

## 14 Ecology

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### 14.1 Introduction

This report provides an assessment of the likely impacts of the proposed road development of the M7 Osberstown Interchange and the R407 Sallins Bypass, Co Kildare, on the ecological environment (i.e. flora, fauna and habitats). It is carried out in compliance with the Environmental Protection Agency's *Guidelines on the Information to be Contained in Environmental Impact Statements* (EPA, 2002) and the relevant National Roads Authority Environmental and Planning Construction Guidelines. The chapter sets out the methodology to be followed (Section 14.2), describes the existing environment (Section 14.3), reviews predicted impacts (Section 14.4), sets out mitigation measures proposed (Section 14.5) and describes anticipated residual impacts (Section 14.6).

### 14.2 Methodology

#### 14.2.1 Consultations

- Consultation letters were submitted to the National Parks and Wildlife Service (NPWS) of the Department of Arts, Heritage and the Gaeltacht (DAHG).
- The NPWS were consulted regarding designated area boundaries, records of protected species of flora and fauna, and their concerns and requirement in relation to the proposed scheme.
- The recommendations and observations of the DAHG were received on 10<sup>th</sup> July 2013 in relation to the EIS scoping report for the proposed scheme.
- Consultation was also undertaken with Inland Fisheries Ireland (IFI) to determine the fisheries value of watercourses within and adjacent to the site, and to seek their views and requirements on design of watercourse crossings.
- The recommendations and observations of IFI were received on 11<sup>th</sup> July 2013 in relation to the EIS scoping report for the proposed scheme.
- Further requirements in relation to the angling amenity value of the River Liffey in the vicinity of the proposed crossing points were received from IFI on the 6<sup>th</sup> August 2013.

#### 14.2.2 Background Review

Existing information relating to the proposed scheme was reviewed which included the ecological component of an earlier Environmental Impact Statement prepared by Dr. P. Ashe for the Millennium Park Centre (2001) which incorporated part of the proposed development area in the vicinity of the Osberstown attenuation pond. The ecology section of an earlier submitted EIS prepared by EirEco Environmental Consultants for the upgrade of the M7 Osberstown Interchange (Arup, 2008) was also reviewed.

The NPWS website database was reviewed to determine the proximity of the proposed scheme to designated areas for conservation and along with the website of the National Biodiversity Database website, for records of protected species of flora and fauna. The habitats along the proposed scheme were mapped and broadly classified based on a review of orthophotography prior to undertaking any field surveys.

A review of the OSI mapping and orthophotography was carried out to determine the proximity of the proposed scheme to aquatic habitats that may be subject to direct impacts through crossing or indirect impacts through severance of connecting corridors, pollution run-off during construction, etc. A review was also undertaken of existing sources of information and records pertaining to the aquatic environment in the vicinity of the study area including a review of water quality data on the EPA Envision website.

### 14.2.3 Field Survey

Following on from the desk study, a series of site visits were undertaken in June and July 2013.

#### Habitat Survey

Habitats along the proposed scheme were classified according to the Heritage Council scheme (Fossitt, 2000) (habitat codes are shown in parenthesis within the text). The plant communities within each habitat type were noted and particular attention was given to identifying any protected, rare or invasive species of plant. In this report, scientific and common names for plants follow Webb et al. (1996), and Scannell and Synnott (1987) respectively.

The aquatic habitats in the vicinity of the proposed scheme were surveyed for the presence of, and suitability for, rare or protected species of fauna and flora in accordance with the methodologies outlined in the *Ecological Surveying Techniques for Protected Flora and Fauna during Planning of National Road Schemes* (2008).

All watercourses (as identified from OSI Discovery mapping) crossed by the proposed scheme were surveyed in detail over a stretch from 50 m upstream to approximately 300 m downstream of the proposed crossing point, while instream habitat conditions were assessed for a further 200 m downstream. Consideration was also given to the potential for effects on aquatic habitats further downstream in terms of nursery habitat, drift food supply (in the form of invertebrates etc.) and the risks of sediment or pollution transfer. The survey recorded a variety of physical parameters including depth, width, substrate, flow-regime and bankside profile, instream and bankside vegetation, fisheries habitats and a visual assessment of water quality. The stretch downstream of all proposed crossing points was surveyed in particular to assess spawning areas for salmonids that would be prone to siltation. The assessment of the fisheries value of each watercourse was made on the basis of suitability for spawning, nursery and holding potential for fish species, including the Annex II listed salmon.

## Mammal Survey

Mammals were assessed in the course of the main habitat surveys using a combination of direct sightings and observations of signs, tracks and droppings. A dedicated faunal survey was undertaken in July 2013, though the growth of vegetation at this time of the year may have resulted in some smaller badger setts being undetected.

The surveys aimed to determine evidence of otter activity (including spraints, holts, couches, lie-ups, twists and slides) along all watercourses with the main emphasis being placed on-line or within c100 m of the proposed crossing point. Consideration was also given to the potential of the watercourse to act as a corridor for the movement of otter between other sites.

## Bird Survey

Birds were also assessed in the course of the main habitat surveys using a combination of direct sightings and observations of signs, tracks and droppings. Kingfisher nest sites were also searched for along all watercourses crossed by the proposed development. The main emphasis was placed on potentially suitable nesting sites (riverbanks with exposed soil or sands) and feeding perches on-line and within c100 m of the proposed crossing point though the survey extended over the entire 500 m corridor study area. .

## Aquatic Ecology

Specific surveys to determine the presence of crayfish were undertaken using manual searches in five suitable patches of habitat within a 200 m section of watercourses with suitable water chemistry for the species (specifically the River Liffey, Grand Canal and the Osberstown Pond). This survey was carried out under Licence No. C112/2013 from the Department of Arts, Heritage and the Gaeltacht.

Watercourses identified as having the potential to support brook lamprey were assessed for ammocoete larvae by a combination of hand coring and sweep netting in potentially suitable soft sediments.

## Bat Survey

*Aardwolf Wildlife Surveys* carried out a study of bat fauna within the area of the proposed M7 Osberstown Interchange and R407 Sallins Bypass road to determine the suitability of the habitats for roosting, commuting and feeding purposes by bats.

The study included site visits as well as a desk study of known bat activity in the area in accordance with the following guidelines:

- EPA (2002) - *Guidelines on the Information to be contained in Environmental Impact Statements*.

Recommendations and evaluation techniques utilised are in general accordance with the following:

- *Guidelines for Baseline Ecological Assessment* (Institute of Environmental Assessment, UK 1995),

- *Wildlife Impact: the treatment of nature conservation in environmental assessment* (RSPB 1995) and *Guidelines for ecological evaluation and impact assessment* (Regini 2000).

The on-site habitats were assessed during daylight hours in October 2013 to determine their favourability for bats and, at dusk and into the hours of darkness, on-site bat activity was assessed by listening for bats while walking transects using *Batbox Duet* Heterodyne/Frequency Division and *Echo Meter EM3+* Heterodyne/Frequency Division/Time Expansion bat detectors. Bats were identified by their ultrasonic calls coupled with behavioural and flight observations. Structures were inspected for evidence of the presence of these animals with the aid of a powerful torch (141 Lumens) – Petzl MYO RXP.

The field surveys were supplemented by evaluation of relevant literature and review of *Bat Conservation Ireland's* (BCIreland) National Bat Records Database.

#### 14.2.4 Reporting

The evaluation of the ecological environment and the criteria used to assess the significance of impacts are derived from the following guidance:

- *Guidelines for Assessment of Ecological Impacts on National Road Schemes* (NRA, Rev. 2, 2009, refer to Appendix A14.1 V4).

Reporting is in compliance with the following guidance:

- *Environmental Impact Assessment of National Road Schemes – A Practical Guide* (NRA, Rev1, 2008).

Mitigation proposals are based on the relevant National Roads Authority construction guidance documents pertaining to the natural environment including:

- *Ecological Surveying Techniques for Protected Flora and Fauna;*
- *Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes;*
- *Guidelines for the treatment of bats during construction on National Road Schemes;*
- *A Guide to Landscape Treatments on National Road Schemes;*
- *Guidelines for the Treatment of Badgers during the Construction of National Road Schemes;*
- *Guidelines for the Treatment of Otters during the Construction of National Road Schemes*) and
- *Guidelines on the Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads.*

## 14.3 Receiving Environment

### 14.3.1 General Description of the Study Area

The M7 Osberstown Interchange is located along the M7 approximately 2 km north of the Naas in County Kildare. There is an existing farm accommodation overbridge (Osberstown Bridge), which connects lands on the north to the land south of the M7 in the vicinity of a large attenuation pond. The pond is filled by the Osberstown Stream which flows from the south into the pond, and drains to the north in two culverts under the M7.

The land north of the M7 is in agricultural use, while that to the south of the road is comprised of neglected fields, and disturbed ground in the vicinity of Western Distributor Road.

The route of the Sallins Bypass runs to the east of Osberstown House and runs through primarily agricultural grasslands in a north-south orientation. The route crosses the Grand Canal, a proposed Natural Heritage Area, and the river Liffey at two separate locations before tying-in to the R407 Clane Road.

### 14.3.2 Designated Areas

Flora and fauna in Ireland are protected at a national level by the Wildlife Act, 1976 and Wildlife (Amendment) Act, 2000 and the Flora (Protection) Order, 1999 (SI 94/1999). They are also protected at a European level by the EU Habitats Directive (92/43/EEC) and the EU Birds Directive (79/409/EEC) which are transposed into Irish law by the European Union (Natural Habitats) Regulations, 1997 (S.I. No 94 of 1997) as amended.

Under these provisions important sites for nature conservation are designated in order to legally protect faunal and floral species and important/vulnerable habitats.

Three categories of designated area are within the zone of influence (i.e. 10km) of the proposed road development, as follows;

- Candidate Special Areas of Conservation (cSAC) are designated under the European Communities (Natural Habitats) Regulations 1997 to comply with the EU Habitats Directive (92/43/EEC).
- Special Protection Areas (SPAs) are designated under the EU Birds Directive (79/409/EEC) and are transposed into Irish law by the European Union (Natural Habitats) Regulations, 1997 (S.I. No 94 of 1997). These cSACs and SPAs are considered to be of international importance.
- Proposed Natural Heritage Areas (pNHAs) which were published on a non-statutory basis in 1995, but have not since been statutorily proposed or designated. They have limited protection in the form of recognition of the ecological value of pNHAs by Planning and Licensing Authorities such as county councils and the County Development Plan.

### 14.3.2.1 Natura 2000 Sites

The Candidate Special Areas of Conservation (cSAC) and Special Protection Areas (SPAs) are classified as Natura 2000 sites and the Habitats Directive applies to these sites only. A separate screening report has been prepared to determine the potential impacts, if any, of the proposed road scheme on the Natura 2000 network. This report is contained in **Appendix A14 V4**.

There is no crossing of or direct impact on any Natura 2000 site by the proposed M7 Osberstown Interchange and R407 Bypass Scheme. The screening stage report concluded there will be no direct or indirect impact on any Natura 2000 site and therefore, there are not likely to be significant effects on any Natura 2000 site.

### 14.3.2.2 Non-Natura 2000 Sites

The R407 Sallins Bypass route crosses the Grand Canal at Ch. 1+560 and a section of abandoned canal, known locally as the 'dead canal' is crossed on the Sallins Link Road at Ch. 0+330. The Canal is a proposed Natural Heritage Area (pNHA) (site code no. 2104) which encompasses the canal channel and the banks on either side of it and the 'dead canal' which extends to the River Liffey immediately west of Sallins (see **Figure 14.1 V3**). The canal supports otter (*Lutra lutra*), listed under Annex II of the EU Habitats Directive and opposite-leaved pondweed (*Groenlandia densa*), a Flora Protection Order listed species. A Site Synopsis for the pNHA is presented in Appendix A14.2, V4.

## 14.3.3 Habitats

The distribution of habitats within and adjacent to the proposed scheme is shown in **Figure 14.2a** and **14.2b V3**.

### Grasslands and Reed Swamp

The majority of the site consists of improved agricultural grassland (GA1), which is grazed by cattle and horses or cut for silage. The fields to the north of the M7 are currently being farmed and managed intensively. To the south of the M7, the grasslands around the Osberstown Pond are neglected and ungrazed supporting various species typically associated with low levels of management including ragwort (*Senecio jacobea*), thistles (*Cirsium* spp.) and docks (*Rumex* spp.). The embankments of the Osberstown Bridge support a suite of species typical of dry meadows and grassy verges (GS2) including creeping bent (*Agrostis stolonifera*), Yorkshire fog (*Holcus lanatus*), cocksfoot (*Dactylis glomerata*), thistles, dock, nettle (*Urtica dioica*), vetches (*Vicia* spp.) and occasional coltsfoot (*Tusilago farfara*).

The existing accommodation overbridge itself supports two narrow bands of dry calcareous - neutral grassland (GS1) that has formed on the capping of glacial sands and gravels used as surface layer. The diversity of species is moderate and includes meadow grasses (*Poa* spp.), fescues (*Festuca* spp.), blue sedge (*Carex flacca*), daisy (*Bellis perennis*), medick (*Medicago lupulina*), yarrow (*Achillea millefolium*), knapweed (*Centaurea nigra*) and *Calliargon* moss with occasional orchids (*Dactylorhiza* sp.) and saplings of whitebeam (*Sorbus aria*).

Around the edge of Osberstown Pond, a narrow fringe of species-poor wet grassland (GS4) occurs which is broadest to the south of the pond. The vegetation is dominated by rushes (*Juncus acutiflorus* and *J. effusus*), creeping bent and creeping buttercup (*Ranunculus repens*) with small amounts of hairy willow herb (*Epilobium hirsutum*) and meadow sweet (*Filipendula ulmaria*). These grades into an irregular band of reed swamp (FS1) that fringes the attenuation pond, which is dominated by mono-typic stands of bulrush (*Typha latifolia*) and branched bur reed (*Sparganium erectum*).

Tall herb swamp (FS2) fringes the River Liffey at both crossing locations but is most developed along the northern bank of the crossing at Ch. 3+050 where it forms a band up to 10 m in width.

It is dominated by reed canary-grass (*Phalaris arundinacea*) with abundant nettle, hairy willow herb and meadowsweet with water horsetail (*Equisetum fluviatile*) and marsh bedstraw (*Galium palustre*). The invasive non-native Himalayan balsam (*Impatiens glandulifera*) is present in the vicinity of both crossing points on the River Liffey.

### **Recolonizing Bare-ground**

An area of filled ground extends in a rough triangle between the Western Distributor Road, the farm track leading onto the Osberstown Bridge and the attenuation pond. The fill is comprised of heavily compacted subsoils and till which supports a sparse suite of colonizing plants typical of recolonizing bare ground (ED3) including creeping bent, creeping buttercup, oxeye daisy (*Leucanthemum vulgare*), fat-hen (*Chenopodium album*), red bartsia (*Odonites verna*), thistle, ragwort and dock.

### **Trees, Treelines, Hedgerows and Scrub**

Two relic treelines (WL2) occur on the south of the M7 at Osberstown; the first is adjacent to the farm track and adjoins the area of filled ground. This is a relic piece of mature, unmanaged hedgerow dominated by hawthorn (*Crataegus monogyna*) and supports a small number of mature ash (*Fraxinus excelsior*), sycamore (*Acer pseudoplatanus*) and willow (*Salix* sp.), with bramble (*Rubus fruticosus* aggr), dog rose (*Rosa canina*) and ivy (*Hedra helix*). A second treeline occurs to the south of the attenuation pond and is comprised of mature ash and hawthorn with privet (*Ligustrum vulgare*), bramble and rose in the understorey.

Both dogwood (*Cornus sanguinea*) and willow (*Salix* spp.) have been planted along the western side of the attenuation pond forming linear patches of scrub (WS1). A solitary mature and heavily ivy-clad ash tree occurs immediately south of the M7 at the toe of the Osberstown Bridge embankment. Both sides of the M7 have been planted with hedgerows (WL1) comprised solely of hawthorn. These hedgerows are of recent origin and are regularly trimmed as part of highway maintenance.

To the north of the M7 a treeline of mature trees runs parallel to the line of the proposed Sallins bypass between Ch. 0+200 to Ch. 0+450. This is comprised of a mixture of species though dominated by ash, some of which have exceptionally large girths (>3 m) and constitute specimen trees. In addition, there are occasional sycamore, maple (*Acer* sp.), silver poplar (*Populus alba*) and a small number of spruce (*Picea* sp.) at the southern end. Mature hawthorn are frequent throughout the treeline which has an associated dry ditch.

A remnant hedgerow runs across the route at Ch. 0+200 which consists of a line of very mature and well spaced hawthorn. A second treeline runs across the proposed route at Ch. 0+550 which includes a number of mature to over mature trees but is dominated by large hawthorn. A specimen oak is located in the line of the proposed road development.

The Sallins Link Road at Ch. 0+150 crosses a treeline dominated by mature hawthorn and ash with a mixture of other woody species including crab apple (*Malus sylvestris*), rose (*Rosa canina*) and elder (*Sambucus niger*).

At Ch. 0+330 on the Sallins Link Road, the 'dead canal' is crossed which forms a linear wetland with a fringing treeline along its northern side dominated by hawthorn and ash with cheery (*Prunus avium*), rose and briar.

The canal forms a broad band of reedswamp (FS1) with occasional willow thickets forming pockets of immature wet woodland (WN6). At the eastern end of the 'dead canal' an area of dense scrub woodland occurs (WS1/2) comprised of hawthorn, elder, blackthorn, briar and young ash. The 'dead canal' forms an important ecological link between the River Liffey and the Grand Canal.

To the north end of the proposed R407 Sallins Bypass another mature treeline is crossed at Ch.3+440 again dominated by hawthorn and ash with occasional crab apple. A treeline of mature ash and sycamore runs along the western side of the Clane Road joining with a mixed planting of mature trees and shrubs around Easkey House.

### **Artificial Ponds and Drainage Ditches**

The attenuation pond at Osberstown is an artificial waterbody (FL8) fed by a small inflowing stream in a drainage ditch (FW4) in its southern tip. The pond is approximately 1ha in area and is fringed over much of its banks with reed swamp (FS1). There appears to be limited submerged aquatic vegetation in the main body of the pond, though both watercress (*Rorippa nasturtium-aquaticum*) and starwort (*Callitriche* sp.) are very abundant in the vicinity of the inflowing stream. The surface of the water was heavily choked in filamentous green algae during the site visits in July 2013.

A small pond occurs in the vicinity of the proposed scheme to the northwest of the second Liffey crossing at Ch. 3+050. This is heavily eutrophic due to cattle access and supports no aquatic vegetation or species of note. A second pond occurs immediately south of the Sallins Link Road at Ch. 0+700 and again is of no significant ecological value due to cattle access for drinking.

### **Rivers and Canals**

The Grand Canal is a man-made waterway linking the River Liffey at Dublin with the Shannon at Shannon Harbour and the Barrow at Athy. The canal is crossed at Ch. 1+560 and the 'dead canal' is crossed on the Sallins Link Road at Ch. 0+330. The aquatic plant diversity of the canal is particularly high between Lowtown and Inchicore, which encompasses the proposed location of the proposed R407 Sallins Bypass. Arrowhead (*Sagittaria sagittifolia*), water-cress and hemlock water-dropwort (*Oenanthe crocata*) are widespread along this stretch and the nationally rare and legally protected opposite-leaved pondweed (*Groenlandia densa*) (Flora Protection Order 1987) is present at a number of sites along this stretch, though no evidence of the plant was recorded during the current surveys.



The ecological value of the canal lies in the diversity of species it supports along its linear habitats and its function as a linear corridor through the landscape.

The River Liffey will be crossed at two separate locations at Ch. 2+000 and Ch. 3+050 respectively. The river is a depositing lowland river with large gentle meanders in a relatively flat landscape with a width varying between approximately 15 m to 20 m.

A series of small islets occur upstream and downstream of the Ch. 2+000 crossing though there are none at the crossing itself where the flow regime is a gentle glide. Around the islands there are numerous shallow riffles stretches which provide good spawning habitat for salmonids and lamprey.

The southern bank is fringed with a narrow band of riparian woodland (WN5) overhanging the river consisting of ash, willow species and alder with a dense understorey dominated by reed canary grass, nettle and willow herb. The northern bank is low and open grassland with a narrow fringe of reed canary grass. Instream macrophytes consist of starwort (*Callitriche* sp.), the submerged form of branched bur-reed (*Sparganium erectum*) and willow-moss (*Fontinalis antipyretica*) with curly pondweed (*Potamogeton crispus*) in sheltered areas.

The northern crossing point of the River Liffey, is in an area of slacker uniform gentle glide flow with a depth of c0.8 to 1 m during normal low flow conditions. The southern bank is open grassland with a narrow reedswamp fringe while the northern bank is steeper with a broad band of reedswamp with occasional scattered willow and alder. A band of wet woodland dominated by willow with occasional alder, blackthorn and ash occurs immediately east of the crossing which merges with a block of mixed woodland dominated by mature beech (*Fagus sylvaticus*) further upstream. Instream macrophytes are abundant and dominated by submerged form of branched bur-reed and water crowfoot (*Ranunculus* sp.), with starwort and flote grass (*Glyceria fluitans*) along the edges.

The outflow from the attenuation pond at Osberstown, i.e. the Osberstown Stream, is culverted under the M7 in two separate outlets before merging to the northwest of the proposed M7 Osberstown Interchange into a stream known as the Naas stream, which ultimately discharges to the River Liffey. The two branches of the Osberstown Stream are heavily choked with watercress and are used by cattle for drinking. They have a mixed gravel and sand substrate with pockets of silt in areas of slack flow. There are scattered hawthorn and thickets of briar along the main channel.

### **Artificial Surfaces & Bare Ground**

The lands to the south of the M7 motorway and proposed M7 Osberstown Interchange consist of a mixture of spoil and bare ground and recolonizing bare ground (ED2/3).

## **14.3.4 Fauna**

### **Otter**

Evidence of otter, an Annex II listed species under the EU Habitats Directive, was recorded during the site surveys at a number of waterbodies along the proposed scheme including the attenuation pond at Osberstown, the Grand Canal and the River Liffey.

Otter utilize holts (excavated or natural cavities amongst tree roots, boulders, etc. adjacent to a water body) for breeding purposes. No evidence of a holt was recorded during the survey from any of the watercourse crossing points, though fresh spraints were recorded at a heavily vegetated island approximately 70 m downstream of the proposed crossing point of the River Liffey at Ch. 2+000 where it is possible a holt or couch site may be concealed. Upstream of the Liffey crossing point at Ch. 3+050 the mature woodland along the northern bank of the river provides high potential for both holts and couches where mature trees overhang the river. Otter movement is highly likely to occur along the 'dead canal' crossed by the Sallins Link Road connecting between the River Liffey and the Grand Canal.

Otter spraint was also recorded at both ends of the Osberstown Stream culverts under the M7 draining the attenuation pond.. Movement through these culverts is however impeded due to the presence of a hydro-brake within the culverts and it is unclear as to whether otters are moving across the existing farm accommodation overbridge at Osberstown or attempting to cross the M7. The existing fencing along the M7 in the vicinity of the culverts has abundant breaks in the chain-link through which mammals could pass, though the large volumes of traffic along this stretch of road render this an unlikely regularly used option. There is likely to be otter movement from the pond at Osberstown east to the Grand Canal.

### **Freshwater Crayfish**

The freshwater crayfish (*Austropotamobius pallipes*), an Annex II listed species, is found in alkaline waters and is widespread throughout the Liffey catchment (National Biodiversity Data Centre website). The species often occurs in very high densities where aquatic vegetation or substrate allows for good concealment and feeding opportunities. Freshwater crayfish were recorded during surveys at the Ch.2+000 crossing of the River Liffey though no evidence was found at the Ch. 3+050 crossing point. No evidence of freshwater crayfish was found within the Grand Canal despite both habitat and water chemistry being highly suited for the species. There are no records of freshwater crayfish from the Grand Canal on the NBDC website. Again no evidence of freshwater crayfish was found in the Osberstown Pond or Osberstown Stream during the field survey and there are no existing records from this location (NBDC website). Nonetheless, they may occur at low densities within these waterbodies as the water chemistry is suitable.

### **Brook Lamprey**

The brook lamprey (*Lampetra planeri*) is the smallest and most widespread of the three lamprey species found in Ireland. It requires riffle habitat for spawning but due to its small size is capable of utilizing quite limited areas for this purpose. The juvenile phase of the lamprey lifecycle (ammocoete) is spent buried in fine silts and thus they are able to cope with small watercourses which are heavily choked with aquatic growth. Lamprey ammocoetes were recorded from bankside silt beds at the Ch.2+000 crossing of the River Liffey though no evidence was found at the Ch. 3+050 crossing point. Brook lamprey may also occur in the out flowing Osberstown Stream though again no evidence was recorded from this location during the field survey. The pond at Osberstown and the Grand Canal are unsuitable habitat for this species.

## Fisheries

The River Liffey is a highly significant salmonid catchment supporting significant populations of Atlantic salmon (*Salmo salar*), listed under Annex II and V of the EU Habitats directive), and sea trout (*Salmo trutta*) in addition to resident brown trout (*Salmo trutta*). The river also supports a and Eel populations. The Liffey also support Freshwater Crayfish and Lamprey species (listed under Annex II the EU Habitats directive) along with European eel (*Anguilla anguilla*), gudgeon (*Gobio gobio*), stone-loach (*Barbatula barbatula*), three-spined stickleback (*Gasterosteus aculeatus*) and a variety of coarse fish species.

The Grand Canal supports stocks of a number of coarse fish species including perch (*Perca fluviatilis*) along with European eel and minnow (*Phoxinus phoxinus*).

There is considerable angling activity along both the River Liffey for game species and on the Grand Canal for coarse species. The proposed Liffey crossing points are both in key areas for angling activity.

## Badger

Evidence of badger (*Meles meles*) feeding activity was found on both sides of the M7 in the vicinity of the proposed interchange and bypass. Foraging signs were recorded in 2008 to the south of the road adjacent to the attenuation pond, though none were recorded in the area during the current surveys in 2013. North of the M7, feeding signs were present on the lower part of the embankment of the accommodation overbridge at Osberstown and it is probable that badgers are using the overbridge to access the attenuation pond and surrounds for foraging with a set located north of the road in the vicinity of Osberstown House.

Badger activity was recorded to the east of the proposed R407 Sallins Bypass between the two Liffey crossing points and also to the north of the alignment in the vicinity of Castlesize. No evidence of badger setts was recorded on the line of the proposed route. A disused sett was recorded immediately northwest of the Ch. 3+050 Liffey crossing in a section of hedgerow.

No other setts were recorded in the vicinity of the alignment though further detailed survey is required in the appropriate season to confirm this.

## Other Mammals

The majority of the site is comprised of a mixture of agricultural grasslands separated by hedgerow and treelines which are of value for a range of birds and mammals. Signs of fox (*Vulpes vulpes*), rabbit (*Oryctolagus cuniculus*) and brown rat (*Rattus norvegicus*) were recorded during the site visit. Additional species likely to occur include hedgehog (*Erinaceus europaeus*), stoat (*Mustela erminea*), Irish hare (*Lepus timidus hibernicus*) and wood mouse (*Apodemus sylvaticus*). The naturalized American Mink (*Mustela vison*) and grey squirrel (*Sciurus carolinensis*) are also likely to be present in the area.

## Birds

Kingfisher (*Alcedo atthis*), afforded protection under Annex I of the EU Birds Directive, are a piscivorous species typical feeding on slow moving waters. They are known to breed on both the Grand Canal and the River Liffey. Their breeding requirements are quite specific, preferring a steep to over-hanging bank of exposed clay or sand adjacent to water. A suitable bank with a number of old nest holes occurs on the north side of the River Liffey approximately 100 m downstream of the proposed crossing at Ch. 2+000. There was no evidence of breeding in the current year though the site remains an important feature. No evidence of suitable nesting habitat was evident in the vicinity of the Ch. 3+050 crossing point or at the Grand Canal though foraging is expected to occur at both locations. Kingfishers are unlikely to utilise the pond at Osberstown for foraging due to the heavy algal cover on the surface of the water, though the abundant minnow stocks may provide seasonal foraging opportunities.

Overall the landscape through which the proposed scheme crosses supports a typical assemblage of birds associated with the range of habitats present, ie. agricultural pasture, hedgerows and treelines, lowland rivers, canals and artificial ponds. The watercourses and Osberstown Pond supports a range of waterbirds including breeding moorhen (*Gallinula chloropus*), little grebe (*Tachybatus ruficolus*), mute swan (*Cygnus olor*) and mallard (*Anas platyrhynchos*). Heron (*Ardea cinerea*) were observed feeding along the Liffey and at Osberstown Pond though no breeding sites were noted in the vicinity of the proposed scheme. A single little egret (*Egretta garzetta*) was observed feeding upstream of the proposed crossing point on the River Liffey at Ch. 2+000. This species is afforded protection under Annex I of the EU Birds Directive. Little egrets frequently nest with their larger relatives the grey heron. The nearest recorded heronry occurs in Palmerstown Demesne approximately 4 km east of the proposed scheme.

The treelines and hedgerows present are also likely to support a range of passerines including various tits, finches, thrushes and corvids. The grassland and recolonizing bare ground provide feeding opportunities for seed-eating species such as goldfinch (*Carduelis carduelis*), siskin (*C. spinus*) and linnet (*C. cannabina*). Ground nesting species skylark (*Alauda arvensis*) and meadow pipit (*Anthus pratensis*) may also nest in some of the larger permanent lea grasslands and around Osberstown Pond. Raptors likely to occur include sparrowhawk (*Accipiter nisus*), kestrel (*Falco tinnunculus*), buzzard (*Buteo buteo*), long eared owl (*Asio otus*) and possibly barn owl (*Tyto alba*).

The large mature trees in treelines and along the River Liffey provide suitable nesting habitat for these species with the exception of the barn owl which prefers old buildings, though will occasionally utilise suitable cavities in trees also.

## Amphibians

The pond at Osberstown is likely to support breeding Common Frog (*Rana temporaria*) and possibly also Smooth Newt (*Lissotriton vulgaris*). There are records of smooth newt breeding in the ponds adjacent to the Grand Canal at Gollierstown in Co. Dublin (Grand Canal pNHA Site Synopsis, NPWS). The 'dead canal' on the Sallins Link Road at Ch. 0+330 provides potential breeding habitat for both species.

The ponds in the open grassland at Ch. 3+050 and immediately south of the Sallins Link Road at Ch. 0+700 are unsuited to breeding due to regular cattle access for drinking and resultant eutrophication.

## 14.4 Predicted Impact on Ecology

### 14.4.1 Ecological Evaluation and Impact Significance

Impacts on designated areas, ecological sites, flora, fauna and habitats impacted by the proposed scheme were assessed according to the criteria outlined in the relevant legislation (e.g. EU Habitats Directive (92/43/EEC) and Regulation 30 of Statutory Instrument No. 94/1997 – European Communities (Natural Habitats) Regulations, 1997 and the Roads Act, 1993 Section 50) and assisted by the relevant guidance documents (e.g. the NRA Guidelines for Assessment of Ecological Impacts of National Road Schemes (NRA, 2009), the EPA Guidelines on the Information to be Contained in Environmental Impact Statements (EPA, 2002), NPWS Circular Letters 1/2007 and 2/2007).

In assessing the ecological value of a site which is not covered by a statutory designation (e.g. cSAC or SPA) the following geographic frame of reference is used where appropriate:

Ratings for ecological sites and fisheries waters	
A	International importance
B	National importance
C	County Importance
D	Local importance (higher value)
E	Local importance (lower value)

The final value of a site will depend on such factors as the range and diversity of species present, the naturalness of the site and the size of the site in relation to the geographical area and the habitat types found in the surrounding area.

The prediction of impacts is based upon the guidance provided in the NRA Guidelines and considers such factors as the magnitude, extent, duration and the timing and frequency of the predicted impact. Where possible the likelihood of the impact occurring is also considered. From these criteria the significance of the impact is determined on the basis of the factors which characterise the site and take into account the effects on the conservation status or integrity of the site resulting from the proposed development. The integrity of a site can be regarded as the coherence of ecological structure and function, across the entirety of a site, which enables it to sustain all of the ecological resources for which it has been valued. The following impact significance criteria (EPA, 2002) are used where applicable:

Significance of Impact	Significance Criteria
Imperceptible impact	An impact capable of measurement but without noticeable consequences
Slight impact	An impact which causes noticeable changes in the character of the environment without affecting its sensitivities

Significance of Impact	Significance Criteria
Moderate impact	An impact that alters the character of the environment in a manner that is consistent with existing and emerging trends
Significant impact	An impact which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment
Profound impact	An impact which obliterates sensitive characteristics

The Grand Canal pNHA is crossed by the proposed route at Ch. 1+560 and the 'dead canal' spur is crossed on the Sallins Link Road at Ch. 0+330. The Grand Canal pNHA is rated of National Importance.

The River Liffey, while not designated for nature conservation, supports populations of a number of species listed under Annex II of the EU Habitats Directive and Annex I of the EU Birds Directive including salmon, otter, brook lamprey, freshwater crayfish, kingfisher and little egret. The wooded islands on the River Liffey upstream and downstream of the crossing at Ch. 2+000 may conform to the Priority habitat Alluvial Woodland under the EU Habitats Directive. Due to the range of protected species occurring within the River Liffey and its overall biodiversity value, the site is rated of County Importance.

The treelines, hedgerows, minor watercourses and the pond at Osberstown are rated of Local Importance (higher value) due to their associated biodiversity and functionality as a network for faunal movement.

#### 14.4.2 Description of the Proposed Road Development

A full description of the proposed road development is provided in Chapter 4 - *Description of the Proposed Scheme* of the EIS. The proposed M7 Osberstown Interchange will be a grade separated junction located between the existing M7 Maudlins and Newhall Interchanges, north and south of Naas respectively. This interchange will provide necessary connectivity between the national road network (M7) and the towns of Naas and Sallins. The interchange will connect to the R407 Sallins Bypass to the north and the existing local and regional road network to the south.

The R407 Sallins Bypass will be located to the west of Sallins town commencing at the proposed M7 Osberstown Interchange and tying into the existing R407 Clane Road to the north of Sallins town. The bypass will proceed in a north easterly direction from the M7 Osberstown Interchange and will cross under the Dublin to Cork railway line, cross over the Grand Canal, and cross over the River Liffey at two locations before tying into the existing R407 Clane Road.

Both crossings of the Grand Canal and River Liffey will be clear span structures. The bypass will be approximately 3.6 km in length.

### 14.4.3 Impacts on Designated Areas

The Grand Canal, a proposed Natural Heritage Area will be crossed by the proposed scheme at Ch. 1+555 and the ‘dead canal’ spur will be crossed by the Sallins Link Road at Ch. 0+330. The Grand Canal supports a number of protected species including otter and kingfisher, and acts as an important linear habitat and corridor for animal movement. The ‘dead canal’ crossed by the Sallins Link Road also forms a valuable corridor between the River Liffey and Grand Canal.

The main channel of the Grand Canal will be crossed by a clear span structure encompassing both the tow path and local road on either side of the canal as shown in **Figure 4.7 V3**. The bridge deck will result in some shading under the deck and may limit the growth of marginal and submerged aquatic vegetation. The semi mature treeline along the canals northern bank would be fragmented as a result of the works. Overall however, the structure will not interfere with the canals ecological integrity and continuity as the waterway and the adjacent towpath and local road will remain open and not impede movement of mammals, birds or aquatic fauna. Subject to the adoption and adherence of measures prescribed in Section 14.5 the construction of the crossing will not present a significant risk of impacting on water quality. The impact on the pNHA at this location is rated as slight.

The ‘dead canal’ being crossed by the Sallins Link Road at Ch. 0+330 will be crossed by a portal frame culvert which allow for the retention of a natural base through the culvert. The adjacent treeline and freshwater marsh vegetation in the footprint of the crossing would be lost as result of the crossing though aquatic habitat continuity would be maintained within the culvert due to its internal structure size of 2.95 m x 1.3 m. The culvert will allow for the unimpeded movement of otter and aquatic fauna, though may not be conducive to movement of kingfisher (see Section 14.4.4 below). Overall the impact on the pNHA at this location is rated as moderate. Specific requirements are presented in Section 14.5 to reduce the impact on the adjacent pNHA and associated habitats.

Traffic emissions potentially impacting on NO<sub>x</sub> levels at the Grand Canal pNHA was assessed as part of the EIA process (see Chapter 12.1). Modelling was carried out at Osberstown (Ch. 1+600) where the Sallins Bypass crosses the Grand Canal pNHA. Ambient NO<sub>x</sub> concentrations predicted for the opening and design years along a transect of up to 200 m within the Grand Canal pNHA are given in Table 12.10 in accordance with NRA guidance. The contribution of the road to dry deposition is also given and was calculated using the guidance methodology.

The predicted annual average NO<sub>x</sub> levels at the Grand Canal pNHA near Osberstown exceed the limit value of 30 µg/m<sup>3</sup> for the “do minimum” and “do something” scenarios the opening year. The impact of the Proposed Scheme leads to an increase in NO<sub>x</sub> concentrations of at most 6.10µg/m<sup>3</sup> within the Grand Canal pNHA. These increases are not sufficient to result in any measureable change in the aquatic ecology of the canal and concentrations are predicted to increase in a similar scale under the do-nothing scenario.

#### 14.4.4 Impacts on Habitats

The crossings of the River Liffey at Ch. 2+000 and Ch. 3+050 will be by bridge structures as detailed in **Figure 4.8 V3** and **Figure 4.9 V3** respectively. The crossing at Ch.2+000 (structure S5) will have a single pier which will be located on the north of the river and provide a clear span across the river channel maintaining both river banks intact. The crossing at Ch. 3+050 (structure S6) will have two piers, one on either side of the river with a clear span across the river channel, again maintaining both river banks intact and facilitating unobstructed access for anglers. Fringing vegetation outside of the riparian zone will be removed during the construction though the ecological continuity of the river corridor will be maintained within the riparian zone. The crossing points on the river have been selected to avoid areas of well-developed fringing vegetation and occur at narrow points in the channel. At both crossings the stretches upstream and downstream support a significantly higher diversity of instream and riparian habitats.

The main impacts on the River Liffey are temporary in nature associated with the construction phase of both crossings points and works within the immediate catchment. During this phase there are high risks of impacting on water quality through siltation from run-off and pollution by hydrocarbons and various other compounds including concrete run-off, water-proofing agents, etc. There will be a requirement for a temporary crossing to facilitate construction which will have similar associated risks during both erection and dismantling. The abutments and piers for the bridge structures are set sufficiently back from the river banks to avoid any direct impacts on the riparian zone, but have risks of accidental damage or pollution with appropriate mitigation measures being employed. The operation phase of the proposed scheme will also have inherent risks of impacting on water quality through road-runoff and accidental spillages resulting from traffic accidents. The overall impact of the proposed crossings are rated as moderate as the character of the environment at both sections of the river will be permanently altered. Temporary impacts during construction which could be significant will be adequately mitigated by the measures detailed in Section 14.5.

A section of the attenuation pond at Osberstown will be lost as a result of the proposed M7 Osberstown Interchange embankment, though the pond will be resized to retain its current attenuation capacity. The pond is an artificial feature and its ecological value is currently limited by water quality and associated landscaping. Associated wet and dry grassland habitats will be lost along its northern side, though post construction, the lands around the pond will be re-landscaped and the feature will regain its ecological functionality over a short period of time. Overall the impact on this feature is rated as slight.

Elsewhere on the proposed scheme, the principle impacts will be on treelines and hedgerows which will be dissected by the proposed route. To the north of the M7 the treeline of mature trees running parallel to the line of the proposed R407 Sallins bypass between Ch. 0+200 to Ch. 0+450 will be retained intact and afforded protection during construction by the measures prescribed in Section 14.5 below. Impacts on treelines and hedgerows elsewhere along the route will result in a loss of this habitat resource and severance of ecological corridors.



Associated landscaping for the proposed scheme will overtime compensate for the loss of this habitat and to some extent provide ecological continuity which will be further facilitated through the provision of mammal underpasses as detailed in Section 14.5 below. The impacts on these features is rated as slight, though over time with the maturation of landscaping in combination with faunal passage facilities associated with the development, the impact may reduce to imperceptible.

#### 14.4.5 Impacts on Fauna

##### Otter

The main potential impact on otter relates to the increased risk of direct mortality through road-kill. While no holts are located on the line of any crossing points, movement of otter is expected along all watercourses on the proposed scheme. A potential otter couch or holt site occurs approximately 70 m downstream of the River Liffey crossing point at Ch. 2+000 at a point which is within the CPO line for the proposed scheme. Adequate protection of this location (as detailed in Section 14.5 below) will be required to avoid disturbance during the construction phase. The Sallins bypass will result in a permanent level of increased disturbance at both crossing points and along the 'dead canal'. The direct and permanent impact as a result of disturbance on otter is rated as slight subject to the provision of appropriate passage facilities and associated fencing.

A decline in water quality through pollution or siltation arising during the construction or operation phase of the proposed road development could result in indirect impacts on otter through a reduction in prey availability. Increased levels of human activity associated with the proposed road development may also directly affect otter through disturbance. As the otter is listed under Annex II of the EU Habitats Directive, an increased risk of mortality could constitute a significant impact for the species. There is a potential for indirect impacts on otter through a reduction in water quality during both the construction and operation phase of the proposed scheme.

With appropriate mitigation during the construction phase and with the proposed design measures of treatment of road run-off and accidental spillages during the operation phase (as detailed in Section 14.5) the risk of indirect impacts is reduced to imperceptible.

##### Freshwater Crayfish and Brook Lamprey

Freshwater crayfish and brook lamprey were recorded during surveys at the Ch. 2+000 crossing of the River Liffey and while no evidence was found at the Ch. 3+050 crossing point; both species are likely to occur at this location also. As no instream works are proposed as part of the construction process of the bridge structure crossings, there is no risk of direct impacts on these Annex II listed species. As with otter, there remains however a potential for indirect impacts through a reduction in water quality during both the construction and operation phase of the proposed scheme. With appropriate mitigation during the construction phase and with the proposed design measures of treatment of road run-off and accidental spillages during the operation phase (as detailed in Section 14.5) the risk of indirect impacts is reduced to negligible.

Overall impacts on freshwater crayfish and lamprey are rated as imperceptible following mitigation.

### **Other Mammals**

The main risk to mammals from the proposed scheme will be as a result of increased risk of mortality during the operation phase. There is no evidence of any badger setts or other mammal refugia occurring on the line of the proposed scheme though a detailed mammal survey will be undertaken during the winter period 2013-2014 to confirm this status. Mammal underpasses and associated mammal-proof guide fencing will be provided to allow for the unimpeded movement of mammals across the line of the proposed scheme and to prevent access onto the carriageway. Outline details of these measures are provided in Section 14.5 below and will be subject to amendment following the completion of the detailed mammal survey in the winter period of 2013-2014. Subject to the provision of adequate mammal passage facilities and associated fencing, the impact on mammals from the scheme should be imperceptible to slight.

### **Birds**

Temporary impacts on breeding water birds within the attenuation pond at Osberstown will occur through disturbance as a result of the construction phase. The riverbank identified as providing kingfisher nesting habitat downstream of the River Liffey crossing point at Ch. 2+000 will not be impacted by the proposed scheme and the movement of birds along the river and within the Grand Canal will be unimpeded as a result of the bridge designs being employed. The portal frame culvert proposed for the canal spur being crossed by the Sallins Link Road at Ch. 0+330 may facilitate kingfisher movement though the height of 1.3 m may result in birds flying over the Sallins Link Road and thus being subject to vehicle collision.

For other species of bird, the impact of the proposed scheme should be imperceptible, though as in all road developments, an increased risk of traffic collision is inevitable. This loss is unlikely to affect local populations of any of the species occurring in the study area.

## **14.5 Mitigation Measures**

### **14.5.1 Designated Areas**

The crossing of Grand Canal pNHA at Ch. 1+555 will be by a clear span structure encompassing the canal and both the tow path and adjacent local road, which is designed to allow for uninterrupted continuity of the linear habitat and associated fauna. The construction area will be minimised to reduce the disturbance to the canal and associated linear features including the treeline along the northern side. The working area will be defined at the outset of works by a robust fence which will allow for the continued unimpeded movement of fauna along the canal. Measures to avoid impacts on water quality are prescribed below in Section 14.5.2.

## 14.5.2 Habitats

The crossings of the River Liffey at Ch. 2+000 and Ch. 3+050 will be by bridge structures as detailed in **Figure 4.8 V3** and **Figure 4.9 V3** respectively. The design of both structures has been developed to provide a clear span across the river channel at both locations maintaining both river banks intact in order to avoid any instream disturbance and to maintain the riparian zone of the channels. The principle risks of impacts arise during the construction phase. Measures of pollution control for road run-off to the River Liffey during the operation phase of the proposed scheme include provision of vegetated treatment systems which will function as attenuation, treatment systems and containment to accommodate accidental spillage.

The construction work zones along the River Liffey shall be defined at the outset of construction using rigid timber or equivalent robust fencing. Within the site boundary fence, earth bunds shall be constructed to contain surface water run-off and channel it to a silt trap before discharge. This shall entail a mechanism for containment of runoff in the event of accidental spillage to enable clean-up and appropriate disposal through licensed facilities. The east side of the river at structure S5 can be accessed from the proposed Sallins Link Road while the east side of the river at structure S6 can be accessed from the existing R407. This means that it will only be necessary to construct one temporary crossing which will be a clear-span Bailey Bridge type structure.

The measures described below under Mitigation for Aquatic Habitats will serve to ensure that any potential impacts on the River Liffey, Grand Canal and other waterbodies from siltation or pollution during both the construction and operation phases are avoided or remedied.

### Mitigation for Aquatic Habitats

The mitigation measures detailed below will be incorporated in their entirety into the construction contract documentation.

- A suitably qualified project ecologist will be employed as part of the client's representative team to ensure successful implementation of the mitigation measures.
- All design, construction and operation will be carried out in accordance with *Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes* (NRA, 2006), *Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites* (Murphy, 2007) and *Control of water pollution from construction sites; Guidance for Consultants and Contractors* (SP156) (CIRIA, 2002) in addition to the specified requirements within the EIS.
- Design and construction method statements will be submitted to Inland Fisheries Ireland for approval prior to commencement of construction.
- Sediment traps or settlement ponds will be provided for on all watercourses during construction. Total suspended solid levels in all waters discharging to the River Liffey system shall be in compliance with the Quality of Salmonid Water Regulations (SI 293:1988).

- Where site investigation (including archaeological works) is required in the vicinity of or adjacent to the watercourses within the River Liffey system, these works will be carried out with due sensitivity and appropriate measures employed to minimise siltation.
- Site compounds and soil storage areas will be located at a minimum distance of 50m from the River Liffey. All drainage from these facilities will be directed through adequately sized settlement ponds with appropriate capacity and measures to provide spill containment.
- The contractor will undertake an inspection and maintenance programme of all treatment facilities during the construction phase to ensure compliance with the discharge limits.
- Watercourse crossing and approach road design will incorporate best environmental practice and design in the control of road run-off and accidental spillage. All stormwater discharges will be directed through hydrocarbon interceptors.
- Realignments of the Osberstown Stream will incorporate hydraulic and morphological continuity with the existing channel. Bankside protection if required will utilise natural materials only. All instream works will be completed during the period May to September unless otherwise agreed with IFI.
- Run-off from the road during operation will be channelled through a stilling process to allow suspended solids to settle out (this may be in open ditches, ponds, hydrodynamic separators, etc.) or through some form of spill-containment facility and vegetated treatment system prior to discharge to a watercourse.
- The short-term storage and removal/disposal of excavated material will be planned and managed such that the risk of pollution from these activities is minimised.
- Specific measures for the River Liffey outfalls include provision of vegetated treatment systems which will function as attenuation, treatment systems and containment to accommodate accidental spillage. Discharge from the system will be via a penstock or similar to enable retention of accidental spillages, into a shallow drainage channel excavated towards the river. As the channels will be shallow channels (swales) discharging at the river bank, no headwalls will be required at the river banks, thus avoiding any instream works or requirements for headwalls, scour protection etc. within the river.
- An emergency-operating plan will be established to deal with incidents or accidents during construction that may give rise to pollution within any watercourse. This will include means of containment in the event of accidental spillage of hydrocarbons or other pollutants (including oil booms, soakage pads, etc.).

- Landscaping and design in the vicinity of all watercourses will focus on the establishment of naturally occurring habitat types using native species to re-establish the linear corridor of vegetation along watercourses in accordance with *A Guide to Landscape Treatments for National Road Schemes in Ireland* (NRA, 2006).
- Angling access will be maintained along the River Liffey and the Grand Canal.
- Throughout all stages of the construction phase of the project the contractor will ensure that good housekeeping is maintained at all times and that all site personnel are made aware of the importance of the freshwater environments and the requirement to avoid pollution of all types.
- The storage of oils, hydraulic fluids, etc., will be in a bunded facility with filling and take-off points within the bunded area in accordance with current best practice for oil storage (Enterprise Ireland, BPGCS005). The bunds will be protected against accidental tank rupture and will ensure any spilled oil can be retained for subsequent disposal to an appropriate facility.
- During construction, temporary, contained chemical toilet facilities will be used, which will be taken off site for emptying at a suitably licensed disposal location. Consequently, there will be no discharge of sewage to surface waters.
- Adequate security measures will be put in place to prevent any acts of vandalism that may result spillage or discharge of pollutants.
- The pouring of concrete, sealing of joints, application of water-proofing paint or protective systems, curing agents, etc., will be completed in the dry to avoid pollution of the freshwater environment. As grout/cementous materials are highly toxic to aquatic life all such works must be maintained in complete isolation of all waters and the storm water system. Wash down from delivery and concrete pumping areas will be contained and removed off site for appropriate disposal.
- All machinery operating in the vicinity of watercourses will be steam-cleaned in advance of works and routinely checked to ensure no leakage of oils or lubricants occurs. All fuelling of machinery will be undertaken on dry land.
- The risk of accidental transfer of non-native invasive species will require adherence to current best practice protocol for avoiding the spread or transfer of all invasive plants and animals in accordance with the NRA National Roads Authority *Guidelines on the Management of Noxious Weeds and Non-native plant species on National Road Schemes* (2010) along with any modified or updated approaches to invasive alien species control ([www.invasivespeciesireland.com](http://www.invasivespeciesireland.com)).
- These measures will be enforced during construction to ensure accidental spread does not occur on machinery or materials from / to the site. The developers will also adopt any modified or updated approaches to invasive alien species control.

For terrestrial habitats, the principle mitigation will be the minimisation of impacts during the construction phase coupled with the design of the landscaping associated with the proposed scheme. In the vicinity of trees and other woody vegetation to be retained, protection will be afforded in accordance with BS 5837:2012 (*Trees in relation to design, demolition and construction – Recommendations*). Landscape design will utilise a native suite of trees and shrubs in accordance with *A Guide to Landscape Treatments for National Road Schemes in Ireland* (NRA, 2006).

### 14.5.3 Fauna

#### Otter

Mitigation requirements for otter require the provision of safe passage along all watercourse crossed by the proposed scheme. This will be achieved by the incorporation of a suitable mammal passage facility in conjunction with otter-proof fencing along the road network to prevent animals from accessing the carriageway. The specification for otter passage and fencing design will be in accordance with the *Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes* (NRA, 2007). The maintenance of water quality is covered in Section 14.5.2 above.

#### Freshwater Crayfish and Brook Lamprey

Mitigation requirements for freshwater crayfish and brook lamprey similarly entail maintenance of good water quality as detailed in Section 14.5.2 above. Marginal aquatic vegetation is of particular importance to crayfish and the requirement for the maintenance and development of this habitat listed above equally applies. Provision for the salvage of crayfish and lamprey from the Osberstown Stream and attenuation pond edge at Osberstown where impacted, should be made at the outset of works. This task should be undertaken by appropriately experienced personnel under license from the NPWS.

#### Badger

As the mammal survey for the EIS was undertaken in mid-summer, vegetation growth precluded a comprehensive search for setts and other signs of mammal activity. While there are no setts apparently within the line of the proposed scheme, in order to identify the extent of the badger territories in the vicinity of the proposed scheme and confirm locations for mammal passage facilities and associated fencing, a follow-up survey is proposed during the appropriate time of the year (November 2013 to April 2014).

The provision of otter passage along all watercourses may also facilitate badger movement across the proposed scheme. However, the detailed design of measures should be in accordance with the specifications as outlined *Guidelines for the Treatment of Badgers Prior to the Construction of a National Road Scheme* (NRA, Rev.2006).

#### Other mammals

Measures detailed for otter, bats and badger above will serve to mitigate against impacts for other mammals species also.

## Bats

Felling of all trees on site which may be potential bat roosts should be scheduled for the autumn months of September/October when bats are less likely to be using trees. Prior to any works commencing, an assessment of the tree should be conducted by a suitably qualified bat specialist who will advise on the appropriate felling methodology.

To avoid disturbance to bats feeding in the vicinity of the watercourses lighting in the vicinity of the Grand Canal, River Liffey crossings and Osberstown Pond should be cowed to prevent spread onto the pond and associated wet grassland area and the adjacent treelines.

## Birds

To avoid impacting on breeding birds, no vegetation clearance will be carried out in relation to the proposed scheme within the period March 1<sup>st</sup> to August 31<sup>st</sup> in accordance with the Wildlife (Amendment) Act 2000.

Works in the vicinity of the River Liffey crossing at Ch. 2+000 will be confined in the vicinity of the identified kingfisher nest site located 100m downstream of the Ch.2+000 crossing and demarcated by robust fencing to avoid disturbance.

To compensate for the loss of habitat for other bird species, landscaping proposals will primarily entail the use of native trees and shrubs in accordance with *A Guide to Landscape Treatments for National Road Schemes in Ireland* (NRA, 2006). In addition, the use of pesticides and herbicides will be minimized to avoid reductions in insect populations and potential impacts on bird fertility.

## 14.6 Residual Impacts

The main impacts of the proposed scheme will arise from the construction of crossings for the Grand Canal pNHA and the River Liffey along the proposed R407 Sallins Bypass. The risks are considered temporary in nature as they are associated with the construction phase of the crossings points and works within the immediate catchment with risks of impacting on water quality through siltation and pollution. With adherence to the specified measures detailed in Section 14.5.2 above, these risks can be adequately mitigated and will not result in any residual impact. The abutments and piers for the three bridge structures are set sufficiently back from the river banks to avoid any direct impacts on the riparian zone and will not interfere with the ongoing ecological functioning and connectivity of these linear habitats.

The operation phase of the proposed scheme will also have inherent risks of impacting on water quality through road-runoff and accidental spillages resulting from traffic accidents, though the design of the road drainage and associated attenuation spill containment and run-off treatment will provide adequate protection against these risks. As a result the operation of the proposed scheme will not result in any residual impact on water quality.

While the attenuation pond at Osberstown will be resized as a result of the Osberstown interchange the pond will be retained and post construction, the lands around the pond will be re-landscaped and the feature will regain its current ecological functionality over a short period of time.

Elsewhere on the proposed scheme, there will be a loss of habitats associated with the construction and operation of the proposed scheme, with the principle ecological receptors of concern being the treelines and hedgerows that will be dissected by the proposed route with resultant severance of ecological corridors. Over time landscaping for the proposed scheme will compensate for the loss of this habitat and to some extent provide ecological continuity which will be further facilitated through the provision of mammal underpasses.

Overall movement across the proposed scheme for fauna will be facilitated through the combination of the clear span structures over the Grand Canal and the River Liffey, mammal underpasses at strategic locations and the portal frame culvert on the 'dead canal'. The ability of this latter structure to accommodate the movement of kingfisher is however uncertain, though there is no evidence that kingfisher, an Annex I listed species under the EU Birds Directive utilise the 'dead canal' as a connecting corridor between the Grand Canal and the River Liffey. Mortality of kingfisher through vehicle collisions should they attempt to fly over the Sallins Link Road would constitute a significant negative residual impact.

## 14.7 References

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