
DUBLIN AIRPORT NORTHERN PARALLEL RUNWAY EIS ADDENDUM

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SECTION 1 - INTRODUCTION

This section is unchanged in this addendum.

In response to the request for Additional Information contained within Fingal County Council Decision Order No. 0436 (reference item 1), a more detailed account of the methodology and assumptions that underpin the forecasts has been included as follows:

Addendum Appendix	Title	Remarks
1.1	Air Traffic Forecasts (Scott Wilson - August 2005)	Summary of Forecasting Documents use of Forecasts in the EIS.
1.2	Dublin Airport Forecast 2003 (Aer Rianta - Sept 2003)	Forecasts of Annual Passengers and Aircraft Movements used for the 'with runway' case within the EIS.
1.3	Dublin Airport Passenger and Aircraft movements Demand Forecast report (Dublin Airport Authority - March 2005)	Updated forecasts of Annual Passengers and Aircraft Movements for comparison.
1.4	Preparation & Evaluation of Dublin Airport Traffic Forecasts (Mott MacDonald - May 2005)	Benchmarking reference material.
1.5	Global Market Forecast 2004-2023 (Airbus - 2004)	Benchmarking reference material.
1.6	Current Market Outlook (Boeing - 2004)	Benchmarking reference material.
1.7	Dublin Airport Authority - Runway 10L-28R Runway Capacity & Demand (Scott Wilson - July 2005)	Estimate of relationship between annual and hourly demand and capacity.
1.8	Scenario Summary: Constrained Forecast 2003 Aer Rianta Passenger & Aircraft Movement Report for Dublin Airport 2003 to 2030 (Aer Rianta - March 2004 (Updated July 2005))	Forecasts of Annual Passengers and Aircraft Movements used for the 'without runway' case within the EIS.

SECTION 2 - ALTERNATIVES

This section is unchanged in this addendum.

For clarity, the detailed evaluation of alternatives to which reference is made in paragraph 2.1.1.2 is included in Addendum Appendix 2.1

SECTION 3 - MASTER PLAN

This section is unchanged in this addendum.

SECTION 4 - PROJECT DESCRIPTION

This section is unchanged in this addendum except as noted.

In response to the request for Additional Information (Fingal County Council Decision Order No. 0436) (reference item 2) more detailed stormwater management proposals are contained in Appendix 4.1.

In response to the request for Additional Information (reference item 3) more details of the proposals to manage water quality are contained in Appendix 4.1.

With reference to Additional Information Item 3(c) it is now proposed to dispose of contaminated effluent to foul sewer rather than within the airport environment as stated in 4.11.1.4 of the EIS.

In response to the request for Additional Information (reference item 4) more details of the proposals for water supply are contained in Appendix 4.2.

In response to the request for Additional Information (reference items 5(d)(i)) more detail of the proposed junctions where the road network is altered by the scheme are contained within Appendix 13.2.

As part of the scheme the existing engine test site adjacent to the Forrest Little Road on the disused Runway 23 threshold will be decommissioned. Engine testing will be carried out, at or near the existing engine test site in the centre of the airfield.

SECTION 5 - CONSTRUCTION

This section is unchanged in this addendum.

In response to the request for Additional Information (reference items 3(d) and 7(d)), a more detailed account of the approach to the management and protection of watercourses and water quality during the construction phase is contained in RPS MCOS Report contained in Addendum Appendix 4.1 (see Section 5.1).

SECTION 6 - EMPLOYMENT & ECONOMICS

This section is unchanged in this addendum.

For reference the complete study from which the summary presented in the EIS is now attached at Addendum Appendix 6.1.

In addition, a review of the impact of the scheme under other growth scenarios is presented in addition to that for centreline growth presented within the EIS. This is included as Addendum Appendix 6.2.

SECTION 7 - LAND USE

This Section is unchanged in this addendum. For clarity, noise mitigation measures referred to at paragraph 7.5.1.4 have been expanded upon at Sections 16 and 19.10 of this EIS Addendum.

SECTION 8 - CULTURAL HERITAGE

No change to this section in this addendum.

SECTION 9 - ECOLOGY

The following section appends parts of the Ecology section of the EIS. in (This does not affect the impact assessment as set out in the EIS, but provides clarification in respect of pertinent matters raised in the request for additional information (Item 9).

9.1 Introduction

The following text expands on the information provided at Section 9.1 of the EIS.

The impact analysis undertaken adheres to ecological best practice as set out by the Institute of Ecology and Environmental Management (IEEM) Draft guidelines for ecological impact analysis (EcIA) which are in accordance with the EPA Guidelines for impact assessment, but with greater emphasis on ecology. As a result of the IEEM guidelines being specifically devised for the evaluation of a site in terms of the habitats present together with their constituent species, the assessment generally results in a more accurate reflection of ecological impact.

It is also useful to note that the Institute of Ecology and Environmental Management (IEEM) now has an active Irish (all Ireland) membership and an Irish Geographical Section. The draft guidelines for ecological impact assessment are now used widely by the Irish membership; and in conjunction with the EPA Guidelines.

The analysis and assessment were undertaken by experienced and competent ecologists in the context of a wide knowledge of Irish habitats and species; also in the context of issues relating to agricultural lands; land-use; and the habitats and species present on site and the surrounding areas.

The impact analyses presented in EIS Section 9.5 Impacts take account of local, regional and national contexts.

9.2.2 Methodology

The following text expands upon information contained at Section 9.2 of the EIS.

Informal consultations took place with NPWS regarding designations, protected plant species etc.

No written correspondence has been received from the Eastern Regional Fisheries Board other than an official response to the EIS. A field-trip to the development site watercourses outside the airport perimeter fence was undertaken in the company of the EIS team with officers of the board on 13th July 2005 followed by a similar trip to the same watercourses inside the perimeter fence and a meeting in DAA (Airport Technical Section) where the Fisheries Board outlined their requirements with regard to treatment of surface water run-off to both the Ward and Forrest Little Streams. DAA agreed to consider these concerns in drainage design options.

9.4.3 Habitats and Plant Species – Hedgerows

The following text expands upon and clarifies Section 9.4.3 of the EIS.

The hedgerow evaluation was undertaken within the Irish context. It is notable that the Irish methodology for hedgerow survey and evaluation was not developed at the time when the hedgerow survey and evaluation of the Dublin Airport runway

site was undertaken. It was therefore necessary to use the most scientifically appropriate methodology available at that time, i.e. HEGS. Indeed, had the Irish (currently draft) methodology been established, tried and tested at the time of the EIS surveys and evaluation, then it would have been used. It should be noted though, that the draft Irish report clearly states that evaluations using any of the three above methods are both compatible and comparable, so any of the methodologies stand scrutiny, i.e. the results are comparable – irrespective of which method of survey and analysis is used. This is clearly stated in the draft report – please see reference and extract below:

The Irish draft methodology is described in: “Methodology for a National Hedgerow Survey” – Anja Murray, Networks for Nature April 2003.

Page 6, paragraph 2.1 Initial development of the methodology of the Report states:

“The methodology has been designed so that the data collected is compatible and thus comparable with:

- NICS (the Northern Ireland Countryside Survey)...
- HEGS – a widely used hedgerow survey methodology...

The standard procedure for local hedgerow surveys in the UK”

9.4.4 Fauna - Birds

The following expands upon, and clarifies information contained at section 9.4.4 of the EIS.

The EU Birds Directive (Directive 79/409/CEE) protects all wild bird species in the European Union. It requires special conservation measures to be taken for the habitat of species listed in Annex I of the directive. Annex I of the Birds Directive lists 181 species and sub-species, 33 of which occur – with any regularity – in Ireland. These Annex I species are given special protection as they fulfil one or more of the following criteria:

- Species is in danger of extinction;
- Species is vulnerable to specific changes in their habitat;
- Species is considered rare because of small populations or restricted local distribution;
- Species requires particular attention for reasons of the specific nature of habitat.

EU Member States have a particular duty to classify their most suitable territories in number and size as Special Protection Areas. A number of designated special protection areas (SPA) are in county Dublin. These include Baldoyle Bay (parts of), north Dublin Bay, around Bull Island, Howth Head, Ireland's Eye and parts of Dublin Bay around Sandymount Strand. Most of these areas are within 13 km of the airport.

Baldoyle Bay is within 5 km and regularly holds internationally important numbers of Brent Geese (*Branta bernicla*) as well as a wide variety of wildfowl and wading birds – likewise Malahide Estuary. Baldoyle Bay also holds a number of Annex I species: notably high numbers of Golden Plover and Bar-tailed Godwit (*Limosa lapponica*).

North Dublin Bay SPA holds internationally important numbers of five species in the winter period – Brent Goose, Knot (*Calidris canuta*), Black-tailed Godwit (*Limosa*

limosa), Bar-tailed Godwit, and Redshank. The area around Bull Island is of particular importance for birds. This small island has built up over 200 years as a result of the construction of the north harbour wall of Dublin Port. It has an adjoining foreshore of sandy beaches, dunes, saltmarshes and mudflats. Its classification as a UNESCO Biosphere reserve within a capital city is also unique and it is classified as a Wetland of International importance under the Ramsar Convention.

Despite the considerable numbers and variety of wading birds found at the sites in County Dublin relatively few such species were found in the vicinity of the airport. The tilled fields and playing fields near the airport did occasionally hold flocks of Lapwing and Golden Plover during the winter months. More typically, these large flocks of waders were sighted in flight in the wider area. Smaller wading birds such as Redshank (*Tringa totanus*) and Dunlin (*Calidris alpina*), known to be common at the coastal SPAs, were not observed in the vicinity of the proposed development. The grassland and arable fields normally held a fairly typical farmland bird assemblage and only occasionally did the presence of wildfowl and waders indicate the coastal nature of the site.

Very few Annex I species were encountered in the area of the proposed development. The airport wildlife management has a zero tolerance approach to flocks of hazardous species such as gulls and wading birds congregating on or over the airfield. Two Annex I species were recorded, Peregrine Falcon and Golden Plover. There was a widespread post-1960 decline in Peregrine numbers, caused mainly by food-chain contamination with persistent toxic chemical residues, mainly of agricultural organochlorines insecticides. The controls and later banning of the use of the majority of persistent organochlorines over most of Europe was followed by a general recovery in Peregrine numbers. Numbers have continued to recover and the conservation outlook for this species is quite healthy. Golden Plover were relatively common in the vicinity of the airport during the winter months – during this period this species forms large flocks that come inland to roost and feed. The main threats for the species are the loss and deterioration of habitat and disturbances at the breeding period.

Other Annex I species have occasionally been recorded in the area of the proposed development but were not encountered during the current survey, e.g. Merlin, and Short-eared Owl.

BirdWatch Ireland and the RSPB (Northern Ireland) have agreed a list of priority bird species for conservation action on the entire island of Ireland. This list was drawn up considering the Annex I species and other threatened or scarce bird species that occur in Ireland. The species identified as being of special interest need not be especially rare but need to fulfil certain selection criteria – hence certain Annex I species are not considered of special conservation concern under these protocols.

Birds of Conservation Concern in Ireland are classified into three separate lists (Red, Amber and Green). Red-listed species are of highest conservation concern and Amber-listed species are of medium conservation concern; 18 species are currently Red-listed, while a further 77 are considered Amber-listed (Newton, *et al.*, 1999). These conservation designations take into account the dangers faced by bird species that occur in Ireland.

Red-listed species are classified according to the following criteria:

- Their breeding population or range has declined by more than 50% in the last 25 years. The species is considered to be declining in breeding population.
- Their breeding population has undergone significant decline since 1900. The species is considered to be historically declining.
- They are of global conservation concern.

Amber-listed species are classified according to the following criteria:

- Their breeding population or range has declined by 25-50% in the last 25 years. The species is considered to have moderate declining breeders.
- They are rare or sporadically breeding species.
- Their breeding or wintering population is internationally important and/or localised.
- They have an unfavourable conservation status in Europe and are hence of European conservation concern.

In total, three Red-listed species and ten Amber-listed species were recorded in the vicinity of the proposed development.

Lapwing, Curlew and Yellowhammer are all Red-listed species. Both Lapwing and Curlew are thought to have experienced a moderate decline in their breeding population in the Republic over recent decades, while Yellowhammer has shown a moderate decline in both range and population over the same period. The declines have been even more marked in Northern Ireland (Newton *et al.*, 1999). Lapwings were only encountered during the winter period and do not breed locally. Curlews were found in much smaller numbers during the breeding season. Lapwings and Curlews are relatively abundant wading birds that have a largely coastal distribution. They both come inland to feed and roost, particularly during periods of tidal inundation. They are also partial migrants whose numbers are greatest in the winter and early spring. They are both highly mobile species and the loss of habitat is likely to be of very little significance for these predominantly coastal feeders.

The Yellowhammer is a bird typically associated with mixed and arable farmland. There is a good deal of this type of habitat in north county Dublin and the bird is reasonably common in the area surrounding Dublin Airport. Small numbers breed in the area of the proposed development and the loss of habitat will certainly mean that there will be a permanent loss of this bird as a breeding species in the affected area. This loss is likely to be localised and given the availability of suitable habitats in the surrounding areas this species is likely to continue to breed in the vicinity of the airport.

The Amber-listed species recorded were Shelduck, Peregrine Falcon, Snipe, Black-headed Gull, Common Gull, Stock Dove, Skylark, Swallow, Stonechat, and Spotted Flycatcher. The reason why each of these species is considered of elevated conservation concern is shown in Table 1. Several are migratory species that are believed to have an unfavourable conservation status elsewhere in Europe, or in their wintering grounds. The majority are highly mobile species that are irregularly present in the area around the airfield and potentially affected habitats, e.g. Peregrine, Shelduck and Gulls (Laridae). The development would be likely to have very little effect on the species that occur spasmodically in the area. The potential effects for species that are resident and breed locally are somewhat greater. The loss of nesting habitat for Stonechat and Spotted Flycatcher would see a probable local decline in the breeding numbers of these species. However, neither species is

common within the affected area and it is entirely possible that with mitigation even these displaced birds could successfully disperse into nearby habitats.

Table 1. Bird species of conservation concern recorded during the survey at Dublin Airport. Species of Medium Conservation Concern are in Amber coloured cells and birds of High Conservation Concern are in Red coloured cells. The specific reasons for the heightened conservation status of these species (as per Newton *et al.*, 1999) are also noted.

Species	Latin Name	Conservation Status*
Shelduck	<i>Tadorna tadorna</i>	W
Peregrine Falcon	<i>Falco peregrinus</i>	E
Lapwing	<i>Vanellus vanellus</i>	D
Curlew	<i>Numenius arquata</i>	D
Snipe	<i>Gallinago gallinago</i>	B
Black-headed Gull	<i>Larus ridibundus</i>	B
Common Gull	<i>Larus canus</i>	E
Stock Dove	<i>Columba oenas</i>	B
Skylark	<i>Alauda arvensis</i>	B, E
Swallow	<i>Hirundo rustica</i>	E
Stonechat	<i>Saxicola torquata</i>	E
Spotted Flycatcher	<i>Muscicapa striata</i>	B, E
Yellowhammer	<i>Emberiza citrinella</i>	D

***Key**

- B Breeding species with moderate decline, rare/sporadic breeding and/or internationally important, localised.
- D Declining breeders.
- E European conservation concern.
- W Internationally important numbers wintering/passage.

9.5.3 Impact on Habitats

The following text expands upon information contained at Section 9.5.3 of the EIS.

The area of the footprint, including construction compounds, has been superimposed on the habitat maps/aerial photographs (EIS Addendum Figure 9.1). In addition the key to habitat types includes the Heritage Council (Fossitt, 2000) equivalents of the Phase 1 types shown on the map.

The approximate area of each habitat to be lost is as follows:

JNCC Phase 1	Heritage Council (Fossitt)	Habitat	Area (hectares)
B4	GA1	Improved Grassland	80
B6	GA1	Poor Improved Grassland	6
J1	BC / GA	Cultivated/Disturbed	120
J1.1	BC1	Arable	21
J1.2	GA2	Amenity	3
J1.3	ED3	Ephemeral/Short Perennial	3
J1.4	WS3	Introduced Scrub	1
J2	WL1 & WL2	Boundaries*	-
J3	BL	Built-up Areas	-
J3.4	BL3	Bare Ground/Runways	22
J3.6	ED	Buildings	5
*	*	Hedgerows [§]	8

Notes:

The area for each habitat has been taken to the boundary of each field, i.e. there is an overlap with the hedgerow area.

[§]Hedgerow area calculated on the basis of 29 km of hedgerows with an average width of 2.75 metres.

9.5.3 Impact on Habitats – Hedgerow Removal

The following text clarifies information contained at Section 9.5.3 of the EIS.

With regard to historic context and for information, based upon woody species presence and content, the percentages of ancient (probably remnant woodland), old field enclosures and recently planted hedgerows which will be lost approximately equate to the following:

Ancient (remnant woodland):	8.69%
Old field enclosures:	21.16%
Recently planted boundaries:	70.14%

9.5.3 *Impact on Habitats - Other Habitats*

The following text clarifies information contained at paragraph 9.5.3.6 of the EIS.

Ecologically, the ditches and streams in question are of only minor ecological value (in the main) so culverting them will at most constitute a minor adverse impact. The same goes for the fisheries importance of these watercourses.

A series of drawings showing the drainage ditches in the vicinity of the site are included at EIS Addendum Figures 9.2 to 9.4.

9.6 **Mitigation - Compensation Habitat**

The following text clarifies and expands upon information contained at Section 9.6.1 of the EIS.

No specific site for the compensation habitat has been identified to date, although the general area of the Ward River valley has been cited in discussions with Fingal County Council.

Detailed plans for the proposed compensation habitat will be drawn up when the precise site location is known and its (existing) ecology, physical (soil), topography and landscape characteristics determined. Layout and species composition will be dependent upon the site characteristics. Detailed method statements will then be drawn up in consultation with competent habitat and species ecologist(s).

Similarly, a monitoring plan can be put in place only when the parameters to be monitored are known.

The area of compensation habitat required has been calculated on the basis that eight hectares is the equivalent area of hedgerow to be removed, (based on an average width of 2.75 metres). Some hedgerows are very sparse with just occasional shrubs while others are mature wide hedgerows. It is considered that 8 hectares will give scope for a diverse mosaic of habitats and will be large enough to create viable units.

Appendix B8 of the EIS contains Outline Recommendations for compensation habitat.

SECTION 10 - LANDSCAPE

In response to the request for additional information contained within Fingal County Council Decision Order No. 0436 (reference item 8) additional information with specific reference to the impact/mitigation of proposed approach lighting is presented here (also see EIS Addendum Figures 10.1 to 10.15). All other aspects of the landscape impact assessment unchanged.

10.1 Potential Impact of Landing Lights

10.1.1 This appraisal of the potential impact of landing lights follows the assessment of the landscape and visual effects of the proposed second runway development carried out as part of the EIS in 2004. It builds on and adds detail to this earlier report on the visual and landscape impact of the proposed approach lighting in the context of the overall impacts of the new runway.

10.1.2 The assessment seeks to distinguish between the direct effects upon the physical landscape and the visual implications of the development upon the observer, particularly the views from residential properties. Both the landscape and visual assessment would be set against an understanding of the existing landscape character and context. The impact of the development on this existing context would be appraised and where significant adverse impacts occur to either the landscape character or visual amenity, then appropriate forms of mitigation to alleviate these impacts would be proposed.

10.2 Key Points of Airport Landscape and Visual Assessment

- 10.2.1 The relevant key points from the landscape and visual section of the EIS are:
- Navigational equipment, such as lights, were identified as one of the elements of the runway proposals that would potentially give rise to adverse visual impacts. Visual impact could also result from the need to remove potential obstacles to aviation, such as trees, from the approach lighting plane.
 - The approach lighting structures would reinforce the loss of rural character across the area of western expansion of the runway.
 - The combined effect of approach lighting and operational activity at night will increase the overall night-time effects at the western end of the runway in Kilreesk/Millhead and St Margaret's during the periods when the lighting is in operation. Localised impact would be moderate.
 - Lighting will affect the Northern Diversion Road and the redirected Naul Road.
 - Mitigation measures to reduce the impact of the lighting include native perimeter planting, although approach safety requirements restrict the height of proposed planting within the take off surface, flight path and approach lighting plane.

10.3 Methodology

10.3.1 The methodology and terminology to be adopted in this assessment is based on the 'Guidelines on the Information to be Contained in Environmental Impact

Statements', prepared on behalf of the Environmental Protection Agency (EPA), in March 2002.

- 10.3.2 The precise methodology for each stage of the assessment process as outlined above in the introduction is described under each heading and, where appropriate, the EPA guidance is amplified by reference to the best practice advice contained within the 'Guidelines for Landscape and Visual Impact Assessment (GLVIA), second edition', produced by The Landscape Institute and Institute of Environmental Management & Assessment within the UK.
- 10.3.3 This report is based on an assessment of the landscape and visual impact carried out on site in May 2005.

10.4 Approach Lighting

10.4.1 Location

- 10.4.1.1 The runway, structures and lighting are designed to enable both the eastern and western ends to operate for both take off and landing during different time periods. Approach lights are, therefore, located at both ends. 10L Approach Lights located at the western end of the runway extending from the threshold at chainage 280 to chainage 610 (EIS Addendum Figures 10.1 and 10.7, Section C), 28R Approach Lights at the eastern end extending from the threshold at chainage 2660 to chainage 3560 (EIS Addendum Figures 10.2 and 10.8, Section H).
- 10.4.1.2 Approach lights are located along the centreline of the approach plane in the following linear arrangements:
- Centreline approach lighting: linear groups of two to five white luminaries at 30 m centres, located along the centreline at intervals of 30 m.
 - Side approach lighting: linear groups of four red luminaries at 30 m centres, located between the threshold and Crossbar 2 at either end of the centreline or crossbar lights.
 - Crossbars: between 52.5 m to 37.5 m wide consisting of linear groups of luminaries of, seven either side of the centreline.

10.5 Design

10.5.1 Frangible Approach Masts

- 10.5.1.1 Effective functioning of approach lights require that they are maintained at a constant level throughout the approach plane. Where the topography is uneven or changes in level, the lights would be attached to adjustable approach frangible masts. The topography at Dublin Airport would require the approach lights to be mounted on masts of between 2 m to 9.367 m high (EIS Addendum Figure 10.10 - Photograph 1). Luminaires that require to be located between ground level and 2 m high can be ground mounted.
- 10.5.1.2 Frangible Approach Masts are a light structure constructed from 25 mm diameter anodised aluminium alloy tubing. They are primarily designed to:
- collapse if they are struck by an aircraft;

- be adjustable to permit a range of mounting heights from 2-25 m above ground level (base unit can be extended by adding additional 750 mm sections; top sections are telescopic and permit step-less adjustments of up to 380 mm);
- be wind resistant
- be easily maintainable.

10.5.1.3 Small enclosures constructed from post and wire fencing would be erected around each group of masts.

10.5.2 Fixtures

10.5.2.1 Light fittings will be mounted on top of the frangible lighting masts and consist of a luminaire and yellow encasement.

10.5.2.2 Approach centreline lights will be white 150 W bulbs, with an average intensity of 22108 cd. Horizontal beam spread will be -10 to +10 degrees. Vertical Beam Spread will be 2-13 degrees. They are directional, with the beam spreading from the luminaire in a light cone. EIS Addendum Figures 10.3 and 10.4 show the effect of similar lighting at Manchester Airport.

10.5.2.3 Approach side row lights are red 150 W bulbs, with a lower average intensity of 6921 cd. Horizontal beam spread (-5 to +9 degrees) and Vertical Beam Spread (9-13 degrees). They are directional, with the beam spreading from the luminaire in a light cone. They are therefore less intense and will have less impact than the centreline approach lights.

10.6 Operational Hours

10.6.1 The Airport is operational 24 hours. It should be noted, however, that the 10L would be in use for approximately 25% on the time when wind is from the east and 28R would be in use for approximately 75% of the time as winds are predominately from the west.

10.7 Study Area

10.7.1 The approach lighting is located at either end of the runway and therefore the extent of the study area has been drawn based on the visual envelope for these areas, taking the effect of and areas of landscape potentially affected by the air safety requirements to restrict obstacles on the approaches to the runway. This could include the lopping or felling of trees. Site visits have concluded that this covers the following sub-zones:

- Cloghran/Baskin/Stockhole to the east.
- Swords/Forrest and Barberstown to the north.
- Kilreesk/Millhead and St Margaret's to the west.
- Dunbro to the south.

10.8 Landscape Context

10.8.1 A full description of landscape character and context can be gained by reading Section 7 - Landscape and Visual Assessment of the EIS.

10.8.2 The Broader Landscape Setting

- 10.8.2.1 The existing airport is set within a gently rolling pastoral landscape of fields enclosed by a network of hedgerows and hedgerow trees, with either scattered individual farm buildings or residential properties, sometimes grouped together into small settlements. The larger residential areas are at Swords to the north and to the south of the M50 at Poppintree and Santry on the northern edge of the Dublin conurbation.
- 10.8.2.2 The study area as a whole presents a mildly attractive landscape, with little of recognised human interest either historically, ecologically or of recreational importance. Landscape detractors include the large scale road corridors of the N1.

10.9 Landscape Character Areas

- 10.9.1 The landscape and visual assessment study area was divided into landscape character areas based on their structure, that is the topography and drainage pattern, overlaid by the palette of landscape components, for example, the land use, vegetation and structures.
- 10.9.2 Four of the Landscape Character Zones assessed in the landscape and visual assessment lie within the visual envelope of the proposals (EIS Addendum Figures 10.5 and 10.6). They include:
- Agricultural Plain (Ap).
 - Agricultural plain (Ae) (more open character).
 - The Airport (DA).
 - Settlements and Villages (SV).

10.10 Landscape Policy Context

- 10.10.1 Policies exist within the County Council Development Plan that seek to protect the rural agricultural character of the area, whilst accepting and supporting the need to realise the potential of the airport.
- 10.10.2 A fuller description of the planning context for the airport and its expansion is contained in the Landscape and Visual Impact Assessment.

10.11 Landscape Impact

- 10.11.1 The assessment of the effect of the lighting and associated structures on the landscape will be appraised in terms of the direct impact upon the environment as a physical landscape resource and the significance of this disruption on the existing landscape structure. The Landscape and Visual Impact Tables contain a full copy of the assessment (Tables 1 and 2).
- 10.11.2 Approach lighting is an integral component of the structures necessary for the safe operation of the runway and therefore their impact can not be assessed in isolation. During the daytime, lighting and associated structures contribute to the landscape impacts created by other structures and the expansion of the airport in general.
- 10.11.3 The safe operation of the runway requires that vegetation be removed and trees reduced in height (declared) within the take off climb surface, take off

flight path and the approach lighting plane (EIS Addendum Figures 10.5 and 10.6). Within these areas:

- All vegetation within the Airport Authority boundary will be removed.
- All trees removed or coppiced where they form an obstacle to aviation.

10.11.4 The plan extent of the approach lighting plane extends 60 m either side of the centreline, up to 1,350 m from the threshold, within the take off climb surface and flight path. The vegetation in this area is therefore necessary to be removed/reduced in height to remove obstacles from the take off climb surface, take off flight path and approach lighting plane. The elevation of the approach lighting plane is lower than either the take off flight path or climb surface and therefore that affected trees will need to be reduced to a lower height or coppiced.

10.11.5 The airport expansion proposals have resulted in the expansion of the airport landscape character area into the Agricultural Plains, and affect the Kilreesk/Millhead and St Margaret's subzone. Lighting structures and frangible masts are in character and scale with the vast expanses of the airport landscape, particularly when seen in the context of other airport structures, buildings and moving aircraft. The contribution of the approach masts to the loss of rural character is slight negative.

10.12 Visual Impacts

10.12.1.1 As described in the GLVIA Methodology, the impact of the proposed development on the visual domain (the visual envelope of the proposed development) is assessed through firstly identifying the source of potential effects and then appraising the significance of visual intrusion on key receptor(s). Sections on EIS Addendum Figures 10.7 and 10.8 give an indication of the views from roads and local properties to the proposed runway. Section locations are shown on EIS Addendum Figures 10.1 and 10.2.

10.12.1.2 The landscape and visual assessment identified that navigational equipment such as lights were one of the main elements of the airport expansion that would potentially give rise to visual impacts.

10.12.1.3 In addition, the landscape and visual assessment identified that visual impact could potentially result from the need to remove potential obstacles to aviation, such as trees, in the locality of the runway. The proposals have now been developed and it has become clear that any trees affected by the approach lighting plane, will also be affected by the take off flight path and climb surface. Reducing the trees to a slightly lower height than required for these paths/surfaces is unlikely to lead to a perceptible increase in visual impact.

10.12.2 Receptors

10.12.2.1 The two main receptor groups for visual impacts emerging from the development of the second runway:

- The occupiers are those who live, work or congregate in the affected landscape, permanent views of residents would be considered to be more sensitive; and

- the users would be those undertaking both active and passive activities within the established visual envelope. Transient views of motorists or temporary views of nearby workers.

10.12.3 Daytime Visual Impact of Approach Lighting Masts

10.12.3.1 The proposed frangible (lighting) masts at Dublin airport are located within the confines of the Dublin Airport Authority boundary (EIS Addendum Figures 10.1 and 10.2). On the 10L approach lighting plane (west), the masts will form a vertical element of between 2 m to 9.367 m tall extending across the open airport landscape for 410 m. On the 28R approach lighting plane (east), the masts will form a vertical element of between 2 m to 6.083 m tall extending across the open airport landscape for 120 m.

10.12.3.2 An assessment of 4-6 m tall approach masts on the existing runway at Dublin Airport and 12 m masts at Manchester Airport has concluded that the light see-through structure of the mast and neutral colour reduces the visibility of the masts from the surrounding countryside against both skyline and wooded views (EIS Addendum Figures 10.3 and 10.4; Figure 10.10 - Photographs 2 and 3). Views from the airport boundary are substantially restricted by airport boundary hedgerows, but where they exist, occur in the context of plane movements, runways, aviation structures and ancillary buildings (EIS Addendum Figure 10.3).

10.12.4 Night-time Visual Impact of the Approach Lighting

10.12.4.1 The landscape and visual assessment identified as being particularly affected by the combined effect of approach lighting and operational activity (EIS Addendum Figure 10.9).

10.12.4.2 An assessment of similar lighting at Manchester Airport has shown that the ADB luminaires are largely directional and can be seen as individual spots along the centreline. The luminaire is most intense at the centre, spreading out in a light cone directed into the sky. The visual impact, therefore, varies dependant on angle of view, with intense spot light seen along the centreline to a general glow or light cone perpendicular to the centreline (EIS Addendum Figures 10.3 and 10.4).

10.12.4.3 The visual impact of the lighting array and resulting light glow will not be continuous but will alter depending on which end of the runway is used. It is envisaged that, due to the prevailing wind direction, aeroplanes will land 25% of the time from the west, using the 10L approach lights, and 75% of the time from the east, using the 28R approach lights. Furthermore, the light glow effect would only occur during overcast and misty weather conditions.

10.12.5 Winter Visual Impact

10.12.5.1 The survey work and assessment was carried out in spring due to programme, and therefore the effect of the development in winter was not assessed. Daytime impacts of the approach masts are unlikely to change significantly as, although the vegetation is largely deciduous, the masts are not very noticeable from a distance.

10.12.5.2 The night time impact of direct views of the 10L lighting arrays are likely to slightly increase in winter from the new property in Millhead (3) during hours of

operation due to the deciduous character of the intervening vegetation. The extent of the change in impact is unlikely to be an order of magnitude and therefore the assessment grade of direct impacts will remain the same.

- 10.2.5.3 The impact of light glow in winter will not change the assessment grade as it has been assessed on worst case. Light glow is more likely to occur during winter due to longer darkness hours and increased likelihood of adverse atmospheric and weather conditions.

10.13 Significance of Impacts

- 10.13.1 The significance of these impacts are categorised in the EPA Guidance as:

- ‘imperceptible’ – an impact capable of measurement but without noticeable consequence;
- ‘slight’ – an impact which causes noticeable changes in the character of the environment without affecting its sensitivities;
- ‘moderate’ – an impact that alters the character of the environment in a manner that is consistent with existing and emerging trends;
- ‘significant’ – an impact which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment;
- ‘profound’ – an impact which obliterates sensitive characteristics.

10.13.2 10L Approach Lighting and Associated Structures: Western End

- 10.13.2.1 The landscape impacts of the approach masts are detailed on EIS Addendum Figures 10.5 and 10.7 and in the Landscape and Visual Impact Table (Table 1). A summary of which is as follows:

- Slight negative impact on the rural character of the landscape in the context of the runway proposals. Masts would be in character with the expanded Airport Landscape Character Area.
- All trees on the approach lighting plane will be coppiced and incorporated into the hedgerow where they form an obstacle to aviation. This will create an imperceptible effect as trees are required to be reduced in height due to take off climb surface and flight path (EIS Addendum Figure 10.11 - Photograph 4).
- Imperceptible effect of loss of small amounts of pasture within mast enclosures.

- 10.13.2.2 The visual impacts of the runway approach lighting and related structures are detailed on the Landscape and Visual Impact Tables (Table 1). A summary of which is as follows:

- Views from the west of the proposed runway extension are sensitive to change due to the rural character of the landscape.

- Approach frangible (lighting) masts would have a moderate negative impact adjacent to St Margaret's bypass when viewed from gaps in hedge (EIS Addendum Figure 10.11 - Photograph 5). Impact from all other areas is imperceptible due to the distance and light structure of the mast.
- The direct effects of the approach lighting would have a significant negative visual impact from the new property in Millhead (EIS Addendum Figure 10.12 - Photograph 6). The remaining properties in the area would be protected from direct views of the lights due to substantial boundary hedgerows or walls at the property boundaries (EIS Addendum Figure 10.12 - Photograph 7).
- Direct views of the approach lighting will also be available from St Margaret's bypass from gaps in the hedge and where the approach plane crosses the road (EIS Addendum Figure 10.11 - Photograph 5).
- Significant negative impacts will be created throughout the area to the west of the runway extension by light glow due to the lack of other artificial light sources in the area. This duration of this effect would be limited due to the restricted nature of landings from the west and the intensity of the light glow effect would be dependant on adverse atmospheric and weather conditions. Properties at Millhead, St Margaret's, Kilreesk, R108, River Ward Valley and Dunbro would be affected (EIS Addendum Figure 10.9).

10.13.3 28R Approach Lighting Associated Structures: Eastern End

10.13.3.1 The landscape impacts of the approach masts are detailed on EIS Addendum Figure 10.6 and in the Landscape and Visual Impact Tables (Table 2). A summary of which is as follows:

- Slight negative impact on the rural character of the landscape in the context of the runway proposals. Masts in character with the expanded airport landscape Character Area.
- Four trees will be removed within approach lighting plane but not as a direct result (EIS Addendum Figure 10.13 - Photograph 8).
- Imperceptible effect of loss of small amounts of rough pasture within mast enclosures.

10.13.3.2 The visual impacts of the airport lighting and related structures are detailed on EIS Addendum Figures 10.8 and 10.9 and the Landscape and Visual Impact Tables (Table 2). A summary of which is as follows:

- Views from the east of the proposed runway extension are moderate to low sensitivity to change due to the presence of other developments within the area, including the existing airport, N1 corridor and Swords.
- Approach frangible (lighting) masts would have an imperceptible impact as they would be located within the airport authority boundary away from boundary roads. Views to the north and east are screened by significant road corridor planting along the N1 and hedgerows at field boundaries between the viewpoint and the airport.

- Approach lighting can not be seen directly from any property or road as they are located within the airport authority boundary away from boundary roads. Views to the north and east are screened by mature N1 corridor and field boundary vegetation (EIS Addendum Figure 10.13 - Photograph 9).

10.13.3.3 The bungalow, which is in the ownership of the Dublin Airport Authority, would experience an increase in light glow due to its proximity to the scheme (EIS Addendum Figure 10.13 - Photograph 9). All other properties and public viewpoints are located within areas which experience light glow from the N1, Airport Terminal and Swords (EIS Addendum Figure 10.9). The increase in light glow, which would be perceived from the garden centre, Coachman pub, Clochran Old School, Swords, N1 north of roundabout, and Forrest Little Road would be imperceptible.

10.14 Mitigation

10.14.1 Mitigation proposals, therefore, fall into two broad groups; firstly, measures to reduce the visual impact of the runway proposals on the local views and, secondly, measures to help compensate for the loss of landscape and amenity resources.

10.14.2 Mitigation planting works proposed within the landscape and visual assessment will also be effective in mitigating for the loss of landscape resources such as trees and hedgerows (EIS Addendum Figures 10.1 and 10.2).

10.14.3 The lighting assessment of Manchester Airport has shown that boundary hedgerow planting is a very effective means to reduce the visual impact of safety masts in proximity to the airport. Substantial new lengths of hedgerow are proposed to the boundary of the second runway development were proposed (subject to security requirements) within the landscape and visual assessment to screen the visual impact of the airport.

10.14.4 Safety requirements restrict the height of proposed planting within the approach lighting plane, take off climb surface and flight path, thus limiting the use of trees as a visual barrier in these areas. Woodland belt planting to the north of the second runway could be carried out to reduce longer distance views from lower lying, more open areas to the outskirts of Sword.

10.15 Residual Impacts

10.15.1 10L Approach Lighting Associated Structures: Western End

- ◆ Moderate negative visual impact St Margaret's bypass of approach masts where approach plane crosses road.
- ◆ Significant negative visual impact of light arrays from new property in Millhead during hours of operation, could be reduced by off-site planting adjacent to the property and outside the area of height restrictions due to approach surfaces.
- ◆ Significant negative visual impact of indirect light glow on all properties to the west of the runway extension during hours of operation (20% of movements only) and adverse weather conditions.

10.15.2 28R Approach Lighting Associated Structures: Eastern End

- ◆ Slight negative visual impact of indirect light glow on the existing bungalow during hours of operation and adverse weather conditions. Note this bungalow will be removed prior to operation of the airport.

10.16 Summary and Conclusion

- 10.16.1 The study area is dominated by the Agricultural Plains Character Area, which is a rural gently rolling landscape enclosed by a network of hedgerows and hedgerow trees with small settlements and scattered farm buildings and residential properties. The eastern end of the study area is more developed with the settlement of Swords, N1 corridor and existing airport terminal and infrastructure.
- 10.16.2 The approach lighting masts would have a slight adverse impact on the character of the landscape in the context of the overall affect of the new runway.
- 10.16.3 There would be an imperceptible landscape impact on trees and hedgerows in the context of the clearance required for the take off flight path and climb surface.
- 10.16.4 The proposed approach lighting masts are light see-through structures which have a low visual impact when seen against the skyline or vegetated views. During the daytime they would be primarily visible where the approach lighting plane crosses a roadway.
- 10.16.5 Direct light would have a significant adverse impact on the new property at Millhead during periods when the 10L approach lights are in operation.
- 10.16.6 Indirect light glow from the luminaires will have significant negative visual impact on the rural areas to the west of the proposed runway during hours where the 10L approach lights are in operation and during adverse weather conditions.
- 10.16.7 The impact of approach masts and direct lighting is significantly reduced by the presence of airport and property boundary hedgerow. The impacts of light glow and visibility of the approach masts and direct lights along the approach plane will be residual due to the difficulty of achieving effective mitigation through height restrictions in the immediate area.

Table 1 Landscape and Visual Impact Table – 10L Approach Lighting: Western End.

Description:		Evaluation			
Impact	Character	Magnitude	Duration	Consequences	Significance
Landscape	Approach frangible (lighting) masts are an integral part of the expansion of the airport and contribute to the resulting loss of rural character of Agricultural Plains.	Impact largely restricted to the Dublin Airport Authority boundary due to design of masts and boundary hedgerows. Slight change.	Permanent. Daytime.	Contributes to change in Landscape Character Area from Agricultural Plains to Airport Landscape. Masts in character with airport character area. Perceptible from St Margaret's bypass. Impact can be restricted through boundary planting. Residual impact.	Slight negative impact in the context of the overall impacts of runway.
Landscape	Loss of hedgerows within approach lighting plane.	No additional hedgerows removed than that required for take off climb surfaces and climb paths.	Permanent.	None	None
Landscape	Reduction in height of trees from level required for take off flight path along approach lighting plain.	Trees in 70 m hedgerows further reduced in height and coppiced. Slight change.	Permanent. Continual management of vegetation height will be required.	Loss of landscape resource (Photo 4). Mitigation: additional tree and shrub planting.	Imperceptible impact as trees required to be reduced in height for take off climb surfaces and flight paths.
Landscape	Loss of grassland within mast enclosure.	Local impact. Imperceptible change.	Permanent.	Loss of landscape resource.	Imperceptible impact.
Visual	Visibility of frangible (lighting) approach masts.	Noticeable change within existing gaps in hedge.	Daytime. Permanent along approach lighting plane. Medium term in other areas.	Sensitivity to change low in the context of the runway proposals and when viewed from moving vehicles. St Margaret's Bypass. Millhead (1) (Photo 7/Section D) Millhead (2) (Photo 7/Section D) Millhead: New Property (3) (Photo 6 /Section D) St Margaret's (4) (Photo 10/Section E) Kileesk (5) (Photo 11/Section C) Property adjacent to R108 (6) Kileek (7) (Photo 12, Section A) Dunbro (8)	Masts in proximity to Dublin Airport Authority boundary moderate negative impact. Impact of other masts slight negative. Imperceptible impact Imperceptible impact Imperceptible impact Imperceptible impact Imperceptible impact Imperceptible impact
Visual	Direct views of approach lighting.	Significant change where property boundaries have open views and vegetation height has been reduced.	Night time during operational hours. Permanent as trees must be maintained below approach lighting plane throughout airport lifetime.	Mitigation: additional hedgerow boundary planting. Local residual impact along approach lighting plane. Sensitive to change due to lack of artificial lighting sources. St Margaret's Bypass (Photo 5) Millhead (1) (Photo 7/Section D) Millhead (2) (Photo 7/Section D) Millhead: New Property (3) (Photo 6 /Section D) St Margaret's (4) (Photo 10/Section E) Kileesk (5) (Photo 11/Section C) Property adjacent to R108 (6) Kileek (7) (Photo 12, Section A) Dunbro (8) [Residual impact unless offsite planting at property boundaries to Millhead (3) an option]	Local moderate adverse impact Imperceptible impact Imperceptible impact Significant negative impact Imperceptible impact Imperceptible impact Imperceptible impact Imperceptible impact

Description:				Evaluation		
Impact	Character	Magnitude	Duration	Consequences	Significance	Certainty
Visual	Indirect light glow from the approach lighting.	Significant change within rural areas. Magnitude dependant on presence of other artificial light sources.	Night time during operational hours and poor weather conditions.	Sensitive to change due to lack of other artificial light sources St Margaret's Bypass Millhead (1) Millhead (2) Millhead (3) St Margaret's (4) Kilreesk (5) Property adjacent to R108 (6) (20% of movements) Kilreesk/River Ward Valley (7) Dunbro (8) Residual Impact	Significant negative impact Significant negative impact Significant negative impact Significant negative impact Significant negative impact Significant negative impact Significant negative impact Significant negative impact Significant negative impact Moderate negative impact	High

Table 2 Landscape and Visual Impact Table - 28R Approach Lighting: Eastern End.

Description:		Evaluation			
Impact	Character	Magnitude	Duration	Consequences	Certainty
Landscape	Approach frangible (lighting) masts are an integral part of the expansion of the airport and contribute to the resulting loss of rural character of Agricultural Plains.	Impact restricted to the Dublin Airport Authority boundary at Forrest Little Road due to design of masts and boundary hedgerows. Slight change.	Permanent: Daytime.	Contributes to change in Landscape Character Area from Agricultural Plains to Airport Landscape. Perceived from Forrest Little Road but masts in character with airport character area. Impact can be reduced through boundary planting.	Slight negative impact in the context of the overall impacts of runway. High
Landscape	Loss of hedgerows and four trees within approach lighting plane.	No additional hedgerows or trees are to be removed than that required for take off climb surfaces and climb paths. Local impact. Imperceptible change.	None	None	High
Landscape	Loss of grassland within mast enclosure.	Local impact. Imperceptible change.	Permanent	Loss of landscape resource (Photo 8).	Imperceptible impact High
Visual	Visibility of frangible (lighting) masts.	Slight change along length of Forrest Little road within approach lighting plane. Imperceptible change in other areas due to distance, light structure of masts, N1 corridor planting and property boundary planting.	Daytime. Permanent.	Sensitivity to change low within the open landscape in the context of the runway proposals and when viewed from moving vehicles. Garden Centre (9) Coachman Pub (10) Clochran Old School (11) (Photo 9a/Section I) Bungalow (12) (Photo 10) Swords/ N1 North of roundabout (13) (Photo 9b/Section F) Forrest Little Road (Photo 9c) Mitigation: additional hedgerow boundary planting.	Imperceptible impact Imperceptible impact Imperceptible impact Imperceptible impact Imperceptible impact Imperceptible impact as masts located way from site boundary High
Visual	Visibility of approach lighting.	Slight change where property boundaries have open views vegetation height has been removed and in locations to north of the N1 roundabout.	Night time during operational hours. Permanent as vegetation must be maintained below approach lighting plane throughout airport lifetime.	Sensitive to change low due presence of other artificial light sources. Garden Centre (9) Coachman Pub (10) Clochran Old School (11) (Photo 9a/Section I) Bungalow (12) (Photo 10) Swords/ N1 North of roundabout (13) (Photo 9b/Section F) Forrest Little Road (Photo 9c) Mitigation: additional hedgerow boundary planting.	Imperceptible Impact Imperceptible Impact Imperceptible Impact Imperceptible Impact Imperceptible Impact Imperceptible Impact High

Description:		Evaluation			
Impact	Character	Magnitude	Duration	Consequences	Certainty
Visual	Indirect light glow from the approach lighting.	Slight change within rural areas to the north of the scheme. Imperceptible change in other areas due to the presence of other artificial light sources.	Night time during operational hours and poor weather conditions.	Low sensitivity to change due to the presence of other artificial light sources, particularly street lighting along N1 and Forrest Little Road. Garden Centre (9) Coachman Pub (10) Clochran Old School (11) Bungalow (12) Swords/ N1 North of roundabout (13) Forrest Little Road Residual Impact.	High
				Imperceptible impact Imperceptible impact Imperceptible impact Slight negative impact Imperceptible impact Imperceptible impact	

SECTION 11 - SURFACE WATER

- 11.2.1.1 Dublin Airport, including the existing runway complex and airport terminal buildings, is situated at the summit of four separate watersheds or river catchments including those of the Ward River, the Sluice River, the Mayne and the Santry. Drainage to the Sluice River is via the Forrest Little Stream, the Wad Stream and Kealy's Stream, which drains the northern and northeastern section of the airport and eventually enters Dublin Bay via the Baldoyle Estuary at Portmarnock Bridge. The Mayne River receives drainage from the Cuckoo Stream, which drains the central and eastern sections of the airport. The Mayne River also enters the Baldoyle Estuary, at Mayne Bridge. The upper reaches of the Santry River drain the southwestern section of the airport; it enters the sea at Raheny, behind Bull Island. The proposed new runway, which will be located along the northern boundary of the existing airport, will also extend westward to the townlands of Barberstown and Pickardstown. Drainage for the proposed runway will drain to the Forrest Little Stream (Sluice catchment) and for the first time to the Ward River catchment, which drains to the Malahide estuary at Swords. Proportionally, the new runway site and its surrounds drain roughly 60:40 to the Sluice and Ward catchments respectively, at present.
- 11.5.1.1 The Ward River is exceptional among the rivers in the area in having a resident salmon and sea trout population, underlying the sensitivity of this particular watercourse (Mr Jim O'Brien, ERFB). Electro-fishing surveys within the St. Margaret's Stream drainage area carried out by the ERFB have revealed the presence of brown trout.
- 11.7.2.7 The significance of these impacts will clearly depend on the severity and duration of the solids releases and the fisheries status of the receiving watercourses. At present the proposed development site discharges approximately 40:60 to the Ward Catchment and the Forrest Little Stream (Sluice Catchment). In the case of the main channel of the Forrest Little Stream, the water quality is already clearly degraded with moderate pollution (Q3 or Q2-3) the norm at most sites. Thus, moderate solids escarpment to these sites would likely have only minor to moderate impacts. Nevertheless, a number of the small upper channels are not as severely impacted, being slightly polluted (Q3-4) or bordering on unpolluted (Q4) and the impact on these could potentially be locally severe. The watercourses draining to the Ward River from the proposed site are all little more than drainage ditches, so that the impact from moderate amounts of escaped solids would be relatively minor. However, elevated amounts of solids reaching these ditches might carry-over to sites further downstream on the Ward with potentially more serious consequences for macroinvertebrates and fish life as previously outlined. Any drainage to the latter channels should be strictly controlled and treated if contaminated with solids.

11.8.3 Proposed Surface Water Drainage System and Associated Treatment Facilities

Surface Drainage - Overview

11.8.3.1 There are two options for the surface water drainage, which are;

- Option 1: One pavement network with one outfall to the Forest Little Stream Sub-Catchment (preferred option)
- Option 2: Two pavement networks with one outfall to the Ward River Catchment and one outfall discharging to the Forest Little Stream Sub-Catchment (which maintains flows to existing catchments)

11.8.3.2 Option 1 has been chosen as the preferred option in response to a request from the Eastern Regional Fisheries Board (ERFB) to ensure that no paved area run-off enters the Ward River catchment given its much more sensitive status as a salmonid watercourse.

11.8.3.3 In option 1, the new runway and taxiway will be served by a sealed pipe drainage system with slot drains or appropriately spaced gullies to intercept all the surface water run-off from these impervious areas. Run-off from grassed areas will continue to drain to existing catchments. The drainage from all paved areas within the Ward section of the runway catchment will be diverted to the Forrest Little catchments drainage system, in order to prevent potentially contaminated water reaching the more sensitive Ward River.

Oil Separation

11.8.3.4 Class 1 bypass hydrocarbon separators will be placed at several points within the surface drainage network in both catchments in order to prevent pollution of surface waters by hydrocarbons. The separators will be designed to an appropriate size to catch the first flush from the area being served. The chosen design will allow for easy inspection, de-oiling and de-sludging. Furthermore, they will be designed in such a way that during a storm event, oil already trapped by the separator will not be flushed out.

11.8.3.5 It is important that any hydrocarbon interceptors and sedimentation areas should be emptied and de-sludged regularly to avoid the treatment system itself becoming a source of contaminants.

Monitoring of Stormwater Run-off

11.8.3.5 The run-off from all paved areas in the Ward catchment end of the runway will be directed to the Forrest Little section of the drainage system. This stormwater run-off from will be monitored continuously for contamination, such as that from de-icing activity, using an in-line BOD monitor. The data from monitors will be transmitted to the environment division of Dublin Airport. If the contamination does not exceed the recommended discharge threshold (3mg/l BOD in May-September and 5mg/l, BOD October to April), the run-off will be directed to a balancing tank, otherwise the run-off will be directed to a polluted water holding tank.

- 11.8.3.6 If the monitors fail then the flow will be directed to the polluted water holding tank. Under no circumstances will surface run-off from the runway or other paved areas of the new development flow directly to receiving waters. As a failsafe, as soon as a decision has been made to de-ice pavements, all paved area drainage will be manually directed to the contaminated water holding tank, immediately BEFORE de-iceant is applied and this situation will continue to obtain until at least the first two run-off events after de-icing have been retained in the contaminated water tanks. This will ensure that at a time when it is LIKELY that contaminated run-off will occur that the system would not be reliant on the sensor system.

Stormwater Attenuation

- 11.8.3.7 There will be balancing tank(s) sufficiently large to attenuate the flows to that of the 'greenfield' run-off of the catchment in the 100 year storm event so as not to increase the risk of flooding downstream.

Polluted Water Holding Tanks and Treatment

- 11.8.3.8- Following cold snaps when runway and aircraft de-icing is necessary, run-off contaminated by de-icing agents will be directed to the polluted water holding tank(s) in the Forrest Little catchment. The polluted water holding tank(s) will be sized to contain the contaminated run-off associated with two de-icing events.
- 11.8.3.9 Contaminated run-off contained within the holding tanks will be discharged to sewer.

Retention of Spillages

- 11.8.3.10 The holding tanks will be large enough to contain the total fuel volume of two Boeing 747s and all the firewater/foam used to control the fire which would ensue if both crashed into each other or the catchments of the proposed runway, provided the tanks were no more than 80% full.

Fire Training Ground

- 11.8.3.11 The fire training ground will be moved from its current location within the Ward Catchment as it is in the path of the proposed runway. The new facility will be purpose-built and outside both the Ward and Forrest Little catchments and subject to a separate planning application.

Recommended Discharge Thresholds

- 11.8.3.12 In order to prevent deterioration in the water quality and fisheries status of the Forrest Little and Ward Rivers the following parameter limits are suggested for the treated surface water discharge from the proposed development:

Table 19.1. Parameter Limits.

Forrest Little
pH 6-9
DO % sat >80
BOD mg/l, O2 3-5 (October-April); 3 (May-September)

For the Ward the following parameters should apply:

pH 6-9
DO % sat >80
BOD mg/l, 3mg/l

The values chosen are in line with Irish and EU legislation and are designed to protect salmonid waters. The more stringent value set for the Ward is in recognition of the presence of a known sea trout and salmon run into this river.

It should be noted that The Ward River will only receive drainage from grassed areas within the area of the new development.

- 11.8.4.4 The second worst-case scenario relevant to watercourses would be the failure of the pavement drainage system. This would result in the presence of sewage fungus growth in the Forrest Little Stream during the winter and spring months of most years. This would have the potential to adversely impact salmonid spawning and fry survival as well as adversely impacting on the diversity of macroinvertebrates in the riverbed in the Forrest Little Stream. This would occur at a time when trout normally spawn and so any present would be susceptible to adverse impact. The estimation of the extent of such an impact is somewhat speculative, however, as the precise concentrations and quantities of contaminants (mainly anti-icing and de-icing agents) involved is unknown. Nevertheless, elevated BOD are consistently and frequently recorded by Dublin Airport environmental staff during the cold months of the year and sewage fungus is also observed by them. It is reasonable to assume, therefore, that this will also be a feature of the proposed development if the pavement drainage system fails. Again, the impact is potentially moderate to severe and adverse. Duration of the impact will depend on the frequency of failure, but in each case would likely last for several months and could have long-term adverse effects on a proportion of the fish population if it occurred more frequently than once in three to four years. It is likely to reduce rather than eliminate stocks however (fish and macroinvertebrates).
- 11.9.1.2 During the preparation of additional information, Dublin Airport has carried out a review of the surface water drainage in relation to the proposed runway development and have concluded that the preferred approach is to discharge contaminated water to the foul sewer. This is the first stage in the comprehensive review given as a commitment under the EIS (11.9.1.1). The review of the entire airfield in relation to surface water and water quality will continue under a separate process and should be completed within approximately 12 months.

SECTION 12 - GEOLOGY & GROUNDWATER

Changes to surface water management and design are outlined in RPS-MCOS Surface Water Management Plan, Final Report – EIS Addendum Appendix 4.1. No change, however, to impact and mitigation in this EIS Addendum.

SECTION 13 - ROAD TRAFFIC

This section, which is the Traffic Impact Assessment, is unchanged in this addendum except as noted.

In response to Additional Information (Fingal County Council Decision Order No. 0436) (Reference Items 5(a), (b) and (c) and Item 6), additional details of the Traffic Impact Assessment regarding access to the airport from the west, junction analysis with and without metro, and alternative access measures, are provided in Addendum Appendix 13.1.

In response to Additional Information (Fingal County Council Decision Order No. 0436) (Reference Item 5(d)), details of the junctions directly affected by the scheme including road safety measures are provided in Addendum Appendix 13.2

In response to Additional Information (Fingal County Council Decision Order No. 0436) (Reference Item 6), Road Safety Audits for junctions indirectly affected by the scheme are contained in Addendum Appendix 13.3.

SECTION 14 - AIR QUALITY

No change to this section in this addendum.

SECTION 15 - CLIMATE

No change to this section in this addendum.

SECTION 16 - NOISE

This section provides additional information to that contained in section 16.1 of the Environmental Impact Statement. These changes are primarily concerned with the mitigation of noise impacts, taking into consideration the views expressed in observations/submissions by Third Parties on the proposed development. Subsequent to the decision of the planning authority to issue a Request for Further Information, the applicant has had the opportunity to revisit mitigation proposals regarding Mode of Operation (This is also reflected in EIS Addendum Section 19 Schedule of Environmental Commitments). In order to address community concerns in a proactive manner, further information on noise mitigation is set out below.

16.1 Noise Assessment of Air Movements

Mitigation of Noise Impacts

The approach to mitigation of the noise impacts of the scheme comprises two parts: the first being preferential use of the runways to limit the numbers of households where the impact is significant; and the second is to provide a sound insulation scheme for those most affected.

The noise analysis contained in the EIS at Section 16.1, Appendix G, and Figures 44 to 67 inclusive shows that different modes of operation lead to differing levels of impact on differing communities. An additional scenario based on preferential use of runways, providing for the mitigation of noise impacts on existing communities was developed and is presented and assessed below.

Mode of Operation

The choice of mode of operation used at any particular time is dependent on a number of factors. These include weather conditions (in particular wind speed and direction), safety considerations, maintenance requirements, air traffic demand and environmental considerations.

Many of these cannot be influenced by the Airport Authority, but where weather, safety or maintenance considerations do not dictate the mode of operation, and air traffic demand can be accommodated, then to mitigate the impact of the operation of the runway system, the following preferences in the use of the runways is proposed:

Firstly, the parallel runways (10R-28L and 10L-28R) would be used in preference to the cross runway 16-34 to mitigate the impacts associated with over-flying of the highly populated areas on North Dublin City.

Runway 16-34 was used for approximately 7% of movements in 2003 and 5% of movements in 2004. A recent study has indicated that the non-availability of Runway 16-34 would result in the loss to Dublin Airport of approximately 1% of movements because of crosswinds greater than those permissible for safe operations. Currently this runway is used as an alternative to the main runway 10R-28L during maintenance activities and on a tactical basis by air traffic control as dictated by airline demand and/or weather conditions.

The value of the cross runway to the operation at Dublin is greater than that of the traffic it carries. The value also includes the ability to accept traffic in adverse weather conditions that may be of strategic or national importance given the gateway nature of an airport serving a capital city.

With a runway parallel to the main runway, then use of the cross runway as an alternative during maintenance periods would not be required and it is therefore anticipated that usage, as a percentage of the total, could fall to the levels (approximately 1%) required by limits on permissible crosswinds for safe operations. Noise contour modelling has considered 2% of movements on the cross runway as a conservative estimate.

Secondly, when winds are westerly, Runway 28L will be preferred for arriving aircraft. Either Runway 28L or 28R will be used for departing aircraft as determined by ATC. This is illustrated in EIS Addendum Figure 16.3.



EIS Addendum Figure 16.3 - Preferential Use of Parallel Runways (Westerly Winds).

When winds are easterly, either Runway 10L or 10R as determined by ATC will be preferred for arriving aircraft. Runway 10R will be preferred for departing aircraft. This is illustrated in EIS Addendum Figure 16.4.



EIS Addendum Figure 16.4 - Preferential Use of Parallel Runways (Easterly Winds).

This approach has the aim of limiting the numbers of people affected by operations on the proposed northern parallel runway.

Noise Contour Modelling of Proposed Preferential Runway Use

The consequence of the preferential use of the runways outlined above is that the number of movements on each runway would lie somewhere between the scenarios modelled as 1b, 2b and 4b within the Environmental Statement (Ref: Figures 51, 52 and 54 of Part 4 EIS December 2004).

An estimate of the proportions of movements using each runway on the basis of the proposed preferential use of runways has been based on the following assumptions:

1. Runway 16-34 is only used when crosswinds exceed permissible limits rounded to 2%. On the basis of past records, the ratio of 16 operations to 34 operations has been taken as approximately 3 to 1.
2. On the basis of past records, the proportion of traffic on Runways 10L and 10R together is approximately one-quarter of remaining traffic, rounded to 25%.
3. Eight percent of total traffic has been allocated to the 'non-preferred' runways (i.e. 28R for arrivals and 10L for departures) on the basis of past maintenance activity in the ratio of 3:1 between Runway 28 and Runway 10.
4. In 2010, departures to the west are distributed between 28L (existing) and 28R (new) in the approximate ratio 1 to 3 to reflect the need for segregated mode for capacity reasons. Arrivals from the west are also distributed between 10R (existing) and 10L (new) in the approximate ratio 1 to 3 to reflect the need for segregated mode.
5. In 2025, departures to the west are distributed between 28L (existing) and 28R (new) in the approximate ratio 1 to 5 to reflect the need for segregated mode for capacity reasons. Arrivals from the west are also distributed between 10R (existing) and 10L (new) in the approximate ratio 1 to 5 to reflect the need for segregated mode.

The percentages on each runway are set out in the following table:

TABLE 1. Forecast Usage of Runways (%) (Environmental Preferential Usage).

Runway		2010		2025	
		Departures	Arrivals	Departures	Arrivals
Existing Southern Parallel Runway	28L	18.0	67.0	12.2	67.0
	10R	23.0	6.3	23.0	4.0
Proposed Northern Parallel Runway	28R	55.0	6.0	60.8	6.0
	10L	2.0	18.7	2.0	21.0
Existing Crosswind Runway	16	1.5	1.5	1.5	1.5
	34	0.5	0.5	0.5	0.5
Total		100.0	100.0	100.0	100.0

The number of flights this represents per annum is set out as follows.

TABLE 2. Forecast Usage of Runways (Total Annual Movements - High Growth Scenario) (Environmental Preferential Usage).

Runway		2010		2025	
		Departures	Arrivals	Departures	Arrivals
Existing Southern Parallel Runway	28L	19,157	71,307	21,250	116,700
	10R	24,479	6,705	40,061	6,967
Proposed Northern Parallel Runway	28R	58,536	6,386	105,901	10,451
	10L	2,128	19,902	3,484	36,578
Existing Crosswind Runway	16	1,596	1,596	2,613	2,613
	34	532	532	871	871
Total		106,428	106,428	174,180	174,180

The results of this modelling are shown on EIS Addendum Figure 16.1.

For the purposes of Noise Modelling, night-time is defined as 2300 to 0700 in accordance with UK government planning document, Planning Policy Guidance PPG24. However, for the purposes of the airport operation, night-time is taken as 2300 to 0600 when the first scheduled aircraft begin to operate.

In preparing these contours, it has been assumed that a significant number Boeing 737-200 aircraft remain in service, although the airline that operates the majority of this type of aircraft currently flying at Dublin Airport has plans to replace them with quieter types. The sensitivity to this assumption was discussed in Section 16.1.7 of the Environmental Impact Assessment and shown on EIS Figure 66.

Sound Insulation Schemes

To further mitigate noise impacts, the following sound insulation measures would be provided:

Firstly, all schools within the 2025 60dB contour on any of the scenarios 1b, 2b, 4b or 7b as detailed in EIS Addendum Figure 16.2 will be offered sound insulation before the northern parallel runway was brought into use. This is to mitigate the noise impacts in the most sensitive receptors and will be provided well in advance of need. One of the schools concerned, St Margaret's, was insulated as part of the southern runway scheme. The insulation will be carried out in consultation with the Department of Education.

Secondly, DAA will introduce a residential property buy-out scheme for houses falling within the 69dB contour. Houses will become eligible under this scheme as and when they fall within the 69dB contour, measured on a two year basis and based on the aircraft mix

appropriate at the time¹. Details of this scheme will be agreed with Fingal County Council on the granting of planning permission.

Thirdly, the current residential Sound Insulation Scheme as proposed in the EIS will be extended to include properties falling within the 63dB contour. Again houses will become eligible under this scheme as and when they fall within the 63dB contour measured on a two-year basis as detailed in the EIS and based on the aircraft mix at the time¹. Details of this scheme are included in Appendix 19.1.

Monitoring

Noise & Flight Track Monitoring System

Dublin Airport Authority has had an operational Noise & Flight Track Monitoring system since 2002. The Noise & Flight Track Monitoring system measures noise levels generated by aircraft and identifies the flight path taken to and from the airport, for each individual aircraft movement. This enables a full understanding of the impact on local communities.

Details of this scheme are included in the Noise and Flight Track Monitoring Report Dublin Airport (July 2005) at EIS Addendum Appendix 16.1.

¹ It should be noted that contours may be smaller than shown in the EIS if trends towards quieter aircraft continue (Ref: Figure 66 in the EIS).

SECTION 17 - HAZARD

No change to this section in this addendum.

SECTION 18 - HUMAN HEALTH

This section remains unchanged, however additional mitigation measures with regard to noise are outlined in Sections 16 and 19.10.

SECTION 19 - SCHEDULE OF ENVIRONMENTAL COMMITMENTS

This section amended as follows:

19.4.1.1 A compensation habitat will be located as close as possible to the site when removal of hedgerows has taken place and will be at least 8 ha in area.

19.5.1.1 Landform, planting and sympathetic detail design of the development will both reduce negative visual impacts and assist in compensating for the loss of the landscape character. Further mitigation proposals will compensate for the loss of hedgerows and trees, through the sponsoring of a study into the coverage and condition of hedgerows within Fingal County Council, the acquisition of 3 ha of land in the Swords area for public amenity and recreation and 8 ha for ecological woodland creation (see above – Section 19.4.1.1). Contributions will also be made to the restoration of the historic formal gardens in the Ward River valley regional park.

19.6 Surface Water

19.6.1. Construction Phase

19.6.1.1 A pollution prevention plan including a Method Statement will be drawn up as part of contract documents. The methods involved will be agreed in advance with the regulatory authorities (Fingal County Council and the Eastern Regional Fisheries Board) and will form part of the overall construction design and construction site management plan. The site will have a designated pollution prevention officer, who will be a member of the construction team, present during normal working hours and for sensitive operations outside normal working hours. More details are included in Section 5.1 of Addendum Appendix 4.1 (Surface Water Management Plan for Proposed New Runway at Dublin Airport – RPS MCOS August 2005).

Solids

19.6.1.4 Streams and ditches which drain the site will not be deepened or widened unless absolutely necessary. Where it is necessary, this will be undertaken during low-flow conditions, with water being pumped around the excavation area, in order to prevent the escape of solids to the watercourses downstream.

19.6.1.10 All solids-contaminated water either running directly off exposed soil and earthworks or pumped from sumps or excavations will be intercepted and directed to a settlement lagoon. Settlement lagoons will be designed by an appropriately qualified engineer to meet discharge standards to be agreed in advance. Unless otherwise agreed the suspended solids level discharged from these lagoons will not exceed 25 mg/l.

19.7 Surface Drainage

19.7.1.1 There are two options for the surface water drainage, which are:

- Option 1: One pavement network with one outfall to the Forrest Little Stream Sub-Catchment (proposed solution).

- Option 2: Two pavement networks with one outfall to the Ward River Catchment and one outfall discharging to the Forrest Little Stream Sub-Catchment.

19.7.1.2 The following mitigation measures are based on Option 1, which has been chosen in response to a request from the Eastern Regional Fisheries Board (ERFB) to ensure that no paved area run-off enters the Ward River catchment given its much more sensitive status as a salmonid watercourse.

19.7.1.3 The new runway and taxiway will be served by a sealed pipe drainage system with slot drains or appropriately spaced gullies to intercept all the surface water run-off from these impervious areas. Run-off from grassed areas will continue to drain to the existing network of surface drains. The drainage system will roughly divide in two with the western half draining to the Ward River catchment and the eastern half to the Forrest Little catchment. However, the drainage from all paved areas within the Ward section of the runway catchment will be diverted to the Forrest Little catchments drainage system, in order to prevent potentially contaminated water reaching the more sensitive Ward River.

Oil Separation

19.7.1.4 Class 1 bypass hydrocarbon separators will be placed at several points within the surface drainage network in both catchments in order to prevent pollution of surface waters by hydrocarbons. The separators will be designed to an appropriate size to catch the first flush from the area being served. The chosen design will allow for easy inspection, de-oiling and de-sludging. Furthermore, they will be designed in such a way that during a storm event, oil already trapped by the separator will not be flushed out. These interceptors will include level sensors linked to alarms back to duty personnel.

19.7.1.5 Hydrocarbon interceptors and sedimentation areas will be emptied and de-sludged regularly to avoid the treatment system itself becoming a source of contaminants.

Monitoring of Stormwater Run-off

19.7.1.6 The run-off from all paved areas in the Ward catchment end of the runway will be directed to the Forrest Little section of the drainage system. This stormwater run-off from will be monitored continuously for contamination, such as that from de-icing activity, using an in-line BOD monitor. The data from monitors will be transmitted to the environment division of Dublin Airport. If the contamination does not exceed the recommended discharge threshold (3 mg/l BOD in May-September and 5 mg/l, BOD October to April), the run-off will be directed to a balancing tank, otherwise the run-off will be directed to a polluted water holding tank.

19.7.1.7 If the monitors fail then the flow will be directed to the polluted water holding tank. Under no circumstances will surface run-off from the runway or other paved areas of the new development flow directly to receiving waters. As a failsafe, as soon as a decision has been made to de-ice pavements, all paved area drainage will be manually directed to the contaminated water holding tank, immediately BEFORE de-iceant is applied and this situation will continue

to obtain until at least the first two run-off events after de-icing have been retained in the contaminated water tanks. This will ensure that at a time when it is LIKELY that contaminated run-off will occur that the system would not be reliant on the sensor system.

Stormwater Attenuation

- 19.7.1.8 There will be balancing tank(s) sufficiently large to attenuate the flows to that of the 'greenfield' run-off of the catchment in the 100 year storm event so as not to increase the risk of flooding downstream.

Polluted Water Holding Tanks and Treatment

- 19.7.1.9 Following cold snaps when runway and aircraft de-icing is necessary, run-off contaminated by de-icing agents will be directed to the polluted water holding tanks in the Forrest Little catchments. The polluted water holding tank will be sized to contain the contaminated run-off associated with two de-icing events.
- 19.7.1.10 Contaminated run-off contained within the holding tanks will be discharged to sewer.

Recommended Discharge Thresholds

- 19.7.1.13 In order to prevent deterioration in the water quality and fisheries status of the Forrest Little and Ward Rivers the following parameter limits are suggested for the treated surface water discharge from the proposed development:

Table 19.1. Parameter Limits.

Forrest Little
pH 6-9
DO % sat >80
BOD mg/l, O2 3-5 (October-April); 3 (May-September)

For the Ward the following parameters should apply:

pH 6-9
DO % sat >80
BOD mg/l, 3mg/l

The values chosen are in line with Irish and EU legislation and are designed to protect salmonid waters. The more stringent value set for the Ward is in recognition of the presence of a known sea trout and salmon run into this river.

It should be noted that The Ward River will only receive drainage from grassed areas within the area of the new development.

- 19.7.1.14 Dublin Airport has embarked on a comprehensive review of the surface water drainage in relation to the proposed runway development and has concluded that the preferred approach is to discharge contaminated water to the foul sewer. This is the first stage in the comprehensive review given as a commitment under the EIS (11.9.1.1). The review of the entire airfield in relation to surface water and water quality will continue under a separate process and should be completed within approximately 12 months.

19.10 Noise

19.10.2 Operational Phase

19.10.2.1 Dublin Airport Authority shall, except where safety, weather, air traffic demand or runway maintenance requirements necessitate otherwise, undertake to mitigate the noise impact of the operation of the new runway system through the following operational commitments for commercial aircraft:

- a) The parallel runways (10R-28L and 10L-28R) would be used in preference to the cross runway 16-34 to mitigate the noise impacts associated with over-flying of the highly populated areas of north Dublin City.
- b) When winds are westerly, Runway 28L will be preferred for arriving aircraft. Either Runway 28L or 28R will be used for departing aircraft as determined by Air Traffic Control.
- c) When winds are easterly, Runway 10R will be preferred for departing aircraft. Either Runway 10L or 10R, as determined by Air Traffic Control, will be preferred for arriving aircraft.

19.10.2.2 All schools within the 2025 60 dB contour on any of the scenarios 1b, 2b, 4b or 7b as detailed in EIS Addendum Figure 16.2 will be offered sound insulation before the northern parallel runway was brought into use. This is to mitigate the noise impacts in the most sensitive receptors and will be provided well in advance of need. One of the schools concerned, St Margaret's, was insulated as part of the southern runway scheme. The insulation will be carried out in consultation with the Department of Education.

19.10.2.3 DAA would introduce a residential property buy-out scheme for houses falling within the 69 dB contour. Houses will become eligible under this scheme as and when they fall within the 69 dB contour, measured on a two year basis and based on the aircraft mix appropriate at the time. Details of this scheme would be agreed with Fingal County Council on the granting of planning permission.

19.10.2.4 The current residential Sound Insulation Scheme as proposed in the EIS will be extended to include properties falling within the 63 dB contour. Again houses will become eligible under this scheme as and when they fall within the 63 dB contour measured on a two year basis as detailed in the EIS and based on the aircraft mix at the time. Details of this scheme are included in Appendix 19.1.

19.10.2.5. Dublin Airport Authority will develop and implement a Community Fund to assist neighbourhood and community projects that benefit areas most affected by the airport's operation. The fund, which ideally will be administered independently of Dublin Airport, will be targeted towards projects that have a community, social or environmental focus.