

The background of the cover is a map of Dublin, Ireland, showing the proposed Metro North route. The route is indicated by a dotted line connecting various stations. The stations are labeled from north to south: Belinstown, Usherhall, Crumay, Seaview, Swords, Fonestown, Airport, Dardicross, Northwood, Ballymas, Dublin City University, Giffchavenue, Drumcondra, Mace, Parnell Square, O'Connell Bridge, and St. Stephen's Green. The map uses a color palette of blues and greys to represent land and water.

ENVIRONMENTAL IMPACT STATEMENT – METRO NORTH

BELINSTOWN TO ST. STEPHEN'S GREEN

ANNEXES

VOLUME 3 – BOOK 2 OF 2

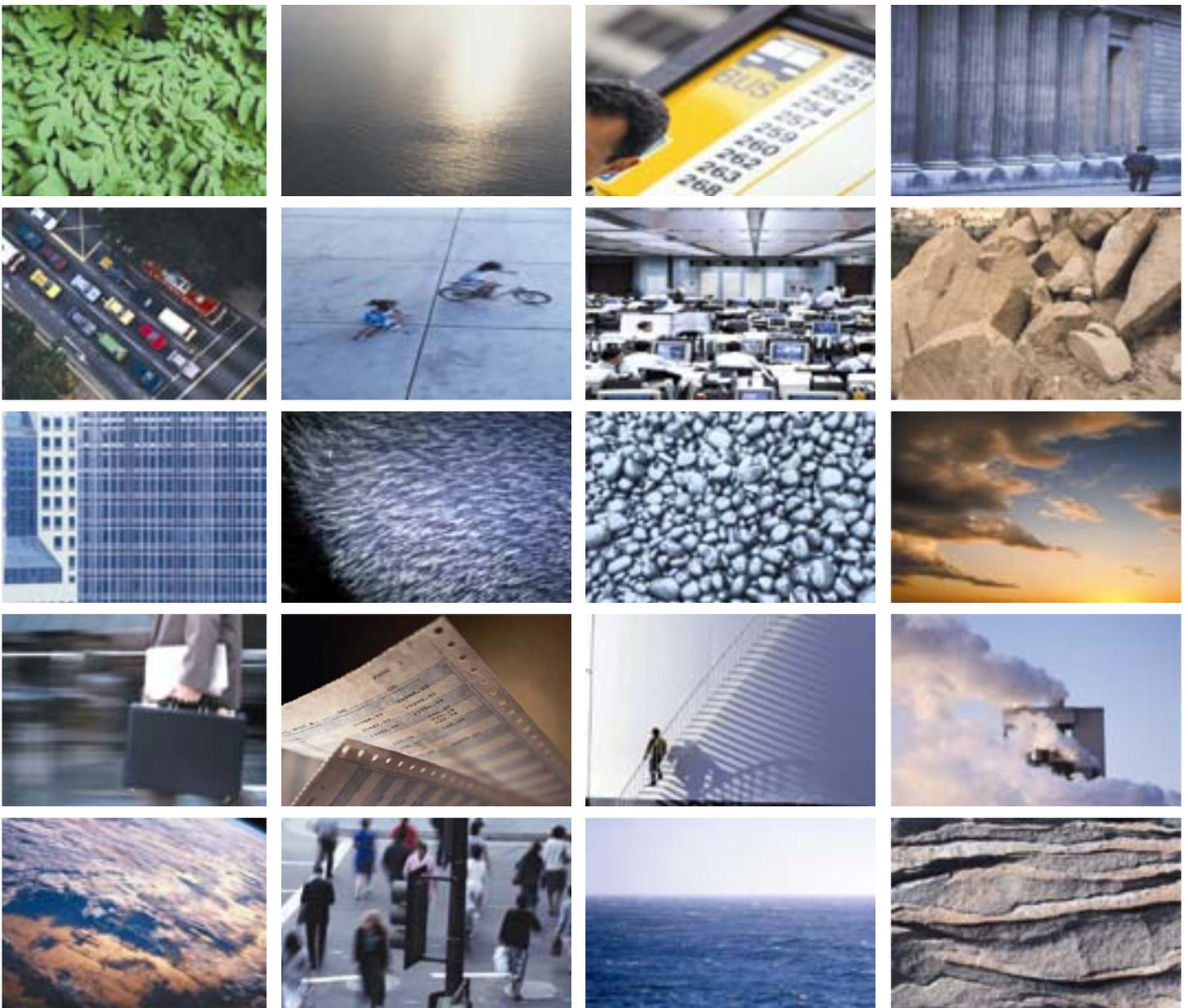
ANNEX D

Annex D

Metro North EIS

Information supporting the flora and fauna chapters

- Habitats Regulations Assessment
- Bat fauna studies



Habitats Regulations Assessment

For Metro North EIS

Final Report

August 2008

www.erm.com

Railway Procurement Agency

Habitats Regulations Assessment: *For Metro North EIS*

August 2008

For and on behalf of
Environmental Resources Management

Approved by: Alistair Davison

Signed:



Position: Partner

Date: 12/08/2008

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1 INTRODUCTION

1.1 BACKGROUND

The proposed alignment occurs within 10 km of a number of Natura 2000 sites, comprising Special Protection Areas (SPAs) ⁽¹⁾ and candidate Special Areas of Conservation (cSACs) ⁽²⁾. There is the possibility the proposed development will directly and/ or indirectly impact on these sites.

A Habitats Regulation Screening is an initial screening assessment which is carried out to determine the potential for significant impacts on Natura 2000 sites to occur due to a proposed development or plan. If **likely significant effects** on any Natura 2000 site are considered to be possible, an Appropriate Assessment is undertaken to fully assess the effects that may occur in consideration of other plans and projects in the region. A Habitats Regulation Screening was carried out in May 2008 to determine the potential for adverse impacts on Natura sites within 10 km of the proposed scheme (ERM, 2008). This Habitats Regulation Screening indicated that the scheme, as proposed at that time, was likely to have a significant effect on six Natura 2000 sites, comprising Broad Meadow Swords Estuary SPA, Rogerstown Estuary SPA, Baldoyle Bay SPA, Sandymount Strand/Tolka Estuary SPA, North Bull Island SPA and Malahide Estuary cSAC. The findings of this screening therefore indicated that an Appropriate Assessment was required to determine that the proposal will not adversely affect the integrity of any these Natura 2000 sites.

The findings of both the Habitats Regulation Screening and the Appropriate Assessment are presented in this report.

1.2 AIM OF THIS REPORT

This report presents the findings of the Habitat Regulations Screening and Appropriate Assessment with respect to whether the proposed development is likely to have significant adverse effects on designated Natura 2000 sites, alone or in-combination with other operations or activities.

Only a preliminary design for the scheme is available at this time. This assessment will therefore be reviewed and updated as the design progresses to ensure that the design continues to be in compliance with the requirements of the Habitats Regulations ⁽³⁾ at all times.

(1) Special Protection Area (SPA) is a site designated (or pending designation) under the *European Directive on Conservation of Wild Birds (79/409/EEC)* (known as the *Birds Directive*) to protect birds that are considered rare or vulnerable within the European Community and all regularly occurring migratory birds. Enacted in Ireland through the European Union (Natural Habitats) Regulations, SI 94/1997 as amended.

(2) Special Area of Conservation (SAC) is a site designated under the European Directive on the Conservation of Natural Habitats and Wild Flora and Fauna (92/43/EEC) (known as the *Habitats Directive*) to protect sites that are considered rare because of their habitats or the species contained within them. Enacted in Ireland through the European Union (Natural Habitats) Regulations, SI 94/1997 as amended.

(3) European Union (Natural Habitats) Regulations (S.I. 94/1997)

1.3

STRUCTURE OF THIS REPORT

The remainder of this report is structured as follows:

Section 2: The Habitats Regulations Assessment Process

Section 3: Findings

Section 3.1: Assessment of the Broad Meadow/ Swords Estuary Special Protection Area (SPA)

Section 3.2: Assessment of the Malahide Estuary candidate Special Area of Conservation (cSAC)

Section 3.3: Assessment of the Sandymount Strand/Tolka Estuary Special Protection Area

Section 3.4: Assessment of the Rogerstown Estuary Special Protection Area

Section 3.5: Assessment of the North Bull Island Special Protection Area

Section 3.6: Assessment of the Baldoyle Bay Special Protection Area

Section 3.7: Assessment of the Rogerstown Estuary candidate Special Area of Conservation

Section 3.8: Assessment of the South Dublin Bay candidate Special Area of Conservation

Section 3.9: Assessment of the North Dublin Bay candidate Special Area of Conservation

Section 3.10: Assessment of the Baldoyle Bay candidate Special Area of Conservation

2.1 CONSENTING PROCESS AND NATURA 2000 SITES

In Ireland, the European Directive on the *Conservation of Natural Habitats and Wild Flora and Fauna (92/43/EEC)* (known as the *Habitats Directive*) has been transposed into national law by means of the European Union (Natural Habitats) Regulations (S.I. 94/1997), as amended.

'Where an operation or activity is being carried out, or is proposed to be carried out, on any land that is not within –

- (a) a site placed on a list in accordance with Chapter I of this Part, or*
- (b) a site where consultation has been initiated in accordance with Article 5 of the Habitats Directive, or*
- (c) a European site,*

and is liable to have an adverse effect on the integrity of the site concerned either alone or in combination with other operations or activities the Minister shall ensure that an appropriate assessment of the implications for the site in view of the site's conservation objectives is undertaken.'

The process is described further in *Section 2.2*.

2.2 THE HABITATS REGULATIONS ASSESSMENT PROCESS

The process is prescribed in *Article 6(3) and (4) of Habitats Directive* (see *Box 2.1*).

Box 2.1 *Habitats Directive (Council Directive 92/43/EEC)*

Article 6(3)

'Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans and projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives. In light of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public'.

Article 6(4)

'If in spite of a negative assessment of the implications of for the site and in the absence of alternative solutions, a plan or project must nevertheless be carried out for overriding public interest, including those of a social or economic nature, the member states shall take all compensatory measures necessary to ensure that overall coherence of Natura 2000 is protected. It shall inform the Commission of the compensatory measures adopted.

Where the site concerned hosts a priority natural habitat type and/ or priority species, the only considerations which may be raised are those related to human health or public safety, of beneficial consequences of primary importance for the environment or, further to an opinion from the Commission, to other imperative reasons of overriding public interest'.

European guidance ⁽¹⁾ on assessing projects and plans against the requirements of the Habitats Regulations includes a staged process to the assessment.

1. Define the proposal.
2. Establish that the proposal is not necessary to the management of the site for nature conservation purposes.
3. Determine whether the proposal is likely to have a significant effect on the site – the approach to this is set out in *Section 2.3*.
4. If a project is likely to have a significant effect, assess the implications of the proposal for the site's Conservation Objectives so as to answer the question "*can it be demonstrated that the proposal will not adversely affect the integrity of the site?*" This is referred to as the Appropriate Assessment.
5. If the Appropriate Assessment indicates that no adverse effect will occur the competent authority may proceed to grant consent; if not, further steps are required to demonstrate that specific reasons why the development should be permitted apply, before consent may be granted.

2.3

PROCESS OF DETERMINING LIKELY SIGNIFICANT EFFECT

To determine if the proposal is likely to have any significant effects on the designated sites the following issues are considered:

- could the proposals affect the qualifying interest and are they sensitive to the effect?;
- the probability of the effect happening;
- the likely consequences for the site's Conservation Objectives if the effect occurred; and
- the magnitude, duration and reversibility of the effect.

The aim of the Habitats Regulations process is to demonstrate that the proposals will not have an adverse effect on the integrity of the site. Site integrity is defined as:

"the coherence of its structure and function across its whole area that enables it to sustain the habitat, complex of habitats and/or the levels of populations of the species for which it was classified" ⁽²⁾.

The decision on whether the site integrity could be adversely affected by the proposals should focus on and be limited to the site's Conservation Objectives.

⁽¹⁾ European Commission Environment Division 2001; Assessment of plans and projects significantly affecting Natura 2000 sites.

⁽²⁾ European Communities (2000) Managing Natura 2000 sites - The provisions of Article 6 of the 'Habitats' Directive 92/43/CEE. EC

The assessment has drawn on the following information:

- description of the Natura 2000 sites and the qualifying interest features for which the sites are designated;
- details on the proposed plan, highlighting possible effects on the qualifying interest features of the Natura 2000 sites;
- identification and evaluation of impacts on the ecology and nature conservation value of the Natura 2000 sites; and
- the potential for in-combination effects when considered along with other existing and proposed schemes.

This information has been gathered from data held by the National Parks and Wildlife Service (NPWS) and the Railway Procurement Agency.

Where any Natura 2000 sites are considered to be subject to likely significant effects, further assessment has been carried out to determine whether it can be demonstrated that the proposals will not have an adverse effect on the integrity of those Natura 2000 sites.

The section comprises a number of tables which set out the findings of the Habitats Regulations Assessment process and describe the predicted impacts on the qualifying interest features of the European sites. The tables included in this section are intended to inform the competent authority during its determination of whether the scheme will adversely affect the integrity of any Natura 2000 sites. A table has been prepared for each designated site. Within each table the findings of the Habitats Regulations Screening and Appropriate Assessment (where required) are presented. The locations of the European sites considered are shown on Figure 3.1.

3.1 BROAD MEADOW/SWORDS ESTUARY SPECIAL PROTECTION AREA (SPA)

The results of the assessment of the Broad Meadow/Swords Estuary Special Protection Area are shown in *Table 3.1*.

Table 3.1 APPRAISAL OF THE IMPLICATIONS OF THE PROPOSED SCHEME ON THE BROAD MEADOW/SWORDS ESTUARY SPECIAL PROTECTION AREA (SPA)

Parameter	Description
Project and site description	
Brief description of the project	<p>Metro North will form part of Dublin's integrated light rail network, in the form of a segregated, high performance, high capacity, light rail system. The scheme will serve an 18 km corridor from Belinstown in the north to St. Stephen's Green in the city centre via Dublin Airport.</p> <p>The proposed alignment comprises approximately 6 km of twin bored tunnel under the historic centre of the city of Dublin and the River Liffey, with a further 2.4 km of twin bored tunnel constructed under Dublin Airport. The remainder of the line will be constructed at grade, in retained cut, in cut and cover and as elevated viaduct.</p> <p>The proposed alignment crosses Broad Meadow River and Ward River approximately 732 m west of the Broad Meadow / Swords Estuary SPA. The Broad Meadow River will be crossed via the existing Lissenhall Bridge, which will require minor upgrading. The Ward River will be crossed via the existing Balheary Bridge, also requiring minor upgrading, and via a new single span bridge to carry the northbound track of the Metro.</p>
Brief description of the designated Natura site	<p>The Broad Meadow/Swords Estuary SPA (004025) is located 732 m east of the proposed scheme. This site is situated in north County Dublin, between the towns of Malahide and Swords. It is the estuary of the River Broad Meadow, a substantial river which drains a mainly agricultural, though increasingly urbanised, catchment. This site is of high importance for wintering waterfowl and supports a particularly good diversity of species. The SPA is a fine example of an estuarine system, providing both feeding and roosting areas for a range of wintering waterfowl. The lagoonal nature of the inner estuary is of particular value as it increases the diversity of birds which occur. In particular, the salt marshes provide important roosts during high tide,</p>

Parameter	Description
Conservation objectives for the designated Natura 2000 site	<p data-bbox="715 181 1477 241">in parts of the outer estuary and in the extreme inner part of the inner estuary.</p> <p data-bbox="715 277 1477 371">This site qualifies under Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance of regularly occurring pale-bellied brent goose, an Annex I species.</p> <p data-bbox="715 407 1437 434">The SPA fully overlaps with the Malahide Estuary cSAC (<i>Table 3.2</i>).</p> <p data-bbox="715 465 1477 790">The Conservation Objectives for the SPA are currently under review and not available at present. However, for the purposes of this appraisal, the appraisal will assume the Conservation Objectives will aim to avoid deterioration of the habitats of the qualifying species (listed above) or significant disturbance to the qualifying species. This will ensure that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for each of the qualifying features, as well as ensuring that the qualifying species are maintained in the long term with respect to:</p> <ul data-bbox="715 826 1477 1144" style="list-style-type: none"> <li data-bbox="715 826 1378 853">• population of the species as a viable component of the site <li data-bbox="715 889 1193 916">• distribution of the species within the site <li data-bbox="715 952 1369 978">• distribution and extent of habitats supporting the species <li data-bbox="715 1014 1477 1075">• structure, function and supporting processes of habitats supporting the species <li data-bbox="715 1111 1182 1137">• no significant disturbance of the species
Is the proposal directly connected with, or necessary to, conservation management of the designated Natura site?	The proposal is not directly connected with, or necessary to, the conservation management of the Broad Meadow/Swords Estuary SPA.
Consider whether there are any likely direct, indirect or secondary impacts of the project on the designated Natura site	<p data-bbox="715 1370 1477 1563">There is the potential for qualifying bird species to use areas of improved grassland and dry meadows in the vicinity of the northern half of the proposed alignment for roosting and/ or foraging. Brent geese for example have been recorded flying distances of approximately 6-10 km between roosting and feeding sites. The potential impacts of the proposal include:</p> <ul data-bbox="715 1599 1477 2045" style="list-style-type: none"> <li data-bbox="715 1599 1477 1753">• direct habitat loss due to land-take within the working corridor including rail tracks, access tracks, electricity grid connection and ancillary structures on land that is outside the boundary of the SPA but which may be used by qualifying bird species connected to the SPA. <li data-bbox="715 1792 1477 1984">• indirect habitat loss due to the displacement of qualifying bird species from land that is outside the boundary of the SPA but which may be used by birds connected to the SPA. Such disturbance may occur as a consequence of construction work or due to the presence of operating metro vehicles close to nesting or foraging sites or habitual flight routes. <li data-bbox="715 2020 1394 2047">• loss or injury to birds connected with the SPA, as a result of

Parameter	Description
	<p>collision with metro vehicles, overhead wires, fencing , as these birds move into or out of the SPA.</p> <ul style="list-style-type: none"> disturbance or damage to the habitats of the SPA bird species caused by pollution of the Broad Meadow River which runs into the Broad Meadow / Swords Estuary SPA/Malahide Estuary cSAC. <p>The main river flowing into the Broad Meadow estuary is the Broad Meadow River, but there are also a number of smaller streams and surface water drains entering the site. The Broad Meadow and its main tributary, the Ward River, drain a catchment of 17,000 hectares (Anon, 1998a). The water quality of both these rivers is C - moderately polluted (Lucey <i>et al</i>, 1999 ⁽⁶⁾).</p>
<p>Consider the key phases of development and the risk of effects associated with each</p>	<p>If mitigation measures were not put in place, the key phases of the development which have the greatest potential to give rise to effects upon the Broad Meadow/Swords Estuary SPA are:</p> <p>Construction phase</p> <ul style="list-style-type: none"> construction work – the main risks being disturbance of birds and indirect effects from pollution affecting habitats supporting SPA birds <p>Operational phase</p> <ul style="list-style-type: none"> the main risk being habitat loss as birds avoid the metro vehicles and areas in the vicinity of the track infrastructure maintenance – the main risk being disturbance to birds. operation of the metro vehicles – the main risk being disturbance and collision with metro vehicles.
<p>Appraise which individual elements of the overall project would give rise to the greatest risk of effects. State any element of the project where the scale or magnitude of effect is not known</p>	<p>If mitigation measures were not put in place, the following risks could exist:</p> <ul style="list-style-type: none"> The risk of direct habitat loss due to land-take by rail tracks, access tracks, substations, surface and subsurface stops and other ancillary structures is of concern because of the potential loss of important habitat for qualifying bird species which are connected with the SPA The hydrological link between the area of the scheme and the Broad Meadow Estuary means that if mitigation measures were not put in place, polluting run-off generated during construction could enter the Broad Meadow River and damage coastal habitats which support SPA species.. Possible indirect habitat loss due to the displacement of birds as a consequence of construction work or proximity of the development close to nesting or foraging sites or habitual flight routes. Another important risk is loss or injury to birds as a result of

(6) Lucey, J., Bowman, J.J., Clabby, K.J., Cunningham, P., Lehane, M., MacCarthaigh, M., McGarrigle, M.L., and Toner, P.F. (1999). *Water Quality in Ireland 1995-1997*. Environmental Protection Agency. Wexford.

Parameter	Description
	collision with metro vehicles.
	The construction phase is the period most likely to result in the identified indirect effects. Track installation, together with installation of areas of hardstanding and the substations, have the largest potential for causing pollution. Once established the potential effects from the proposal diminish as the infrastructure becomes weathered-in eg run-off from tracks and other infrastructure will diminish.
Is the plan/project likely to have a significant effect on the Natura 2000 sites, either alone or in combination, with other plans or projects?	The initial screening indicated that at the time the assessment was carried out, it could not be concluded that the proposed scheme would not have an adverse effect on the integrity of the European sites. As a consequence, an Appropriate Assessment was carried out and the findings of that Appropriate Assessment are detailed in the following sections.

Appraisal of Impacts on Site Integrity

Identify the relevant conservation objectives to consider for the designated Natura site.	<p>The Conservation Objectives for the SPA are currently under review and not available at present. However, for the purposes of this appraisal, the appraisal will assume the Conservation Objectives will aim to avoid deterioration of the habitats of the qualifying species (pale-bellied brent goose) or significant disturbance to the qualifying species. This will ensure that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for each of the qualifying features, as well as ensuring that the qualifying species are maintained in the long term with respect to:</p> <ul style="list-style-type: none"> • population of the species as a viable component of the site • distribution of the species within the site • distribution and extent of habitats supporting the species • structure, function and supporting processes of habitats supporting the species • no significant disturbance of the species
Can it be ascertained that the proposal/plan will not adversely affect the integrity of the Broad Meadow / Swords Estuary SPA?	<p>For the conservation objectives for pale-bellied brent goose the following assessment can be made.</p> <p>Brent geese favour coastal habitats for feeding and prefer eelgrass (<i>Zostera</i> spp), green algae (<i>Enteromorpha</i> spp) and saltmarsh. In areas where numbers have increased, inland feeding on improved grassland and winter cereals has occurred. It has been suggested that this is due to the depletion of food resources, and inland feeding in Ireland was first recorded in the mid 1970s (cit Robinson <i>et al</i>, 2004). The use of grassland habitats inland for feeding has increased steadily since then, especially in the east and southeast of the country where it is estimated that a quarter of the population spends a large proportion of time feeding on managed grasslands (Robinson <i>et al</i>, 2004). In Dublin such grassland areas include recreational playing fields and golf courses. The northern end of the proposed scheme crosses an area which is dominated by improved agricultural grassland fields and arable, and it is possible that such habitat could be used by brent geese.</p>

Parameter	Description
	<p>No light-bellied brent geese were observed foraging in these fields during the studies for the EIA, although specific surveys for this species have not been undertaken. Discussions with NPWS suggest that many of the birds in this area forage closer to the Estuary.</p> <p>The proposals will, however, only affect a small proportion of the grassland and arable habitats which are available in Area MN101 north of the Broad Meadow River. Large areas of amenity grassland will also remain unaffected especially in Area MN102 to the south of the Broad Meadow River. Whilst some loss of grassland habitat will occur, it is likely that changes in these habitats will occur in any event, for example due to changes in agricultural practices. A site visit in June 2008 noted that several of the fields north of the Broad Meadow River, which were grassland at the time of the habitat surveys are now been used for growing potatoes. Such fields would not be favoured by foraging brent geese.</p> <p>The scheme will result in the severance of some of the fields, however, large areas will still remain, and given that the birds are known to use playing fields and golf courses, it is likely that they are reasonably tolerant of a degree of disturbance, and are likely to habituate to the presence of the metro vehicles.</p> <p>The surveys undertaken for the Metro North EIS recorded pale-bellied brent geese flying in a westerly direction across the alignment from the direction of the Broad Meadow / Swords Estuary SPA. The birds were observed flying at heights of over 50m which is well above the height of the vehicles which will use the scheme, and collisions of birds with the vehicles are not predicted. The height at which the birds were flying may reflect the fact that they have to fly across M1 and the R132 before flying across the proposed alignment.</p> <p>In conclusion the proposed scheme will not directly affect the habitats which support pale-bellied brent geese within the designated site, or the distribution of the birds within the site. Effects outside the designated will not affect the viability of the populations, taking account of the mitigation measures which will be implemented to ensure that the construction works across the Broad Meadow River do not affect the structure and function of the process which support the habitats within the designated site. Hence neither the conservation objectives nor the integrity of the designated site will be affected.</p> <p>The structure, function and supporting processes of habitats supporting the pale-bellied brent goose could be affected by pollution of the Broad Meadow River, and its tributaries, which runs into the Broad Meadow / Swords Estuary SPA. The following impacts could occur as a result of the Metro North scheme:</p> <p>Construction Impacts</p> <p><i>Pollution and spill risk</i></p> <p>During construction there is the potential for impacts on water quality of the Broad Meadow River due to:</p> <ul style="list-style-type: none"> accidental spillage or incorrect use of cements, concretes, fuel or oils, either directly into surface watercourses or indirectly through contamination of groundwater;

Parameter	Description
	<ul style="list-style-type: none"> • leakage of fuel or oils from construction vehicles; • mobilisation of sediments and dusts during construction works via surface runoff or air e.g. from excavations and soil storage mounds; • mobilisation of historic pollution (contaminated land); • discharge of sediment-laden water from dewatering operations or construction drainage systems into surface watercourses; • the use of chemical treatments on any invasive species; • the requirement for specialist ground treatments or works such as grouting and piling; and • direct deposition of material into the surface watercourses during bridge strengthening works and transportation.
	<p>The particular works most likely to cause pollution of Broad Meadow River and Ward River (and consequently the Broad Meadow / Swords Estuary SPA) include minor upgrading of the Lissenhall Bridge (over Broad Meadow River) and Balheary Bridge (over Ward River) and the construction of a new bridge over the Ward River. General construction activities (eg construction traffic movements, construction compounds, soil storage, excavations) in the vicinity of watercourses and drainage ditches which drain towards the Broad Meadow Estuary also present a risk of the above pollution impacts.</p>
	<p>Although subsequent dilution and dispersion processes would reduce the polluting impact on receptors located downstream, if mitigation measures were not put in place, the risk of accidental water pollution damage would be high and the SPA site is considered sensitive to this impact.</p>
	<p><i>Change in watercourse flow dynamics and drainage conditions</i></p>
	<p>Construction of the new Ward River bridge has the potential to impact upon the hydraulic flow regime of the Ward River if the structure results in a reduction in channel dimensions (primarily width) or capacity. The span of the bridge and particularly the freeboard between water level and bridge soffit also has the potential to influence flow during periods of high-water. These factors could potentially lead to an increase in flooding upstream or downstream of the bridge and / or changes to sedimentation and erosion within the river system.</p>
	<p>The proposed new Ward River bridge has been designed to avoid any reduction in channel width or capacity, with bridge abutments set 1 to 2 metres back from top of bank and no in-channel supports. The risk of changes to watercourse flow dynamics (and associated increased flooding, erosion or sediment deposition) is therefore considered to be low.</p>
	<p>The installation of hard standing for temporary construction compounds and access roads would be expected to lead to increased surface runoff. If appropriate drainage systems are not installed, this in turn, has the potential to increase the risk of flooding. Increased surface runoff could also result from the disturbance and compaction of soils by construction traffic, with resulting impacts to shallow drainage, increases in erosion and the potential subsequent mobilisation of sediments to surface water features in the vicinity. Areas of</p>

Parameter	Description
	<p>hardstanding will be kept to a minimum during construction, and attenuation ponds or other suitable Sustainable Drainage Systems (SUDS) will be installed to contain surface runoff and storm waters during rainfall events. Before installation of the scheme, haul roads will utilise the scheme corridor, minimising the impacts to land and drainage. Movement of construction traffic will also be controlled to minimise soil compaction and disturbance. The risk of the above impacts occurring is therefore considered to be low.</p> <p>The requirement for specialist ground treatments or works such as grouting and piling would be expected to affect drainage and groundwater flow paths if mitigation measures were not put in place.</p> <p>Operation Impacts</p> <p><i>Pollution and spill risk</i></p> <p>If mitigation measures were not put in place, during operation there would be potential for impacts on water quality of the Broad Meadow River due to:</p> <ul style="list-style-type: none"> • leakage of oils, coolants, brake fluids and grease from metro vehicles; • contaminated runoff from the park and ride site and depot car park; • application of herbicides for weed control; • incorrect or insufficient design or maintenance of drainage systems; and • the installation of non-sulphate resistant concrete structures during construction. <p><i>Change to natural drainage conditions</i></p> <p>If mitigation measures were not put in place, natural drainage conditions surrounding the alignment could be altered due to:</p> <ul style="list-style-type: none"> • increased runoff from areas of permanent hardstanding; and • the presence of the bridge, with particular regard to high flows. • incorrect or insufficient design (capacity) or maintenance of drainage systems leading to increased levels of runoff and resultant increased risk of flooding, erosion or sediment deposition downstream of the scheme <p>Potential temporary impacts associated with impacts to shallow drainage would be anticipated to occur in the initial period of operation as drainage patterns re-stabilise. Drainage on areas of hardstanding will be permanently altered, Provided the SUDS and drainage schemes are of suitable design, capacity, and condition, the overall magnitude of modifications to the natural drainage pattern is considered to be minor, and is not expected to cause any significant long term impact on the water environment.</p> <p>The proposed new Ward River bridge has been designed to avoid any reduction in channel width or capacity, with bridge abutments set 1 to 2</p>

Parameter	Description
	<p>metres back from top of bank and no in-channel supports. The risk of changes to watercourse flow dynamics (and associated increased flooding, erosion or sediment deposition) is therefore considered to be low. Potential effects could, however, be experienced during extreme flood events, where the presence of the bridge soffit could be expected to constrain flows and introduce afflux upstream of the bridge. In this regard, the bridge is being constructed in accordance with OPW requirements, to allow the passage of waters in a 1:100 year flood. In addition, design error allowances, a 60% allowance for an Arterial Drainage Area, 20% climate change allowance and a 300 mm freeboard has been provided for by the scheme's engineers within the outline bridge design.</p> <p>Emergency or Unforeseen Events</p> <p>Emergency and unforeseen events have been included under separate section here to convey that although, inherently, they have the potential to result in major adverse impacts, they have a low likelihood of occurrence, and therefore fall outside 'normal' construction or operational risks. Emergency events, including large leaks and spills, significant drainage system malfunctions (with associated secondary impacts to water quality and flooding), extreme flood events, and events such as fires (due to fire waters and associated additives) have the potential to have significant impacts upon the water environment and dependent habitats and species.</p>
<p>Consider whether mitigation measures can be adopted to avoid impacts on site integrity.</p>	<p>The following mitigation measures have been developed to address the impacts of the proposed development on the Broad Meadow / Swords Estuary SPA.</p> <p>General Measures</p> <p>It is anticipated that the majority of minor impacts can be at least partly mitigated by adherence to good construction practice and site management, which will be set out in the Scheme's Environmental Management Plan (EMP) and Waste Management Plan (WMP). All agreed mitigation will be integrated within these documents. Documents will be adopted in consultation with the relevant authorities and will be regularly updated and reviewed, paying particular attention to the anticipated changes in water legislation during the construction period. This will include, for example, changes associated with key European water policy milestones, such as 2013 when the Dangerous Substances Directive, the Freshwater Fish Directive, and the Groundwater Directive will be repealed by the Water Framework Directive (WFD).</p> <p>Site inspections, mitigation reviews and any required monitoring programmes will be conducted at agreed intervals throughout the projects construction and operation. Such inspections will follow correct incident reporting procedures and will result in corrective action where required.</p> <p>Pollution and spill risk</p> <p><i>During construction, the following mitigation will be applied.</i></p> <ul style="list-style-type: none"> No direct discharge to watercourses or waterbodies will be made without prior consent, and will only be conducted in accordance with consent conditions (ie with regard to treatment, volume).

Parameter	Description
	<ul style="list-style-type: none"> • Appropriate wastewater treatment systems will be installed to serve critical construction areas and where a risk of historic contamination exists, within the vicinity of watercourses or within areas considered to be at risk of flooding. • Oil separators and silt traps will be installed at all discharge points. • Pumped discharges will be treated and recharged to groundwater where possible, or treated to remove sediments as above prior to discharge to surface watercourses in accordance with appropriate consents. • Silt fences will be used during bridge strengthening and new bridge construction works to prevent entry of sediments to watercourses. • No in-river works will be carried out as part of bridge construction works. • Precast concrete structures will be used wherever practicable. Where liquid concretes are required, detailed method statements will be produced prior to works commencing. Such statements will include measures to ensure that concretes do not enter watercourses or waterbodies and will be agreed in consultation with the relevant authorities. • Piling, dewatering and any other specialist works (such as grouting) will be conducted by an experienced contractor in accordance with developed method statements. Approval of such method statements will be sought from the relevant authorities. • Trenching or excavation activities in open land will be restricted during periods of intense rainfall or high winds; • Stockpiles or soil, spoil and construction materials (eg sand, gravel, ballast) will not be located within the vicinity of watercourses or in areas at risk of flooding. • Dust suppression and erosion minimisation procedures will be developed and implemented. Stockpiling of soil, spoil and construction materials (such as sand and gravels) will be kept to a minimum and where necessary, stockpiles will be covered to provide stabilisation. • Maintenance procedures and timetables will be developed and correctly implemented to ensure the optimum functioning of the drainage and attenuation features and systems, plant and vehicles during construction in order to promote optimal performance. • Refuelling and maintenance of construction equipment will take place in designated bunded areas within the construction compounds. Drip trays will be placed under stationary machinery. • Equipment, materials and chemicals will not be stored within or near watercourses, or in areas at risk of flooding. At storage sites, fuels, lubricants and chemicals will be contained within a bunded area. • All bunds and trays will suitably sized (110% of the volume of a single container, or 25% of the total volume of multiple containers),

Parameter	Description
	<p>and correctly checked and maintained, particularly after periods of heavy rainfall.</p> <ul style="list-style-type: none"> • Spill kits and hydrocarbon adsorbent packs will be stored onboard all construction vehicles and within all construction compound areas. • All washing of concrete trucks will take place in designated bunded areas within the construction compounds, and no washout water will be discharged to surface watercourses under any circumstances. • Where materials and equipment are to be transported over watercourses loose materials will be covered so as to prevent leaks and spills. In addition, equipment and chemicals will be checked for leaks and safely secured to the vehicle before crossing. • During construction, appropriate waste handling, storage and disposal procedures will be implemented to prevent the mobilisation or entry of any wastes to surface water or groundwater. • A pollution prevention and emergency response plan will be developed to be implemented during construction. The plan will include the requirement for suitably trained, designated personnel and the provision of equipment to contain and clean up any accidental releases. Together with emergency events associated with large leaks and spills, the plan will cover incidents such as flooding, fires and significant drainage system malfunctions. <p><i>During operation the following mitigation will be applied.</i></p> <ul style="list-style-type: none"> • Metro vehicles will be regularly maintained within workshops to reduce the risk of leaks during operation. • Any discharges into the foul sewer network or surface watercourses or waterbodies will only be conducted with appropriate consent and in accordance with consent conditions. • Suitable sulphate resistance concretes will be used. • Areas of hardstanding at the depot site with low to medium risk of contamination (HGV parking and turning areas) will be contained and drained using a pipe and gully system. Runoff from these areas will be passed through an approved Class 1 Light Liquid by-pass Separator before discharging to the on-site drainage system. • Areas of high risk of contamination such as fuel off-load and distribution areas, internal inspection pits, skip area and waste compactor area will be fully protected and drained to a separate effluent drainage system connected to an approved Class 1 full retention oil separation prior to discharge to the on-site package treatment plant. • Drainage from areas with a risk of historic contamination will be isolated from underlying sediments to minimise the risks of mobilisation occurring. • Any substance with the potential to pollute (fuels, oils, chemicals etc) will be stored and handled at a suitable location with

Parameter	Description
	<p>appropriate bunds to contain leaks and spills should they occur.</p> <ul style="list-style-type: none"> • All bunds will be suitably sized (110% of the volume of a single container, or 25% of the total volume of multiple containers), and correctly checked and maintained, particularly after periods of heavy rainfall. Spill kits and hydrocarbon adsorbent packs will be available. • All discharge points along the track length will be fitted with suitable treatment systems. • Herbicides used to control weed growth will comply with all applicable environmental controls, and the quantities used will be small. • Maintenance procedures and timetables will be developed and correctly implemented to ensure the optimum functioning of the drainage and attenuation features and systems, plant and vehicles during operation in order to promote optimal performance. • During operation, appropriate waste handling, storage and disposal procedures will be implemented to prevent the mobilisation or entry of any wastes to surface water or groundwater. • A pollution prevention and emergency response plan will be developed to be implemented during operation. The plan will include the requirement for suitably trained, designated personnel and the provision of equipment to contain and clean up any accidental releases. Together with emergency events associated with large leaks and spills, the plan will cover incidents such as flooding, fires and significant drainage system malfunctions.

Change in watercourse flow dynamics and drainage conditions

It should be noted that additional mitigation to control pollution and spill risk may be referred to within the sections above. In many cases, particularly those associated with the introduction of sediments, potential secondary effects to flow dynamics will be controlled through the implementation of spill and pollution prevention and control mitigation.

During construction the following mitigation will be applied.

- The proposed new Ward River Bridge has been designed to avoid any reduction in channel width or capacity, with bridge abutments set approximately 1 to 2 metres back from top of bank. There will be no in-channel supports.
- Areas of hardstanding will be kept to a minimum during construction, and suitable SUDS, will be installed to contain surface runoff during rainfall events.
- Before installation of the scheme, haul roads will utilise the scheme corridor, minimising the impacts to land and drainage.
- Movement of construction traffic will be controlled to minimise soil compaction and disturbance.

Parameter	Description
	<p><i>During operation the following mitigation will be applied.</i></p> <ul style="list-style-type: none"> • At Belinstown Depot storm water runoff will be managed on site using a combination of SUDS techniques and conventional pipe drainage systems (see full description in the EIS). The total discharge from the site will be restricted to the Greenfield runoff rate of 2 l/s/ha or 6 l/s/ha for impermeable areas as recommended by Fingal County Council. • All new pipes and culverts will be adequately sized to convey the existing peak flows plus an additional 10% allowance for the effects of climate change. • All filter drains for track and road drainage will be designed in accordance with CIRIA 697 and CIRIA 522 to accommodate a 1 in 30 year storm with a 10% climate change allowance. • The soffit levels and bridge span will accord with OPW specifications with respect to flooding, allowing the passage of flood waters for a 1:100 year event + 20% climate change allowance, 300 mm freeboard and taking account of drainage from the Arterial Drainage Area. • Due to the evolving nature of flood risk and climate change policy and associated requirements, during detailed design allowances with regard to the drainage and bridge systems will be reviewed to ensure that requirements and good practice with respect to the design flood event and allowances for climate change are being met or exceeded.
Conclusion of Appraisal	
Can it be ascertained that the proposal will not adversely affect the integrity of the Broad Meadow / Swords Estuary SPA?	Provided that the mitigation measures to prevent pollution and avoid changes to natural drainage conditions are adopted, successfully implemented and monitored on-the-ground, then the Dublin Metro North proposal will not adversely affect the integrity of the Broad Meadow / Swords Estuary SPA.

3.2

MALAHIDE ESTUARY CANDIDATE SPECIAL AREA OF CONSERVATION (CSAC)

The results of the assessment of the Malahide Estuary are shown in *Table 3.2*.

Table 3.2 *Appraisal of the Implications of the proposed scheme on the Malahide Estuary cSAC*

Parameter	Description
Project and site description	
Brief description of the project	<p>Metro North will form part of Dublin's integrated light rail network, in the form of a segregated, high performance, high capacity, light rail system. The scheme will serve an 18 km corridor from Belinstown in the north to St. Stephen's Green in the city centre via Dublin Airport.</p> <p>The proposed alignment comprises approximately 6 km of twin bored tunnel under the historic centre of the city of Dublin and the River</p>

Parameter	Description
Brief description of the designated Natura site	<p>Liffey, with a further 2.4 km of twin bored tunnel constructed under Dublin Airport. The remainder of the line will be constructed at grade, in retained cut, in cut and cover and as elevated viaduct.</p> <p>The proposed alignment crosses Broad Meadow River and Ward River approximately 242 m west of the Malahide Estuary SAC. The Broad Meadow River will be crossed via the existing Lissenhall Bridge, which will require minor upgrading. The Ward River will be crossed via the existing Balheary Bridge, also requiring minor upgrading, and via a new single span bridge to carry the northbound track of the Metro.</p> <p>The Malahide Estuary cSAC (000205) is located 242 m east of the northern end of the proposed development. The site is situated immediately north of Malahide and east of Swords. It is the estuary of the River Broad Meadow. The site is divided by a railway viaduct built in the 1800s. The outer part of the estuary is mostly cut off from the sea by a large sand spit, known as "the island".</p> <p>The site is currently listed as a candidate SAC for supporting a number of Annex I habitats, comprising:</p> <ul style="list-style-type: none"> • fixed coastal dunes with herbaceous vegetation (grey dunes) (a priority habitat); • <i>Salicornia</i> (glass-wort) and other annuals colonizing mud and sand; • Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>); • Mediterranean salt meadows (<i>Juncetalia maritimi</i>); • <i>Spartina</i> (cord-grass) swards (<i>Spartinion maritimae</i>); • shifting dunes along the shoreline with <i>Ammophila arenaria</i> (marram grass) (white dunes); and • mudflats and sandflats not covered by seawater at low tide. <p>Additional Annex I habitats which occur within the site, but for which the site was not primarily selected, include annual vegetation of drift lines, embryonic shifting dunes, white dunes and estuary.</p> <p>This site overlaps with the Broad Meadow/ Swords Estuary SPA described previously.</p>
Conservation objectives for the designated Natura site	<p>The draft Conservation Objectives for this site are as follows:</p> <p>Objective 1</p> <p>To maintain the Annex I habitats for which Malahide Estuary cSAC has been selected at favourable conservation status: Fixed coastal dunes with herbaceous vegetation (grey dunes), Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes), Mudflats and sandflats not covered by seawater at low tide, <i>Salicornia</i> and other annuals colonizing mud and sand, Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>), Mediterranean salt meadows (<i>Juncetalia maritimi</i>) and <i>Spartina</i> swards (<i>Spartinion maritimae</i>).</p> <p>Objective 2</p>

Parameter	Description
	To maintain the extent, species richness and biodiversity of the entire site
	Objective 3
	To establish effective liaison and co-operation with landowners, legal users and relevant authorities
Screening	
Is the proposal directly connected with, or necessary to, conservation management of the designated Natura site?	The proposal is not directly connected with, or necessary to, the conservation management of any of the Natura 2000 sites listed above.
Consider whether there are any likely direct, indirect or secondary impacts of the project on the designated Natura site	<p>If mitigation measures were not put in place, the potential impacts of the proposal could include:</p> <ul style="list-style-type: none"> disturbance or damage to Annex I habitats of the Malahide Estuary cSAC caused by dust, spillage of fuels and chemicals and emissions. <p>The main river flowing into the Broad Meadow estuary is the Broad Meadow River, but there are also a number of smaller streams and surface water drains entering the site. The Broad Meadow and its main tributary, the Ward River, drain a catchment of 17,000 hectares (Anon, 1998a). The water quality of both these rivers is C - moderately polluted (Lucey et. al., 1999).</p>
Consider the key phases of development and the risk of effects associated with each	If mitigation measures were not put in place, the key phase of the development which has the greatest potential to give rise to effects upon the Malahide cSAC is construction work – the main risk being indirect effects from pollution affecting Annex I habitats of the cSAC.
Appraise which individual elements of the overall project would give rise to the greatest risk of effects. State any element of the project where the scale or magnitude of effect is not known	<p>If mitigation measures were not put in place, the hydrological link between the development and the Broad Meadow Estuary means that pollution resulting from run-off during construction via the Broad Meadow River could indirectly impact on the cSAC through damaging Annex I habitats of the cSAC.</p> <p>Construction activity is the period most likely to result in this effect. If mitigation measures were not put in place, track installation and structures including bridge abutments, have the largest potential for causing pollution. Once established the potential effects from the proposal would diminish as the infrastructure becomes weathered-in eg run-off from tracks and other infrastructure will diminish.</p>
Is the plan/project likely to have a significant effect on the Natura 2000 sites, either along or in combination, with other plans or projects?	The initial screening indicated that at the time the assessment was carried out, it could not be concluded that the proposed scheme would not have an adverse effect on the integrity of the European sites. As a consequence, an Appropriate Assessment was carried out and the findings of that Appropriate Assessment are detailed in the following sections.
Appraisal of Impacts on Site Integrity	
Identify the relevant conservation objectives to	The conservation objectives to consider are those that relate to the Annex 1 habitats which may be affected by the proposal. The draft

Parameter	Description
consider for the designated Natura site.	<p>Conservation Objectives to consider therefore include:</p> <p>Objective 1</p> <p>To maintain the Annex I habitats for which Malahide Estuary cSAC has been selected at favourable conservation status: Fixed coastal dunes with herbaceous vegetation (grey dunes), Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes), Mudflats and sandflats not covered by seawater at low tide, <i>Salicornia</i> and other annuals colonizing mud and sand, Atlantic salt meadows (<i>Glaucopuccinellietalia maritima</i>), Mediterranean salt meadows (<i>Juncetalia maritimi</i>) and <i>Spartina</i> swards (<i>Spartinion maritima</i>).</p> <p>Objective 2</p> <p>To maintain the extent, species richness and biodiversity of the entire site</p>
Can it be ascertained that the proposal/plan will not adversely affect the integrity of Malahide Estuary cSAC?	See <i>Table 3.1</i>
Consider whether mitigation measures can be adopted to avoid impacts on site integrity.	See <i>Table 3.1</i>
Conclusion of Appraisal	
Can it be ascertained that the proposal will not adversely affect the integrity of the Malahide Estuary cSAC?	Provided that the mitigation measures to prevent pollution and avoid changes to natural drainage conditions are adopted, successfully implemented and monitored on-the-ground, then the Dublin Metro North proposal will not adversely affect the integrity of the Malahide Estuary cSAC.

3.3

SANDYMOUNT STRAND/TOLKA ESTUARY SPECIAL PROTECTION AREA

The results of the assessment of the Sandymount Strand/Tolka Estuary Special Protection Area are shown in *Table 3.3*.

Table 3.3 *Appraisal of the Implications of the proposed scheme on the Sandymount Strand/Tolka Estuary SPA*

Parameter	Description
Project and site description	
Brief description of the designated Natura site	The Sandymount Strand/Tolka Estuary SPA (004024) is divided into the northern and southern subsites. The northern and southern subsites are located 2.2 km and 3.0 km, respectively, southeast of the southern end of the proposed development route. This site comprises a substantial part of Dublin Bay. It includes virtually all of the intertidal area in the south bay, as well as much of the estuary of the River Tolka to the north of the River Liffey. A portion of the shallow

Parameter	Description
	<p>marine waters of the bay is also included. The site is an important site for wintering waterfowl, being an integral part of the internationally important Dublin Bay complex. Although birds regularly commute between the south bay and the north bay, recent studies have shown that certain populations which occur in the south bay spend most of their time there.</p> <p>This site qualifies under Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance of pale-bellied brent goose, an Annex I species.</p> <p>This site also qualifies under Article 4.2 of the Directive (79/409/EEC) by supporting populations of European importance of the following occurring migratory species, all listed on Annex I of the Directive:</p> <ul style="list-style-type: none"> • common tern; • Arctic tern; and • roseate tern. <p>The SPA fully overlaps with part of the South Dublin Bay SAC (considered in <i>Table 3.8</i>).</p>
<p>Conservation objectives for the designated Natura site</p>	<p>The Conservation Objectives for the SPA are currently under review and not available at present. However, for the purposes of this appraisal, the appraisal will assume the Conservation Objectives will aim to avoid deterioration of the habitats of the qualifying species (listed above) or significant disturbance to the qualifying species. This will ensure that the integrity of the site is maintained and the site makes an appropriate contribution to achieving a favourable conservation status for each of the qualifying features, as well as ensuring that the qualifying species are maintained in the long term with respect to:</p> <ul style="list-style-type: none"> • population of the species as a viable component of the site; • distribution of the species within the site; • distribution and extent of habitats supporting the species; • structure, function and supporting processes of habitats supporting the species; and • no significant disturbance of the species
<p>Screening</p>	
<p>Is the proposal directly connected with, or necessary to, conservation management of the designated Natura site?</p>	<p>The proposal is not directly connected with, or necessary to, the conservation management of any of the Natura 2000 sites listed above.</p>
<p>Consider whether there are any likely direct, indirect or secondary impacts of the project on the designated Natura site</p>	<p>There is the potential for pale-bellied brent geese to use areas of improved grassland and dry meadows in the vicinity of the northern half of the proposed alignment route for roosting and/ or foraging. Brent geese for example have been recorded flying distances of approximately 6-10 km between roosting and feeding sites. If</p>

Parameter	Description
	<p data-bbox="715 181 1481 241">mitigation measures were not put in place, the potential impacts of the proposal could include:</p> <ul data-bbox="715 277 1481 1055" style="list-style-type: none"> <li data-bbox="715 277 1481 405">• direct habitat loss due to land-take within the working corridor including rail tracks, access tracks, electricity grid connection and ancillary structures on land outside the SPA but which may be used by qualifying bird species connected to the SPA. <li data-bbox="715 441 1481 636">• indirect habitat loss due to the displacement of qualifying bird species from land outside the SPA but which may be used by birds connected to the SPA . Such disturbance may occur as a consequence of construction work or due to the presence of operating metro vehicles close to nesting or foraging sites or habitual flight routes. <li data-bbox="715 669 1481 763">• loss or injury to birds connected with the SPA, as a result of collision with metro vehicles, overhead wires, fencing , as these birds move into or out of the SPA. <li data-bbox="715 797 1481 958">• disturbance or damage to the habitats of the SPA bird species caused by pollution of the River Liffey, which runs into Dublin Bay, and the adjacent Natura sites of Sandymount/Tolka Strand SPA, North Bull island SPA, South Dublin Bay cSAC and the North Dublin Bay cSAC. <li data-bbox="715 992 1481 1055">• disturbance or damage to the habitats of the SPA bird species caused by dust, spillage of fuels and chemicals and emissions. <p data-bbox="715 1088 1481 1149">If mitigation measures were not put in place, the potential impacts on terns could include:</p> <ul data-bbox="715 1182 1481 1377" style="list-style-type: none"> <li data-bbox="715 1182 1481 1377">• disturbance or damage to the habitats of the SPA bird species caused by dust, spillage of fuels and chemicals, airborne emissions or pollution to the River Liffey which runs into Dublin Bay and the adjacent Natura sites of Sandymount/Tolka Strand SPA, North Bull Island SPA, South Dublin Bay cSAC and the North Dublin Bay cSAC.
<p data-bbox="379 1413 687 1496">Consider the key phases of development and the risk of effects associated with each</p>	<p data-bbox="715 1413 1481 1496">If mitigation measures were not put in place, the key phases of the development which have the greatest potential to give rise to effects upon the Sandymount Strand/Tolka Estuary SPA are:</p> <ul data-bbox="715 1529 1481 2047" style="list-style-type: none"> <li data-bbox="715 1529 1481 1568">• construction work – the main risks being disturbance to birds; <li data-bbox="715 1601 1481 1695">• operational phase – the main risk being avoidance by birds of the metro vehicles and their vicinity effectively resulting in habitat loss; <li data-bbox="715 1729 1481 1792">• operation of the metro vehicles – the main risk being disturbance and collision with metro vehicles; and <li data-bbox="715 1825 1481 1888">• infrastructure maintenance – the main risk being disturbance to birds; <li data-bbox="715 1921 1481 2047">• construction phase – risk of release of contaminants from the construction and operation of the temporary Bailey Bridge and working deck area over the River Liffey adjacent to O’Connell Bridge

Parameter	Description
Appraise which individual elements of the overall project would give rise to the greatest risk of effects. State any element of the project where the scale or magnitude of effect is not known	<p>If mitigation measures were not put in place, the following risks could occur:</p> <ul style="list-style-type: none"> • The risk of direct habitat loss due to land-take by rail tracks, access tracks, substations, surface and subsurface stops and other ancillary structures is of concern because of the potential loss of important habitat for qualifying bird species which are connected with the SPA • Possible indirect habitat loss due to the displacement of birds as a consequence of construction work or proximity of the development close to nesting or foraging sites or habitual flight routes. • There is a risk of loss or injury to birds as a result of collision with metro vehicles. • Potential indirect damage to habitats by the release of contaminants from the construction and operation of the temporary Bailey Bridge and working deck area over the River Liffey adjacent to O'Connell Bridge.
Is the plan/project likely to have a significant effect on the Natura 2000 sites, either alone or in combination, with other plans or projects?	The initial screening indicated that at the time the assessment was carried out, it could not be concluded that the proposed scheme would not have an adverse effect on the integrity of the European sites. As a consequence, an Appropriate Assessment was carried out and the findings of that Appropriate Assessment are detailed in the following sections.
Appraisal of Impacts on Site Integrity	
Identify the relevant conservation objectives to consider for the designated Natura site.	See conservation objectives listed above.
Can it be ascertained that the proposal/plan will not adversely affect the integrity of Sandymount Strand/Tolka Estuary SPA	<p>In addition to the assessment of the potential impacts discussed in <i>Table 3.1</i> in relation to the Dublin Bay Natura sites, the in-stream works in the River Liffey adjacent to O'Connell Bridge present some additional and indirect potential impacts. The proposed in-stream works comprise two elements; a Bailey Bridge and a working deck structure to be constructed and operated in the River Liffey. The Bailey Bridge is a temporary structure to assist in alleviating traffic impact during the construction period. The Bailey Bridge will be supported on No16 600mm piles. The piles will be aligned in rows to coincide with the two side piers and two in river piers of O'Connell Bridge. This arrangement of piles is intended to minimise the impact of the additional piles on the hydrodynamic regime of the River Liffey.</p> <p>The second element of the River Liffey in-stream works is the installation of a 25m long working deck across the width of the river (approx. 50m). This working deck structure will be supported on rows of piles again aligned with the O'Connell Bridge piers to minimise impact on the hydrodynamic regime of the river in this area. The use of the working deck structure will be confirmed at the detailed design stage, however it is anticipated that the deck will be used for office accommodation and to house a treatment plant for treating and</p>

Parameter	Description
	<p>recovering bentonite (used in the construction works) prior to the bentonite being re-used. The waste element removed from the bentonite during treatment will be removed from the construction site.</p> <p>Additional construction impacts</p> <p><i>Pollution and spill risk</i></p> <p>During construction there is the potential for impacts on water quality of the River Liffey as summarised in <i>Table 3.1</i>. The in-river works in the River Liffey present additional potential for impact on the water quality due to:</p> <ul style="list-style-type: none"> • The release of historic contaminants in the river bed sediment due to piling and other construction works on site. • The release of additional sediment and any historic contaminants in the river bed sediment due to the impact of localised scour around the new piles. <p>The sediment contamination analysis shows comparatively low levels of contamination within the River Liffey bed sediments above and at the site of the proposed bridge and working deck. As a result the risk posed to the Dublin Bay Natura sites due to remobilisation of contaminants from the construction phase of the project is considered to be not significant.</p> <p>The mitigation measures set out in this document present a comprehensive suite of precautions to minimise and manage the risk of accidental release of contaminants from the bridge and working deck areas. The residual impact following these mitigation measures is not considered to present a significant likelihood of impact to the Natura sites in Dublin Bay.</p> <p><i>Change in watercourse flow dynamics and drainage conditions.</i></p> <p>The construction of any new structure in a river has the potential to impact the hydraulic flow regime of the river. The temporary Bailey Bridge and working deck structures have been designed to minimise impact through the use of narrow piles rather than the pier construction that would be associated with more permanent structures.</p> <p>The River Liffey in the area of the construction area is confined in an open tidal channel. The open piled approach to the two proposed structures is not anticipated to have a significant impact on the hydrodynamic regime of the River Liffey. It is anticipated that any small changes in hydrodynamic regime as a result of the River Liffey in-river works will be indiscernible when the River Liffey enters Dublin Bay.</p> <p>Operational Impacts</p> <p>Impacts arising from the operation of the Metro North scheme are presented in <i>Table 3.1</i>. As both the Bailey Bridge and the working deck are temporary structures that will be used only during the construction period, there are no additional operational impacts arising from the River Liffey in-river works that need to be considered.</p>
Consider whether mitigation measures can be adopted to	The following mitigation measures have been developed to address the impacts of the proposed development on the Sandymount/ Tolka

Parameter	Description
avoid impacts on site integrity.	<p data-bbox="715 174 858 212">Estuary SPA.</p> <p data-bbox="715 241 916 280">General Measures</p> <p data-bbox="715 309 1476 719">It is anticipated that the majority of minor impacts can be at least partly mitigated by adherence to good construction practice and site management, which will be set out in the Scheme's Environmental Management Plan (EMP) and Waste Management Plan (WMP). All agreed mitigation will be integrated within these documents. Documents will be adopted in consultation with the relevant authorities and will be regularly updated and reviewed, paying particular attention to the anticipated changes in water legislation during the construction period. This will include, for example, changes associated with key European water policy milestones, such as 2013 when the Dangerous Substances Directive, the Freshwater Fish Directive, and the Groundwater Directive will be repealed by the Water Framework Directive (WFD).</p> <p data-bbox="715 748 1476 904">Site inspections, mitigation reviews and any required monitoring programmes will be conducted at agreed intervals throughout the projects construction and operation. Such inspections will follow correct incident reporting procedures and will result in corrective action where required.</p> <p data-bbox="715 934 970 972">Pollution and spill risk</p> <p data-bbox="715 1001 1315 1039"><i>During construction, the following mitigation will be applied.</i></p> <ul data-bbox="715 1068 1476 2036" style="list-style-type: none"> <li data-bbox="715 1068 1476 1158">• No direct discharge to watercourses or waterbodies will be made without prior consent, and will only be conducted in accordance with consent conditions (ie with regard to treatment, volume). <li data-bbox="715 1187 1476 1276">• The bentonite recovery plant, if installed on the working deck area over the River Liffey will be suitably bunded or housed to remove the risk of routine losses of liquid waste to the river below. <li data-bbox="715 1305 1476 1395">• Any surface water run off from the bunded area will be collected and treated to remove bentonite and any other contaminants prior to discharge. <li data-bbox="715 1424 1476 1514">• Suitable surface water catchment and treatment systems will be installed in both the working deck area and the proposed Bailey Bridge that will be installed over the River Liffey. <li data-bbox="715 1543 1476 1677">• Appropriate wastewater treatment systems will be installed to serve critical construction areas and where a risk of historic contamination exists, within the vicinity of watercourses or within areas considered to be at risk of flooding. <li data-bbox="715 1706 1476 1841">• Pumped discharges will be treated and recharged to groundwater where possible, or treated to remove sediments as above prior to discharge to surface watercourses in accordance with appropriate consents. <li data-bbox="715 1870 1476 2036">• Precast concrete structures will be used wherever practicable. Where liquid concretes are required, detailed method statements will be produced prior to works commencing. Such statements will include measures to ensure that concretes do not enter watercourses or waterbodies and will be agreed in consultation

Parameter	Description
	<p data-bbox="762 185 1070 215">with the relevant authorities.</p> <ul style="list-style-type: none"> <li data-bbox="715 248 1481 371">• Piling, dewatering and any other specialist works (such as grouting) will be conducted by an experienced contractor in accordance with developed method statements. Approval of such method statements will be sought from the relevant authorities. <li data-bbox="715 405 1481 465">• Trenching or excavation activities in open land will be restricted during periods of intense rainfall or high winds. <li data-bbox="715 499 1481 591">• Stockpiles or soil, spoil and construction materials (eg sand, gravel, ballast) will not be located within the vicinity of watercourses or in areas at risk of flooding. <li data-bbox="715 624 1481 781">• Dust suppression and erosion minimisation procedures will be developed and implemented. Stockpiling of soil, spoil and construction materials (such as sand and gravels) will be kept to a minimum and where necessary, stockpiles will be covered to provide stabilisation. <li data-bbox="715 815 1481 938">• Maintenance procedures and timetables will be developed and correctly implemented to ensure the optimum functioning of the drainage and attenuation features and systems, plant and vehicles during construction in order to promote optimal performance. <li data-bbox="715 972 1481 1064">• Refuelling and maintenance of construction equipment will take place in designated bunded areas within the construction compounds. Drip trays will be placed under stationary machinery. <li data-bbox="715 1097 1481 1220">• Equipment, materials and chemicals will not be stored within or near watercourses, or in areas at risk of flooding. At storage sites, fuels, lubricants and chemicals will be contained within a bunded area. <li data-bbox="715 1254 1481 1377">• All bunds and trays will suitably sized (110% of the volume of the largest container, or 25% of the total volume of all containers), and correctly checked and maintained, particularly after periods of heavy rainfall. <li data-bbox="715 1411 1481 1503">• Spill-kits and/or hydrocarbon adsorbent packs will be stored onboard all construction vehicles and within all construction compounds. <li data-bbox="715 1536 1481 1659">• All washing of concrete trucks will take place in designated bunded areas within the construction compounds. Washwater will not be discharged to surface watercourses unless appropriate treatment and consent procedures have been established. <li data-bbox="715 1693 1481 1816">• Where materials and equipment are to be transported over watercourses loose materials will be covered so as to prevent leaks and spills. In addition, equipment and chemicals will be checked for leaks and safely secured to the vehicle before crossing. <li data-bbox="715 1850 1481 1973">• During construction, appropriate waste handling, storage and disposal procedures will be implemented to prevent the mobilisation or entry of any wastes to surface water or groundwater. <li data-bbox="715 2007 1481 2067">• A pollution prevention and emergency response plan will be developed to be implemented during construction. The plan will

Parameter	Description
	<p data-bbox="762 185 1481 342">include the requirement for suitably trained, designated personnel and the provision of equipment to contain and clean up any accidental releases. Together with emergency events associated with large leaks and spills, the plan will cover incidents such as flooding, fires and significant drainage system malfunctions.</p> <p data-bbox="715 376 1278 405"><i>During operation the following mitigation will be applied.</i></p> <ul data-bbox="715 439 1481 2036" style="list-style-type: none"> <li data-bbox="715 439 1481 499">• Metro vehicles will be regularly maintained within workshops to reduce the risk of leaks during operation. <li data-bbox="715 533 1481 622">• Any discharges into the foul sewer network or surface watercourses or waterbodies will only be conducted with appropriate consent and in accordance with consent conditions. <li data-bbox="715 656 1305 685">• Suitable sulphate resistance concretes will be used. <li data-bbox="715 719 1481 875">• Areas of hardstanding at the depot site with low to medium risk of contamination (HGV parking and turning areas) will be contained and drained using a pipe and gully system. Runoff from these areas will be passed through an approved Class 1 Light Liquid by-pass Separator before discharging to the on-site drainage system. <li data-bbox="715 909 1481 1099">• Areas of high risk of contamination such as fuel off-load and distribution areas, internal inspection pits, skip area and waste compactor area will be fully protected and drained to a separate effluent drainage system connected to an approved Class 1 full retention oil separation prior to discharge to the on-site package treatment plant. <li data-bbox="715 1133 1481 1223">• Drainage from areas with a risk of historic contamination will be isolated from underlying sediments to minimise the risks of mobilisation occurring. <li data-bbox="715 1256 1481 1346">• Any substance with the potential to pollute (fuels, oils, chemicals etc) will be stored and handled at a suitable location with appropriate bunds to contain leaks and spills should they occur. <li data-bbox="715 1379 1481 1536">• All bunds will be suitably sized (110% of the volume of a single container, or 25% of the total volume of multiple containers), and correctly checked and maintained, particularly after periods of heavy rainfall. Spill kits and hydrocarbon adsorbent packs will be available. <li data-bbox="715 1570 1481 1637">• All discharge points along the track length will be fitted with suitable treatment systems. <li data-bbox="715 1671 1481 1760">• Herbicides used to control weed growth will comply with all applicable environmental controls, and the quantities used will be small. <li data-bbox="715 1794 1481 1917">• Maintenance procedures and timetables will be developed and correctly implemented to ensure the optimum functioning of the drainage and attenuation features and systems, plant and vehicles during operation in order to promote optimal performance. <li data-bbox="715 1951 1481 2036">• During operation, appropriate waste handling, storage and disposal procedures will be implemented to prevent the mobilisation or entry of any wastes to surface water or

Parameter	Description
	<p>groundwater.</p> <ul style="list-style-type: none"> A pollution prevention and emergency response plan will be developed to be implemented during operation. The plan will include the requirement for suitably trained, designated personnel and the provision of equipment to contain and clean up any accidental releases. Together with emergency events associated with large leaks and spills, the plan will cover incidents such as flooding, fires and significant drainage system malfunctions. <p>Change in watercourse flow dynamics and drainage conditions</p> <p>In many cases, particularly those associated with the introduction of sediments, potential secondary effects to flow dynamics will be controlled through the implementation of spill and pollution prevention and control mitigation. The mitigation measures detailed previously are also therefore relevant to this section.</p> <p><i>During construction the following mitigation will be applied.</i></p> <ul style="list-style-type: none"> The proposed temporary Bailey Bridge and working deck structures over the River Liffey have been designed to minimise impacts on the hydrodynamic regime of the River Liffey. A more detailed consideration of the cumulative impact of the piled structures on the hydrodynamic regime and the flood risk should form part of the detailed design process Suitable water treatment arrangement will be installed to ensure suitable treatment of all effluents and discharges from the bridge and working deck structure consistently meet or exceed discharge consent requirements. The soffit levels and bridge span will accord with OPW specifications with respect to flooding, allowing the passage of flood waters for a 1:100 year event + 20% climate change allowance, 300 mm freeboard and taking account of drainage from the Arterial Drainage Area. Due to the evolving nature of flood risk and climate change policy and associated requirements on the project; the preferred design, should be reviewed in consultation with EPA and Dublin City Council officer responsible for flood policy officers to ensure it meets all the required design standards. <p>Conclusion of Appraisal</p> <p>Can it be ascertained that the proposal will not adversely affect the integrity of the Sandymount Strand/ Tolka Estuary SPA</p> <p>Provided that the mitigation measures to prevent pollution and avoid changes to natural drainage conditions are adopted, successfully implemented and monitored on-the-ground, then the Dublin Metro North proposal will not adversely affect the integrity of the Sandymount Strand/ Tolka Estuary SPA.</p>

3.4

ROGERSTOWN ESTUARY SPECIAL PROTECTION AREA

The results of the assessment of the Rogerstown Estuary Special Protection Area are shown in *Table 3.4*.

Table 3.4 *Appraisal of the Implications of the proposed scheme on the Rogerstown Estuary SPA*

Parameter	Description
Project and site description	
Brief description of the designated Natura site	<p>The Rogerstown Estuary SPA (004015) is located 3.2 km northeast of the northern end of the proposed development route. The site is situated about 2 km north of Donabate in north County Dublin. It is a relatively small, funnel shaped estuary separated from the sea by a sand and shingle peninsula and extending eastwards beyond the low water mark to include an area of shallow marine water. The estuary receives the waters of the Ballyboghil and Ballough rivers, both of which flow through intensive agricultural catchments. The estuary is an important link in the chain of estuaries on the east coast. At low tide extensive intertidal sand and mud flats are exposed and these provide the main food resource for the wintering waterfowl. The intertidal flats of the estuary are mainly of sands, with soft muds in the north-west sector and along the southern shore. Salt marsh fringes parts of the estuary, especially its southern shores.</p> <p>This site qualifies under Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance of regularly occurring pale-bellied brent goose, an Annex I species.</p> <p>The SPA overlaps with the Rogerstown cSAC (considered in <i>Table 3.7</i>).</p>
Conservation objectives for the designated Natura site	<p>The Conservation Objectives for the SPA are currently under review and not available at present. However, for the purposes of this appraisal, the appraisal will assume the Conservation Objectives will aim to avoid deterioration of the habitats of the qualifying species (listed above) or significant disturbance to the qualifying species. This will ensure that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for each of the qualifying features, as well as ensuring that the qualifying species are maintained in the long term with respect to:</p> <ul style="list-style-type: none"> • population of the species as a viable component of the site • distribution of the species within the site • distribution and extent of habitats supporting the species • structure, function and supporting processes of habitats supporting the species • no significant disturbance of the species
Screening	
Is the proposal directly connected with, or necessary to, conservation management of the designated Natura site?	The proposal is not directly connected with, or necessary to, the conservation management of any of the Natura 2000 sites listed above.
Consider whether there are any likely direct, indirect or	There is the potential for qualifying bird species to use areas of improved grassland and dry meadows in the vicinity of the northern

Parameter	Description
secondary impacts of the project on the designated Natura site	<p>half of the proposed alignment route for roosting and/ or foraging. Brent geese for example have been recorded flying distances of approximately 6-10 km between roosting and feeding sites. If mitigation measures were not put in place, the potential impacts of the proposal include:</p> <ul style="list-style-type: none"> • direct habitat loss due to land-take within the working corridor including rail tracks, access tracks, electricity grid connection and ancillary structures on land outside the SPA but which may be used by qualifying bird species connected to the SPA. • indirect habitat loss due to the displacement of qualifying bird species from land outside the SPA but which may be used by birds connected to the SPA . Such disturbance may occur as a consequence of construction work or due to the presence of operating metro vehicles close to nesting or foraging sites or habitual flight routes. • loss or injury to birds connected with the SPA, as a result of collision with metro vehicles, overhead wires, fencing , as these birds move into or out of the SPA.
Consider the key phases of development and the risk of effects associated with each	<p>If mitigation measures were not put in place, the key phases of the development which have the greatest potential to give rise to effects upon the Rogerstown Estuary SPA are:</p> <ul style="list-style-type: none"> • construction work – the main risks being disturbance to SPA birds • operational phase – the main risk being avoidance by birds of the metro vehicles and their vicinity effectively resulting in habitat loss • infrastructure maintenance – the main risk being disturbance to birds • operation of the metro vehicles – the main risk being disturbance and collision with metro vehicles.
Appraise which individual elements of the overall project would give rise to the greatest risk of effects. State any element of the project where the scale or magnitude of effect is not known	<p>If mitigation measures were not put in place, the following risks would occur:</p> <ul style="list-style-type: none"> • The risk of direct habitat loss due to land-take by rail tracks, access tracks, substations, surface and subsurface stops and other ancillary structures is of concern because of the potential loss of important habitat for qualifying bird species which are connected with the SPA • Possible indirect habitat loss due to the displacement of birds as a consequence of construction work or proximity of the development close to nesting or foraging sites or habitual flight routes. • Another important risk is loss or injury to birds as a result of collision with metro vehicles. <p>Construction activity is the period most likely to result in the identified indirect effects.</p>
Is the plan/project likely to	The initial screening indicated that at the time the assessment was

Parameter	Description
have a significant effect on the Natura 2000 sites, either along or in combination, with other plans or projects?	carried out, it could not be concluded that the proposed scheme would not have an adverse effect on the integrity of the European sites. As a consequence, an Appropriate Assessment was carried out and the findings of that Appropriate Assessment are detailed in the following sections.
Appraisal of Impacts on Site Integrity	
Identify the relevant conservation objectives to consider for the designated Natura site.	See conservation objectives listed above.
Can it be ascertained that the proposal/plan will not adversely affect the integrity of Rogerstown Estuary	See <i>Table 3.1</i>
Consider whether mitigation measures can be adopted to avoid impacts on site integrity.	See <i>Table 3.1</i>
Conclusion of Appraisal	
Can it be ascertained that the proposal will not adversely affect the integrity of the Rogerstown Estuary SPA	Provided that the mitigation measures to prevent pollution and avoid changes to natural drainage conditions are adopted, successfully implemented and monitored on-the-ground, then the Dublin Metro North proposal will not adversely affect the integrity of the Rogerstown Estuary SPA.

3.5

NORTH BULL ISLAND SPECIAL PROTECTION AREA

The results of the assessment of the North Bull Island Special Protection Area are shown in *Table 3.5*.

Table 3.5 *Appraisal of the Implications of the proposed scheme on the North Bull Island SPA*

Parameter	Description
Project and site description	
Brief description of the designated Natura site	The North Bull Island SPA (004006) is located 5.1 km east of the southern end of the proposed development route. The landward side of the island is a saltmarsh area and is a roosting site for wintering birds. This site qualifies under Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance of pale-bellied brent goose, an Annex I species.
Conservation objectives for the designated Natura site	The Conservation Objectives for the SPA are currently under review and not available at present. However, for the purposes of this appraisal, the appraisal will assume the Conservation Objectives will aim to avoid deterioration of the habitats of the qualifying species

Parameter	Description
	<p>(listed above) or significant disturbance to the qualifying species. This will ensure that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for each of the qualifying features, as well as ensuring that the qualifying species are maintained in the long term with respect to:</p> <ul style="list-style-type: none"> • population of the species as a viable component of the site • distribution of the species within the site • distribution and extent of habitats supporting the species • structure, function and supporting processes of habitats supporting the species • no significant disturbance of the species <p>The SPA overlaps with the North Dublin cSAC (considered in <i>Table 3.9</i>).</p>

Screening

Is the proposal directly connected with, or necessary to, conservation management of the designated Natura site?	<p>The proposal is not directly connected with, or necessary to, the conservation management of any of the Natura 2000 sites listed above.</p>
Consider whether there are any likely direct, indirect or secondary impacts of the project on the designated Natura site	<p>There is the potential for qualifying bird species to use areas of improved grassland and dry meadows in the vicinity of the northern half of the proposed alignment route for roosting and/ or foraging. Brent geese for example have been recorded flying distances of approximately 6-10 km between roosting and feeding sites. If mitigation measures were not put in place, the potential impacts of the proposal would include:</p> <ul style="list-style-type: none"> • direct habitat loss due to land-take within the working corridor including rail tracks, access tracks, electricity grid connection and ancillary structures on land outside the SPA but which may be used by qualifying bird species connected to the SPA. • indirect habitat loss due to the displacement of qualifying bird species from land outside the SPA but which may be used by birds connected to the SPA . Such disturbance may occur as a consequence of construction work or due to the presence of operating metro vehicles close to nesting or foraging sites or habitual flight routes. • loss or injury to birds connected with the SPA, as a result of collision with metro vehicles, overhead wires, fencing , as these birds move into or out of the SPA. • disturbance or damage to the habitats of the SPA bird species caused by dust, spillage of fuels and chemicals and emissions. • disturbance or damage to the habitats of the SPA bird species caused by dust, spillage of fuels and chemicals, airborne emissions

Parameter	Description
<p>Consider the key phases of development and the risk of effects associated with each</p>	<p>and pollution to the River Liffey which runs into Dublin Bay and the adjacent Natura sites of Sandymount/Tolka Strand SPA, North Bull island SPA, South Dublin Bay cSAC and the North Dublin Bay cSAC.</p> <p>If mitigation measures were not put in place, the key phases of the development which have the greatest potential to give rise to effects upon the North Bull Island SPA are:</p> <ul style="list-style-type: none"> • construction work – the main risks being disturbance to birds; • operational phase – the main risk being avoidance by birds of the metro vehicles and their vicinity effectively resulting in habitat loss; • infrastructure maintenance – the main risk being disturbance to birds; • Construction phase – risk of release of contaminants from the construction and operation of the Bailey Bridge and working deck area over the River Liffey adjacent to O’Connell Bridge; and • operation of the metro vehicles – the main risk being disturbance and collision with metro vehicles.
<p>Appraise which individual elements of the overall project would give rise to the greatest risk of effects. State any element of the project where the scale or magnitude of effect is not known</p>	<p>If mitigation measures were not put in place, the following risks would exist:</p> <ul style="list-style-type: none"> • The risk of direct habitat loss due to land-take by rail tracks, access tracks, substations, surface and subsurface stops and other ancillary structures is of concern because of the potential loss of important habitat for qualifying bird species which are connected with the SPA • Possible indirect habitat loss due to the displacement of birds as a consequence of construction work or proximity of the development close to nesting or foraging sites or habitual flight routes. • There is a risk of loss or injury to birds as a result of collision with metro vehicles. • Potential indirect damage to habitats by the release of contaminants from the construction and operation of the Bailey Bridge and working deck area over the River Liffey adjacent to O’Connell Bridge. <p>If mitigation measures were not put in place, construction activity is the period most likely to result in the identified indirect effects.</p>
<p>Is the plan/project likely to have a significant effect on the Natura 2000 sites, either along or in combination, with other plans or projects?</p>	<p>The initial screening indicated that at the time the assessment was carried out, it could not be concluded that the proposed scheme would not have an adverse effect on the integrity of the European sites. As a consequence, an Appropriate Assessment was carried out and the findings of that Appropriate Assessment are detailed in the following sections.</p>

Appraisal of Impacts on Site Integrity

Parameter	Description
Identify the relevant conservation objectives to consider for the designated Natura site.	See conservation objectives listed above.
Can it be ascertained that the proposal/plan will not adversely affect the integrity of North Bull Island Bay SPA	See <i>Table 3.1</i>
Consider whether mitigation measures can be adopted to avoid impacts on site integrity.	See <i>Table 3.1</i>
Conclusion of Appraisal	
Can it be ascertained that the proposal will not adversely affect the integrity of the North Bull Island SPA	Provided that the mitigation measures to prevent pollution and avoid changes to natural drainage conditions are adopted, successfully implemented and monitored on-the-ground, then the Dublin Metro North proposal will not adversely affect the integrity of the North Bull Island SPA.

3.6

BALDOYLE BAY SPECIAL PROTECTION AREA

The results of the assessment of the Baldoyle Bay Special Protection Area are shown in *Table 3.6*.

Table 3.6 *Appraisal of the Implications of the proposed scheme on the Baldoyle Bay SPA*

Parameter	Description
Project and site description	
Brief description of the designated Natura site	<p>The Baldoyle Bay SPA (004016) is located 6.2 km east of the proposed development. Baldoyle Bay extends from just below Portmarnock village to the west pier at Howth, Co. Dublin. It is a tidal estuarine bay protected from the open sea by a large sand dune system. Two small rivers, the Mayne and the Sluice, flow into the inner part of the estuary. Large areas of intertidal flats are exposed at low tide. These are mostly sands but grade to muds in the inner sheltered parts of the estuary. Baldoyle Bay is of high ornithological importance for wintering waterfowl, providing good quality feeding areas and roost sites for an excellent diversity of waterfowl species.</p> <p>This site qualifies under Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance of pale-bellied brent goose, an Annex I species.</p>
Conservation objectives for the designated Natura site	The Conservation Objectives for the SPA are currently under review and not available at present. However, for the purposes of this appraisal, the appraisal will assume the Conservation Objectives will aim to avoid deterioration of the habitats of the qualifying species (listed above) or significant disturbance to the qualifying species. This will ensure that the integrity of the site is maintained and the site

Parameter	Description
	<p>makes an appropriate contribution to achieving favourable conservation status for each of the qualifying features, as well as ensuring that the qualifying species are maintained in the long term with respect to:</p> <ul style="list-style-type: none"> • population of the species as a viable component of the site • distribution of the species within the site • distribution and extent of habitats supporting the species • structure, function and supporting processes of habitats supporting the species • no significant disturbance of the species <p>The SPA overlaps with the Baldylye cSAC (considered in <i>Table 3.10</i>).</p>
Screening	
<p>Is the proposal directly connected with, or necessary to, conservation management of the designated Natura site?</p>	<p>The proposal is not directly connected with, or necessary to, the conservation management of any of the Natura 2000 sites listed above.</p>
<p>Consider whether there are any likely direct, indirect or secondary impacts of the project on the designated Natura site</p>	<p>There is the potential for qualifying bird species to use areas of improved grassland and dry meadows in the vicinity of the northern half of the proposed alignment route for roosting and/ or foraging. If mitigation measures were not put in place, the potential impacts of the proposal would include:</p> <ul style="list-style-type: none"> • direct habitat loss due to land-take within the working corridor including rail tracks, access tracks, electricity grid connection and ancillary structures on land outside the SPA but which may be used by qualifying bird species connected to the SPA. • indirect habitat loss due to the displacement of qualifying bird species from land outside the SPA but which may be used by birds connected to the SPA . Such disturbance may occur as a consequence of construction work or due to the presence of operating metro vehicles close to nesting or foraging sites or habitual flight routes. • loss or injury to birds connected with the SPA, as a result of collision with metro vehicles, overhead wires, fencing, as these birds move into or out of the SPA.
<p>Consider the key phases of development and the risk of effects associated with each</p>	<p>If mitigation measures were not put in place, the key phases of the development which have the greatest potential to give rise to effects upon the Baldylye Bay SPA are:</p> <ul style="list-style-type: none"> • construction work – the main risks being disturbance to birds • operational phase – the main risk being avoidance by birds of the metro vehicles and their vicinity effectively resulting in habitat loss • infrastructure maintenance – the main risk being disturbance to

Parameter	Description
	birds
Appraise which individual elements of the overall project would give rise to the greatest risk of effects. State any element of the project where the scale or magnitude of effect is not known	<ul style="list-style-type: none"> operation of metro vehicles – the main risk being disturbance and collision with metro vehicles. The risk of direct habitat loss due to land-take by rail tracks, access tracks, substations, surface and subsurface stops and other ancillary structures is of concern because of the potential loss of important habitat for qualifying bird species which are connected with the SPA Possible indirect habitat loss due to the displacement of birds as a consequence of construction work or proximity of the development close to nesting or foraging sites or habitual flight routes. Another important risk is loss or injury to birds as a result of collision with metro vehicles. <p>If mitigation measures were not put in place, construction activity is the period most likely to result in the identified indirect effects.</p>
Is the plan/project likely to have a significant effect on the Natura 2000 sites, either along or in combination, with other plans or projects?	The initial screening indicated that at the time the assessment was carried out, it could not be concluded that the proposed scheme would not have an adverse effect on the integrity of the European sites. As a consequence, an Appropriate Assessment was carried out and the findings of that Appropriate Assessment are detailed in the following sections.
Appraisal of Impacts on Site Integrity	
Identify the relevant conservation objectives to consider for the designated Natura site.	See conservation objectives listed above.
Can it be ascertained that the proposal/plan will not adversely affect the integrity of Baldoyle Bay SPA	See <i>Table 3.1</i>
Consider whether mitigation measures can be adopted to avoid impacts on site integrity.	See <i>Table 3.1</i>
Conclusion of Appraisal	
Can it be ascertained that the proposal will not adversely affect the integrity of the Baldoyle Bay SPA	Provided that the mitigation measures to prevent pollution and avoid changes to natural drainage conditions are adopted, successfully implemented and monitored on-the-ground, then the Dublin Metro North proposal will not adversely affect the integrity of the Baldoyle Bay SPA.

The results of the assessment of the Rogerstown Estuary candidate Special Area of Conservation are shown in *Table 3.7*.

Table 3.7 *Appraisal of the Implications of the proposed scheme on the Rogerstown Estuary Candidate Special Area of Conservation (cSAC)*

Parameter	Description
Project and site description	
Brief description of the designated Natura site	<p>The Rogerstown Estuary cSAC (000208) is located approximately 2.0 km northeast of the northern end of the proposed development. The site is currently listed as a candidate SAC for a number of Annex I habitats, comprising:</p> <ul style="list-style-type: none"> • fixed coastal dunes with herbaceous vegetation (grey dunes) (a priority habitat); • estuaries; • <i>Salicornia</i> (glass-wort) and other annuals colonizing mud and sand; • Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>); • Mediterranean salt meadows (<i>Juncetalia maritimi</i>); • shifting dunes along the shoreline with <i>Ammophila arenaria</i> (marram grass) (white dunes); and • mudflats and sandflats not covered by seawater at low tide. <p>The cSAC overlaps with the Rogerstown SPA (considered in <i>Table 3.4</i>).</p>
Conservation objectives for the designated Natura site	<p>The draft Conservation Objectives for this site are as follows:</p> <p>Objective 1</p> <p>To maintain the Annex I habitats for which Rogerstown Estuary cSAC has been selected at favourable conservation status: estuaries; mudflats and sandflats not covered by seawater at low tide; <i>Salicornia</i> and other annuals colonizing mud and sand; Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>); Mediterranean salt meadows (<i>Juncetalia maritimi</i>); shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes); fixed coastal dunes with herbaceous vegetation (grey dunes).</p> <p>Objective 2</p> <p>To maintain the extent, species richness and biodiversity of the entire site</p> <p>Objective 3</p> <p>To establish effective liaison and co-operation with landowners, legal users and relevant authorities</p>

Parameter	Description
Screening	
Is the proposal directly connected with, or necessary to, conservation management of the designated Natura site?	The proposal is not directly connected with, or necessary to, the conservation management of any of the Natura 2000 sites listed above.
Consider whether there are any likely direct, indirect or secondary impacts of the project on the designated Natura site	The geographical and hydrological separation between the proposal and the cSAC indicates that the indirect risks of pollution would not impact the cSAC.
Consider the key phases of development and the risk of effects associated with each	Not applicable
Appraise which individual elements of the overall project would give rise to the greatest risk of effects. State any element of the project where the scale or magnitude of effect is not known	Not applicable
Is the plan/project likely to have a significant effect on the Natura 2000 sites, either along or in combination, with other plans or projects?	The proposed development is unlikely to have a significant effect either directly or indirectly on the qualifying features of the site.

3.8

SOUTH DUBLIN BAY CANDIDATE SPECIAL AREA OF CONSERVATION

The results of the assessment of the South Dublin Bay candidate Special Area of Conservation are shown in *Table 3.8*.

Table 3.8 Appraisal of the Implications of the proposed scheme on the South Dublin Bay cSAC

Parameter	Description
Project and site description	
Brief description of the designated Natura site	The South Dublin Bay cSAC (000210) is located approximately 3.0 km east of the southern end of the proposed development route. This site lies south of the River Liffey and extends from the South Wall to the west pier at Dun Laoghaire. It is an intertidal site with extensive areas of sand and mudflats. The sediments are predominantly sands but grade to sandy muds near the shore at Merrion gates. The main channel which drains the area is Cockle Lake. The site is currently listed as a candidate SAC for supporting

Parameter	Description
	extensive areas of the Annex I habitat mudflats and sandflats not covered by seawater at low tide.
	The cSAC fully overlaps with part of the Sandymount Strand/Tolka Estuary SPA (considered in <i>Table 3.3</i>).
Conservation objectives for the designated Natura site	<p>The draft Conservation Objectives for this site are as follows:</p> <p>Objective 1</p> <p>To maintain the Annex I habitat for which the cSAC has been selected at favourable conservation status: Mudflats and sandflats not covered by seawater at low tide.</p> <p>Objective 2</p> <p>To maintain the extent, species richness and biodiversity of the entire site</p> <p>Objective 3</p> <p>To establish effective liaison and co-operation with landowners, legal users and relevant authorities</p>

Screening

Is the proposal directly connected with, or necessary to, conservation management of the designated Natura site?	The proposal is not directly connected with, or necessary to, the conservation management of any of the Natura 2000 sites listed above.
Consider whether there are any likely direct, indirect or secondary impacts of the project on the designated Natura site	Indirect anthropogenic impacts on the habitats of the SAC caused by contaminant release or increased suspended sediment to the River Liffey which runs into Dublin Bay and the adjacent Natura sites of Sandymount/Tolka Strand SPA, North Bull island SPA, South Dublin Bay cSAC and the North Dublin Bay cSAC.
Consider the key phases of development and the risk of effects associated with each	Construction phase - risk of release of contaminants from the construction and operation of the Bailey Bridge and working deck area over the River Liffey adjacent to O'Connell bridge.
Appraise which individual elements of the overall project would give rise to the greatest risk of effects. State any element of the project where the scale or magnitude of effect is not known	Minor risk of release of contaminants from the construction and operation of the Bailey Bridge and working deck area over the River Liffey adjacent to O'Connell bridge
Is the plan/project likely to have a significant effect on the Natura 2000 sites, either along or in combination, with other plans or projects?	The initial screening indicated that at the time the assessment was carried out, it could not be concluded that the proposed scheme would not have an adverse effect on the integrity of the European sites. As a consequence, an Appropriate Assessment was carried out and the findings of that Appropriate Assessment are detailed in the following sections.

Appraisal of Impacts on

Parameter	Description
Site Integrity	
Identify the relevant conservation objectives to consider for the designated Natura site.	See conservation objectives listed above.
Can it be ascertained that the proposal/plan will not adversely affect the integrity of South Dublin Bay cSAC	See <i>Table 3.13</i>
Consider whether mitigation measures can be adopted to avoid impacts on site integrity.	See <i>Table 3.13</i>
Conclusion of Appraisal	
Can it be ascertained that the proposal will not adversely affect the integrity of the South Dublin Bay cSAC	Provided that the mitigation measures to prevent pollution and avoid changes to natural drainage conditions are adopted, successfully implemented and monitored on-the-ground, then the Dublin Metro North proposal will not adversely affect the integrity of the South Dublin Bay cSAC.

3.9

NORTH DUBLIN BAY CANDIDATE SPECIAL AREA OF CONSERVATION

The results of the assessment of the North Dublin Bay candidate Special Area of Conservation are shown in *Table 3.9*.

Table 3.9 Appraisal of the Implications of the proposed scheme on the North Dublin Bay cSAC

Parameter	Description
Project and site description	
Brief description of the designated Natura site	<p>The North Dublin Bay cSAC (000206) is located approximately 5.1 km east of the southern end of the proposed development route. This site covers the inner part of north Dublin Bay, the seaward boundary extending from the Bull Wall lighthouse across to the Martello Tower at Howth Head. The site is currently listed as a candidate SAC for supporting the following Annex I habitats, comprising:</p> <ul style="list-style-type: none"> • mudflats and sandflats not covered by seawater at low tide; • annual vegetation of drift lines; • Salicornia (glass-wort) and other annuals colonizing mud and sand; • Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>);

Parameter	Description
	<ul style="list-style-type: none"> • Mediterranean salt meadows (<i>Juncetalia maritimi</i>); • embryonic shifting dunes; • shifting dunes along the shoreline with <i>Ammophila arenaria</i> (marram grass) (white dunes); • fixed coastal dunes with herbaceous vegetation (grey dunes) (a priority habitat); and • humid dune slacks. <p>The site is also selected for the Annex II plant species <i>Petalophyllum ralfsii</i> (petalwort).</p> <p>The cSAC overlaps with the North Bull Island SPA (considered in <i>Table 3.5</i>).</p>
Conservation objectives for the designated Natura site	<p>The draft Conservation Objectives for this site are as follows:</p> <p>Objective 1</p> <p>To maintain the Annex I habitats for which the cSAC has been selected at favourable conservation status: mudflats and sandflats not covered by seawater at low tide; annual vegetation of drift lines; <i>Salicornia</i> and other annuals colonising mud and sand; Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>); Mediterranean salt meadows (<i>Juncetalia maritimi</i>); Embryonic shifting dunes; shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes); fixed coastal dunes with herbaceous vegetation (grey dunes); Humid dune slacks.</p> <p>Objective 2</p> <p>To maintain the Annex II species for which the cSAC has been selected at favourable conservation status: <i>Petalophyllum ralfsii</i> (petalwort).</p> <p>Objective 3</p> <p>To maintain the extent, species richness and biodiversity of the entire site</p> <p>Objective 4</p> <p>To establish effective liaison and co-operation with landowners, legal users and relevant authorities.</p>
Screening	
Is the proposal directly connected with, or necessary to, conservation management of the designated Natura site?	The proposal is not directly connected with, or necessary to, the conservation management of any of the Natura 2000 sites listed above.
Consider whether there are any likely direct, indirect or	Indirect anthropogenic impacts on the habitats of the SAC caused by contaminant release or increased suspended

Parameter	Description
secondary impacts of the project on the designated Natura site	sediment to the River Liffey which runs into Dublin Bay and the adjacent Natura sites of Sandymount/Tolka Strand SPA, North Bull island SPA, South Dublin Bay cSAC and the North Dublin Bay cSAC.
Consider the key phases of development and the risk of effects associated with each	Construction phase – risk of release of contaminants from the construction and operation of the Bailey Bridge and working deck area over the River Liffey adjacent to O’Connell Bridge.
Appraise which individual elements of the overall project would give rise to the greatest risk of effects. State any element of the project where the scale or magnitude of effect is not known	Minor risk of release of contaminants from the construction and operation of the Bailey Bridge and working deck area over the River Liffey adjacent to O’Connell Bridge
Is the plan/project likely to have a significant effect on the Natura 2000 sites, either along or in combination, with other plans or projects?	The initial screening indicated that at the time the assessment was carried out, it could not be concluded that the proposed scheme would not have an adverse effect on the integrity of the European sites. As a consequence, an Appropriate Assessment was carried out and the findings of that Appropriate Assessment are detailed in the following sections.
Appraisal of Impacts on Site Integrity	
Identify the relevant conservation objectives to consider for the designated Natura site.	See conservation objectives listed above.
Can it be ascertained that the proposal/ plan will not adversely affect the integrity of North Dublin Bay cSAC	See <i>Table 3.13</i>
Consider whether mitigation measures can be adopted to avoid impacts on site integrity.	See <i>Table 3.1.3</i>
Conclusion of Appraisal	
Can it be ascertained that the proposal will not adversely affect the integrity of the North Dublin Bay cSAC	Provided that the mitigation measures to prevent pollution and avoid changes to natural drainage conditions are adopted, successfully implemented and monitored on-the-ground, then the Dublin Metro North proposal will not adversely affect the integrity of the North Dublin Bay cSAC.

3.10

BALDOYLE BAY CANDIDATE SPECIAL AREA OF CONSERVATION

The results of the assessment of the Baldoyle Bay candidate Special Area of Conservation are shown in *Table 3.10*.

Table 3.10 *Appraisal of the Implications of the proposed scheme on the North Baldoyle Bay cSAC*

Parameter	Description
Project and site description	
Brief description of the designated Natura site	<p>The Baldoyle Bay cSAC (000199) is located approximately 6.2 km east of the proposed development. Baldoyle Bay extends from just below Portmarnock village to the west pier at Howth, Co. Dublin. It is a tidal estuarine bay protected from the open sea by a large sand dune system. Two small rivers, the Mayne and the Sluice, flow into the inner part of the estuary. Large areas of intertidal flats are exposed at low tide. These are mostly sands but grade to muds in the inner sheltered parts of the estuary.</p> <p>The site is currently listed as a candidate SAC for supporting four Annex I habitats, comprising:</p> <ul style="list-style-type: none"> • mudflats and Sandflats not covered by seawater at low tide; • <i>Salicornia</i> (glasswort) and other annuals colonising mud and sands; • Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimiae</i>); and • Mediterranean salt meadows (<i>Juncetalia maritimi</i>). <p>The cSAC overlaps with the Baldoyle SPA (considered in Table 3.6).</p>
Conservation objectives for the designated Natura site	<p>The draft Conservation Objectives for this site are as follows:</p> <p>Objective 1</p> <p>To maintain the Annex I habitats for which the cSAC has been selected at favourable conservation status: mudflats and sandflats not covered by seawater at low tide; <i>Salicornia</i> and other annuals colonising mud and sand; Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimiae</i>); Mediterranean salt meadows (<i>Juncetalia maritimi</i>).</p> <p>Objective 2</p> <p>To maintain the extent, species richness and biodiversity of the entire site</p> <p>Objective 3</p> <p>To establish effective liaison and co-operation with landowners, legal users and relevant authorities</p>
Screening	
Is the proposal directly connected with, or necessary to, conservation management	The proposal is not directly connected with, or necessary to, the conservation management of any of the Natura 2000 sites listed above.

Parameter	Description
of the designated Natura site?	
Consider whether there are any likely direct, indirect or secondary impacts of the project on the designated Natura site	The Metro North will not affect any watercourses directly linked to the cSAC and hence it will not be affected by the proposals.
Consider the key phases of development and the risk of effects associated with each	Not applicable
Appraise which individual elements of the overall project would give rise to the greatest risk of effects. State any element of the project where the scale or magnitude of effect is not known	Not applicable
Is the plan/project likely to have a significant effect on the Natura 2000 sites, either along or in combination, with other plans or projects?	The proposed development will not have a likely significant effect either directly or indirectly on the qualifying features of the site.



PROPOSED METRO NORTH RAIL LINE, COUNTY DUBLIN.

BAT FAUNA STUDIES AT SPECIFIC SITES ON THE ROUTE ALIGNMENT

prepared for

Railway Procurement Agency

By

Conor Kelleher AMIEEM, AMCQI

12th August 2008



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1. Introduction

1.1 Background

Aardwolf Wildlife Surveys was commissioned by the *Railway Procurement Agency*, Parkgate Business Centre, Parkgate Street, Dublin 8, to carry out a specific study of the bat fauna within certain sections of the proposed Metro North rail line route which runs from St. Stephen's Green, in Dublin City, northwards to Belinstown, north of Swords within the county.

A wide-corridor bat survey was previously undertaken as part of the Environmental Assessment of the proposed rail route in 2006 and 2007 by *Environmental Resources Management Ireland Ltd* (ERM, 2008). This survey highlighted several areas, habitats and structures along the route, where the line runs above ground, that were deemed to be favourable to bats. Following this, a letter requesting further information was received from the *National Parks and Wildlife Service* of the *Department of the Environment, Heritage and Local Government* – reproduced in the Appendices. This included a request for further bat surveys in certain areas including lands at Belinstown, Balheary, Fosterstown South/Cloghran, Santry Demesne/North Ballymun, Albert College Park (Hampstead Park) in Whitehall and St. Stephen's Green, to further evaluate potential impacts of the scheme on these animals and to determine mitigation measures to limit same. Another area, along a lane at Ballystruan, immediately south of Dublin Airport was also subsequently added to the site list.

The construction of a new rail line may adversely affect bats in a number of ways. For instance, construction often entails the removal of vegetation that was previously used by bats. This may impact bats through the creation of an open space barrier that bats may be unwilling to cross eventually resulting in a local population decline as bats are prevented from reaching preferred foraging areas. Bat roosts in trees or buildings within or immediately adjacent to the route corridor may have to be removed. The removal of hedgerows and treelines and the loss of mature trees and lighting all affect the availability of invertebrate prey and feeding areas.

This report details the results of summer season bat surveys, conducted during June, July and August 2008, during the period of highest bat activity and describes the bat fauna occurring in the area of the proposed Metro North rail line within the designated study areas. This report also includes an assessment of trees along the proposed route as potential bat roosts and gives mitigation measures to safeguard these animals during the construction and operation phases of the scheme. Enhancement measures are also suggested.

The National Roads Authority has recently produced a series of guidelines for bats which have been referred to:

National Roads Authority (2006a) *Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes*. National Roads Authority: www.nra.ie



National Roads Authority (2006b) *Guidelines for the Treatment of Bats during the Construction of National Road Schemes*. National Roads Authority: www.nra.ie

1.1.1 Study aims

The aims of the present study were to:

- Assess the likely impacts of the proposed Metro works on the local bat populations;
- Gain a better understanding of bat habitats, foraging areas and movements within the Metro North study area;
- Identify resident bat species in St. Stephen's Green and the immediate vicinity.
- Suggest suitable mitigation measures to minimize the Metro North rail line's impact on bats during both construction and operation phases.

1.1.2 Location of study sites

The study areas are covered by Ordnance Survey Discovery Series Map numbers 43 and 50, are all within the county of Dublin and are listed below.

Belinstown/Lissenhall: Approximate National Grid Reference: O189 191, 2.5km north of Swords – Map 43.

Balheary: Approximate National Grid Reference: O183 485, 1.5km north of Swords – Map 50.

Fosterstown South/Cloghran: Approximate National Grid Reference: O176 447, 2.5km south of Swords – Map 50.

Ballystruan: Approximate National Grid Reference: O160420, 0.5km south of Dublin Airport – Map 50.

Santry Demesne/North Ballymun: Approximate National Grid Reference: O156 410, 1.5km south of Dublin Airport – Map 50.

Albert College Park (Hampstead Park): Approximate National Grid Reference: O156 385, in Whitehall – Map 50.

St. Stephen's Green: Approximate National Grid Reference: O160 335, within Dublin City centre – Map 50.

1.2 Bat survey

This report presents the results of all bat surveys undertaken within designated areas along the proposed route during the summer months of June, July and August 2008. The bat fauna occurring on each site is described and the likely impacts of the development on bat species discussed with recommendations for mitigation or remedial measures. Pro-active conservation measures are also considered. As on site habitats were fully described in previous reports this will not be repeated here except where relevant to bats.



1.2.1 Survey methodology

All surveys were carried out by Conor Kelleher of *Aardwolf Wildlife Surveys* during optimum weather conditions which included mild temperatures and light winds but with occasional rainfall.

Impacted structures along the proposed route were also surveyed. These structures were inspected externally by binoculars - *Canon* - and internally (where possible) for roosting bats using a powerful torch - 6-cell *Maglite*. The presence of bats is assessed with reference to their signs – principally staining, droppings, feeding signs such as invertebrate prey remains and the presence of bat fly *Nycteribiidae* pupae, although direct observations are also occasionally made. Dusk emergence activity was also checked for using a bat detector.

The activity of bats in the open countryside was recorded using a heterodyne - *Pettersson D200* - and heterodyne/Frequency Division detector - *BATBOX Duet*. Areas of suitable habitat were walked while watching and listening for bats. Bats were identified by their ultrasonic calls coupled with behavioural and flight observations.

Nocturnal bat activity is mainly bi-modal taking advantage of increased insect numbers on the wing in the periods after dusk and before dawn, with a lull in activity in the middle of the night. This is particularly true of 'hawking' species – i.e. bats which capture prey in the open air. However, 'gleaning' species remain active throughout the night as prey is available on foliage for longer periods. The prime periods for detecting bat activity, therefore, are two hours after dusk and again for a shorter period before dawn.

The field surveys were supplemented by evaluation of relevant literature and a review of *Bat Conservation Ireland's* National Bat Distribution Database.

1.2.2 Survey constraints

Bat surveys were undertaken in optimum weather conditions and within the appropriate season. In July and August, young bats as well as adults are on the wing so bat activity is maximised.

Some of the existing dwellings on or adjacent to the rail route which show potential to harbour bats were not internally accessible at time of survey.

1.3 Bat fauna survey results

The key locations of importance for bats along the route include water courses and bodies e.g. St. Stephen's Green Lake, Broad Meadow, Ward and Santry rivers, linear features such as treelines and hedgerows, woodland and scattered mature trees. These and other sites were surveyed on the 16th and 17th June and from the 29th July to the 3rd August 2008.

The bat fauna present on site is typical of the habitats present, with the predominantly arable landscape at the north and amenity grassland within urban parks providing a limited range of habitats. Faunal diversity is greater in areas dominated by semi-natural vegetation. Mature trees in these areas are beneficial to insect populations which favour some bats species and the taller treelines offer commuting and foraging areas for bats. Some of these have ivy *Hedera helix* cover that may be used by bats for roosting on occasion. An assessment of individual trees for favourability as bat roosting sites was not undertaken during the present fieldwork due to the density of foliage which prevented inspection. Such a survey should be undertaken on impacted trees in the winter months once foliage has died off. Mitigation measures are given to protect any animals present within such trees during felling.



An assessment of the area for potential hibernation sites proved negative and only minor hibernacula e.g. crevices in the stonework of old buildings, are expected.

The detector survey of various locations along the length of the proposed route revealed that at least four bat species occur in the area and others are expected. Those detected included two pipistrelle species; the common *Pipistrellus pipistrellus* and the soprano *P. pygmaeus*, which were ubiquitous along hedgerows and treelines in each of the study areas, Leisler's bat *Nyctalus leisleri*, which forages over agricultural landscapes, scrub and woodland was also detected feeding over Belinstown/Lissenhall, Fosterstown South/Cloghran, Ballystruan, Santry/Ballymun and within St. Stephen's Green. This is a high flying species and its commuting routes and foraging areas will not be impacted unduly by the planned scheme. During a recent survey of the runways and taxiways of Dublin Airport, this was the only species recorded on site (pers. obs. July 2008) and, in the first incident of its kind in Ireland, a Leisler's bat was struck by a departing aircraft here in August of 2006.

Daubenton's bat *Myotis daubentonii*, which forages over open water, was also found to be present at the Broad Meadow and Ward Rivers at Balheary. This species travels over considerable distances along watercourses and is also found on smaller water bodies such as ponds and pools. It often roosts beneath stone masonry bridges, taking advantage of cracks and crevices. In such locations, roosts are vulnerable through infilling of fissures during maintenance works, impacts of lighting etc. Mitigation measures are given as part of this report to offset and prevent such disturbance at the old Lissenhall Bridge and Ward River crossings.

Even though not observed during the present survey, the brown long-eared bat *Plecotus auritus* is certain to be in the immediate area as a known roost is present in the St. Margaret's area approximately 3km west of the proposed rail route (pers. obs.). This species roosts in trees and buildings; it is a very quiet bat which produces very weak echolocation pulses and sometimes hunts without emitting sounds and so can be missed by detector. It is a common species throughout Ireland and is expected to be widespread in the local area even where undetected.

Although the impact on bat species of the proposed Metro North scheme is considered to be low, mitigation measures are included in this report to enhance bat roosting, commuting and foraging habitat in the vicinity.

A derelict farm building in Belinstown (Plate 3) offers some potential as a bat roosting site but no activity was noted during an internal and external inspection and a dusk emergence survey with detector. This is a partially burned building of block construction with a corrugated asbestos roof which is deteriorating. The structure has a dense covering of ivy on two sides which may appeal to bats as a temporary refuge.

A two-storey dwelling (Plate 13) and a gate lodge (Plate 14) on the Old Ballymun Road at Santry similarly offer roosting potential but again no activity was noted at these properties during a dusk emergence survey and an internal inspection was not possible. A small wooden gazebo (Plate 12) within the gardens of St. Anne's in Santry was also inspected for signs of bat use but none were observed.

Each of the above structures should be surveyed again for signs of bat use/activity immediately prior to any demolition works on the structures to ensure any bats that are present at time of removal are safeguarded. An internal inspection of the roof space of the Old Ballymun Road properties is especially warranted. As none of the impacted and inspected structures along the route showed signs of bat use, a derogation licence is presently *not* required for their demolition – *Bat Mitigation Guidelines for Ireland* (Legislation and Licensing) (Kelleher & Marnell, 2007) and NPWS Circular Letter 2/07 as reproduced in the Appendices.

A list of the known Irish bat species is given in Table 1 below with their adjudged status on site.



Table 5: Adjudged status of Irish bat species within the study areas

Common name	Scientific name	Status on site
Common pipistrelle	<i>Pipistrellus pipistrellus</i>	Present – foraging and commuting
Soprano pipistrelle	<i>Pipistrellus pygmaeus</i>	Present – foraging and commuting
Nathusius pipistrelle	<i>Pipistrellus nathusii</i>	Potential – recorded in the county
Leisler's bat	<i>Nyctalus leisleri</i>	Present – foraging and commuting
Brown long-eared bat	<i>Plecotus auritus</i>	Certain – roost known nearby
Lesser horseshoe bat	<i>Rhinolophus hipposideros</i>	Absent – not found in county
Daubenton's bat	<i>Myotis daubentonii</i>	Present – forages on water bodies
Natterer's bat	<i>Myotis nattereri</i>	Potential – existing local records
Whiskered bat	<i>Myotis mystacinus</i>	Potential – existing local records
Brandt's bat	<i>Myotis brandtii</i>	Potential – rare, no county records

1.3.1 St. Stephen's Green

The area given most attention during the present study was St. Stephen's Green (Plates 19 - 36). This park was surveyed over three nights due to its past history as a prominent location for bats within Dublin City centre.

A survey of parks and the Grand Canal within the central area of Dublin was undertaken in 2000 (Roche, 2000). This survey, which assessed St. Stephen's Green, Merrion Square and the Grand Canal, found that Leisler's bats which were feeding over the lake in St. Stephen's Green. Both common and soprano pipistrelles were also noted as being active within the park. During the survey, the call of another bat species was recorded and it was tentatively identified as a whiskered bat *M. mystacinus* which is rare in Ireland.

Based on the results of the 2000 survey it was concluded that *“the presence of ponds and deciduous woodland-type habitats combine to make St. Stephen's Green important for city centre bats”*. No roosts were identified during the survey and the report stated that *“nothing is known about roosts in the city centre. Some of the bats may roost in the trees in the parks. There have been occasional reports of bats found in city centre buildings.”*

One such previously discovered specimen was that of a whiskered bat which was found on the ground outside the adjacent St. Stephen's Green Shopping Centre in the late 1990s (B. Keeley, pers. comm.). A pipistrelle was also found in the basement of No. 51, St. Stephen's Green East, in recent years (T. Doherty, pers. comm.).

For the present study, St. Stephen's Green was surveyed for bat activity on the 16th and 17th June and 2nd and 3rd of August 2008. The habitats within the park were assessed in relation to bats during daylight hours and a dusk to dawn survey was undertaken on the 16th June (sundown: 21.53, sunrise: 04.57) followed by a half night survey on the 17th June (pre-sunset to 00.30) when heavy rain prevented further bat activity. Mr. Terry Doherty, Conservation Ranger NPWS, also attended on the night of the 17th and surveyed the external park area and surrounding streets at the same time as the park was surveyed internally. A re-survey of the park was carried out on the 2nd of August (sundown: 21.17) and into the early hours of August 3rd.



Bat activity during survey of the park was very low with few species and individuals being present and the animals' behaviour followed the same pattern on each occasion: three Leisler's bats arrived over the lake (Plate 30) approximately 35 minutes after sundown and foraged for 45 to 50 minutes. The first soprano pipistrelle was detected within the park adjacent to the lake five to ten minutes later and up to four bats of this species were recorded feeding on site until 00.40 the first night, 00.00 the second night when rain began and until 00.55 on the third date. These bats fed near the lake and also along paths and trails (Plates 32 & 33) within wooded areas. Open areas such as amenity grassland (Plates 28, 29 & 34) were avoided.

Only a single common pipistrelle was detected on both nights in June. This bat was foraging at the waterfall end of the lake (Plate 31). It was not encountered in August.

In total therefore, approximately eight bats of three species were observed in the park over three nights. None of these animals were detected or observed entering the park from an external origin and, due to the low numbers it is considered that all bats recorded on site originated from roosting sites within the park itself.

Although some individual trees showing potential to harbour bats (Plates 35 & 36) and all buildings and structures were surveyed, no bat roost was identified on site and, as the number of bats using the site is low, a major maternity roost is not expected to be present within the park. Locating the roosting site of an individual bat within the confines of a park such as St. Stephen's Green is impossible without capturing and marking the animal.

Some of the on site structures do offer potential for roosting bats e.g. Ardilaun Lodge (Plate 21), the public toilets (Plate 26), Swiss shelters (Plates 24 & 25), summer house (Plate 23), bandstand (Plate 20) and the park maintenance building (Plate 22). However, no bats were observed entering or leaving any of these buildings. The stone bridge over the lake (Plate 27) was also inspected for bat use but it is not suitable as the underside of the arch is in good condition with no suitable crevices to act as bat refugia. The Fusiliers' Arch (Plate 19) similarly does not offer roosting areas for bats.

Apart from bats, it was noted during survey, that a vixen *Vulpes vulpes* and at least two cubs were present on the island in the lake. These were being supplied with food by a dog fox that left the park to the south and scavenged in the area to the rear of the National Concert Hall. Although not a protected species, the presence of a breeding fox earth on the island should be taken into consideration during planned works to ensure that the animals are treated humanely and translocated safely.

1.4 Overall assessment of scientific interest of study areas for bats

The habitats in the various study areas vary in their favourability for bats. Ironically, the arable agricultural lands within countryside to the north are poor for bats; being monocultural and exposed areas that do not offer the required prey species for bats but the sheltered and older parklands and mature woodland nearer and within the city are more attractive to these animals.

1.4.1 Belistown, Lissenhall, Fosterstown South/Cloghran and Ballystruan

The agricultural areas of Belistown, Lissenhall, Forstestown South/Cloghran and Ballystruan (Plates 1, 2, 7 and 9) may be considered as of low or negligible interest from a bat perspective. These arable fields are ecologically low-grade and widespread. However, a few of the hedgerows on these sites are relatively diverse (Plate 8) and are principally of hawthorn *Crataegus monogyna* and bramble *Rubus fruticosus* agg. Sycamore *Acer pseudoplatanus* and ash *Fraxinus excelsior* also occur in boundaries and many hedgerows are on low earthen banks.



These boundary features are of low local value being used by bats for both commuting and foraging.

1.4.2 Balheary

The boundaries of the Balheary Demesne include some mature specimen trees of beech *Fagus sylvatica* and lime *Tilia* spp. (Plates 4 & 6) that are on or adjacent to the proposed Metro North rail line. These trees may be expected to offer roosting opportunities for bats. The Broad Meadow and Ward Rivers and their associated riparian habitats provide important corridors for a number of bat species and their quality should be maintained. Both the old Lissenhall Bridge and the Balheary Bridge offer further roosting potential for bats. The combination of these habitats at this site is considered to be of moderate to high local importance.

1.4.3 Santry Demesne/North Ballymun

The remnant mature deciduous woodland and the presence of the Santry River in the Santry Demesne adjacent to the Old Ballymun Road provide significant foraging habitats for bats with additional favourability for roosting opportunities in the large mature trees on site. This area of woodland and associated hedgerows and treelines, the mature trees at the entrance to Santry Lodge (Plates 15 & 16), including ivy covered lime and horse chestnut *Aesculus hippocastanum*, and the sheltered gardens within the private St. Anne's property (Plates 10, 11 and 12), provide the principal bat foraging habitat along the proposed route; these are therefore important locally in this context and are considered as of moderate to high local value. Old structures are present in these areas also which may, on occasion, be used by bats as roosting sites. Although the deciduous woodland will not be impacted by the scheme, the trees at the entrance to Santry Lodge are to be removed.

1.4.4 Albert College Park (Hampstead Park) and St. Stephen's Green

The urban parklands of Hampstead Park and its immediate environs (Plates 17 & 18) and St. Stephen's Green (Plates 19 – 36) act as oases within built-up areas for bat foraging, commuting, socialising and, possibly, mating. The various mature tree species offer potential roosting sites and, in the case of the latter park, the on site lake is of further benefit to these animals as it encourages insect swarms. These parks are also dark, undisturbed areas at night where these animals can be safely active and are important locally being considered as of moderate to high local value.

1.5 Legal status - bats

All Irish bat species are protected under the Wildlife Act (1976) and Wildlife Amendment Act (2000). Also, the EC Directive on The Conservation of Natural habitats and of Wild Fauna and Flora (Habitats Directive 1992), seeks to protect rare species, including bats, and their habitats and requires that appropriate monitoring of populations be undertaken. Across Europe, they are further protected under the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention 1982), which, in relation to bats, exists to conserve all species and their habitats. The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention 1979, enacted 1983) was instigated to protect migrant species across all European boundaries. The Irish government has ratified both these conventions.

All Irish bats are listed in Annex IV of the Habitats Directive and the lesser horseshoe bat *Rhinolophus hipposideros* is further listed under Annex II.

The current status and legal protection of the known bat species occurring in Ireland is given in Table 2 below.



NB: Destruction, alteration or evacuation of a known bat roost is a notifiable action under current legislation and a derogation licence **has** to be obtained from the National Parks and Wildlife Service **before** works can commence.

Furthermore, it should be noted that any works interfering with bats and especially their roosts, including for instance, the installation of lighting in the vicinity of the latter, may only be carried out under a licence to derogate from Regulation 23 of the Habitats Regulations 1997, (which transposed the EU Habitats Directive into Irish law) issued by NPWS. The details with regards to appropriate assessments, the strict parameters within which derogation licences may be issued and the procedures by which and the order in relation to the planning and development regulations such licences should be obtained, are set out in Circular Letter NPWS 2/07 "Guidance on Compliance with Regulation 23 of the Habitats Regulations 1997 - strict protection of certain species/applications for derogation licences" issued on behalf of the Minister of the Environment, Heritage and Local Government on the 16th of May 2007 - document is reproduced in the Appendices.

Table 2: Legal status and protection of the Irish bat fauna

Common and scientific name	Wildlife Act 1976 & Wildlife (Amendment) Act 2000	Irish Red Data Book status	Habitats Directive	Bern & Bonn Conventions
Common pipistrelle <i>Pipistrellus pipistrellus</i>	Yes	Internationally Important	Annex IV	Appendix II
Soprano pipistrelle <i>P. pygmaeus</i>	Yes	Internationally Important	Annex IV	Appendix II
Nathusius pipistrelle <i>P. nathusii</i>	Yes	Not referenced	Annex IV	Appendix II
Leisler's bat <i>Nyctalus leisleri</i>	Yes	Internationally Important	Annex IV	Appendix II
Brown long-eared bat <i>Plecotus auritus</i>	Yes	Internationally Important	Annex IV	Appendix II
Lesser horseshoe bat <i>Rhinolophus hipposideros</i>	Yes	Internationally Important	Annex II Annex IV	Appendix II
Daubenton's bat <i>Myotis daubentonii</i>	Yes	Internationally Important	Annex IV	Appendix II
Natterer's bat <i>M. nattereri</i>	Yes	Indeterminate	Annex IV	Appendix II
Whiskered bat <i>M. mystacinus</i>	Yes	Indeterminate	Annex IV	Appendix II
Brandt's bat <i>M. brandtii</i>	Yes	Not referenced	Annex IV	Appendix II

2. Mitigation measures

Standard mitigation measures, as would apply to any large-scale development, shall be adopted in the construction of the Metro North rail line. These include limiting season of disturbance to trees and vegetation so as to reduce impacts on breeding species, to provide for habitat replacement and measures to reduce pollution and sedimentation into watercourses during construction and operation phases. Measures are required to protect bats on site. Pro-active enhancement measures are also considered, in relation to improvement of bat habitats along the route.



2.1 Protection of bats

There was no evidence of current bat use of any of the impacted buildings or structures surveyed along the proposed rail route but as some could not be inspected internally, it is recommended that these structures be re-inspected prior to any planned works.

Bats utilise several of the habitats on site for feeding and roosts may be present in crevices or hollows in mature trees or trees with ivy-cover at several locations.

The following mitigation measures are in line with the NRA Guidelines on provisions for the conservation of bats during the planning and construction of roads (2006). Reference is made to the NRA Guidelines (*Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes*) and the *Guidelines for the Treatment of Bats during the Construction of National Road Schemes*. Mitigation and enhancement measures are further summarised in Table 5 below.

2.1.1 Potential bat roosts in buildings

Some structures along the proposed rail route show varying potential for use by bats including a derelict farm building at Belinstown (Plate 3) which is directly within the rail route corridor, the old Lissenhall Bridge at Balheary (Plate 5) and a two-storey dwelling (Plate 13) and gate lodge (Plate 14) on the Old Ballymun Road. These structures shall be re-surveyed prior to any demolition works. This is especially recommended for the two properties on the Old Ballymun Road which show high potential for bat use but were not accessible for inspection at time of present survey.

Buildings with roosting bats shall not be demolished during the bat breeding period (late May to mid-August) as the risk of accidental death or injury is too great at this time. In exceptional circumstances where demolition must proceed, in buildings known to contain bats, the special mitigation measures as detailed in the *NRA Guidelines for the Treatment of Bats during the Construction of National Road Schemes* (National Roads Authority 2006b) to protect bats must be put in place and a licence to derogate from the conservation legislation must be sought from the NPWS.

The procedure to be followed for the demolition of buildings depends on whether bats are suspected or known to be present. In all cases, immediately in advance of demolition, a bat specialist must undertake a comprehensive examination of the building.

The local NPWS Conservation Ranger shall also be informed of the location of any new roosts found.

Should a bat roost be discovered in any of the aforementioned structures that require removal then a derogation licence shall be applied for from the Licensing Department of the NPWS at 7 Ely Place, Dublin. The application shall be made by a bat specialist on behalf of the RPA and it is recommended that this is done as early as possible as the granting process can take several months. Should a roost be confirmed the following mitigation measures are given to safeguard any animals using the building:-

Any removal of structure(s) identified as a bat roosting site shall preferably be undertaken within the winter months - November to March - as bat numbers are then known to be fewer in buildings. This should lessen the impact on these animals.

All works shall be overseen by a bat specialist. The roofing material of the structure shall be removed manually and carefully in the expectation that bats may be found. If discovered, the animal(s) shall be collected by the bat specialist and retained in a box until dusk and then released on site.



2.1.2 Potential bat roosts in trees

Where possible, treelines and mature trees which are located immediately adjacent to the line of the proposed route or are not directly impacted shall be avoided and retained intact. Overall impacts on these sites can be reduced through modified design and sensitivity during construction. Any existing mature trees adjacent to the corridor and any construction sites to be retained shall be protected from root damage by machinery by an exclusion zone of at least 7 metres or that equivalent to canopy height. Such protected trees shall be fenced off by adequate temporary fencing prior to other works commencing. This is especially important within the Hampstead Park and St. Stephen's Green construction and site depot areas.

Trees, which are to be removed, shall first be assessed for likely bat roosting opportunities by a bat specialist. Any tree confirmed as a bat roosting site requires a derogation licence to be granted for its removal – *Bat Mitigation Guidelines for Ireland* (Legislation and Licensing) (Kelleher & Marnell, 2007).

Trees shall be felled during the spring months of March, April, May or autumn months of September, October or November (felling during the spring or autumn months avoids the periods when bats are most likely to be present) in order to avoid the disturbance of any roosting bats as per NRA guidelines. However, the bird breeding season should also be considered during the former period. Any trees showing crevices, hollows etc. and identified as Potential Bat Roosts (PBRs), shall be removed while a bat specialist is present to deal with any bats found. Such animals shall be retained in a box until dusk and then released on site.

Large mature trees shall be felled carefully in the expectation that bats may be present, essentially by gradual dismantling by tree surgeons, under supervision of a bat specialist. Care shall be taken when removing branches as removal of loads may cause cracks or crevices to close, crushing any animals within. Such cracks shall be wedged open prior to load removal. Dead branches with cracks shall be lowered to the ground using ropes to avoid impacts which may injure or kill bats within.

Ivy covered trees, once felled, shall be left intact on site for 24 hours to allow any bats beneath the foliage to escape prior to disposal. A bat specialist shall be present during the removal of the mature beech trees on the Ennis Lane at Balheary and any lime trees to be removed along the Balheary Demesne boundary and also during the removal of any mature trees within the Santry/Ballymun area and St. Stephen's Green.

Landowners shall be advised that the timber from felled trees will remain for their use. This should prevent trees being felled prematurely.

2.1.3 Alternative bat roost provision

A bat box scheme shall be provided within the adjacent woodland within the former Santry Demesne. It is recommended that c. 20 bat boxes would suffice. These shall be placed upon existing mature trees and shall be sited and erected by a bat specialist. 'Schwegler' woodcrete bat boxes of the 2F design are recommended. Supplier contact details are given in Appendix 6.

Ready-made artificial roost units are also available for mounting beneath bridges. Bat 'Tubes' of the 750/6 design are recommended to be erected beneath the old Lissenhall and Balheary Bridges. These can also be obtained via the Internet from the suppliers listed in Appendix 6. Two tubes erected under each bridge shall suffice. These shall be sited by a bat specialist. Bat tubes have an added advantage, as they are maintenance free (the slit is at the bottom of the artificial roost, allowing bat droppings to fall freely from the tube).

Recommended numbers and locations for bat tube and box erection are given in Table 3 below.



Table 3: Artificial roost units required on the scheme

Location	No of bat units required
Old Lissenhall Bridge	2 x 750/6 bat tubes
Balheary Bridge	2 x 750/6 bat tubes
Santry Demesne woodland	20 x 2F <i>Schwegler</i> bat boxes
Total bat boxes/tubes required	24 (4 tubes & 20 boxes)

2.1.4 Bridge works

Any planned strengthening works on the old Lissenhall and Balheary Bridges shall be designed to retain existing bat roosting crevices. Studies have shown that bats use a variety of crevice sizes in bridges from 13mm to 70mm in width to 350mm to 1000mm in depth for summer roosts and deeper for winter hibernation sites (Billington & Norman 1997).

2.1.5 Lighting restrictions

In general, artificial light creates a barrier to commuting bats so lighting shall be minimised along the proposed route especially at areas of interest for bat species. Lighting shall especially be avoided during both the construction and operational phases at the old Lissenhall and Balheary Bridges as this would impact on bat foraging and/or roosting at these structures especially that of Daubenton's bats that are presently using the area and may also prevent use of installed bat tubes.

Where lighting is required at construction sites and at the depots within Hampstead Park and St. Stephen's Green, directional lighting (i.e. lighting that only shines on the work area and not nearby vegetation or water bodies) shall be used to prevent overspill. This shall be achieved by the design of the luminaire and by using accessories such as hoods, cowls, louvres and shields to direct the light to the intended area only.

The impact on bats shall be minimised by using low pressure sodium lamps instead of high pressure sodium, mercury or metal halide lamps. The lighting mount shall be as short as possible as light at a limited height reduces the ecological impact. However, there are cases where a taller column would enable light to be directed downwards at a more acute angle and thereby reduce horizontal spill and this shall be considered.

The intensity of the lighting shall be as low as guidelines permit and not more than 3 lux at ground level and the times during which the lighting is operational shall be limited to provide some dark periods.

Computer software packages are available that can model the proposed lighting of the route area and show how the area will be affected by light spill when all the factors of the lighting components are taken into consideration.

2.1.6 Compensation for loss of commuting routes

Linear features such as hedgerows and treelines serve as commuting corridors for bats and other wildlife. Mitigation measures are recommended to compensate for the loss of such features. These measures will also compensate for habitat loss and provide continuity in the landscape.



Severed linear features shall be reconnected using semi-mature trees under planted with hedgerow species. Native species shall be used as they support more insect life than non-native varieties. These would also serve to screen the development.

Such planting is recommended at Belinstown/Lissenhall and Fosterstown South/Cloghran areas and shall preferably be completed during the pre-construction phase to provide hedgerow/tree growth prior to completion of the rail line construction. This would ensure that bats commuting in the area have prior knowledge of newly planted landscape features as well as ensuring the newly planted hedgerows/treelines are well established prior to completion of construction.

2.1.7 Habitat retention, replacement and landscaping

Habitat replacement and landscaping could compensate for or add to the wildlife value of the area and is necessary to minimise visual intrusion of the development into the landscape and also to provide areas of aesthetic as well as wildlife interest. Further pro-active habitat restoration measures are considered below.

In general, best practice design shall aim to retain the quality of the landscape where possible and ensure its protection within the landscaping programme. Retain existing hedgerows and treelines where possible.

Dusk and/or night-scented plants could also be planted as part of landscaping to encourage night-flying insects onto the site to act as prey items for bats. A list of suggested plant species is given in the Appendices.

The area of the proposed Belinstown depot site shall be completely bounded by new shrub and tree planting to ensure bats and other wildlife can commute around the development. These plantings shall be of an age to provide a minimum vegetative feature of three metres in width and height when planted and to ensure two woodland levels - a shrub layer and a tree layer - to effectively form a surrounding linear woodland habitat that is currently absent in the area. Recommended tree species are oak *Quercus* spp., ash, birch *Betula* spp., crab apple *Malus sylvestris*, alder *Alnus glutinosa*, hawthorn etc. according to local conditions. These shall be planted and maintained by botanical specialists. As this woodland habitat matures, it will offer further benefits for bats by providing roosting opportunities and a possible location for future bat box erection.

2.1.8 Pollution hazards: construction and operation phase

Contamination incidents and run-off of sediments into the local watercourses could affect the river habitats on, around and downstream of the construction areas. Such would also affect bat habitats. As any construction works or habitat restoration measures may result in runoff and sedimentation into local watercourses, such incidents shall be avoided. Strict guidelines for safe use of fuels, lubricants and disposal of same shall be provided and adhered to. Disposal facilities shall be provided for all other wastes including non-hazardous wastes in order to limit littering and contamination incidents.

2.1.9 Works on site: construction and operation phase

There are especial constraints on areas suitable for storage, machinery depots, site offices or other uses. Areas identified for protection of habitats and bats shall be avoided and all construction sites and storage areas shall be located away from watercourses in order to limit potential impacts and pollution hazards. Adequate precautions shall be taken to ensure that any pollution hazards are reduced to negligible hazard. Areas for protection and for landscaping and conservation measures (such as mature trees due for retention) shall be identified, fenced off



and excluded from construction traffic and other operations. Any site works outside of the proposed route corridor shall not be placed where such would affect fauna and habitats of interest not specifically referred to above.

2.1.10 Additional measures: monitoring

The success of the mitigation measures for bats shall be monitored for a period of three years after construction and appropriate measures taken to enhance these if and where required. A recommended schedule for such monitoring is given in Table 4 below.

Table 4: Monitoring schedule recommended for mitigation measures

Mitigation measure	Monitoring required	Description	Duration
Newly planted hedgerows and treelines	Ensure viable growth of planting	Planted material shall be checked periodically over the growing season to remove dead material. Any dead material shall be replaced within the same season with viable stock according to age/height restrictions already specified in mitigation.	From time of planting to 1 year post construction
Bat boxes and tubes	Monitor bat usage of alternative roosting units	Bat tubes and boxes shall be examined by a licensed bat specialist or NPWS Conservation Ranger according to NPWS recommendations. Records should be submitted to <i>Bat Conservation Ireland</i> for inclusion in their bat distribution database.	18 months post construction

Table 5: Summary of recommended mitigation and enhancement measures

Location	Bat species recorded	Importance	Mitigation measure
Belinstown/Lissenhal I	Common and soprano pipistrelle.	Hedgerow commuting routes and feeding areas.	2.1.1 2.1.6 2.1.7
Balheary	Common and soprano pipistrelle, Daubenton’s bat.	Hedgerow and riparian commuting routes and feeding areas. Potential bridge roosts.	2.1.1 2.1.2 2.1.3 2.1.4 2.1.5 2.1.8 2.1.10
Fosterstown South/Cloghran	Common and soprano pipistrelle, Leisler’s bat.	Hedgerow commuting routes and feeding areas.	2.1.6
Ballystruan	Common and soprano pipistrelle, Leisler’s bat.	Hedgerow commuting routes and feeding areas.	None proposed
Santry/Ballymun	Common and soprano pipistrelle, Leisler’s bat.	Hedgerow commuting routes and feeding areas, woodland and riparian feeding areas. Potential building and tree roosts.	2.1.1 2.1.2 2.1.3 2.1.8 2.1.10



Location	Bat species recorded	Importance	Mitigation measure
Albert College Park (Hampstead Park)	Common and soprano pipistrelle.	Treeline commuting routes and feeding areas.	2.1.2 2.1.5 2.1.9
St. Stephen's Green	Common and soprano pipistrelle, Leisler's bat.	Feeding and potential tree roosting area.	2.1.2 2.1.5 2.1.8 2.1.9 2.1.10

3. Predicted impact of the proposal

The losses and modifications of various bat-used habitats on site will be counteracted by replacement planting and creation of new habitats including hedgerow and woodland. The replacement habitats and habitat improvements will considerably offset the loss of existing habitats entailed for the development. The proposed development will bring about changes in the floral and faunal representation on site; some negative impacts will undoubtedly occur as a result of these changes but habitat creation and improvement should lead to improved habitat quality for other species including bats.

The proposed development within St. Stephen's Green involves the temporary removal of the Fusilier's Arch and demolition of the existing public toilets. It also requires the draining of the north western part of the lake, removal of the existing island and several mature trees and scrub cover. These operations will reduce the available foraging habitat within the park for bats and, potentially, reduce roosting opportunities. However, as the number of bats currently using the park is small and alternative roosting and foraging opportunities will continue to be available to these animals during works, the species and individuals observed within St. Stephen's Green are expected to persist.

Given best practice design and operation of the proposed development and with the mitigation and enhancement recommendations given within this report incorporated, the Residual Medium to Long-term impact of the development may be considered as of Neutral or Minor Negative impact in terms of likely impacts on the area's bat fauna.



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5. APPENDICES

5.1 APPENDIX 1: bat ecology

Introduction

The bat is the only mammal that is capable of true flight using modified hands and arms which are covered by a supple membrane of skin. This ability has allowed bats to exploit aerial insect prey and avoid predation. As the largest mammalian group after the rodents (to which they are not related), bats are very successful and have diversified into over 1,100 species worldwide, representing almost a quarter of all mammal species. Within such diversification, they have evolved a range of hunting strategies, means of reproduction, roosting behaviours and social interactions (Kunz, 1982). They are found throughout the world and in every continent apart from Antarctica.

Bats are classified within the Order Chiroptera (meaning 'Hand-wing') and this is further divided into two Superfamilies: the Megachiroptera and Microchiroptera. The former are mainly fruit-eaters while the latter are predominantly insectivorous. Of these, 47 bat species are currently known in Europe.

Irish bat species

In Ireland, ten species of bat are currently known to be resident. These are classified into two Families: the Rhinolophidae (Horseshoe bats) and the Vespertilionidae (Common bats). The lesser horseshoe bat *Rhinolophus hipposideros* is the only representative of the former Family in Ireland. All the other Irish bat species are of the latter Family and these include three pipistrelle species: common *Pipistrellus pipistrellus*, soprano *P. pygmaeus* and Nathusius' *P. nathusii*, four *Myotis*: Natterer's *Myotis nattereri*, Daubenton's *M. daubentonii*, whiskered *M. mystacinus*, Brandt's *M. brandtii*, the brown long-eared *Plecotus auritus* and Leisler's *Nyctalus leisleri* bats.

Individual species accounts with distribution maps are given in Appendix 2 below.

Hunting with sound

The microbats are unique as they use a type of sonar, called echolocation, by which they hunt their prey. This is a stream of sound produced at high frequencies which allows the animal to build-up a complete 'sound picture' of their surroundings. These sounds are produced well beyond the range of human hearing. Using these sounds, the bats are able to detect the clutter of nearby leaves, hear an insect, know how fast it is travelling, how fast its wings are beating, whether it is hard or soft bodied etc. before closing in for the catch. Although bats use this method to find their way around, they also use their eyes to see in low light levels.

All the European bat species feed exclusively on insects and/or spiders and a pipistrelle, weighing only 4 to 8 grams, will eat up to 3,500 insects every night. This allows the bat to increase its body weight by 50% each night but this is immediately burned off through calorie consumption while flying. Such feeding ensures a build up of fat in the form of brown adipose tissue between the shoulder blades of the bat which acts as a winter fuel store to keep the animal alive while in hibernation.

Roosting behaviour

Bats naturally roost in caves and trees but some species have recently adapted to using man-made structures for roosting. Being social animals, these roosts can reach substantial numbers in the peak period of bat activity in mid-summer and especially if the roost has been selected as a maternity site. These nursery roosts are mainly composed of breeding females but often they include some non-breeding females and males that may be the

previous season's young still with their mother. Males are more solitary and form smaller roosts apart from the females.

For summer roosts, bats seek warm temperatures but, for hibernation in winter, they require constant temperatures of only 5° or 6°C and humid surroundings to keep from dehydrating. In mild winters, bats will emerge from such sites to hunt should insects be on the wing.

Breeding and longevity

In autumn, male bats attract females by song flights and form harems with up to 20 females being defended by a male. After mating, the males take no further part in the rearing of the young.

Irish bats can produce one young per year but, more usually, only one young is born in spring every two years (Boyd & Stebbings, 1989). There is no fixed pregnancy period and gestation is governed by ambient temperature. The slow rate of reproduction by bats inhibits repopulation in areas of rapid decline. Although bats have been known to live for twenty or more years, this is rare as most die in their first and the average lifespan, in the wild, is four years. The survival of the young is closely linked to climate and poor weather in spring and summer can result in high infant mortality.

Threats

All bat species are in decline as they face many threats to their highly developed and specialised lifestyles. Many bats succumb to poisons used as woodworm treatments within their roosting sites (Racey, P. A. & Swift, S. 1986). Agricultural intensification, with the loss of hedgerows, treelines, woodlands and species-rich grasslands have impacted bat species also. Habitual roosting or hibernation sites in caves, mines, trees and disused buildings are also often lost to development. Summer roosts are prone to disturbance from vandals. Agricultural pesticides accumulate in their prey, reaching lethal doses (Jefferies, D. J. 1972). Chemical treatments in cattle production sterilise dung thus ensuring that no insects can breed within it to be fed upon by bats. Likewise, river pollution, from agricultural runoff, reduces the abundance of aquatic insects. Road building, with the resultant loss of foraging and roosting sites is a significant cause in the reduction of bat populations across Europe.

Extinction

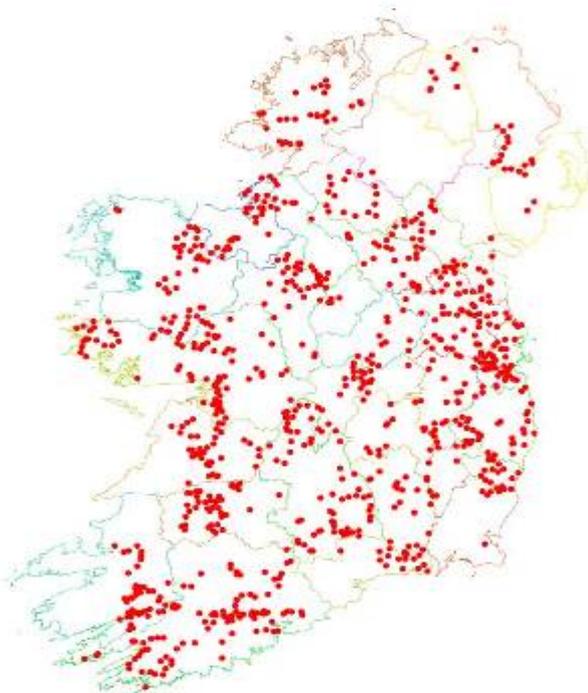
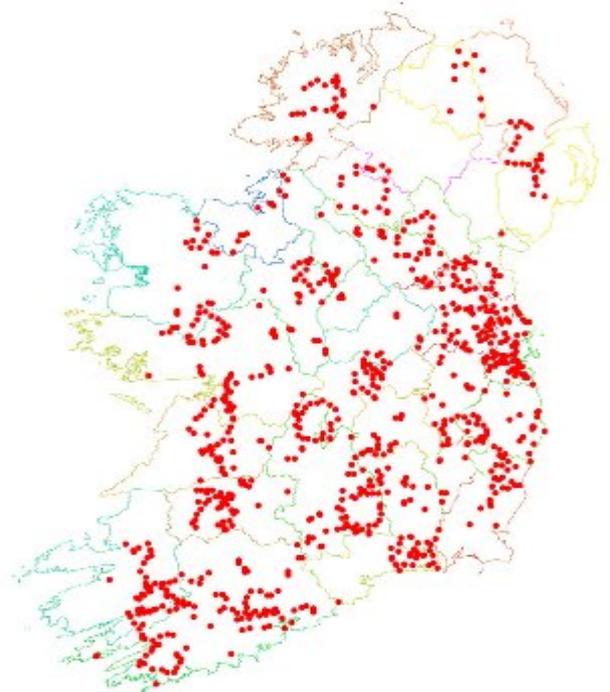
As recently as 1992, the greater mouse-eared bat *Myotis myotis* became the first mammal to become extinct in Britain since the wolf in the 18th century.

5.2 APPENDIX 2: description and distribution of known Irish bat species

Brief species accounts and current known distribution (maps from *Bat Conservation Ireland*)

Common pipistrelle *Pipistrellus pipistrellus*

This species was only recently separated from its sibling, the soprano or brown pipistrelle *Pipistrellus pygmaeus*, which is detailed below (Barratt, E. M. et al, 1997). The common pipistrelle's echolocation calls peak at 45 kHz. The species forages along linear landscape features such as hedgerows and treelines as well as within woodland.

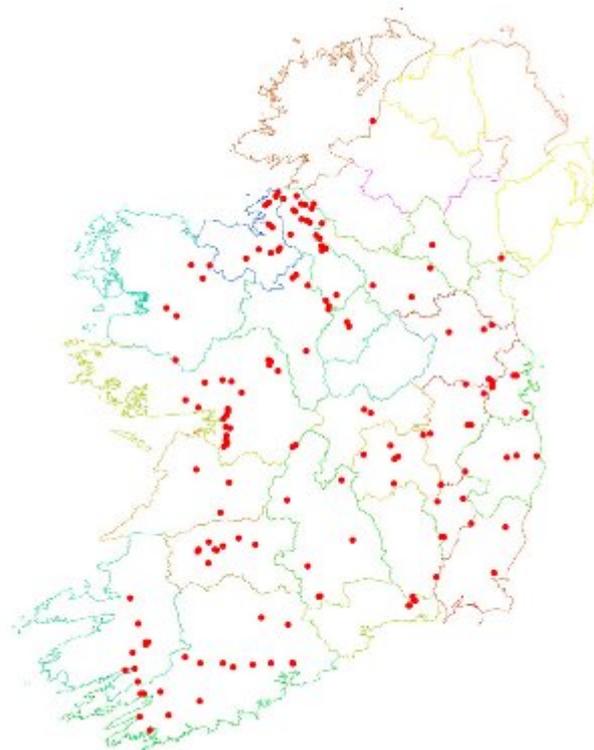
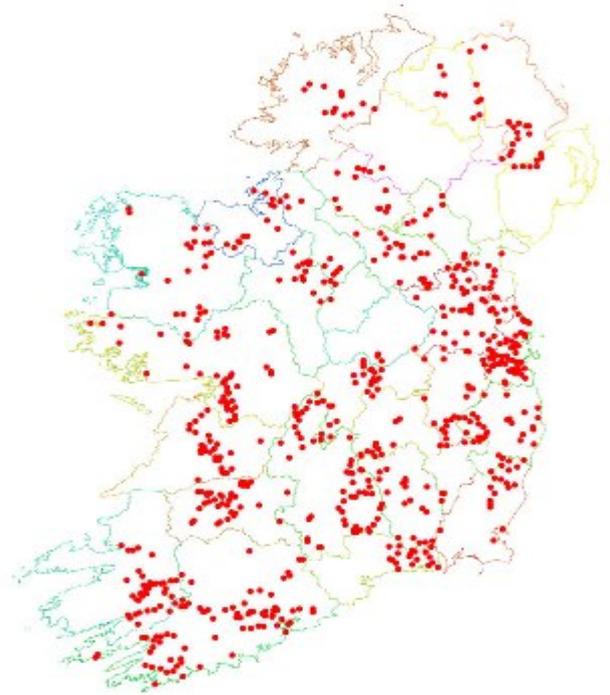


Soprano pipistrelle *Pipistrellus pygmaeus*

The soprano pipistrelle's echolocation calls peak at 55 kHz, which distinguishes it readily from the common pipistrelle. The pipistrelles are the smallest and most often seen of our bats, flying at head height and taking small prey such as midges and small moths. Summer roost sites are usually in buildings but tree holes and heavy ivy are also used. Roost numbers can exceed 1500 animals in mid-summer.

Leisler's bat *Nyctalus leisleri*

This species is Ireland's largest bat, with a wingspan of up to 320mm; it is also the third most common bat, preferring to roost in buildings, although it is sometimes found in trees and bat boxes. It is the earliest bat to emerge in the evening, flying fast and high with occasional steep dives to ground level, feeding on moths, caddis-flies, and beetles. The echolocation calls are sometimes audible to the human ear being around 15 kHz at their lowest. The audible chatter from their roost on hot summer days is sometimes an aid to location. This species is uncommon in Europe and Ireland holds the largest national population. The species is considered as *Internationally Important*.

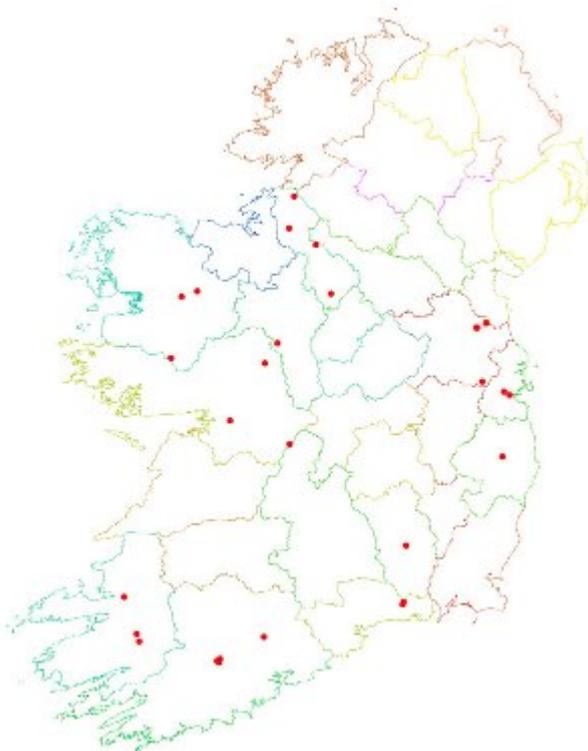
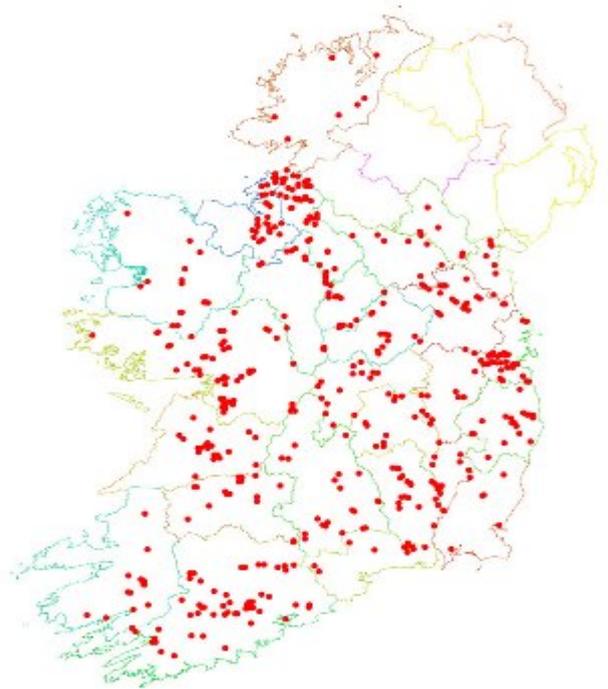


Natterer's bat *Myotis nattereri*

This species has a slow to medium flight, usually over trees but sometimes over water. They follow hedges and treelines to their feeding sites, consuming flies, moths and caddis-flies. Natterer's bats are frequently recorded in hibernation sites in winter but there are few records of summer roosts. Those that are known are usually in old stone buildings but they have been found in trees and bat boxes. The status of the Natterer's bat has not been determined but it is classed as *Threatened* and is listed in the *Irish Red Data Book* (Whilde, A 1993).

Daubenton's bat *Myotis daubentonii*

This bat species feeds close to the surface of water, either over rivers, canals, ponds, lakes or reservoirs, but can also be found foraging in woodlands. Flying at 15 kilometres per hour, it gaffs insects with its over-sized feet as they emerge from the surface of the water - feeding on caddis flies, moths, mosquitoes, midges etc. It is often found roosting beneath bridges or in tunnels and also makes use of hollows in trees.

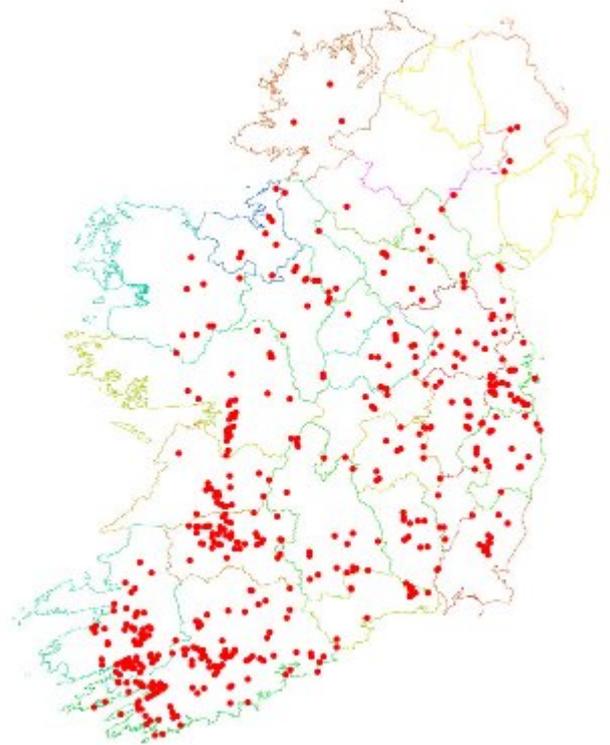


Whiskered bat *Myotis mystacinus*

This species, although widely distributed, has been rarely recorded in Ireland. It is often found in woodland, frequently near water. Flying high, near the canopy, it maintains a steady beat and sometimes glides as it hunts. It also gleanes spiders from the foliage of trees. Whiskered bats prefer to roost in buildings, under slates, lead flashing or exposed beneath the ridge beam within attics. However, they also use cracks and holes in trees and sometimes bat boxes. The status of the species has not been determined but it is classed as *Threatened* and is listed in the *Irish Red Data Book* (Whilde, A 1993).

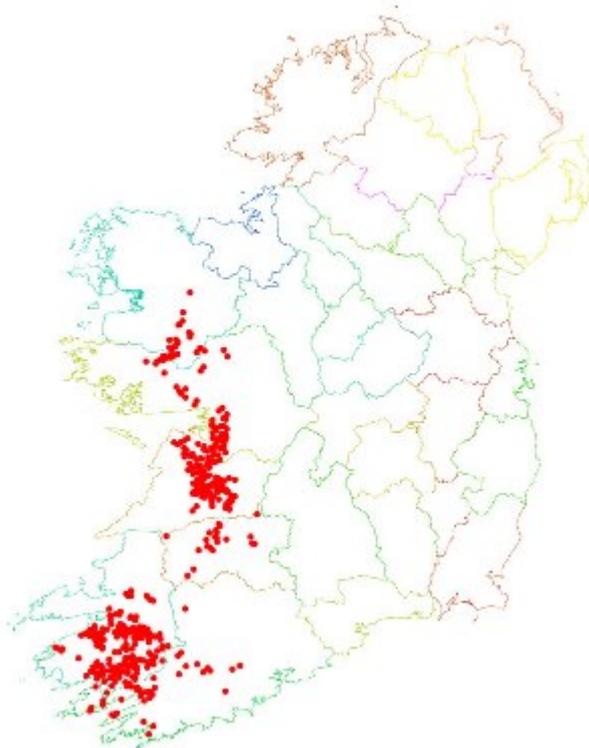
Brown long-eared bat *Plecotus auritus*

This species of bat is a 'gleaner', hunting amongst the foliage of trees and shrubs, and hovering briefly to pick a moth or spider off a leaf, which it then takes to a sheltered perch to consume. They often land on the ground to capture their prey. Using its nose to emit its echolocation, the long-eared bat 'whispers' its calls so that the insects, upon which it preys, cannot hear its approach (and hence, it needs oversize ears to hear the returning echoes). As this is a whispering species, it is extremely difficult to monitor in the field as it is seldom heard on a bat detector. Furthermore, keeping within the foliage, as it does, it is easily overlooked.



Lesser horseshoe bat *Rhinolophus hipposideros*

This species is the only representative of the Rhinolophidae family in Ireland. It differs from our other species in both habits and looks, having a unique nose leaf with which it projects its echolocation calls. It is also quite small and, at rest, wraps its wings around its body. Lesser horseshoe bats feed close to the ground, gleaning their prey from branches and stones. They often carry their prey to a perch to consume, leaving the remains beneath as an indication of their presence. The echolocation call of this species is of constant frequency and, on a bat detector, sounds like a melodious warble. Its distribution is restricted to the western Atlantic seaboard counties of Mayo, Galway, Clare, Limerick, Kerry and Cork (Kelleher, C. 2004). However, single specimens have recently been discovered in Lough Key, near Boyle,

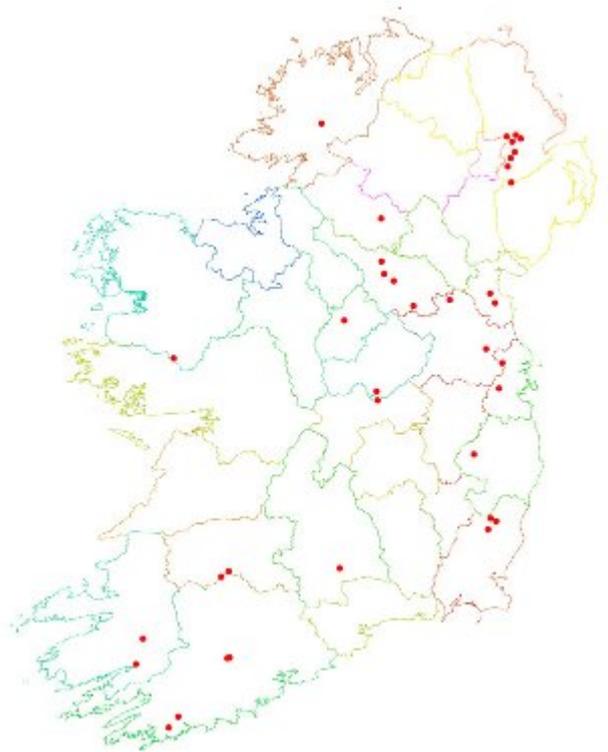


Co. Roscommon in 2004 (B. Keeley, pers. comm.) and in Tubbercurry, Co. Sligo in 2008 (C. Kelleher, pers. obs.), two counties where their low numbers may have caused their

presence to be overlooked in the past. This species is considered as *Internationally Important* and it is an Annex II species under the *EC Habitats Directive 1992*.

Nathusius' pipistrelle Pipistrellus nathusii

Nathusius' pipistrelle is a recent addition to the Irish fauna and, so far, has mainly been recorded from the north of the island in Cos. Antrim, Down and Longford (Richardson, P, 2000) but is assumed to be spreading as single specimens have been recorded in Kerry and Cork (Kelleher 2006) and elsewhere and the known resident population is enhanced in the autumn months by an influx of animals from Scandinavian countries. There is a likelihood, therefore, that this species may occur in the area as a vagrant especially in the autumn months. The status of the species has not been determined.



Brandt's bat Myotis brandtii

This sibling species to the whiskered bat is known from four specimens found to date in Cos. Wicklow (Mullen, 2007), Cavan, Clare (B. Keeley pers. comm.) and Tipperary (Kelleher, 2006b). A fifth specimen was identified in Killarney National Park, Co. Kerry in August 2005 (Kelleher, C. 2005 & 2006a). Its status is unknown.

5.3 APPENDIX 3: bat roost definitions (as defined by Schofield 1996)

Maternity roost

Where 20 or more bats reside between May and August and where the young are born and suckled.

Satellite roost

Generally less than 20 adults and in close proximity to maternity roosts.

Transitional roost

Used by bats prior to and after leaving maternity roosts in April and October.

Night roost

Where bats are found between the months of March and November. These can also harbour a few individuals during the day but usually less than 5.

Hibernation roost

Used by bats between October and March.

5.4 APPENDIX 4: NPWS Circular Letter 2/07



Circular Letter NPWS 2/07

16 May, 2007

AN ROINN COMHSHAOIL
OIDHREACHTA AGUS
RIALTAIS ÁITIÚIL
DEPARTMENT OF
THE ENVIRONMENT, HERITAGE
AND LOCAL GOVERNMENT

7 PLÁS ELY
BAILE ÁTHA CLIATH 2, EIRE
7 ELY PLACE,
DUBLIN 2, IRELAND

TEL NO: +353 1 888 2000
LOCAL NO: 1890 321 421
FAX NO: +353 1 888 3272

**Guidance on Compliance with Regulation 23
of the Habitats Regulations 1997
– strict protection of certain species/ applications for derogation licences.**

A chara,

I am directed by the Minister for the Environment, Heritage and Local Government to refer to the EU Habitats Directive, to the Habitats Regulations 1997-2005 which transpose that directive into Irish law,¹ and to Ireland's obligations under that Directive.

The Directive, and the implementing Regulations, require that certain species listed in Annex IV of the Habitats Directive are strictly protected. A list of these species is appended.

These species are not necessarily associated with areas subject to a specific nature designation: in the case of bat species and otters they may be found anywhere throughout the country.

Under Regulation 23 of the Habitats Regulations 1997, any person who, in regard to the animal species listed in Annex IV of the Habitats Directive-

- (a) deliberately captures or kills any specimen of these species in the wild,*
- (b) deliberately disturbs these species particularly during the period of breeding, rearing, hibernation and migration,*
- (c) deliberately takes or destroys the eggs from the wild, or*
- (d) damages or destroys a breeding site or resting place of such an animal,*

shall be guilty of an offence."

¹ Council Directive 92/43/EEC of 21 May 1992, on the conservation of natural habitats and of wild flora and fauna, the European Communities (Natural Habitats) Regulations, 1997 (S.I. No. 94 of 1997), the European Communities (Natural Habitats) (Amendment) Regulations, 1998, (S.I. No. 233 of 1998), and the European Communities (Natural Habitats) (Amendment) Regulations, 2005, (S.I. No. 378 of 2005),



Regulation 21 provides corresponding protection for Annex IV plant species.

The carrying out of any work that has the potential to disturb these species, and for which a derogation licence has not been granted, may constitute an offence under Regulation 21 or 23 of the Habitats Regulations.

It should be noted that in the case of Regulation 23 (d), it is not necessary that the action should be deliberate for an offence to occur. This places an onus of due diligence on anyone proposing to carry out an action or project that might result in such damage or destruction.

A particular concern arises regarding works carried out by or on behalf of local authorities themselves, including works of maintenance or repair.

Examples of cases that are likely to require assessment are the removal of trees and other habitat during the construction of roads or other infrastructure, the modification of the courses of rivers, drainage and discharge of water, and even the re-pointing or replacement of masonry in bridges, walls and other structures where bats are likely to roost, etc.

Procedure to be followed

Local authorities must ensure that they, their staff and their agents comply fully with the requirements of the Directive and the Regulations as follows:

1. In advance of any works, an appropriate initial assessment should be carried out by a person competent to identify where a risk of damage or disturbance to an Annex IV species may exist (e.g. by an appropriately qualified ecologist). The fact that such an assessment has been carried out should be recorded and kept with the papers associated with the project.
2. Projects where a risk is identified should be subject to an appropriate scientific assessment. It will be necessary to identify alternatives or modifications that will avoid that risk.
3. Where it is not possible to identify a means of avoiding the risk completely, the question of seeking a derogation licence from the Minister under Regulation 23 of the Habitats Regulations should be considered if it is desired, notwithstanding, to proceed with the action or project.
4. The Minister is empowered, within strict parameters, to grant a license for derogation from complying with the requirements of the provisions of section 21 of the Wildlife Act 1976 and Regulations 23 and 24 of the Habitats Regulations. The scope of the Minister's powers to grant derogation licences is set out in Regulation 23, as follows:

Where there is no satisfactory alternative and the derogation is not detrimental to the maintenance of the populations of the species to which the Habitats Directive relates at a favourable conservation status in their natural range, the Minister may, in respect of those species, grant a licence to one or more persons permitting a

derogation from complying with the requirements of the provisions of section 21 of the Principal Act and Regulations 23 and 24 where it is—

(a) in the interests of protecting wild fauna and flora and conserving natural habitats, or

(b) to prevent serious damage, in particular to crops, livestock, forests, fisheries and water and other types of property, or

(c) in the interests of public health and public safety, or for other imperative reasons of overriding public interest, including those of a social or economic nature and beneficial consequences of primary importance for the environment, or

(d) for the purpose of research and education, of repopulating and re-introducing these species and for the breeding operations necessary for these purposes, including the artificial propagation of plants,

(e) to allow, under strictly supervised conditions, on a selective basis and to a limited extent, the taking or keeping of certain specimens of the species to the extent (if any) specified therein, which are set out in the First Schedule.

6. Any application for a derogation licence (to be submitted to Mr Jamie Mulleady of this Department at: Species and Regulations Unit, National Parks and Wildlife Service, 7 Ely Place, Dublin 2 email: Jamie.mulleady@environ.ie) should address the criteria referred to in the above paragraph as well as proposed scientifically-based mitigation measures to address any potential impact on the identified Annex IV species. A decision on an application will be made on the basis of the information and proposals submitted and best scientific knowledge.

7. An application for such a derogation licence should be made in advance of seeking approval under Part 8 or 10 of the Planning and Development Regulations, 2001, as amended, or seeking planning permission for works. This will ensure that full consideration can be given to the impacts of the proposed project on the species and to avoid the possibility of delay to the proposed project or of a refusal of a derogation licence which would prevent the works being carried out as planned.

8. The obligation to obtain a derogation licence is additional to the requirement to notify the Minister of a proposed development which may have an impact on nature conservation to the Minister under article 82(3)(n) and others of the Planning and Development Regulations, 2001 (as amended). Local authorities should notify the Minister (Development Applications Unit) in any case where it appears that a proposed development may pose a risk to Annex IV species.

9. Should a problem be identified regarding Annex IV species in the course of works, this should be reported immediately to the National Parks and Wildlife Service. No further work that might impact on such species should take place unless a derogation licence has been obtained.

Applications for planning permission

Issues concerning damage or disturbance to Annex IV species also arise in the context of applications for planning permission for proposed development, e.g. proposals to renovate older houses. The responsibility of avoiding disturbance or damage to Annex IV species, or of obtaining an appropriate derogation licence, rests with the developer.

However, planning authorities should note that in any case where it appears that a proposal may pose a risk to Annex IV species, the planning application should be referred to the Minister under article 27(1)(n) of the Planning and Development Regulations 2001 (as amended). This referral should be done in the appropriate manner for applications having impacts on nature conservation sites. Planning authorities could also take the opportunity afforded by any pre-application discussions to alert prospective applicants to the requirements in relation to Annex IV species.

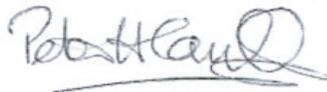
Further information

Species Action Plans, which set out specific measures for the monitoring and protection of these species, have been or are being prepared. They are published on www.npsw.ie or can be obtained from Species Unit (Tel: 01 888 3212). Guidelines in regard to bats are available at www.npsw.ie.

General questions in relation to the protection of Annex IV species or require any further information on an application for a derogation licence should be referred to Species Unit (01 8883214). Specific queries regarding a proposed project, location or species should be referred to the appropriate National Parks and Wildlife Service Divisional Ecologist or to the Regional Manager (contact details http://www.npws.ie/media/Media_4976_en.pdf).

If you have any questions in relation to the referral of a planning application, please contact Development Applications Unit (Tel: 01 8883181)

Is mise le meas,



Peter Carvill,
Assistant Principal Officer.

To: all County and City Managers, Directors of Services for Planning, Town Clerks

5.5 APPENDIX 5: list of dusk/night-scented plant species

The following selection of native and non-native garden plant species produce their scent at dusk or during the night and so attract night-flying invertebrates as a food source for bats.

Bedding plants

Nottingham catchfly	<i>Silene nutans</i>
Night-flowering catchfly	<i>S. noctiflora</i>
Bladder campion	<i>S. vulgaris</i>
Red campion	<i>S. dioica</i>
Night-scented stock	<i>Matthiola bicornis</i>
Sweet rocket	<i>Hesperis matronalis</i>
Evening primrose	<i>Oenothera biennis</i>
Tobacco plant	<i>Nicotiana affinis</i>
Cherry pie	<i>Petasites hybridus</i>
Soapwort	<i>Saponaria officinalis</i>
Greater butterfly orchid	<i>Platanthera chlorantha</i>
Dame's violet	<i>Hesperis matronalis</i>
Borage	<i>Borago officinalis</i>
Four O'Clock	<i>Mirabilis jalapa</i>
Thorn-apple	<i>Datura stramonium</i>
Common evening primrose	<i>Oenothera biennis</i>
Phlox	<i>Phlox</i> spp.
Tobacco	<i>Nicotiana tabacum</i>
Petunia	<i>Petunia</i> spp.

Scented herbs

Chives	<i>Allium</i> spp.
Borage	<i>Borago officinalis</i>
Lemon balm	<i>Melissa officinalis</i>
Marjoram	<i>Origanum vulgare</i>
Mint	<i>Mentha</i> spp.

Climbers

European honeysuckle	<i>Lonicera caprifolium</i>
Italian honeysuckle	<i>L. etrusca superba</i>
Japanese honeysuckle	<i>L. japonica halliana</i>
Native honeysuckle	<i>L. periclymenum</i>
White jasmine	<i>Jasminium officinale</i>
Dogrose	<i>Rosa canina</i>
Sweetbriar	<i>R. rubiginosa</i>
Field rose	<i>R. arvensis</i>
Ivy	<i>Hedera helix</i>
Hedge bindweed	<i>Calystegia sepium</i>
Traveller's Joy	<i>Clematis vitalba</i>
Bramble	<i>Rubus</i> spp.

Trees and shrubs

Goat willow	<i>Salix caprea</i>
Sweet chestnut	<i>Castanea sativa</i>
Small-leafed lime	<i>Tilia cordata</i>
Wild privet	<i>Ligustrum vulgaris</i>
Lilac	<i>Syringa vulgaris</i>
Buddleia	<i>Buddleia davidii</i>

5.6 APPENDIX 6: alternative bat roost suppliers

Bat Boxes and Tubes:

Alana Ecology Ltd.,
The Old Primary School,
Church Street,
Bishop's Castle,
Shropshire SY9 5AE
UK.

Telephone: 0044-1588-630173
Fax: 0044-1588-630176
Email: sales@alanaecology.com
Web: www.alanaecology.com

Jacobi, Jayne & Co.,
Living with Birds,
Wealden Forest Park,
Herne Bay CT6 7LQ
UK.

Telephone: 0044- 800-0720130
Email: enquiries@livingwithbirds.com
Web: www.jacobijayne.co.uk

Bat bricks:

Marshall Clay Products,
Quarry Lane,
Howley Park,
Woodkirk,
Dewsbury,
West Yorkshire WF12 7JJ
UK.

Telephone: 0044-113-2203535
Fax: 0044-113-2203555

Illustration: 'Schwegler' bat boxes – 2F design



5.7 APPENDIX 7: photographic record



Plate 1: Arable field and associated treelines and hedgerows at Belinstown, north of Swords

Plate 2: Arable fields and associated hedgerows at Belinstown, north of Swords



Plate 3: Derelict farm building within route corridor at Belinstown, north of Swords

Plate 4: Mature beech trees on Ennis Lane at Lissenhall Little, Swords





Plate 5: Old Lissenhall Bridge and the Broad Meadow River at Balheary Demesne, Swords

Plate 6: Mature treeline between the Broad Meadow and Ward Rivers at Balheary Demesne, Swords



Plate 7: Arable lands at Fosterstown South north of Dublin Airport

Plate 8: Lane at Ballystruan, south of Dublin Airport, off minor road between R108 and R132





Plate 9: End of laneway within arable fields at Ballystruan, south of Dublin Airport

Plate 10: Beech hedge maze in the private garden of St. Anne's, Santry



Plate 11: Avenue of young trees in the garden of St. Anne's, Santry

Plate 12: Gazebo within the Metro line corridor through St. Anne's garden, Santry





Plate 13: Two-storey dwelling on Old Ballymun Road in Santry

Plate 14: Gate lodge at entrance to Santry Lodge on Old Ballymun Road in Santry



Plate 15: Entrance to Santry Lodge and crossing point of Metro line with mature trees

Plate 16: Santry Lodge on the Old Ballymun Road in Santry





Plate 17: Avenue of mature lime trees at College Lawn from Ballymun Road leading to Albert College

Plate 18: Treeline and amenity grass in Hampstead Park adjacent to Albert College in Whitehall



Plate 19: External view of the Fusilier's Arch

Plate 20: Band stand within lawn area of Green





Plate 21: Ardilaun Lodge at corner of St. Stephen's Green West and South

Plate 22: Maintenance offices and workshops at southern side of Green



Plate 23: Summerhouse adjacent to lake

Plate 24: Eastern Swiss Chalet within Green





Plate 25: Western Swiss Chalet within Green

Plate 26: Public toilet block on St. Stephen's Green West



Plate 27: Stone arched bridge over St. Stephen's Green Lake

Plate 28: Lawn area within the Green





Plate 29: Central area of St. Stephen's Green with lawns, flower beds and fountains

Plate 30: North western area of St. Stephen's Green Lake from vantage point



Plate 31: Artificial waterfall feature at north western end of St. Stephen's Green Lake

Plate 32: Pedestrian pathway within park showing mature deciduous trees





Plate 33: Pedestrian area within park bordered by young deciduous plantings

Plate 34: Park entrance from Grafton Street area showing lawn, lake edge and island greenery

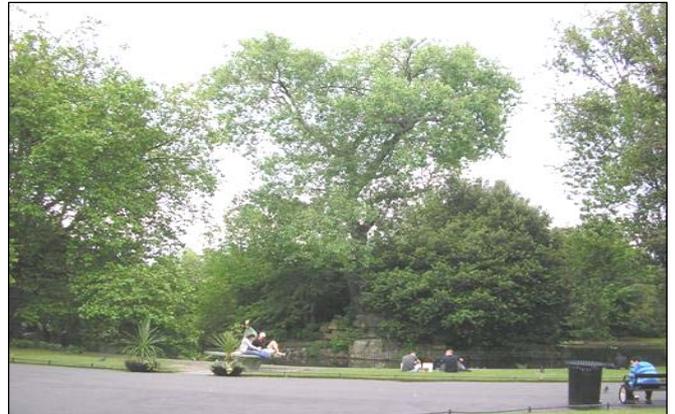


Plate 35: Mature black poplar on island showing hollow which may be of use to bats occasionally

Plate 36: Loose bark on mature tree offering roosting potential for bats within St. Stephen's Green

