and sale.

It is not possible to obtain a licence to legally kill or injure the commoner species of reptiles for the purposes of development. Where such reptiles are present, it is necessary to take all reasonable precautions to avoid committing such an offence before commencing works within areas of suitable reptile habitat.

7.2 Mitigation Strategy Summary Overview

The mitigation strategy is designed to mitigate and compensate for the loss of reptile habitat through the continuation of operations at Wingmoor Farm IWMF. The mitigation strategy will consist of three main elements:

- ensuring the protection of reptiles by avoiding them being killed or injured. The principle means of ensuring this is by the capture and translocation of animals from operational areas of the quarry/landfill site to safe areas;
- minimising disturbance to known reptile habitats outside the proposed development site; and
- ensuring there is not net reduction in the local population in the medium to long-term by retaining the population in the local vicinity by ensuring no net loss of suitable terrestrial habitat, and enhancement of habitats for reptiles.(ie, providing artificial refuges and hibernacula).

It is proposed that the reptile mitigation strategy will be implemented on site prior to development of the areas for quarrying and landfill operations and will be carried out in conjunction with the mitigation detailed previously for great crested newt.

7.3 Minimising the Risk of Reptiles being Killed or Injured

A comprehensive capture and removal strategy will be employed in areas of the site likely to contain reptiles. This is necessary in order to minimise the risk of reptiles being killed or injured during the site clearance and quarrying/landfill operations. This work will be carried out in conjunction with and using similar techniques as detailed in section 6 for the capture and removal of great crested newt. More specifically, artificial refugia will be set out exceeding the minimum recommended density of 50 refuges/Ha. The capture scheme will run for a minimum of 30 visits, followed by a minimum of five clear visits with no reptiles being captured. Following five clear visits the area, or sub-compartment, will be considered clear of reptiles. Visits do not have to be on successive days, reducing the chances of unsuitable weather conditions during the exercise.

During the capture scheme, habitats within each cell may be strimmed of tall grass and other existing refugia removed to provide fewer areas for reptiles to seek shelter and therefore allowing capture effort to be concentrated in smaller areas. This will increase the habitat area:capture effort ratio.

Habitats cleared of reptiles will be removed or modified by vegetation stripping immediately after clearance to reduce the risk of reptiles re-colonising cleared areas.

The receptor site for any captured reptiles will the same as the enhancement site for great crested newt and has been selected on the basis that it will be within the natural range of the population at this site and that it will provide suitable safe terrestrial habitats in the long term.

Proposed habitat enhancements include the creation of a tussocky grassland/scrub mosaic as well as pond creation and the construction of artificial hibernacula. In addition, a total of three habitat piles (consisting of cut grass and other organic material) will be created on site to provide potential egg laying sites for grass snake.

In addition, the restored landfill will provide a mosaic of habitats which will offer suitable habitats for reptiles.

7.4 Minimising Disturbance to Reptile Habitat Outside the Proposed Development Site

It is proposed that the primary method of mitigation to minimise disturbance to reptile habitat outside the proposed development site will be avoidance of disturbance to known reptile habitats particularly along the railway line and its corridor habitats.

7.5 Population Monitoring

Annual population monitoring surveys will be carried in the receptor site. The methods used, timing of survey and level of survey effort will be in accordance with the guidelines published by Gent & Gibson 1998 (Gent, T. and Gibson, S. (1998). Herpetofauna Workers' Manual. Joint Nature Conservation Committee, Peterborough).

The results of the monitoring surveys will be used to advise any possible changes or variations in the management of these areas.

8.0 Summary of Agreed Mitigation and Enhancement

Table 2 summarises the mitigation and enhancements detailed in the sections above. All dates provided are to be used as a guide only as they will be subject to change based on the dates when EPS licences are submitted and granted.

9.0 Closure

This report has been prepared by SLR Consulting Limited with all reasonable skill, care and diligence, and taking account of the manpower and resources devoted to it by agreement with the client. Information reported herein is based on the interpretation of data collected and has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of Grundon Waste Management; no warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR.

SLR disclaims any responsibility to the client and others in respect of any matters outside the agreed scope of the work.

Table 2: Implementation Timetable and Responsibilities for Mitigation and Enhancement Measures

Phase	Description	Responsibility	Timetable for Implementation
Pre-construction phase	Habitat creation (i.e. new ponds, amphibian/reptile hibernacula and artificial refuges) and habitat enhancement (i.e. grassland/scrub mosaic) of amphibian/reptile receptor site	Grundon	Immediately
	Detailed design and construction of the bat barn, installation of bat boxes and habitat enhancements to The Lodge	Grundon	Immediately
	Installation of amphibian/reptile fencing	Grundon	Summer 2010
	Capture and removal of amphibians/reptiles from the development site.	Grundon/ Suitably Licensed Ecologist	One EPS licence granted – Summer 2010
	Bat surveys and exclusion of bats from buildings known/could support roosting bats	Grundon/ Licensed Bat Worker	Once EPS licence granted - Summer 2010
Development works	Planting of trees/shrubs and grassland along green corridor linking the artificial badger sett to other active setts	Grundon	Within 2 years of commencement of development
	Installation of additional bird boxes on retained trees.	Grundon /Ecologist	Within 2 years of commencement of development
	Monitoring of great crested newt and reptiles within the receptor site	Grundon/ Suitably Licensed Ecologist	Once EPS licence granted - Summer 2010
	Monitoring of new bat barn and bat boxes	Grundon/ Licensed Bat Worker	Once EPS licence granted - Summer 2010
	Habitat management of amphibian/reptile receptor site	Grundon/ Ecologist	Within 5 years of commencement of development
Post development	Habitat creation through restoration of the site and management of restored habitats	Subsequent site owner	Annually