3.8 Ecology & Geology Management Plan - General

3.8.1 Objectives and Scope

The overall objectives of ecological and geological management of the CTRL Project are given in the Code of Construction Practice (CoCP) Part A (paragraphs 11.1.and 11.2). These are that:

> *"The nominated undertaker will ensure compliance with the relevant statutory provisions in respect of the protection of areas of nature conservation interest and of protected species. The nominated undertaker will carry out the works in such a way as to ensure that disturbance to areas of nature conservation interest and areas of geological interest is controlled and limited as far as reasonably practicable and that appropriate measures are adopted to preserve the ecology of specified areas and maintain accessible in situ geological remains wherever reasonably practicable in accordance with the principles set out in the Environmental Memorandum*
>
> *Where a species is protected by specific legislation, the nominated undertaker will follow approved guidance in complying with the legislative requirements for that species."*

In order to achieve the key objectives of the EMPs (see Section 1.2), this Ecology and Geology Management Plan covers the issues specified in paragraph 11.7 of the CoCP Part A. It describes the route-wide strategy for ecological measures to be adopted in advance of construction, during construction and during site restoration for the CTRL. The route-wide strategy for controlling and limiting disturbance to geological remains is also given in this management plan.

The general strategy for ecological and geological management given in this section is developed into specific measures for each local authority in the local EMPs.

The areas of nature conservation or geological interest potentially affected throughout the CTRL scheme are listed in Appendix 3.8B. This list includes a number of sites with statutory and non-statutory nature conservation or geological designations, which are explained further in Appendix 3.8A.

Special measures or works for the habitats and also species affected, including translocation and habitat creation works, will be required both prior to and during construction at a number of locations throughout the CTRL route. These sites and species have been the subject of a series of rigorous specialist surveys (see Appendix 3.8C) in order to identify mitigation needs and develop suitable strategies and methods for approval by English Nature. The various measures which will be employed are based on the mitigation suggested in the CTRL Environmental Statement and also a number of subsequent detailed mitigation strategies drawn up for particular habitats or species. These measures are summarised in Sections 3.8.8 to 3.9.12 inclusive and are tabulated in Appendix 3.8D for ease of reference.

Other activities may also be necessary in order to undertake these measures and to meet the requirements of English Nature and/or the Department of the Environment. These include further ecological surveys (see Section 3.8.3), licensing (see Section 3.8.6), specialist ecological monitoring (see Section 3.8.7), reporting during construction (see Section 3.8.15) and maintenance of newly created habitats and landscape areas (see the Landscape Management Plan).

URL

UNION RAILWAYS, 106 TOTTENHAM COURT ROAD, LONDON W1P 9HF
EXTENSION:

MEMORANDUM

TO:	TED ALLETT ALAN DYKE / HAYDEN DAVIES PAUL RICHENS / CHRIS NICHOLAS
CC:	DOC CON C.Meeks
FROM:	RACHEL STARLING
OUR REF:	L/DA/500-001/224199/DA
YOUR REF:	
DATE:	12th August 1997

97 0003964

SUBJECT: **ECOLOGY & GEOLOGY MANAGEMENT PLANS - GENERAL**

Please find attached the updated general Ecology & Geology Management Plans.

HMC

3.8.2 Legislation and Guidance

The main statutory provisions, regulation, codes of practice and notes for guidance which may be relevant for the formulation and subsequent implementation of this management plan are outlined below:

- Environmental Protection Act 1990;
- Environment Act 1995;
- Conservation Regulations (Natural Habitats &c.) Regulations 1994;
- Protection of Badgers Act 1992;
- Wildlife and Countryside Act 1981 (excluding Section 28(5) and Section 29(3));
- Water Resources Act 1991;
- Weeds Act 1958;
- Planning Policy Guidance Note 9, Nature Conservation;
- BS5837 Guide for Trees in Relation to Construction 1991;
- Planning Policy Guidance Note 16, Archaeology and Planning.

3.8.3 Surveys

An intensive programme of ecological surveys has been undertaken since 1989 (see Appendix 3.8C). These have established a baseline of information along the CTRL route and its environs. Surveys for protected species have been particularly rigorous, with repeated survey where necessary to ensure that up-to-date information on location is maintained.

Baseline ecological surveys are considered to be complete at the time of submission of detailed information to English Nature in compliance with the relevant licensing requirements.

3.8.4 Areas of Nature Conservation Interest Potentially Affected

The CTRL will affect a number of sites with nature conservation interest (see Appendix 3.8B). Many of these sites possess either statutory or non-statutory nature conservation designations (defined in Appendix 3.8A). A number of sites have been identified in the Environmental Memorandum by the appropriate statutory authorities as being of particular concern, known as 'Priority Sites' (see Annex 5 of the Environmental Memorandum). Although the Priority Sites and those with designation are the main concern of this management plan, mitigation is also included for a number of undesignated sites of more local ecological interest and especially for undesignated sites and areas which are known to support one or more protected species.

The affected sites specifically identified within a particular local authority are listed in the Local EMPs and are indicated on a series of location plans. Where appropriate, more detailed plans of these sites are provided, for example indicating the mitigation works, work area and access routes, planting areas, etc., usually in the form of combined landscape and ecological proposal drawings. Precise details of locations are not given in the case of mitigation for badgers, especially the siting of artificial setts, in order to ensure their protection.

A summary of the effect by habitat type and details of the mitigation measures for the habitat type is included within this section for each Local Authority area. Full details of the effects of the CTRL on habitats and species are provided in the Assessment of Ecological Effects and in a number of specialist reports. A summary of this information is included here. Land-take measurements have been taken from the Ecobalance study for habitats of moderate or high quality, and have been estimated for habitats of lower quality. The Ecobalance study (which was prepared at the time of the CTRL Bill's passage through Parliament and defines the landtake to areas of ecological interest) showed that for the reference design land of nature conservation value lost to the CTRL could be replaced with a greater area of equal or greater value.

A number of different habitat types are affected by the CTRL. The effects on these are summarised in the following paragraphs.

Woodland

There are several types of woodland, including ancient and secondary, which can be categorised as semi-natural or planted, managed or unmanaged. There are 19 woodlands which may be classified as ancient woodland, amounting to a land-take of approximately 42 ha (Reference Design). It is proposed to relocate soil from 16 of these to 15 receptor sites and woodland planting is proposed at 9 other locations. Table 1 lists the areas of the ancient woodlands that will be affected and table 2 lists the areas of the proposed receptor/woodland creation sites and details the woods from which soil will be received.

(Information provided in Tables 1-6 is taken from the draft report "Ecological Mitigation for the Channel Tunnel Rail Link" prepared by Scott Wilson, dated June 1997. Following comments from members of the Environmental Forum, this report is being revised and will be issued as a supplement to the Ecology Management Plan. The information presented in the tables is the latest available information).

Table 1 Areas of Ancient Woodland lost to CTRL (from Scott Wilson's report, June 1997)

District	Ref.	Woodland	Area lost (ha)
Gravesham	1	Ashenbank Wood SSSI	7.2
Rochester-upon-Medway	2	Cobham Woods SSSI	4.4
	3	Head Barn Wood	2.2
	4	Merrals Shaw	5.9
Tonbridge and Malling	5	Bridge Woods SNCI	2.2
Maidstone	6	Copse north of Boxley Abbey	0.2
	7,8	Donkey Shaws and Park Wood West	0.7
	9	Park Wood East	2.2
	10	Horish Wood SNCI	2.4
	11	Honeyhills Wood SNCI	2.6
	12	Gorewood Farm Wood	0.3
	13	Longham Wood	1.6
	14	Warren/Coombe Wood SNCI	3.1
Ashford	15	Hurst Wood	1.1
	16	Beechbrook Wood	0.6
	17	Potters Corner Wood SNCI	0.6
	18	Lodge Wood	2.0
Shepway	19	House Wood	0.2
	20	Grange Alders and Oak Banks, Bargrove Wood SNCI	2.5
		Total area affected	***42***

All of the receptor/woodland creation sites are currently in agricultural use. It is intended that the creation of the new woodlands will mitigate for the loss of existing woodland, providing ideal conditions for dormice and the development of woodland of high nature conservation value. The woodland types to be encouraged in the new areas will be of the ash/hazel or oak/hazel type, with smaller quantities of other species including hornbeam and field maple.

Prior to the transfer of woodland soil, the receptor sites will normally be prepared by stripping off the topsoil and loosening the sub-soil to a depth of 400mm. Soil will be collected from the donor site and transferred directly to the receptor site. These areas will then be planted with a suitable mix of tree and shrub species. Many of the woodlands contain a high proportion of sweet chestnut coppice; it is intended for the new woodlands to contain a lower proportion of sweet chestnut but a higher proportion of hazel.

Table 2 Areas of woodland to be created (Receptor Sites) - (from Scott Wilson's report, June 1997)

District	Site	Location Receptor/Creation site	Donor Ref.	Area (ha)
Gravesham	AW1	East of Scaler's Hill	-	4.2
	AW2	Knights Place Farm	2,4	6.3
Rochester-upon-Medway	AW3	Great Wood/Head Barn Wood	2,3	2.4
	WC1	Head Barn/Merrals Shaw/Magpie Shaw	3,4	3.8
Tonbridge and Malling	AW4	North of Bridge Woods	-	3.1
	WC2	Bridge Wood	5	2.4
Maidstone	WC3	Donkey Shaw/Park Wood West	7,8	1.3
	AW5	East of Park Wood East	-	0.6
	WC4	Beulah Wood	9	1.1
	AW6	East of Horish Wood	10	1.1
	AW7	West of Honeyhills	10	0.9
	WC5	Longham Wood (west side)	11	2.1
	WC6	Longham Wood (east side)	13	1.8
	AW8	The Chestnuts/Ash Shaw	14	0.5
	AW9	Ash Shaw/Warren Wood	-	0.9
	AW10	South of Warren Wood	-	1.4
Ashford	AW11	West of Hurst Wood	-	2.1
	WC7	Hurst Wood	16	0.7
	AW12	Ripple Wood	-	0.7
	AW13	West of Broomfield Wood	-	3.1
	AW14	North of Marble Wood	-	0.3
	AW15	Potters Corner Wood	17,18	1.1
	AW16	Lodge Wood	18	1.6
Shepway	AW17	House Wood	19	0.2
		Total area created		***43.7***

Trees will be planted in single species clumps to mimic natural dispersal and a hedge of predominantly hawthorn and hazel will be grown around the edge to provide shelter from the wind. Half of the trees planted will be birch, which grows fast and will provide rapid cover at the creation sites, thereby improving conditions for woodland herbs.

Due to the large scale of planting, a number of alternative sources of woody planting stock will be used. Seed has already been collected from a number of woods along the CTRL route for propagation. As a supplement, some nursery stock of UK origin (Kent where available) will be required. Only where no other suitable stock is readily available would stock of non-UK provenance be considered.

Following establishment, quantitative botanical surveys will be undertaken at the receptor sites for ancient woodland soils annually for five years. This is to monitor the colonisation of ground flora. Management of the woodland creation sites will need to be determined on a site by site basis.

Woodland that has developed on land formerly used for another purpose (such as quarries, industrial sites, etc.) is termed secondary woodland. It generally lacks the stable communities and specialised species associated with ancient woodland.

Table 3 details the locations of the main areas of secondary woodland and scrub affected by the CTRL and the area of land-take. For some sites this is estimated (indicated in the table by ~). The sites listed are the largest and most typical examples. A few very small areas have been excluded.

No specific mitigation measures are proposed for any of the locations mentioned. However, secondary woodland and scrub will develop with time along sections of the CTRL, and many of the landscape proposals associated with the route will form an important reserve of this habitat type.

Table 3 Areas of Secondary Woodland and Scrub lost to the CTRL (from Scott Wilson's report, June 1997)

Borough or District	Secondary Woodland or Scrub	Area lost (ha)
Camden	Camley Street Natural Park SMI LNR	0.1
Camden/ Islington	Railside Land SBI	0.5
Newham	Railside Land SBI	0.1
Dartford	Disused railway between Pepper Hill and Longfield	~5.0
Gravesham	St Botolph's Pit	~5.0
	Ebbsfleet Valley SNCI	~2.2
	Downs Road hedgerow	neg.
	Henhurst Dale, Twenty Acre Wood	~2.0
	Cobham Park Golf Course	7.1
Rochester-upon-Medway	Cuxton no.3 Pit	18.9
	Recycling centre at M2/A228 junction	~0.5
Maidstone	Poer Meadow Shaw	0.1
	Snarkhurst Wood SNCI	0.6
	Musket Lane SNCI	0.2
	Ash Shaw and the Chestnuts	1.1
	woodland north of Chilston Park	~1.5
Ashford	Cowlees Plantation	0.4
	Plantation near Tutt Hill	~0.5
	Ripple Wood	0.1
Shepway	River View Woodland	~0.5
	Honeywood Plantation	neg.
	Scrub at Sandling Station	~0.5
	Total area affected	***47***

The landscape proposals along the route include provision for 101 ha of new planting of trees and shrubs, and 164 ha of screen planting. In addition a total of 11,730 m of hedgerow are to be planted. For all areas of landscape planting an approximate species mix will be chosen to favour maximum diversity of locally native plants and encourage a complex vegetation structure. This planting may include sweet chestnut which is non-native but has a long tradition of use in Kent woodlands.

Grassland

The majority of open countryside through which the CTRL will pass is in agricultural use: either for arable farming or grazing. Many of the grazing pastures have been 'improved' through ploughing, re-seeding and fertilising. Improved pastures are species poor and are of little ecological value. No attempt has been made to measure the area of improved pasture affected.

Pastures that have not been subject to intensive management are of greater ecological value. There are no areas of unimproved grassland affected by the CTRL, but there are a number of areas where semi-improved grassland occurs. The sites with significant amounts of this habitat are identified in table 4.

Table 4 Areas of semi-improved grassland lost to the CTRL (from Scott Wilson's report, June 1997)

Borough or District	Location	Type	Area lost (ha)
Havering	Grassland between Ford Motor Works and Rainham Sewage Works	Neutral	~1.0
Thurrock	Grassland west of Mar Dyke	Neutral	~0.5
	Pasture at Purfleet	Neutral	0.4
Dartford	Disused railway at Longfield	Calcareous	~1.0
Gravesham	Ebbsfleet Valley (part SNCI)	Neutral	~2
	A2/A227 junction at Tollgate	Neutral	~0.1
	A2/B2009 junction at Cobham	Neutral	~1.0
Rochester-upon-Medway	Pasture west of the River Medway	Neutral	~1.0
	Common Marsh SNCI	Neutral	~1.0
Maidstone	Blue Bell Hill banks and verges (part SNCI)	Calcareous	neg.
	Pasture west of Honeyhills Wood	Neutral	~0.5
	Pasture at Ash Shaw	Neutral	~0.5
	Templetree Pasture	Neutral	0.6
	Chilston Park	Neutral	4.1
	Bowley Lane Pasture SSSI	Neutral	~1.0
	Pasture near Sandway	Neutral	0.9
	Sandway Pit	Neutral	~1.0
Ashford	Brockton Farm Pasture	Neutral	~1.0
	Hurst Wood Pasture	Neutral	~0.5
	Rough grassland at Boys Hall Road	Neutral	~1.0
	Pasture at Jemmetts Farm	Neutral	~0.5
	Little Stock Farm pastures	Neutral	2.5
Shepway	Barrowhill Rough	Neutral	0.1
	Sandling Park Grassland	Neutral	2.6
	Sandling Station	Neutral	~0.5
	Saltwood Tunnel	Neutral/Acid	1.7
	Total area affected		27

Mitigation for the loss of semi-natural grassland will be included within the landscape proposals and along sections of the CTRL. In suitable, appropriate locations grasslands will be allowed to regenerate naturally on exposed substrates. Sites where this is proposed are identified for each local authority area in section 4. The landscape proposals contain provision for 260 ha of grassland seeding, of which part will be wildflower mix appropriate to the local geology.

Urban 'Wasteland'

In urban areas, post-industrial sites have often developed into "wasteland" of ephemeral, short perennial and tall herb communities. Regular disturbance prevents this stage of succession developing to secondary woodland, although small areas of scrub may be present at some sites. The value for wildlife of wasteland is usually a reflection of the location; most occurring in heavily developed areas where there is otherwise a scarcity of habitat available. Some wastelands may support specialised and uncommon

species. Table 5 details the locations and extent of land-take to wasteland. It is not intended to provide new wasteland habitats.

Table 5 Areas of wasteland lost to the CTRL (from Scott Wilson's report, June 1997)

Borough or District	Location	Area lost (ha)
Camden	North London Link and Kings Cross Goods Yard SBI	0.5
Hackney	Graham Road Railway Triangle SLI	0.2
Newham	Former Stratford Railway Works SBI *	0.3
Waltham Forest	Temple Mills Wasteland SBI	24.0
	Total area affected	***25.0***

Wetland

The CTRL crosses several types of aquatic and wetland habitat, including grazing marsh, saltmarsh, riverine, reed-bed, tall-herb fen and pond. Large areas of grazing marsh and small pockets of saltmarsh occur alongside the River Thames and the River Medway. The other rivers and watercourses crossed support more riverine habitats of open water, aquatic marginal vegetation and fringes of trees and shrubs. The significant areas of wetland habitat affected are listed below.

Many of the grazing marshes crossed by the CTRL are under development pressure and indeed some areas (such as Barking Levels SMI) have already been allocated for development in adopted statutory plans. Apart from their use by wintering and breeding birds, the grassland areas of the grazing marshes are of limited value for nature conservation. The ditches and dykes, however, may support interesting assemblages of plants and invertebrates and therefore tend to be of greatest nature conservation interest.

Table 6 lists the grazing marshes crossed by the CTRL, the area lost by construction of the CTRL and the number of watercourses directly affected. Mitigation for the loss of the grassland will be incorporated into the landscaping proposals as described for semi-improved grassland.

Mitigation for the effects on watercourses involves the diversion and creation of new ditches and dykes and the creation of new wetland habitats.

Alongside the tidal reaches of the River Thames and Medway are patches of saltmarsh. No saltmarsh will be affected along the Thames Marshes but there may be some landtake to saltmarshes at Swanscombe Marshes and Common Marsh.

Engineered, realigned or disturbed watercourses will be re-established to replicate the natural meandering form of the watercourses wherever reasonably practicable.

Table 6 Area of Grazing Marsh Lost to the CTRL (from Scott Wilson's report, June 1997)

Borough or District	Location of Grazing Marsh	Area lost (ha)	No. of watercourses directly affected.
Barking and Dagenham	Barking Levels (SMI)	5.8	2
Havering/ Thurrock	Inner Thames Marshes SSSI	19.4	19
Dartford/ Gravesham	Swanscombe and Botany Marshes	8.4	7
Rochester-upon-Medway	Common Marsh	~0.5	1
	Total Affected	*33.1*	*29*

3.8.5 Protected Species

In addition to designated and other sites, certain species also require protection. Details of the protected species that have been identified in the vicinity of the CTRL route are given below.

Badgers

Badger surveys have identified more than a hundred and twenty-one badger setts, including main, annex and outlier setts, in the vicinity of the CTRL route. Fifty-nine are within the Limits of Deviation (LOD) and twenty-three are within 20m of the LOD. Eighty-five setts will be affected by the CTRL, including between five to eight main setts. It is necessary to ensure that all affected setts are unoccupied and closed before construction starts and that where a main sett will be destroyed, a suitable replacement has been provided prior to the closure of the existing sett.

Bats

Field surveys and collation of existing records has indicated that seven species of British bat (long-eared bat, Daubenton's bat, Leisler's bat, Natterer's bat, noctule, pipistrelle and serotine) have been recorded in the general vicinity of the CTRL. There is evidence that whiskered bat and/or Brandt's bat may also occur.

The surveys have located about a hundred sites, which potentially may be used by bats for roosting or hibernation, scattered throughout much of the CTRL alignment and construction sites. These roosts are mainly in mature trees, but some are in structures such as houses, farm buildings, bridges and culverts. It is necessary to ensure that bat roosts are removed at the appropriate time prior to construction. Breeding roosts need to be removed between September and April, whereas hibernation roosts need to be removed during April-October

Dormice

Dormice have been detected in twenty-one of the woodlands affected by the CTRL. It is a requirement to remove the dormice from the areas affected during construction. In agreement with English Nature, some animals will be relocated within adjacent woodland. Others will be used in English Nature's Species Recovery Programme for this species and will be introduced to suitable woods in southern England that do not currently support dormice.

In addition to the relocation of the dormice populations which will be directly affected the CTRL, it is a requirement under the EC Habitats Directive to provide habitat mitigation measures by the provision of suitable new habitat and links to mitigate for severance effects.

Great Crested Newts

Great crested newts have been found, or are suspected in ten ponds or waterbodies, which will be affected by the CTRL. Great crested newts live in semi-natural habitats, such as rough grassland and scrubby areas, and return to nearby waterbodies, such as ponds or ditches, only to breed. In order to mitigate for the loss of a newt breeding site, it is normally a licence condition to provide two replacement waterbodies and to translocate the animals under licence in early spring as they return to breed. The correct siting of the replacement ponds is required to ensure that there is suitable foraging habitat and hibernation sites nearby. Enhancement of the surrounding terrestrial habitat may be required to achieve this.

Other Species

Where reasonably practicable and in accordance with the requirement in the Wildlife and Countryside Act to protect all bird species, clearance of trees and shrubs needs to be undertaken outside the recognised bird nesting season (April-July inclusive) throughout the route. At a number of locations it will be particularly important to avoid effects to bird species listed under Schedule 1 of the Wildlife and Countryside Act. Where operations have the potential to result in the disturbance of habitats used by breeding birds, the need for appropriate adjustments to the programme will be identified.

Slow-worm, common lizard and grass snake occur along the CTRL, and a programme is underway to identify the prime sites for these species with a view to moving them prior to construction.

A number of waterbodies have been identified, which do not support great crested newts, but do have significant populations of other amphibians. Where reasonably practicable, replacement ponds or ditches will be provided to mitigate for the loss of these sites.

Special measures may be required at a number of locations for the protection or conservation of rare or scarce plant species of either national or county value. In addition, rigorous weed control measures may be required at particular locations in relation to noxious plant species identified under Schedule 9 of the Wildlife and Countryside Act (see Section 3.9.15).

3.8.6 Licensing

Under the provisions of the Conservation (Natural Habitats &c.) Regulations 1994, the Department of the Environment (DoE) has issued or is in the process of issuing URL with licences to damage or destroy habitats inhabited by certain protected species. As required by the licences, the relevant detailed works will be agreed with English Nature.

Further licences will be required directly from English Nature under the Badgers Act 1992.

Badgers

A licence will be obtained from English Nature for any active sett requiring closure prior to construction. Closure may only take place between the period July-November. Where required, replacement artificial setts should be in place at least four months prior to the closure of existing main setts.

Bats

An application for a licence has been made to the DoE. This will be required to undertake the necessary mitigation measures with respect to bats, other than for Leisler's bat for which a licence has already been

obtained. All potential roosts and hibernating sites will need to be removed under observation by a bat specialist, ideally between September-October, or possibly between April-May, depending on the licence conditions.

Dormice

A licence has been obtained from the DoE in order to undertake mitigation works in respect of

dormice. The licence conditions specify that dormice are to be trapped and removed between 1st May and 1st November.

Great Crested Newts

A licence has been obtained from the DoE for the trapping and translocation of great crested newts. Due to the practical constraint of when the animals are active and can be collected, translocation will normally be conducted between the period February-June.

Other Species

Licences will not be required in relation to works affecting bird species protected under Schedule 1 of the Wildlife and Countryside Act.

In relation to reptiles, all native British species are protected under the Wildlife and Countryside Act, which makes it an offence to cause wilful injury to any reptile. Special protection is also afforded to some reptile species listed in Schedule 5 of the Act. None of the reptile species with special protection will be affected by the CTRL, therefore a licence will not be required.

During the course of the translocation of great crested newts, small numbers of other amphibian species may be transferred to new or existing habitats. However, this will not, of itself require a licence.

3.8.7 Monitoring and Protection Measures

Monitoring of protected species is a requirement of the licences issued by the DoE (in respect of the Conservation Regulations) and English Nature (in respect of the Badgers Act). For each of these species, a suitable monitoring regime will be agreed by RLE with the issuing authority. In particular, monitoring will be designed to demonstrate the success of any licensed translocation or other mitigation measures, or to identify shortcomings to allow further appropriate measures to be implemented.

Where appropriate, those species which are translocated (certain amphibians, reptiles and dormice) will be individually identified prior to release (either by recording distinguishing features or by marking). This allows future monitoring to determine the relative success of the translocation exercises.

Where vegetation is transplanted, the survival and spread of the vegetation at its new location will be monitored to assist future management. Similarly, where woodland soils are moved to new receptor sites for woodland re-creation, the developing vegetation will be monitored. Such monitoring will be of sufficient frequency and duration to enable the objectives of the woodland creation programme to be achieved.

There may be special, site specific arrangements for construction sites involving, for example, the avoidance of features of ecological value such as mature trees, ponds, watercourses or areas of general ecological interest. There may also be restrictions on the seasonal timing of clearance works to be undertaken in these areas. A description of these special arrangements and the locations where such measures are to be implemented are identified for a specified Local Authority area in the local EMPs.

3.8.8 Translocation of Protected Animal Species

For some species of protected animals, which have relatively low capabilities for dispersal, translocation is the recommended method for mitigating loss of habitat when other options are not viable. Such species include:

- great crested newts and other amphibians;
- reptiles;
- dormice.

Translocation programmes for each of these species will be implemented where appropriate, using best practice techniques agreed with English Nature.

For great crested newts, new ponds will be provided to replace each known breeding pond which is lost. Details to be agreed with English Nature for each of these sites will include the location of new ponds, further habitat enhancement works (such as provision of additional hibernation sites) and the methods to be employed in translocation.

For dormice, details which will be agreed with English Nature include the trapping regime, woodland clearance works subsequent to trapping, location of sites to which dormice will be moved, monitoring of these receptor sites, and provision of new habitat to replace that lost to the CTRL.

For other amphibians and reptiles there is no licensing requirement, but translocation will be undertaken where reasonably practicable.

For some other species, including badger, bats and birds, translocation is not recommended or is inappropriate. Where a need is identified, appropriate alternative mitigation measures will be implemented.

3.8.9 Translocation of Habitats, Soils or Flora

There are a few sites along the CTRL route where herbaceous perennials or turves will be removed from existing habitats and transplanted to sites not affected by the CTRL. Where this applies, such sites are identified for each Local Authority in the local EMPs. Where reasonably practicable, this will be done at the appropriate time of year (September-October) using best practice methods.

Where they would otherwise be destroyed, vegetation and soils of nature conservation importance may be translocated to new locations. Such translocation allows retention of at least some of the former species from the affected areas, and provides potential for their long-term re-establishment.

During woodland creation, some existing hazel from the original site will be coppiced, and the stools immediately transplanted to appropriate locations within the woodland creation receptor sites. The aim of this is to speed up the development of suitable habitat to support dormice in the new woodland, because the mature stools will produce fruit earlier than the new planted stock. No other woody species will be transplanted.

In all cases, translocation should be rapid as, once removed, vegetation is susceptible to stress such as that caused by desiccation. The most susceptible species are likely to be those which have given most cause for translocation to be undertaken. Conditions to optimise the efficiency and effectiveness of translocation are subject to the requirements of the individual species and sites concerned.

3.8.10 Planting

To assist colonisation by native plants and animals, a number of sites adjacent to existing semi-natural woodlands have been identified for woodland creation. The location of each of the proposed sites is identified for each local authority in the local EMPs. Some of these sites will receive ancient woodland soil which will be transferred from sites affected by the CTRL. At these sites, the agricultural soil (and sub-soil where appropriate) will be stripped off (to remove nutrients), and the ancient woodland soil will be spread to the appropriate depth. The reuse of agricultural top-soil is considered within the Agriculture Management Plan.

After soil stripping, native trees and shrubs (including stock of local provenance where reasonably practicable) will be planted on the site. The sites will be managed appropriately, and for a period which will be long enough to ensure, as far as practicable, that the objectives of the work are achieved. Species that are not native to the UK will not normally be included. Dead and dying, standing and fallen timber will be retained, or will be introduced into new areas to promote invertebrate populations and enhance the overall value of the site as a feeding area for wildlife.

In order to meet the requirement set out in Paragraph 5.6a of the Environmental Memorandum, which specifies greater than 1:1 ratio for replacing lost ancient woodland (see Appendix 3.8B), additional areas of woodland creation are required. At these additional sites, where ancient woodland soil is not available, a second method of planting will be used. Here, the topsoil will be partially stripped, and the areas will then be planted with native trees and shrubs (of local provenance if available). Over the CTRL as a whole, ancient woodland will be replaced by new woodland planting at a ratio of greater than 1:1.

All trees and shrubs planted for ecological mitigation purposes will be planted and maintained in accordance with appropriate good silvicultural arboricultural practice for the site in question, for a period long enough to ensure, as far as practicable that the objectives are achieved.

3.8.11 Measures to Reduce Habitat Fragmentation

Land-bridges will be provided to reduce the effect of habitat fragmentation of some woodland sites. Land-bridges are special permanent structures across the CTRL, which will be planted with a hedge of suitable species composition to allow dormice to cross from one side of the railway to the other. These will also have an area of grass and track which will allow deer, badgers and other large mammals to cross safely.

Where reasonably practicable, woodland fragments resulting from construction and operation of the CTRL will be linked by new planting. New hedges will form links between fragmented hedgerows and other habitats, particularly woodland. Existing links severed by the CTRL will be replaced by new hedges, as appropriate, in accordance with their function as wildlife corridors.

3.8.12 Other General Mitigation Measures

A number of general practical protection measures will be adopted where necessary during construction including:

- the erection of fencing to prevent physical encroachment from construction sites onto adjoining areas of nature conservation interest;
- remedial or protective work to trees adjacent to construction activity carried out by suitably trained or qualified personnel using recognised methods in accordance with BS 5837 "Guide for Trees in Relation to Construction";

- compliance with the relevant provisions set out in Section 6 of the CoCP, Dust, Odour and Exhaust Emissions and Section 9 of the CoCP to prevent dust deposition onto neighbouring sites of nature conservation interest as identified in the Dust Management Plan;

- appropriate measures to reduce the risk of accidental spillage of fuel or other toxic substances and to prevent such pollutants entering watercourses as identified in the Surface and Groundwater Management Plan and the Pollution Incident Control Plan.

3.8.13 Contingencies in Case of Unanticipated Ecological Discoveries

A watching brief will be kept to confirm compliance with the CoCP in relation to ecological resources. This will include the notification of RLE by the Contractors of the presence of unexpected species or ecological features encountered during construction. RLE will consider this information and identify appropriate action. In particular, English Nature will be informed when specially protected species are involved. Contingency measures will be prepared by RLE and discussed with the Environment Forum.

3.8.14 Control of Noxious or Invasive Weeds

Under the Wildlife and Countryside Act 1981, it is an offence to knowingly introduce, or cause to grow in the wild, a number of plant species which are specified in Part II of Schedule 9 of the Act. In relation to the CTRL, two Schedule 9 plants are known to be present in certain areas:

- Japanese knotweed (*Reynoutria japonica* also known as *Polygonum cuspidatum*);

- giant hogweed (*Heracleum mantegazzianum*).

These very invasive species are introduced to the UK and can seriously degrade ecological habitats and landscape works. The spread of these species is aided by dispersal along linear corridors, such as railway lands and rivers. In the case of giant hogweed, this plant also presents a health hazard, because its sap can cause severe skin blistering on exposure to sunlight.

In addition to the Scheduled species above, another introduced pest species, which is not currently included in the Act, Himalayan balsam (*Impatiens glandulifera*), also known as (*Impatiens roylei*), has been noted at sites along the CTRL. This plant may present similar problems to that of Japanese knotweed in respect of adversely affecting habitats.

Guidelines for the control of invasive plants near watercourses featuring these three species have been produced by the Environment Agency. Detailed guidelines for the control of Japanese knotweed (but which are also generally applicable to other invasive species) have been produced by the Welsh Development Agency.

The appropriateness and efficacy of control methods is dependent upon the extent of the area affected and its setting. For example, stricter controls will apply within a sensitive ecological sites or close to a watercourse.

3.8.15 Project Reporting

Where works affect a site identified by a statutory agency as a Priority Site (refer to Annex 5 of the Environmental Memorandum) the Contractors may be required to employ a competent, suitably qualified ecologist to monitor the works. Additional site monitoring by a specialist ecologist may also be necessary at non priority sites, which will be identified by RLE. In line with the licence requirements for protected species, six monthly progress reports will be submitted to English Nature.

Additional regular reporting to the project team will also be necessary in regard to the completion of particular habitat or species mitigation works, or *ad hoc* reporting in the event of finding unanticipated ecological resources.

3.8.16 Geological Procedures

It will be necessary to notify English Nature and English Heritage of any geological features of high scientific value that are exposed, and the criteria for notification will be prepared by RLE and agreed by the Environment Forum. The Contractors will be required to notify RLE of any geological feature of high scientific value exposed. RLE will consider this information in the context of the requirements of paragraphs 5.6d and 5.6e of the Environmental Memorandum and will inform English Nature and English Heritage, if necessary. A procedure will be prepared which sets out how access will be provided for study, enabling appropriate recording and rescue work to be undertaken. Any data gathered in this process will be made available by RLE to relevant parties, where appropriate.

Appendix 3.8A: Definition of Ecological and Geological Designations

International Designations

Sites of international importance for nature conservation, such as **Special Protection Areas (SPAs)** for birds, **Special Areas of Conservation (SACs)** and **Ramsar** sites are listed under specific EC Directives, or under international wildlife treaties ratified by the UK government (Ramsar sites).

Under the Conservation (Natural Habitats &c.) Regulations 1994, SACs within the UK can be designated either because they contain rare or vulnerable habitats, or because they contain significant populations of rare or vulnerable species. SPAs will be included as SACs under the Regulations. No SACs will be affected by the CTRL.

National Designations

The National Parks and Access to the Countryside Act 1949 establishes **National Nature Reserves (NNR)**. No NNR will be affected by the CTRL. The Act also establishes **Local Nature Reserves (LNR)**. The Wildlife and Countryside Act 1981 although partly superseded by the Conservation Regulations, remains an important piece of protection legislation. **Sites of Special Scientific Interest (SSSI)** are designated under this legislation on the basis of their biological value or their geological, or geomorphological characteristics. Two types of geological SSSIs exist: 'exposure sites' where the deposit is accessible at the surface; and 'integrity' sites where the deposit is plentiful underground, but only accessible by remote sampling.

Other Non-Statutory Protected Sites

A variety of non-statutory designations exist within the various local authorities' jurisdiction:

- **Site of Metropolitan Importance (SMI)** for nature conservation are those sites which contain the best examples of London's habitats, sites which contain rare species, rare assemblages of species, or which have particular significance within large areas of otherwise heavily built-up London. In the context of London, they have the highest priority for protection. SMI are identified and designated by the London Ecology Unit.

- **Sites of Borough Importance (SBI)** for nature conservation are those sites important in a London Borough context. SBIs are divided into two grades on the basis of their quality, which are identified and designated by the London Ecology Unit.

- **Sites of Local Importance (SLI)** for nature conservation are important in areas within London otherwise deficient in nearby accessible wildlife sites. They may be of particular value to nearby residents or schools. SLI are identified and designated by the London Ecology Unit.

- **Sites of Importance to Nature Conservation (SINC)** are designated in Essex by the Essex Wildlife Trust (EWT) using criteria similar to those used by English Nature to identify SSSI, but within a county context.

- **Sites of Nature Conservation Interest (SNCI)** are designated in Kent by the Kent Trust for Nature Conservation (KTNC) using criteria similar to those used by English Nature to identify SSSI, but within a county context.

- **Ancient Woodland** sites are defined as areas *"..which have had woodland cover since at least 1600 AD and have only been cleared for underwood and timber production"* (Hutton, 1990). The woodland may have been felled, allowed to re-grow, or may even have been

replanted, but the site has effectively remained as woodland throughout. Ancient Woodlands are identified in the county Inventories of Ancient Woodlands compiled by the former Nature Conservancy Council (NCC), now English Nature.

- Other **Nature Reserves** are sites established by the county wildlife trust, the Royal Society for the Protection of Birds (RSPB) and other non-government organisations (NGOs).

- **Regionally Important Geological and Geomorphological Sites (RIGS)** are designated by the local authority based on similar criteria to the selection of geological SSSI. They may be selected on the basis of their educational value, scientific study, historical or aesthetic value, and may also be categorised as 'exposure' or 'integrity' sites.

Appendix 3.8B: Areas of Nature Conservation and Geological Interest

LOCATION (ROUTE WINDOW)	SITE NAME AND ECOLOGICAL STATUS
Camden (RW1)	Kings Cross Goods Yard SBI 1
Camden/ Islington (RW1)	Copenhagen Junction and Canonbury Junction Railside Land SBI 1
Hackney (RW2)	Graham Road Triangle SLI
Hackney/ Newham (RW3)	River Lee SMI
Newham (RW3)	Bully Point Nature Reserve SBI 1 (including the Channelsea River)
Newham (RW3)	Lee Junction Railway Triangle SBI 1
Newham (RW3)	Former Stratford Railway Works and Railside Lands SBI 2
Newham (RW5)	Railside Land SBI 2
Newham/ Barking and Dagenham (RW5)	River Roding at Little Ilford SBI 1
Waltham Forest (RW3A)	Temple Mills Wasteland SBI 1
Barking and Dagenham (RW7)	Barking Levels SMI
Barking and Dagenham (RW7)	Dagenham Breach and the lower River Beam SBI 1
Barking and Dagenham (RW8)	Grassland between Ford Motor works and Rainham Sewage Works (undesignated)
Barking and Dagenham (RW8)	Beam Valley South and Wantz Stream SBI 1
Havering/ Thurrock (RW9)	Inner Thames Marshes (inc. Wennington, Aveley and Rainham Marshes) and Purfleet Rifle Ranges SSSI, SMI, SINC
Thurrock (RW10)	Purfleet Chalk Pits SSSI (geological)
Thurrock (RW11)	Pasture at Purfleet (undesignated)
Thurrock (RW11)	West Thurrock Lagoon and Marshes SSSI
Thurrock (RW11)	Thurrock Marshes Reedbed potential SINC
Dartford (RW12)	Swanscombe Marshes (undesignated)
Dartford (RW12/13)	Botany Marshes (undesignated)
Dartford (RW13)	Bakers Hole SSSI (geological)
Dartford/ Gravesham RW13)	Ebbsfleet Marshes, etc. and Northfleet and Ebbsfleet Valley South SNCI
Gravesham (RW14)	Downs Road Hedgerow (undesignated)
Gravesham (RW16)	Ashenbank Wood (part of Shorne and Ashenbank SSSI)
Gravesham (RW16)	Cobham Woods Junction and area between Ashenbank Wood and Cobham Hall Woods and Pasture (undesignated)
Gravesham (RW16/17)	Cobham Park Golf Course and Cobham Shooting Ground (undesignated)
Gravesham (RW17)	Cole Wood (undesignated)
Gravesham/ Rochester upon Medway (RW17)	Cobham Woods Complex SSSI (Ancient Woodland)
Rochester upon Medway (RW17)	Head Barn Wood (Ancient Woodland)
Rochester upon Medway (RW17)	Merrals Shaw (Ancient Woodland)

LOCATION (ROUTE WINDOW)	SITE NAME AND ECOLOGICAL STATUS
Rochester upon Medway (RW17)	Cuxton No.3 Pit County SNCI
Rochester upon Medway (RW18)	Pasture West of the Medway SNCI (undesignated)
Rochester upon Medway (RW18)	River Medway and Common Marsh County SNCI
Rochester upon Medway (RW19)	Monk Wood (Ancient Woodland, part of Bridge Woods and Burnham SNCI)
Rochester upon Medway/ Tonbridge and Malling (RW19)	Syle Wood (Ancient Woodland, part of Bridge Woods and Burnham SNCI)
Maidstone (RW20)	Hedge and Verge West of Boarley Farm (undesignated)
Maidstone (RW21)	Donkey Shaws (Ancient Woodland)
Maidstone (RW21)	Park Wood West (Ancient Woodland)
Maidstone (RW21)	Boxley Estate Copse and Pond (Ancient Woodland)
Maidstone (RW21)	Park Wood East (Ancient Woodland)
Maidstone (RW22)	Horish Wood SNCI (Ancient Woodland)
Maidstone (RW22)	Honeyhills Grassland, Pasture West of Honeyhills Wood (undesignated)
Maidstone (RW22)	Honeyhills Wood SNCI (Ancient Woodland)
Maidstone (RW22)	Gore Wood Farm Wood (Ancient Woodland)
Maidstone (RW23)	Longham Woods County SNCI (Ancient Woodland)
Maidstone (RW23)	Pasture South of Poer Meadow Shaw (undesignated)
Maidstone (RW23)	Cottage Wood SNCI (Ancient Woodland, part of Snarkhurst Wood SNCI)
Maidstone (RW23)	Musket Lane SNCI (part of Snarkhurst Wood SNCI)
Maidstone (RW24)	Pasture South of Ash Shaw/The Chestnuts (undesignated)
Maidstone (RW24)	Warren Wood SNCI (Ancient Woodland)
Maidstone (RW25)	River Len and Alder Carr SNCI at Harrietsham
Maidstone (RW25)	Pastures at Harrietsham (undesignated)
Maidstone (RW26)	Pastures and Hedges near Sandway, including Templetree Pasture and old landfill (undesignated)
Maidstone (RW26)	Small Sand Pit and Environs near Sandway (undesignated)
Maidstone (RW26)	Sandway Pit (undesignated)
Maidstone (RW26)	White Horse Inn Pastures (undesignated)
Maidstone (RW26/27)	Lenham Heath and Chilston Park Pasture (undesignated)
Maidstone (RW27)	Bowley Lane Pasture SSSI (part of Lenham Heath and Chilston Park Pasture SSSI)
Maidstone (RW27)	Marshall Farm Carr SSSI (part of Lenham Heath and Chilston Park Pasture SSSI)
Ashford (RW28)	Brockton Farm Pasture and Ponds, aka Heath Farm Rough (undesignated)
Ashford (RW28)	Hurst Wood (Ancient Woodland)
Ashford (RW29)	Westwell Leacon Ponds and Environs (undesignated)
Ashford (RW30)	Ripple Wood (undesignated)
Ashford (RW30)	Beechbrook Wood (Ancient Woodland)
Ashford (RW31)	Hothfield Lake SNCI
Ashford (RW31)	Potters Corner Wood SNCI (partly Ancient Woodland)
Ashford (RW31)	Lodge Wood and Chapel Field Wood SNCI (Ancient Woodland)
Ashford (RW32)	Great Stour River SNCI
Ashford (RW32)	Hunters Railway Yard (undesignated)

LOCATION (ROUTE WINDOW)	SITE NAME AND ECOLOGICAL STATUS
Ashford (RW32)	Aylesford Stream and Pasture (undesignated)
Ashford (RW32)	Railway Yards South of Elwick Road (undesignated)
Ashford (RW33)	Boys Hall Road Rough Grassland (undesignated)
Ashford (RW33)	Church Road at Sevington (undesignated)
Ashford (RW33)	Pasture and Copse East of Jemmetts Farm (undesignated)
Ashford (RW33)	Little Hook Farm Pastures (undesignated)
Ashford (RW34)	Little Stock Farm Pastures (undesignated)
Shepway (RW35/36)	East Stour River (undesignated)
Shepway (RW35)	River View Woodland (undesignated)
Shepway (RW36)	Barrowhill Rough (undesignated)
Shepway (RW36)	Westhanger Damp Grassland (undesignated)
Shepway (RW37)	House Wood (Ancient Woodland)
Shepway (RW37)	Pasture at Sandling Park (undesignated)
Shepway (RW37)	Saltwood Tunnel County SNCI
Shepway (RW38)	Saltwood Valley County SNCI, including Grange Alders, Oak Banks and Bargrove Wood (Ancient Woodland)
Shepway (RW38)	Seabrook Stream SSSI

Appendix 3.8C: Specialist Ecological Surveys & Studies

Specialist Surveys and Studies Undertaken

The Assessment of Ecological Effects (AEE) report, prepared by Cobham Resource Consultants (CRC) for Union Railways Limited (URL), November 1994, which is the specialist ecological report for the Environmental Statement (ES) for the Channel Tunnel Rail Link (CTRL), contains a summary of the specialist ecological surveys undertaken up to the completion of the ES dated November 1994. Since the publication of the ES, a number of further surveys and studies have been undertaken and other surveys are programmed to start or continue during 1997.

Baseline surveys have been completed for the following animal species/species groups:

- badgers;
- bats (all species);
- dormice;
- otters;
- great crested newts;
- other amphibians;
- reptiles (selected sites);
- breeding birds;
- wintering birds;
- aquatic invertebrates (ditches and streams/rivers);
- terrestrial invertebrates (selected sites).

Baseline vegetation surveys have been undertaken as follows:

- phase 1 habitat survey;
- ancient woodland ground flora surveys;
- river corridor surveys.

Soil surveys of ancient woodland donor and receptor sites (various sites) have also been completed.

Copies of all survey reports completed to date have been provided to English Nature (Kent Office).

Specialist Surveys Programmed to be Undertaken in 1997

The survey programme is ongoing, and the following additional or follow-up surveys are proposed for 1997:

- Badgers (9 sites);
- Reptiles (18 sites);
- Bats (25 sites);
- Black redstart (1 site);
- Kingfishers;
- Orchids (2 sites);
- Ancient woodland ground flora surveys (various sites).

Appendix 3.8D: Ecological Mitigation Measures for Habitats and Species

Mitigation measures for particular types of habitat are given in Table 1 below and measures for the protection or translocation of specific fauna are summarised in Table 2. Specific measures for kingfisher and other bird species afforded special protection under the Wildlife and Countryside Act have not been included separately. However, general protection measures for breeding birds are included. Where appropriate, habitat enhancement measures favourable towards birds will be applied within the guidance provided for each habitat type in Table 1 and therefore specific measures are not required in Table 2.

Ecological methods (EMs) are numbered to simplify the information and to cross-referencing with other mitigation (e.g. landscape works). Use of such codes avoids unnecessary repetition within the descriptions of sites, however, details or variations to these basic measures that are specific to each particular location are provided in the local EMPs. Habitat types listed are those which exist within the vicinity of the scheme and which could potentially be affected.

TABLE 1: MITIGATION METHODS - HABITATS

CODE	METHOD	DESCRIPTION
EM1	Ancient Woodland Soil Translocation	Translocation of ancient woodland soils to specially identified receptor areas (see EM8), followed by planting of native trees and shrubs. The receptor areas will have agricultural topsoil stripped prior to receipt of woodland soil. Where reasonably practicable transfer of topsoil will be undertaken during the plants' dormant period. Normally soil to a depth of between approximately 250 - 350 mm will be removed and spread within a suitable receptor site. Woodland ground flora species will be transferred by means of seed or propagules present in the soil. It is proposed that a proportion of the tree and shrub species used in the new plantations will be produced from seed collected and propagated from existing ancient woodland sites. The proportions of tree and shrub species will normally reflect that present in the affected site. However, where appropriate, for example where commercial sweet chestnut coppice is affected, or where joint mitigation for dormice is required (see EM20), different proportions of species may be planted. Specific ratios for each site will be identified at a later date. Woodland planting can include open glades, which may contain grassland, scrub or wetland, where soil conditions permit. Once a tree canopy has been formed (i.e. after about 5-10 years) it may be appropriate to plant certain woodland herbs. Situations where this may be appropriate will be identified on an individual basis.
EM2	Woodland Planting	Where ancient woodland soils are not available, native trees and shrubs will be planted directly onto sites where topsoil has been stripped. At these sites, planting of woodland plants after canopy formation will be essential.
EM3	Ecological Landscape Planting	Where woodland planting is not practical (e.g. on embankments and construction sites), some mitigation for loss of woodland can be provided by ensuring that the

CODE	METHOD	DESCRIPTION
		species mix of landscape planting is suitable.
EM4	Hedgerow Replacement	Where new hedges compensate for those removed, species planted will normally be the same as those lost. New hedges will be species-diverse and include tree species. Non-native species will not be planted. Removal of existing hedges will, where reasonably practicable, be timed to avoid the bird nesting season (see EM21). Mature trees will be checked for bats and appropriate measures taken before felling (see EM18). Where reasonably practicable,, particularly where bat foraging areas are affected, double-hedges will be created.
EM5	Scrub Regeneration	Natural regeneration of scrub on wasteland or from grassland which is left uncut, where appropriate.
EM6	Scrub Planting	Planting of shrubs for landscape reasons or to compensate for similar habitat which has been lost using species to reflect the habitat of affected sites (unless non-native, or invasive species predominate). Locally native species should dominate new areas of scrub, which should be species-diverse and structurally varied to maximise habitat diversity and maximise potential use of breeding birds.
EM7	Grassland Regeneration	Grassland will be allowed to regenerate naturally on exposed substrate (e.g. on cutting slopes). Where appropriate, grassland will be mown, or shrub growth cleared periodically to prevent scrub from developing (see EM5).
EM8	Wildflower Seeding	Seeding the subsoil (B horizon) directly with a wild flower mix suitable to the local geology. Topsoil will not be added as this will severely reduce the effectiveness of the mitigation. Application of fertilisers, nutrients and pesticides will be strictly avoided and the mowing regime should be restricted to 2-3 times per year. Management plans which are specific to the physical (e.g. drainage, aspect, slope) and biological (e.g. species make-up, other ecological objectives) composition of each site would be required. Application of permitted pesticides will be necessary in the 5 m adjacent to the track, and this area will therefore not be used for grassland creation.
EM9	Grassland Habitat Translocation	Individual plants, such as orchids, may be transferred by the cutting and re-planting of soil cores within suitable receptor locations, or larger areas may be translocated as turves. Treatment of areas where these materials are transferred to will be as for EM8.

EM10	Grey Mouse-ear Translocation	Translocation of the annual grey mouse-ear (*Cerastium brachypetalum*) will be by the collection and dispersal of ripe seed on suitably prepared railway banks/cuttings. The best method for preparation is the subject of ongoing research.
EM11	Wetland Creation	New wetland habitats will be created to replace those affected by the scheme. This would occur on land which is relatively flat.. New drainage ditches will be dug, which may include hollows and ponds would be scraped and allowed to fill with water. Wetland areas can be "seeded" by translocation of vegetation from other sites. Wetland plants would be removed as individuals or clumps and relocated to appropriate receptor sites such as ponds or rivers. Emergent and rooted aquatic species can be transferred as rhizomes during the dormant period. Lightly rooted submerged or floating aquatic species, which die back over winter, may be transferred by raking out towards the end of the summer, or by transference of silt containing propagules in the dormant period. No fertilisers, nutrients or pesticides would be applied to these areas. Clearance of invasive vegetation would be undertaken when required to prevent loss of species diversity. Measures would be required to prevent adverse water quality impacts or drainage of the site.
EM12	New Amphibian Ponds	Where ponds containing important amphibian communities are lost, new ponds will be provided which are designed accordingly. These will typically be up to 1.5 m deep, with shallow sloping margins and will be planted with native aquatic and marginal plants. Plants will be translocated from ponds which will be lost where this is reasonably practicable.
EM13	Balancing Ponds and Pollution Control Ponds	Balancing ponds will be designed to include a permanently wet area and incorporate other wetland habitat creation features beneficial to wildlife, where reasonably practicable.
EM14	Replacement of Watercourses and Riparian Habitats	Engineered, realigned or disturbed watercourses will be re-established so as to replicate the natural meandering form of watercourses where this is reasonably practicable. They should vary in width, depth, and cross-sectional profile to maximise their habitat diversity. River banks should be engineered into such channels using earth held in place with biodegradable matting to ensure that re-establishment is as rapid and successful as possible. Such matting should be planted at, or immediately after, the time of construction works. Wetland (marsh) areas should be created adjacent to watercourses. Other appropriate fringing habitats include scrub, woodland, hedgerows, grassland and isolated trees. Banks and inundated areas would be planted with species typical of similar watercourses, by vegetation translocated from affected sites, or stands of typical riverside vegetation taken from other local watercourses where present in abundance. Structures, such as bridges and culverts will be designed in accordance with the Design Guidelines provided by the

		Environment Agency. All construction works in the vicinity of watercourse will be undertaken in accordance with the Code of Construction Practice in order to avoid possible pollution.
EM15	Land Bridges	Where require, permanent land bridges will be provided to connect areas of woodland fragmented by the route. These will be designed to allow a hedge to be planted across them, thereby providing a crossing point for woodland animals.

TABLE 2: MITIGATION MEASURES - PROTECTED AND OTHER SPECIES

CODE	SPECIES	METHOD
EM16	Great Crested Newts	Where destruction of an existing pond identified as a breeding site used by great crested newts is necessary, two replacement ponds will be provided (see EM12). Ideally, the new ponds would be completed at least six months prior to be breeding season starting in February/March. Trapping and translocation of great crested newts will be undertaken in the spring under licence, prior to destruction of the existing pond. Other species of amphibians captured with the great created newts will either also be transferred to the created ponds, or if numbers are high, released at other suitable sites nearby. Areas chosen for new ponds would be adjacent to existing terrestrial habitat that is suitable for the amphibians concerned e.g. semi-natural woodland, rough grassland, scrub and hedgerows. Where there appear to be few suitable areas for the newts to hibernate, piles of dead tree trunks and branches, or rubble to provide suitable hibernation sites. Suitable designs for such features are provided in the appropriate specialist report. Where necessary, additional terrestrial habitat may also need to be provided by tree and shrub planting. In line with the licence requirement, details for mitigation at each site will be agreed with English Nature prior to commencement.
EM17	Other Important Sites for Amphibians	Where a pond identified as an important breeding site for other amphibians is to be lost, only one replacement pond will be provided where reasonably practicable (see EM12). Trapping and translocation of adult amphibians at these sites is not proposed, but spawn may be transferred to new ponds. Destruction of the existing ponds will occur outside the breeding season. Provision of additional terrestrial habitat may be required as for EM15 above.
EM18	Bats	Trees, structures and buildings that have been identified as possibly being used by bats will be inspected beforehand by a bat licence holder. Sites used by bats will be removed when they are not likely to be in use (normally September/October, or April/May). All work will be undertaken in accordance with the appropriate licences, and details will be agreed with English Nature prior to commencement. Where appropriate bat boxes (of approved design) will be provided on mature trees, to promote use of the area by roosting bats or to compensate for lost bat roosts. The numbers of bat boxes used would be dependent upon the requirements of individual sites. Suitable bat box designs have been proposed for this scheme based on designs presented in the relevant specialist report.
EM19	Badgers	For each location where an active badger sett is to be destroyed, a licence will be obtained from English Nature. Closure of setts will follow best practice, and will be undertaken outside the breeding period (i.e. in July-November). Where a main sett is to be lost, an artificial sett will normally be provided as close as practicably possible to the existing main sett, and in suitable habitat. Where badgers are likely to cross the railway badger proof fencing will be provided. Fencing will be designed to guide the badgers to safe crossing points such as over-bridges, existing underpasses, or purpose-built badger underpasses.

CODE	SPECIES	METHOD
EM20	Dormice	Dormice will be removed from woodland prior to felling and relocated to unaffected areas of adjacent woodland. They will be trapped by methods specified in the DoE licence and relocated as agreed with English Nature. Trapping will occur in the period May to October (inclusive). Additional dormouse habitat will be provided by planting new woodlands (EM1-EM3). The tree/shrub species to be planted will be chosen to favour dormice. These new woodlands will be joined to existing dormouse habitat to allow natural re-colonisation. Where necessary land bridges (EM15) and hedgerows will be provided to link areas of existing/new habitat.
EM21	Breeding Birds	Clearance of habitats, including vegetation or artificial structures, known or considered to be used by breeding birds (in particular Schedule 1 species), will be cleared or removed outside the recognised breeding season of April to July inclusive where reasonably practicable.
EM22	Reptiles	Where significant reptile habitats are affected, the reptiles will be caught and translocated to existing suitable habitat.
EM23	Deer	Where significant deer populations are present or migration routes are affected, permanent 2m high deer-proof fencing will be provided. Fencing will be designed to guide deer to safe crossing points, such as land bridges.

3.11 Pollution Incident Control Plan

3.11.1 Objectives and Scope

The overall objective of the Pollution Incident Control Plan for the CTRL Project is given in the Code of Construction Practice (CoCP) Part A (paragraphs 14.1 and 14.2) which state that:

> *"The nominated undertaker will undertake the works in such a way as to avoid pollution incidents; however should any occur, procedures and measures will be implemented to contain and limit the effects as far as reasonably practicable."*
>
> *"Such procedures and measures will cover **atmospheric, aquatic or land pollution** and procedures in the event of **fire**."*

In order to achieve the key objectives of the Environmental Management Plans (EMPs) as stated in Section 1.2, the Pollution Incident Control Plan covers the issues specified in paragraphs 14.3 to 14.8 of the CoCP Part A. It describes the strategy for providing the notification and immediate remedial measures to be implemented in respect of Pollution Incidents during the construction of the CTRL.

Pollution Incident Control and Reporting is also referenced as part of other general Environmental Management Plans as follows:

- Section 3.4 - Dust Management Plan - General
- Section 3.5.6 - Contaminated Land and Waste management Plan - General
- Section 3.6.4 - Surface and Groundwater Management Plan - General

3.11.2 Legislation and Guidance

The main statutory provisions, regulations, codes of practice and notes for guidance which may be relevant for the formulation and subsequent implementation of this management plan are outlined below:

Legislation

- Environment Act 1995
- Clean Air Act 1993
- Water Industry Act 1991
- Water Resources Act 1991
- Land Drainage Act 1991
- Environmental Protection Act 1990
- Health and Safety at Work Act etc. 1974
- Control of Pollution Act 1974
- Control of Substances Hazardous to Health Regulations1994 (COSHH) - as amended
- Special Waste Regulations 1996
- Trade Effluents (Prescribed Processes and Substances) Regulations 1989

Guidance

- Protection of workers and the general public during development of contaminated land. HS(G)66 - HSE, 1992;

3.11.3 Definitions

RLE will implement a system to ensure pollution incidents are reported by the Contractors, or by the appropriate RLE staff, to the relevant persons/authorities, dependant on the severity of the potential or actual event. The system allows for follow up investigations and reporting to ensure the circumstances surrounding an incident, or the circumstances that could have led to an incident, are learnt from. It is intended that pollution incidents will be reported as either a "Serious Incident" or as an "Incident" as defined below.

"Serious Incidents"	Serious incidents are, for the purposes of this plan, defined as an unplanned or uncontrolled pollution event, which has led to or could have caused harm to the environment.
"Incidents"	Incidents are defined as an occurrence which could or has the potential to result in a "Serious Incident".

3.11.4 Pollution Incident Control Plan

For ease of reference the areas covered by the Pollution Incident Control Plan refer directly to the points set out in paragraph 14.7 of the Code of Construction Practice Part A.

Guidance on the storage and use of hazardous materials with the aim of preventing and containing spills and releases

The Contractors employed to construct the CTRL may carry out certain processes and use certain materials and substances that have the potential to pollute the land, air and surface waters and groundwaters. In order to reduce the risk to the environmental media of air, land and water the Contractor will be required to implement certain controls.

For surface and groundwaters controls on the handling and storage of hazardous materials and substances are as stated in section 3.6.4 of the General Surface and Groundwater Management Plan. Similarly the requirements stated in 3.5.4 of the Contaminated Land and Waste Management Plan will be implemented in order to ensure contaminated waste and hazardous materials/substances, in solid or liquid form, are adequately controlled. The requirements stated in 3.4.4 of the Dust Management Plan will also be implemented to ensure contaminated materials and /or hazardous materials are controlled in a way that prevents their dispersal as dust.

Where appropriate detailed measures/procedures on the handling and storage of potentially polluting materials and substances will be adopted by the Contractors in their Pollution Incident Control Plans.

Guidelines on the degrees of containment which take account of the nature of the materials and the sensitivity of the environment

Measures to be implemented to ensure that surface and groundwaters are protected from potentially polluting materials through containment are stated in section 3.6.4 of the General Surface and Groundwater Management Plan.

Measures to ensure protection of air quality (section 3.4 of the General Dust Management Plan), contamination of land (section 3.5 of the General Contaminated Land and Waste Management Plan) are as stated in the relevant general EMPs. More specific measures on surface and groundwater protection, air quality protection and waste management are to be developed and included, where necessary, in the local EMPs.

The Contractor will be required to comply with RLE's Pollution Incident Control Plan and will be required to provide details on how he will implement the Plan to ensure compliance. Where appropriate detailed measures/procedures on the handling and storage of potentially polluting materials and substances will be adopted by the Contractors in their Pollution Incident Control Plans.

Procedures to be adopted in the event of a pollution incident, to contain and limit any adverse effects

The procedures to be adopted in the event of a pollution incident are dependant on how it has been classified (i.e. "incident" or "serious incident"). In cases of an "incident" the key mechanism for ensuring control and awareness is through reporting, as outlined in the next section. Control in respect of a "serious incident" is implemented through the following generic measures, to ensure any adverse effects are limited as far as practicable, and through reporting in order to ensure the relevant statutory authorities and other persons are informed as necessary.

Generic measures to contain and limit adverse effects

- If the process leading to pollution is still operating ensure it is stopped or modified to prevent further contamination/pollution.
- Isolate polluted area and inform staff.
- Ensure there are no sources of ignition if polluting matter/substance is flammable.
- Ensure staff and neighbours are evacuated if pollution is harmful when inhaled.
- Screen/cover stockpiles of polluted matter to prevent airborne dispersion.
- Contain polluting matter prior to clean up procedure.
- Seal off drains that polluting matter may enter.
- Use absorbent pads/booms to contain polluting substance.
- If liquid spill add absorbent matter to reduce effect of pollution - do not hose away.
- Dispose of polluting and polluted matter as special waste.

Procedures and appropriate information required in the event of any incident such as a spillage or release of a potentially hazardous material

Depending on the classification of the pollution incident the generic pollution control measures outlined in the preceding paragraph will be implemented as appropriate.

For both "serious incidents" and "incidents" information will be recorded on a form similar to that in Attachment 2. It should be noted that if the incident has the potential to pollute the environment although has not yet done so then this is still recorded on the form to allow potential serious incidents to be identified at an early stage and the appropriate corrective action implemented. Information recorded will need to include the details below. It is intended that the relevant information with regard to the pollution incident will be collected by the Contractors Environmental Manager in consultation with the relevant RLE staff.

Basic information will include:

- The date and time of the incident
- The location of the incident
- A description of the incident or the process which resulted in the incident
- The classification, (i.e. "incident" or "serious incident")
- The name of the person reporting the incident, the organisation he works for and his position
- The action taken to minimise the effect of the pollution incident
- If required by legislation, details on the persons/agencies etc notified and when
- The recommended actions for ensuring the incident does not reoccur

Systems for notifying appropriate emergency services, authorities, the nominated undertaker and Contractor's personnel & arrangements for notifying appropriate statutory bodies and local authorities of pollution incidents where required by legislation

Systems to ensure the notification of the relevant authorities and personnel will be developed in accordance with the measures outlined in the Contractors Emergency Preparedness Plan and Pollution Incident Control Plan. Notification will be dependant on the classification, scale and nature of the pollution incident.

If the pollution incident has resulted in the pollution of controlled waters (as defined in the Water Resources Act 1991) then the Environment Agency will be informed as soon as possible. Their Emergency Hot Line Number is 0800 807060.

Relevant procedures and contacts for each work site for forwarding to the emergency services, and appropriate authorities

In developing the Contractors Pollution Incident Control Plan, and Emergency Preparedness Plan, reference will be made to the particular authorities and emergency services to be contacted in the event of a pollution incident and the particular procedures to be followed.

In the exceptional circumstance that a "serious incident" occurs the following RLE and Contractors personnel will be informed in conjunction with the relevant emergency services and statutory authorities:

- The Contractors Environment Manager
- The Contractors Supervising Engineer or nominee
- RLE's Supervising Engineer
- RLE's Construction Manager
- RLE's Health and Safety Manager or nominee
- RLE's Technical Director or nominee
- RLE's Community Relations Department
- RLE's Environment Manager

3.11.5 Training

It is a requirement that the construction contractor adequately trains his staff with regard to environmental protection and pollution control. The level of training will be dependant on the type of work undertaken by the contractors staff but will include guidance on the measures to be undertaken in the event of a pollution incident and basic measures to ensure pollution incidents are avoided.

It is also intended that RLE site staff will be given awareness training with respect to environmental protection and pollution incident control.

3.11.6 Attachment 1

Example Pollution Incident Control Notification Form

Section				
1	CTRL Contract Number Contractors Name Site Name and Location			
2	Date of Incident Time of Incident Exact Location of Incident (Chainage if applicable)			
3	Description of Pollution Incident - (state how incident reported - i.e. notification by public, site staff etc.) Was it a? Serious Incident Incident	☐ tick box as appropriate ☐ tick box as appropriate		
4	Person(s) involved in the Incident Name Occupation Company Contact Address & telephone number			
5	Immediate actions taken to control the Incident - Provide Details. State if no action taken (tick as appropriate)		No action taken	Action taken (fill in section above)
	Notification details (tick as appropriate) and state person and department contacted.	URL RLE Environment Agency Local Authority Emergency Services Water Companies HSE Railtrack London Underground Limited	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	
7	Follow up investigation/actions to be implemented?			
8	Recommendations?			
9	Form Completed by: Name Company Position Signature Date Telephone Number			

Please note this form must be notified to the RLE Manager of Health and Safety if the Pollution Incident is, or could be, an accident or incident in respect of Health and Safety.