

London Gateway Logistics Park Local Development Order

Ecological Mitigation and Management Plan



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Contents

	Page	
Chapter 1	Introduction	3
Chapter 2	Wintering Birds	6
Chapter 3	Breeding Birds	10
Chapter 4	Invertebrates	15
Chapter 5	Great Crested Newts	20
Chapter 6	Bats	23
Chapter 7	Water Vole	24
Chapter 8	Brown Hare	27
Chapter 9	Reptiles	28
Chapter 10	Scarce Plants	30
Figure 1	Off-site Habitat Creation Areas	
Appendix 1	RSPB Information and Advice Note, 2003	
Appendix 2	Essex Coast, Environmentally Sensitive Areas Scheme Prescriptions.	
Appendix 3	Great Crested Newt Ecological Habitat Management and Maintenance Plan (Amendment 012). Thomson Ecology (September 2011)	
Appendix 4	GCN Monitoring Recording Sheet	
Appendix 5	Bat Survey Methodologies	
Appendix 6	Environmental Advisory Group Constitution	

Chapter 1: Introduction

- 1.1 The London Gateway Ecological Mitigation and Management Plan (EMMP) forms part of the London Gateway Local Development Order and must be read in conjunction with it.
- 1.2 This document provides a framework for compliance identifying mitigation, management, surveillance, and monitoring protocols for terrestrial ecology in the off-site habitat creation areas (refer to Figure 1). The management protocols shall apply also to any on-site habitat creation areas.
- 1.3 The Site has been cleared of ecological interest and species present on the site translocated to various receptor sites in preparation for development of the logistics park.
- 1.4 A number of license applications have been made in respect of legally protected species. These are listed below:

Table 1.1 Natural England Licenses

License Detail	License Number	Date
Natural England Great Crested Newt License – Rest of Park	EPSM2010-1983 E	March 2011
London Gateway East Port Great Crested Newt License	EP3L30151D	October 2008
London Gateway Water Vole License – Rest of Park	20101256	March 2010

- 1.5 There remains an on-going requirement to ensure that the receptor sites and habitat enhancement areas are monitored and managed appropriately in accordance with the terms of the licenses. This EMMP is a compilation of all of the Natural England license method statements held by London Gateway.
- 1.6 The Code of Construction Practice (CoCP) sets out procedures that shall be followed if species are encountered during the construction phase.
- 1.7 The EMMP does not avoid the need to obtain any necessary environmental permit.

Environmental Advisory Group

- 1.8 The Environmental Advisory Group (EAG) (formerly known as the Ecological Advisory Group) established by London Gateway Park Development Ltd (LGPDL) has been meeting since 2008. It is a requirement of the London Gateway LDO that the EAG continues to operate for the duration of the LDO and for any longer period required by a monitoring regime in this EMMP.
- 1.9 The EAG consists of representatives from statutory and non-statutory groups including the Environment Agency, Natural England, the Port of London Authority, the Marine Management Organisation, Thurrock Council, RSPB, Essex and Kent Wildlife Trusts and the LGPDL Environmental Assurance Team.

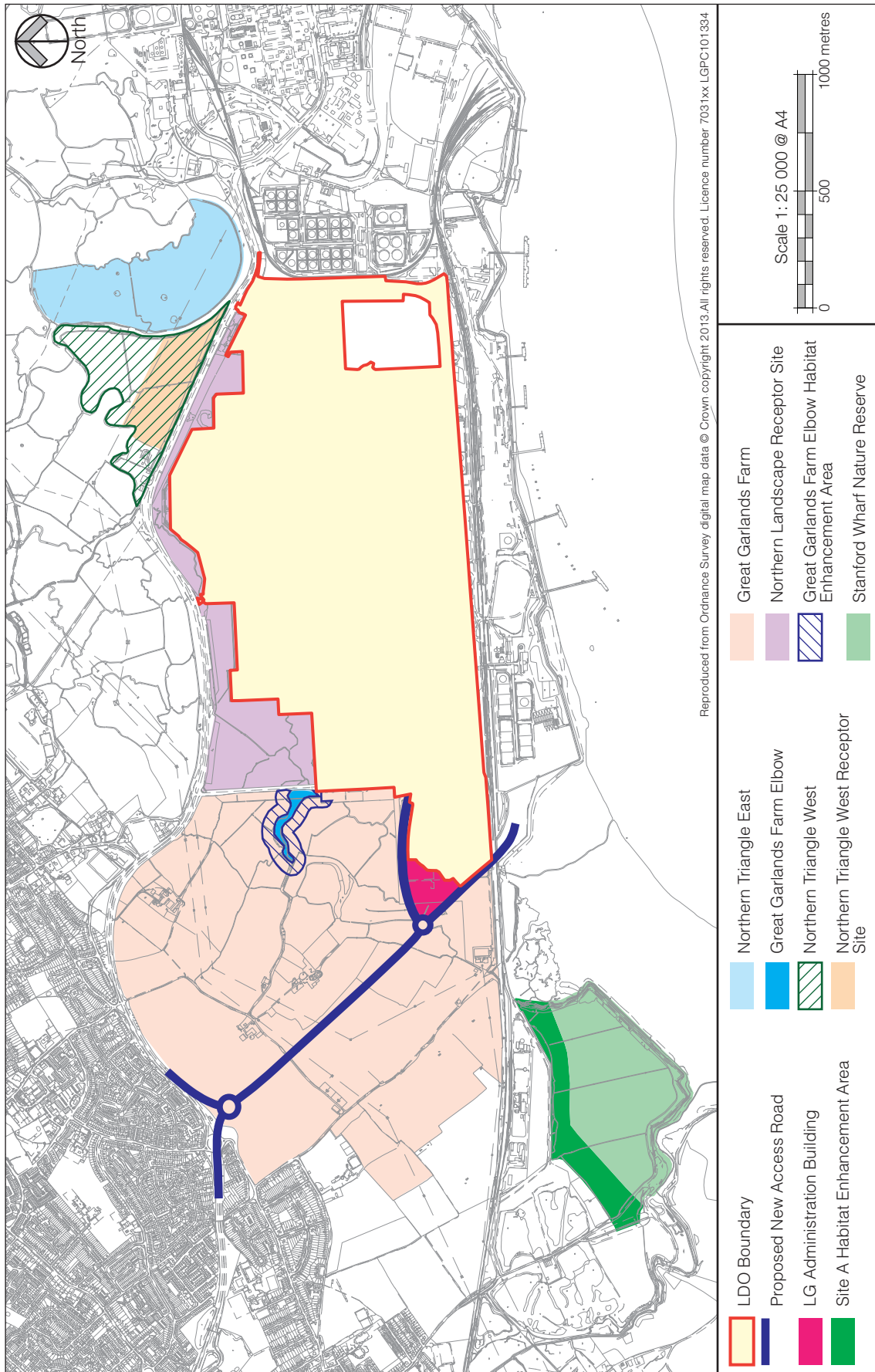
- 1.10 The EAG shall act in accordance with the terms of reference set out in the constitution included at Appendix 6.

Content of this Document

- 1.11 This document includes a section on each of the following species group:

- Wintering Birds
- Breeding Birds
- Invertebrates
- Great crested newts
- Water Voles
- Bats
- Brown hares
- Reptiles
- Scarce Plants

Figure 1: Off-site Habitat Creation Areas



Chapter 2 - Wintering Birds

- 2.1 The mitigation, management, monitoring and surveillance measures set out in this section are relevant to all winter bird species present on the site.

Habitat Creation and Management

Park

- 2.2 The strip of habitat around the perimeter of the commercial development shall act as a buffer to disturbance.

Great Garlands Farm

- 2.3 Within the western grazing marshes in Great Garlands Farm, a series of shallow scrapes shall be constructed in order to provide wet flashes in winter. These scrapes shall be profiled in order to be not so wet in winter that the grass shall not grow back in summer. The scrapes shall be constructed in accordance with RSPB Information and Advice Note (2003) in Appendix 1.
- 2.4 Great Garlands Farm Elbow receptor site and Great Garlands Farm Elbow Habitat Enhancement Area comprise two ponds and 5.4ha of grassland that shall be grazed at a low intensity and managed in accordance with the management regime set in tables A3.10a and A3.10b in Appendix 3. The measures for the management of ponds set out in Appendix 3 shall be implemented for the benefit of wintering birds.
- 2.5 The Western Grazing Marshes located within Great Garlands Farm shall be subject to the management measures outlined in Appendix 2 (Tier 2A of the Essex Coast ESA Scheme Prescription) to ensure that:
- The area is maintained as permanent grassland;
 - Stocking levels are limited to 0.75 Livestock Units (LU) per hectare during the period 1st April to 15th May;
 - Fertilizers and pesticides shall only be used in low quantities at specific times of the year; and
 - Water levels in the ditches and dykes shall be managed to ensure they do not dry out.
- 2.6 The central area of the fleet retains the greatest water and is used preferentially by wintering wildfowl over the drier northern areas of the fleet.
- 2.7 In order to ensure that it retains more water in the winter months (November to February inclusive) 100m of the fleet in the northern section shall be dug out. To date 50m of fleet was restored in 2012 and a further 50m shall be restored in the first autumn following completion of the access road (2013). To maximise the benefit to wintering wildfowl, the remaining area proposed for restoration shall be profiled to the following specification:
- Excavated in the autumn, after the breeding birds season but before the arrival of migratory winter wildfowl;

- Include gently sloping muddy margins; and
- Have a maximum depth of 45cm in winter.

Northern Triangle East

- 2.8 The management and maintenance measures for ponds and grassland in Appendix 3 shall be implemented in the Northern Triangle East to benefit wintering wildfowl.

Northern Triangle West

- 2.9 In the south of the area, 5ha of land has been enhanced for the benefit of great crested newts and shall be managed in accordance with the measures set out in Appendix 3.

- 2.10 The remaining 13ha of the Northern Triangle West shall be managed in accordance with the management measures set out in Appendix 2 (Tier 2A of the Essex Coast ESA Scheme Prescription).

- 2.11 Three small plots (approximately 0.5ha each) within the northern part of the Northern Triangle West shall be stripped to create shallow wader scrapes (including the surrounding habitat) and managed in accordance with the measures set out in Appendix 1.

- 2.12 The scrapes shall be constructed to the following specification:
- They shall be dug out in early spring to allow grass species to re-colonise the area before the onset of winter;
 - The top 10cm of surface layer (including the turf) shall be scraped back and retained;
 - The scrape shall then be dug to a maximum depth of 45cm with gently sloping edges and an uneven finish;
 - The spoil shall be disposed of on the Park Development or used in other habitat creation/enhancement works.
 - The retained top 10cm of soil/turf shall be rolled back into the scrape and compacted down to help facilitate the colonisation of the scrape by grass species;
 - The water level in the scrape shall be managed so that it remains dry from the end of March to October, becoming inundated in November and rising to a maximum depth of 25cm in January/February and then drying out by the end of March; and
 - If the scrape becomes dry in the period December to February inclusive, appropriate action such as draining water from the administration building and new access road shall be taken to re-wet them.

- 2.13 The scrapes and surrounding habitat shall continue to be managed in accordance with the measures set out in Appendix 2 (Tier 2A of the Essex Coast ESA Scheme Prescription) to ensure that grass levels are kept short, therefore benefiting grazing wildfowl such as wigeon and ensuring the scrape remains suitable for the intended species and is not colonised by tall vegetation.

Northern Landscape Receptor Site

- 2.14 Stocking density in the 23.7ha of grassland on the Northern Landscape Receptor Site shall not exceed 0.25 animals per hectare over a period of 300 days to allow a sward height of 100mm to be maintained over at least 75% of the area.
- 2.15 The management and maintenance measures for ponds and scrub in Appendix 3 shall be implemented in the Northern Landscape Receptor Site to benefit wintering birds.

Stanford Wharf Nature Reserve (include Site A Habitat Enhancement Area)

- 2.16 A concrete/beach area shall be provided on the margins of the balancing pond located at the eastern end of the Site A Habitat Enhancement Area to provide a suitable foraging habitat for green sandpiper.
- 2.17 The management and maintenance measures for ponds set out in Appendix 3 shall be implemented in the Northern Landscape Receptor Site to benefit wintering birds.

Surveillance and Monitoring of the 'off' site habitat creation areas

- 2.18 The following surveillance and monitoring methods shall be employed:
- The grazing marshes in DPW ownership shall be visited twice a month to coincide with a high and low tide cycle. On each occasion, an experienced ornithologist equipped with binoculars and a telescope of appropriate magnification, shall walk over the survey area ensuring that a good view is obtained of each area.
 - Surveys shall take place twice a month between October and March inclusive and reported to the EAG.
 - Waterfowl, primarily waders and ducks shall be counted, though all notable species and large numbers shall be logged.
 - Records shall be kept of the stocking density, standing water and sward heights; and data should be recorded on maps and/or tables including the locations of vantage points.
 - At the end of the survey, tables of data detailing the results from each visit shall be submitted to the EAG. This shall include date of visit, tide cycle, weather condition, stocking density, sward height, water level and bird species and numbers.
 - Prior to commencement of development, stocking densities and sward heights shall be recorded every quarter on both grazing marsh areas until such time as the EAG think it unnecessary.

- Prior to commencement of development, regular waterfowl counts of both grazing marsh areas shall be carried out through the winter, recording activity, in order to identify any changes in numbers or species of waterfowl occurring, or any change in period or type of use.
- Water levels in the drainage ditches and the maximum extent and duration of flooding each winter shall be recorded. Any correlation(s) between extent and/or duration of flooding and/or stocking densities and use by wintering waterfowl shall be recorded for use in management.
- Throughout construction of the development, the scrapes in the Northern Triangle West Receptor Site (once they are in place) shall be monitored, specifically recording the extent to which they are continuously wet and whether birds were present.
- Upon completion of the development, a winter bird survey shall be repeated once the new habitat (within the Park and receptor sites) has matured and again 3 - 5 years later, in consultation with the EAG.

Timings and Frequency of surveillance and monitoring

- 2.19 Grazing marsh winter bird surveys shall take place between October and March inclusive to encompass the winter season for various species of bird. Poor weather conditions (e.g. very wet or windy days) shall be avoided as far as possible as this can limit bird activity.
- 2.20 Surveys shall be undertaken annually in the period prior to and throughout the construction period. The results shall be analysed to identify the areas favoured by important species and the approximate numbers of each species.
- 2.21 The results of these surveys together with any interpretation or recommendations considered necessary shall be reported and presented to the EAG as appropriate.

Chapter 3: Breeding Birds

- 3.1 The mitigation, management, monitoring and surveillance measures set out in this section are relevant to breeding birds listed in the Schedule 1 of the Wildlife and Countryside Act 1981 (as amended), UK BAP, Essex BAP and Red Listed bird species.

Habitat Creation and Management

Park

- 3.2 Habitat enhancement to benefit breeding birds shall include the creation of 6km of habitat corridors including swales and balancing ponds.
- 3.3 The swales and balancing ponds shall be colonised by reeds and shall be managed for the benefit of bearded tits. Careful management of water levels shall be used to maintain the transitional phase of reedbed development favoured by bearded tits ensuring that some areas of open water are always present.
- 3.4 Cutting back of reeds shall only take place outside the breeding bird season (March – September inclusive) and shall be included in the Park maintenance plan. Annual cutting shall be undertaken on a rotational basis and cutting shall not take place throughout the whole site in any one year.

General - Off-site habitat creation

- 3.5 The habitat surrounding the development (including the Northern Landscape buffer) shall be used to provide new nesting habitat for UKBAP and Red Listed species.

Great Garland Farm

- 3.6 Great Garlands Farm Elbow receptor site and Great Garlands Farm Elbow Habitat Enhancement Area comprise two ponds and 5.4ha of grassland that shall be grazed at a low intensity and managed in accordance with the measures set out in Appendix 3.
- 3.7 The Western Grazing Marshes located within Great Garlands Farm and immediately west of the development site shall be managed in accordance with the measures set out under Tier 2A of the Essex Coast, Environmentally Sensitive Areas (ESA) Scheme Prescriptions (see Appendix 2). The measures shall ensure that:
- The area is maintained as permanent grassland that shall not be cut for hay or silage before 1st July;
 - Stocking levels are limited to 0.75 Livestock Units (LU) per unit during the period 1st April to 15th May;
 - Fertilizers and pesticides shall only be used in low quantities at specific times of the year;
 - Mechanical operations shall not be carried out in the period 1st April to 30th July; and
 - Water levels in the ditches and dykes shall be managed to ensure they do not dry out.

- 3.8 The management measures shall ensure that the grassland areas of the Western Grazing Marshes shall not be overgrazed and shall benefit breeding birds. Seasonal restrictions on hay and silage cutting shall allow the majority of ground nesting birds to raise broods before the habitat is cleared and the restricted application of mechanical operations during the period 1st April to 30th June shall also help to minimise disturbance to breeding birds.
- 3.9 Six kilometres of selected hedgerows on Great Garlands Farm shall be restored by supplementary planting with the aim of creating a variety of dense continuous hedgerows between 2–4m high, 2–3m wide at the base and 1.5m at the top to provide suitable nesting habitat for a variety of birds. Hedgerows located in proximity to areas favoured by wintering waders and waterfowl in the grazing marsh shall not be selected for restoration, as these species prefer open habitats.
- 3.10 The hedgerows and their understorey shall be restored with species of various sizes and longevity, in order that a wide variety of invertebrates are able to populate the habitat. Flowering species shall be selected to blossom and set seed/berry at different times during the season providing food for birds at important times of the year.
- 3.11 Hedges shall be trimmed in January – February, before breeding birds start nesting (trimming shall be avoided between March – August inclusive) and after wintering birds have fed on the berry crop. No hedgerow standard tree shall be felled unless it is a health and safety requirement. Hedge trimming shall be done on a 2 – 3 year rotation and the trimming of all hedges in the same year shall be avoided.

Northern Triangle East

- 3.12 The management and monitoring regime set out in Appendix 3 for the Northern Triangle East receptor site shall be implemented.
- 3.13 The 20ha of coarse tussocky grassland shall not be subject to any management for the first three years and thereafter the cutting of specific areas shall only be undertaken by machine in late summer, once every three years. In addition to the grassland species, this shall allow a variety of herbaceous species to become established that would not typically be able to set seed in grazed areas, such as thistles (*Cirsium* sp) and teasel (*Dipsacus fullonum*). This shall benefit breeding birds by:
- Providing a different variety of seeds to the grazed areas that shall form a food source for a variety of farmland species such as linnet, yellowhammer and corn bunting;
 - Supporting a wide range of invertebrate species that shall provide a food source for insectivorous species such as Cetti's warbler and skylark;
 - The additional cover provided by the taller vegetation shall support a large population of small mammals such as short-tailed voles (*Microtus agrestis*) that are important prey items for barn owls and kestrels (*Falco tinnunculus*); and
 - Providing suitable nesting habitat for species such as grasshopper warbler and skylark.

Northern Triangle West

- 3.14 One barn owl box shall be erected late 2013/early 2014.
- 3.15 The 5ha of land in the south of this area has been enhanced to create 4 ponds, 3.5ha of coarse grassland and 1.4ha of scrub and shall be managed in accordance with the measures set out in Appendix 3.
- 3.16 The remaining area (13ha) of Northern Triangle West shall be subject to the management measures outlined in Appendix 2 (Tier 2A of the Essex Coast ESA Scheme Prescription).
- 3.17 Three small plots of land within the remaining 13ha of land in Northern Triangle West (outside the receptor site) shall be stripped to create scrapes and bare substrates for the benefit of Winter Wildfowl but which could also benefit ground nesting waders such as lapwing and redshank.

Northern Landscape Receptor Site

- 3.18 The Northern Landscape Receptor Site includes 22 ponds that shall be managed and maintained in accordance with the measures set out in Appendix 3 to benefit breeding birds.
- 3.19 Stocking density on 23.71ha of the grassland in the Northern Landscape Receptor Site shall not exceed 0.25 animals per hectare over a period of 300 days to allow sward height of 100mm to maintain over at least 75% of the area.
- 3.20 The planting of scrub and trees over 6.2ha shall benefit breeding birds by providing suitable nesting and foraging habitat for a variety of farmland birds. The inclusion of tree species in the planting scheme shall also provide further nesting opportunities for breeding birds that prefer to nest at higher elevations such as hobby.

Stanford Wharf Nature Reserve

- 3.21 Site A Habitat Enhancement Area is 10ha in size and includes two ponds and 7ha of coarse grassland and shall be managed in accordance with the measures set out in Appendix 3 to benefit breeding birds.

Surveillance and monitoring

- 3.22 The following surveillance and monitoring methods shall be employed:
- 3.23 During construction, surveys shall be undertaken each year in April, May and June to assess the impact of the works on the populations of important species. More frequent surveys shall be carried out around working areas to locate nest-sites of Schedule 1 species and ground-nesting birds for protection, where required.
- 3.24 The surveys shall be repeated once the new habitat has matured and again 3 - 5 years later, in consultation with the EAG.
- 3.25 The survey methodology to be employed is the territory (registration) mapping techniques as detailed in 'Bird Census Techniques (Bibby, C.J., Hill, D.A., Burgess, N.D. and Mustoe, S. (2000)).

- 3.26 A species shall be assumed to be breeding if one or more of the following activities are recorded:
- territorial/alarm;
 - song;
 - aggressive encounter;
 - occupied nest/nest box/sitting on nest;
 - carrying nest material; and
 - carrying food.
- 3.27 The study area shall be walked at a slow pace in appropriately favourable weather in order to locate and identify all individual birds. All field boundaries and suitable breeding habitats shall be walked. Visits shall be undertaken early in the morning, generally between 04:00 – 11:00. The whole survey area shall be covered in each visit using suitable optical equipment (binoculars and telescope) to observe bird behaviour. Survey routes shall be mapped and routes alternated on each visit to ensure that all areas shall be covered at various times of day across the duration of the survey. Surveys shall be undertaken between March and June.
- 3.28 Observations of birds made in the field shall be recorded directly on to maps to aid the accurate location and recording of the bird's breeding territories. Upon completion of the surveys, the data shall be used to create specific species maps (Master Maps).
- 3.29 The data analyses shall follow procedures detailed in Bird Monitoring Methods published by the RSPB (Gilbert, G., Gibbons, D.W. and Evans, J. 1998). From species Master Maps, the number of territories for each species can be calculated.
- 3.30 The conservation status of the species recorded as breeding shall be measured against the following criteria:
- Annex 1 of the EU Birds Directive (Directive 79/409/EEC);
 - Schedule 1 of the Wildlife and Countryside Act 1981, (as amended);
 - UK Biodiversity Action Plan (UK BAP) priority species (Anon, 1998; Anon, 1999);
 - Birds of Conservation Concern (BoCC) Red List (Gregory et al., 2002); and
 - Essex local BAP species.
- 3.31 Species Master Map production and territory assessment shall only be undertaken for those species that are covered by one or more of the above criteria.

Timings and frequency

- 3.32 Prior to and during the construction period breeding bird surveys shall take place between March and June inclusive to encompass the breeding season for various species of birds. The results shall be used to identify the areas favoured by important species and the approximate numbers of each species.

- 3.33 More frequent specific surveys shall be carried out as required around working areas to locate nest sites of Schedule 1 and ground nesting birds. A Natural England Schedule 1 bird disturbance license may be required for this activity.
- 3.34 A post construction breeding bird survey shall be carried out once the new habitat has matured and again 3 - 5 years later, in consultation with the Environmental Advisory Group.
- 3.35 The results of these surveys shall be reported and presented to the EAG as appropriate.

Chapter 4: Invertebrates

- 4.1 This chapter sets out mitigation, management, monitoring and surveillance measures for fresh water and terrestrial invertebrates.

Habitat Creation and Management

Park

- 4.2 'Bee banks' shall be incorporated into the habitat creation works within on-site habitat corridors. They shall measure 6m x 1m x 1m high and shall be constructed out of spoil from the pond creation. The banks shall be south-facing, kept weed-free and free from chemical treatment. They will be valuable to solitary bee and wasp species to create tunnels for breeding in the exposed earth.
- 4.3 The following list of plant species which are valuable to invertebrates shall be included in habitat creation in the Park:
- Gorse (*Ulex europaeus*);
 - Guelder rose (*Viburnum opulus*);
 - Dogwood (*Cornus sanguinea*);
 - Broom (*Cytisus scoparius*);
 - Blackthorn (*Prunus spinosa*);
 - Hawthorn (*Crataegus monogyna*); and
 - Elder (*Sambucus nigra*).
- 4.4 Approximately 6km of habitat corridors shall be created in the Park for landscaping, drainage and general biodiversity enhancement, which will also be beneficial to invertebrates. The on-site habitat corridors shall consist of approximately:
- 3.4km of ditches;
 - 6.5ha of grassland;
 - 3.0ha of shrubs;
 - 3.0ha of woodland;
 - 13 log piles; and
 - 13 artificial hibernacula.
- 4.5 The management and monitoring regime set out in Appendix 3 for ditches, grassland, shrubs, log piles and hibernacula shall be implemented.

General

- 4.6 Areas of specific habitat for significant invertebrate species such as sparsely vegetated shingle, rough grassland around bushes and scrub and species-rich wildflower grassland, shall be incorporated into the boundary habitat areas. The habitat designed for reptiles and birds such as black redstart and certain ground-nesting species will also benefit invertebrates.
- 4.7 Around the boundary of the site and along the road network, areas of scrub and shingle shall be incorporated which will provide valuable foraging and nesting habitats to many populations of invertebrates. In addition, green landscaped

areas shall be seeded with nectar-rich plant species and tall grassland mosaics. Where embankments or mounds are constructed bare ground and 'bee banks' shall be incorporated and bare surfaces shall provide further burrowing habitat.

- 4.8 Management of the swales, the reptile and amphibian refuges and the boundary habitat areas shall also be designed to provide suitable conditions for invertebrates.
- 4.9 The use of weed killers on gravelled areas along roads etc. shall be reduced to a minimum. Where this management is considered essential, it shall be carried out on rotation throughout the site so that colonisation can take place from adjacent areas;
- 4.10 The use of insecticides on the service and landscaping areas shall be avoided where possible.

Receptor Sites

- 4.11 A total of 6km of habitat corridors consisting of ditches, grassland, shrubs, woodland, log piles and artificial hibernacula shall be created post development in the receptor sites.

Great Garlands Farm Elbow

- 4.12 Management of the two ponds shall include the removal of accumulated silt and the cutting back of marginal vegetation to ensure minimal shading.
- 4.13 Aquatic vegetation removal shall be undertaken every few years or when required. The target for management shall be to create a mosaic of densely vegetated areas with intervening areas of open water. The vegetation that is removed shall be taken away from the pond margins to avoid damaging marginal communities of plants and invertebrates.
- 4.14 The marginal vegetation shall be managed in order to develop a more varied sward and mosaic of habitats. The cutting of the vegetation shall not occur between the months of May and August inclusive.
- 4.15 Grass cutting shall be varied across the site and different parts of the grassland shall be cut annually. The cutting of different areas at different times shall ensure a varied structure that is important for invertebrates. Areas shall be left uncut to provide a patchwork of small areas of tall, tussocky grass, offering valuable havens for communities of invertebrates which would be harmed by cutting elsewhere.
- 4.16 No initial management shall be required for the native shrubs that have been planted over 20% of the Great Garlands Farm Elbow. After five years, the scrub shall be assessed and subsequent management shall be implemented, if required. Management may include coppicing and piling of coppice brush.
- 4.17 The eight log piles that have been constructed shall be managed by replacing logs that become displaced from the main pile and adding new logs if piles become significantly reduced in size due to rotting. The log piles shall be monitored annually.

- 4.18 The eight hibernacula that have been constructed shall be examined annually and maintained including the replacement or addition of stone if required.
- 4.19 The use of weed killers and insecticides shall be avoided where possible or otherwise kept to a minimum. Where it is required, it shall be applied by spot treatment only around the base of newly planted shrubs.
- 4.20 The management measures in Appendix 3 shall be implemented in the Great Garlands Farm Elbow to benefit invertebrates.

Northern Triangle East Receptor Site

- 4.21 The habitat creation that has been undertaken on the eastern section of the Northern Triangle shall be beneficial to invertebrates. The enhancements at the Northern Triangle East Receptor Site include:
- The creation of 24 ponds;
 - Use of the spoil from pond creation to create uncompacted mounds of soil close to the new pond;
 - Encouraging the development of coarse, tussocky grassland over 80% of the site;
 - Planting of native shrub species over 20% of the north of the site;
 - Provision of 24 log piles; and
 - Provision of 24 artificial hibernacula.
- 4.22 The management of the ponds and terrestrial habitat shall be as for Great Garlands Farm Elbow. Grazing within the Northern Triangle East ceased at the end of April 2008. Control of scrub shall be undertaken when necessary to maintain scrub cover at no more than 70% of the total area of Northern Triangle East.
- 4.23 As with Great Garlands Farm Elbow, the use of weed killers and insecticides shall be kept to a minimum and be avoided where possible. Where it is required, it shall be applied by spot treatment only around the base of newly planted shrubs.

Northern Triangle West Receptor Site

- 4.24 'Bee banks' shall be created to a similar design and dimensions as those to be incorporated into the Park Area.
- 4.25 Three wader scrapes shall be incorporated into Northern Triangle West to the north of the receptor site for the benefit of breeding birds and to provide additional habitat for invertebrates.
- 4.26 The habitat creation that has been undertaken in this area for great crested newts and reptiles will also benefit invertebrates. The habitat enhancements include:

- The creation of four ponds;
- Planting of 1.4ha of scrub;
- Creation of 8.5ha of coarse grassland;
- The construction of 12 log piles; and
- The construction of eight hibernacula.

4.27 The management and monitoring regime set out in Appendix 3 for the ponds, scrub, grassland, log piles and hibernacula shall be implemented.

Northern Landscape Receptor Area

4.28 The Northern Landscape Receptor Site has been created as a receptor site for great crested newts and reptiles. Habitat creation in this area shall benefit a range of species including invertebrates. The enhancements include:

- The creation of 22 ponds;
- Development of lightly grazed tussocky grassland over approximately 23ha;
- The construction of 22 log piles and hibernacula; and
- Tree and shrub planting over an area of approximately 6.2ha.

4.29 Coarse tussocky grassland habitat shall be allowed to develop on a rotational basis by removing grazing animals for a period of 12 months and subsequent management by grazing at a low stock density, or annual cutting. The height of grass cutting, if undertaken, shall be varied across the site and different areas shall be cut at different times to ensure a varied structure that is important for invertebrates.

4.30 The management and monitoring regime set out in Appendix 3 for the ponds, shrubs, log piles and hibernacula shall be implemented.

Stanford Wharf Nature Reserve (Site A) Habitat Enhancement Area

4.31 The site has been flooded and converted to mudflats specifically to enhance the area for waterfowl (particularly wading birds) and invertebrates. Habitat enhancements include:

- The construction of a new seawall;
- The creation of two ponds;
- The creation of brownfield habitat (created by importing brownfield substrate for a “clean” source);
- Development of tussocky grassland over approximately 7ha; and
- The construction of two log piles and two hibernacula.

4.32 The management and monitoring regime set out in Appendix 3 for the ponds, grassland, log piles and hibernacula shall be implemented.

Surveillance and Monitoring

4.33 A post-construction survey shall be undertaken in the year following completion of construction and again five years following completion to determine populations of invertebrates within the affected areas (habitat creation areas and on-site habitat corridors).

Translocation

- 4.34 Areas of habitat identified for translocation shall be protected by post and wire fences to prevent accidental damage until they can be moved.
- 4.35 The newt refuge in the Northern Triangle shall be used as a receptor site for translocated material including relict upper saltmarsh vegetation and associated soil. This translocation shall be undertaken three times in a year to ensure that different invertebrate lifecycles are incorporated into the translocation activity. This should ensure that there is no complete loss of this habitat or its invertebrate assemblage.

Chapter 5: Great Crested Newts

- 5.1 This chapter sets out management, monitoring and surveillance measures for great crested newts.

Management and Maintenance

- 5.2 The management and maintenance measures for aquatic and terrestrial habitats in the habitat creation areas set out in Appendix 3 of this document shall be implemented to benefit great crested newts.

Great Crested Newt Tunnels

- 5.3 The management and monitoring of the existing Great Crested Newt (GCN) tunnels shall be implemented in accordance with protocols set out in table 5.1. Management and maintenance shall be carried out until such time as the EAG consider it unnecessary. Further detail on the monitoring of great crested newt tunnels is provided in paragraphs 5.7 - 5.8.

Table 5.1: Great Crested Newt Tunnels

Location	Manorway Road and Access Road newt Tunnels
Objective	<ol style="list-style-type: none"> 1. Maintain tunnels free of debris to facilitate the passage of newts. 2. Ensure tunnel base is not completely flooded for more than 10 days between 1st February and 31st October each year. 3. Maintain permanent amphibian fencing in sound condition either side of each tunnel entrance. 4. Maintain high quality terrestrial habitat of scrub and coarse grassland for a radius of 5 metres at tunnel entrances.
Management	<ol style="list-style-type: none"> 1. Any blockages shall be cleared and jet cleaned with water to remove contaminants (Prefabricated "ACO" tunnels only) prior to breeding and hibernation migrations, in early January and late August. 2. The Manorway ACO type tunnels shall be jet washed twice annually at the same time as they are examined to remove contaminants. 2. The drainage system shall be maintained to prevent tunnel flooding. 3. Permanent amphibian fencing shall be repaired as required. 4. Management of terrestrial habitat at tunnel entrances if required.
Monitoring	Monitoring shall take place twice annually in early January, prior to breeding migration, and late August, prior to hibernation migration.
Remedial Action	Replacement or reconstruction.

Great Crested Newt Monitoring

- 5.4 Great crested newts shall be monitored to ensure the creation of a viable population in accordance with the procedures set out in Appendix 3 and the protocols set out below.
- 5.5 Starting in the year following creation, all water bodies created for great crested newts shall be surveyed every year, for ten years or until 3 years after the total development is complete and operational, whichever is the longer period.
- 5.6 The survey methodology shall follow that in the English Nature Great Crested Newt Mitigation Guidelines. Six visits shall be conducted each year using the range of standard survey techniques, as appropriate to each water body to provide population size class data for each water body, with annual results collected for at least ten years and until three years after the total development is completed.
- 5.7 Monitoring of the use of the access road newt tunnels and connectivity across roadways shall take place for five years from October 2013. Monitoring shall only begin once great crested newts have been recorded in water bodies in the immediate vicinity of the tunnel entrances. If monitoring does not demonstrate newt movements through the tunnels within five years, a further subsequent five years' monitoring shall be carried out. Monitoring shall be continued until use of the tunnels by GCN has been observed.
- 5.8 Interim reports on the monitoring shall be supplied to Natural England at the end of each year. After five years' monitoring, a report shall be provided including an assessment of the effectiveness of the tunnels in providing connectivity. Should the tunnels be found to be ineffective following monitoring for a period of 10 years then LGPDL shall commit to further measures, as appropriate, to ensure connectivity is achieved. Three methods of monitoring shall be used as outlined for the access road tunnels.
- A series of numbered, rubber backed carpet tiles shall be located at the tunnel entrances. These shall be checked on a minimum of 20 occasions annually, with effort concentrated during the peak migration seasons for great crested newts. The belly pattern of any great crested newts encountered shall be photographed and the number of the refuge noted. Belly pattern recognition shall be used as evidence for newt movement through the tunnel.
 - In years 3 and 5, funnel traps shall be installed within the tunnel in such a way that all newts attempting to enter or leave the tunnel at either end shall be captured and the direction shall be known. The traps shall be installed for a period of 15 days during the spring migration period and checked daily (early morning) by a licensed ecologist. The belly pattern of any great crested newts encountered shall be photographed and the newt shall be released on the opposite side of the barrier created by the trap from which it was captured.

- 5.9 During monitoring surveys of those receptor ponds closest to the tunnel entrances, belly patterns of captured newts shall be photographed. Belly patterns shall be compared between years to look for evidence of newts having migrated across roadways.
- 5.10 The newt tunnels shall also be monitored for physical condition, blockages and environmental factors such as flooding, as set out in table 5.1. Results of this monitoring shall be considered together with the results of great crested newt monitoring and any shortfalls shall be addressed with changes in management or remedial actions as appropriate.
- 5.11 A report on all monitoring work shall be submitted to Natural England and the results of all surveys shall be made available to the Environmental Advisory Group. A final report of the whole scheme shall be published by the EAG. Interim results shall be described in an annual ecology report. LGPDL shall be responsible for ensuring that all monitoring is carried out and reported as required. All monitoring work shall take place on land owned by LGPDL or on land to which LGPDL has access rights.

Habitat Monitoring

- 5.12 Habitats shall be monitored in accordance with the protocols set out in Appendix 3. Information shall be carefully recorded before, during and after any work.
- 5.13 Information collected shall include the location, date and extent of management activities, observations made while management activities are being carried out and recommendations for future management.
- 5.14 A monitoring visit shall be made to all sites in late summer every year. Terrestrial habitat grassland sward height shall also be monitored during GCN survey visits in April/May and on a monthly basis during periods of management by grazing at NLRS and GGFE Habitat Enhancement Area. Results of the monitoring visit and recommendations for management shall be recorded on a habitat monitoring recording sheet (see Appendix 4). All fields on the recording sheet shall be completed.
- 5.15 Habitat monitoring and management shall be the responsibility of LGPDL and shall be carried out in until such time as the EAG consider it unnecessary. Action shall be undertaken as appropriate in the event of any negative or sub-optimal results.

Chapter 6: Bats

- 6.1 This chapter sets out mitigation, management, monitoring and surveillance measures for all species of bats.

Habitat Creation and Management

- 6.2 No new commuting or foraging habitat shall be created specifically for bats. However, water bodies provided for amphibians, boundary ditches and flets and additional new native tree planting shall all provide habitats for the prey items of bats and sheltered corridors for movement.

Park

- 6.3 Bat boxes shall be incorporated into roofs of substations, pumping houses and other non-commercial buildings.

Off-site habitat creation areas

- 6.4 No habitat management has been undertaken specifically for bats. However, management of habitat areas created for other species shall provide improved feeding and commuting opportunities for bats. The management and maintenance of terrestrial and aquatic habitats set out in Appendix 3 shall be implemented to provide improved feeding and commuting opportunities for bats by maintaining sufficient ground cover and abundant invertebrate prey. The planting and maintenance of hedges and scrub shall also provide habitat for insects and sheltered commuting corridors for bats.

General

- 6.5 The use of weed killers along roadside verges shall be kept to a minimum. If this is required, it shall be carried out on a rotational basis.

Surveillance and Monitoring

- 6.6 The following surveillance and monitoring shall be carried out:
- Inspection of any potential roosts shall be carried out.
 - The baseline survey shall be repeated once the new habitat has matured and after 3 – 5 years in agreement with the EAG.
- 6.7 The commuting and foraging habitat survey undertaken in 2008 shall be replicated two and five years after completion of the development (see Appendix 5). Transects shall be selected to be as close as practicable to those visited in the 2008 survey.

Chapter 7: Water Vole

- 7.1 This chapter sets out mitigation, management, monitoring and surveillance measures for water voles.

Habitat creation and management

Park

- 7.2 At least 6km of suitable water vole habitat within the development site shall be created. A large proportion of this shall be created by the boundary ditch and habitat corridors.

General

- 7.3 Habitat management shall aim to maintain between 1 metre and 300mm of stand water in all new fleets. A linear strip of at least 2 – 3m of tall grassland along both sides of watercourses shall be maintained. Cutting of such vegetation shall occur annually in late autumn to no shorter than 100mm. Aquatic vegetation shall be dredged between October and March, with no more than half to be removed in any annual cycle.
- 7.4 A minimum of 6km of fleet shall be created for water voles. It is expected that the construction of the outer boundary ditch surrounding the Park, the drainage swales and new fleets created within the Western Marshes and Northern Triangle will fulfil this target.
- 7.5 If there is a time lag between the loss of existing habitat and the creation of the new habitat, then temporary habitat shall be created in the form of re-profiling of existing grazing marsh ditches to the west of the Park and in the Northern Triangle.
- 7.6 In line with good practice, mink and brown rats shall be controlled until such point as the EAG consider it no longer necessary.

Monitoring and Surveillance

- 7.7 Monitoring of receptor sites shall be undertaken for another three years to gather data confirming firstly that release populations have become established, and secondly to estimate the population density and distribution present following translocation.
- 7.8 In line with best practice, monitoring shall occur during soft-release of animals to confirm natural movement away from the release pen. A full survey for signs indicating the presence of water voles shall be undertaken:
- One month after the release cohorts have been placed in the soft release pens;
 - Immediately before the first winter period (late September);
 - Immediately after the first winter period (early April); and
 - Annually for a minimum of five years post release.

- 7.9 Action shall be dependent upon the receptor site in question and detailed survey results. It will be essential to identify and address the cause of population failure prior to any further reintroductions.
- 7.10 The receptor sites shall be subject to management plans implemented by the site owner, the RSPB, Essex Wildlife Trust or LGPDL. Management plans shall aim to ensure the long-term survival and viability of the released water vole populations.

Responsive Water Level Management

- 7.11 Water levels shall be managed where appropriate to ensure that excessive flooding or drying out of water bodies on the receptor sites does not occur. The objective of management of this type shall be to create stable water levels for the majority of the water bodies in the receptor area.
- 7.12 At West Canvey Marshes, the RSPB have stated that they have in place a reservoir in order that water levels can be controlled throughout the year. Water levels shall not be allowed to fluctuate more than 10cm in any one year.

Long-term Water Level Management

- 7.13 Where appropriate, management shall include de-silting of all water bodies every 3-5 years. The objective of clearance shall be to maintain the drainage function of attenuation pools and drainage ditches and prevent channels becoming choked with vegetation. Detailed de-silting plans shall be informed by up to date water vole survey information to allow lengths containing active water vole burrows to be avoided.
- 7.14 De-silting shall be conducted between November and January to avoid the water vole breeding season, and machinery shall be selected that is appropriate to the task. Works shall be undertaken from one bank only, and efforts shall be made to minimise impacts upon bankside vegetation by confining dredging activity to the central section of the channels where possible.
- 7.15 To provide short-term refuges for voles during the works, regular sections approximately 10-20m in length, shall be left untouched. To ensure longer term habitat availability at least a third of the total length of each water body shall remain untouched each year. If appropriate, work shall proceed upstream to allow any dislodged plant propagules or invertebrates to float downstream onto the disturbed substrate and colonise such areas.

Bankside Vegetation Management

- 7.16 Before works commence, a full baseline survey shall take place on both the Park and grazing marsh area to determine the population at that time. Surveys shall be carried out before and after the breeding season, in March/April and September, to identify minimum and maximum populations and territories. Monitoring of sample areas shall determine rates of colonisation of new and improved habitat. Mink and brown rat shall also be monitored.
- 7.17 Baseline surveys shall be repeated once the new habitat has matured and again 3 – 5 years later. Mink and brown rat shall also be monitored.

- 7.18 Bankside vegetation management in receptor sites shall be undertaken specifically to ensure the continued availability of suitable habitat for water voles. To avoid the water vole breeding season, bankside vegetation management shall occur in the autumn (September – October). This shall also facilitate the emergence of a rich grass sward prior to the winter months.
- 7.19 Management shall aim to maintain marginal vegetation and a 2 metre strip at the top of the bank, in order that cover and food resources are maintained.

Mink Control Measures

- 7.20 Measures to control American mink shall be implemented at all receptor sites in line with good practice, until such time as the EAG consider it no longer necessary.
- 7.21 Mink control shall be in line with best practice guidelines; Game Conservancy Trust mink rafts shall be employed in order to facilitate this action. Where necessary trapping of mink shall occur year round. However, it is anticipated that efforts shall be concentrated in early spring (February – April) prior to the mink breeding season when mink are known to particularly target over wintering water voles. Any such programme of control shall be included as part of the management strategy for the receptor site concerned.

Translocation Methodology

- 7.22 Should there be a need for further translocation of water voles, soft-release shall be used to introduce translocated voles into the receptor sites. Prior to the introduction of voles, release pens shall be constructed in the receptor site. The pens shall be 1m x 1m with the fencing dug into the ground to a depth of 250mm.
- 7.23 Each pen shall house one water vole (although family groups shall be released together), and individuals of the same sex shall be separated by at least 40 metres. Thus two pens shall be placed every 50 metres, one with a male and the other a female/family group (ref: Strachan R. and Moorhouse, T. (2006) Water Vole Conservation Handbook (second edition) Wildlife Conservation Research Unit, Oxford). Each pen shall be provided with fresh bails of hay for burrowing.
- 7.24 Water voles shall only be released into receptor sites once conditions are considered optimal. Water voles shall not be released before the beginning of April, in order that sufficient vegetative growth has occurred, and no later than mid June in order to allow a sufficient population growth to cope with any over wintering mortality (ref: (ref: Strachan R. and Moorhouse, T. (2006) Water Vole Conservation Handbook (second edition) Wildlife Conservation Research Unit, Oxford).
- 7.25 Water voles shall be monitored within the pens, and shall be supplied with fresh food daily for 4 months. Monitoring shall include searching for evidence of voles leaving the pens, and new burrows and latrine sites on the receptor site. Once the appearance of the first burrow or latrine is detected (beyond the pens) then feeding shall be reduced and one side of the pen shall be left open.
- 7.26 Pens shall be removed once the water voles are noted to be self-sufficient. Monitoring of the population shall occur for at least two years after the translocation.

Chapter 8: Brown Hare

- 8.1 This chapter sets out the management, monitoring and surveillance measures for Brown Hares.

Habitat creation and management

- 8.2 No habitat has been specifically provided for brown hares. However, habitat created for other protected species, especially tall grassland shall benefit brown hares. Arable and grazing marsh management undertaken for other species shall also improve habitat provision for brown hares.
- 8.3 The grassland habitat creation areas at Northern Triangle East, Northern Triangle West, Northern Landscape Receptor Site, Site A habitat enhancement area and Great Garlands Farm Elbow Receptor Site and habitat enhancement area provide suitable brown hare habitat. The grassland shall be managed, maintained and monitored in accordance with measures set out in Appendix 3. In total an area of 67.5ha of coarse grassland habitat suitable for hares will be created.
- 8.4 The area of Great Garlands Farm is already under an Environmentally Sensitive Area scheme, and LGPDL shall encourage the tenant farmer (Dr Froot) to continue this and implement measures to encourage brown hares where possible.

Surveillance and Monitoring

- 8.5 Sightings of Brown Hare shall be recorded and mapped during other protected species survey visits that shall take place during the operational phase of the development in order that breeding numbers and preferred areas can be determined.

Chapter 9: Reptiles

9.1 The mitigation, management, monitoring and surveillance measures set out in this chapter are relevant to the following reptiles that are protected under the Wildlife and Countryside Act 1981 (as amended):

- Common lizard;
- Slow worm;
- Adder;
- Grass snake.

Habitat creation and management

Park

- 9.2 Habitat corridors shall be provided throughout all areas of the development. At least 6km of boundary ditch and habitat corridors including a linear strip of between 2 - 3 metres of tall grassland shall be provided along all bank sides. The cutting of which shall take place annually in late autumn, to no shorter than 100mm. These corridors shall also provide suitable habitat for reptiles which may re-colonise the site following completion of the development.
- 9.3 No deadwood shall be removed from the site rather it shall be transferred to rot down in refuge areas.
- 9.4 Refugia suitable for basking shall be provided in all refuge areas and vegetation shall be cleared back from them annually.
- 9.5 Reptile habitat creation shall be incorporated into parts of the drainage swale network, providing new hibernation sites in areas distant from the railway. Rough grassland provided for water voles and scrub for breeding birds shall also provide good reptile habitat.
- 9.6 The management measures set out in Appendix 3 for on-site habitat corridors shall also be implemented for the benefit of reptiles.

Off-site receptor sites

- 9.7 Specific reptile habitat shall be created in a 10m buffer strip on the perimeter of the Park (Northern Landscape Receptor Site). The receptor area has been fenced off to prevent reptiles re-entering the development site.
- 9.8 Other receptor sites, also primarily established as mitigation areas for great crested newts, include: Great Garlands Farm Elbow Receptor Site, Northern Triangle East Receptor Site and Northern Triangle West Receptor Site.
- 9.9 The Northern Triangle East, Northern Triangle West, Northern Landscape receptor sites shall be managed in accordance with the measures set out in Appendix 3.

Protection Measures

Installation of Reptile Exclusion Fencing around the Exclusion Zones

- 9.10 The exclusion fence which forms the perimeter of the Park shall be maintained to prevent reptiles re-colonising the Park until earthworks and landscaping are complete. The exclusion fencing shall then be removed.
- 9.11 Removal of the exclusion fencing shall be done under the supervision of an ecologist and outside the reptile hibernation period, i.e. between the months of April to September inclusive. An ecologist shall also be present during site clearance in case any reptiles are found.

Surveillance and Monitoring

- 9.12 Translocated reptiles shall be monitored at the receptor sites annually for a period of at least five years following the completion of translocation to each receptor site (following HGBI 1998 best practice guidelines) and shall continue three to five years after completion of the construction phase. The monitoring shall comprise the use of refugia and shall aim to determine evidence of breeding success, population recruitment, overwinter survival and shall measure increase or decrease in relative abundance.

Chapter 10: Scarce Plants

10.1 This chapter sets out mitigation, management, monitoring and surveillance measures for nationally scarce plants:

- Divided sedge (*Carex divisa*);
- Dittander (*Lepidium latifolium*);
- Stiff saltmarsh-grass (*Puccinellia rupestris*);
- Broad-leaved spurge (*Euphorbia platyphyllos*);
- Annual beard-grass (*Polypogon monspeliensis*).

Protection Measures

Park

10.2 Habitat corridors shall be created across the Park that shall allow movement of great crested newts and other wildlife through the site. The inclusion of habitat suitable for breeding and foraging great crested newts within these corridors shall provide the opportunity for planting of divided sedge grown in the plant nursery, at suitable locations next to ditches and water bodies. In conjunction with the creation of the habitat corridors, approximately 200 divided sedge shall be planted out in suitable habitat, in clumps of 20-30 plants across the site. The habitat corridors shall also be subject to management plans to be agreed with the EAG that consider Locally Important plants.

Northern Triangle West

10.3 Wader scrapes shall be incorporated into Northern Triangle West, which shall offer additional habitat for the divided sedge and dittander.

Surveillance and Monitoring

10.4 In 2011, scarce plants (including divided sedge, dittander, stiff saltmarsh-grass and annual beard-grass) were translocated from the London Gateway site to the following off-site receptor sites:

- Northern Triangle East Receptor Area;
- Northern Triangle West Receptor Site;
- Northern Landscape Receptor Site;
- Stanford Wharf Nature Reserve.

10.5 The following measures shall be undertaken:

- Translocated plants shall be monitored at the receptor sites for a period of two years following each translocation. If the survival rate of translocated plants of each species is less than 50% at each of the receptor sites, the reason for the poor survival rate shall be investigated and if appropriate further translocations shall be conducted where possible from remaining populations within the Park and the scarce plant nursery.

- Monitoring of the off-site receptor sites shall be carried out at an interval of 3 and 5 years following completion of the development to assess the long-term success of the translocation programme. This shall also include marking out and control of invasive species. The translocations and monitoring shall be documented in a report that shall be made available to the County Biological Recorder following completion.

Appendix 1:
RSPB Information and Advice Note, 2003

Information and advice note

Version 1 –
June 2003

Compiled by: J. Day, R. Sheldon, N. Symes, G. White, R. Winspear
For further information, contact Graham White at RSPB
On: 01767 680551, or by e-mail at graham.white@rspb.org.uk



Creating wader scrapes and flashes on farmland.

Summary

Several species of wading bird of conservation concern use farmland on which to breed. They may nest in spring crops and tillage on arable land, in wet grassland or in-bye pasture. However, drainage and improvement of grassland to provide better grazing and forage has greatly reduced suitable areas for feeding and nesting. An opportunity to offset some of the declines in breeding waders on farmland is possible through the creation of scrapes and wet flashes with sparse marginal vegetation. These can provide important feeding areas for adult and young birds alike, and can help a range of other important species of bird throughout the year. Table 1 lists the birds likely to benefit by the creation of scrapes and flashes.

Table 1: Birds of conservation concern likely to benefit from the creation of a scrape.

Species	BoCC status	Requirements for nesting	Requirements for feeding
Curlew	Amber	Tussocky damp grassland or heathland.	Pastures, damp fields, particularly with wet flushes
Lapwing	Amber	Short grass (0- 12cm) with some tussocks, spring tillage or bare ground	Short vegetation and wet mud in damp grassland and water margins,
Redshank	Amber	Short (5-15 cm) damp grassland with tussocks, close to standing water.	Damp grassland, marginal vegetation, mud and shallow water.
Snipe	Amber	Wet pastures and boggy heaths with a tussocky sward of 10-30 cm.	Soft damp ground, or shallow muddy bottomed pools. Close to cover.
Oystercatcher	Amber	Short grassland, bare ground or shingle banks, all with open views.	Short grassland, and marginal vegetation with soft damp ground to probe for food.
Ringed Plover	Amber	Bare stony ground including spring tillage	Soft damp mud or dry muddy areas.
Teal	Amber	Tussocky marsh vegetation near shallow water.	Aquatic invertebrates and weed seeds.
Shoveler	Amber	Tussocky marsh vegetation near shallow water.	Aquatic invertebrates and weed seeds
Water Rail	Amber	Tall dense clumps of marsh vegetation in shallow standing water.	Invertebrates
Turtle Dove	Red	Dense scrub and thick tall hedges often in climbers.	Weed seeds especially around short sparse vegetation.
Yellow Wagtail	Amber	Damp meadows or cereal fields	Insects from grazed pasture and short, sparse marginal vegetation around pools.
Song Thrush	Red	Trees, hedges or scrub.	Invertebrates, especially earthworms and snails, and, in autumn, fruit.
Starling	Red	Trees, buildings or nest boxes	Insects and seeds from grazed pasture and short, sparse marginal vegetation around pools.
House Sparrow	Red	Buildings or nest boxes, hedges or scrub	Insects and weed seeds.
Tree Sparrow	Red	Trees, buildings or nest boxes	Insects and weed seeds.
Linnet	Red	Thick thorny hedges. Also, scrub and brambles on grassland and waste ground.	Insects and weed seeds.
Yellowhammer	Red	Thickets and tall thick grass.	Insects and weed seeds.
Reed Bunting	Red	Ditch edges, crops and set-aside. Occasionally in hedges.	Insects and weed seeds.
Corn Bunting	Red	Crops, set-aside and field margins.	Insects and weed seeds.

BoCC= Birds of Conservation Concern: 2002-2007 (RSPB) Red = high concern, Amber = medium concern

The Countryside Stewardship Scheme, operated in England by DEFRA, provides payments to farmers to improve and extend wildlife habitats, including scrapes. This Information and advice note provides guidance on how to create and manage shallow scrapes and wet flashes for wetland birds on farmland. The landscape feature likely to be most appropriate to scrapes within the Countryside Stewardship Scheme is waterside land. Where there are no conflicts with other priorities, scrapes could also be considered for arable land, low lying coastal land, degraded old meadows and pasture, and for upland.

Assessing the habitat

Scrape creation should only be attempted in suitable areas. These are often in low-lying poorly drained areas of fields, where as a result, crop yield and productivity is low. It is important to consider all the issues before proceeding, and where necessary, specialist advice should be sought. Table 2 identifies the key issues needed to be assessed.

Table 2 Key issues to be considered in scrape creation

Issue	Rationale	Points to consider
Geographic location	Breeding waders have been lost from large areas of the country. Newly created habitat may be only slowly colonised by target species.	<ul style="list-style-type: none"> • Target species should ideally be present in the locality to enable colonisation.
Site suitability	Waders generally require unenclosed habitats with an open and tussocky vegetation structure.	<ul style="list-style-type: none"> • The site should be unenclosed, being relatively free of hedgerows, trees and other screening. • Is the site accessible for grazing or cutting management required to maintain the habitat structure.
Hydrology and soils	Adult waders and their chicks feed in damp soil and shallow water with muddy margins	<ul style="list-style-type: none"> • Can shallow water be maintained throughout the spring and early summer? (water control structures will be needed to manage water levels in some cases). • Are the soils suitable? Free draining soils are generally unsuitable unless the water table is close to the surface. • Have the water flows entering or leaving the area been identified and quantified. • Consult with appropriate authorities to ensure there is no conflict when altering drainage.
Potential conflict with other features:	A scrape should NOT be created in areas where there is a conflict of interest, for instance where there is: <ul style="list-style-type: none"> • Environmental • Historic and archaeological, or • Cultural landscape interest. 	<ul style="list-style-type: none"> • Does the land have existing conservation value; eg a wet marsh or species rich flower meadow? • Is the land a Scheduled Ancient Monument, other archaeological site, or ridge and furrow field system? • Are there existing public rights of way?

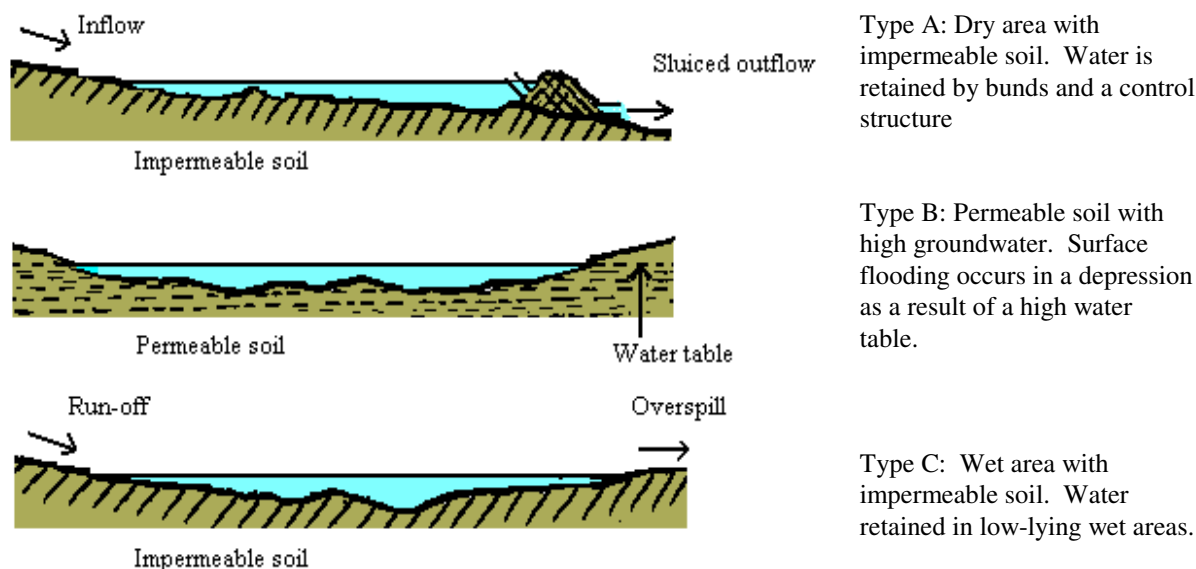
Creating the scrape

Scrapes may be located in a range of soil and hydrological conditions (see Figure 1) but most frequently will be on relatively level open land, preferably seeking a known damp area where water lies naturally on impermeable soils. Creating a scrape is often simply a case of reversing or reducing the function of drainage in a particular area, in others water may be directed to a chosen location. Assess the soils and drainage patterns for the site and if necessary, block any drains that take water away from the scrape area or redirect others to drain into it. Consider any likely impacts created up-stream by blocking or diverting drainage and consult with the necessary statutory agency (eg The Environment Agency in England and Wales) for further advice. In potentially difficult situations, it may be necessary to assess rainfall against evapo-transpiration and volumes of water flow throughout the critical spring period, using local climate data from the Meteorological Office. Expert assistance may be required at this stage.

- There is no minimum size of scrape but 1 hectare will provide an adequate amount of feeding habitat.
- Several small flashes could be created instead of one larger one, and will provide more marginal habitat, but may also require more maintenance.
- Sculpting a convoluted, or sinuous, edge to the scrape will increase available feeding area and is likely to provide shelter in windy weather.
- Water depths in the scrape in early spring should typically be between 0–25 cm over half of the area and the remainder 25–50 cm.
- Ideally locate in a natural depression; otherwise, earthmoving, undertaken during a dry period, may be required to achieve the correct depth.
- A very gentle slope with an uneven finish will allow shallow wet pools to remain longer within the scrape and allow a gradual exposure of the feeding surface.

Any spoil material that is the by-product of excavating the scrape should ideally be removed away from the area. Alternatively, the spoil could be used to construct a bund around the downstream edge of the scrape. Note that this may limit the openness of the scrape and reduce its attractiveness to birds. Bunds need to be carefully engineered so that they are stable and impervious. It is very important to consult with the appropriate authorities to ensure that designs are appropriate and storage capacities are not exceeded, as there are serious safety considerations¹.

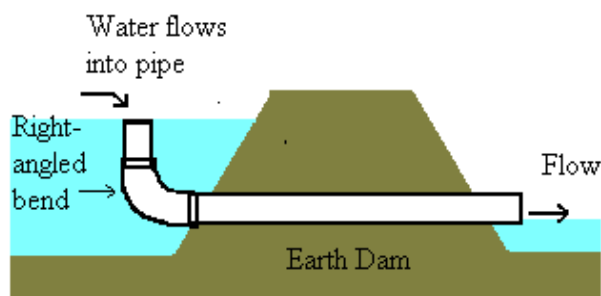
Figure 1 Types of scrape



Managing water levels

The provision of shallow water and muddy margins are important to feeding waders, and ideally, the water levels in a scrape should be controllable. Without the ability to control the inflow or outflow of water, the scrape may dry out too soon in early dry weather, while a wet spring may result in levels remaining too high. A simple water control device, or sluice, can be installed to help manage levels.

Figure 2: Diagram of a pipe sluice.



The most cost effective sluice is likely to be constructed with a length of plastic piping, either rigid pipe with a swivel end or flexipipe, laid through an earth dam in the outflow ditch or bund (Figure 2). Each end extends beyond the dam, and the upstream end is held at the desired level. Flexipipe will normally need weighting to keep the lip submerged and require a length of rope to hold the upstream end at the desired level. Adjusting the upstream end (by swivelling the pipe or raising or lowering the rope) will set the desired water levels.

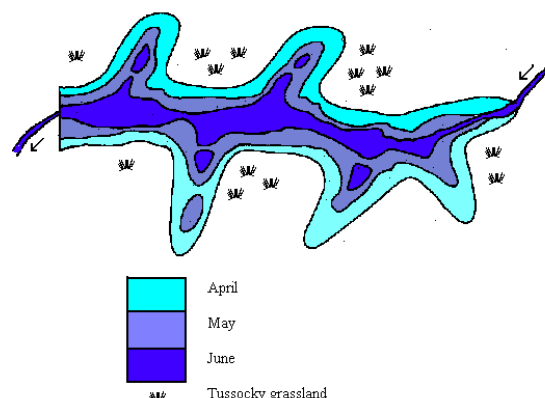
Other options are available, for example: drop-board sluices. These are more costly in time and resource to install. Details of these can be found in Reedbed Management for commercial and wildlife interests (see further reading).

¹ Note: Impounding volumes of water in excess of 25,000m³ above ground falls under 1975 Reservoir Safety Provisions Act. Design and construction under control of DEFRA Panel Engineer and inspected annually. (A bunded scrape with an average depth of 25cm would need to be bigger than 10 ha to exceed this)

The scrape should naturally reduce in depth slowly during the spring through evaporation. Alternatively, depending on weather, let water out of the scrape slowly (1cm depth at a time) to create a muddy fringe. If the sluice is not connected to an existing watercourse, a soak away will need to be created behind the dam to take the water drawn off through the sluice.

In Figure 3 the outer line represents the extent of the open water in early April, ideally surrounded by short grassland with up to 20% tussocky grassland. The middle line represents the shrinking area of water by the end of May and the inner by the end of June. Annual weeds will have grown on the mud and set seed. By August the scrape should be all but dry and ready for management.

Figure 3: Hypothetical scrape, showing receding area of water throughout spring and early summer.



Feeding requirements

Waders and their chicks require a constant supply of high protein invertebrate food throughout the breeding season. A rich supply of insects will also help other birds such as Reed Bunting and Yellow Wagtail, which rely heavily on insect food for their chicks. The conditions created by the periodic flooding and drying of ephemeral water bodies attract a limited but specialised range of invertebrates. These often occur in very high numbers because of reduced competition and few predators. The water body is often nutrient rich because of the levels of organic matter, which encourages high rates of invertebrate reproduction, particularly of midge larvae, which are a valuable food source for waders and their chicks.

As the water levels in the scrape are lowered, or dry naturally, annual plants will germinate on the margins; these provide additional food and cover for chicks. The seeds they produce will accumulate around the edges of the pool and will provide winter food for waterfowl as well as a variety of finches and buntings that come to the shallow margins to drink and bathe.

Maintenance

It will be necessary to manage colonising plants, such as rushes or grasses, to prevent them from choking the whole area. Patchy cover of marginal plants will provide cover for young chicks, but if this exceeds more than 25% of the scrape, then management should be considered. Grazing with livestock at a moderate intensity is ideal as it a) creates a mosaic of tussocks and short turf used for nesting by a range of wader species, b) augments the invertebrate population of the margin through dunging. If grazing is not possible, cutting or cultivation could be used. Cutting should be timed for suitably dry periods after the end of the breeding season, usually between August and October. It is not necessary to remove the cuttings, as they will initially provide a source of seed food and later, as it decomposes, a source of insect food for birds.

Following summer/autumn management, re-flooding in winter will kill colonising perennial vegetation such as grass. Annual weeds, which germinate each year on the muddy margins as the water retreats, are important as they provide a large supply of seeds for dabbling duck as well as number of passerines such as Yellowhammer, Reed Bunting and Linnet.

Further reading²

- Andrews, J & Rebane, M, (1994), *Farming and Wildlife, a practical management handbook*, RSPB.
- Benstead, P, Drake, M, Jose, P, Mountford, O, Newbold, C, Treweek, J, (1997) *The Wet Grassland Guide, Managing floodplains and coastal wet grasslands for wildlife*. RSPB
- Gregory, RD, Wilkinson, NI, Noble, DG, Robinson, JA, Brown, AF, Hughes, J, Procter, DA, Gibbons, DW, Galbraith, CA (2002), *The Population Status of Birds in the United Kingdom, Channel Islands and Isle of Man: an analysis of conservation concern: 2002-2007*, RSPB
- Gilbert, O.L., Anderson, P., (1998) *Habitat Creation and Repair*, Oxford University Press
- Giles, N., (1992), *Wildlife After Gravel*, ARC/Game Conservancy Trust
- Green, A.J., Hilton, G.M., (1998), *Management Procedures Required to Increase Chironomid Availability to Waders Feeding on Artificial Lagoons Remains Unclear*. *Journal of Applied Ecology*, vol 35 (1) pp9-12
- Hawke, C.J., Jose, P.V., (1996) *Reedbed Management for commercial and wildlife interests*, RSPB
- Murkin, H.R., & Wrubleski, D.A., (1988) *Aquatic Invertebrates of Freshwater Wetlands: Function and Ecology*, in Hook, D (1988) *The Ecology and Management of Wetlands*, vol 1 *Wetland Conservation*, pp 239-249, Croom Helm Ltd.
- Street, M., (1985) *The Restoration of Gravel Pits for Wildlife*, ARC/Game Conservancy Trust

² A complimentary set of Information and Advice Notes on the Ecology and Conservation for tree sparrow, yellowhammer, corn bunting, turtle dove, linnet, lapwing and yellow wagtail, all listed in Table 1, can be obtained from RSPB Conservation Management Advice. There are also available, leaflets for lowland and upland farmland habitats and species. Contact: richard.winspear@rspb.org.uk or telephone: 01767 680551

Case study sites

Old Hall Marshes, RSPB reserve

Old Hall Marshes nature reserve was acquired by the RSPB in 1984 and is run as a working farm as well as a nature reserve composed of several habitat types, including 70ha of improved grassland. The primary management of the reserve is as a traditional grazing marsh, providing sheep and cattle grazing to a number of local graziers.

The current 'improved' grassland is primarily managed for wintering Brent Geese by tightly grazing with sheep and cattle. A low-lying 'creek' feature, a remnant of the old saltmarsh grassland, retained water throughout the winter months but quickly dried out in the spring, minimising any benefit for breeding waders. By controlling water levels, this feature has been enhanced and maintained as a shallow scrape throughout the spring to provide feeding opportunities for breeding waders.

A windpump was installed in 2000 to lift water 2.0 m from the adjacent ditch and circulate through the scrape. Installation costs amounted to £9,000, while ongoing maintenance costs are negligible. Water can be let out of the scrape through a simple sluice mechanism of a 300 mm plastic pipe with a 90 degree 'turner' joint on the upward end. This enable precise water level control on the scrape by turning the joint to the required angle.

Breeding waders have increased from one or two pairs to 15 pairs of Lapwing and eight pairs of Redshank in 2002.



The wader scrape at high winter level, showing shallow pools and long shorelines

Contact: paul.charlton@rspb.org.uk

Newsham Hall Farm, North Yorkshire

This 330 ha farm supports a diverse range of lowland farmland habitats, including a newly created 31ha wetland complex of open water, fen and grassland.

After discussions with relevant agencies, the landowner was able to reinstate the wetland with a Countryside Stewardship grant to support the capital and revenue costs (£280 per ha for arable reversion to grassland and an annual re-wetting payment of £60 per ha for raised water levels)

Restoration was relatively simple, with the existing drainage infrastructure (an Archimedes Screw sub-soil system) switched off. This allowed ground water to rise, creating an area of shallow water (0.2 – 0.5m deep), surrounded by newly established wet grassland and hay meadows.

This attracts several hundred wintering waders (eg lapwing and golden plover), wildfowl and passage birds. Once the water management and new grasslands are established, breeding wader densities are expected to be high. Breeding reed buntings, sedge warblers and snipe have quickly colonised the wetland fringes.

Water level control – in the first year, water levels remained very high all year, with no lowering of levels during the breeding season to create good wader habitat. A newly installed flexi pipe system on the main ditch should now give the appropriate level of water level control

Grazing management – During the first year, there was no grazing in the wetland compartments. Agreements are now in place to deliver low-intensity cattle grazing year round, possibly using native hardy cattle breeds.

Condition monitoring –regular site visits from DEFRA and bird monitoring from a local volunteer should ensure site management continues to evolve to maximise the site’s biodiversity delivery.

Another CSS agreement is now in place, to convert an adjacent 40ha of arable land, into fenland and wet grassland. A bird hide overlooking the existing wet grassland area is proposed and the farm may be used as a demonstration farm in the future.

Contact: nick.mason@rspb.org.uk

Great Bridgeford Hall Farm, Staffordshire.

Under the Countryside Stewardship Scheme, 10ha of floodplain grassland along the River Sow is being managed as extensively grazed damp pasture. Through the RSPB Waders of Wet Meadows project, CSS has been actively promoted and targeted at floodplain sites in Staffordshire, Shropshire and Cheshire. Great Bridgeford Hall Farm came under CS management because of this project.

To introduce in-field wet features and raised water levels, sub surface drains on the site have been exposed, creating shallow, well-profiled, linear scrapes/ditches.

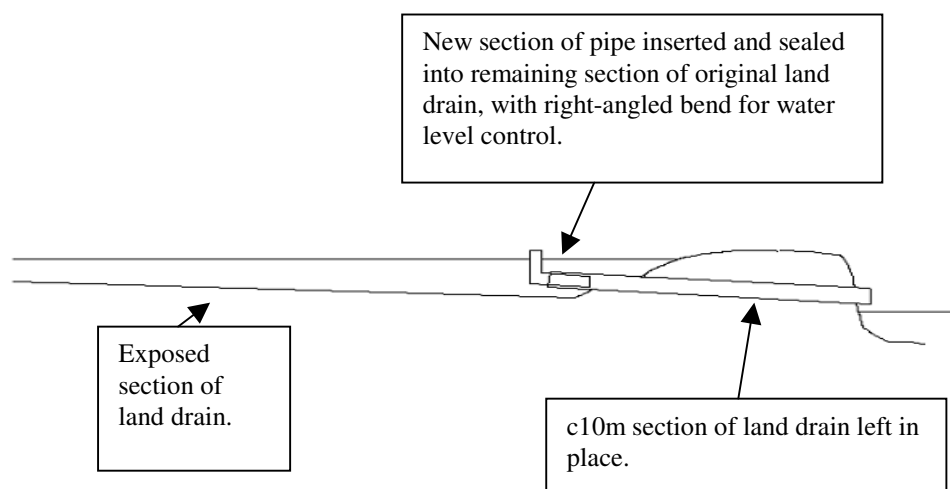
The final 10m of the drain, before they enter the River Sow, have been left intact. Where the remaining length of drain enters the exposed section, a right-angled-bend section of pipe has been inserted and sealed with the remaining land drain, to provide a system of control on water levels held in the exposed sections.

All exposed sections have been kept as shallow as possible, with gentle profiles. The result has been a network of linear, shallow scrapes/ditches across the site, providing plenty of shallow, muddy, margins. The right-angled bend arrangement provides water level control.

As well as creating the in-field wet features, the system has also resulted in raised water levels and some splash flooding across the field surface, away from the scrapes/ditches themselves.

Elsewhere on the site, land drains have been left in place, but blocked using commercially available pipe test plugs.

Longitudinal cross section of new ditch/scrape arrangement.



Contact: andrew.gouldstone@rspb.org.uk

Appendix 2:
Essex Coast, Environmentally Sensitive
Areas Scheme Prescriptions

Environmentally Sensitive Areas

SCHEME PRESCRIPTIONS

ESSEX COAST ESA

NB. If you carry out any work contrary to the scheme's objectives, for example the destruction of features such as walls, buildings or hedges, or the ploughing of valuable grassland, shortly before applying to join or rejoin the scheme, the Department is likely to reject your application.

The Department may modify the prescriptions set out below, to introduce additional requirements or amend existing ones, where this will help to protect and/or enhance habitats and species which are of importance within the designated area. Such modifications may be made for the lifespan of the agreement or from time to time, by means of a written agreement with you which will form part of your ESA agreement for the term specified.

TIER 1 – PERMANENT GRASSLAND

1. Maintain permanent grassland. Do not plough, level or reseed. Cultivate only with a chain harrow or a roller.
2. Graze with cattle, sheep or horses or cut the grass and remove the cuttings. Where the grassland is grazed, avoid poaching, overgrazing or undergrazing. Wilt and turn any grass cut for silage before removal.
3. Do not increase your existing application rates of inorganic fertiliser and do not apply more than 90 kg nitrogen per hectare in any one application.
4. Do not increase your existing application rates of organic fertiliser and, in any event, do not apply more than 30 tonnes per hectare per year. Do not apply slurry, pig or poultry manure or sewage sludge.
5. Do not apply organic fertiliser within 50 metres of a spring, well or borehole that supplies water for human consumption or within 10 metres of any watercourse.
6. Do not apply lime, slag or any other substance designed to reduce soil acidity.
7. Do not apply fungicides or insecticides.
8. Control infestations of stinging nettles, spear thistle, creeping or field thistle, curled dock, broadleaved dock or ragwort.
9. Do not apply herbicides except to control the weeds named above.
10. Apply herbicides only by means of a wick applicator or by spot treatment.
11. Do not install any new land drainage system or modify any existing land drainage system so as to bring about improved drainage.
12. Maintain ditches and dykes for which you are responsible (including margins and banks) in rotation and carry out any necessary management by mechanical means, not pesticides. Spread spoil thinly away from the ditch edge.
13. Agree in writing with the Project Officer measures to exploit any opportunities for retaining water in ditches and low areas.
14. Do not infill existing natural depressions or low areas.
15. Retain and manage hedges. Retain and, where necessary, manage individual and small groups of trees.
16. Obtain written advice on the management of woodland and scrub and on any proposals to plant new woodland.
17. Do not apply pesticides or fertiliser on land within 1 metre of any hedge.
18. Retain and where necessary manage ponds and reedbeds.
19. Obtain the Department's prior written approval if you wish to construct any new ponds.
20. Dispose of sheep dip safely. Do not spread sheep dip where it may affect areas of nature conservation value.
21. Do not damage, destroy or remove any feature of archaeological or historic value or interest.
22. At the start of your agreement obtain written advice on the management of known archaeological and historic features on your land. Where standard advice on agricultural management is provided this should be implemented within 12 months. Where more specific advice is required this should be obtained within the first 12 months, and appropriate advice implemented within two years of the start of your agreement.
23. Obtain written advice on siting, design and materials before constructing buildings or roads or carrying out any other engineering or construction works that do not require planning permission or prior notification determination by the Local Planning Authority.

24. You must abide by the Codes of Good Agricultural Practice for the Protection of Soil, Air and Water, published by the Department (references PB 0617, PB 0618 and PB 0585) as amended from time to time.

GRAZING MARSH SUPPLEMENT (available on Tiers 1 and 3)

Observe prescriptions for either Tier 1 (1-24) or Tier 3 (50-54), and Tier 2A (34-35) plus prescriptions set out below:

25. Agree in writing with the Project Officer a programme of measures to maximise water retention on site in ditches and low areas.
26. During the period 1 April to 15 May do not exceed a stocking level of 0.75 LU per hectare. Alternatively agree a Marsh Management Plan (MMP) which will specify areas and periods where stocking rates will apply, water management requirements, restrictions on fertiliser use and cultivation and other management to enhance the overall environmental benefit.
27. Do not top or cut for hay or silage before 1 July, unless as part of a MMP, and graze the re-growth.
28. Do not increase your existing application rates of inorganic nitrogen fertiliser and in any event, do not exceed an application of 50 kg nitrogen per hectare per year unless some variation is agreed within the overall total as part of an MMP or in conjunction with a Wildfowl Pasture Supplement.

WILDFOWL PASTURE SUPPLEMENT (available on Tiers 1, 2A and 3)

Observe prescriptions for either Tiers 1 (1-24), 2A (33-42) or 3 (50-54), plus prescriptions set out below:

29. Maximise water levels on site through a plan agreed in writing with the Project Officer.
30. By grazing with livestock or cutting produce a short lush sward with a maximum height of 8 cm in early October. A proportion of the area should be cut or grazed to 5-6 cm. If you choose to cut, at least three cuts are recommended between July and October and the cuttings must be removed or be short enough to avoid forming a mulch on the surface.
31. Apply 50 kg/ha nitrogen in September each year. Do not apply any fertiliser within 10 metres of field boundaries.
32. Allow wildfowl to graze undisturbed.

TIER 2A WET GRASSLAND

Observe prescriptions 1-24 (Tier 1) plus additional prescriptions set out below:

33. Agree in writing with the Project Officer a programme to:

EITHER

maintain water levels in ditches and dykes at not less than 45 cm (18 in) below mean field level during the period 1 March to 30 April and for as long as possible thereafter before allowing natural drawdown to occur;

OR

maximise water retention and create areas of surface water in dykes, ditches, creeks and low areas during the period 1 March to 30 April and for as long as possible thereafter before allowing natural drawdown to occur;

AND

retain as much water as possible in ditches and dykes during the period 1 September to 31 December. Water levels should begin to be raised by 1 January to meet the higher levels required on 1 March.

34. Do not carry out any mechanical operations on the land during the period 1 April to 30 June.
35. Graze with cattle or sheep or both and avoid poaching, overgrazing or undergrazing. Horses may also be grazed but only in association with cattle or sheep or both.
36. During the period 1 April to 15 May do not exceed a stocking level of 0.75 Livestock Units (LU) per hectare.
37. Do not top the grass or cut it for hay or silage before 1 July.
38. Restrict supplementary feeding of livestock to areas agreed in advance with the Project Officer.
39. Do not increase your existing application rates of inorganic fertiliser and, in any event, do not exceed 50 kg nitrogen per hectare per year.
40. Do not increase your existing application rates of FYM and, in any event, do not apply more than 12.5 tonnes per hectare per year.
41. Do not apply FYM during the period 1 April to 30 June and, outside this period, apply it only in a single dressing.
42. Within two years of the start of the agreement, agree with the Project Officer a programme for the management of ditches and dykes for which you are responsible.

TIER 2B MARSHLAND

Observe prescriptions 1-24 (Tier 1) plus additional prescriptions set out below:

43. Do not carry out any mechanical operations on the land during the period 1 January to 15 July.
44. Graze with cattle or sheep or both and avoid poaching, overgrazing or undergrazing. Remove all cattle during the period 1 November to 15 May.
45. Do not top the grass or cut it for hay or silage before 16 July.
46. Restrict supplementary feeding of livestock to areas agreed in advance with the Project Officer.
47. Do not apply any organic or inorganic fertiliser.
48. Within two years of the start of your agreement, agree with the Project Officer a programme for the management of ditches and dykes for which you are responsible.

Appendix 2 – Essex Coast, Environmentally Sensitive Areas Scheme Prescriptions

49. Agree in writing with the Project Officer a programme to:

EITHER

maintain water levels in ditches and dykes at not more than 45 cm (18") below mean field level throughout the year. In addition, create conditions of field wetness and surface splashing during the period 1 January to 30 April;

OR

maintain areas of surface wetness and high ditch water levels throughout the year. In addition create areas of surface water over the field in low areas, creeks and foot drains and maximise water in dykes and ditches during the period 1 January to 30 April before allowing natural drawdown to occur.

TIER 3 REVERSION OF ARABLE TO PERMANENT GRASSLAND

50. Cease arable production from the start of your agreement. Within 12 months of the start of your agreement establish a permanent grass sward. Agree in writing with the Project Officer before purchase the seed mix to be used. Seed of native origin and local provenance should be used wherever the Department considers it appropriate.

51. During the first 12 months of the agreement do not apply any of the following without the Department's prior written approval:

organic or inorganic fertiliser;

lime, slag or any substances designed to reduce soil acidity;

fungicides, insecticides or herbicides.

52. From the start of your agreement observe Tier 1 prescriptions (2 and 11-24).

53. After the first 12 months observe all the remaining Tier 1 prescriptions except that, in any one year, apply no more than 125 kg nitrogen of inorganic fertiliser per hectare per year. Organic fertiliser levels remain as in Tier 1.

54. On grassland reverted from arable do not exceed an annual average stocking level of 1.4 Livestock Units LU per hectare.

ACCESS TIER

55. Make the access route available for public access at no charge.

56. Maintain a free passage over the access route.

57. Do not erect new fences on or adjacent to the access route without the prior written approval of the Department.

58. Keep the access route and fields crossed by it free of litter and other refuse.

59. Exclude bulls from the access route and fields crossed by it, except for bulls which:

do not exceed the age of 10 months; or

are not of a recognised dairy breed and are at large in any field or enclosure in which cows and heifers are also at large.

60. Agree with the Department in writing in advance the Public Liability Insurance cover which you will maintain for the duration of the access agreement.

61. Provide and maintain adequate means of entry to the access route.

62. Affix and maintain appropriate signboards and waymarking.

63. Do not permit any of the following activities on the access route or on fields crossed by it: camping, caravanning, lighting of fires, organised games or sports, riding of motor vehicles (except those used for agricultural operations on the land) without the Department's prior written approval.

64. Agree with the Department in writing whether the riding of horses or cycles may be permitted on the access route.

65. If you wish to apply for temporary closure of the access route you must agree this with the Department in writing in advance. Where temporary closure is permitted you must post signs giving notice of the intended closure and the reasons for it at each entry point to the access route at least two weeks in advance of the date of closure.

Appendix 3:
London Gateway Great Crested Newt
Ecological Habitat Management and
Maintenance Plan (Amendment 012). Thomson
Ecology (September 2011)

Creation of favourable habitat features

- A3.1 Terrestrial and aquatic habitat enhancement for great crested newts at the receptor sites and habitat enhancement areas includes the creation of coarse grassland areas, scrub areas, dry ditch features, log piles, stone pile hibernacula and ponds. The extent (numbers and areas) of habitat creation works are shown in table A3.1.

Table A3.1: Extent of habitat creation works for great crested newts at London Gateway receptor sites and habitat enhancement areas

Receptor Site	Habitat	Approximate No. or Area
Great Garlands Farm Elbow Receptor Site (1.35ha)	Ponds	2 (0.05ha)
	Grassland	1.0ha
	Scrub	0.3ha
	Log Piles	8
	Artificial Hibernacula	8
Great Garlands Farm Elbow Habitat Enhancement Area (4.4ha)	Grassland	4.4ha
	Log Piles	4
Northern Triangle East GCN Receptor Site (27ha)	Ponds	24 (0.65ha)
	Grassland	20ha
	Dry Ditches	27
	Scrub	5.5ha
	Log Piles	24
	Artificial Hibernacula	24
Northern Triangle West GCN Receptor Site (~5ha)	Ponds	4 (0.1ha)
	Grassland	3.5ha
	Scrub	1.4ha
	Log Piles	8
	Artificial Hibernacula	8
Northern Landscape Receptor Site (30.5ha)	Ponds	22 (0.59ha)
	Grassland	23.71ha
	Scrub and Trees	6.2ha
	Log Piles	22
	Artificial Hibernacula	22
Stanford Wharf Nature Reserve Enhancement Area (10ha)	Ponds	2 (0.1ha)
	Grassland/Brownfield	9.9ha
	Woodland edge	500m
	Log Piles	2
	Hibernacula	2

Management and maintenance of aquatic and terrestrial Habitats

A3.2 The management and maintenance measures set out below shall be implemented in the off-site receptor sites and habitat enhancement areas where applicable according to table A3.1. Habitat management measures for the on-site habitat corridors shall be implemented.

Management and Maintenance of Aquatic Habitat

Management of water levels

A3.3 The measures set out in table A3.2 to control pond water levels shall be implemented.

Table A3.2: Management of water levels

Objective	Minimum summer water level for ponds shall not be below 50% of maximum planned depth.
Management	Ponds shall be topped up as necessary using mains water supply outlets currently available close to the ponds. Mains water is preferred since it is free from fish and fish eggs.
Monitoring	The water level in ponds shall be monitored annually in June.
Remedial Action	Top up water levels. Put liners into currently unlined ponds if necessary.

Removal of excess aquatic vegetation

A3.4 Aquatic vegetation shall not be removed from more than 60% of the pond area. The measures set out in tables A3.3a to manage aquatic vegetation for a variety of pond types and table A3.3b to manage aquatic vegetation within the on-site habitat corridor ditches shall be implemented.

Table A3.3a: Management of aquatic vegetation

Location	Habitat creation sites
Objective	10% to 50% open water
Management	Removal of excess vegetation shall take place annually in January to give 10% to 50% open water. Vegetation shall be search for newts, placed on the pond edge for 1-2 days and then removed from the vicinity of the pond.
Monitoring	The percentage cover of aquatic vegetation in ponds shall be recorded annually in June.
Remedial Action	If vegetation is excessive it shall be removed to give 35% to 60% open water. If vegetation is insufficient appropriate aquatic species shall be planted.

Table A3.3b: Management of aquatic vegetation

Location	On site habitat corridor ditches
Objective	10% to 25% open water
Management	Removal of excess vegetation shall take place annually in January to give 10% to 25% open water. Vegetation shall be searched for newts, placed on the pond edge for 1-2 days and then removed from the vicinity of the pond.
Monitoring	The percentage cover of aquatic vegetation in ponds shall be recorded annually in June.
Remedial Action	If vegetation is excessive it shall be removed to give 35% open water. If vegetation is insufficient appropriate aquatic species shall be planted.

Removal of excess marginal vegetation

- A3.5 The measures set out in table A3.4a to manage marginal vegetation for different pond types and the measures in table A3.4b to manage marginal vegetation within the on-site habitat corridor ditches shall be implemented.

Table A3.4a: Management of marginal vegetation

Location	Habitat creation sites
Objective	Unmanaged marginal vegetation over 25% to 50% of pond margin. Managed marginal vegetation over 50% to 75% of pond margin. No encroachment of marginal vegetation beyond 3 metres inward of plotted or original pond edge.
Management	Marginal vegetation shall be cut and removed annually in January for 55% to 75% of the pond margin. Planting of marginal vegetation shall take place if insufficient establishment has been achieved three years after construction.
Monitoring	Species diversity and percentage of encroachment shall be recorded through the receptor site management plan.
Remedial Action	Cutting and removal of marginal vegetation

Table A3.4b: Management of marginal vegetation

Location	On site habitat corridor ditches
Objective	Maintain marginal vegetation and a 2 metre strip at the top of the bank with optimal cover to benefit water voles and GCN.
Management	An annual cut and rake shall take place in September and October.
Monitoring	Monitor status of vegetation annually in June.
Remedial Action	Alteration of management regime.

Invasive Non-Native Plant Species

- A3.6 The measures set out in table A3.5 to manage invasive non-native plant species in all pond types at all habitat creation sites and within the on-site habitat corridor ditches shall be implemented.

Table A3.5: Management of invasive non-native plant species

Location	All Pond types at all habitat creation sites and on site habitat corridor ditches
Objective	Unmanaged marginal vegetation over 50% of pond margin. Managed marginal vegetation over 50% of pond margin. No encroachment of marginal vegetation beyond 3 metres inward of plotted or original pond edge.
Management	If detected, non-native plant species shall be removed from ponds as soon as possible. The main invasive species likely to be encountered are Australian swamp stonecrop (<i>Crassula helmsii</i>), parrot's feather (<i>Myriophyllum aquaticum</i>) and floating pennywort (<i>Hydrocotyle ranunculoides</i>). The removed vegetation shall be searched for newts, placed on pond/ditch edge for 1-2 days and then removed from the vicinity of the pond or ditch.
Monitoring	Monitoring shall take place annually in June for the presence of invasive non-native plant species.
Remedial Action	Immediate removal of non-native species.

Shading scrub

- A3.7 The measures set out in table A3.6 to manage shading scrub in all pond types at all habitat creation sites and within the on-site habitat corridor ditches shall be implemented.

Table A3.6: Management of shading scrub

Location	All Pond types at all habitat creation sites and on site habitat corridor ditches.
Objective	0% to 25% scrub shade
Management	Removal of scrub around pond/ditch margins to 25% or less in January each year shall take place.
Monitoring	The amount of shading scrub in ponds shall be monitored annually in June.
Remedial Action	Scrub shall be removed if shading is more than 25% of the pond/ditch margin.

Removal of Fish

- A3.8 The measures set out in table A3.7 to manage fish in all pond types at all habitat creation sites shall be implemented.

Table A3.7: Management of fish

Location	All Pond types at all habitat creation sites
Objective	Absence of fish
Management	Ponds shall be checked for the continued hydrological isolation of water bodies and for potential sources of fish colonisation.
Monitoring	Monitoring for the presence of fish shall be carried out annually in June. Monitoring shall be carried out by visual search of the shallow pond margins and by netting.
Remedial Action	If fish are found to be present then action shall be take to remove them. Temporary draining and drying of ponds during winter months. Subject to approval by the EAG, it is proposed that pond draining and drying shall only be carried out if the presence of fish has been confirmed.

Accumulation of silt

- A3.9 The measures set out in table A3.8 to manage silt in all pond types at all habitat creation sites and within the on-site habitat corridor ditches shall be implemented.

Table A3.8: Silt Management

Location	All Pond types at all habitat creation sites and on site habitat corridor ditches.
Objective	Sediment layer no greater than 0.5 metres above original pond/ditch base.
Management	Vegetation (including roots) shall be removed from ponds as described in Table 3a-3d or the remedial actions shall be reverted to.
Monitoring	Ponds shall be annually monitored in June.
Remedial Action	Excavation of the existing pond/ditch or the creation of a new neighbouring pond if possible

Control of pollution

- A3.10 The measures set out in table A3.9 to manage pollution in all pond types at all habitat creation sites and within the on-site habitat corridor ditches shall be implemented.

Table A3.9: Pollution Management

Location	All Pond types at all habitat creation sites and on site habitat corridor ditches.
Objective	Absence of pollution
Management	Check for pollution sources and stop if possible.
Monitoring	The monitoring for the presence of obvious signs of pollution shall take place annually in June. pH and salinity levels shall be recorded.
Remedial Action	Terminate or divert pollution at source.

Management and Maintenance of Terrestrial Habitat

Grassland Habitat

A3.11 The measures set out in table A3.10a-A3.10e to manage grassland in the receptor sites and habitat enhancement areas shall be implemented. The measures set out in table A3.10f to manage grassland in the onsite habitat corridors shall be implemented.

Table A3.10a: Grassland Management

Location	Northern Triangle East receptor site, Great Garlands Farm Elbow receptor site and Northern Triangle West receptor site
Objective	Rank coarse grassland terrestrial habitat coverage over minimum 65% of site.
Management	The area shall be cut no more frequently than once every three years. Cutting shall be carried out by machine in the late summer* to minimum of 100mm and raked.
Monitoring	The Grassland shall be monitored annually in June and during GCN survey visits in April/May. Sward height and scrub invasion shall be recorded.
Remedial Action	Removal of natural scrub regeneration to <10% coverage in grassland area.

Table A3.10b: Grassland Management

Location	Northern Landscape receptor site main grassland areas, Great Garlands Farm Elbow Habitat Enhancement Area
Objective	Tussocky grassland with sward height in excess of 100mm over minimum 75% of site.
Management	The area shall be cut annually or cattle-grazed at low stocking density (see table A3.11 for stock density)
Monitoring	The Grassland shall be monitored annually in June and during GCN survey visits in April/May by an ecologist. Sward height and scrub invasion shall be recorded. Sward height shall be measured at least once per month by an ecologist if managed by grazing.
Remedial Action	If sward height is less than 100mm over more than 25% of the area then stocking density shall be reduced. Removal of natural scrub regeneration to <10% coverage in the grassland area.

Table A3.10c: Grassland Management

Location	Stanford Wharf Nature Reserve Habitat Enhancement Area
Objective	Hay meadow coverage at least 80% of the site.
Management	The hay meadow (covering at least 80% of the site) shall be cut annually in late summer*. Cutting shall be by machine and no lower than 100mm. Cuttings shall be raked and piled within the site.
Monitoring	The hay meadow shall be monitored annually in June. Sward height and scrub invasion shall be recorded.
Remedial Action	Annual cuts shall cease if the habitat created is deemed to be unsuitable for newts. Removal of natural scrub regeneration to <10% coverage in the grassland area.

Table A3.10d: Grassland Management

Location	Receptor sites grassland areas within pond stock fences.
Objective	Rank coarse grassland terrestrial habitat coverage over 100% of area within fences not occupied by hibernacula and log piles
Management	Grassland shall not be cut. Scrub shall be removed if causing die back of grass.
Monitoring	The grassland area shall be monitored annually in June and during GCN survey visits in April/May. Sward height and scrub invasion shall be recorded.
Remedial Action	Scrub shall be removed if shading causes die back of grassland or causes pond shading (refer to table 3.5).

Table A3.10e: Grassland Management

Location	Stanford Warren and Marshes SINC
Objective	Maintain existing suitable terrestrial habitat for great crested newts.
Management	Minimal intervention management.
Monitoring	Monitored annually in June. Sward height and scrub invasion shall be recorded.
Remedial Action	If habitats are found to be unsuitable for great crested newts, Thurrock Borough Council shall be informed and appropriate management shall be prescribed and implemented.

Table A3.10f: Grassland Management

Location	Onsite habitat corridors
Objective	Hay meadow along habitat corridor verges
Management	Annual cut in late summer by machine no lower than 100mm. Cuttings shall be raked and removed.
Monitoring	Monitored annually in June. Sward height and scrub invasion shall be recorded.
Remedial Action	Annual cuts shall be ceased if habitat created is deemed to be unsuitable for newts.

Table A3.11: Example of maximum stock density for different durations of cattle grazing.

Grazing duration (days per year)	75	100	150	300
No. animals per hectare	1	0.75	0.5	0.25
No. animals on Northern Landscape receptor site (~25ha of grassland)	25	18	12	6
No. animals on Great Garlands Farm Elbow Habitat Enhancement Area (~4.4ha of grassland)	4	3	2	1

Note: Figures have been rounded to create whole numbers.

Dry ditch landscape features

A3.12 The measures set out in table A3.12 to manage dry ditch features that have been built between the ponds on the Northern Triangle East receptor site shall be implemented.

Table A3.12: Management of dry ditch features

Location	Northern Triangle East
Objective	Linear habitat of rank coarse grassland with up to 25% natural scrub regeneration forming habitat corridors linking ponds.
Management	The grass shall not be cut and natural scrub regeneration in excess of 25% area coverage shall be removed by hand cutting.
Monitoring	Monitoring shall take place annually in June and the percentage of scrub cover shall be recorded.

Remedial Action	Scrub removal
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Scrub

A3.13 The measures set out in table A3.13 to manage planted scrub areas shall be implemented.

Table A3.13: Management of planted scrub areas

Location	All areas of planted scrub
Objective	Maintain scrub cover over designated areas (20% of GGFE, NTE & NTW, 7% of the NLRS as part of the structural landscape zone 1A & 1B and 2.08ha on the off site rail bend) with understorey of high value as terrestrial habitat for newts.
Management	No management of the scrub vegetation shall take place in the first five years. If necessary weed growth at the base of young plants shall be cut by strimming to reduce competition. After five years scrub areas shall be assessed and following assessment, management shall be implemented to improve the value of these areas for the species. Management at this stage may include coppicing, piling of coppice brush and additional log piles.
Monitoring	Monitoring shall take place annually in June. Any loss (%) of planted scrub shall be mapped and recorded.
Remedial Action	Replacement of dead scrub plating. Enhancement of understorey layer with deadwood.

Log Piles

A3.14 The measures set out in table A3.14 to manage log piles at all receptor and habitat enhancement areas shall be implemented.

Table A3.14: Management of log piles

Location	All receptor and habitat enhancement areas
Objective	Partially rotted, intact, log piles.
Management	The log piles shall be replaced or additional logs deposited to maintain the pile at a minimum of 75% of the original dimensions.
Monitoring	Monitoring shall take place annually in June.
Remedial Action	Reconstruction or replacement.

Artificial Hibernacula

A3.15 The measures set out in table A3.15 to manage artificial hibernacula shall be implemented.

Table A3.15: Management of artificial hibernacula

Location	All receptor and habitat enhancement areas
Objective	Intact stone piles of no less than 90% of original dimension.
Management	The artificial hibernacula shall be managed by replacing or depositing additional stones to maintain the original dimensions.
Monitoring	The artificial hibernacula shall be checked annually in June.
Remedial Action	Replacement or reconstruction.

Appendix 4:
GCN Monitoring Recording Sheet

Great Crested Newt Receptor Site Habitat Monitoring Recording Sheet	
Site Name / Pond No.:	Location / grid reference:
AQUATIC HABITAT Photo ref:	
Aquatic Vegetation % coverage:	Species: Recommendations:
Marginal Vegetation % coverage:	Species: Recommendations:
Non-native invasive % coverage:	Species: Recommendations:
Shading scrub % shading:	Species: Recommendations:
Silt Accumulation	Notes: Recommendations:
Pollution	Evidence: pH: Salinity: Recommendations:
Fish	Evidence (note that evidence of fish is more likely to be recorded during GCN monitoring visits than habitat monitoring visits) Recommendations:
TERRESTRIAL HABITAT Photo ref:	
Grassland	Sward Height: Suitability & Recommendations:
Habitat within stock fenced ponds	Sward Height: Suitability & Recommendations:
Dry ditch features	Sward Height: Suitability & Recommendations:
Log Piles	Condition: Management Recommendation:
Hibernacula	Condition: Management Recommendation:
Newt Tunnels	Condition: Management Recommendation:

NOTES: Please record additional notes, photograph reference numbers and sketches, where appropriate, on the reverse of this sheet.

Appendix 5: Bat Survey Methodologies

Appendix 5a – Bats: Tree Survey Methodology

Background

- A5.1 All trees identified during the initial daytime survey with a low, medium or high potential to support a bat roost shall be revisited.
- A5.2 An ecologist shall be stationed at each potential roost site with moderate or high potential at either dawn or dusk. The potential roost site shall be watched constantly by the ecologist. A Duet frequency division bat detector with an MP3 recording device attached shall be used by the ecologist to detect bats emerging from or returning to the potential roost site. Bat calls shall be retained for later analysis using Adobe audition, bat sound or wavesurfer where necessary.
- A5.3 The dusk survey shall begin 30 minutes before sunset and ended 90 minutes after sunset (or up to 2 hours after the first bats are seen emerging). The dawn survey shall begin 60 minutes before sunrise and ended at sunrise (or 15 minutes after last bat recorded). The cloud cover, wind strength, rain and temperature shall be noted.

Incidental Records

- A5.4 During the dusk emergence and/or dawn return surveys, incidental bat activity within the vicinity of the potential roost shall be recorded. For each location the species of bat and number of passes shall be recorded. As a gauge to the overall level of activity the total number of passes for all species during each survey event at each location is divided by the duration time of the survey. This is then multiplied by 100 to give an activity score. The activity score is then compared to those in the table below. A bat pass is defined as an unbroken stream of echolocation calls, heard as a series of 'clicks' on a bat detector as the bat passes in and out of the detector's range.

Categorisation of activity level:

Activity Score	Assessment of Activity Level
Up to 5	Very Low
6 – 30	Low
31 – 50	Medium
51 – 90	High
90 plus	Very High

Appendix 5b – Bats: Tree Felling Methodology

Distribution

- A5.5 This information shall be read and understood by all those involved in felling any mature trees within the port or park area. This includes the site owner, clerk of works or supervising ecologist, and arboriculturalist/contractor whose task it is to fell the trees.

A Species with Full Legal Protection

- A5.6 Both within and outside designated sites, all bat species are fully protected under the Conservation of Habitats and Species Regulations 2010, the Wildlife and Countryside Act 1981 and the Countryside and Rights of Way Act (2000). Taken together, these make it an offence to damage or disturb any bat roost, whether occupied or not, or to harm a bat. Some trees or groups of trees may be further protected by the Hedgerow Regulations 1997 which, provides for the conservation of important hedgerows where the presence of bats is relevant and included when assessing whether a hedgerow is important. The presence of a bat roost is not a reason for a Tree Preservation Order. However, these trees are often suitable for bats and are protected under part VII of the Town & Country Planning Act 1990 (as amended) and the Town and Country Planning (Trees) Regulations 1999 which make it an offence to cut down, uproot or wilfully damage or destroy a tree(s) without permission from the planning authority.
- A5.7 Prosecution could result in imprisonment or fines of £5,000 for each offence. If more than one bat is involved, the fine is £5,000 per animal affected. When convicted the court may require forfeiture of any items used to commit the offence such as the vehicles and equipment used.
- A5.8 In order to minimise the risk of breaking the law it is essential to work with care to avoid harming bats and to be aware of the procedures to be followed if bats are found.

Finding Roosts

- A5.9 Surveys undertaken have identified that the trees have potential to support roosting bats. Further surveys carried out did not identify the presence of any roosting bats. However, bat roosts can be difficult to detect, trees may be used throughout the year by a variety of species, many of which move unpredictably between roosts and only require gaps and cracks just 14-20mm wide. Roosts are commonly found in woodpecker & rot holes, under loose bark, branch cavities, in split trunks & branches, and behind dense ivy or climbing plants.

Working Approach

- A5.10 A suitably qualified ecologist (experienced and licensed) shall be present during tree felling works and shall guide the contractors responsible for the works to ensure that:
- Felling I takes place in early March or between September and mid-

- November only;
- The minimum works necessary to make the tree(s) safe, while maintaining the roost potential wherever possible e.g. sensitive reduction work rather than complete branch removal;
- Prior to commencing works branches, limbs or sections of trunk which appear to have holes suitable for use by bats have been identified to the felling team and they are clear on how the sections are to be removed;
- Pruning or section felling shall, wherever possible, avoid crosscutting in proximity to cavities or hollow sections;
- Sections containing cavities, with the potential to contain bats, shall be lowered carefully then left on site, with opening exposed for at least 48 - 72 hours;
- Trees covered in dense ivy shall be inspected where possible and left on the ground for a period of at least 24hours;
- Split limbs that are under tension may need to be wedged open to prevent their closure when pressure is released;
- Long sections are examined with an endoscope to determine the extent of the cavity and whether it is occupied; and
- Once felling is complete the ecologist shall supervise sawing of any remaining branches or trunk sections which could contain bats into suitable lengths and check for any emerging bats.

Finding Bats

- A5.11 If bats are discovered prior to felling or removal of that section of tree all works on that tree shall stop until such a time as a European Protected Species Licence is obtained from Natural England.
- A5.12 If any bats are found once the tree or roost structure has been felled the licensed ecologist shall take into care any bats which do not immediately fly off, and assuming they are uninjured, should be carefully kept in the dark in a quiet place until it can be released at dusk near to where it was found, or moved to an undisturbed part of the site, and placed in a location safe from predators. Deliver any injured bat into properly qualified care.
- A5.13 Do not unless absolutely necessary touch or remove bats. If it is necessary to remove a bat to avoid it being harmed, gloves should be worn.

References

Cowan, A (2003) Trees and Bats, Arboricultural Association Guidance Note 1 (Second Edition), Arboricultural Association.

Bat Conservation Trust. Professional Support Series, Bats and Trees In England.

Veteran Trees: A guide to good management. Natural England, Peterborough.

Mitchell-Jones, A.J. & McLeish, A.P. (1999). Bat Workers' Manual (2nd Edition). Joint Nature Conservancy Committee, Peterborough

Mitchell-Jones, A.J. (2004). Bat Mitigation Guidelines, English Nature.

Appendix 5c – Bats: Building Survey Methodology

- A5.14 The following structures shall be inspected for features which could be used by roosting bats:
- A5.15 Buildings shall be inspected searching for the following evidence::
- Gaps around windows, doors and lintels;
 - Lifted lead flashing;
 - Loose or missing tiles;
 - Gaps between stone or brickwork where mortar has fallen out;
 - Other gaps or cracks between various elements of building structure;
 - Presence or absence of cavity wall and potential access points; and
 - Suitable access points around eaves, soffits, barge board, fascia, flashing and hanging tiles.
- A5.16 The information recorded for each potential roost shall include the site type and a description of the potential roost and its location, including aspect and height above ground level. Photographs of each potential roost shall be taken and their location recorded on a map of the site.
- A5.17 Each building shall be graded and placed into a category for its level of potential for roosting bats. This is dependent on the degree of exposure, cavity dimensions and the presence or absence of crevices considered suitable for bats to use as roosts. In addition the following factors shall also be considered:
- Setting & locality;
 - Level of disturbance;
 - Age of building or structure;
 - Proximity of nearest woodland and / or water;
 - Presence or absence of substantial linear features linking to woodland or other commuting and foraging habitat; and
 - Size, particularly when considering potential for hibernation.

Detailed Inspection of Potential Roosts

- A5.18 All sites identified during the initial daytime survey with a moderate or high potential to support a bat roost shall be revisited.

Table A5.1 – Outline of categories of bat potential

Type of roost	Summer or transitional roost used by non breeding bats	Maternity roost	Hibernation roost
Level of potential			
Confirmed	Presence of bats or evidence of bats. Confirmation of roost status may require further survey.		
High Bat Potential	Feature with multiple roosting opportunities for one or more species of bat. With good connectivity to high quality foraging habitat.	Feature with multiple roosting opportunities for breeding bats (size, temperature). With Proximity and connectivity to high quality foraging habitat.	Large site that offers cool stable conditions with multiple roosting opportunities. With proximity and connectivity to high quality foraging habitat.
Medium Bat Potential	Feature with some roosting opportunities. With connectivity to moderate - high quality foraging habitat.	Feature providing some roosting opportunities. With some connectivity and proximity to moderate or high quality foraging habitat.	Medium sized feature with a number of roosting opportunities. With some connectivity and proximity to moderate or high quality foraging habitat
Low Bat Potential	Feature with a limited number of roosting opportunities. With poor connectivity to foraging habitat	Feature with a limited number of roosting opportunities for breeding bats. With low proximity and connectivity to low - moderate quality foraging habitat.	Small sized feature or feature which may be subject to disturbance or environmental variations, with a limited number of roosting opportunities. With limited connectivity to foraging habitat.
Negligible Bat Potential	Feature with no or very limited roosting opportunities for bats or where the feature is isolated from foraging habitat.	Feature with no suitable roosting opportunities for breeding bats.	Feature with no suitable roosting opportunities for hibernating bats.

Buildings External Inspections

A5.19 Buildings shall be inspected from ground level to look for bats or evidence of bats. Evidence searched for include:

- Dark staining below an access point that may be caused by bat faeces;
- Staining around a hole that may be caused by the natural oils in bat fur;
- Scratch marks around the hole made by bat claws;
- Bat droppings; and
- Noises made by bats.

Building Internal Inspections

A5.20 Where permission for access has been obtained and it was safe to do so, all buildings shall be thoroughly inspected for bats and evidence of bats. The following techniques shall be used within the roof void:

- A torch and/or endoscope shall be used to inspect for bats themselves and evidence of bats along ridge beams and over brick work etc;
- Droppings searched for, concentrating on the area beneath the ridge

beam, the junctions between two ridges and around the chimneys, gables and all around the eaves;

- Feeding remains, such as moth wings were searched for; and
- Remains of bats, including inspecting uncovered water tanks for drowned bats.

Emergence Survey

- A5.21 All sites identified during the initial daytime survey with a low, medium or high potential to support a bat roost shall be revisited.
- A5.22 An ecologist shall be stationed at each potential roost site with moderate or high potential at either dawn or dusk. The potential roost site shall be watched constantly by the ecologist. A Duet frequency division bat detector with an Mp3 recording device attached shall be used by the ecologist to detect bats emerging from or returning to the potential roost site. Bat calls shall be retained for later analysis using Adobe audition, bat sound or wavesurfer where necessary.
- A5.23 The dusk survey shall begin 30 minutes before sunset and ended 90 minutes after sunset (or up to 2 hours after the first bats are seen emerging). The dawn survey shall begin 60 minutes before sunrise and ended at sunrise (or 15 minutes after last bat recorded). The cloud cover, wind strength, rain and temperature were all noted.

Incidental Records

- A5.24 During the dusk emergence and/or dawn return surveys, incidental bat activity within the vicinity of the potential roost shall also recorded. For each location the species of bat and number of passes shall be recorded. As a gauge to the overall level of activity the total number of passes for all species during each survey event at each location is divided by the duration time of the survey. This is then multiplied by 100 to give an activity score. The activity score is then compared to those in Table A5.2 below. A bat pass is defined as an unbroken stream of echolocation calls, heard as a series of 'clicks' on a bat detector as the bat passes in and out of the detector's range.

Table A5.2: Categorisation of activity level

Score	Assessment of Activity Level
Up to 5	Very low
6 – 30	Low
31 – 50	Medium
51 – 90	High
90 plus	Very High

Appendix 5d – Bats: Transect Survey Methodology

Commuting and Foraging Habitat

- A5.25 Transects of approximately 600m in length shall be selected across the site. Transects shall be selected that run through homogenous areas of habitat considered to be either good or poor quality habitat for bats.
- A5.26 The routes shall be walked in daylight then revisited during the evening survey period. Ecologists starting at opposing ends of the transect shall walk at a steady pace along the transect, walking to and then stopping at each point (taking 10 minutes total time). A total of 30 minutes shall be spent in each transect by each surveyor.
- A5.27 Whilst walking along each transect ecologists shall record all bat passes. A bat pass is defined as an unbroken stream of echolocation calls, heard as a series of 'clicks' on a bat detector as the bat passes in and out of the detector's range. Each bat pass shall be recorded using a Duet bat detector and a MP3 recorder and retained for later analysis using Adobe audition, bat sound or wavesurfer where necessary. The location of each bat shall be recorded on a map and where possible the flight direction and species of the bat shall also be noted.
- A5.28 For each section, the start time, finish time, percentage of cloud cover, wind strength, rain and temperature shall be noted.
- A5.29 As well as calculating the total number of bat passes for each species along each section, the number of bat passes for each species shall be divided by the total length of the survey to give a standard measure of bat activity within each section. An activity score shall then be calculated and compared to those given in Table A5.2 of Appendix 5c.
- A5.30 The dusk survey shall begin at sunset and end up to 3.5 hours after sunset. The cloud cover, wind strength, rain and temperature shall all be noted.

Appendix 6:
Environmental Advisory Group Constitution

Appendix 6 – Environmental Advisory Group Constitution

1. Formation and Operation of the Advisory Group
 - 1.1 The Environmental Advisory Group (**EAG**) (formerly known as the Ecological Advisory Group) was established in 2008 by London Gateway Park Development Ltd (**LGPDL**).
 - 1.2 The EAG Committee (**Committee**), consisting of DP World London Gateway staff, was established by London Gateway Park Development Ltd for the purpose of implementing this constitution and the roles described therein.
 - 1.3 The EAG consists of up to two nominated representatives (or their delegates) of each Party, set out in Schedule 1 (together the **Parties**) as notified by each Party to all the other Parties from time to time in writing. Other representatives from statutory and non-statutory groups may be invited to attend the EAG from time to time but will not have voting rights.
 - 1.4 Each Party shall have one vote whether it nominates one or two representatives, and may vote by proxy.
 - 1.5 The representatives (or delegates) of each Party may be accompanied by one or more additional representatives upon the EAG's approval in each case.
 - 1.6 The EAG will be chaired by a representative of the EAG Committee and will;
 - 1.7 Meet periodically (at least once every 12 months). Meetings shall be convened by the Chairman with at least 20 working days prior written notice with an agenda. Any of the Parties may request the Chairman to call a meeting;
 - 1.8 Hold such meetings at a convenient location to be provided by the Committee; and
 - 1.9 Appoint a secretary who shall be responsible for sending draft minutes of each meeting to the Parties within 10 working days of the meeting. The Committee shall provide the secretarial services unless otherwise agreed.
 - 1.10 One representative of all Parties shall sign the minutes within 20 working days (or as agreed) of their receipt. Any Party wishing to propose amendments to such draft minutes shall notify the Parties within 20 working days of receipt. Comments by any Party on proposed amendments shall be made within 10 working days of receipt. If after 10 working days no proposed amendments have been notified, the minutes will be taken as agreed and will be duly signed; otherwise agreement of the minutes will be subject to discussion between the Parties.

2. Expenses

- 2.1 The administrative expenses of the EAG (including office and secretarial expenses) shall be borne by the Committee but the ordinary expenses of individual representatives or delegates in attending the meetings of the EAG shall be borne in each case by the Party nominating them as being a part of the exercise of their respective statutory duties.

3. Terms of Reference

- 3.1 The EAG shall:
- 3.2 Advise the Committee on environmental management issues arising out of the development implemented under the London Gateway Local Development Order (**LDO**).
- 3.3 Review environmental monitoring and other information collected by London Gateway Services Limited (**LGSL**) for the purpose of the implementation of the LDO and conformity with associated existing and new Environmental Permits and Licences;
- 3.4 Consult relevant parties (such to be agreed by the EAG) and consider if it sees fit any relevant representations made by them;
- 3.5 Consider any relevant questions raised by the Parties in connection with operation of the LDO.
- 3.6 Make suggestions to the Committee on any relevant matter connected with the administration of the Ecological Mitigation and Management Plan (**EMMP**) or this constitution which could further the interests of achieving the objectives set out and agreed in the EMMP or this constitution.
- 3.7 Shall stimulate interest and the voluntary engagement of the occupiers of the Logistics Park as the case may be in the achievements of the EMMP, Code of Construction Practice, Design Code or this constitution. The EAG acting in concert, may invite representatives from relevant public organisations or user groups, to attend a part of meetings in the context of any relevant agenda item. Such strangers will not be entitled to vote or to take part in any formal part of the meeting and will be required to leave the meeting during any confidential discussion or any discussion involving financial matters or management of the EAG;
- 3.8 Produce and make publicly available an Annual Report which will comprise in the form of an Executive Summary a review of the progress to date in respect of the LDO or this constitution;
- 3.9 In light of the review of the progress mentioned above to make recommendations to the Committee for any modifications considered necessary by the EAG to ensure the measures in the EMMP or this constitution are met.

4. Decisions and Dead-Lock

- 4.1 Decisions of the EAG (including recommendations to the Committee and EAG's annual report) require unanimous consent. No approval, consent, or agreement required from or by any party under this constitution shall be unreasonably withheld or delayed. If any issue is unresolved after formal consideration by the EAG, each Party may by written notice to the other Parties, who shall in good faith negotiate to resolve that issue within 30 (thirty) calendar days, or for such other period as the EAG may agree, subject to paragraph 4.2 of this constitution, refer the dispute to binding arbitration pursuant to paragraph 10 of this constitution. In matters of scientific opinion any Party may make use of an Expert to aid in the resolution of dead-lock.
- 4.2 If the Committee exercises its vote in opposition to all other voting parties of the EAG then the Parties shall (after having followed the procedure in paragraph 4.1 above) follow the procedure in this paragraph 4.2. The Committee's decision to so vote will be reviewed by its Lawyer within 28 working days of the failure by the senior officers to reach agreement, such review to be circulated to voting members of the EAG. Recipients of the review will have 14 days in which to respond and such response will set out whether or not that member intends to refer the matter to arbitration pursuant to paragraph 10 below against the Committee and if so on what grounds. The Committee shall respond to any intention of a member to refer the matter to arbitration within a further 28 days. Thereafter the Party intending to take such action shall either take such action or shall either confirm to the EAG that its concerns have been satisfied by the Committee or that it requires further time in which to consider the matter.

5. Annual Meeting and Annual Report

- 5.1 The Committee will constitute a formal meeting of the parties (plus others) which shall report once annually as to progress made against the Terms of Reference in this constitution, and the LDO, including monitoring outcomes required in the Code of Construction Practice, Design Code and EMMP. Annual Reports will be published on the London Gateway website and submitted to Thurrock Borough Council for the duration of the life of the EAG. The Committee agrees to consider properly the advice of the EAG of which it is a party and to proceed according to that advice where that advice is based on sound scientific knowledge and judgement and where it is so agreed by all parties to the EAG acting unanimously (or subject to the dispute resolution procedure as set out at paragraph 9 below) provided that all such required actions of the Committee are lawful for it, and fall within its statutory remit and are within its control.

6. Informal dialogue

- 6.1 In addition to formal EAG meetings, the Parties intend, but are not required so to do, to maintain an informal, interactive dialogue throughout the course of the implementation of the LDO.

7. Dissolution of the Advisory Group

7.1 The EAG shall continue in operation for the duration of the LDO and for any longer period as needed by a monitoring regime under the EMMP. Thereafter it may only be dissolved irrevocably by unanimous agreement of the Parties

8. Statutory Remit of the Parties

8.1 No Party will exceed its statutory duties when considering issues before it as the EAG. The EAG will inform the relevant statutory remit of each party but will not take the place of statutory duties of the relevant parties (if any).

8.2 Nothing in this constitution shall be taken to prejudice or otherwise fetter the exercise by Natural England or the Environment Agency of their respective statutory functions.

9. Arbitration

9.1 Subject to paragraph 4 of this EAG constitution, any dispute or difference arising out of or in connection with this EAG constitution (including without limitation any question regarding its existence, validity, interpretation, performance or termination) shall be referred to and finally resolved by arbitration under the Rules of the London Court of International Arbitration ("the Rules"), which Rules are deemed to be incorporated by reference into this paragraph. It is agreed that:

9.2 The number of arbitrators shall be one;

9.3 The appointing authority for the purpose of the Rules shall be the London Court of International Arbitration;

9.4 The seat, or legal place, of arbitration shall be London;

9.5 The language to be used in the arbitration shall be English;

9.6 The governing law of the agreement shall be the substantive law of England and Wales.

Schedule 1

The Parties to the EAG are:-

- DP World;
- Natural England ("NE");
- Environment Agency ("EA");
- Thurrock Borough Council.