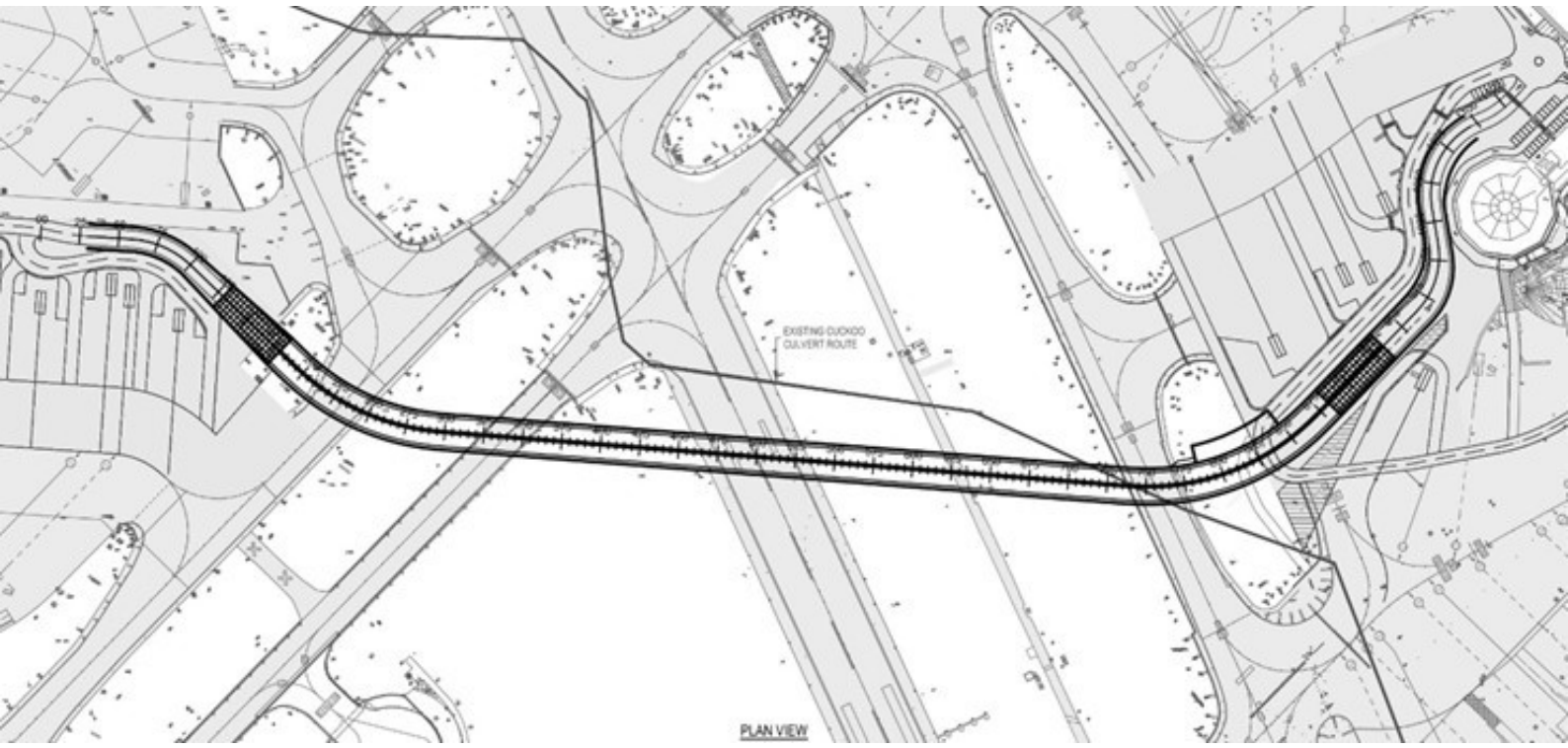

Dublin Airport Underpass

Environmental Impact Assessment Report
Volume 2 - Main Report

August 2022

daa

DublinAirport

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Glossary

Abbreviation / Term	Definition
%	Percentage
µg/m^3	Microgram per cubic meter
µm	Micro-metre. A measure of length equalling $1x10^{-6}$ of a metre
AA	Appropriate Assessment
ABP	An Bord Pleanála
Abstraction	Groundwater abstraction is the process of taking water from a ground source, either temporarily or permanently. In many aquifers the groundwater has to be pumped out through boreholes or wells. As water is abstracted the water table is lowered around the borehole. If rates of abstraction exceed rates of groundwater recharge within an aquifer, the water table can fall across a wide area.
ACA	Architectural Conservation Area
ANCA	Aircraft Noise Competent Authority
ANPR	Automatic Number Plate Registration
APU	Auxiliary Power Units
AQLV	Air Quality Limit Values
ATM	Air Traffic Movement
ASI	Archaeological Survey of Ireland
ACDM	Airport Collaborative Decision Making
Baseflow	Groundwater flow to a surface water body (lake, swamp, or stream); i.e., that portion of stream discharge that is derived from groundwater flow or the draining of large lakes swamps or other sources outside the net rainfall that creates surface runoff/overland flow.
BCT	Bat Conservation Trust
BGL	Below Ground Level
BNL	Basic Noise Level
BSI	British Standards Institute
CAR	Commission for Aviation Regulation
CAFE	Cleaner Air for Europe
CCD	Climb, Cruise and Descent
CCR	Climate Change Resilience
CEMP	Construction Environmental Management Plan
CFRAM	Catchment Flood Risk Assessment and Management
CGI	Computer Generated Imagery
CHD	Coronary Heart Disease
CH_4	Methane
CIEEM	Chartered Institute of Ecology and Environmental Management
CIRIA	Construction Industry Research and Information Association
CO	Carbon Monoxide
COD	Chemical Oxygen Demand

Abbreviation / Term	Definition
CODA	Central Office of Delay Analysis
CO_2	Carbon Dioxide
COMAR	Control of Major Accident Hazard
CSO	Central Statistics Office
CD	Cardiovascular Disease
C_6H_6	Benzene
DAA	Dublin Airport Authority
dB	The unit of noise measurement that expresses the loudness in terms of decibels (dB) based on a weighting factor for humans sensitivity to sound (A)
dB(A)	The unit of sound level, weighted according to the A-scale, which takes into account the increased sensitivity of the human ear at some frequencies
DBA	Desk-Based Assessment
DCHG	Department of Culture, Heritage and the Gaeltacht
DCLG	Department od Communities and Local Government
DECC	Department of Energy and Climate Change (UK)
Defra	Department for Environment, Food and Rural Affairs (UK)
DfT	Department for Transport (UK)
DoEHLG	Department of Transport and the Department of Environment, Heritage and Local Government
DRAQMP	Dublin Regional Air Quality Management Plan
DTTAS	Department of Transport, Tourism and Sport
DUB	Dublin
EASA	European Aviation Safety Agency
EC	European Commission
ED	Electoral Divisions
EIA	Environmental Impact Assessment.
EIAR	Environmental Impact Assessment Report
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
EPS	European Protected Species
EPUK	Environmental Protection UK
ETS	Emission Trading Scheme
EU	European Union
FAA	Federal Aviation Administration (US)
FDI	Foreign Direct Investment
FEGP	Fixed Electrical Ground Power
FCC	Fingal County Council
FRA	Flood Risk Assessment
Fracture	A fracture is any separation in a geologic formation, such as a joint or a fault that divides the rock into two or more pieces. A fracture will sometimes form a deep fissure or crevice in the rock.

Abbreviation / Term	Definition
NFTMS	Flight Track Monitoring System
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GLVIA	Guidelines for Landscape and Visual Impact Assessment
Groundwater ingress (infiltration)	The process of seeping rainwater and water from other sources into the ground to form groundwater is called infiltration. Infiltration refills the groundwater. Aquifer: Rainwater and water from rivers, ponds seep through the soil and fill the gaps between particles of soil and rocks.
Groundwater flow path	Groundwater flow means the volume and direction of groundwater through an aquifer. Groundwater flows from regions of higher hydraulic level to regions of lower hydraulic level.
Groundwater recharge	The process by which water enters the groundwater system or, more precisely, enters the phreatic zone.
GSE	Ground Support Equipment
ha	Hectare
HFCs	Hydrofluorocarbons
HIA	Health Impact Assessment
HSA	Health and Safety Authority
HSE	Health and Safety Executive
HT	High Technology
Hydraulic continuity	The relationship between ground water (within the superficial deposits or bedrock aquifer) and surface water (Rivers, lakes and streams). The relationship depends on whether groundwater discharges to surface water (referred to as baseflow); or where surface water discharges to ground water, such as from riverbed seepage to an adjacent aquifer.
IAA	Irish Aviation Authority
IAI	Institute of Archaeologists Ireland
IAQM	Institute of Air Quality Management
ICAO	International Civil Aviation Organisation
ICE	Inventory of Carbon and Energy
ICCI	In-combination Climate Change Impact Assessment
IEMA	Institute of Environmental Management and Assessment
IFC	International Finance Corporation
IFI	Inland Fisheries Ireland
IGI	Institute of Geologists of Ireland
IHD	Ischaemic Heart Disease
IHT	Institution of Highways and Transportation
IPC	Integrated Pollution Control
IPPC	Intergovernmental Panel on Climate Change
ISO	International Organisation for Standardisation
IW	Irish Water
JA	Jobseekers Allowance
JB	Jobseekers Benefit

Abbreviation / Term	Definition
km	Kilometres
LAP	Local Area Plan
LAQM	Local Air Quality Management.
Ltd.	Limited
LTO	Landing and Take-off
mppa	Million Passengers Per Anum
NAP	National Aviation Policy
N/A	'Not applicable' or 'Not appropriate'
NDP	The National Development Plan 2018 – 2027
NF_3	Nitrogen Trifluoride
NIAH	National Inventory of Architectural Heritage
NIS	Natura Impact Statement
NLS	National Landscape Strategy
NMS	National Monument Service
NMTs	Noise Monitoring Terminals
NO_2	Nitrogen Dioxide
NOEL	No Observed Effect Level
NO_x	Nitrogen Oxides
NPPF	National Planning Policy Framework. (UK)
NPF	National Planning Framework
NPPG	National Planning Policy Guidance (UK)
NPWS	National Parks and Wildlife Services
NQP	Night Quota Period
NRA	National Roads Authority
NSO	National Strategic Outcomes
NSS	National Spatial Strategy
NTA	National Transport Authority
NTS	Non-Technical Summary
N_2O	Nitrous Oxide
O-D	Origin-Destination
OPW	Office of Public Works
OS	Ordnance Survey
OSI	Ordnance Survey Ireland
Outcrop	Where a bedrock formation is present at the surface.
Overburden	Any material that lies above bedrock geology commonly referred to as superficial deposits.
PAX	Annual Passengers
PDA	Planning and Development Acts
Permeability	The ease with which a porous medium can transmit water or other fluids.
PFCs	Perfluorocarbons

Abbreviation / Term	Definition
PM_{10}	Particulate Matter
$PM_{2.5}$	Particulate Matter
PWHT	Polluted Water Holding Tank
QC	Quota Count
QI	Qualifying Interest
RMP	Record of Monument and Places
RMSE	Root Mean Square Error
RoI	Republic of Ireland
RPS	Record of Protected Structures
RSES	Regional Spatial and Economic Strategy
PSZ	Public Safety Zones
SA	Small Areas
SAC	Special Area of Conservation
SCI	Special Conservation Interests
SEAI	Sustainable Energy Authority of Ireland
SF_6	Sulphur Hexafluoride
SI	Statutory Instrument
SID	Standard Instrument Departure
SO_2	Sulphur Dioxide
SPA	Special Protected Area
SRI	Societal Risk Index
SSSI	Site of Special Scientific Interest
TFS	Trans Frontier Shipping
TII	Transport Infrastructure Ireland
Till deposits	Till is an unsorted sediment derived from the transportation and deposition of by or from a glacier. Glacial till is composed of a heterogeneous mixture of clay, sand, gravel and boulders.
TOC	Total Organic Carbon
TTA	Traffic and Transport Assessment
UK	United Kingdom
UV	Ultraviolet
VOC	Volatile Organic Compounds
Weathering	Weathering is the breaking down or dissolving of rocks in surface
WFD	Water Framework Directive
WHO	World Health Organisation
ZOI	Zone of Influence

Key Concepts and Terminology Used in the EIAR

Proposed Development

The **Proposed Development** consists of four key elements:

- A subterranean Underpass of Runway 16/34 including ramps and portals, plantroom, and all attendant access roads at surface level to tie in with the existing airside road network
- Relocation of aircraft stands at Pier 3 to accommodate access roads to serve the Underpass. Works include introduction of new nodes, fixed links and airbridges, to provide access to the relocated stands, while accommodating the Underpass footprint where it interacts with existing apron and aircraft stands.
- Modifications to Pier 3 Fixed Links and Airbridges to accommodate necessary road modifications, to ensure safe and efficient passenger access to aircraft stands
- Drainage works including temporary diversion of the Cuckoo Culvert and local attenuation

as described in Chapter 1 ('Introduction') and Chapter 3 ('Proposed Development') in this EIAR.

In addition, the **Proposed Development** includes two ancillary elements: six inert pipelines which will form part of the **Future Drainage Network** at Dublin Airport and three construction compounds. These are also described in Chapter 3 ('Proposed Development').

Underpass

The **Underpass** is that part of the **Proposed Development** linking the Eastern Campus of the airport with the Western Campus, including ramps and portals, plantroom, and all attendant access roads at surface level.

Future Drainage Network

This is the planned set of interventions to upgrade and partially replace the existing drainage network at Dublin Airport with new infrastructure designed to enhance the environmental performance of the drainage network. It does not form part of the **Proposed Development**, except as noted above, and will be the subject of a separate application for planning permission.

Current State of the Environment

This is the description of the current environmental conditions, as required by the EIA Directive 2011/92/EU (as amended by Directive 2014/52/EU). It is determined through desk-study and surveys undertaken between 2018 and 2021, as detailed in the technical chapters that cover the effects on environmental factors.

Future Receiving Environment

The **Future Receiving Environment** is the predicted state of the environment in two **Assessment Years** (2024 and 2025) and represents the likely evolution of the **Current State of the Environment** without implementation of the **Proposed Development**. It is also used as the baseline environment against which the assessment of effects is undertaken. It is derived from the **Current State of the Environment**, adjusted to reflect likely changes occurring between now and the assessment years (insofar as it is possible to determine these).
This is in line with the Guidelines on the Information to be contained in Environmental Impact Assessment Reports (EPA, 2022) which explain that the predicted future baseline may be referred to as the likely future receiving environment.

Assessment of Effects

The effects of the **Proposed Development** are identified by examining their predicted impacts on the **Future Receiving Environment**.

Assessment Year(s)

The **Assessment Years** are the points in time at which the likely significant effects of the **Proposed Development** are assessed. The reasons for selecting these years are given below.

- **2024**: the likely peak year of environmental effects from construction of the **Proposed Development**.
- **2025**: the likely opening year of the **Proposed Development**.

32 million passengers per annum (mppa) Cap (32 mppa Cap)

Cap on the permitted annual passenger capacity of the Terminals at Dublin Airport as a result condition no. 3 of the **Terminal 2 Planning Permission** and condition no. 2 of the **Terminal 1 Extension Planning Permission**. These conditions provide that the combined capacity of Terminal 1 and Terminal 2 together shall not exceed 32 million passengers per annum.

Terminal 1 Extension Planning Permission

The **Terminal 1 Extension Planning Permission** is the planning application FCC Reg. Ref. No. F06A/1843, ABP Ref. PL06F. 223469 granted on the 10th January 2008 by An Bord Pleanála.

Terminal 2 Planning Permission

The **Terminal 2 Planning Permission** is the planning application FCC Reg. Ref. No. F06A/1248, ABP Ref. PL06F.220670 granted on the 29th August 2007 by An Bord Pleanála.

1. Introduction

1.1 Background

1.1.1 This Environmental Impact Assessment Report (EIAR) has been prepared on behalf of daa plc. (hereafter referred to as 'the Applicant') to accompany the application for a Proposed Development comprising an underpass (the "Underpass") connecting the Western part of Dublin Airport ("the Airport") with the facilities in the East, including the two Terminals, and associated works to facilitate the Underpass.

1.1.2 The Airport is unofficially divided into an Eastern Campus and a Western Campus, with the Crosswind Runway (16/34) bisecting the two. Passenger activity is concentrated in the Eastern Campus which hosts key Airport infrastructure, including the Terminal buildings, passenger piers, and the majority of aircraft stands. The primary infrastructure supporting surface access to the Airport operates on the East also, including the Ground Transportation Centre, short-term car parking, taxi holding area and main access roads. Operations in the Western Campus are currently focused on the West Apron which is mainly used for cargo operations, General Aviation, and contingency stands, as well as transit and business aviation.

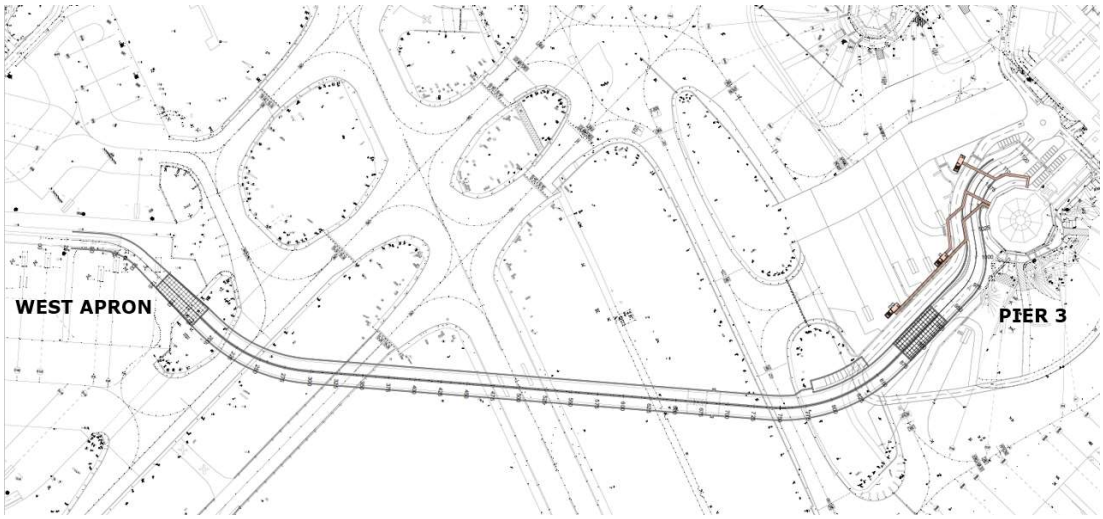


Plate 1-1. Proposed Underpass

1.1.3 The current means of access from the Eastern Campus to the Western Campus – the West Apron Surface Crossing, directly over Runway 16/34 - will no longer be viable once the new North Runway becomes operational in 2022, as Runway 16/34 will be required as an additional taxiway as well has having a continuing role for essential occasional use in line with the terms of Condition 4 of the North Runway Planning Permission. The Irish Aviation Authority (IAA) has also advised that the continued use of the Surface Crossing after the opening of the North Runway is, unsustainable from a safety perspective. All traffic to and from the West Apron will, as described in Chapter 3: Proposed Development, then have to use the 8km Perimeter Road.

1.1.4 The permanent solution which best suits the operational and regulatory requirement to provide safe, efficient, dedicated access to the West Apron, that avoids interfaces with operational runways and taxiways, is to construct an underpass beneath the taxiways and Runway 16/34. Compared with the other alternatives that have been studied, this has the advantage of providing quick, safe access from the eastern campus to the western campus. Alternatives are discussed in more detail in Chapter 2: Alternatives.

1.1.5 The Proposed Development is described fully in Chapter 3: Proposed Development but, in brief, it consists of four key elements:

- A subterranean Underpass of Runway 16/34 including ramps and portals, plantroom, and all attendant access roads at surface level to tie in with the existing airside road network
- Relocation of aircraft stands at Pier 3 to accommodate access roads to serve the Underpass. Works include introduction of new nodes, fixed links and airbridges, to provide access to the relocated stands, while accommodating the Underpass footprint where it interacts with existing apron and aircraft stands.
- Modifications to Pier 3 Fixed Links and Airbridges to accommodate necessary road modifications, to ensure safe and efficient passenger access to aircraft stands
- Drainage works including temporary diversion of the Cuckoo Culvert and local attenuation

1.1.6 Construction of the Proposed Development will require the use of a main airside compound for concrete crushing / batching and construction laydown and storage, and two compounds landside.

1.1.7 In addition, it is proposed to take the opportunity afforded by the excavations for the Underpass to install six inert pipes alongside it, which will form part of the future drainage network at Dublin Airport. The rest of this network will be the subject of a future planning application, with the six pipes serving no function unless and until the future drainage network receives planning consent.

1.1.8 No additional aircraft stands are proposed as part of the Proposed Development, which will in fact result in a net loss of 3 Narrow Body Equivalent (NBE) and addition of 1 Wide Body (WB) stand on the Eastern Campus. Replacement stands to off-set these losses will be the subject of a later future planning application.

1.1.9 No additional aviation activity, such as additional air traffic movements (ATMs) or cargo activity, will arise as a consequence of the Proposed Development, which is intended to maintain existing operations which currently take place on the West Apron.

1.1.10 The Proposed Development also does not propose any additional passenger capacity for the Airport, which will remain the subject of the cap of 32 million passengers per annum (mppa) on the Terminals (”the 32mppa Cap”).

1.2 Environmental Impact Assessment

1.2.1 EIA is the process for assessing the likely significant effects, if any, which a proposed development, if carried out, would have on the environment. An EIA is required for certain classes of project as defined in domestic legislation that transposes the EIA Directive 2011/92/EU (as amended by Directive 2014/52/EU). Amendments introduced by the 2014 Directive were transposed into Irish law on the 1st September 2018 in the form of the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (hereafter referred to as ‘the EIA Regulations’), which amended the Planning and Development Regulations, 2001.

1.2.2 An EIA is required for certain classes of projects defined in Schedule 5, Part 2(10) (d)) of the Planning and Development Regulations 2001, as amended. Where a project falls into one of these classes and exceeds a related size threshold (also defined in the legislation) an EIA is required. Where the project is below the threshold, an EIA may still be required if there is the potential for significant environmental effects and this potential is assessed in relation to criteria set out in Annex III of the EIA Directive.

1.3 Environmental Impact Assessment Screening

1.3.1 The Proposed Development does not exceed the relevant thresholds set out in the Planning and Development Regulations, 2001 (as amended) for the most appropriate classes of development, including:

- Class 2(b) Extraction of stone, gravel, sand or clay, where the area of extraction would be greater than 5 hectares: the Application Site is 34.06 hectares in area, but the excavation is not for the purpose of extracting minerals
- Class 10(b)(iv) Urban development which would involve an area greater than 2 hectares in the case of a business district, 10 hectares in the case of other parts of a built-up area and 20 hectares

elsewhere: the Proposed Development site is located outside the built up area of Dublin, and is less than 20 hectares in area

- Class 10 (d) All private roads which would exceed 2000 metres in length: the proposed Underpass and approach roads taken together are less than 2000m in length;
- Class 13(a) Any change or extension of development already authorised, executed or in the process of being executed (not being a change or extension referred to in Part 1) which would:-
  - (i) result in the development being of a class listed in Part 1 or paragraphs 1 to 12 of Part 2 of this Schedule, and
  - (ii) (ii) result in an increase in size greater than –
    - 25 per cent, or
    - an amount equal to 50 per cent of the appropriate threshold, whichever is the greater.

    The Proposed Development will not result in the development being of a class listed in Part 1 or paragraphs 1 to 12 of Part 2 of this Schedule, and will not result in an increase in the size of the Airport, or an existing runway[1]
- Class 13 (c) (c) Any change or extension of development being of a class listed in Part 1 or paragraphs 1 to 12 of Part 2 of this Schedule, which would result in the demolition of structures, the demolition of which had not previously been authorised, and where such demolition would be likely to have significant effects on the environment, having regard to the criteria set out under Schedule 7. The Proposed Development does not involve the demolition of structures
- Class 14 Works of Demolition Works of demolition carried out in order to facilitate a project listed in Part 1 or Part 2 of this Schedule where such works would be likely to have significant effects on the environment, having regard to the criteria set out in Schedule 7. The Proposed Development involves minor demolition works.

1.3.2 On the basis of the information currently available it cannot be shown that significant environmental effects on certain environmental factors would not be likely. Therefore, an EIA is necessary to identify, describe and assess the direct and indirect significant effects of the Proposed Development on the environment.

1.4 Environmental Impact Assessment Report Content

1.4.1 The EIAR must include at least:

> *"(a) a description of the project comprising information on the site, design, size and other relevant features of the project;*
>
> *(b) a description of the likely significant effects of the project on the environment;*
>
> *(c) a description of the features of the project and/or measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment;*
>
> *(d) a description of the reasonable alternatives studied by the developer, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the project on the environment;*
>
> *(e) a non-technical summary of the information referred to in points (a) to (d); and*
>
> *(f) any additional information specified in Annex IV relevant to the specific characteristics of a particular project or type of project and to the environmental features likely to be affected."*[2]

1.4.2 This EIAR comprises 20 chapters, as follows:

- Chapter 1: Introduction

[1] It is noted that the CJEU has interpreted point 13 of Annex II, read in conjunction with point 7 of Annex I (regarding airports with a basic runway length of 2 100 m or more) as *"also encompassing works to alter the infrastructure of an existing airport, without extension of the runway, where they may be regarded, in particular because of their nature, extent and characteristics, as an alteration of the airport itself"* (Abraham, paragraph 40). However, this ruling adds *"…That is the case in particular for works aimed at significantly increasing the activity of the airport and air traffic."*, which is not the purpose or effect of the Proposed Development.

[2] Directive 2011/92/EU (as amended by Directive 2014/52/EU) Article 5

- Chapter 2: Alternatives
- Chapter 3: Proposed Development
- Chapter 4: Methodology
- Chapter 5: Traffic & Transport
- Chapter 6: Land & Soils
- Chapter 7: Air Quality
- Chapter 8: Water
- Chapter 9: Noise & Vibration
- Chapter 10: Biodiversity
- Chapter 11: Climate
- Chapter 12: Cultural Heritage
- Chapter 13: Landscape & Visual
- Chapter 14: Material Assets (Waste)
- Chapter 15: Material Assets (Built Services)
- Chapter 16: Major Accidents & Disasters
- Chapter 17: Population & Human Health
- Chapter 18: Interactions & Cumulative Effects
- Chapter 19: Future Development Plans
- Chapter 20: Summary of Mitigation Measures

1.4.3 A Non-Technical Summary of this EIAR is available, together with technical appendices for those chapters that require such.

1.4.4 Other environmental assessments are included with the planning application and are referenced where relevant in the EIAR. These are a Water Framework Directive Assessment and a Natura Impact Statement (Appropriate Assessment). A Flood Risk Assessment is also provided.

1.4.5 The full requirements of the EIA Directive concerning the content of an EIAR are reproduced in Table 1-1. This table also indicates where the required information can be found in this EIAR.

Table 1-1 Required Content of the EIAR

EIA Directive Source	Stated Requirement	Where Found
Article 3	1. The environmental impact assessment shall identify, describe and assess in an appropriate manner, in the light of each individual case the direct and indirect significant effects of a project on the following factors:	
	(a) population and human health	Chapter 17: Population & Human Health
	(b) biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC;	Chapter 10: Biodiversity A Natura Impact Statement is provided as Appendix 10-1
	(c) land, soil, water, air and climate;	Chapter 6: Land & Soils Chapter 7: Air Quality Chapter 8: Water Chapter 11: Climate A Water Framework Directive report is provided as Appendix 7-1
	(d) material assets, cultural heritage and the landscape;	Chapter 5: Traffic & Transport Chapter 12: Cultural Heritage Chapter 13: Landscape & Visual Chapter 14: Material Assets (Waste) Chapter 15: Material Assets (Infrastructure)
	(e) the interaction between the factors referred to in points (a) to (d).	Chapter 18: Interactions & Cumulative Effects
	2. The effects referred to in paragraph 1 on the factors set out therein shall include the expected effects deriving from the vulnerability of the project to risks of major accidents and/or disasters that are relevant to the project concerned.	Chapter 16: Major Accidents & Disasters
Article 5	1. Where an environmental impact assessment is required, the developer shall prepare and submit an environmental impact assessment report. The information to be provided by the developer shall include at least:	
	(a) a description of the project comprising information on the site, design, size and other relevant features of the project;	Chapter 3: Proposed Development
	(b) a description of the likely significant effects of the project on the environment;	Assessment of Effects & Significance sections of Chapters 5 – 18 Residual Effects sections of Chapters 5 - 17
	(c) a description of the features of the project and/or measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment;	Environmental Design & Management and Mitigation & Monitoring sections of Chapters 5 - 17

EIA Directive Source	Stated Requirement	Where Found
	(d) a description of the reasonable alternatives studied by the developer, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the project on the environment;	Chapter 2: Examination of Alternatives
	(e) a non-technical summary of the information referred to in points (a) to (d);	EIAR Volume 4: Non-Technical Summary
	(f) any additional information specified in Annex IV relevant to the specific characteristics of a particular project or type of project and to the environmental features likely to be affected.	As set out below
Annex IV	1. A Description of the project, including in particular:	
	(a) a description of the location of the project;	Chapter 3: Proposed Development
	(b) a description of the physical characteristics of the whole project, including, where relevant, requisite demolition works, and the land-use requirements during the construction and operational phases;	Chapter 3: Proposed Development
	(c) a description of the main characteristics of the operational phase of the project (in particular any production process), for instance, energy demand and energy used, nature and quantity of the materials and natural resources (including water, land, soil and biodiversity) used;	Chapter 3: Proposed Development
	(d) an estimate, by type and quantity, of expected residues and emissions (such as water, air, soil and subsoil pollution, noise, vibration, light, heat, radiation and quantities and types of waste produced during the construction and operation phases.	Chapter 3: Proposed Development Assessment of Effects & Significance sections of Chapters 5 – 18
	2. A description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.	Chapter 2: Examination of Alternatives
	3. A description of the relevant aspects of the current state of the environment (baseline scenario) and an outline of the likely evolution thereof without implementation of the project as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge.	Current State of the Environment sections of Chapters 5 – 17 Future Receiving Environment sections of Chapters 5 – 17
	4. A description of the factors specified in Article 3(1) likely to be significantly affected by the project: population, human health, biodiversity (for example fauna and flora), land (for example land take), soil (for example organic matter, erosion, compaction, sealing), water (for example hydromorphological changes, quantity and quality), air, climate (for example greenhouse gas emissions, impacts relevant to adaptation), material assets, cultural heritage, including architectural and archaeological aspects, and landscape.	Current State of The Environment sections of Chapters 5 - 17

EIA Directive Source	Stated Requirement	Where Found
	5. A description of the likely significant effects of the project on the environment resulting from, inter alia:	
	(a) the construction and existence of the project, including, where relevant, demolition works;	Assessment of Effects & Significance sections of Chapters 5 – 18 Residual Effects sections of Chapters 5 - 17
	(b) the use of natural resources, in particular land, soil, water and biodiversity, considering as far as possible the sustainable availability of these resources;	Chapter 3: Proposed Development Chapter 6: Land & Soils Chapter 7: Air Quality Chapter 8: Water Chapter 10: Biodiversity
	(c) the emission of pollutants, noise, vibration, light, heat and radiation, the creation of nuisances, and the disposal and recovery of waste;	Chapter 9: Noise & Vibration Chapter 14: Material Assets (Waste)
	(d) the risks to human health, cultural heritage or the environment (for example due to accidents or disasters);	Chapter 16: Major Accidents & Disasters
	(e) the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources;	Chapter 18: Interactions & Cumulative Effects
	(f) the impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change;	Chapter 11: Climate
	(g) the technologies and the substances used.	Chapter 3: Proposed Development
	The description of the likely significant effects on the factors specified in Article 3(1) should cover the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium- term and long-term, permanent and temporary, positive and negative effects of the project. This description should take into account the environmental protection objectives established at Union or Member State level which are relevant to the project.	All technical chapters (Chapters 5 to 18)
	6. A description of the forecasting methods or evidence, used to identify and assess the significant effects on the environment, including details of difficulties (for example technical deficiencies or lack of knowledge) encountered compiling the required information and the main uncertainties involved.	Chapter 4: Methodology Methodology sections of Chapters 5 - 18
	7. A description of the measures envisaged to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment and, where appropriate, of any proposed monitoring arrangements (for example the preparation of a post-project analysis). That description should explain the extent, to which significant adverse effects on the environment are avoided, prevented, reduced or offset, and should cover both the construction and operational phases.	Mitigation & Monitoring sections of Chapters 5 – 18 Chapter 20: Summary of Mitigation Measures

EIA Directive Source	Stated Requirement	Where Found
	8. A description of the expected significant adverse effects of the project on the environment deriving from the vulnerability of the project to risks of major accidents and/or disasters which are relevant to the project concerned. Relevant information available and obtained through risk assessments pursuant to Union legislation such as Directive 2012/18/EU of the European Parliament and of the Council or Council Directive 2009/71/Euratom or relevant assessments carried out pursuant to national legislation may be used for this purpose provided that the requirements of this Directive are met. Where appropriate, this description should include measures envisaged to prevent or mitigate the significant adverse effects of such events on the environment and details of the preparedness for and proposed response to such emergencies.	Chapter 16: Major Accidents & Disasters
	9. A non-technical summary of the information provided under points 1 to 8.	EIAR Volume 4: Non-Technical Summary
	10. A reference list detailing the sources used for the descriptions and assessments included in the report.	Footnotes throughout the EIAR when a source is first cited in each chapter

1.5 EIA Team

1.5.1 This EIAR has been prepared by an EIA team appointed by the Applicant and led by AECOM Ireland.

1.5.2 AECOM is one of the largest environmental consultancies in Europe, with extensive knowledge of EIA, and is one of eight founding members of the EIA Quality Mark scheme, helping the Institute of Environmental Management and Assessment (IEMA) to pilot the scheme prior to its launch in 2011 and maintaining membership ever since. The EIA Quality Mark is a voluntary scheme through which AECOM's EIA activity is reviewed annually by IEMA.

1.5.3 The Quality Mark demonstrates that AECOM EIAs are of high quality, technically sound, independently audited and regularly monitored to high standards. It also underlines AECOM's commitment to continuous improvement of EIA practice across the UK and Ireland.

1.6 Statement of Authority

1.6.1 This chapter was written, and the entire EIAR edited, by Colin Bush, BA(Hons), MSc, CEnv, an AECOM Associate Director from the Environment and Sustainability team with over 18 years' experience in leading and managing EIA projects, including the recent application for a Relevant Action on the Dublin Airport North Runway.

1.6.2 The EIAR was reviewed and approved by Martin Birt, BA(Hons), MSc, MSc, MRTPI a Technical Director from the Environment and Sustainability team with 30 years' experience in leading and managing EIA projects, including projects for expansion of Birmingham Airport, East Midlands Airport and London Luton Airport in the UK.

1.6.3 Technical chapters were written and reviewed by appropriately qualified AECOM staff as set out in the chapters that follow.

2. Alternatives

2.1 Introduction

2.1.1 The requirement to consider alternatives within an EIAR is set out in Annex IV (2) of the EIA Directive (2014/52/EU) which states:

> *"A description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects."*

2.1.2 The EU Commission "Guidance on the preparation of the Environmental Impact Assessment Report" (2017) defines alternatives as:

> *"Different ways of carrying out the Project in order to meet the agreed objective. Alternatives can take diverse forms and may range from minor adjustments to the Project, to a complete reimagining of the Project." That guidance states that the requirement to assess alternatives has been broadened and that: "The level of detail concerning the description of the environmental effects of the Alternatives may be less than for the chosen option. Nevertheless, the aim of the exercise is to provide a transparent and well justified comparison."*

2.1.3 This chapter outlines the alternatives considered to meet the identified needs outlined in EIAR Chapter 1: Introduction and summarised below. It then provides a comparison of the environmental effects and indicates the main reasons why the Proposed Development was chosen.

2.1.4 This chapter was written by Colin Bush, BA (Hons), MSc, CEnv, an AECOM Associate Director from the Environment and Sustainability team with over 18 years' experience in leading and managing EIA projects.

2.2 Need for the Proposed Development

2.2.1 Dublin Airport is unofficially divided into an Eastern Campus and a Western Campus, with the Crosswind Runway (16/34) bisecting the two. The Eastern Campus hosts most of Dublin Airport's infrastructure: the Terminal buildings, aircraft stands, car parking and so forth (see Plate 2-1, below); with the Western Campus mainly used for cargo operations, located on the West Apron, as well as transit and business aviation.

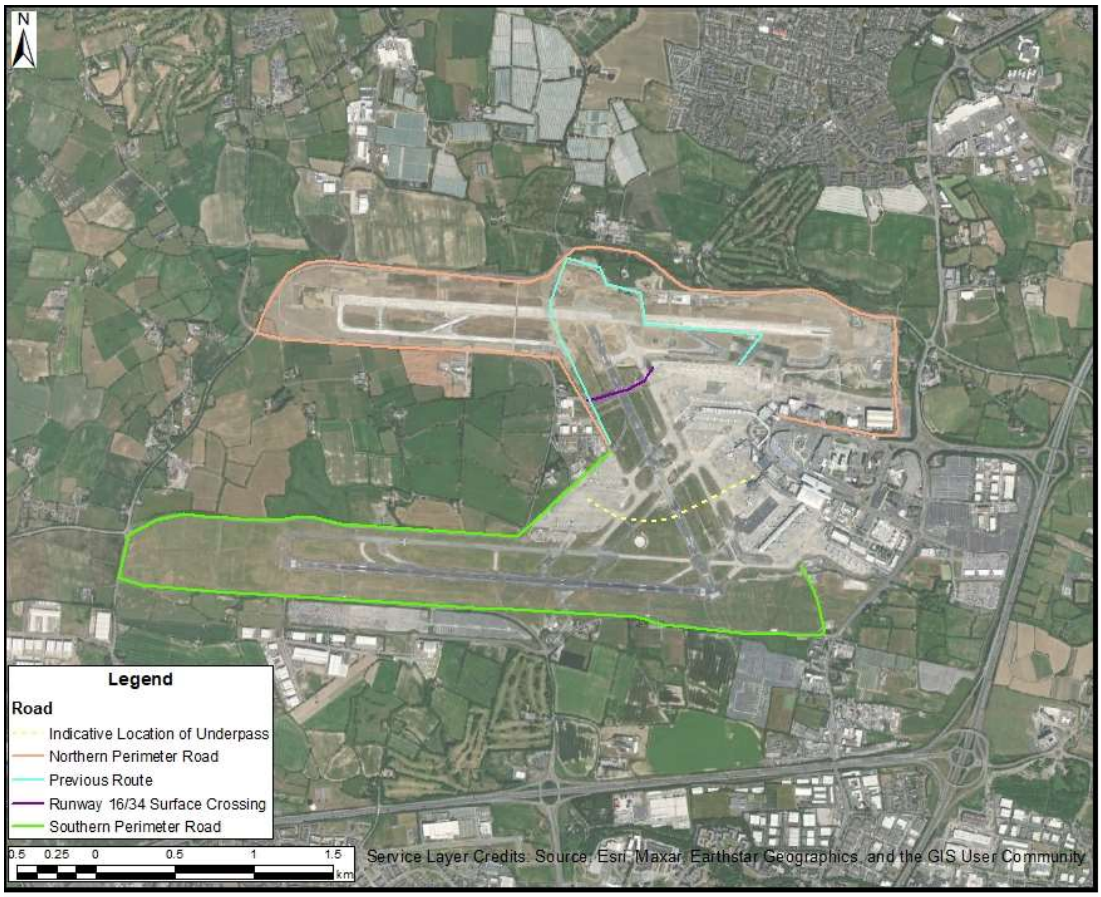


Plate 2-1. Runway 16 Perimeter Road and Other Routes

2.2.2 Access to the West Apron and the rest of the Western Campus has become more difficult as the airport has grown. Prior to the construction of the new North Runway, access to Dublin Airport's western campus - principally the West Apron, and the operations that take place in this location - was via the Runway 16 Perimeter Road or directly across Runway 16/34 under escort (see Plate 2-1).

2.2.3 Now that the North Runway is nearing completion, current access to the West Apron is directly across Runway 16/34 via the West Apron Surface Crossing (purple line in Plate 2-1). This crossing is used under a temporary approval received from the Irish Aviation Authority (IAA-SRD). However, this access is subject to strict Standard Operating Procedures to ensure safety and is not available when Runway 16/34 is operational.

2.2.4 Although Runway 16/34 will only be used as a runway when required by international regulations for safety reasons once the North Runway is operational, it will also be used as an additional taxiway, which will mean that the West Apron surface Crossing will no longer be a viable option to access the West Apron. Instead, cargo vehicles would need to travel around the airport perimeter (see Plate 2-1); a journey of around 8km.

2.2.5 In addition, there will continue to be safety issues involved in crossing operational taxiways, meaning that the West Apron Surface Crossing is not viable as a permanent solution in any case - a point which was underlined by the IAA in a letter dated 21st February 2021, which stated that the underpass was an essential safety improvement (the letter is reproduced in Appendix 2-1).

2.2.6 In summary, the Applicant's objective is to replace the existing access to the West Apron, which is no longer viable, with a new means of access, which is both efficient in operational terms and robust in safety terms.

2.3 Assessment Methodology

Types of Alternatives

2.3.1 An EIAR should provide an assessment of the reasonable alternatives considered. The EPA's 'Guidelines on the information to be contained in Environmental Impact Assessment Reports' (2022) (hereafter referred to as 'the EPA Guidelines') outlines different types of alternatives that should be studied in an EIAR. These include:

- Do Nothing scenario
- Alternative processes
- Alternative locations
- Alternative layouts
- Alternative designs
- Alternative mitigation measures

2.3.2 The different types of alternatives stated in the EPA Guidelines are used within this chapter and discussed below. However, the reasonable alternatives considered by the developer depend on the nature and extent of the project and the objective which the project seeks to achieve, as a result not all the different types of alternatives are necessarily considered relevant.

2.3.3 The Commission's guidance adds several other types of alternatives that might need consideration:

- Nature of the Project
- Timeframes for construction or the lifespan of the Project
- Process by which the Project is constructed
- Equipment used either in the construction or running of the Project
- Site layout (e.g., location of buildings, waste disposal, access roads)
- Operating conditions (e.g., working schedule, timing of emissions)
- Physical appearance and design of buildings, including the materials to be used
- Means of access, including principal mode of transport to be used to gain access to the Project

2.3.4 These alternatives are also considered in this chapter, although where there is overlap with the EPA Guidelines they are excluded.

2.3.5 The approach taken was first to identify where there were reasonable alternatives to all elements of the Proposed Development, then to consider the impact of these alternatives – if any – on the full range environmental factors used in this EIAR. Where an impact was identified, this effect was compared with the assessed effect of the Proposed Development.

2.3.6 An indication of the main reasons for the option chosen, taking into account the effects of the project on the environment and including a comparison of their environmental effects is what is required by the Directive, and this is carried out in a qualitative fashion, using a table to facilitate that comparison. As the EPA notes: *"It is generally sufficient to provide a broad description of each main alternative and the key issues associated with each…A detailed assessment (or 'mini-EIA') of each alternative is not required."*

Limitations and Assumptions

2.3.7 The degree to which it is possible to assess alternatives depends on the amount of information available for each alternative. Alternatives discarded at an early stage of the design process necessarily will not have the same level of information as is available for the Proposed Development. This places limits on the detail possible in the assessments. For example, it is known that two of the alternative routes for the Underpass are substantially shorter than the chosen route of the Proposed Development. This implies that there would be proportionally fewer materials used in construction of these alternatives and that the

construction period would be shorter, however the exact amounts of materials or duration of the alternative programmes is not known.

2.4 Assessment of Alternatives

Introduction

2.4.1 This section explains the work done to select the preferred solution to the problem of reaching the Western Campus from the Eastern Campus and highlights the advantages and disadvantages of each option considered. The reasons why the alternatives comprising the Proposed Development were chosen are set out and the section concludes with a comparison of the environmental effects of each alternative.

Alternatives Considered

2.4.2 Alternatives to the four main elements of the Proposed Development are identified in Table 2-1.

Table 2-1: Alternatives Considered

Alternative	Underpass	Pier 3 Fixed Links and Nodes	Aircraft Stands	Drainage
Processes	Use of non-underpass solutions	None identified	None identified	None identified
Locations	Four alternative underpass routes	Not a reasonable alternative	Not a reasonable alternative	None identified
Layouts	Covered under alternative locations	Shorter fixed links and no fixed links	Pier 3 layout with a smaller number of retained stands	None identified
Designs	Three alternative tunnel configurations	None identified	None identified	None identified
Mitigation Measures	None identified	None identified	None identified	None identified
Nature of the Project	Covered under alternative processes	None identified	None identified	None identified
Timeframes	Not a reasonable alternative	Not a reasonable alternative	Not a reasonable alternative	Not a reasonable alternative
Construction Processes	Tunnelling for Underpass construction	None identified	None identified	None identified
Equipment	None identified	None identified	None identified	None identified
Operating Conditions	Not a reasonable alternative	Not a reasonable alternative	Not a reasonable alternative	Not a reasonable alternative
Physical Appearance	None identified	None identified	None identified	Not applicable
Means of Access	Not a reasonable alternative	None identified	None identified	Not applicable

Do Nothing Scenario

2.4.3 The need for a solution to the problem of reaching the Western Campus from the Eastern Campus is discussed above. As explained there, the imminent opening of the North Runway will mean that the only access route to the Western Campus will be the Northern Perimeter Road and that this is not viable as a permanent access solution. The aviation regulator, the IAA, has requested on safety grounds that an alternative solution is put in place as soon as possible. Doing nothing has therefore been rejected as an alternative. The environmental effects of doing nothing would be as follows:

- Traffic & Transport – no construction traffic would be generated
- Land & Soils – there would be no excavations
- Air Quality – the negligible impact on air quality from construction traffic would not occur

- Water – the small risk of pollution of the Cuckoo stream during construction would not occur
- Noise & Vibration – the negligible impact on noise from construction traffic would not occur
- Biodiversity – there would be no difference in the 'do nothing' scenario as the Proposed Development will not have a significant effect on biodiversity
- Climate – the embedded carbon in the tunnel segments would not be emitted, however there would be higher emissions from the much longer route that operational traffic would be forced to take instead along the Northern Perimeter Road
- Cultural Heritage – there would be no difference in the 'do nothing' scenario as the Proposed Development will not have any effect on cultural heritage
- Landscape & Visual – there would be no difference in the 'do nothing' scenario as the Proposed Development will not have any effect on landscape character or visual amenity
- Material Assets (Waste) – the disposal of excavation and other construction wastes associated with the Proposed Development would not occur
- Material Assets (Built Services) – there would be little difference in the 'do nothing' scenario as the Proposed Development only amends the layout of Pier 3, it's stands and fixed links, and the layout of stands in the West Apron. The environmental effects of this are negligible.
- Major Accidents & Disasters – the use of the Northern Perimeter Road would likely be less safe because the journey durations would be longer, with more scope for accidents to occur
- Population & Human Health – there would be no difference in the 'do nothing' scenario as the Proposed Development will not have any effect on population or health

Reasonable Alternative Processes

Northern Perimeter Road

2.4.4 Use of the Northern Perimeter Road perimeter (pink line in Plate 2-1) is not possible in the event that the Crosswind Runway 16/34 is required for emergency use. The road itself is not currently wide enough for the vehicles that would need to use it and it is unsuitable for winter operations.

2.4.5 More pertinently, the journey of around 8 km would take from 20 to 30 minutes and there could be further delays as traffic would be held up by slow-moving vehicles (e.g., baggage dollies) at intervals along the route. This would seriously impact airport operations, lengthening aircraft turnaround times and thus reducing capacity at the airport.

Southern Perimeter Road

2.4.6 The Southern Perimeter Road perimeter (green line in Plate 2-1) suffers from the same operational problems that come about because of the length of the journey on the Northern Perimeter Road. Moreover, it cannot be used in low visibility conditions and is closed to all but essential authorised daa staff only, to avoid potential interference with Instrument Landing System (ILS) used by aircraft landing at the airport.

Duplication of Eastern Campus Facilities in Western Campus

2.4.7 For some operations duplication of facilities is not practicable. For example, baggage handling requires access to a terminal with appropriate facilities and refuelling needs a source of fuel. These are all provided in the Eastern Campus and re-providing them in the Western Campus would be very expensive, would take a long time to construct and require a lot of land to be freed up for these purposes. In addition, there would be ongoing costs to operators from the duplication of equipment and loss of operational efficiency. Even if this could be achieved there would still be a residual requirement to transfer passengers and baggage between the Eastern and Western Campus, necessitating an underpass.

Closure of Runway 16/34

2.4.8 Closure of Runway 16/34 with a view to facilitating access to the West Apron is an option but is not supported by the IAA and airlines as it is required as a taxiway and for crosswind operations. Even if this

position were to change it would still be needed as a taxiway and the safety issues arising from the unnecessary interaction between taxiing aircraft and ground vehicles would still persist.

Underpass

2.4.9 The permanent solution which best suits the operational and regulatory requirement to provide safe, efficient, dedicated access to the Western Apron that avoids interfaces with operational runways and taxiways is to construct an underpass beneath the taxiways and Runway 16/34.

Comparison of the Environmental Effects

2.4.10 The environmental effects of the alternatives processes are compared below, in Table 2-2, examining the potential effects upon the range of environmental factors considered in this EIAR and comparing these to the predicted effects of the Proposed Development. This table summarises the effects by exception; that is, where for a given environmental factor no substantive difference between any of the alternative processes is identified, the factor is excluded from the table.

Table 2-2: Environmental Effects of the Alternative Processes

Process	Air	Land & Soils	Water	Noise & Vibration	Climate Change	Material Assets (Waste)	Material Assets (Built Services)	Human Health
Proposed Development	Potential dust from construction vehicles	Temporary excavations	Temporary diversion of Cuckoo stream	Traffic noise during construction	Embodied carbon in materials used	Excavation waste	Changes to drainage network	Non-significant construction noise amenity impact
Northern Perimeter Road	Negligible Effect	Minor works only	Negligible Effect	Negligible Effect	Greater operational fuel use	Negligible Effect	Negligible Effect	Negligible Effect
Southern Perimeter Road	Negligible Effect	Minor works only	Negligible Effect	Negligible Effect	Greater operational fuel use	Negligible Effect	Negligible Effect	Negligible Effect
Duplication of Eastern Campus Facilities in Western Campus	Potential dust from construction vehicles	Would likely have a large footprint and land take	Unknown	Likely some traffic noise during construction	Embodied carbon in materials used	Likely some excavation waste	Likely change to drainage network	Some construction noise amenity impact
Closure of Runway 16/34	Negligible Effect	Negligible Effect	Negligible Effect	Negligible Effect	Negligible Effect	Negligible Effect	Loss of taxiway	Negligible Effect

Reasonable Alternative Locations

2.4.11 Four alterative locations were studied by the Applicant. These are shown in Plate 2-2 below and comprise:

- Northern 5G Underpass – a link between Apron 5G and the West Apron
- Pier 1 Underpass – a link between Pier 1 and the West Apron
- Central Underpass – an alternative most closely corresponding to the Proposed Development
- Southern Underpass

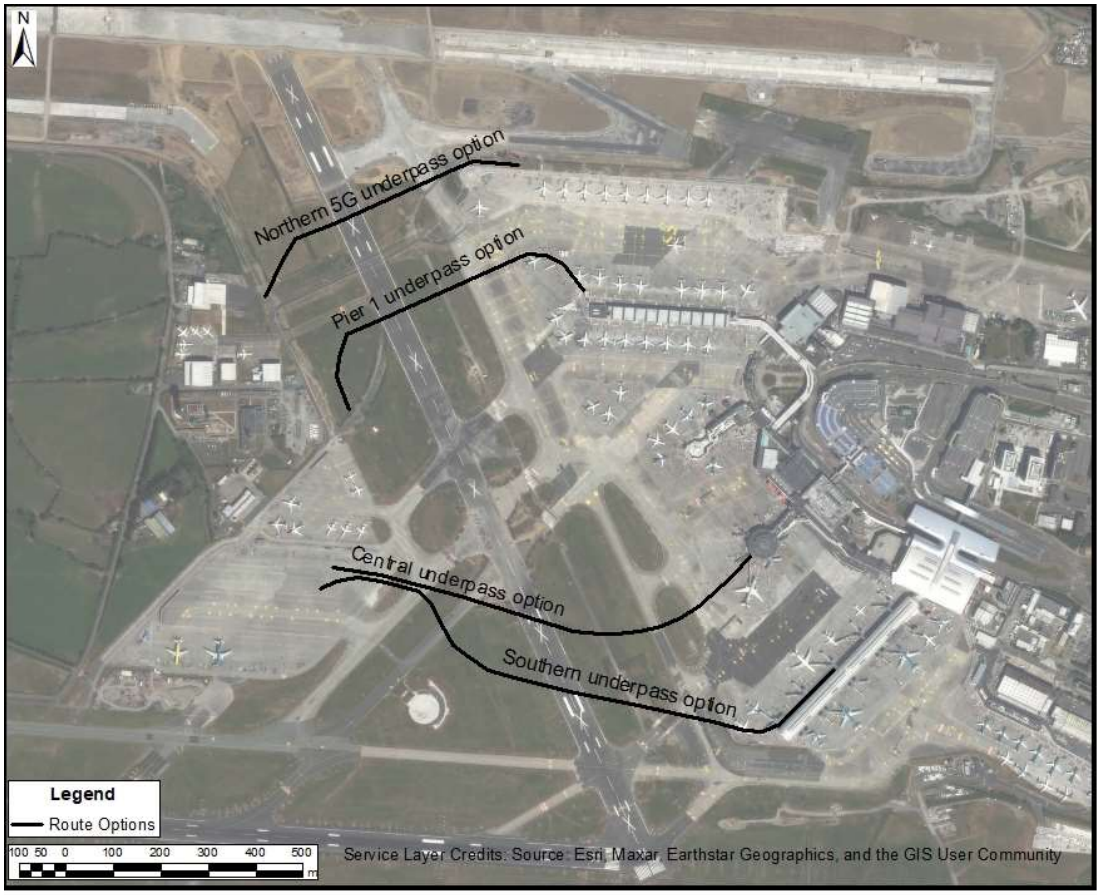


Plate 2-2: Alternative Route Options

2.4.12 The four alternatives considered had the following advantages and disadvantages, as set out in Table 2-3, below.

Table 2-3: Summary of Route Options

Route Option	Advantages	Disadvantages
Northern 5G Underpass	Shortest construction period Least stand disruption and conflict with airfield operations	Conflicts with future triple Wide Body taxiway network Aircraft apron / road conflict at Taxiway.C crossing Closure of taxiway for up to three weeks during construction
Pier 1 Underpass	Most direct access to West Apron Short, though not shortest, construction period	Western ramp would conflict with future Taxiway Whiskey Loss of one Narrow Body Equivalent (NBE) stand Conflicts with Terminal 1 pedestrians and would need over road fixed links and Vertical Circulation Core

		Island worksite requiring surface crossing for construction access
Central Underpass	Most direct access to West Apron Similar travel times from Terminal 1 and Terminal 2 to future satellite pier	Pier 3 stands would require realignment and extended fixed links Apron Taxiway 4 lost May complicate possible future Pier 3 extensions
Southern Underpass	Direct access from US Customers and Border Protection to West Apron and future satellite pier	Up to 6 Vertical Circulation Cores and 12 airbridges require relocation and modification Needs to consider operation of taxiways during construction Construction presents substantial stand availability challenges

2.4.13 The central underpass option was preferred to the southern underpass on grounds of construction costs. Whilst the central underpass was both more expensive and more complex to build than the Northern 5G underpass and the Pier 1 underpass options, it was considered to perform better operationally, giving the best travel times to the West Apron, and the least conflict with vehicle and aircraft taxi routes.

Comparison of the Environmental Effects

2.4.14 The environmental effects of the alternatives route options are compared below, in Table 2-4, using the environmental factors considered in this EIAR. This table again summarises the effects by exception. Where a factor is not shown, while it has been considered, no impact has been identified.

Table 2-4: Environmental Effects of the Alternative Route Options

Route	Land & Soils	Water	Noise & Vibration	Climate Change	Material Assets (Waste)	Material Assets (Built Services)
Proposed Development	Excavations	Temporary diversion of Cuckoo stream	Traffic noise during construction	Embodied carbon in materials used	Excavation waste	Changes to drainage network
Northern 5G Underpass	Smaller excavations	Unknown	Less traffic noise during construction	Less embodied carbon in materials used	Less excavation waste	Likely change to drainage network
Pier 1 Underpass	Smaller excavations	Unknown	Less traffic noise during construction	Less embodied carbon in materials used	Less excavation waste	Likely change to drainage network
Southern Underpass	Larger excavations	Unknown	More traffic noise during construction	More embodied carbon in materials used	More excavation waste	Likely change to drainage network

2.4.15 The environmental effects of these alternatives are broadly similar and were not a consideration in the selection of the preferred alternative. Effects of the rejected options on the water environment are unknown because the designs did not progress to a stage where detail of their dimensions and depth below ground, required to consider this matter, was known.

Reasonable Alternative Layouts

2.4.16 Alternatives to providing fixed links from Pier 3 to the aircraft stand could include:

- Shorter links
- No links, with passengers walking across the tarmac to the aircraft and climbing steps to board it

2.4.17 In both cases there would be a small decrease in the use of materials as part of the Proposed Development but otherwise little difference in the environmental impacts between these alternatives and the fixed links adopted for the Proposed Development. The fixed links in the Proposed Development essentially replace existing fixed links that are already part of Pier 3 but make better use of space than would the alternative shorter links by allowing more aircraft to be accessed through links rather than by walking across the tarmac to the aircraft. Fixed links, whether longer or shorter, are inherently safer than the alternative of walking across the tarmac since passengers are kept physically separate from vehicles also accessing the stand.

2.4.18 Layouts for the drainage design were driven entirely by the design of the Underpass itself and so no alternatives were considered.

2.4.19 An earlier version of the Proposed Development envisaged the loss of five NBE stands but after work to optimise the layout was undertaken it was found to be possible to retain more of the existing stands around Pier 3, resulting in the current proposed loss of three NBE stands. As the Proposed Development does not alter the number of aircraft movements or increase capacity at Dublin Airport the principal effect of the alternative would be slight lower operational efficiency and flexibility as a result of having fewer stand available at Pier 3. The environmental differences would be negligible.

Reasonable Alternative Designs

2.4.20 Three alternative tunnel configurations were considered. Firstly, a single cell option, that met the original minimum requirements at the Capital Investment Plan (CIP) stage, featuring 2 lanes, each wide enough for vehicles up to 5 m.

2.4.21 Secondly, a single cell option, similar to the CIP stage design, which in addition to the 2 lanes, each wide enough for vehicles up to 5 m, also included passing points at selected locations. It was envisaged that two passing points would be provided in each direction, to allow slower moving vehicles, such as baggage dollies to pull in and be passed by priority vehicles, such as passenger transfer buses. This option is referred to as the CIP+ option.

2.4.22 Thirdly, a twin cell section variant, which provided a lane for faster vehicles up to 2.8 m wide and a lane for slow moving vehicles up to 4.1 m wide in each cell. This option is referred to as the CIP++ option.

2.4.23 Regarding journey times, the CIP++ option was preferred as this section allows general traffic to move through the underpass without being obstructed by slow moving traffic such as baggage dollies. Moreover, it was considered to be the only option that could reliably meet the 10-minute gate-to-gate time.

2.4.24 Similarly, the robustness of the CIP++ option allows the underpass to remain operational in the event of a breakdown, incident or maintenance work by allowing vehicles to pass the incident (without requiring overtaking in contraflow) or keep traffic flowing in one cell using a traffic light system while the incident is addressed.

2.4.25 Safety is also improved due to the additional cell in the CIP++ option, removing the possibility of head-on collisions in the enclosed section. Access and egress for Fire and Rescue teams is better than in the single cell CIP+ option, as the non-incident cell can be used. This is likely to shorten the time taken to recover from any incident and allow the underpass to return to normal operations sooner.

2.4.26 Based on these results, the CIP++, twin-cell alignment is considered the most suitable arrangement to meet the functional requirements established by daa in terms of safety, robustness and resilience.

Comparison of the Environmental Effects

2.4.27 The environmental effects of the alternatives designs are compared below, in Table 2-4, using the environmental factors considered in this EIAR. While all factors have been considered, this table again summarises the effects by exception.

Table 2-4: Environmental Effects of the Alternative Designs

Design	Climate Change	Material Assets (Waste)
Proposed Development	Embodied carbon in materials used	Excavation waste
CIP Option	Less embodied carbon in materials used	Less excavation waste
CIP * Option	Less embodied carbon in materials used	Less excavation waste

2.4.28 The environmental effects of these alternatives are broadly similar and were not a consideration in the selection of the preferred alternative.

Alternative Mitigation Measures

2.4.29 No alternative mitigation measures have been identified in the technical chapters of this EIAR.

Alternative Timeframes for Construction of the Project

2.4.30 This is not considered a reasonable alternative to consider, since the Proposed Development is a safety critical project and is needed as soon as possible.

Alternative Construction Processes

2.4.31 An alternative considered for construction of the Underpass was tunnelling, using one or more tunnel boring machines. This would have the advantage that Runway 16/34 would not need to be closed for six months during the construction programme, but technical considerations caused this option to be rejected because experience of tunnelling in the rock formation underlying the airport has shown this to be difficult owing to the strength and stiffness of the till. Cost was also a consideration as the tunnel boring machine(s) would need to be purchased.

2.4.32 The environmental effects of this alternative are not likely to be very different to that of the preferred cut and cover option. For instance, the amount of waste to be taken off site would be much the same leading to similar indirect effects on noise and air quality arising from construction transport.

Alternatives to Equipment Used

2.4.33 The main alternative to the equipment proposed for use in construction of the Underpass would be a tunnel boring machine. The reasons why cut and cover is preferred and the environmental effects of the alternative are discussed immediately above.

Alternative Operating Conditions

2.4.34 This alternative is not considered reasonable as the only meaningful alternative to the 24-hour use of the Proposed Development would be to use it for only part of the day. There is no reason why that would be desirable and so it is not assessed here.

Alternative Physical Appearance and Design of Buildings

2.4.35 Alternatives to the physical appearance and design of buildings were not considered by the Applicant. The changes to Pier 3 are very minor, mostly internal and driven ultimately by the changes to the fixed links and nodes connecting to the pier.

Alternative Means of Access

2.4.36 There is no reasonable alternative to accessing the Underpass other than the ramps forming part of the Proposed Development, which are simple and require no energy to operate them as, for example, would a lift arrangement.

2.4.37 Passenger access to and from Pier 3 is discussed above in the context of alternative site layouts.

2.5 Conclusions

2.5.1 The permanent solution which best suits the operational and regulatory requirement to provide safe, efficient, dedicated access to the Western Apron that avoids interfaces with operational runways and taxiways is to construct an underpass beneath the taxiways and Runway 16/34. Compared with the other alternatives that have been studied, this has the advantage of providing quick, safe access from the Eastern Campus to the Western Campus.

2.5.2 The main alternatives studied concerned:

- Whether an alternative process (other than an underpass) was a viable option. It was determined that none were reasonable alternatives as they did not meet the operational requirement for safe and efficient access to the Western Campus.
- Which of the four alternative routes was the best solution? The route most closely matching the that of the Proposed Development was preferred as it best met the operational requirement.

- Which of three potential internal configurations for the tunnel was most appropriate? The twin cell configuration adopted for the Proposed Development was considered to best meet the operational requirement, providing the safest and most efficient means of access to the Western Campus.

2.5.3 Other alternatives are discussed in this chapter but were not studied by the Applicant.

2.5.4 The environmental assessments show that the main alternatives have broadly similar environmental impacts and there would be little difference in the environmental outcomes between the main alternatives studied, albeit that these might vary slightly in magnitude. In particular, it is noted that the Central Underpass option would be preferable in terms of material use compared with the Southern Underpass, which is longer, although the Central Underpass would require more materials than the other two shorter options.

3. Proposed Development

3.1 Introduction

3.1.1 This chapter of the EIAR describes the Proposed Development, including information on the site, design, size and other relevant features of the project, its physical characteristics, use of materials and emissions associated with it, both during construction and operation. The chapter also sets out the likely construction programme and activities, including proposed mitigation methods for on- and off-site construction environmental impacts. The full requirements of the EIA Directive are listed in Chapter 1: Introduction.

3.1.2 A description of how an underpass became the preferred solution to the question of linking the East and West campuses, and how the design of the Proposed Development was chosen is provided in Chapter 2: Alternatives.

3.1.3 This chapter was written by Colin Bush, BA (Hons), MSc, CEnv, an AECOM Associate Director from the Environment and Sustainability team with over 18 years' experience in leading and managing EIA projects.

3.2 Application Site Context

Dublin Airport

3.2.1 The Application Site is located entirely on land owned by the Applicant, mainly within the boundary of Dublin Airport itself, which sits to the north of the city of Dublin. Dublin City Centre is circa 10 km to the south, while the town of Swords is circa 2 km to the north.

3.2.2 The airport campus is framed by a high-capacity road network - the M1 motorway is to the east, the M50 to the south, and upgraded N2 to the west. The primary access to the airport is located at the eastern site boundary via the airport roundabout, which links with a major motorway junction on the M1 and the Swords Road (R132).

Operational and Other Buildings

3.2.3 Within Dublin Airport there is a complex of operational buildings such as terminal buildings and piers. The terminal buildings are arranged in a horseshoe configuration, as shown in Plate 1-1 (Chapter 1: Introduction) along with ancillary uses such as car parking facilities. Operational buildings include the Old Central Terminal Building, Terminal 1, Terminal 2 and their associated pier structures as well as airfield, cargo and other operational buildings.

Runways

3.2.4 Dublin Airport has two main runways: the South Runway (10/28) (2,637 m long) and a Crosswind Runway (16/34) (2,071 m long). Runway 10/28 is set out on an east-west axis to the south of the Application Site, whilst Runway 16/34 crosses the Application Site in a roughly north-south direction.

3.2.5 Planning permission has been granted for a new 3,110 m North Runway[1], 1.6 km north of the existing main runway (Reg. Ref. F04A/1755; ABP Ref. 217429). Construction of the runway is almost complete, and it is expected to begin operations in August 2022.

Taxiways

3.2.6 The existing taxiway system facilitates the safe and efficient movement of aircraft to and from aircraft stands to and from the runways. The South Runway 10/28 has one parallel taxiway. The North Runway has been designed with a parallel taxiway system and a series of rapid exit taxiways.

[1] A planning application to amend the physical configuration of the North Runway and taxiways was approved in March 2020 (FCC Ref F19A/0023, ABP Ref. PL06F.305298)

3.3 Application Site

Application Site Baseline

3.3.1 The Application Site, shown in Figure 3-1, is 34.06 hectares in extent and comprises:

- Part of Pier 3 and the aircraft stands, fixed links and nodes to the north of the pier
- Two sections of the West Apron
- Sections of the taxiways and Runway 16/34 between Pier 3 and the West Apron
- Two landside sites, one to the north-west of the airport (south of the R108) and the other to the south-west (north of the R108)

Pier 3

3.3.2 The Pier 3 decagon comprises of four levels including Level 30 office accommodation, Level 20 departure gates with open lounges, Level 15 mezzanine providing access to the fixed links and nodes and Level 10 arrivals immigration hall. The existing arrangement of Pier 3 and the surrounding stands is shown in Plate 3-1, below.

Plate 3-1: existing arrangement of Pier 3 and the surrounding stands

West Apron

3.3.3 At present, the West Apron is used for cargo operations, general aviation, transit flights and contingency parking of aircraft. There are no piers or terminal buildings in this location. Facilities in vicinity of the West Apron include the IAA control towers and Dublin Airport Fire Station, located to the northwest. Only part of the West Apron is included within the Application Site, again as shown in Figure 3-1. This comprises only the apron itself and does not include any buildings.

3.3.4 An indication of the number of vehicles currently using the existing Runway 16/34 Surface Crossing to the West Apron is given by the figures provided by the Applicant for vehicle movements in March and April 2020, which were 2,338 and 2,645 respectively. Although taken from the start of the Covid-19

lockdown period, these figures remain representative since the main impact of the lockdown restrictions was on passengers flights, cargo operations continued largely as normal. These numbers are not thought likely to be affected by the imminent opening of the North Runway, which is not expected to change the number of internal vehicle movements.

Taxiways and Runway 16/34

3.3.5 The taxiways within the Application Site (F2, W1, W2 and Apron Taxiway 4) and Runway 16/34 are hardstanding with grassed surfaces separating them, as can be seen in Figure 3-1.

Construction Compounds

3.3.6 Two compounds are proposed within the daa landholding but outside the operational airport boundary, as shown in Figure 3-1. The north-western compound currently comprises an existing compound, which was used in the construction of the North Runway, and a field which may be or have recently been in agricultural use. The south-western compound is currently a field with some existing hard standing.

Environmental Features

Cuckoo Stream

3.3.7 The principal environmental feature of the Application Site is the Cuckoo stream, which passes underneath the taxiways and the proposed location of the Underpass roughly speaking from north-west to south-east. The Cuckoo stream is culverted and runs entirely below ground within the Application Site and emerges from the culvert downstream (within the wider Airport campus). The Cuckoo stream has long formed part of the Airport's drainage infrastructure. Details of the condition of the Cuckoo stream can be found in Chapter 7: Water. Although currently of little importance for biodiversity in its own right, it does form a pathway with a theoretical connectivity to the Baldoyle Bay SAC / SPA.

Other Environmental Features

3.3.8 There are no other valuable environmental features within the Application Site. The surface is either hardstanding (aircraft stands and taxiways) or grassland which has no value as a habitat and is actively managed to be kept clear of birds that might cause a safety risk to aircraft.

3.4 Description of the Proposed Development

Overview

3.4.1 The Proposed Development consists of four key elements:

- A subterranean Underpass of Runway 16/34 including ramps and portals, plantroom, and all attendant access roads at surface level to tie in with the existing airside road network. The Underpass will provide vehicular access between the Eastern Campus (accessed close to Pier 3) and the West Apron.
- Relocation of aircraft stands at Pier 3 to accommodate access roads to serve the Underpass. Works include introduction of new nodes, fixed links and airbridges, to provide passenger access to the relocated stands, while accommodating the Underpass footprint where it interacts with existing apron and aircraft stands. This will result in a net loss of three Narrow Body Enabled (NBE) stands and net gain of one Wide Body (WB) stand in the East Campus.
- Modifications to Pier 3 (including revised internal layout and breaking through the facade) to accommodate the proposed Fixed Links and Airbridges. These new fixtures will span the apron and roads below and ensure safe and efficient passenger access to aircraft stands.
- Drainage works including temporary diversion of the Cuckoo Culvert and local attenuation.

3.4.2 The Proposed Development also includes:

- Use of a site adjacent to the existing Western Compound located near the R108, landside, north-west of the Airport, for deliveries going airside, to include an airside pass office, car parking and bus parking for construction staff.

- The provision of a new Southern Compound also on the R108, to the southwest of the Airport.
- One main compound located on the West Apron.

3.4.3 In addition, it is proposed to take the opportunity afforded by the excavations for the Underpass to install six inert pipes alongside it which will form part of the future drainage network at Dublin Airport. The rest of this network will be the subject of a future planning application, with the six pipes serving no function unless and until the future drainage network receives planning consent.

3.4.4 To facilitate this work, it will be necessary to demolish and reinstate part of the pavement surfaces of Apron Taxiway 4, Taxiway F-2, Runway 16/34 (the Crosswind Runway), Taxiway W1 and W2, and the West Apron.

3.4.5 No net additional aircraft stands or aviation or increase in passenger activity are proposed as part of the Proposed Development and the existing 32mppa Cap remains in place. The stand impact in the east and the west is provided in Table 3-1 below. It is envisaged that a planning application for stands to replace those lost will be made in the medium term.

3.4.6 Each of the key elements are discussed in turn in the paragraphs that follow.

Underpass of Runway 16/34

3.4.7 The central element of the project is a twin-cell enclosed subterranean tunnel linked to the surface by two ramps, one at each end. The enclosed section of the Underpass is approximately 0.7 km long with the overall alignment being approximately 1.1 km in length from top of ramp to top of ramp (see Figure 3-2, showing 53 twin-cell segments in the enclosed section). It will be approximately 24m in width and 5.50m in height from road to tunnel ceiling, with an overall height of approximately 8.75m. It will be up to 13.9m below existing ground level at low point of the structure, or 17.5m below existing ground level including the drainage sump.

The proposed eastern portal is entered via a ramp which wraps around the north of Pier 3, before descending into the enclosed tunnel section.

3.4.8 On the West Apron, from the enclosed tunnel section, the Underpass will transition to a ramp at a portal located outside the wingtip clearance of Taxiway W-2. From this point the ramp will continue to climb and turn to the left reaching ground level at the north of the West Apron

3.4.9 A cross-section of a typical twin-cell is shown below, in Plate 3-2:

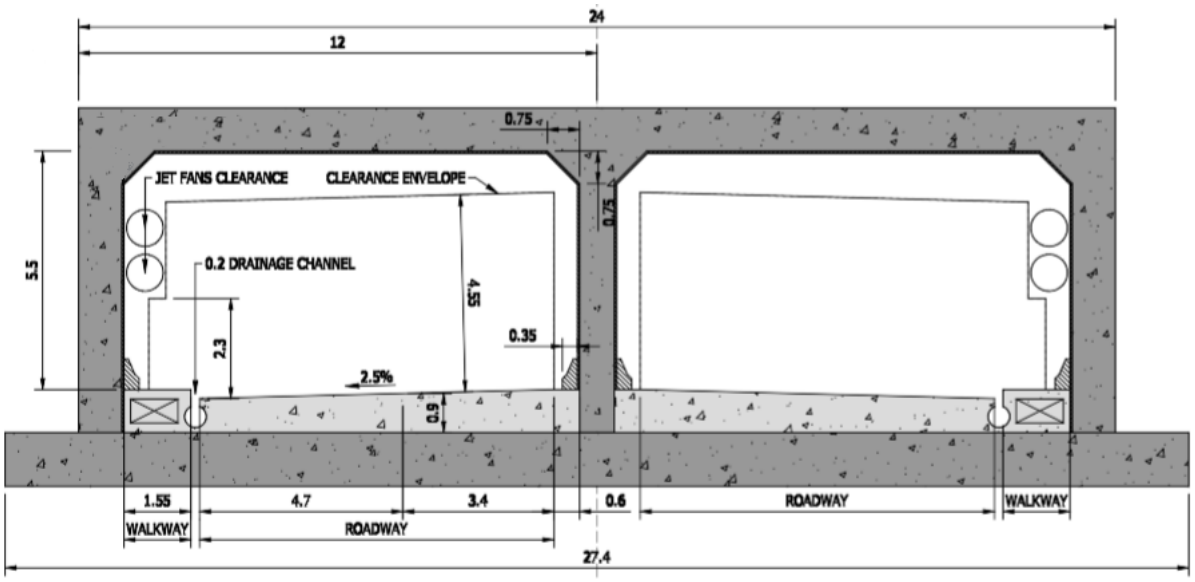


Plate 3-2: Twin-cell cross-section

3.4.10 A plant room comprising housing for transformers, pumps, controls and communications equipment (see Plate 3-3) is proposed at the portal of the east ramp, which will have a floor area of approximately 625m².

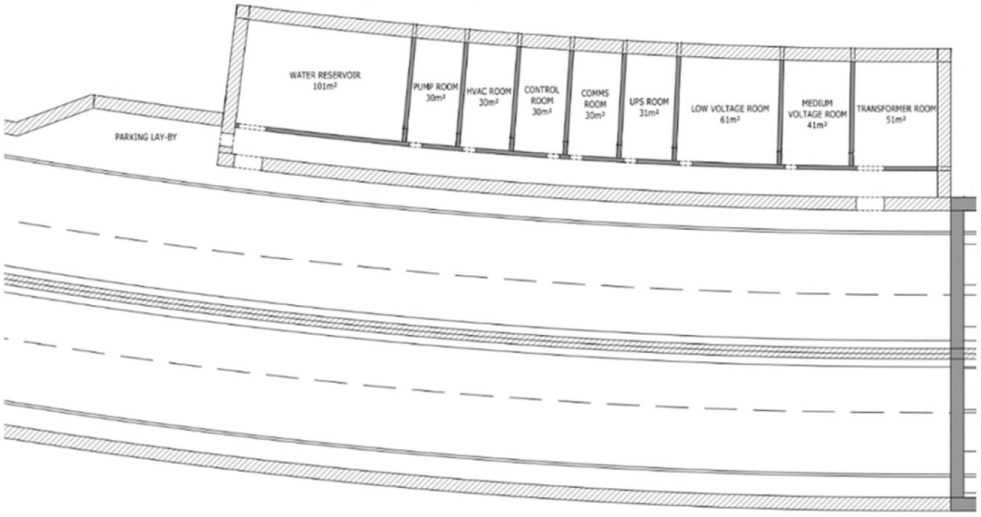


Plate 3-3: General Arrangement of Plant Room

Relocation of Aircraft Stands

3.4.11 The Underpass introduces an access ramp, portal and airside road positioned to the north of the Pier 3. The airside road connects with the existing airside road network adjacent to Terminal 1. This road requires a height clearance of 4.55m for vehicles passing through the Underpass. Additionally, a realigned road to the north of Pier 3 is required, also requiring a height clearance of 4.55m.

3.4.12 The stands to the north of the Pier will be reconfigured to include two Code E stands for wide-bodied aircraft with wingspans of up to 65m, one of which is reconfigured as a Multiple Aircraft Ramp System (MARS) stand. This involves no construction works, merely the repainting of the boundary lines. The new inter-stand clearway roads between these centrelines require a height clearance of 4.4m. The existing stand arrangement to the south of the pier is retained with the exception of a realigned centreline for Stand 315L. The number of stands lost and gained at Pier 3 is set out in Table 3-1 below.

Table 3-1: Aircraft Stand: Pier 3

Stands	NBE	WB
Current	12	4
Proposed	9	5
Difference	-3 NBE	+1 WB

3.4.13 There is no change to the number of stands in the West Apron as can be seen in Table 3-2 below, however the stands do need to be reconfigured / realigned to accommodate the Underpass portal.

Table 3-2: Aircraft Stands: West Apron

Stands	NBE	WB
Current	16	8
Proposed	16	8
Difference	None	None

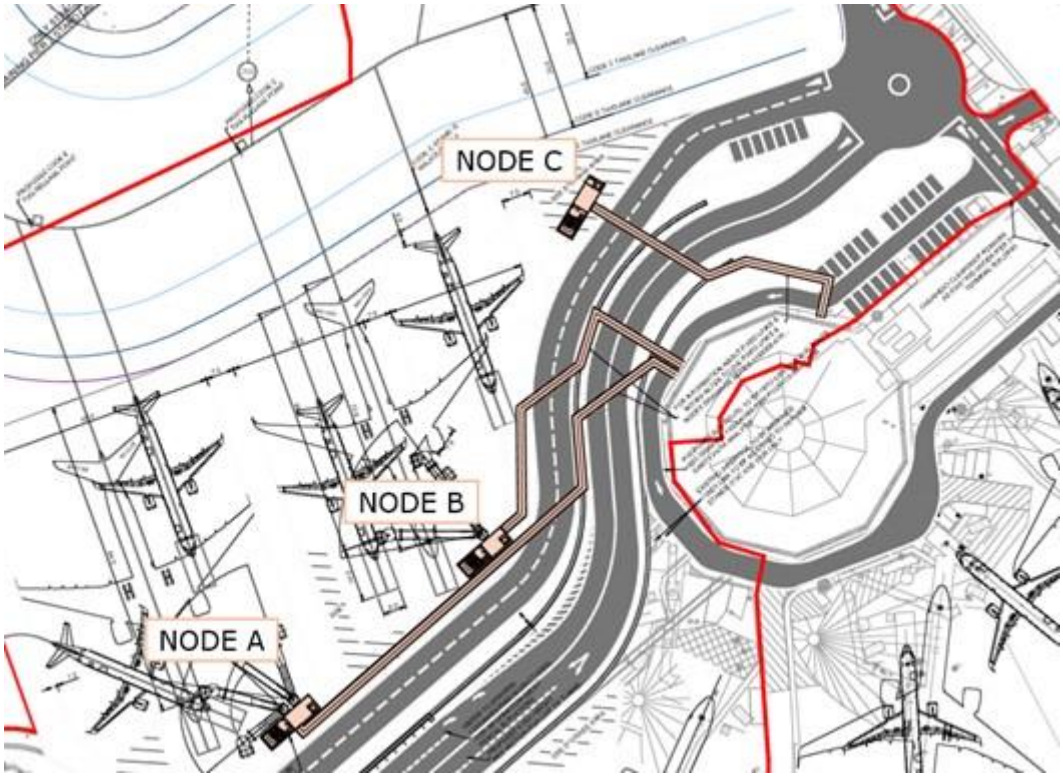


Plate 3-4: Revised Stand Layout and Proposed Nodes and Links

3.4.14 The revised stand arrangement drives the need for new fixed links and nodes (shown in Plate 3-4) to connect the relocated stands to the Pier 3 decagon, enabling passengers to safely and efficiently board the aircraft. The works will include demolition of fixed links and nodes, with associated airbridges serving three aircraft stands, at Level 20 (departure gates) of Pier 3 (approximately 97m^2). To the south of Pier 3, an existing airbridge is to be removed and an existing fixed link is to be adjusted to service existing stands in that area.

3.4.15 The demolished fixed links will be replaced with three new fixed links:

- A: approximately 356m^2 in area and approximately 150m long
- B: approximately 227m^2 in area and approximately 95m long
- C: (approximately 170m^2 in area and 70m long

3.4.16 All three will be approximately 2.2m in width, with walkways of a maximum height of approximately 7.1m above the surrounding apron.

3.4.17 Three replacement two-storey nodes are proposed. These are nodes A, B and C, will be approximately 157m^2, 154m^2 and 148m^2 in area respectively.

Modifications to Pier 3

3.4.18 New fixed links will connect and span from Level 20 where the departure gates are located. Fixed Link A will serve passengers from gate lounge 303, Fixed Link B passengers from gate lounge 302 and Fixed Link C passengers from gate lounge 301. These arrangements are shown in Plate 3-4, above.

3.4.19 Modifications to the elevations of Pier 3 at Level 20 are proposed to accommodate the links and airbridges, including part replacement of the existing glazing with new glazing/cladding, and a new cladded portal with new doors and access control at each new fixed link location. Rearrangement of part of the internal floorspace of Level 20 is also required, including a new partition between the entrance/ exits of proposed fixed links A and B to ensure full segregation of departing and arriving passengers. These are shown in Plate 3-5 below.

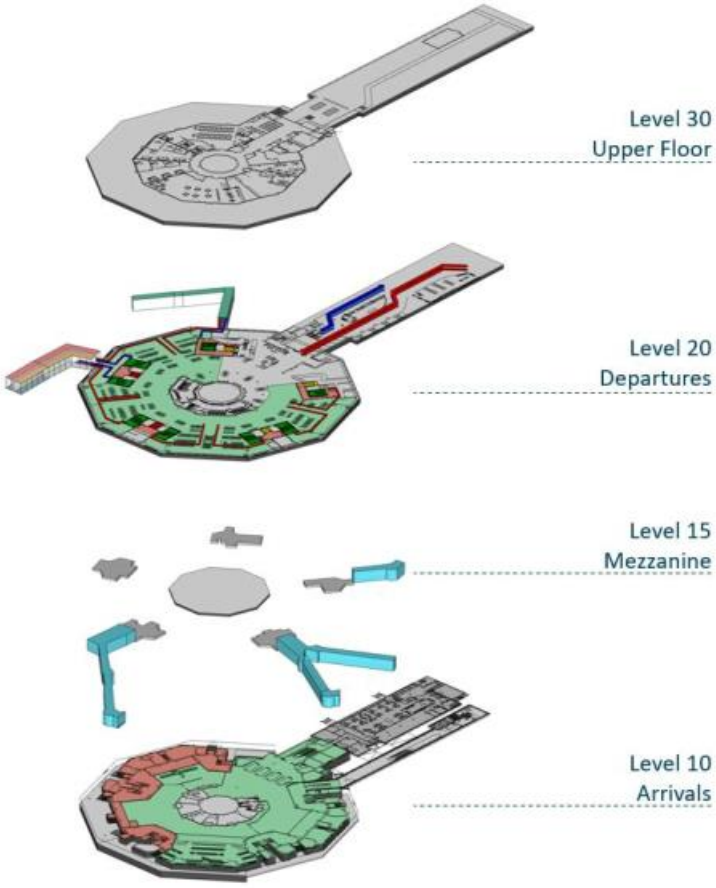


Plate 3-5: Pier 3 Internal Works

3.4.20 Fixed Link C has been positioned to join the departures level where it has the least impact on the existing food and beverage concession. Due to the retained stand arrangement to the south of the pier, no changes are required to the fixed links and gate lounges serving these stands. These changes do not provide additional passenger or operational capacity to the airport.

Drainage Works

Drainage of the Underpass

3.4.21 The Underpass drainage works from Pier 3 to the West Apron include:

- Clean surface water drainage
- Potentially polluted surface water drainage
- Contaminated flow from fuel spillage or use of fire suppression system

3.4.22 The proposed clean surface water drainage is designed to convey the rainfall generated within the Underpass portals/ramps to the low point and sump pump system via combined kerb drainage. The clean flow will be pumped back up to surface level for discharge to the Cuckoo stream network via below ground attenuation tank and flow restriction set to match greenfield runoff rates (based on the area of the ramp). The pump will encompass emergency storage to ensure protection against failure of the pump system. The existing surface water catchments at ground level will be retained where possible with appropriate diversions provided to ensure the existing surface water regime is maintained at ground level. Drainage at ground level including Pier 3 and the West Apron will continue to discharge as existing to the Cuckoo stream network.

3.4.23 Potentially polluted surface water drainage (by fuel spillage or fire events) will run through the same collection system as the surface water network and will pass through a fuel interceptor prior to discharging to the pumped network.

3.4.24 In addition to the fuel interceptor, a fire suppression system will be installed within the Underpass. This will include an automated valve system and separate contaminated storage tank. Should there be a major spillage event or fire, contaminated flow is to be diverted to the contaminated storage tank. The tank will then be emptied via a dry riser by a tanker at surface level.

3.4.25 It will be necessary to temporarily divert a section of the existing Cuckoo stream during the construction period. The proposed diversion will be predominantly via temporary pipework and short term over pumping.

3.4.26 The proposed design of the new drainage infrastructure includes the decommissioning and removal of existing infrastructure that is redundant or is an obstruction to the provision of the new drainage system. The construction of proposed infrastructure and decommissioning of existing infrastructure will be phased such that there is no reduction in the total available storage volume of existing systems for either clean or polluted surface water runoff at any point during the project.

3.4.27 As part of the drainage design, a trunk pipeline is required to convey flow from the realigned surface water network in the West Apron to the existing Airfield Trunk Culvert. However, the future airport drainage network proposes a trunk pipeline designed to convey flows from future developments to the west of the airfield, whose alignment would overlap significantly with the required West Apron trunk pipeline line. The Underpass drainage design now incorporates additional hydraulic capacity, such that a single pipeline can serve both the West Apron outflows and the future airport drainage network.

3.4.28 Additionally, the future airport drainage network includes two trunk drainage pipeline routes which are not required to convey flows from the Proposed Development, but which follow a similar alignment to that of the Underpass from the west to the east of the airfield. It is therefore proposed to construct these sections of pipeline as part of the Proposed Development to avoid repeat construction along this route in future. However, the six pipes will serve no function and will not be capable of use unless and until the future drainage network receives planning consent and is constructed.

Construction Compounds

Main Construction Compound

3.4.29 The main construction compound will be located at the southern end of the West Apron. This will contain site offices, most of the storage / laydown facilities and plant for concrete crushing and batching.

Western Compound

3.4.30 A new western compound at a site located to the north-west of the airport, and adjacent to the existing compound that was used for construction of the North Runway, will be utilised to facilitate construction of the Proposed Development. This will provide a pre-screening facility to be used by all deliveries going airside and thus needing to pass through airport security. An airside pass office will also be established there. Some car parking and staff bussing will also be provided, which would be used by the workforce at the Underpass works.

Southern Compound

3.4.31 An existing area of hard standing to the south-west of the airport will be utilised as a lorry waiting area for HGVs. No works are required at this southern compound. This compound will be used as a contingency in the event of queuing at the airside gates in order to avoid queuing on the public road. Provision is also made for additional materials storage.

3.5 Construction of the Proposed Development

3.5.1 The construction works will comprise:

- Enabling works comprising service diversions and construction logistics facilities
- Temporary re-routing of some airport operations
- Civils works relating to the construction of the Underpass, ramps, portals and the plantroom
- Mechanical, electrical, instrumentation, control and automation installations

- Minor reconfiguration of existing Pier 3 and West Apron interfaces
- Associated infrastructure works including airfield and general services, surface water attenuation and pollution control

3.5.2 The general civil and structural works include the following activities:

- Excavation (including removal of existing paved areas and diversion of shallow utilities)
- Construction of concrete structures
- Backfilling around and above the structure
- Reinstatement of runway, taxiways and aprons (where applicable) including shallow utilities / airfield ground lighting (AGL)

3.5.3 The Underpass is proposed to be constructed using a bottom-up cut-and-cover method, with the general approach illustrated in Plate 3-5 below. The bottom-up method is a form of construction which can be adopted for a cut-and-cover tunnel, in which the excavation is made from the ground surface. The tunnel is then constructed within this excavation. The tunnel may be constructed of in-situ concrete, precast concrete, precast arches or corrugated steel arches. The excavation is then backfilled and the surface reinstated. This method has the benefit of allowing good access to the construction area but means that the surface reinstatement happens last.

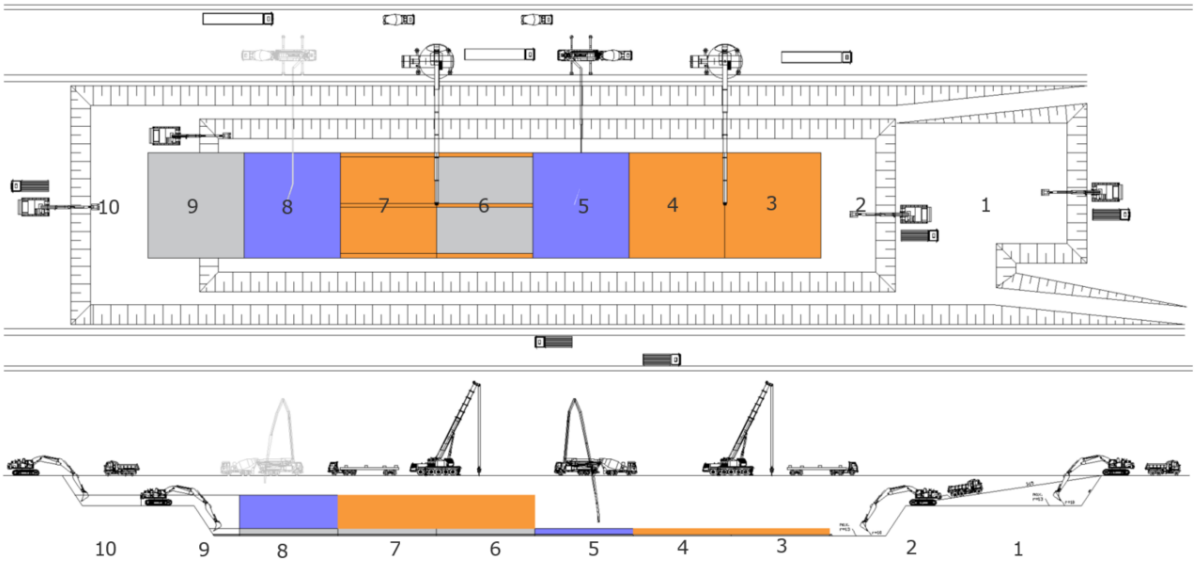


Plate 3-5. Schematic Showing Proposed Cut and Cover Construction Activities

3.5.4 Notes on Plate 3-5 above:

- Step 1 & 2: Excavation.
- Step 3: Foundation layers, Base-slab formwork.
- Step 4: Base slab reinforcement.
- Step 5: Base-slab casting.
- Step 6: Outer walls formwork & reinforcement walls.
- Step 7: Tunnel formwork & reinforcement roof slab.
- Step 8: Walls/roof casting.
- Steps 9 & 10: Re-covering.

3.5.5 The excavation works are expected to encounter mainly soil such as till materials, which are likely to require equipment suitable for excavating moderate to stiff ground, particularly below 5m depth.

3.5.6 Groundwater control will be required as the works are to be undertaken within an open-cut excavation, particularly through the superficial deposits. Ground water pumping will be required to maintain water levels for the bottom 2-3m of the excavation.

3.5.7 Water-flows into the excavation, either groundwater or rainfall, would need to be collected by temporary drainage within the excavation (e.g., at the top and base of the cutting slopes). Simple treatment such as sedimentation, aeration and attenuation would need to be implemented as necessary before discharge to the nearby watercourse or sewer system.

3.5.8 Working hours on the Dublin Airport campus are proposed to take place 24/7 (typically 6-days per week). Work is proposed to be carried out on dayshifts as far as possible, however a considerable part of the works is expected to be undertaken during night shifts to minimise disruption to airport operations. The current proposed shift times are 07:00 to 19:00 Monday to Saturday and 23:00 to 06:00 for nightshifts. The nightshifts are mainly used for the activities that require truck movement crossing taxiways (earthworks and castings).

Construction Programme

3.5.9 Construction is estimated to take about three years in total, with site mobilisation taking three months, the cut-and-fill operation about 18 months, with testing and handover a further nine months.

3.5.10 High level phasing has been considered for the Underpass works as follows:

- Phase 1: Pre-closure runway 16/34
- Phase 2: Closure runway 16/34
- Phase 3: Post closure runway 16/34

Phase 1: Pre-closure of Runway 16/34

3.5.11 Construction activities commence in the west near Taxiways W1 & W2. The first step is to establish traffic route diversions from W2 to P1 and from W1 to Runway 16/34. Taxiways W2 and W1 will then be closed as illustrated in Figure 3-3. Runway 16/34 is available for take-off and landing operations if required during crosswinds

Phase 2: Closure of Runway 16/34

3.5.12 Once the runway is closed for crosswind operations, construction activities will continue towards the east as illustrated in Figure 3-4. During this phase of the Underpass Development, 16/34 will not be available for use for cross wind event for approximately six months.

3.5.13 Runway 16/34 will remain available for aircraft taxiing (taxiing operations require considerably smaller clearances compared to take-off/landing).

Phase 3: Post-closure of Runway 16/34

3.5.14 Once the works near Runway 16/34 are finalised, the runway will be re-opened for essential occasional use as set out in Condition 4 of the North Runway Planning Permission (ABP PL 06F.217429) use. Works will continue near taxiway F and start on the east ramp near Pier 3. Work on the alterations to the stands and fixed links at Pier 3 will then commence as shown in Figure 3-5.

Construction Plant

3.5.15 Typical plant used in the demolition of the taxiway and apron surfaces, and in construction processes are given below in Table 3-3. No plant is required for construction of the internal works to Pier 3 as this will be accomplished using hand tools and small power tools.

Table 3-3: Construction Plant Used in Underpass Construction

Activity	Typical Plant in Use
Removal of existing runway and taxiway	• Excavator • Cold planer

	• Dump truck • Wheel loader • Soil compactor • Grader
Underpass excavation works	• Hydraulic excavators • Dump trucks
Underpass construction	• Telescopic cranes • Concrete mixer pumps • Concrete mixer trucks • Trailers - supply materials • Mobile elevating work platforms
Underpass backfill	• Excavators • Dump trucks • Soil compactors • Tractors + water tank
Underpass end wall	• Piling rigs • Generators • Trailers • Wheel loaders
Underpass backfill	• Road sweepers • Bitumen sprayer truck • Asphalt paving machines • Dump trucks • Rollers • Runway / taxiway reconstruction: • Road sweepers • Bitumen sprayer truck • Asphalt paving machines • Dump trucks • Rollers

Construction Materials

3.5.16 All construction materials will be responsibly sourced. In procuring responsibly, the Applicant seeks assurance that goods and services are legitimately secured from legal and well-managed sources and from suppliers and contractors who can demonstrate responsible sourcing of their materials.

3.5.17 Estimates of materials likely to be used in construction of the Proposed Development are given in Table 3-4. These are provisional estimates only but are useful as a guide to the scale of construction works to be undertaken.

Table 3-4: Construction Materials

Material	Estimated Quantity (m^3 unless otherwise stated)
Concrete (Underpass)	75,600
Reinforcement bars (Underpass)	12,100 tonnes
Asphalt (Underpass)	16,900
Asphalt (taxiways & aprons)	3,300
Pavement quality concrete (taxiways & aprons)	7,600
Granular fill (taxiways & aprons)	10,400
Imported backfill	200,000
Reused site-won backfill	70,000

3.5.18 Materials used in construction of the works to Pier 3 include approximately 50m^3 of glass and 200m^3 of cladding material for the inside and outside of the building.

Construction Traffic

3.5.19 HGV traffic is expected to peak at around 1900 vehicles/week. The majority of excavation and casting works is expected to take place outside of the airport's daily operational hours. Construction traffic generation is expected to intensify during the night.

3.5.20 Construction traffic will vary throughout the project. Estimated total truck movements in each week during the cut and fill phase are shown in Plate 3-6 below.

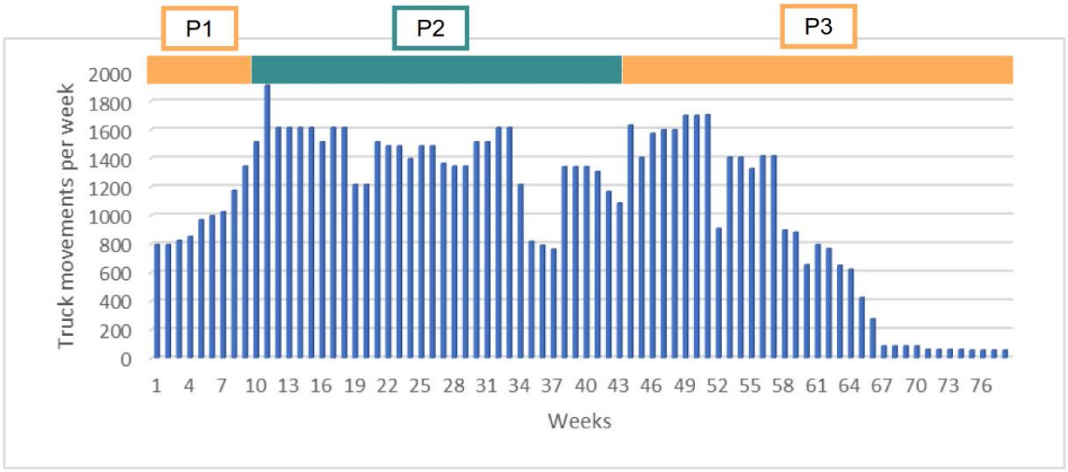


Plate 3-6: Predicted Weekly HGV Movements per Week

3.5.21 The site access and haul routes during construction will vary by Phase. These are shown in Figure 3-6 to 3-8.

3.5.22 During Phase 1, prior to the closure of Runway 16/34, most construction vehicles (77%) will come from the landside western construction compound, the recycling compound or the M50. This traffic would access airside and the construction site via Gate 9. The remaining 23% of construction traffic would originate from the airside construction compound north of the South Runway (10/28) and remain airside.

3.5.23 In Phase 2, some of the landside traffic will instead access airside via Gate 1B. 23% of construction traffic would continue to remain airside, with 62% using Gate 9 and 15% using Gate 1B.

3.5.24 During the final phase, Phase 3, most traffic passing from landside to airside (95%) will access airside via Gate 1B. Most of this traffic will continue to come from the landside western construction compound, the recycling compound or the M50, although some will come from the eastern side (M1). A small proportion (5%) will enter from the east via Gate 4.

3.5.25 The percentages quoted in the Figures show the approximate volume of HGV traffic using each route during each Phase.

Construction Wastes

3.5.26 The anticipated waste arisings generated during the construction phase are detailed in Table 3-5, below.

Table 3-5: Construction Wastes

EWC Code	Waste Description	Estimated Quantity (m^3)
17 01 01	Concrete	10,950
17 05 04	Granular Fill	7,300
17 05 04	Soils	105,000
17 05 04	Soils	211,000

17 03	Asphalt	8,700

Construction Environmental Management Plan

3.5.27 A preliminary Construction Environmental Management Plan has been prepared to set out the standard measures being taken to govern the activities on the construction site and minimise environmental impacts. This is presented in Appendix 3-1.

Construction Workforce

3.5.28 The construction workforce will vary between 100 to 150 personnel for most of the construction period, reaching a peak of about 180 personnel for a few weeks towards the end of construction of the Underpass when the works on Fixed Links and Nodes and Pier 3 overlap with it. During the enabling works at the start of the programme and during the commissioning and testing of the Underpass in the final two months of the programme, the numbers of construction workers will be much lower at around 40 and 20 respectively.

Access to the West Apron

3.5.29 During construction of the Proposed Development access will be via the Northern Perimeter Road.

3.6 Operation of the Proposed Development

3.6.1 Once constructed, the Underpass would allow efficient and safe access to the West Apron, thereby avoiding the use of the Northern Perimeter Road, the risks of runway or taxiway incursion and the potential for introduction of Foreign Object Debris (FOD). It would provide safe access to the existing 23 stands in the West Apron for operations and ancillary services.

3.6.2 The Proposed Development is designed to support existing operations and does not alter or uplift in any way the activities currently being undertaken at Dublin Airport or, more specifically, on the West Apron. The Proposed Development does not provide additional capacity for the airport or facilitate airport expansion beyond the existing 32 mppa Cap.

3.6.3 Internal vehicle movements to and from the West Apron are expected to remain unchanged at approximately 2,500 per month that were observed in March / April 2020 (see above, Section 3-2).

Normal Operating Procedures

3.6.4 There are two critical parts of the operations control:

Traffic Control Centre

3.6.5 A remote Traffic Control Centre will control all aspects of the Underpass operation, including:

- Power supply
- Lighting
- Ventilation
- Traffic control, such as signage and signal lighting
- CCTV surveillance
- Traffic data collection
- Fire detection
- Contact with emergency services

3.6.6 In normal circumstances, the Traffic Control Centre would be operated by two people. It is envisaged that the Traffic Control Centre will be located in the Airport Operations Centre.

Plant Room

3.6.7 The Plant Room (see Plate 3-3 above) will house the critical operational equipment.

Normal Operations

3.6.8 In normal circumstances, traffic will be able to pass through the tunnel without stopping. However, to minimise incidents, reduce danger and ensure the optimal use of the tunnel, traffic may be controlled at times of peak flow.

3.6.9 Normal traffic may include hazardous and abnormal loads. Any necessary and appropriate action such as escorting such loads is part of normal tunnel operation.

3.6.10 Due to the expected traffic volume, forced, or mechanical, ventilation in the tunnel during normal operation is not necessary.

Emergency Procedures

3.6.11 An emergency will normally be detected by the Traffic Control Centre from the CCTV monitors, traffic loops, incident detector alarms or the emergency roadside telephones.

3.6.12 A major incident may require a greater response, in terms of resources, than the normal response provided by the standard emergency procedures and could involve the possibility of severe personal injury or loss of life, the risk of a serious fire or serious damage to property and serious disruption to the traffic flow with consequent exceptional delay.

Incidents / Collisions / Vehicle Breakdown

3.6.13 The majority of incidents, such as vehicle breakdowns or shunt accidents, will not require more than the attendance of a traffic officer and a breakdown recovery vehicle. Traffic signing to close affected lanes and traffic control to deal with any build-up of traffic congestion downstream will be required.

3.6.14 Typically, immobilised vehicles will be towed out of the tunnel using wheel-lift towing trucks. Lifting of vehicles onto a flatbed may also be possible.

3.6.15 On receipt of an incident report, or the observation of what is considered to be a major incident then it is proposed that the following emergency procedures shall be put into action:

- Set traffic system to ALL TRAFFIC STOP to prevent traffic entering the tunnel
- Telephone all relevant emergency services and inform them of the type and likely severity of the incident. Advise if Fire and Ambulances services will be required
- Telephone to inform the authorities which may need to be involved

Fire Event

3.6.16 If a fire occurs, all aspects of the incident are the responsibility of the airport Fire and Rescue service under the control of the most senior Fire Officer present. Tunnel equipment would be operated by tunnel personnel who are familiar with the tunnel and its plant, under the direction of the Police or Fire Incident Officer, as appropriate.

3.6.17 In the event of a tunnel fire mechanical ventilation, passive structural fire protection and fixed fire-fighting systems will ensure safe tunnel evacuation conditions, safe conditions for emergency service personnel to access the incident site and prevent or delay the onset of structural damage.

3.6.18 In the event of a fire in the tunnel requiring the attendance of a Fire and Rescue vehicle, domestic fire tenders are to respond, and would be adequate to deal with such a fire.

3.6.19 In the event of an airfield emergency, all fire tenders would use the apron network fire routes as the fastest way to traverse the airfield (as per current protocols).

Operational Energy and Materials Usage

3.6.20 As explained above, there will be no change to operational aircraft or vehicle movements, and passenger numbers will not be affected by operation of the Proposed Development. Associated environmental

impacts such as noise, air quality, or greenhouse gas emissions from the airport will not be affected by operation of the Proposed Development.

3.6.21 The day-to-day requirement for energy includes for uses such as lighting, operation of drainage sump pumps, variable message signs, loudspeakers, CCTV, ventilation and other similar applications, also for emergency consumption such as pumps and valves for the fire-fighting system, emergency lighting etc.

3.6.22 Annual consumption of energy for these purposes is estimated to be around 530kWh, while operational water usage is expected to be about 180m^3 per year. More detail is to be found in Chapter 15 Material Assets (Built Services).

4. Methodology

4.1 Introduction

4.1.1 This chapter explains the process of identifying those matters that could lead to significant environmental effects, thus needing to be investigated in the EIA. It also sets out the overall approach to the assessment and defines key terms used throughout the EIAR. Methodologies specific to the assessment of impacts for each environmental factor are given in the relevant chapters, along with any topic-specific guidance that has been followed.

4.1.2 This chapter was written by Colin Bush, BA (Hons), MSc, CEnv an Associate Director in AECOM's Environment and Sustainability team with over 18 years' experience in leading and managing EIA projects.

4.2 Legislation, Policy & Guidance

4.2.1 The following legislation and guidance is relevant to this chapter, the EIA as a whole and is considered in every chapter.

Legislation

- EIA Directive 2011/92/EU (as amended by Directive 2014/52/EU)
- Planning and Development Act 2000, as amended
- Planning and Development Regulations 2001, as amended
- European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296/2018)

Guidance

- Guidelines on the information to be contained in Environmental Impact Statements, EPA, (May 2022) (hereafter referred to as 'the EPA Guidelines')
- Environmental Impact Assessment of Projects - Guidance on the preparation of the Environmental Impact Assessment Report (Directive 2011/92/EU as amended by 2014/52/EU), European Union, 2017[1]
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment, Department of Housing, Local Government and Heritage, August 2018[2]

4.3 Assessment Methodology

Overall Approach

4.3.1 An EIAR is defined by the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 246 of 2018) as:

> *"…a report of the effects, if any, which proposed development, if carried out, would have on the environment and shall include the information specified in Annex IV of the Environmental Impact Assessment Directive".*

[1] https://ec.europa.eu/environment/eia/pdf/EIA_guidance_EIA_report_final.pdf
[2] https://www.gov.ie/en/publication/53aee9-guidelines-for-planning-authorities-and-an-bord-pleanala-on-carrying/

4.3.2 An objective of the EIAR is therefore to identify baseline environmental conditions in and around the application site, identify, describe and assess the direct and indirect significant effects of the Proposed Development and recommend appropriate mitigating measures where necessary, as set out in Plate 4-1 below.

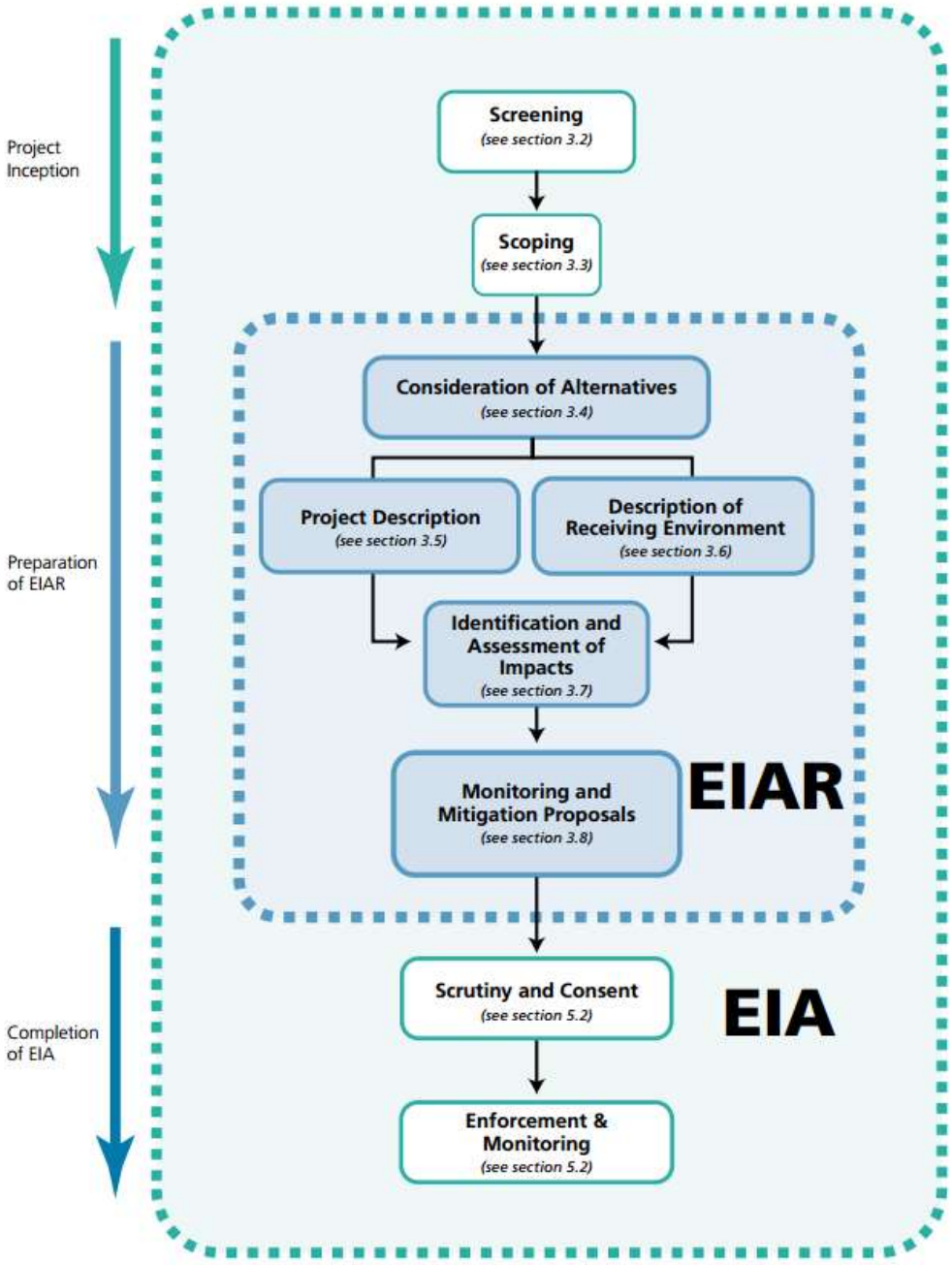


Plate 4-1: EIA Process (taken from EPA Guidelines, EPA, 2022)

4.3.3 This EIAR assesses, as required, the direct effects and any indirect, secondary, cumulative, transboundary effects of the Proposed Development. It also reports them in terms of duration: short term, medium term and long term, permanent and temporary, and distinguishes between adverse and beneficial effects.

4.3.4 In general, the technical chapters (i.e., Chapter 5 onwards) for each environmental factor follow the same structure, where the chapter deviates from this format for technical reasons this is explained:

- Introduction
- Legislation, Policy & Guidance – which sets out the sources which have informed the scope and methodology for assessment of the environmental factor

- Assessment Methodology – describes the specific approach to the assessment undertaken for that factor
- Current State of the Environment – sets out the relevant aspects of the environmental baseline as they currently stand
- Future Receiving Environment – describes the evolution of the environmental baseline without implementation of the Proposed Development insofar as this is possible
- Environmental Design & Management – highlights mitigation measures that are inherent in the design or form part of proposed construction environmental management practices and therefore represent 'in built' mitigation considered to be implemented at the assessment stage
- Assessment of Effects & Significance – provides the assessment of the magnitude of any environmental effects (taking into account any 'in built' mitigation) and their significance
- Mitigation & Monitoring – sets out any further mitigation that may be required to offset significant effects that may have been identified and any measures proposed for environmental monitoring
- Residual Effects & Conclusions – summarises any significant environmental effects remaining after mitigation and provides a general conclusion to the chapter

Identifying Significant Environmental Effects

4.3.5 The EPA Guidelines state that the identification of potential significant impacts from different phases of a proposed development should be considered as far as reasonably possible. The environmental assessments in the EIAR have evaluated the effects of the Proposed Development, and the likelihood, extent, magnitude, duration, reversibility and significance of any likely potential impacts of the Proposed Development.

4.3.6 Where appropriate, specific criteria for certain technical disciplines have been utilised, giving due regard to the following criteria from the EPA Guidelines:

- The magnitude and spatial extent of the impact (for example geographical area and size of the population likely to be affected)
- The nature of the impact
- The transboundary nature of the impact
- The intensity and complexity of the impact
- The probability of the impact
- The expected onset, duration, frequency and reversibility of the impact
- The accumulation of the impact with the impact of other existing and/or approved projects
- The possibility of effectively reducing the impact.

4.3.7 Most technical chapters have two subsections within the 'Assessment of Effects and Significance' section, called 'Determining Construction Effects' and 'Determining Operational Effects'. These sub-sections identify the potential source of the impact; potential impact pathways (route by which receptors can become impacted) and potential effects arising from the potential impact. For each of the potential effects identified, the likelihood of an effect is considered to determine whether a further assessment should be undertaken, or whether no further assessment is necessary to conclude that there will not be any significant effects from a given impact.

4.3.8 Exceptions to this are:

- Chapter 5: Traffic & Transport, because this chapter does not discuss environmental effects *per se* (direct and indirect environmental effects from traffic on the environmental factors, such as noise or air quality impacts, are covered in the appropriate chapter)
- Chapter 18: Major Accidents & Disasters which examines the risk of what are (by definition) non-standard situations rather than impacts predicted to occur
- Chapter 19: Interactions & Cumulative Effects, which instead considers whether there is scope for interactions between impacts of different environmental factors

Assessment Terminology

4.3.9 In order to provide a consistent approach across the different technical disciplines, the following terminology is used throughout the EIAR. Where individual environmental topics use different terminology due to specific guidance or legislative requirements, this is described further in that section.

4.3.10 To define effects, the following terminology is used:

- Positive/Beneficial Effects - A change which improves the quality of the environment (for example, by increasing species diversity; or improving the reproductive capacity of an ecosystem, or by removing nuisances or improving amenities);
- Negative/Adverse Effects - A change which reduces the quality of the environment (for example, lessening species diversity or diminishing the reproductive capacity of an ecosystem; or damaging health or property or by causing nuisance); and
- Neutral Effects - No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error.

4.3.11 When addressing the duration of an effect, the following terminology is used:

- Momentary Effects - Effects lasting from seconds to minutes
- Brief Effects - Effects lasting less than a day
- Temporary Effects - Effects lasting less than a year
- Short-term Effects - Effects lasting one to seven years
- Medium-term Effects - Effects lasting seven to fifteen years
- Long-term Effects - Effects lasting fifteen to sixty years
- Permanent Effects - Effects lasting over sixty years
- Reversible Effects - Effects that can be undone, for example through remediation or restoration
- Frequency of Effects - Describe how often the effect will occur (once, rarely, occasionally, frequently, constantly - or hourly, daily, weekly, monthly, annually)

4.3.12 The extent and context of an effect will also be described as this can affect the perception of significance. These terms are defined as:

- Extent - Describe the size of the area, the number of sites, and the proportion of a population affected by an effect
- Context - Describe whether the extent, duration, or frequency will conform or contrast with established (baseline) conditions (is it the biggest, longest effect ever?)

4.3.13 Where adverse or beneficial effects are identified, these are assessed against the following scale:

- Negligible - An effect that may or may not be capable of measurement but without significant consequences
- Minor - An effect which causes noticeable changes in the character of the environment but without significant consequences
- Moderate Effects - An effect which, by its character, magnitude, duration or intensity, significantly alters a sensitive aspect of the environment or has widespread effects on a less sensitive aspect of the environment
- Major Effects - An effect which, by its character, magnitude, duration or intensity, significantly alters most (or all) of a sensitive aspect of the environment.

4.3.14 Finally, the probability of an effect has been defined to establish how likely it is to occur.

- Likely Effects - The effects caused by the Proposed Development that can reasonably be expected to occur even if all mitigation measures are properly implemented
- Unlikely Effects - The effects that can reasonably be expected not to occur if all mitigation measures are properly implemented

Significance Criteria

4.3.15 For each technical EIAR chapter (i.e., Chapter 5 onwards), the classification and significance of effects have been evaluated with reference to definitive standards, accepted criteria and legislation where available. Where it has not been possible to quantify effects, qualitative assessments were carried out, based on professional opinion and professional judgement. Where uncertainty exists, this is noted in the relevant EIAR chapter.

4.3.16 For each topic, the technical assessment considered the magnitude of impacts and the sensitivity of the resources / receptors that could be affected in order to classify the effect. Many technical disciplines have their own methods based on applicable standards and approaches, which are detailed in a transparent and understandable way in the methodology section of the relevant EIAR chapter. Where this is not the case, the methodology in this chapter is used instead.

Table 4-1: Determination of the Significance of an Effect (Source: AECOM)

	Magnitude of Impact			
Value / Sensitivity of Receptor	**High**	**Medium**	**Low**	**Very Low**
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Negligible	Negligible
Very Low	Minor	Negligible	Negligible	Negligible

4.3.17 Table 4-1, above, indicates how the magnitude of the impact and the sensitivity of the receptor interact to determine the magnitude of the resulting environmental effect[3]. Broadly speaking, impacts having a large magnitude and / or affecting important or sensitive receptors are likely to lead to significant effects.

4.3.18 In general, effects found to be 'moderate' or 'major' are deemed to be significant, whilst effects found to be 'minor' or 'negligible' are considered not significant.

Cumulative Effects

4.3.19 The EIA Directive states in Annex IV (5) that an EIAR should contain:

> *"A description of the likely significant effects of the project on the environment resulting from…the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources."*

4.3.20 The EIA Directive therefore makes clear that the description of the likely significant effects should cover cumulative effects. The EPA Guidelines explain that cumulative effects are 'the addition of many minor or insignificant effects, including the effects of other projects, to create larger, more significant effects'.

4.3.21 Chapter 19: Interactions & Cumulative Effects, assesses the synergistic and cumulative effects associated with the Proposed Development. For the purposes of the EIA, these two types of environmental effects are defined as:

- In-combination or Synergistic Effects - Where the resultant effect is of greater significance than the sum of its constituents, (e.g., combination of oxides of sodium and oxides of nitrogen to produce smog).

[3] Figure 3.4 in the EPA Guidance provides an example of how a significance matrix can be constructed but states that where *"more specific definitions exist within a specialised factor or topic, e.g., biodiversity, these should be used in preference to these generalised definitions."* Recent case law (Monkstown Residents' Association versus An Bord Pleanala, 2022) has exposed certain ambiguities in this example table which mean that it does not provide a sound basis for the determination of significance. Therefore, the Applicant has chosen to use a simpler, unambiguous matrix to ensure that significant effects.

- Cumulative Effects - The addition of many minor or significant effects, including effects of other projects, to create larger, more significant effects.

4.3.22 Interactions with other schemes and transboundary effects have also been considered. Further detail is provided in Chapter 16: Interactions & Cumulative Effects.

Assessment Years

4.3.23 The Assessment Years are the points in time at which the likely significant effects of the Proposed Development are assessed. The reasons for selecting these years are given below:

- 2024: peak year for construction vehicle movements and thus the year of the largest environmental impact during construction
- 2025: opening year and the first year in which the Proposed Development is operational

Baselines

4.3.24 Two different baselines are used in the EIA:

- The Current State of the Environment, or the baseline conditions as they exist in 2022
- The Future Receiving Environment, or the predicted baseline conditions in the Assessment Years as determined by projecting forward the Current State of the Environment to 2024 and 2025, taking account to of any known trends where this is reasonably practicable

4.3.25 In practice, given that the Assessment Years are only 2-3 years ahead, the two baselines will generally be similar, and the Future Receiving Environment is referenced only when there is a clear difference between them.

4.3.26 Baseline data to describe the Current State of the Environment relies, in some cases, on surveys undertaken in 2018 and 2019. This is considered more representative of normal (i.e., pre-Covid-19) conditions than surveys that might have been undertaken more recently. They also describe the baseline conditions when the airport was operating close to the 32mppa cap. In short, therefore, this older baseline data is not regarded as a limitation on the studies presented in the EIAR.

Residual Effects

4.3.27 Residual effects are the effects remaining after all mitigation is applied and represent the actual expected effects of the Proposed Development upon the environment. Any residual effects are set out clearly at the end of each chapter.

4.4 Difficulties Encountered

4.4.1 No unusual difficulties were encountered in undertaking the EIA, however there are some unknowns about which reasonable assumptions were made. Where needed, these assumptions are recorded in the ‘Limitations and Assumptions’ section of each technical chapter.

5. Traffic & Transport

5.1 Introduction

5.1.1 This chapter of the EIAR identifies, describes and assesses the direct and indirect significant effects of the Proposed Development on Traffic & Transport, which is one of the matters that the EPA Guidance suggests is covered within the Material Assets factor. Other matters that the EPA recommends should be addressed under this factor, namely waste and built services, are covered in Chapter 14: Material Assets (Waste) and Chapter 15: Materials Assets (Built Services) respectively.

5.1.2 This chapter was written by Keith Dalton, BA (Hons), MSc, MCIHT, a Principal Consultant from AECOM's Transportation team, with fourteen years professional experience as a transport planner & traffic modeller undertaking Traffic and Environmental Impact Assessments. The chapter was reviewed by Shane Dunny BAI, MA, MSc, CEng a Regional Director from AECOM's Transportation team, with 17 years' experience in planning, design and project management of transport projects.

5.2 Legislation, Policy & Guidance

5.2.1 The following lists the relevant policy guidance and used to inform the assessment:

- 'Traffic and Transport Assessment Guidelines' (Transport Infrastructure Ireland (TII), 2014)
- 'Guidelines on the Information to be Contained in Environmental Impact Assessment Reports' (EPA, 2022)

5.3 Methodology

5.3.1 As described in Chapter 4: Methodology, the assessment has been carried out following the below methodology and the EPA Guidance:

- Establishment of the baseline conditions, including identification and assessment of the receiving environment and receptor sensitivity
- Identification of environmental design measures and mitigation measures that form part of the construction methodology
- Identification of the potential impacts, and assessment of the magnitude of potential effects, and their significance
- Consideration of mitigation measures
- Assessment of residual effects

5.3.2 The Proposed Development will only serve vehicles operating on the airside of Dublin Airport and does not propose any change in passenger numbers or operation of the West Apron. As set out in Chapter 3: Proposed Development, it will not generate any additional landside movements once it is operational, therefore this traffic assessment is concerned only with the potential traffic impact during the construction stage.

5.3.3 Details of construction workforce movements were not available at the time of the assessment; however, these are not likely to affect the outcome of the assessment presented here. The construction workforce will vary between 100 to 150 personnel for most of the construction period, reaching a peak of about 180 personnel for a few weeks towards the end of construction of the Underpass, as explained in Chapter 3: Proposed Development. Not all of these workers will travel by private car and, since construction activities are planned to occur over a 24-hour period, shift patterns for employees can be designed in a way that will ensure that employees are not travelling to site during background peak traffic periods.

5.3.4 In addition, the Proposed Development is only designed to serve operational traffic within the airport itself. Consequently, there is no need to consider other modes of transport external to the airport such as buses or light rail, which will be unaffected by the Proposed Development.

Data Sources

Local Area Model

5.3.5 The traffic flows used in this assessment were taken from a Local Area Model (LAM) of the road network in the vicinity of the Airport, which has been developed to assess future projects at Dublin Airport. The extent of the LAM is illustrated in Plate 5-1.

5.3.6 Since this model provides forecasts of future year traffic conditions on the road network in the vicinity of the Airport, it was used to assess the impact of the Proposed Development during the construction period.

5.3.7 The LAM has been built using VISUM modelling software. It is calibrated and validated to a 2019 Base, using extensive traffic surveys undertaken in May of that year to the standards outlined in TII's Project Appraisal Guidelines for National Roads Unit 5.1 - Construction of Transport Models.

5.3.8 Since 2019 is the year the airport reached its current 32mppa Cap, before the impacts of Covid 19 saw a reduction in passenger numbers, the LAM is considered appropriate to represent peak pre-Covid 'normal' conditions for the Airport in terms of its traffic impact on the surrounding road network, as well as for general background traffic, which reduced significantly during Covid, but is approaching 2019 levels again[1].

5.3.9 The modelled time periods are the AM peak (08.00 – 09.00) and PM peak (17.00 – 18.00), which represent the peak periods for traffic on the road network in the vicinity of the Airport (the extent of which is illustrated in Plate 5-2), as identified by the traffic surveys undertaken in May 2019. The majority of the works, however, are expected to take place outside of these peak periods (and the airport's daily operational hours in general) and construction traffic generation is expected to intensify during the night. As such, the traffic flows from the peak hour models were used to extrapolate 24-hour traffic flows to assess the impacts of construction vehicle movements over the course of a full day.

5.3.10 The expansion factors used to convert peak hour flows to 24-hour flows were derived using data from a TII permanent traffic counter, located within the study area[2].

5.3.11 The future year LAM has been informed by a 2031 run of the National Transport Authority's (NTA) Eastern Regional Model (ERM)[3], in terms of demand, modal split[4] and planned future road network upgrades.

[1] https://www.tii.ie/roads-tolling/operations-and-maintenance/traffic-count-data/covid-traffic-patterns/
[2] https://trafficdata.tii.ie/sitedashboard.asp?sgid=XZOA8M4LR27P0HAO3_SRSB&spid=6AD84D2276C0
[3] https://www.nationaltransport.ie/planning-and-investment/transport-modelling/regional-modelling-system/regional-multi-modal-models/east-regional-model/
[4] The percentage of overall traffic made up by each mode of transport, e.g. private car, rail, bus bicycle etc.

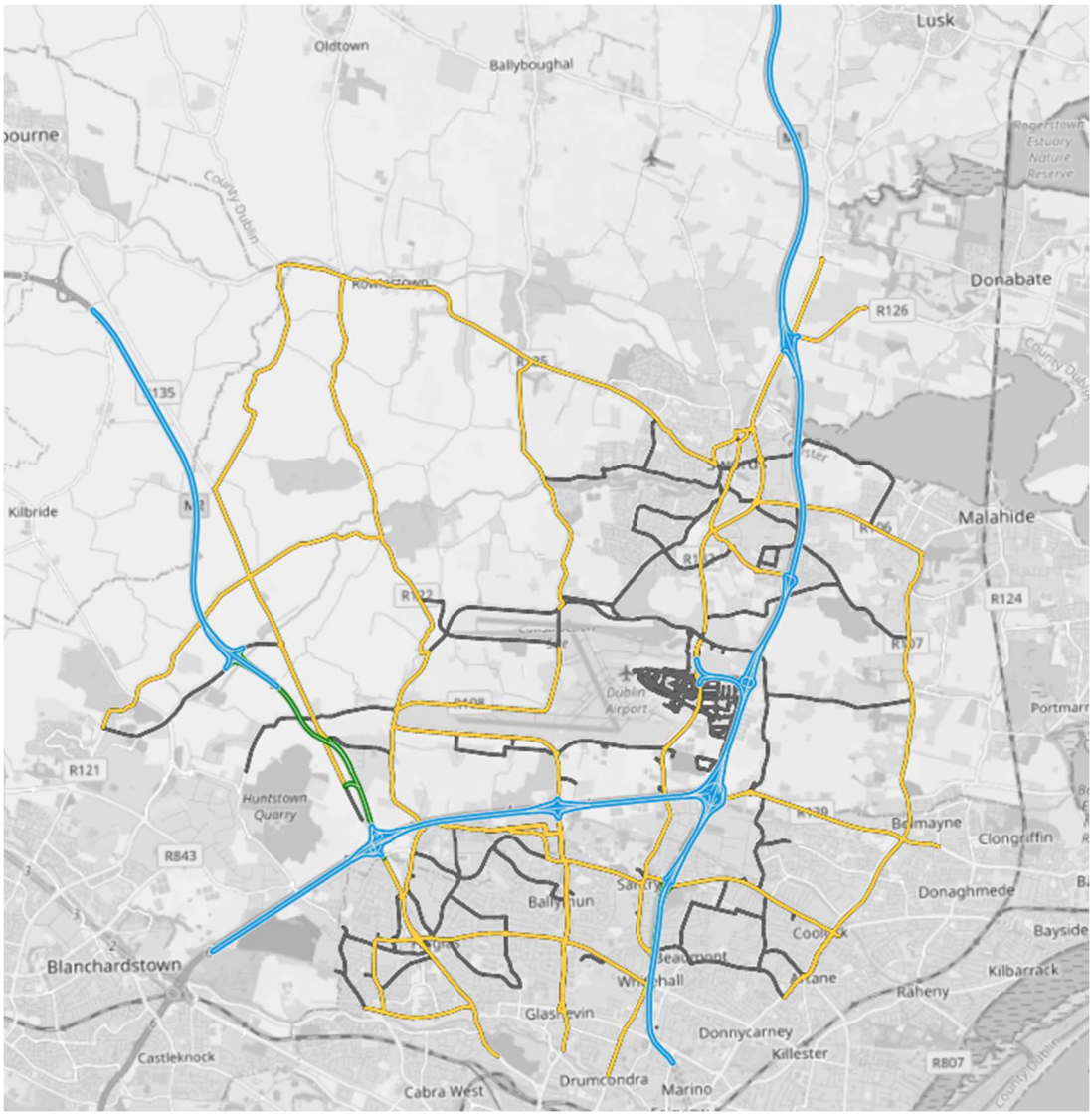


Plate 5-1. Local Area Model Extent

5.3.12 The ERM is a multi-modal model and consists of four input elements; Public Transport (PT); Walking and Cycling; Highways; and Demand.

5.3.13 The NTA ERM is centred on Dublin City and comprises 1,854 zones (1,844 internal zones, 7 external zones and 3 special zones). Demand in the model is built up based on CSO POWSCAR[5], NTA Household Travel Surveys, Transport Surveys and other transport related datasets. The staff demand at the Airport is based on CSO data with distribution based on CSO POWSCAR and NTA Household Surveys. The passenger demand distribution is based on data collected as part of the NTA Airport Surveys[6] for Irish residents and a bespoke distribution model that links passengers to hotels/offices based on density for non-Irish passengers.

5.3.14 The future year ERM run includes a number of committed public transport schemes (i.e., those that have received planning permission or commitment to funding, such as MetroLink and BusConnects), which have informed the mode share and subsequent traffic flows in the LAM. Effectively, the LAM future year reflects a situation where Airport growth remains static at 32mppa, but background growth and committed public transport and road schemes within the Eastern region have been delivered.

Preliminary Construction Environmental Management Plan

[5] Place of Work, School or College - Census of Anonymised Records (POWSCAR) - https://www.cso.ie/en/census/census2016reports/powscar/
[6] https://www.nationaltransport.ie/wp-content/uploads/2018/04/NTA_StateAirportSurvey2016_ReportNovember2017.pdf

5.3.15 A Construction Environmental Management Plan (CEMP), presented in Appendix 3-1, has been developed for the project. The CEMP assumes the following:

- An outline construction phase of 2023 - 2025. An assessment year of 2024 is used in this assessment, as this is planned to be the peak period for construction activity.
- The construction stage will be broken up into three phases, each with different compound locations and site access routes (details of which are provided in Section 5.6)
- The majority of the works will take place at night (typically 23:00 to 06:00) when few flights take place, to minimise any operational impact. Construction traffic generation is expected to intensify during the night
- During construction of the underpass itself (that is, Phase 1 and Phase 2), some 23% of construction vehicle movements will be within the Airport boundary only and will not have an effect on the public highway

5.3.16 The maximum number of weekly construction vehicle movements generated by the construction of the Proposed Development is 1,900 and will occur during Phase 2.

Study Area

5.3.17 The study area is the external road network in the vicinity of the Airport. Since full details of the haul routes origins / destinations are not known at this time, the assessment focuses on the routes to and from the adjacent motorway network. The road links included in the assessment were identified based on the compound locations and site access routes to/from the motorway network outlined in the CEMP and are illustrated in Plate 5-2, below.

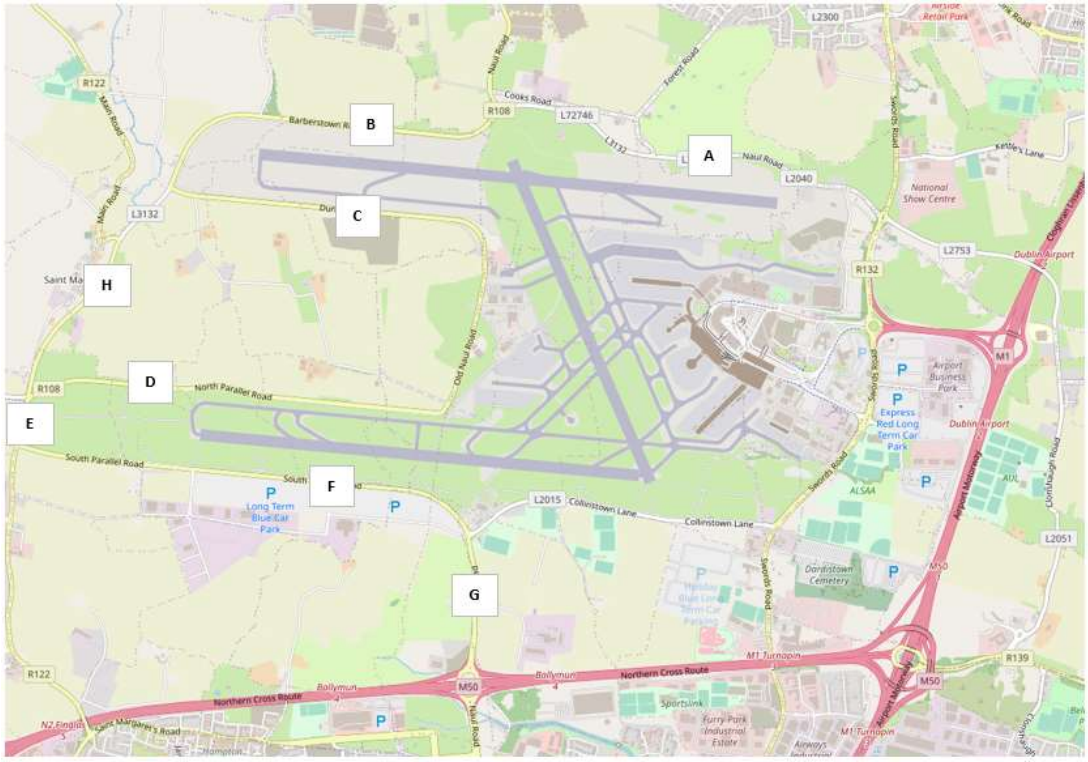


Plate 5-2. Location of Road Links used in the Assessment

5.3.18 The locations for the assessment of the traffic impact are shown in Plate 5-2 above. They comprise:

- A. L2040 Naul Road
- B. R108 Barberstown Road
- C. R108 Dunbro Lane
- D. R108 North Parallel Road
- E. R108 St. Margaret's Road

- F. R108 South Parallel Road
- G. R108 Naul Road
- H. St. Margaret's Bypass

5.3.19 The assessment does not include examination of road accident data. This data usually taken from an interactive map on the Road Safety Authority (RSA) website www.rsa.ie. At time of undertaking the traffic assessment, the RSA was in the process of reviewing its road traffic collision (RTC) data sharing policies and procedures. As such, record-level RTC data was not available.

Assessment Methodology

5.3.20 The LAM has a base year of 2019 and a Future Year of 2031. The Assessment Year, however, is 2024.

5.3.21 To derive the required 2024 background traffic flows on the site access routes identified in Chapter 3: Proposed Development and Figures 3-6 to 3-8, a straight-line extrapolation process was used. For this, the 2019 and 2031 modelled flows on the roads corresponding to the assessment sites were taken from the LAM (as summarised in Tables 5-1 and 5-2, respectively). For each site, the difference between the 2019 and 2031 flows was determined and divided by 12 to derive an annual growth rate. this growth rate was then multiplied by five to extrapolate the modelled growth between 2019 and 2024. These growth rates were then applied to the 2019 modelled flows to derive the 2024 background traffic flows (summarised in Table 5-3).

5.3.22 Separate assessments were undertaken for each of the three phases identified in Chapter 3: Proposed Development.

5.3.23 The overall daily construction vehicle movements were calculated. To ensure a robust assessment, the maximum weekly construction vehicle movements for each phase, identified in Chapter 3: Proposed Development, were used to test the impact of each phase. Furthermore, a 5-day working week was assumed, as this will result in a higher number of daily construction vehicle trips and therefore ensure a robust assessment. The distribution of the daily construction vehicle movements was determined, based on the identified compound locations and site access routes.

5.3.24 The CEMP indicates that a certain proportion of Phase 3 construction traffic will travel to/from the Airport via the M1 Link Road, and R132. For this assessment, despite what was indicated in the CEMP, it was assumed that no construction traffic would be routed this way, as these are the roads used by almost all staff and passengers to access the main airport campus and are therefore considered sensitive to increases in traffic flows. As such, the Phase 3 site access assumption was amended to route 100% of vehicles to access the motorway network via the M50 Junction 4.

5.3.25 The daily construction vehicle movements were added to the background traffic flows to determine the impact of the construction traffic.

5.3.26 In order to provide a quantitative measure for use in this assessment, TII's Traffic and Transport Assessment Guidelines were used. This document outlines the thresholds at which the production of Traffic and Transport Assessments in relation to planning applications is recommended[7]. These thresholds were used as a benchmark in this assessment for what would constitute a significant impact. The thresholds outlined are "where traffic to and from the development exceeds 10% of the traffic flow on the adjoining road, or 5% of the traffic flow, where congestion exists, or the location is sensitive (e.g. at junctions with National Roads)".

5.4 Current State of the Environment

Existing Traffic Flows

5.4.1 The existing 2019 traffic flows at each of the assessment sites identified previously were extracted from LAM, as outlined in Table. 5-1. For each site, flows in are given in each direction, and the light vehicles (LV) and heavy vehicles (HV) are presented separately.

[7] https://www.tiipublications.ie/library/PE-PDV-02045-01.pdf (Page 8)

Table 5-1 Modelled 2019 Background Traffic Flows

Period	Type	Site - Movement															
		A		B		C		D		E		F		G		H	
		EB	WB	EB	WB	EB	WB	EB	WB	NB	SB	EB	WB	NB	SB	NB	SB
AM 08:00 to 09:00	LV	576	372	322	933	2	1	24	9	400	685	319	107	605	302	392	815
	HV	46	10	68	32	0	0	0	0	29	72	20	20	29	40	64	74
PM 17:00 to 18:00	LV	385	959	520	492	0	23	29	18	705	368	394	408	449	776	951	445
	HV	6	15	30	14	0	0	0	0	53	29	35	30	48	62	76	32

5.5 Future Receiving Environment

5.5.1 The modelled 2031 background traffic flows are outlined in Table 5-2.

Table 5-2 Modelled 2031 Background Traffic Flows

Period	Type	Site - Movement															
		A		B		C		D		E		F		G		H	
		EB	WB	EB	WB	EB	WB	EB	WB	NB	SB	EB	WB	NB	SB	NB	SB
AM 08:00 to 09:00	LV	447	458	324	1039	1	2	15	10	358	853	456	126	632	441	379	1022
	HV	40	44	79	76	0	0	0	0	34	102	32	18	28	48	145	126
PM 17:00 to 18:00	LV	341	1263	598	655	0	24	30	18	686	404	399	348	415	833	966	550
	HV	6	35	41	28	0	0	0	0	77	50	45	45	57	69	113	63

5.5.2 Using a straight-line extrapolation between the 2019 and 2031 background traffic flows, the 2024 background traffic flows were calculated, as outlined in Table 5-3.

Table 5-3 Extrapolated 2024 Background Traffic Flows

Period	Type	Site - Movement															
		A		B		C		D		E		F		G		H	
		EB	WB	EB	WB	EB	WB	EB	WB	NB	SB	EB	WB	NB	SB	NB	SB
AM 08:00 to 09:00	LV	522	408	323	977	2	1	20	9	383	755	376	115	616	360	387	901
	HV	44	24	73	50	0	0	0	0	31	85	25	19	29	43	98	96
PM 17:00 to 18:00	LV	367	1,086	553	560	0	23	29	18	697	383	396	383	435	800	957	489
	HV	6	23	35	20	0	0	0	0	63	38	39	36	52	65	91	45

5.5.3 The LAM has two model periods, AM (08:00 – 09:00) and PM (17:00 – 18:00). In order to undertake an assessment of daily construction vehicle movements, a factor was required to convert the modelled period traffic flows to a 24-hour equivalent.

5.5.4 A TII permanent traffic counter is located in the vicinity of Site G. Since this is a non-national road in the direct vicinity of the Airport, it is considered that traffic patterns at this location provide a good proxy for other non-national roads in the vicinity of the Airport, i.e., the other sites in this assessment. It was therefore determined that the traffic patterns at this site, in terms of how much of the total daily traffic is made up by the peak hour flows, could be applied to the other sites in the assessment.

5.5.5 Using data from this counter from the same period as the traffic surveys which informed the base model validation, the recorded AM and PM peak traffic flows were combined and expressed as a percentage of the total 24-hour flow. From this, an expansion factor was derived that could be applied to the combined AM and PM peak flows at the other sites to calculate a 24-hour total, as outlined in Table 5.4. The percentage of construction vehicles (%HGV) at each site is also included in the table and was determined based on the breakdown between light vehicles and heavy vehicles outlined in Tables 5.1 and 5.2, above.

Table 5-4 Extrapolated 2024 24-Hour Traffic Flows

Period	Type	Site (two-way movements)							
		A	B	C	D	E	F	G	H
24-Hour	All Vehicles	23,168	25,342	223	716	23,560	12,916	22,674	29,368
	%HGV	3.9%	6.8%	0.0%	0.0%	8.9%	8.6%	7.9%	10.8%

5.6 Environmental Design & Management

5.6.1 A number of traffic-related mitigation measures are proposed in the CEMP to prevent avoidable impacts on the highway network. Notably, the contractor will develop a Construction Traffic Management Plan (CTMP). The CTMP is particularly required to prepare for the following situations: Large/high volume deliveries and removal of materials; construction works requiring traffic management to facilitate utility/drainage connections; construction phases which re-configure existing traffic flows to facilitate the works.

5.6.2 The Southern Construction Compound has been identified as dedicated parking for HGVs waiting to make deliveries whilst they are unable to enter the construction site and the contractor will be required to coordinate all deliveries with appointed daa liaison so as not to delay passenger journeys.

5.6.3 Dilapidation surveys will be undertaken on all construction access routes.

5.7 Assessment of Effects & Significance

Phase 1

5.7.1 The Phase 1 compound locations and site access routes are illustrated in Plate 5.3.

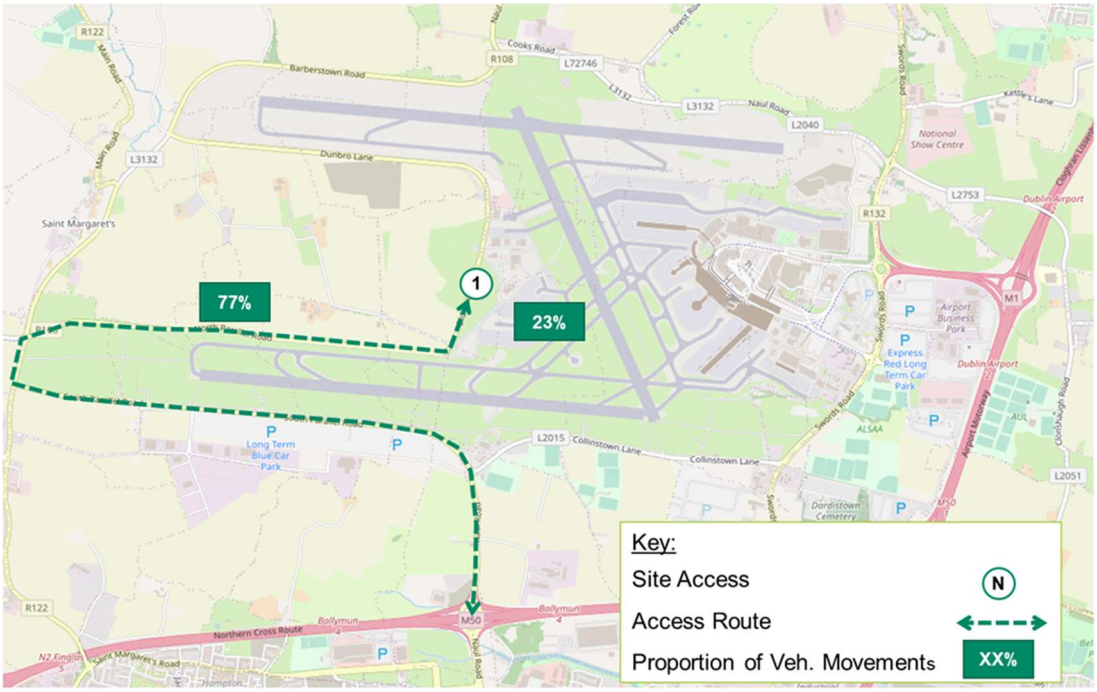


Plate 5-3. Compound Locations and Site Access Routes – Construction Phase 1

Vehicle Trip Generation

5.7.2 HGV numbers are estimated using the volumes of material brought to and taken from the construction site and compounds, assuming a standard HGV load, including for the expected size and duration of concrete pours and volumes of excavated material leaving site.

5.7.3 A maximum of 1,500 weekly construction vehicle movements is expected during Phase 1. For this assessment, a 5-day working week was assumed for the construction period, which results in a maximum daily total of 300 construction vehicles. This is a conservative estimate, as it is likely that some construction activity will take place at weekends, however it ensures a robust assessment of the worst-case potential traffic impact.

5.7.4 Approximately 23% of Phase 1 daily construction vehicle movements will be internal, within the Airport grounds. As such, only 77%, or 231 vehicles, will travel on the external road network, the impact of which is outlined in Table 5.6, below.

Vehicle Trip Distribution

5.7.5 The compound locations and site access routes for Phase 1 are shown in Plate 5-3. For the Phase 1 assessment, it was assumed that all construction traffic would access the motorway network via the M50 Junction 4, as this route avoids the R132, which is the main access route to the Airport, thereby minimising the potential impact of construction activities on day-to-day airport operations. With this in mind, the distribution of the construction vehicle movements on the surrounding road network during Phase 1 was determined, as outlined in Table 5-5, below.

Table 5-5 Distribution of Construction Vehicle Movements – Phase 1

Construction Phase	Daily Construction Veh. Movements	Site (two-way movements)							
		A	B	C	D	E	F	G	H
1	Proportion	-	-	-	77%	77%	77%	77%	-
	Total	-	-	-	231	231	231	231	-

Vehicle Trip Impact

5.7.6 The impact of the Phase 1 daily construction vehicle movements on the adjacent road network, relative to the background traffic flows, is summarised below, in Table 5-6.

Table 5-6 Impact of Construction Vehicle Movements – Phase 1

	Site (two-way movements)							
	A	B	C	D	E	F	G	H
Background Traffic Flows	23,168	25,342	223	716	23,560	12,916	22,674	29,368
Background HGV%	3.9%	6.8%	0.0%	0.0%	8.9%	8.6%	7.9%	10.8%
Construction Traffic Flows (all HGV)	-	-	-	231	231	231	231	-
Traffic Flows with Construction Vehicle Movements	23,168	25,342	223	947	23,791	13,147	22,905	29,368
HGV% with Construction Vehicle Movements	3.9%	6.8%	0.0%	24.4%	9.8%	10.2%	8.8%	10.8%
Impact of Construction Vehicle Movements – Total	0%	0%	0%	+32%	+1%	+2%	+1%	0%
Impact of Construction Vehicle Movements – HGV%	0%	0%	0%	+24%	+1%	+2%	+1%	0%

5.7.7 During Construction Phase 1 it is estimated that the impact of the construction vehicle movements will be minimal at most sites, with overall increases in 24-hour traffic flows in the region of 1%-2%. Site D will see a large (+32%) percentage increase; however, this is due to the relatively low background flow at this location.

5.7.8 The construction vehicle movements are also predicted to have a similarly low impact in terms of HGV%, with the exception of Site D, which sees a large increase in the percentage of HGVs. Once again, however, this is due to the relatively low background flow at this location combined with the 231 HGVs predicted during construction.

5.7.9 Overall, considering the evidence outlined above in this section and having regard to the thresholds identified by TII previously in Section 5.3 above, it is considered that the construction vehicle movements associated with Phase 1 will not have a significant adverse effect on road network in the vicinity of the airport.

Phase 2

5.7.10 The Phase 2 compound locations and site access routes, as outlined in the CEMP, are illustrated in Plate 5-4.

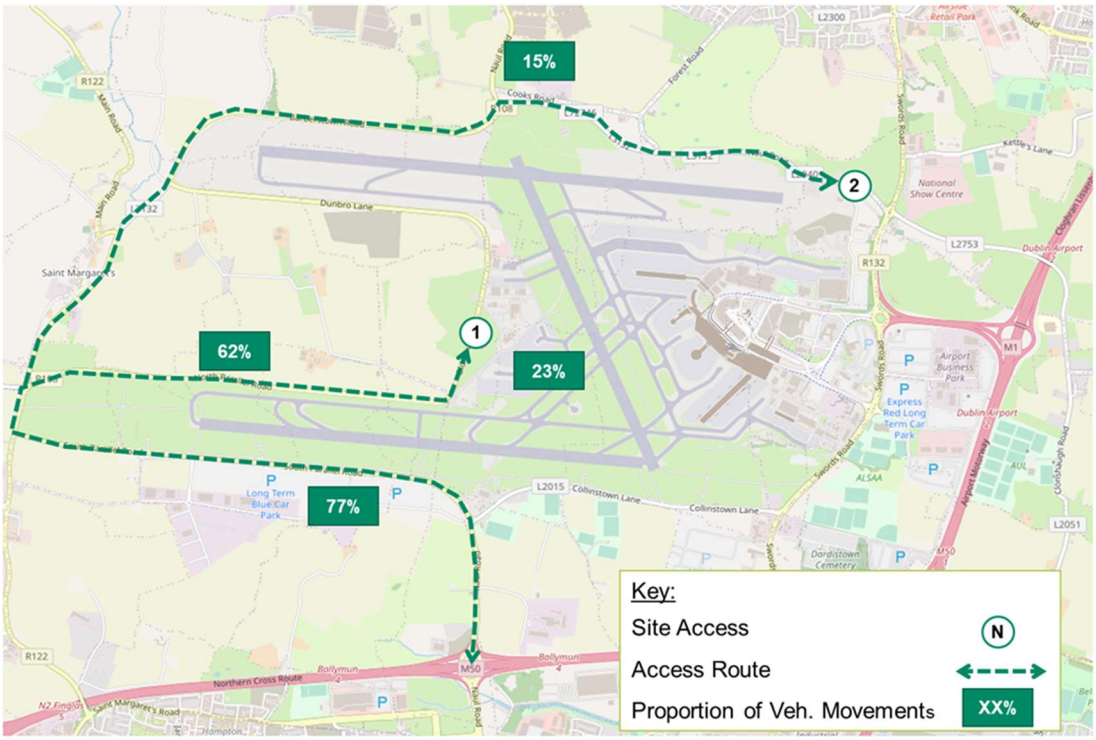


Plate 5-4. Compound Locations and Site Access Routes – Construction Phase 2

Vehicle Trip Generation

5.7.11 A maximum of 1,900 weekly construction vehicle movements is expected during Phase 2, which results in a maximum daily total of 380 construction vehicles. However, once again, 23% of daily construction vehicle movements will be internal, within the Airport grounds. As such, only 77%, or 293 vehicles, will travel on the external road network.

Vehicle Trip Distribution

5.7.12 The compound locations and site access routes for Phase 2 are shown in Plate 5-4. Once again, it was assumed that all construction traffic would access the motorway network via the M50 Junction 4, as this route avoids the R132, which is the main access route to the Airport, thereby minimising the potential impact of construction activities on day-to-day airport operations. With this in mind, the distribution of the construction vehicle movements on the surrounding road network during Phase 2 was determined, as outlined in Table 5-7, below. It was estimated that 62% would enter/exit via a junction on the R108 Old Naul Road (1), while 15% of construction vehicles would enter/exit the Airport via a junction on Naul Road (2).

Table 5-7 Distribution of Construction Vehicle Movements – Phase 2

Construction Phase	Daily Construction Veh. Movements	Site (two-way movements)							
		A	B	C	D	E	F	G	H
2	Proportion	15%	15%	-	62%	77%	77%	77%	15%
	Total	57	57	-	236	293	293	293	57

Vehicle Trip Impact

5.7.13 The impact of the Phase 2 daily construction vehicle movements on the adjacent road network, relative to the background traffic flows, is summarised below, in Table 5-8.

Table 5-8 Impact of Construction Vehicle Movements – Phase 2

	Site (two-way movements)							
	A	B	C	D	E	F	G	H
Background Traffic Flows	23,168	25,342	223	716	23,560	12,916	22,674	29,368
Background HGV%	3.9%	6.8%	0.0%	0.0%	8.9%	8.6%	7.9%	10.8%
Construction Traffic Flows (all HGV)	57	57	-	236	293	293	293	57
Traffic Flows with Construction Vehicle Movements	23,225	25,399	223	952	23,853	13,209	22,967	29,425
HGV% with Construction Vehicle Movements	4.1%	7.0%	0.0%	24.8%	10.0%	10.6%	9.1%	11.0%
Impact of Construction Vehicle Movements – Total	0%	0%	0%	+33%	+1%	+2%	+1%	0%
Impact of Construction Vehicle Movements – HGV%	0%	0%	0%	+25%	+1%	+2%	+1%	0%

5.7.14 As evidenced by the data summarised in Table 5-8, Construction Phase 2 is estimated to have a similar overall impact to Construction Phase 1, with a similar magnitude of increase in 24-hour traffic flows and percentage of HGVs on the surrounding network. As such, using the thresholds identified in Section 5.3 above, it is considered that the construction vehicle movements associated with Phase 2 will not have a significant adverse effect on road network in the vicinity of the airport.

Phase 3

5.7.15 The Phase 3 compound locations and site access routes, as outlined in the CEMP, are illustrated in Plate 5-5.

Plate 5-5. Compound Locations and Site Access Routes – Construction Phase 3

Vehicle Trip Generation

5.7.16 The CEMP outlines a maximum of 1,700 weekly construction vehicle movements during Phase 1, which results in a maximum daily total of 340 construction vehicles. During Phase 3, all construction vehicle movements would be on the external road network.

Vehicle Trip Distribution

5.7.17 The CEMP outlines the compound locations and site access routes for Phase 3. As noted above, despite what was indicated in the CEMP, it was assumed that 100% of Phase 3 construction vehicles would access the motorway network via the M50 Junction 4.

5.7.18 With this in mind, the distribution of the construction vehicle movements on the surrounding road network during Phase 3 was determined, as outlined in Table 5-9, below. It was assumed that 100% of construction vehicles would enter/exit the Airport via a junction on Naul Road.

Table 5-9 Distribution of Construction Vehicle Movements – Phase 3

Construction Phase	Daily Construction Veh. Movements	Site (two-way movements)							
		A	B	C	D	E	F	G	H
3	Proportion	100%	100%	-	-	100%	100%	100%	100%
	Total	340	340	-	-	340	340	340	340

Vehicle Trip Impact

5.7.19 The impact of the Phase 3 daily construction vehicle movements on the adjacent road network, relative to the background traffic flows, is summarised below, in Table 5-10.

Table 5-10 Impact of Construction Vehicle Movements – Phase 3

	Site (two-way movements)							
	A	B	C	D	E	F	G	H
Background Traffic Flows	23,168	25,342	223	716	23,560	12,916	22,674	29,368
Background HGV%	3.9%	6.8%	0.0%	0.0%	8.9%	8.6%	7.9%	10.8%
Construction Traffic Flows (all HGV)	340	340	-	-	340	340	340	340
Traffic Flows with Construction Vehicle Movements	23,508	25,682	223	716	23,900	13,256	23,014	29,708
HGV% with Construction Vehicle Movements	5.3%	8.0%	0.0%	0.0%	10.2%	10.9%	9.3%	11.8%
Impact of Construction Vehicle Movements – Total	+1%	+1%	0%	0%	+1%	+3%	+1%	+1%
Impact of Construction Vehicle Movements – HGV%	+1%	+1%	0%	0%	+1%	+2%	+1%	+1%

5.7.20 It is estimated that Construction Phase 3 will have a minimal impact on the surrounding road network, with 3% representing maximum increase in 24-hour traffic flows and 2% the maximum increase in percentage HGVs. As such, using the thresholds identified in Section 5.3 above, it is considered that the construction vehicle movements associated with Phase 3 will not have a significant adverse effect on road network in the vicinity of Dublin Airport.

5.8 Mitigation & Monitoring

5.8.1 The assessment of effects and significance has indicated that the Proposed Development will not result in any significant effect on the operation of the surrounding road network, thus further mitigation and monitoring are not required.

5.9 Residual Effects & Conclusions

5.9.1 The Proposed Development will not generate any additional landside vehicle movements during operation. As such, assessment of the potential traffic impact of the project was limited to construction traffic.

5.9.2 The results of the assessments indicated that, in terms of the thresholds outlined in TII's Traffic and Transport Assessment Guidelines, the construction vehicle movements associated with the Proposed Development are not predicted to have a significant negative impact on road network in the vicinity of the airport, in terms of increased overall traffic flows or increase in percentage of HGVs.

5.9.3 Non-significant impacts on the road network are considered for their potential to have environmental effects in Chapter 8: Air Quality and Chapter 9: Noise, while cumulative environmental effects are considered in Chapter 18: Interactions & Cumulative Effects.

6. Land & Soils

6.1 Introduction

6.1.1 This chapter of the EIAR identifies, describes and assesses the direct and indirect significant effects of the Proposed Development on Land & Soils. It was written by Edel O'Hannelly BA(Mod), MSc, a Principal Hydrogeologist with 24 years' experience, and reviewed by Kevin Forde BSc, MSc, an Associate Director in AECOM's Ground, Energy and Transactions Services team. Kevin completed his MSc in Hydrogeology and has over 25 years' experience. The chapter should be read in conjunction with Chapter 7: Water and Appendix 7-1, the Water Framework Directive assessment report.

6.1.2 Construction of the Proposed Development will see excavation of soils and subsoils from around Pier 3 in the east, across Runway 16/34, westwards to the West Apron. On completion, the Proposed Development will facilitate the safe movement of vehicles beneath Runway 16/34 between the Eastern and Western Campuses. On the basis of available designs and plans, the Underpass will be excavated and constructed solely within unconsolidated subsoils and glacial boulder clay deposits and will not disturb underlying bedrock.

6.1.3 The EPA Guidance suggests that the matters set out in Table 6-1, below, might be considered in an EIA in respect of land, soils, geology and hydrogeology.

Table 6-1: Matters Considered in the EIA

Matter	Considered further in the EIA?
Land (for example land take)	Yes. There will be a change of land use in the location of the proposed Western Compound. This land was formerly in agricultural use until construction of the North Runway began and has lain unused since. The biodiversity implications of the new use of this land are considered in Chapter 10: Biodiversity.
Soil (for example organic matter, erosion, compaction, sealing)	Yes.
Agricultural capability	No. No agricultural land is lost to the Proposed Development. The Application Site is mainly within the operational airfield and the two external compound sites are not currently in agricultural use.
Geology	Yes.
Hydrogeology	Yes.

6.2 Legislation, Policy & Guidance

6.2.1 The following legislation, policy and guidance are relevant to this chapter and were considered during the assessment presented within it. General legislation, policy and guidance has also been considered but is not listed as this has been covered in Chapter 4: Methodology.

- Institute of Geologists of Ireland (IGI), Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements (2013)
- Transport Infrastructure Ireland (TII), Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (2009)
- European Communities, Environmental Impact Assessment of Projects – Guidance on the preparation of the Environmental Impact Assessment Report' (EC, 2017)
- European Union Water Framework Directive (WFD) (2000/60/EC). The following legislation in Ireland governs the shape of the WFD characterisation, monitoring and status assessment programmes in terms of monitoring different water categories, determining the quality elements and undertaking characterisation and classification assessments:

- European Communities (Water Policy) Regulations, 2003 (S.I. No. 722 of 2003)
- European Communities Environmental Objectives (Surface Water) Regulations, 2009 (S.I. No. 272 of 2009 as amended), as amended in 2012 (by S.I. No. 327 of 2012), 2015 (by S.I. No. 386 of 2015) and 2019 (by S.I. No. 77 of 2019)
- European Communities Environmental Objectives (Groundwater) Regulations, 2010 (S.I. No. 9 of 2010) as amended
- European Communities Environmental Objectives (Groundwater) (Amendment) Regulations, 2016 (S.I. No. 366 of 2016)

- EPA, Towards Setting Guideline Values for the Protection of Groundwater in Ireland (2003)
- EPA, Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (2022)

6.3 Assessment Methodology

6.3.1 As described in Chapter 4: Methodology, the assessment has been carried out following the below methodology and the EPA Guidance:

- Establishment of the baseline conditions, including identification and assessment of the receiving environment and receptor sensitivity
- Identification of environmental design measures and mitigation measures that form part of the construction methodology
- Identification of the potential impacts, and assessment of the magnitude of potential effects, and their significance
- Consideration of mitigation measures
- Assessment of residual effects

Study Area

6.3.2 The study area for the assessment with regard to land, soils and geology is based upon the Application Site including associated compounds used during construction, as shown in Figure 3-1. The study area is therefore mainly located within the operational airfield.

6.3.3 From a hydrogeological perspective, the study area encompasses groundwater which has the potential to be impacted by contamination or by lowering of groundwater levels during the construction of the Proposed Development, which includes:

- Groundwater directly beneath the Application Site
- Groundwater down-gradient of the Proposed Development
- Groundwater within the zone of influence of pumping well(s) during construction of the Proposed Development (i.e., the area where groundwater levels will decline as a result of groundwater abstraction for temporary dewatering by pumping wells)

6.3.4 As construction of the Proposed Development will include the importation of clean backfill material, Irish quarries are also considered within this chapter as the source of that imported backfill to re-cover the Underpass excavations, as explained in Chapter 3: Proposed Development.

Determination of the Baseline Environment

6.3.5 The baseline land, soils, geology and hydrogeology environment has been determined from desktop review and a site walkover survey conducted on 30th August 2019.

6.3.6 Sources of information reviewed include:

- Ordnance Survey of Ireland (OSI) website[1] for historical maps of 1:2,500 scale and 1:10,560 scale (1837 to 1913) and aerial photographs (1995, 2000, 2005)
- Geological Survey of Ireland (GSI)[2] Spatial Resources Viewer
- Environmental Protection Agency (EPA) Map Viewer[3] for land use information and water data, as well as EPA Integrated Pollution Control (IPC) and Industrial Emissions (IE) licensed facilities or EPA licensed waste facilities
- National Parks and Wildlife (NPWS) website Map Viewer[4]
- Met Éireann website for meteorological and climate data[5]

6.3.7 In addition, site investigation reports for areas across the airport were provided by daa and reviewed, including the following reports:

- Ground Investigations Ireland, Additional Airfield Boreholes Ground Investigation Report, reference: 7687-04-18, dated: 17 July 2018 (Appendix 6-1)
- Ground Investigations Ireland, 244 Airfield Surveys Phase 2 Ground Investigation Report, reference: 7926-07-18, dated: 10 January 2019 (Appendix 6-2)
- Ramboll, West Apron Vehicle Underpass Hydrogeological Report, reference: 1100040489-SPE-REP-7000, dated: 07 August 2020 (Appendix 6-3)
- Causeway Geotech Limited, daa Airfield Underpass – Ground Investigation, reference: 21-1219, dated: 10 June 2022 (Appendix 6-4)

Determination of Sensitive Receptors

Geology, Hydrogeology and Soils

6.3.8 Sensitivity of the existing environment identifies the ability of the receptor to respond to potential effects. Receptors have been identified during the baseline study and a qualitative assessment has been used to assign a sensitivity rating from low to extremely high based on TII's 2009 Guidelines. Table 6-2 sets out the criteria used to assign importance or sensitivity to the receptors.

Table 6-2: Importance of Soil, Geological and Hydrogeological Attributes

Importance / Sensitivity	Criteria	Typical Examples
Extremely High	Attribute has a high quality or value on an international scale	• Hydrogeology: – Groundwater supports river, wetland or surface water body ecosystem protected by EU legislation e.g. Special Area of Conservation (SAC) or Special Protected Area (SPA) status
Very High	Attribute has a high quality or value on a regional or national scale Degree or extent of soil contamination is significant on a national or regional scale Volume of peat and/or soft organic soil underlying site is significant on a national or regional scale*	• Soil and Geology: – Geological feature rare on a regional or national scale (Natural Heritage Area, NHA) or of high value on a local scale (County Geological Site) – Large existing quarry or pit – Proven economically extractable mineral resource • Hydrogeology: – Regionally Important Aquifer with multiple wellfields – Groundwater supports river, wetland or surface water body ecosystem protected by national legislation – NHA status – Regionally important potable water source supplying >2,500 homes – Inner source protection area for regionally important water source

[1] GeoHive Map Viewer
[2] Geological Survey Ireland Spatial Resources (arcgis.com)
[3] EPA Maps
[4] NPWS Designations Viewer (arcgis.com)
[5] Available Data - Met Éireann - The Irish Meteorological Service

Importance / Sensitivity	Criteria	Typical Examples
High	Attribute has a high quality or value on a local scale Degree or extent of soil contamination is significant on a local scale Volume of peat and/or soft organic soil underlying site is significant on a local scale*	• Soil and Geology: – Contaminated soil onsite with previous heavy industrial usage – Large recent landfill site for mixed wastes – Geological feature of high value on a local scale (County Geological Site) – Well drained and/or highly fertile soils – Moderately-sized existing quarry or pit – Marginally economic extractable mineral resource • Hydrogeology: – Regionally Important Aquifer – Groundwater provides large proportion of baseflow to local rivers – Locally important potable water source supplying >1,000 homes – Outer source protection area for regionally important water source – Inner source protection area for locally important water source
Medium	Attribute has a medium quality or value on a local scale Degree or extent of soil contamination is moderate on a local scale Volume of peat and/or soft organic soil underlying site is moderate on a local scale*	• Soil and Geology: – Contaminated soil onsite with previous light industrial usage – Small recent landfill site for mixed wastes – Moderately drained and/or moderate fertility soils – Small existing quarry or pit – Sub-economic extractable mineral resource • Hydrogeology: – Locally Important Aquifer – Potable water source supplying >50 homes – Outer source protection area for locally important water source
Low	Attribute has a low quality or value on a local scale Degree or extent of soil contamination is minor on a local scale Volume of peat and/or soft organic soil underlying site is small on a local scale*	• Soil and Geology: – Large historical and/or recent site for construction and demolition wastes – Small historical and/or recent landfill site for construction and demolition wastes – Poorly drained and/or low fertility soils – Uneconomically extractable mineral resource • Hydrogeology: – Poor Bedrock Aquifer – Potable water source supplying <50 homes

* Relative to the total volume of inert soil disposed of and/or recovered

Source: Based on criteria outlined within the TII's Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (TII, 2009)

Use of Natural Resources

6.3.9 With regard to natural resource use, the materials themselves have been identified as the sensitive receptors. Consuming materials impacts upon their immediate and (in the case of primary materials) long-term availability; this results in the depletion of natural resources and adversely impacts the environment.

Describing Potential Effects

6.3.10 The methodology used for describing the potential effects considers the 'quality' of the effects (i.e., whether it is adverse or beneficial), the 'probability' of the event occurring and the 'duration' of the effects (i.e., whether it is short or long term) as set out in Chapter 4: Methodology.

6.3.11 Specific assessment criteria and typical examples based on information within the TII's 2009 Guidelines are outlined in Table 6-3.

Table 6-3: Criteria and Examples for Describing Potential Impacts on Land and Soils Environment

Magnitude of Impact	Criteria for Impacts	Typical Examples (Positive and Negative)
High Adverse	Results in loss of attribute	• Soil and Geology: – Loss of high proportion of future quarry or pit reserves – Irreversible loss of high proportion of local high fertility soils – Removal of entirety of geological heritage feature – Requirement to excavate/remediate entire waste site – Requirement to excavate and replace high proportion of peat, organic soils and/or soft mineral soils beneath alignment • Hydrogeology: – Removal of large proportion of aquifer – Changes to aquifer or unsaturated zone resulting in extensive change to existing water supply springs and wells, river baseflow or ecosystems – Potential high risk of pollution to groundwater from routine run-off – Calculated risk of serious pollution incident >2% annually
Medium Adverse	Results in impact on integrity of attribute or loss of part of attribute	• Soil and Geology: – Loss of moderate proportion of future quarry or pit reserves – Removal of part of geological heritage feature – Irreversible loss of moderate proportion of local high fertility soils – Requirement to excavate/remediate significant proportion of waste site – Requirement to excavate and replace moderate proportion of peat, organic soils and/or soft mineral soils beneath alignment • Hydrogeology: – Removal of moderate proportion of aquifer – Changes to aquifer or unsaturated zone resulting in moderate change to existing water supply springs and wells, river baseflow or ecosystems – Potential medium risk of pollution to groundwater from routine run-off – Calculated risk of serious pollution incident >1% annually
Low Adverse	Results in minor impact on integrity of attribute or loss of small part of attribute	• Soil and Geology: – Loss of small proportion of future quarry or pit reserves – Removal of small part of geological heritage feature – Irreversible loss of small proportion of local high fertility soils and/or high proportion of local low fertility soils – Requirement to excavate/remediate small proportion of waste site – Requirement to excavate and replace small proportion of peat, organic soils and/or soft mineral soils beneath alignment • Hydrogeology: – Removal of small proportion of aquifer – Changes to aquifer or unsaturated zone resulting in minor change to water supply springs and wells, river baseflow or ecosystems – Potential low risk of pollution to groundwater from routine run-off – Calculated risk of serious pollution incident >0.5% annually
Negligible	Results in an impact on attribute but of insufficient magnitude to affect either use or integrity	• Soil and Geology: – No measurable changes in attributes • Hydrogeology: – Calculated risk of serious pollution incident <0.5% annually
Low Beneficial	Results in minor improvement of attribute quality	• Minor enhancement of geological heritage feature
Medium Beneficial	Results in moderate improvement of attribute quality	• Moderate enhancement of geological heritage feature
High Beneficial	Results in major improvement of attribute quality	• Major enhancement of geological heritage feature

Magnitude of Impact	Criteria for Impacts	Typical Examples (Positive and Negative)

Source: Based on criteria outlined within the TII's Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (TII, 2009)

Significance of Effects

6.3.12 A qualitative approach was used to determine the significance of effects as set out in Chapter 4: Methodology, comparing the sensitivity of the attributes (Table 6-2) and the magnitude of the potential effect (Table 6-3). Table 6-4 shows how these two factors interact to create a resulting effect. Effects with a magnitude of Profound or Significant are considered significant.

Table 6-4: Magnitude of Effect

Sensitivity / Importance of Attribute	Magnitude of Impact			
	Negligible	Low	Medium	High
Extremely High	Imperceptible	Significant	Profound	Profound
Very High	Imperceptible	Significant / Moderate	Profound / Significant	Profound
High	Imperceptible	Moderate / Slight	Significant / Moderate	Significant
Medium	Imperceptible	Slight	Moderate	Significant
Low	Imperceptible	Imperceptible	Slight	Slight / Moderate

Source: Based on criteria outlined within the TII's Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (TII, 2009)

6.3.13 Where appropriate, mitigation measures have then been described and assessed for each potential complete pollutant linkage (comprising a source, pathway and receptor).

6.3.14 Table 6-5 outlines the significance criteria used with regard to the use of natural resources.

Table 6-5: Significance Criteria for Assessment of Natural Resource Usage

Effect	Criteria for Effects of Natural Resources Used	Significance
Major	Large decrease in material asset availability, greater than 5% of current baseline, potentially causing significant burden to the national material asset market.	Significant
Moderate	Moderate decrease in material asset availability, between 2% and 5% of current baseline, potentially causing moderate burden to the national material asset market.	
Minor	Minor decrease in material asset availability, between 0.1% and 1.9% of current baseline, causing a minor burden to the national material asset market.	Not Significant
Negligible	Negligible decrease in material asset availability, less than 0.1% of current baseline causing insignificant burden to the local and regional material asset market.	

Limitations & Assumptions

6.3.15 Site investigation data from exploratory holes investigate only a small volume of the ground in relation to the size of the Proposed Development site and can only provide a general indication of site conditions. Geological conditions across the Application Site could vary from that interpreted from existing site investigation data. A geotechnical and hydrogeological investigation has recently been conducted[6] which augments the current dataset.

[6] Causeway Geotech Limited, daa Airfield Underpass – Ground Investigation, reference: 21-1219, dated: 10 June 2022

6.3.16 The location accuracy of published data is variable. For example, the location of boreholes, wells and springs on GSI mapping is generally to within a radius of 50 m. In addition, the GSI groundwater dataset may be incomplete, as there is no statutory requirement to register boreholes or wells unless the well has an abstraction rate of 25 m^3/d. Hence, the presence (historical or current) of boreholes or wells not recorded on the website cannot be discounted though, if present, would be located outside of the airport boundary.

6.3.17 Overall, sufficient information is considered to have been available in completion of this assessment for reasoned conclusions to be drawn.

6.4 Current State of the Environment

6.4.1 The current characteristics of the site with regard to land, soils, geology and hydrogeology have been compiled via a desktop study of available information and a site walkover.

Site History

6.4.2 Available historic maps from 1837-1842 and 1888-1913 indicate that the site was primarily occupied by agricultural lands and there were fewer roads in the surrounding area than there are at present.

6.4.3 It is understood that an airfield was first developed as a military training aerodrome at Collinstown in 1917, during World War 1, with the commercial airport developed in the late 1930s. However, there are no online maps on the OSI website to document changes in the airport layout between then and 1995, when the earliest aerial photograph is available online.

6.4.4 The aerial photograph from 1995 indicates that the airport had already adopted the current 'horseshoe' configuration. The West Apron, Terminal 2, Piers 1 and 4 had not been constructed by that year but Piers 3 and 4 had, and Runway 16/34 was also present.

6.4.5 Examination of aerial photographs taken in 2000 and 2005 indicates that little had changed in the intervening years, apart from paving of the Central Apron extending to the north-west. However, in 2012, several changes are apparent, as the West Apron has been constructed, as have Piers 1 and 4, and Terminal 2.

6.4.6 The most recent aerial photograph available is from the period 2013-2018. It shows no change across the Application Site. Within the airport as a whole the principal change is the works to construct the North Runway.

Land Use

6.4.7 As described in Chapter 3: Proposed Development, the Application Site is located mainly within the operational airfield, with the exception of the proposed Western and Southern Compounds.

6.4.8 The Underpass extends from the apron at Pier 3, Terminal 1, in the east, westwards across Taxiway F2, Runway 16/34 and Taxiways W1 and W2 to the West Apron. The Application Site also incorporates the construction compounds as explained in Chapter 3: Proposed Development. Current passenger access to aircraft for boarding is via Pier 3, while parking for aircraft not in use is currently available at the West Apron.

6.4.9 Ground cover is predominantly concrete at aprons, tarmac along taxiways and the runway, with some grassed areas adjacent to the taxiways and runways.

6.4.10 Apart from Pier 3, there are no other buildings within the Application Site, and there is no storage area for chemicals.

6.4.11 Aircraft are refuelled at their stands via trucks which transport aviation fuel from the fuel storage farm, which is located landside and outside of the airport boundary. Separate to the Proposed Development, underground fuel lines are in the process of being installed that will run from the aviation fuel terminal to each aircraft stand. The underground fuel lines being installed are double-contained and will have leak detection.

Topography

6.4.12 The airport is relatively flat, with an elevation across the Application Site of 62 m to 66 m above Ordnance Datum (OD). While the topographic gradient across the airport as a whole falls from west to east at a gradient of approximately 0.004, the gradient across the Application Site is approximately 0.003 falling from east to west, as calculated between monitoring wells BH110 (east) and BH101 (west), which were drilled in 2022. The ground elevation at borehole BH110 (drilled by Pier 3 in 2022) is 65.09 m OD and the elevation at BH101 (drilled in the Western Apron in 2022) is 62.84 m OD. The ground elevation increases to 66.61 m OD (BH111) to the north of Pier 3.

6.4.13 The GSI website has no record of a landslide event either within the airport or within a 3 km radius around it.

Geology

6.4.14 Data and information relating to the geology of the airport were derived from the online GSI Spatial Resources Viewer, as well as from site investigation reports provided by the Applicant (see Appendices 6-1 to 6-4). Additional data were obtained from the EPA website listed above.

Bedrock Geology

6.4.15 The majority of the airside portion of the airport, incorporating Runways 10/28, 16/34 and 11/29; Terminal 2 and most of Terminal 1; Piers 3 and 4; and the area of the Underpass within the Proposed Development, is underlain by the Tober Colleen Formation, a dark grey, calcareous shale and limestone conglomerate of Carboniferous age, see Figure 6-1.

6.4.16 The bedrock is folded and faulted, with anticlinal and synclinal fold axes in a north-east to south-west orientation. The majority of mapped faults are oriented in a north-north-west to south-south-east orientation with a secondary set orientated from north-east to south-west.

6.4.17 The GSI has mapped areas of bedrock outcrop (Tober Colleen Formation) in the south of the airfield (along Runway 10/28) and to the north-west of the West Apron. These outcrops are outside of the Proposed Development area.

6.4.18 The two compounds in the west of the Proposed Development, the Western Compound and the Southern Compound both near the R108 roadway, are underlain by argillaceous limestone and shale of the Malahide Formation. Bedrock outcrop is mapped north of the Western Compound by the GSI, outside of the Proposed Development area.

Overburden Geology

6.4.19 Soils beneath the airport are mapped as Urban by GSI, reflecting the extent of made ground across the airport complex, while soils immediately surrounding the airport are mapped on the EPA website as the Elton series, comprising fine loamy drift with limestone, which has moderate drainage. This soil type extends to the north, east and south from the airport, while it is present as a narrow strip to the west of the airport. Further west, including in the area of the Western Compound, the soil type is mapped as the Straffan series, also comprising a fine loamy drift with limestone but with poor drainage.

6.4.20 Quaternary subsoil deposits overlying bedrock comprise glacial till derived from limestones (boulder clay). Drilling logs describe the boulder clay as stiff to very stiff, brown to brown/grey, sandy, gravelly clay, though with some sandy, gravelly lenses noted.

6.4.21 Site investigation information from 2022[6] provided by daa, indicates that eleven boreholes were drilled within the area of the Underpass in the Application Site; named BH101 to BH111. Depth to bedrock was found to range between 21.4 m below ground level (bgl) (BH102 in the west) and 32.55 m bgl (BH111 in the east), with corresponding to top of bedrock elevations ranging between 32.35 m OD (BH109 in the east) and 41.25 m OD (BH102 in the west). Depth to bedrock tended to increase from west to east.

6.4.22 The overburden was logged as stiff, slightly sandy, gravelly clay, with similar descriptions provided on logs for earlier boreholes drilled in 2018[7][8]. This is also consistent with the GSI's classification of the overburden as 'low permeability subsoil'.

6.4.23 Figure 6-2 illustrates the locations of boreholes drilled in 2022 and 2018 in relation to the Application Site. Boreholes BH104, BH106 and BH107 are located closest to the middle of the Underpass, where excavation will be deepest, to approximately 48 m OD. At these boreholes, the top of bedrock is between 34.31 m OD (BH107) and 36.94 m OD (BH106), meaning that there will be over 10 m of low permeability, clay-dominated overburden/subsoil between the top of bedrock and the base of the Underpass.

6.4.24 At the Western Compound the GSI has mapped the overburden cover as being thinner, likely between 3 m and 10 m bgl.

Hydrogeology

6.4.25 There is no gravel aquifer underlying the airport, and the overburden has been classified by the GSI as low permeability subsoil. Hence, the GSI designation of 'low' groundwater vulnerability across much of the Application Site, including beneath the West Apron, Runway 16/34, the taxiways and the Southern Compound in the west. However, moving eastwards, beneath Pier 3 and the surrounding apron, the GSI has classified groundwater vulnerability as 'moderate'.

6.4.26 Aquifer vulnerability also increases in the Western Compound, where it is classified by the GSI as 'moderate to high', due to the thinner overburden cover.

6.4.27 The Tober Colleen Formation is generally considered by GSI to be a 'Poor Aquifer, bedrock which is generally unproductive except for local zones' (typical well yields of <100 m^3/d) and has been classified as such by the GSI beneath much of the Application Site. However, beneath the West Apron, the Southern Compound and the Western Compound, the GSI has classified the bedrock aquifer as a 'Locally Important Aquifer - bedrock which is moderately productive only in local zones' (typical well yields of 100 m^3/d to 400 m^3/d).

6.4.28 The GSI database records one water supply well (GSI reference 2923NEW034), mapped with an accuracy of 500 m and centred on Cloghran House, this well is between 0.75 km and 1.25 km east from the eastern ramp of the Underpass. The well was reportedly drilled in 1991 to a depth of 13.7 m bgl, which encountered bedrock at 11.6 m bgl. GSI information indicates that the borehole was for 'industrial' use, with a reported yield of 300 m^3/d. However, it is not known if the borehole is still in use or if it is still present.

6.4.29 It should be noted that the GSI database of wells is not complete, as there is no legal requirement to register wells with them. However, since November 2018, it has become a legal requirement to register water abstractions of 25 m^3/d or greater with the EPA; this register is not published.

6.4.30 A spring (GSI reference 2923NEW042) is mapped adjacent to the Cuckoo Stream within the Eastlands area, approximately 1.30 km south-east of the tunnel. No information is provided on the GSI website with regard to the spring discharge.

6.4.31 A series of six wells is mapped by the GSI between 1.00 km and 2.00 km to the south and south-east of the Underpass's western ramp portal, in the area between the R108 in the west (Naul Road), the M50 motorway in the south, the R132 in the east (Swords Road) and the L2015 (Old Airport Road / Collinstown Lane) in the north.

Table 6-6: Mapped Wells to South and South-East of the Underpass Western Ramp

GSI Well Reference	Year Drilled	Total Depth	Depth to Bedrock	Yield	Recorded Use
2923NEW036	1988	91.4 m	20 m	Moderate, 87 m^3/d	Industrial
2923NEW062	1988	122 m	23 m	Good, 200 m^3/d	Industrial

[7] Ground Investigations Ireland, Additional Airfield Boreholes Ground Investigation Report, dated 17 July 2018, reference: 7687-04-18
[8] Ground Investigations Ireland, 244 Airfield Surveys Phase 2 Ground Investigation Report, dated: 10 January 2019, reference: 7926-07-18

GSI Well Reference	Year Drilled	Total Depth	Depth to Bedrock	Yield	Recorded Use
2923NEW037	1988	122 m	22 m	Not recorded	Industrial
2923NEW061	1988	91.4 m	20 m	Moderate, 87 m^3/d	Industrial
2923NEW015	19th Century	48.8 m	Not recorded	Good, 130 m^3/d	Industrial
2923NEW016	19th Century	35.4 m	Not recorded	Good, 109 m^3/d	Domestic

6.4.32 In addition, there are two wells and two warm springs mapped between 1.00 km and 2.00 km to the west / south-west of the Southern and Western Compounds.

Table 6-7: Mapped Wells and Springs to West and South-West of the Compounds

GSI Reference	Year Drilled	Total Depth	Depth to Bedrock	Yield	Recorded Use
2923NEW035, Well	1984	60 m	13.5 m	Moderate, 48.5 m^3/d	Unknown
2923NEW017, Well	19th Century	9.1 m	4 m	Good, 164 m^3/d	Unknown
2923NEW023, Spring	Not applicable	Not applicable	Not applicable	Not recorded	Not applicable
2923NEW024, Spring	Not applicable	Not applicable	Not applicable	Not recorded	Not applicable

6.4.33 Well and spring locations are illustrated in Figure 6-3. There are no other mapped wells or springs in the GSI database within a 2.00 km radius of the Application Site.

6.4.34 From the EPA website and data provided by daa, it is known that there are groundwater monitoring wells located around Hangars 1 to 6 in the North Apron. These are monitoring wells which are not used for water supply purposes. The monitoring wells are related to facilities which are licensed by the EPA:

- Industrial Emissions Licence, P0480-02, Dublin Aerospace Limited, located at Hangars 1 and 5
- Integrated Pollution Control Licence, P0921-01, International Aerospace Coatings Limited, located at Hangar 3

6.4.35 The original licensed area for Dublin Aerospace Limited (P0480-01, issued by the EPA in 1999) encompassed Hangars 1 to 6 but the licensed area was reduced on several occasions. Hangar 3 was removed from the licensed area in 2010. A separate licence (P0921-01) was subsequently issued to International Aerospace Coatings Limited in 2011 for their operations at Hangar 3.

6.4.36 The majority of licensed monitoring wells for P0480-02 are located on the northern side of the hangars. There is a network of thirteen licensed monitoring wells for P0480-02, which are located between 500 m and 800 m north-east of the eastern portal of the Proposed Development. Chlorinated hydrocarbons, including trichloroethene, cis-1,2-dichloroethene and vinyl chloride, are detected in groundwater from the monitoring wells with concentrations reported to be following declining trends[9].

6.4.37 International Aerospace Coatings Limited's Annual Environmental Report (AER) for 2020 indicates that they have a groundwater monitoring programme, but that no contaminants are detected in groundwater. No AER for 2021 is available on the EPA website for this licence.

6.4.38 The GSI website maps the closest source protection area for a public water supply source as being located 10.8 km west of the airport at Dunboyne, Co. Meath. There are no source protection areas for group water schemes mapped in the vicinity of the airport or wider area (not within 10 km radius of the Proposed Development).

6.4.39 The airport's water supply is solely provided by mains water.

[9] AECOM, Dublin Aerospace Groundwater Monitoring Report 2021, dated 05 July 2022, reference: 60881082-ACM-RP-EN-001, accessed through EPA website

6.4.40 The Underpass and Southern Compound of the Application Site are located within the Dublin Groundwater Body, IE_EA_G_008[10]. This groundwater body is classified under the Water Framework Directive as being a 'Poorly Productive' bedrock aquifer and having Good status for the period 2013-2018 and a risk status of Review. The airport straddles the northern boundary of this groundwater body and the southern boundary of the Swords Groundwater Body. The Dublin Groundwater Body is a large groundwater body with an estimated area of 837 km^2, extending from Dunshaughlin, Kilcock and Naas in the west, eastwards across Dublin city to the coast. The GSI reports[10] that groundwater flow paths are expected to be short (~1 km) from recharge to discharge points, with groundwater discharge occurring to rivers (where they are in hydraulic continuity with the aquifer), to springs and to the coast. Groundwater flow is expected to be primarily through shallow bedrock, where weathering and fracturing is greatest.

6.4.41 The Western Compound is located within the Swords Groundwater Body, IE_EA_G_011[11], to the north. This groundwater body is also classified as having Good status for the period 2013-2018, and as being Not At Risk. The Swords Groundwater Body is smaller, at 199 km^2 in area, extending from Ratoath in the west to Portrane in the east. The GSI reports[11] that groundwater flow paths from recharge to discharge points will commonly take place over a distance of less than 1 km, with the majority of groundwater flow through fractures and fissures in the upper weathered bedrock zone.

6.4.42 A review of trial pit and borehole drilling logs from across the airport indicate that many remain dry following excavation/drilling, though they would seldom be left open for prolonged periods to allow for slow groundwater ingress.

6.4.43 A number of trial pits and boreholes were excavated/drilled between the Central Apron and West Apron in 2018[8], which included the area where it is planned to construct the Proposed Development. Most trial pits were completed at 3 m bgl without encountering groundwater. Seventeen boreholes were drilled to between 3.9 m and 6 m bgl in total depth, with ten remaining dry. In the remainder, static water levels within the overburden of between 2.1 m and 4.2 m bgl were recorded.

6.4.44 During a second site investigation in 2018[7], boreholes were drilled into bedrock to total depths ranging from 22.5 m to 38.0 m bgl. No groundwater ingress was noted into these boreholes and no monitoring wells were installed.

6.4.45 A well was installed in each of the eleven boreholes drilled during the 2022 site investigation[6]. While all of the boreholes extended into bedrock, the well installations were within the overburden. Monitoring wells of 50 mm diameter were installed in nine of the boreholes, with larger diameter abstraction wells of 150 mm diameter installed in BH105 and BH107. Pump and step permeability tests were conducted in BH105 and BH107 following installation, with manual depth to groundwater dip readings recorded from the monitoring wells. It is understood that dataloggers were also used to monitor changes in groundwater elevation during the pump and step tests. It is understood that data collated during the 2022 site investigation will be used to generate a 3-D numerical groundwater model to assess whether dewatering will be required during construction and, if so, whether reinjection of water would also be required to prevent settlement of adjacent structures. However, the 2022 G.I works indicated that limited dewatering will be required during the excavation works.

6.4.46 Much of the airport is paved thus limiting rainfall infiltration, therefore recharge to the underlying bedrock aquifer will be limited. The previously cited drilling and excavation data indicate that groundwater occurrence in the overburden is variable across the airport and will likely depend on the degree of recharge in the area and composition of the glacial till. The GSI estimates recharge to the aquifer through the low permeability overburden as 66 mm/a.

6.4.47 The general groundwater flow direction is expected to follow the regional topographic gradient across the airport to the east and north-east. The direction of shallow groundwater flow in the overburden may vary depending on composition, local permeability differences and the proximity of surface water courses. It is expected that shallow groundwater discharge to surface water courses will occur where they are in hydraulic continuity. The Cuckoo Stream flows from north-west to south-east across the Application Site through a culvert. Given that the stream is culverted, it is considered that hydraulic connectivity of this stream with shallow groundwater in the overburden is limited.

[10] https://secure.dccae.gov.ie/GSI_DOWNLOAD/Groundwater/Reports/GWB/DublinGWB.pdf
[11] https://secure.dccae.gov.ie/GSI_DOWNLOAD/Groundwater/Reports/GWB/SwordsGWB.pdf

Designated Sites

6.4.48 There are no designated sites from a geological heritage perspective within the Application Site. The closest geological heritage site is Feltrim Quarry, which is located 3.4 km to the north-east of the proposed eastern ramp portal to the Underpass.

Ground Investigation

6.4.49 As referred to above, two site investigations were conducted in the airfield area in 2018 that included the area of the Proposed Development, with a third completed along the line of the Proposed Development in 2022.

6.4.50 Of the 2018 site investigations, one was a relatively shallow investigation that included twenty-seven trial pits and seventeen boreholes to maximum depths of 3.0 m and 6.0 m bgl, respectively. The second was a deeper investigation that included the drilling of seven boreholes, six of which extended into bedrock.

6.4.51 Three shallow soil samples (from <2.0 m bgl) were collected and submitted for laboratory analysis in 2018. Polycyclic aromatic hydrocarbons (PAHs) were generally below laboratory method detection limits (MDLs). Total petroleum hydrocarbons (TPHs), BTEX compounds (benzene, toluene, ethyl benzene and total xylenes), and polychlorinated biphenyls (PCBs) were also below laboratory MDLs.

6.4.52 A total of 22 soil samples were submitted for laboratory analysis of waste acceptance criteria in 2022. No asbestos or PCBs were detected in any of the samples analysed. TPHs, BTEX compounds and PAHs were below laboratory MDLs in most samples. TPH was detected in seven soil samples up to 360 mg/kg (BH108 at 8.7 m bgl) predominantly aliphatic and aromatic hydrocarbons in the C12-C16 and C21-C35 carbon chain length ranges. Total 17 PAHs were detected in four samples up to 310 mg/kg (BH111 at 9.5 m bgl, inconsistent with the non-detection of TPH in this sample). Trace concentrations of benzene (1.3 μg/kg) and toluene (3.5 μg/kg) were detected in BH110 at 7.65 m bgl.

6.4.53 A groundwater sample was collected from each of the pumping wells, BH105 and BH107. No PFAS or PAHs were detected above MDLs.

6.4.54 TPH was also below detection in groundwater from BH105 and detected at 780 μg/L in groundwater from BH107, predominantly in the C10-C21 carbon chain length range.

Summary of the Current State of the Environment

6.4.55 A summary of the current state of the environment within the Application Site is provided in the table below.

Table 6-8: Summary of Baseline Conditions

Item	Description
Context	The Application Site is located mainly within the operational airfield. Pier 3 is on the eastern edge of the Application Site; no chemicals are stored there. Apart from in-ground utilities (including the culverted Cuckoo Stream) that serve the airport, there are no underground structures beneath the site. Ground surfacing consists either of concrete, tarmac or grass. Overburden consists of made ground underlain by low permeability limestone boulder clay. Beneath the Underpass area of the Application Site, depth to the calcareous shale and limestone bedrock is between 21.40 m and 32.35 m bgl. This means that the Underpass will be wholly within unconsolidated subsoil material and will not disturb the underlying bedrock.
Character	Bedrock beneath the site is classified as either a Poor Aquifer or, beneath the West Apron and Western Compound, as a Locally Important Aquifer. Due to the presence of low permeability overburden, groundwater beneath the underpass area of the Application Site is classified as having low vulnerability, this increases to moderate vulnerability to the east and moderate to high beneath the Western Compound. There are six wells mapped within a 2 km radius to the south / south-east from which groundwater is reportedly abstracted for industrial use. The wells date from 1991 or earlier and it is not known if they are still active. There is also one domestic supply well dating from the 19th Century mapped within a 2 km radius east, again it is not known if this is still in use.

Item	Description
	Two wells and two warm springs are mapped within a 2 km radius to the west / south-west of the Western and Southern Compounds. The wells date from 1984 or earlier, and it is not known if they are still in use. Limited shallow soil sampling was conducted in 2018 and concentrations of PAHs, TPHs, BTEX and PCBs were close to or below laboratory MDLs. Analysis of additional soil samples collected in 2022 again found concentrations of PAHs, TPHs, BTEX and PCBs to be below laboratory MDLs in most samples. Maximum PAH and TPH concentrations detected were: • Total PAHs, 310 mg/kg, PAHs were detected in 4 of the 22 samples • TPHs, 360 mg/kg, TPHs were detected in 7 of the 22 samples No asbestos was detected in the soil samples. Groundwater monitoring data are available for two licensed sites located between 500 m and 800 m north-east of the eastern portal of the Underpass. Chlorinated hydrocarbons are detected in groundwater, with concentrations following declining trends. Eleven wells were installed across the Proposed Development site in 2022. Groundwater samples were collected from two of these wells. TPHs were detected in one groundwater sample (780 μg/L), with PAHs and PFAS below laboratory MDLs.
Significance	The site has a long history of development and use in the context of an operational airport. There are no designated sites from a geological heritage perspective within a 2 km radius of the site. There are no public water supply or group water scheme source protection areas mapped within a 10 km radius of the site. The general groundwater flow direction is expected to follow the topographic gradient to the east and north-east, though this may vary within overburden depending on composition, local permeability differences and the proximity of surface water courses. It is expected that shallow groundwater discharge to surface water courses will occur where they are in hydraulic continuity, which is considered unlikely to be the case for the Cuckoo Stream as this is culverted beneath the Application Site.
Sensitivity	With regard to land, soils and geology, the Application Site is considered to be of Low sensitivity. With regard to hydrogeology, the Underpass area of the Application Site is considered to be of Low sensitivity while the West Apron, the Southern Compound and the Western Compound areas are considered to be of Medium sensitivity.

6.5 Future Receiving Environment

6.5.1 It is considered that the Future Receiving Environment would not be substantively different to the Current State of the Environment, given that the Application Site is located within the airside zone of the airport and will remain unchanged prior to construction of the Proposed Development.

6.6 Environmental Design & Management

6.6.1 Potential impacts have been taken into account in the design of the Proposed Development. These include:

- The Underpass clean surface water drainage system has been designed to convey rainfall that falls on the portals/ramps to the low point and sump pump system via combined kerb drainage. The flow will be pumped from the below ground attenuation tank back up to surface level for discharge to the Cuckoo Stream network at greenfield runoff rates. The system will encompass emergency storage to ensure protection against failure of the pump.
- Potentially polluted surface water drainage (by fuel spillage or fire events within the operating tunnel) will run through the surface water drainage system and will pass through a fuel interceptor prior to discharging to the pumped network. This will prevent contaminated drainage from entering subsoils and groundwater.
- In addition to the fuel interceptor, a fire suppression system will be installed within the underpass which will include an automated valve system and separate contaminated storage tank. In the event of a major spill or fire, contaminated flow would be diverted to the contaminated storage tank which can then be emptied via a dry riser by a tanker at surface level.

6.7 Assessment of Effects & Significance

Determining Construction Effects

6.7.1 The potential construction impacts in relation to land and soils are described in Table 6-9. It identifies the source of the impact; potential impact pathways (route by which receptors can become impacted) and potential effects arising from the potential impact. For each of the potential effects identified, the likelihood of an effect has been considered to determine whether any further assessment should be undertaken.

Table 6-9: Potential Construction Effects

Potential Impact	Potential Impact Pathway	Potential Effect	Significant Effect?
Construction activities in the vicinity of unlicensed monitoring wells	Mobilisation of contaminants directly to groundwater	Pollution of groundwater	Not significant. Can be mitigated through identification of well locations before construction works commence and decommissioning or protecting the wells. The known licensed sites and monitoring wells are located between 500 m and 800 m north-east of the eastern portal of the Proposed Development and, as they are outside of the boundary of the Proposed Development site, are unlikely to be disturbed.
Construction activities in vicinity of features of geological or geomorphological interest and importance	Direct impact on any features of geological or geomorphological interest and importance	Damage or loss of features of geological or geomorphological interest and importance	Not significant. No such features have been identified in the vicinity of the Application Site
Soil excavation and infilling	Leaching and mobilisation of contamination	Pollution of soil and groundwater and increased mobilisation of contaminants	Discussed further below
Dewatering	Changes in groundwater level and settlement	Structural defects due to settlement and pollution of groundwater and surface water	Discussed further below
Accidental spills and leaks	Introducing contaminants to the subsurface	Pollution of soil and groundwater	Discussed further below
Use of concrete and lime	Introducing highly alkaline cement to the subsurface	Raise groundwater pH	Discussed further below
Use of natural resources	Consumption of non-renewable natural resource	Depletion of non-renewable natural resource	Discussed further below

Determining Operational Effects

6.7.2 The potential operational impacts on land and soils are described in Table 6-10. It identifies the source of the impact; potential impact pathways (route by which receptors can become impacted) and potential effects arising from the potential impact. For each of the potential effects identified, the likelihood of an effect has been considered to determine whether an assessment should be undertaken.

Table 6-10: Potential Operation Effects

Potential Impact	Potential Impact Pathway	Potential Effect	Significant Effect?
Accidental spills and leaks	Introducing contaminants to the subsurface	Pollution of soil and groundwater	Discussed further below

Construction Phase

Excavation and Infilling

6.7.3 Details of construction works are outlined in Chapter 3: Proposed Development. The Underpass would be constructed using a 'cut and cover' tunnel construction technique.

6.7.4 Stockpiling of excavated soils prior to removal from site would, in the absence of mitigation, have the potential to impact on soil and groundwater, through the leaching of contaminants. While there has been limited chemical analysis of soil from beneath the Application Site to date, there is no known source of significant contamination present in soils, subsoils or groundwater beneath the Application Site.

6.7.5 Using the criteria set out in Table 6-2 and due to the presence and thickness of low permeability subsoil beneath the Underpass area of the Application Site, groundwater vulnerability is classified as 'low'. Even with the excavation and removal of subsoils to facilitate construction of the Underpass, there will be at least 10 m of low permeability overburden cover remaining to provide protection of the underlying Poorly Productive bedrock aquifer. While groundwater vulnerability increases to 'moderate to high' in the area of the Western Compound, no ground works are planned in this area.

6.7.6 Excavation and construction works will be undertaken in a phased manner, with the Underpass divided into 50 segments. While the main aim of phasing is to minimise disruption to existing terminal and airside operations, it will also limit the length of time that any one segment is excavated and exposed, and thus limit the time during which potential contamination could be mobilised.

6.7.7 Excavation and infilling impacts will result in a permanent direct effect of neutral quality which will have an imperceptible effect on the character of the soil and geological environment but is certain to occur and is irreversible. According to the criteria in Table 6-3, this is considered to be a low impact on the soil and geological environment of low sensitivity and the significance of the effect is considered imperceptible.

6.7.8 With regard to groundwater, excavation, dewatering and infilling will result in a low impact on an environment of low to medium sensitivity. The magnitude of this is considered slight / imperceptible, and not significant.

Dewatering

6.7.9 While there is limited information on depth to groundwater within the overburden and underlying bedrock beneath the Application Site, limited quantities of groundwater are likely to be encountered during excavation works in the low permeability subsoils. It is anticipated that dewatering and/or depressurisation of the limestone and calcareous shale aquifer will be required during construction.

6.7.10 The geotechnical and hydrogeological investigation undertaken in 2022 has collated data to clarify whether dewatering is required, the extent to which it is required and whether reinjection of that groundwater is necessary to prevent settlement of structures on the terminal side of the proposed Development.

6.7.11 The Proposed Development does not pose a significant risk to the availability of groundwater within aquifers, particularly as dewatering will only be required on a temporary basis during construction works and may include reinjection. Bedrock beneath the underpass area of the Proposed Development site is classified as a Poorly Productive Aquifer and is not used for supply. The impact is considered low on an environment of low sensitivity. As such there will be an imperceptible effect during the construction phase of the Proposed Development, which is not significant.

Accidental Spills and Leaks

6.7.12 During construction of the Proposed Development, there is a risk of accidental pollution incidents from the following sources:

- Spillage or leakage of chemicals stored and used onsite as part of construction works;
- Spillage or leakage of oils and fuels from construction machinery or site vehicles; and
- Spillage of oil or fuel from refuelling machinery onsite.

6.7.13 Accidental spillage of fuels or chemicals could potentially result in the impact of soils and groundwater underlying the Application Site, if inappropriately handled or stored during construction. Potential contaminants could migrate through the subsoils and impact underlying groundwater or nearby surface water.

6.7.14 A number of groundwater wells have been identified within a 2 km radius of the Application Site, the closest of these is between 0.75 km and 1.25 km east from the eastern ramp of the Underpass. However, given their distance from the Proposed Development; the protection afforded by thick, low permeability overburden; and that groundwater abstraction will likely be required during construction, thus providing hydraulic containment, water quality impacts from the Proposed Development on these receptors is, therefore, considered unlikely. There will, however, exist the potential for impact to groundwater quality in the aquifer.

6.7.15 Spills and leaks are considered a direct negative effect and, if they occur, would be confined to one-off releases. The impact could alter the character of soil and/or groundwater at the local site but would be temporary in nature. The impact would, therefore, result in a low impact on a low sensitivity soil and geological environment and the significance of the effect is imperceptible with regard to soils and geology.

6.7.16 Accidental spills and leaks during the construction phase are therefore considered to be a low impact on a low to medium sensitivity hydrogeological environment. The magnitude of this effect is slight / imperceptible with regard to groundwater, which is not significant.

Use of Concrete and Lime

6.7.17 Lime and concrete (specifically, the cement component) is highly alkaline and any spillage which migrates through subsoil could impact groundwater quality. The activity most likely to result in contamination is in-situ concrete casting of the floor, walls and roof during construction of the tunnel.

6.7.18 As noted above, any impacts are considered unlikely to impact on identified groundwater wells but may impact the groundwater body.

6.7.19 The impacts will result in a direct negative effect but unlikely to occur and, if they occur, would be confined to one-off releases. The impact could alter the character of soil and/or groundwater at the local site but would be temporary in nature. Therefore, use of concrete and lime is considered to be a minor effect to a low sensitivity environment and the magnitude of the effect is imperceptible, which is not significant.

Use of Natural Resources

6.7.20 As explained in Chapter 3: Proposed Development it is expected that there will be a requirement for approximately 10,400 m^3 of granular fill for use on taxiways and aprons, with an additional 200,000 m^3 of imported backfill also required. In addition, it is expected that it will be possible to reuse 70,000 m^3 of site-won backfill. The source of imported fill material will involve careful selection and vetting to check that it is of a known origin and that it is 'clean' (i.e., will not cause contamination to the environment).

6.7.21 Aggregates and concrete components are natural non-renewable resources and their use results in depletion of the national stock of these resources. While Ireland produces approximately 36 million tonnes of aggregates annually[12], a proportion of this is exported. Therefore, the Proposed Development's requirements have been assessed against national demand for aggregates based on

[12] Irish Concrete Federation (2019), Essential Aggregates Providing for Ireland's needs to 2040, https://www.irishconcrete.ie/library/publication/

available industry figures, rather than production, to determine the significance of natural resource use. The outcome is summarised in Table 6-11 below.

Table 6-11: Natural Resource Requirements

Material	Quantity	Annual National Demand[12]	Project Volume as % of National Demand	Impact
Concrete - Underpass	75,600 m^3	4,800,000 m^3	1.7%	Minor
Pavement Quality Concrete (Taxiways & Aprons)	7,600 m^3			
Granular fill (Taxiways & Aprons)	10,400 m^3	32,810,000 m^3	0.68%	Minor
Granular fill (Underpass)	11,200 m^3			
Imported Backfill	200,000 m^3			

6.7.22 Based on the calculated percentages of national demand and the significance criteria in Table 6-4, the overall magnitude of effect from the use of natural resources is minor, and not considered to be significant.

Operational Phase

Accidental Spills and Leaks

6.7.23 There is the potential for accidental spills and leaks to occur from vehicles using the Underpass during its operation. However, the impacts are unlikely to occur due to embedded control measures that have been incorporated into the Proposed Development. As explained in Chapter 3: Proposed Development, these include a fuel interceptor on the surface water drainage network and a storage tank for potentially contaminated water.

6.7.24 Potentially polluted surface water drainage (by fuel spillage or fire events) will run through the same collection system as the surface water network and will pass through a fuel interceptor prior to discharging to the pumped network. It is, therefore, unlikely to infiltrate into the ground and affect subsoils and groundwater.

6.7.25 In addition to the fuel interceptor, a fire suppression system will be installed within the Underpass, which will include an automated valve system and separate contaminated storage tank. In the event of a major spill or fire, contaminated firewater flow would be diverted to the contaminated storage tank which can then be emptied via a dry riser by a tanker at surface level.

6.7.26 However, if impacts from accidental spillage and leaks occur, these would be confined to one-off releases. The impact could alter the character of soil, geology and/or groundwater at the local site but the effect would be temporary in nature. Therefore, it is considered to be a negligible impact on a low to medium sensitivity groundwater environment. The magnitude of this effect is imperceptible, which is not significant. Accidental spills and leaks during the operational phase are therefore also considered to be a negligible effect on a low sensitivity soil and geological environment and the magnitude of the effect is imperceptible, which is not significant. Specific mitigation measures are therefore not required.

6.8 Mitigation & Monitoring

Construction Phase

Excavation, Infilling and Dewatering

6.8.1 Temporary storage of excavated soil will be carefully managed in such a way as to prevent potential negative impact on the receiving environment. Spoil and temporary stockpiles will be positioned in locations which are distant from drainage systems and away from areas subject to flooding, so as not to cause potential run off to soil and groundwater.

6.8.2 The contractor shall provide suitable pumps, settlement tanks and filters to filter all water being pumped/discharged from excavations into existing drains. The contractor shall also take measures to ensure that runoff from open excavations does not enter the surrounding drainage system without being treated.

6.8.3 Excavated soil and stone that is surplus to requirements will be managed through the contractor's Resource & Waste Management Plan. The excavated soil will be tested for potential contaminants and waste acceptance criteria to determine whether it can be stockpiled on site for future reuse; sent to a soil recovery facility; or disposed as inert, non-hazardous or hazardous waste.

6.8.4 Where possible, material excavated from site will be reused to minimise the volume of imported fill required. Where imported fill is required, the source will be carefully selected and vetted to ensure that it is of a reputable origin and that it is 'clean' (i.e., will not introduce contamination to the environment). Procurement procedures will be developed to ensure that aggregates are sourced from reputable suppliers who are vetted for their environmental management status, as well as regulatory and legal compliance

6.8.5 Given the nature of the site, a significant part of existing pavements demolished to allow construction of the Proposed Development will need to be eventually reconstructed in the same location. Pavement demolition material may potentially be reused to reconstruct the new pavement. The extent of re-usability will be determined during the works. Any such site-won material will be carefully processed to ensure that no contamination is released to the environment.

6.8.6 If recycled aggregate is used as imported fill, rigorous chemical testing will be undertaken to confirm that it is 'clean' (i.e., will not introduce contamination to the environment).

6.8.7 Estimated volumes of excavated soil and fill requiring reuse, disposal or recycling are provided in Table 6-12 below.

Table 6-12: Estimated Construction and Demolition Waste Volumes

EWC Code	Description	Quantity
17 01 01	Concrete	10,950 m^3
17 05 04	Granular Fill	7,300 m^3
17 05 04	Soils	105,000 m^3
17 05 04	Soils	211,000 m^3
17 03	Asphalt	8,700 m^3

6.8.8 Handling of materials, such as soils, will be kept to a minimum and materials shall be stockpiled at a minimum practicable height. For topsoil, a 2 m height is recommended to prevent the soil compressing under its own weight, all other stockpiles will not exceed 10 m in height and will be suitably graded.

6.8.9 Where required, silt fencing will be deployed at the base of stockpiles when storing fine material, to prevent runoff outside the designated area.

6.8.10 If, during the excavation works, either groundwater or surface water run-off enters the excavation, there will be a requirement to dewater the excavation. This will be achieved by pumping water from the excavation to the nearest watercourse or drain. To ensure that no silt or sediment is transferred to the drains or watercourses, the water will be pumped via settlement tanks or collection basins, where any solids in the water will settle out. The settled solids will be removed from the tank/basin as required and disposed of offsite by appropriately licensed hauliers.

6.8.11 All discharged water (rainwater and groundwater) from pumping will be treated and tested before re-infiltration. Such water will be disposed of as construction site run-off, having first passed through a settlement tank or filtration system where appropriate. No discharge to existing infrastructure / watercourses / ground shall be permitted to take place without the appropriate consents or approvals.

6.8.12 It is proposed to operate the excavation dewatering system as a closed loop system to avoid aeration of the re-injected groundwater. Should it prove possible to manage drawdown effects on existing structures without injecting 100% of the abstracted groundwater, discharge to the nearby stream or

sewer system will be required, subject to necessary consents. It is expected that simple treatment, such as sedimentation and aeration, will be required before discharge.

6.8.13 Chemical testing of groundwater will be conducted to determine appropriate discharge options. Groundwater from the monitoring network and dewatering system, if required, will be regularly monitored before, during and after construction for a range of organic and inorganic parameters.

6.8.14 All construction materials shall be responsibly sourced, with assurances provided that goods and services are legitimately secured from legal and well-managed sources and from suppliers and contractors who can demonstrate responsible sourcing of their materials.

6.8.15 The source of imported fill material will be carefully selected and vetted to ensure that it is of a reputable origin and that it is 'clean' (i.e., will not introduce contamination to the environment). To the extent possible, material excavated from site will be reused to minimise the volume of imported fill required.

6.8.16 If recycled aggregate is used as imported fill, rigorous chemical testing will be undertaken to confirm that it is 'clean' (i.e., will not introduce contamination to the environment).

6.8.17 Imported fill materials will be brought to the Application Site on the public road network, prior to being distributed along the path of the Underpass via the designated haul routes for each Phase.

6.8.18 Temporary drainage during the construction phase will be addressed in the CEMP and will be managed so as to reduce the direct runoff to ground and to watercourses.

6.8.19 Periodic inspections of the construction works will be conducted by the appointed contractor, documented and reported to daa on a monthly basis. daa shall also conduct audits or spot checks to ascertain whether works comply with the requirements of the preliminary CEMP and the contractor's detailed CEMP.

Accidental Spills and Leaks

6.8.20 In order to prevent spillages to ground of fuels or other liquid chemicals, and to prevent consequent soil or groundwater quality impacts, it will be necessary to adopt mitigation measures during the construction phase.

6.8.21 Pollution prevention will be achieved with both physical and procedural measures. The contractor shall comply with all national laws and regulations controlling pollution of the environment. Necessary precautions to prevent pollution occurring to ground of fuels, oils, chemicals, or other harmful materials shall be taken.

6.8.22 The locations of refuelling, storage of oil/fuel, concrete mixing and washing areas should be established, where practicable, at a designated bunded location in the Main Compound. A buffer zone of at least 50 m between the Cuckoo stream culvert network should be provided.

6.8.23 Oil and fuel storage tanks will be bunded to the greater volume of either 110% of the capacity of the largest tank/container within the bunded area or to a volume of 25% of the total capacity of all the containers.

6.8.24 Drainage from the bunded area will be diverted for collection and safe disposal.

6.8.25 All containers within the bunded storage area will be clearly labelled, so that appropriate remedial action can be taken in the event of a spillage. When moving drums from the bunded storage area to locations within the Application Site, a suitably-sized spill pallet will be used for containing any spillages during transit.

6.8.26 A spill response kit will be available onsite and accessible to all to control pollution incidents. These spill kits will contain absorbent pads, absorbent granules and methods of disposal of materials and used kit. These kits will be located at appropriate points around the site which are considered to be at a higher risk of pollution (e.g., refuelling area and next to fuel tanks). Further spill kits and supplies will be located in the stores within the site, where replacements for used kits will be found. The spill kits will need to be regularly inspected and immediately replaced if used. Any used spill kit materials will be disposed of using a licensed hazardous waste contractor in accordance with relevant legalisation.

6.8.27 Refuelling of construction vehicles and the addition of hydraulic oils or lubricants to vehicles, will be conducted by appropriately-trained personnel and take place in designated areas, which will be away from surface water gullies or drains (unless agreed otherwise with daa – which may be necessary in the case of mobile task lighting or generators).

6.8.28 Where mobile fuel bowsers are used on the Proposed Development, in the event of a machine requiring refuelling outside of the designated area, fuel will be transported in a mobile double skinned tank. Any flexible pipe, tap or valve will be fitted with a lock where it leaves the container and locked shut when not in use. Each bowser will carry a spill kit and each bowser operator will have spill response training.

6.8.29 Pumps and generators used on the site will have integral drip trays where possible. All items of plant without an integral drip tray shall be stored over a portable drip tray. Drip trays shall be inspected and kept free of accumulated rainwater as necessary. Any oily water shall be disposed of at an appropriate licensed facility. Any cleaning/arisings from drip trays etc. to be disposed of as hazardous waste in accordance with EPA guidance and legislation.

6.8.30 All plant and equipment shall be checked for leaks of fuel and lubricants before being allowed onto the site. The Principal Contractor will allow for regular checks and maintenance as required.

6.8.31 No discharge to existing infrastructure/watercourses/ground shall be permitted to take place without the appropriate consents or approvals.

6.8.32 The contractor shall provide suitable pumps, settlement tanks and filters to filter all water being pumped/discharged from excavations into existing drains. The contractor shall also take measures to ensure that runoff from open excavations does not enter the surrounding drainage system without being treated.

6.8.33 Ditches and water streams will be clearly identified on site and shown on method statements and site plans. The Principal Contractor carrying out the works shall identify all watercourses, drains and potential conduits for silt-laden run-off and where necessary, measures shall be taken to minimise direct sediment run-off from the working site into watercourses.

Use of Concrete and Lime

6.8.34 The risks from concrete works when constructing the Proposed Development will be managed and mitigated by the Contractor ensuring that no concrete is laid during wet weather, if achievable, so that there is no risk of concrete being washed off the site and into the surface water drains or nearest watercourse.

6.8.35 Ready-mixed concrete will be brought to the Application Site by truck. A suitable risk assessment for wet concreting will be completed prior to works being carried out which will include measures to prevent discharge of alkaline wastewaters or contaminated water to the underlying subsoil and groundwater.

6.8.36 The pouring of concrete will take place within a designated area protected to prevent concrete runoff into the soil/groundwater media. Washout of concrete transporting vehicles will take place at an appropriate facility, offsite where possible, alternatively, where wash out takes place onsite, it will be carried out in carefully managed onsite wash out areas.

6.9 Residual Effects & Conclusions

6.9.1 Residual effects are those that remain following the implementation of mitigation measures. It is concluded that the effect of the Proposed Development on land, soils, geological and hydrogeological environment would be slight to imperceptible or, in the case of natural resources, minor, none which are considered significant.

6.9.2 There are activities during construction that are identified as having the potential to generate temporary and local adverse impacts but, when the proposed mitigation is considered, no significant effects are anticipated.

7. Water

7.1 Introduction

7.1.1 This chapter of the EIAR identifies, describes and assesses the direct and indirect significant effects of the Proposed Development on Water. This chapter should be read in conjunction with Chapter 6: Land & Soils.

7.1.2 A Water Framework Directive Assessment Report is provided in Appendix 7-1. A Flood Risk Assessment is provided in Appendix 7-2.

7.1.3 The EPA Guidance suggests that the matters set out in Table 7-1, below, might be considered in an EIA in respect of water.

Table 7-1: Matters Considered in the EIA

Matter	Considered further in the EIA?
Water (for example hydromorphological changes, quantity and quality)	Yes.
Ground/Surface/Estuarine/Marine	Ground and Surface waters are considered in this chapter and in Chapter 6: Land & Soils. Estuarine / Marine waters are not affected by the Proposed Development as explained in the Natura Impact Statement given in Appendix 10-1, which examines the effects on the closest such receptor: Baldoyle Bay SAC/SPA.
Physical characteristics	Yes.
Chemical characteristics	Yes.
Q value	Yes.
Beneficial uses	No. There are no changes affecting beneficial uses of water resources.
Flooding	Yes. The risk of flooding is covered in the Flood Risk Assessment accompanying the Application and is summarised below.

7.2 Legislation, Policy & Guidance

7.2.1 The following legislation, policy and guidance is relevant to this chapter and has been considered during the assessment presented within it. General legislation, policy and guidance has also been considered but is not listed as this has been covered in Chapter 4: Methodology.

Legislation

7.2.2 The following legislation is relevant to this chapter and has been considered during the assessment presented within it:

- European Union Water Framework Directive (WFD) (2000/60/EC), which was adopted as a single piece of legislation covering rivers, lakes, groundwater and transitional (estuarine) and coastal waters. The WFD was given legal effect in Ireland under the following:
  - European Communities (Water Policy) Regulations, 2003 (S.I. No. 722 of 2003)
  - European Communities Environmental Objectives (Surface Water) Regulations, 2009 ('S.I. No. 272 of 2009) as amended in 2012 (by S.I. No. 327/2012), 2015 (by S.I. No. 386/2015) and 2019 (by S.I. No. 77/2019)
  - European Communities Environmental Objectives (Groundwater) Regulations, 2010 (S.I. No. 9 of 2010) as amended.

- European Communities Environmental Objectives (Groundwater) (Amendment) Regulations, 2016 (S.I. No. 366 of 2016)

- River Basin Management Plan 2018-2021 (DHPLG, 2018)
- Draft River Basin Management Plan 2022-2027 (DHPLG, 2022)

Regional & Local Planning Policy

7.2.3 The following regional and local planning policy is considered relevant to this assessment.

- Fingal Development Plan 2017-2023
- Draft Fingal Development Plan 2023-2029
- Dublin Airport Local Area Plan (2020)

Policy, Standards & Guidance

7.2.4 The following guidance documents are considered relevant to this assessment.

- Environmental Protection Agency (EPA) Guidelines on the Information to be contained in Environmental Impact Assessment Reports (EPA, 2022)
- Transport Infrastructure Ireland (TII 2015) Road Drainage and the Water Environment (DN-DNG-03065)
- Institute of Geologists of Ireland (IGI), Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements (2013)
- Transport Infrastructure Ireland (TII), Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (2009)
- Greater Dublin Strategic Drainage Study Final Strategy Report (Dublin Drainage, April 2005)
- Greater Dublin Strategic Drainage Study – Regional Drainage Policies – Volume 2 – New Development, (Dublin Drainage, March 2005)

7.3 Assessment Methodology

7.3.1 The assessment has been carried out following the below methodology and the EPA Guidance:

- Establishment of the baseline conditions, including identification and assessment of the receiving environment and receptor sensitivity
- Identification of environmental design measures and mitigation measures that form part of the construction methodology
- Identification of the potential impacts, and assessment of the magnitude of potential effects, and their significance
- Consideration of mitigation measures
- Assessment of residual effects

Study Area

7.3.2 The study area is based upon the Application Site including associated compounds used during construction, as shown in Figure 3-1.

7.3.3 The study area for the surface water receptors encompasses all catchments that receive stormwater and overland flow from the Application Site. For groundwater, the study area is the Application Site and a 1km buffer area around it.

7.3.4 In addition, consideration has also been given to any attributes of surface water or groundwater or water-dependent ecological sites outside this study area but hydrologically connected to the airport (i.e., downstream along watercourses), as some impacts can propagate downstream.

Methodology for Determining Baseline Conditions

7.3.5 Baseline condition of the existing water environment has been determined from desktop review and previously undertaken site studies / investigations, as follows:

- Aquatic, Hydrological and Hydrogeological studies undertaken to establish baseline conditions for the Applicant's Infrastructure Application[1] and monitoring conducted in 2020 and 2022
- Ordnance Survey Ireland (OSI) website for historical maps of 1:2,500 scale and 1:10,560 scale and aerial photographs
- OSI discovery series of 1:50,000 scale
- GSI website for public viewer and groundwater maps
- EPA website Geo Portal (envision map viewer)
- Topography maps
- Flood information mapping
- Existing site investigation information

Methodology and Approach

7.3.6 The overall method adopted for undertaking this assessment is set out in Chapter 4: Methodology incorporates other relevant technical framework guidance documents for groundwater risk assessment.

7.3.7 Potential impacts on groundwater or surface water flow, level and quality as a result of the Proposed Development, such as impacts resulting from flow barriers or dewatering activities, incidental spills or surface runoff, are assessed through:

- The development of a conceptual hydrological and hydrogeological model of the Study Area
- The source-pathway-receptor model linkages as further discussed below
- A qualitative and where practicable, quantitative risk assessment

7.3.8 The source-pathway-receptor model linkages are used to assess the identification of sources or potential hazards and impacts to groundwater from the Proposed Development, while examining the consequences and evaluating the significance of any risks.

Source-Pathway-Receptor

7.3.9 The water environment risk assessment identifies the potential sources or 'causes' of effect (such as excavations and the associated dewatering activities); the 'receptors' (water bodies) that could potentially be affected; and the 'pathways' via which the source can affect the receptors. All three elements must be present before a potential impact (linkage) can be realised, as shown in Plate 7-1, overleaf.

[1] See Chapter 19: Future Development Plans for details of the Infrastructure Application.

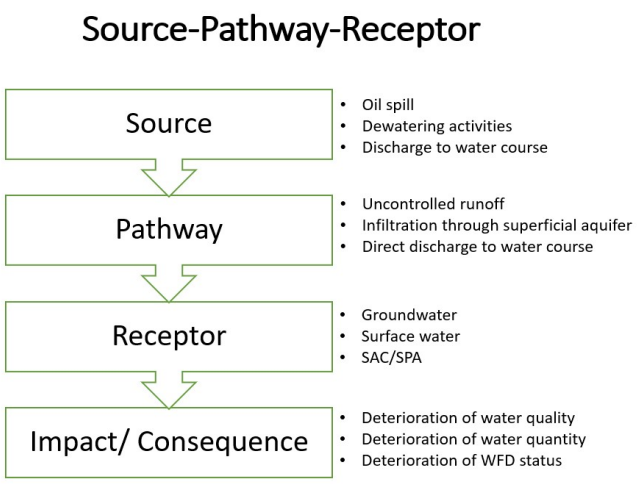


Plate 7-1: Source-Pathway-Receptor model

7.3.10 The first task of the assessment is to identify the sources of potential impact through review of Proposed Development's construction and operational activities (the sources) that have the potential to have an impact the water environment. The Proposed Development includes standard embedded mitigation / Construction Environmental Management Plan (CEMP) measures to address potential adverse impacts being incorporated into the design and construction.

7.3.11 The next task is to identify the potential receptors, i.e., the water bodies that have the potential to be affected by the Proposed Development or vice versa.

7.3.12 The identification of potential water receptors was undertaken with information of water receptors/features in the area, previous studies and available baseline data for the site.

7.3.13 The final task is to determine if there is an exposure pathway or a 'mechanism' allowing an effect to occur at the receptor and to assess the significance of any predicted effect.

Classification of Sensitive Receptors

7.3.14 Receptors have been identified and a qualitative assessment has been used to assign a sensitivity rating from negligible to high and considers their likely adaptability, tolerance and recoverability.

7.3.15 The sensitivity or importance of a water receptor needs to be taken into account to assess the significance of potential consequences of a hazard or impact occurring. Definitions of the level of sensitivity of potential receptors is given in Section 7.4. The scale is defined below in Table 7-2.

Table 7-2 Classification of the Water Receptors

Importance	General Criteria	Receptors
Extremely High	Attribute has a high quality or value on an international scale	• **Hydrogeology:** – Groundwater supports river, wetland or surface water body ecosystem protected by EU legislation e.g. Special Area of Conservation (SAC) or Special Protected Area (SPA) status
Very High	The receptor has little or no ability to absorb change without fundamentally altering its present character, is of very high environmental value, or of national importance.	• **Hydrogeology**: – Source Protection Zone (inner SPZ) within a - Regionally Important Aquifer – Alternatively, groundwater is critical to designated sites of nature conservation – Water abstraction >1000 m^3/day • **Hydrology**: – Q95 ≥ 1.0 metres cubed per second (m^3/s) – Receptors to flood risk: essential infrastructure or highly vulnerable development – Watercourse having a WFD classification shown in a RBMP. Site protected/designated under EC legislation (SAC, SPA, SSSI, Ramsar site, salmonid water)/Species protected by EC legislation

Importance	General Criteria	Receptors
		• **Hydromorphology**: – Unmodified, near to or pristine conditions, with well-developed and diverse geomorphic forms and processes characteristic of river and lake type.
High	The receptor has low ability to absorb change without fundamentally altering its present character, is of high environmental value, or of national importance.	• **Hydrogeology**: – Regionally Important Aquifer (not within SPZ) – Sensitive habitats of national importance – Groundwater is a locally valuable resource because of its moderate quality and / or yield or is known to be locally exploited for water supply – GWDTE with high dependency on groundwater – Water abstraction: 1000-500 m^3/day • **Hydrology**: – Q952 < 1.0 m^3/s – Watercourse having a WFD classification shown in a RBMP. Species protected under EC legislation
Medium	The receptor has moderate capacity to absorb change without significantly altering its present character, has some environmental value or is of regional importance.	• **Hydrogeology**: – Locally Important Aquifer – Groundwater of limited value because its quality does not allow potable or other quality sensitive uses – Exploitation of local groundwater is not extensive and / or local areas of nature conservation known to be sensitive to groundwater impacts – GWDTEs with moderate dependency on groundwater. – Water abstraction: 50-499 m^3/day • **Hydrology**: – Watercourses not having a WFD classification shown in a RBMP • **Hydromorphology**: – Shows signs of previous alteration and / or minor flow / water level regulation but still retains some natural features or may be recovering towards conditions indicative of the higher category
Low	The receptor is tolerant of change without detriment to its character, is low environmental value, or local importance.	• **Hydrogeology**: – Poor Bedrock Aquifer -Unproductive Strata - rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow – Changes to groundwater not expected to impact on local ecology. – Limited economic or social uses – GWDTE with minimal dependency on groundwater i.e. fed by rain and natural surface drainage – Water abstraction: <50 m^3/day • **Hydrology**: – Watercourses not having a WFD classification shown in a RBMP • **Hydromorphology**: – Substantially modified by past land use, previous engineering works or flow / water level regulation. Watercourses likely to possess an artificial cross-section (e.g. trapezoidal) and will probably be deficient in bedforms and bankside vegetation. Watercourses may also be realigned or channelised with hard bank protection, or culverted and enclosed. May be significantly impounded or abstracted for water resources use. Could be impacted by navigation, with associated high degree of flow regulation and bank protection, and probable strategic need for maintenance dredging. Artificial and minor drains and ditches will fall into this category.
Negligible	The receptor is resistant to change and is of little environmental value	• Not applicable.

Source: Based on criteria outlined within the TII's Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (TII, 2009)

Magnitude of Impact

7.3.16 The magnitude of a potential impact is established based on the nature and extent/duration of the proposed development and the likely degree of impact on the receptor. It is independent of the sensitivity of the receptor. Accordingly, the magnitude of the impact has been assigned based on the criteria presented in Table 7-3 as typical examples based on information within the TII's 2009 Guidelines.

7.3.17 Detailed discussion of the magnitude of impacts assessed is given in this Section 7.7. The calculation of magnitude includes consideration of the embedded mitigation measures within the Proposed Development. Where additional mitigation measures are required, these are highlighted in Section 7.8.

Table 7-3: Criteria and Examples for Describing Potential Impacts on the Water Environment

Magnitude of Impact	Criteria for Impacts	Typical Examples (Positive and Negative)
High Adverse	Results in loss of attribute	• Hydrology: – Loss or extensive change to a waterbody or water dependent habitat – Increase in predicted peak flood level >100mm – Extensive loss of fishery – Calculated risk of serious pollution incident >2% annually – Extensive reduction in amenity value • Hydrogeology: – Removal of large proportion of aquifer – Changes to aquifer or unsaturated zone resulting in extensive change to existing water supply springs and wells, river baseflow or ecosystems – Potential high risk of pollution to groundwater from routine run-off – Calculated risk of serious pollution incident >2% annually
Medium Adverse	Results in impact on integrity of attribute or loss of part of attribute	• Hydrology: – Increase in predicted peak flood level >50mm – Partial loss of fishery – Calculated risk of serious pollution incident >1% annually – Partial reduction in amenity value • Hydrogeology: – Removal of moderate proportion of aquifer – Changes to aquifer or unsaturated zone resulting in moderate change to existing water supply springs and wells, river baseflow or ecosystems – Potential medium risk of pollution to groundwater from routine run-off – Calculated risk of serious pollution incident >1% annually
Low Adverse	Results in minor impact on integrity of attribute or loss of small part of attribute	• Hydrology: – Increase in predicted peak flood level >10mm – Minor loss of fishery – Calculated risk of serious pollution incident >0.5% annually – Slight reduction in amenity value • Hydrogeology: – Removal of small proportion of aquifer – Changes to aquifer or unsaturated zone resulting in minor change to water supply springs and wells, river baseflow or ecosystems – Potential low risk of pollution to groundwater from routine run-off – Calculated risk of serious pollution incident >0.5% annually
Negligible	Results in an impact on attribute but of insufficient magnitude to affect either use or integrity	• Soil and Geology: – No measurable changes in attributes • Hydrogeology: – Calculated risk of serious pollution incident <0.5% annually
Low Beneficial	Results in minor improvement of attribute quality	• Reduction in predicted peak flood level >10mm • Calculated reduction in pollution risk of 50% or more where existing risk is <1% annually
Medium Beneficial	Results in moderate improvement of attribute quality	• Reduction in predicted peak flood level >50mm • Calculated reduction in pollution risk of 50% or more where existing risk is >1% annually

Magnitude of Impact	Criteria for Impacts	Typical Examples (Positive and Negative)
High Beneficial	Results in major improvement of attribute quality	• Reduction in predicted peak flood level >100mm

Source: Based on criteria outlined within the TII's Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (TII, 2009)

Significance of Effects

7.3.18 It should be noted that the control measures, such as sealed drainage, have been considered embedded mitigation and control measures in the project design and their application has been assumed to determine the significance of the effect.

7.3.19 The importance of a water resource receptor is determined based on the specific criteria presented in Table 7-2. The magnitude of the effect will be determined based on the criteria in Table 7-3 see above) taking into account, the likelihood of the effect occurring.

7.3.20 Finally, the significance of effects will be determined using a consistent approach (a matrix table) as outlined in Table 7-4 below. Only those effects which are Significant or Profound are considered significant.

Table 7-4: Determination of the Significance of an Effect

Sensitivity / Importance of Attribute	Magnitude of Impact			
	Negligible	Low	Medium	High
Extremely High	Imperceptible	Significant	Profound	Profound
Very High	Imperceptible	Significant / Moderate	Profound / Significant	Profound
High	Imperceptible	Moderate / Slight	Significant / Moderate	Significant
Medium	Imperceptible	Slight	Moderate	Significant
Low	Imperceptible	Imperceptible	Slight	Slight / Moderate

Limitations & Assumptions

7.3.21 Geological and hydrogeological conditions across the Application Site could vary from that interpreted from existing G.I data. Site specific Ground Investigation (G.I) seasonal groundwater level data for the Proposed Development is limited. Therefore, the comments made on groundwater conditions are based on observations made during G.I works and the limited monitoring programme. It should be noted that groundwater levels vary owing to seasonal or other effects. However, this is not expected to impact the finding of the assessment.

7.3.22 The location accuracy of published data is variable. For example, the location of boreholes, wells and springs on GSI mapping is generally to within a radius of 50 m. In addition, the GSI groundwater dataset may be incomplete as there is no statutory requirement to register boreholes or wells unless the well has an abstraction rate of 25 m^3/d. Hence, the presence (historical or current) of boreholes or wells not recorded on the website cannot be discounted. Additionally, no details on the borehole construction or current operational status are available on the mapped boreholes.

7.4 Current State of the Environment

7.4.1 There are a number of water bodies which drain the Applicant site which comprises four river catchments, the Ward River, the Sluice River, the Mayne River and the Santry River. The Ward River enters the sea at the Broadmeadow Estuary at Swords while the Sluice and Mayne Rivers enters the sea at Baldoyle Bay in Portmarnock. The Santry River enters Dublin Bay at Raheny. The Applicant site is further divided into sub-catchments which drain specific areas of the Airport through a network of streams, culverts and surface water drains. These sub-catchments include the Cuckoo, Kealy's, St. Margaret's, Forest Little and Ward Streams.

7.4.2 The proposed development is within the Mayne River sub-basin. The area has only one surface water bodies in close proximity which is a culverted stream referred to as the Cuckoo Stream.

7.4.3 There are a number of bedrock aquifers that underlay the Applicant site which are comprised of Limestone and Shale aquifer. These aquifers are designated as limited productivity aquifers by the GSI. The proposed development is within the superficial deposits which is comprised of low permeability boulder clays with limited productivity (not characterised by an aquifer by the GSI).

Surface water

7.4.4 Dublin Airport is located within four WFD sub-basins:

- The Mayne River sub-basin, which includes the Cuckoo Stream, is a sub-basin of the Liffey and Dublin Bay Catchment. The Proposed Development will be entirely located within the Mayne River sub-basin, which covers the majority of the airport footprint, including the terminal, the west and central aprons, and the majority of the South Runway. The Cuckoo Stream flows into the Mayne River, which subsequently flows into the Baldoyle Estuary Special Area of Conservation (SAC);
- The Sluice sub-basin, includes the Forrest Little Stream and Kealy's Stream. This sub-basin drains the majority of the North Runway, the North Apron, Terminal 1 and Airport Car Parks to the east. Forrest Little Stream and Kealy's Stream flow into the Sluice River, which then flows into the Baldoyle SAC. This sub-basin is not directly hydrologically connected to the Proposed Development;
- The Ward River sub-basin includes the Ward River. The Ward River's natural catchment extends across the western part of the North Runway, however, it does not receive drainage from the North Runway. The Ward River flows into the Malahide Estuary SAC. This sub-basin is not directly hydrologically connected to the Proposed Development; and,
- The Santry River sub-basin, which extends across the western part of the South Runway and airport car parking. The Santry River flows into Dublin Bay behind Bull Island. This sub-basin is not hydrologically connected to the Proposed Development.

7.4.5 The four aforementioned sub-basins lie within two WFD sub-catchments as follows:

- The Mayne sub-catchment (09_17 Mayne_SC_010), a sub-catchment of the Liffey and Dublin Bay WFD Catchment (ID09).
- The Broadmeadow sub-catchment (08_3 Broadmeadow_SC_010), a sub-catchment of the Nanny-Delvin Catchment (ID 09).

7.4.6 The catchment characteristics, surface water quality and WFD status of each of these sub-basins is considered below. The Q-value system is used to assess the quality of Irish Rivers In terms of organic and inorganic pollutants. It has a nine-point scale ranging from Q5 indicating high quality and an unpolluted watercourse, to Q1 which indicates bad quality and a seriously polluted watercourse. The values are summarised in Table 7-5.

Table 7-5: EPA River Quality Q Indices Summary[2]

Q Values	WFD Status	Pollution Status	Condition
Q5, Q4-5	High	Unpolluted	Satisfactory
Q4	Good	Unpolluted	Satisfactory
Q3-4	Moderate	Slightly Polluted	Unsatisfactory
Q3, Q2-3	Poor	Moderately Polluted	Unsatisfactory
Q2, Q1-2, Q1	Bad	Seriously Polluted	Unsatisfactory

[2] Source: https://epawebapp.epa.ie/qvalue/webusers/ Last Accessed February 2022

The Mayne River sub-basin, including Cuckoo Stream

7.4.7 The majority of Dublin Airport, including the area that comprises the Proposed Development and temporary site compounds, currently drains to the Cuckoo Stream of the Mayne River sub-basin (WFD Sub-basin Mayne_010), the upper reaches of which are culverted beneath the airport before discharging to the southeast of the airport. The airport catchment consists of the terminal, other buildings, the west and central aprons, and the majority of the South Runway. A small part of the western extent of the South Runway drains directly to the River Mayne.

7.4.8 The Cuckoo Stream effectively forms the northern branch of the River Mayne, joining the southern branch which flows into the Baldoyle Estuary SAC at Mayne Bridge 2 km below the confluence. The River Mayne catchment is approximately 17 km^2, with a significant proportion of urbanised landscape including approximately 3.5 km^2 within the airport boundary. The length of the watercourse channel between the airport boundary and the outfall into the Baldoyle Estuary is 7.4 km.

7.4.9 The Cuckoo Stream branch of the River Mayne is not monitored for water quality by the EPA. However, a site downstream of the confluence of the Cuckoo Stream with the River Mayne is monitored by the EPA at Wellfield Bridge (station code RS09M030500, approximately 5.5 km east-south-east of the airport). The most recent classification was in 2019 where the water quality was classified as *Poor* with a Q value[3] of 2-3, i.e., moderately polluted. The EPA data indicates that this site has historically varied between Q3 and Q2-3 during monitoring (1988 – 2019).

7.4.10 The Applicant undertakes regular monitoring of the Cuckoo Stream, including near its outfall from the airport, comprising of bi-annual biological monitoring and regular water chemistry analysis. Sampling is conducted by Conservation Services using biological sampling and water quality assessment in accordance with EPA Q value methodology. Available monitoring data for the Cuckoo Stream (up to May 2019[4]) report Q values of 1-2, which shows the stream to be seriously polluted and therefore having Bad Ecological Status under the Water Framework Directive. This has more or less been the situation since 2006 (varying between Q1-2 and Q1 during that period). The Mayne River monitoring had reported Q values of 3 in May 2019, indicating the river is moderately polluted and has a *Poor* Ecological Status under the WFD.

7.4.11 Table 7-6 below summarises monitoring data for sampling points within the Cuckoo Stream / Mayne sub-basin collected by Fitz Scientific between March 2020 and February 2021. Results of surface water monitoring at three locations along the Cuckoo Stream and Mayne River conducted by Fitz Scientific in 2020-2021 indicate that it does not meet the standard for *Good* status. No further data is available beyond this period.

Table 7-6: Monitoring Data for Cuckoo / Mayne, 2020-2021

Monitoring Point	S.I. No. 77/2019 Criteria for Good Status[5]	Cuckoo Mayne 1	Cuckoo Mayne 2	Cuckoo Mayne 3	Cuckoo Mayne 4
Location	NA	53.4117, -6.2391	53.4206, -6.2329	53.4091, -6.1635	53.4097, -61565
Detergents as Methylene blue active substances (MBAS) – average concentration	NC	101 µg/L	86 µg/L	175 µg/L	136 µg/L
Propylene glycol – average concentration	NC	Below detection	Below detection	4.5 mg/L	Below detection
Total Petroleum Hydrocarbons (TPH, carbon band C10-C40) – average concentration	NC	Below detection	Below detection	Below detection	47 µg/L

[3] The EPA classifies river biological quality using Q values. Q values measure the ecological health of rivers based on the population of aquatic invertebrates present, it ranges from 5 (High) to 1 (Bad).
[4] Conservation Services, *Biological Monitoring of Surface Water Quality in the Vicinity of Dublin Airport*, report reference: 19112/DS19/F, dated 06 June 2019.
[5] NA – Not Applicable, NC – No Criteria for good status, µg/L – micrograms per litre, mg/L – milligrams per litre.

Monitoring Point	S.I. No. 77/2019 Criteria for Good Status[5]	Cuckoo Mayne 1	Cuckoo Mayne 2	Cuckoo Mayne 3	Cuckoo Mayne 4
Ammonia as nitrogen (N) – average concentration	0.065 mg/L as N	0.11 mg/L as N	0.10 mg/L as N	0.78 mg/L as N	0.85 mg/L as N
Phosphate (P) (Ortho) – average concentration	0.035 mg/L	0.051 mg/L as P	0.056 mg/L as P	0.193 mg/L as P	0.042 mg/L as P
Biological Oxygen Demand – average concentration	1.5 mg/L	Below detection	3.1 mg/L	13.6 mg/L	5.9 mg/L
Chemical Oxygen Demand – average concentration	NC	23.3 mg/L	8.8 mg/L	30.1 mg/L	24.8 mg/L
pH – average reading	NC	7.82	8.01	7.70	8.09
Dissolved Oxygen – average concentration	NC	10.6 mg/L	9.6 mg/L	7.8 mg/L	7.4 mg/L

7.4.12 The Ecological or Potential WFD status of the Mayne and the Cuckoo is classified as *Poor* for the period 2013-2018 and '*At Risk*'. The River Mayne is at risk due to Poor ecological status, with nutrients and diffuse urban sources of pollution causing significant pressures[6]. A summary of the current WFD status for the Mayne water body is provided in Table 7-7

Table 7-7: WFD Potential Summary for Mayne Water Body (Mayne_010)[7]

WFD Parameter	Status / Summary 2013-2018 monitoring data
Water Body ID	Mayne 010
Water Body Name	Mayne
Water Body Type	River
Water Body Length (m)	16.52 km
Hydromorphological Designation	Unknown
Overall Ecological Potential	Poor
Current Overall Potential	Poor
Supporting Chemistry Conditions	Moderate
General Conditions	Moderate
Oxygenation Conditions	Pass
Dissolved Oxygen (% Sat)	Pass
Other determinand for oxygenation conditions	High
Acidification Conditions	Pass
pH	Pass
Nutrient Conditions	Fail
Nitrogen Conditions	Moderate
Nitrate	Moderate
Ammonium	Good

[6] WFD Cycle 2. Catchment Liffey and Dublin Bay. Sub-catchment Mayne_SC_010. Available online: https://www.catchments.ie/wp-content/files/subcatchmentassessments/09_17%20Mayne_SC_010%20Subcatchment%20Assessment%20WFD%20Cycle%202.pdf Accessed February 2022
[7] Source https://www.catchments.ie/data/#/waterbody/IE_EA_09M030500?_k=10o815 Accessed February 2022

WFD Parameter	Status / Summary 2013-2018 monitoring data
Phosphorous Conditions	Moderate
Orthophosphate	Moderate

7.4.13 According to the Inland Fisheries Ireland (IFI) the Mayne River and tributaries including the Cuckoo Stream are currently non-salmonid[8] although this was historically a salmonid system which had lost its status primarily because of poor water quality due to urbanisation.

Forest Little / Sluice sub-basin

7.4.14 The Sluice River catchment is approximately 10 km^2 in area, with approximately 2.4 km^2 falling within the northern and eastern extent of the airport boundary, draining buildings, roads, several large car parks, aircraft stands, the Northern Runway, and associated taxiways. Forrest Little Stream, Kealy's Stream and the Wad Stream all drain the Sluice River Sub-Basin. The Forest Little / Sluice River flows from west-north-west to east-south-east, discharging to the north of Baldoyle Estuary SAC at Portmarnock Bridge, approximately 7 km east-south-east from the Study Area, the final 2 km of the channel being under tidal influence.

7.4.15 Neither the Sluice River nor its tributaries are monitored for water quality status by the EPA as part of their various river monitoring programmes, nor do they monitor water quality in the Baldoyle Estuary SAC itself.

7.4.16 The Applicant conducts biannual biological sampling and water quality assessment of three monitoring points along the Forest Little / Sluice downstream of the airport; sampling is conducted by Conservation Services using biological sample and water quality assessment in accordance with EPA Q value methodology. Available monitoring data (up to May 2019[9]) report Q values of 3 for each of the three monitoring points in May 2019, indicating a pollution status of *Moderate*. Overtime at the two monitoring points closest to the airport (F4A/B and F5), Q values had improved from 1-2 in 2006 and 2007 to 3 from September 2017 onwards. The most downstream of the three monitoring points (F6) has been monitored since September 2013, and Q values of 3 were predominantly reported up to May 2019. This indicates improving water quality over this time.

7.4.17 Table 7-8 below summarises monitoring data for sampling points within the Forest Little / Sluice sub-basin collected by Fitz Scientific between March 2020 and February 2021. Results of surface water monitoring at three locations along the Forest Little / Sluice conducted by Fitz Scientific in 2020 indicate that it does not meet the standard for *Good* status. No further monitoring data is available beyond this period.

Table 7-8: Monitoring Data for Forest Little / Sluice, 2020-2021

Monitoring Point	S.I. No. 77/2019 Criteria for Good Status[10]	Forest Little 1	Forest Little 2	Forest Little 3
Location	NA	53.4386, -6.2280	53.4268, -6.1772	53.4228, -6.1565
Detergents as MBAS – average concentration	NC	94 µg/L	92 µg/L	109 µg/L
Propylene glycol – average concentration	NC	Below detection	Below detection	Below detection
TPH C10-C40 – average concentration	NC	Below detection	22.5 µg/L	Below detection
Ammonia as nitrogen (N) – average concentration	0.065 mg/L as N	0.07 mg/L as N	0.06 mg/L as N	0.06 mg/L as N
Phosphate (P) (Ortho) – average concentration	0.035 mg/L	0.06 mg/L as P	0.05 mg/L as P	0.05 mg/L as P

[8] Freshwater capable of supporting salmon or trout.
[9] Conservation Services, *Biological Monitoring of Surface Water Quality in the Vicinity of Dublin Airport*, report reference: 19112/DS19/F, dated 06 June 2019.
[10] NA – Not Applicable, NC – No Criteria for good status, µg/L – micrograms per litre, mg/L – milligrams per litre.

Biological Oxygen Demand – average concentration	1.5 mg/L	3.8 mg/L	2.1 mg/L	Below detection
Chemical Oxygen Demand – average concentration	NC	13 mg/L	10.7 mg/L	9.5 mg/L
pH – average reading	NC	7.54	7.53	7.85
Dissolved Oxygen – average concentration	NC	9.0 mg/L	9.6 mg/L	9.6 mg/L

7.4.18 The Ecological or Potential WFD status of the Forest Little / Sluice for the 2013 to 2018 period is Unclassified, while the risk status is to be reviewed. As noted above, for other streams within the Mayne sub-catchment, the Mayne and the Cuckoo, their status is classified as *Poor* for the period 2013 - 2018 and *At Risk*. It is not known whether this water body is heavily modified. However, it is noted that the water body is under significant pressure from anthropogenic sources.

7.4.19 According to the IFI, the Sluice system is salmonid with brown trout historically in the lakes at Abbeyville, though there has been no recent survey on the lakes and in the Sluice downstream of Abbeyville. Towards the downstream part of the stream, where the water quality is improved (Q3) and the substrate is very suitable, brown trout could be present as well as other fish species such as eel and stickleback. This is supported by a 2016 IFI fisheries survey which recorded eel, brown trout (young-of-year), stickleback and flounder on the Sluice River at Portmarnock Bridge 1[11].

The Ward sub-basin

7.4.20 The western end of the North Runway is within the Ward sub-basin (WFD Sub-basin Ward_030), a subdivision of the Broadmeadow sub-catchment. The Ward River sub-basin is approximately 32.9 km^2 in area; approximately 1 km^2 of the airport is shown to be within the Ward River catchment. However, the stormwater drainage does not discharge from hardstanding areas into this catchment, as it diverted to the existing drainage system onsite.

7.4.21 Two tributaries of the Ward are located to the north and west of the Proposed Development; these are named St. Margaret's Stream and Barberstown Stream and flow in westerly and northerly directions respectively. The tributaries confluence approximately 1.1 km north-west of the Airport's North Runway, prior to flowing into the Ward River immediately upstream of Toberburr Road, approximately 1 km further downstream. The Ward River discharges to Malahide Estuary SAC 7 km downstream of the confluence and approximately 4 km north-east of the Study Area.

7.4.22 The EPA monitor the Ward River and tributaries in multiple locations downstream of the airport. The nearest downstream EPA surface water quality monitoring point within the Ward sub-basin that was monitored in 2020 is the bridge north of Killeek (station code RS08W010300). At this monitoring point, the surface water quality is classified by the EPA as *Moderate* with a Q[12] value of 3-4 in 2020. River water quality upstream of this was also classified by the EPA as *Moderate* (Q value of 3-4) in 2020 at Coolatrath Bridge (station code RS08W010070, located 4.6 km upstream), indicating that there is no deterioration in the Q value of watercourses within the Ward sub-basin downstream of the airport.

7.4.23 Table 7-9 below summarises monitoring data for sampling points within the Ward sub-basin collected by the Applicant between March 2020 and February 2021. No further monitoring data is available beyond this period.

[11] Kelly, F.L., Matson, R., Delanty, K., Connor, L., O'Brien, R., Gordon, P., Corcoran, W., McLoone, P., Coyne, L., Morrissey, E., Cierpal, D., Rocks., K., Buckley, S., Kelly, K., McWeeney, D. and Puttharee, D. (2017) Sampling Fish in Rivers 2016. National Research Survey Programme. Inland Fisheries Ireland, 3044 Lake Drive, Citywest Business Campus, Dublin 24, Ireland.

[12] The EPA classifies river biological quality using Q values. Q values measure the ecological health of rivers based on the population of aquatic invertebrates present, it ranges from 5 (High) to 1 (Bad).

Table 7-9: Monitoring Data for Ward, 2020-2021

Monitoring Point	S.I. No. 77/2019 Criteria for Good Status[13]	Ward 1	Ward 2	Ward 3	Ward 4
Location	NA	53.4356, -6.3013	53.4553, -6.2764	53.4640, -6.2188	53.4426, -6.2678
Detergents as MBAS – average concentration	NC	95.4 µg/L	74.3 µg/L	116 µg/L	74.4 µg/L
Propylene glycol – average concentration	NC	Below detection	Below detection	Below detection	Below detection
TPH C10-C40 – average concentration	NC	Below detection	Below detection	Below detection	Below detection
Ammonia as nitrogen (N) – average concentration	0.065 mg/L as N	0.25 mg/L as N	0.09 mg/L as N	1.03 mg/L as N	0.10 mg/L as N
Phosphate (P) (Ortho) – average concentration	0.035 mg/L	0.08 mg/L as P	0.08 mg/L as P	0.08 mg/L as P	0.07 mg/L
Biological Oxygen Demand – average concentration	1.5 mg/L	4.6 mg/L	Below detection	2.6 mg/L	3.4 mg/L
Chemical Oxygen Demand – average concentration	NC	19 mg/L	16.3 mg/L	12.6 mg/L	10.1 mg/L
pH – average reading	NC	7.87	7.86	7.93	7.69
Dissolved Oxygen – average concentration	NC	8.8 mg/L	9.7 mg/L	9.7 mg/L	8.3 mg/L

7.4.24 Under the WFD the Ecological or Potential WFD Status of the Ward sub-basin for the period 2013 to 2018 between the North Runway and the monitoring station at the bridge north of Killeek is classified as *Moderate*, while downstream of that monitoring point it is classified as *Poor* for the same period. No other WFD elements appear to have been classified during this period. The risk status of the Ward is given as *At Risk* with significant anthropogenic and urban wastewater pressures operating within the catchment[14]

The Santry River sub-basin

7.4.25 A small part of Dublin Airport drains to the Santry River sub-basin (WFD Sub-basin Santry_010). The Santry River originates to the west of the airport and flows to the south of the South Runway, and into Dublin Bay behind Bull Island, approximately 11 km downstream of the airport. The catchment of the Santry sub-basin is approximately 9.7 km^2 which includes approximately 1.5 km^2 of the airport, including the western part of the South Runway and airport car parking.

7.4.26 There are multiple monitoring points on Santry River, downstream of the airport. The nearest downstream EPA surface water quality monitoring point within the Santry water body that was monitored in 2020, is at the Clonshaugh Road Bridge (station code RS09S010300), located 6 km downstream of the airport. At this monitoring point, the EPA classified surface water quality as *Poor* with a Q[15] value of 2-3 in 2020.

7.4.27 Table 7-10 below summarises monitoring data for sampling points within the Santry sub-basin collected by the Applicant for 2020-2021. No further monitoring data is available beyond this period.

[13] NA – Not Applicable, NC – No Criteria for good status, µg/L – micrograms per litre, mg./L – milligrams per litre.
[14] WFD Cycle 2. Catchment Nanny-Delvin. Sub=catchment Nanny Delvin_SC-010. Available online: https://catchments.ie/wp-content/files/subcatchmentassessments/08_3%20Broadmeadow_SC_010%20Subcatchment%20Assessment%20WFD%20Cycle%202.pdf Accessed February 2022
[15] The EPA classifies river biological quality using Q values. Q values measure the ecological health of rivers based on the population of aquatic invertebrates present, it ranges from 5 (High) to 1 (Bad).

Table 7-10: Monitoring Data for Santry, 2020-2021

Monitoring Point	S.I. No. 77/2019 Criteria for Good Status[16]	Santry 1	Santry 2	Santry 3
Location	NA	53.4098, -6.2706	53.3966, -6.2055	53.3802, -6.1767
Detergents as MBAS – average concentration	NC	99.7 µg/L	76 µg/L	76.3 µg/L
Propylene glycol – average concentration	NC	Below detection	Below detection	Below detection
TPH C10-C40 – average concentration	NC	Below detection	Below detection	Below detection
Ammonia as nitrogen (N) – average concentration	0.065 mg/L as N	0.04 mg/L as N	0.11 mg/L as N	0.05 mg/L as N
Phosphate (P) (Ortho) – average concentration	0.035 mg/L	0.034 mg/L as P	0.056 mg/L as P	0.056 mg/L as P
Biological Oxygen Demand – average concentration	1.5 mg/L	Below detection	Below detection	Below detection
Chemical Oxygen Demand – average concentration	NC	14.7 mg/L	15.0 mg/L	11.0 mg/L
pH – average reading	NC	7.78	7.84	7.93
Dissolved Oxygen – average concentration	NC	9.1 mg/L	9.2 mg/L	9.6 mg/L

7.4.28 The WFD status of the Santry is classified as *Poor* for the period 2013 - 2018 and *At Risk*. The Santry River is at risk due to Poor ecological status, and diffuse urban sources of pollution causing significant pressures[17].

7.4.29 According to IFI the Santry River is currently non-salmonid due to the presence of a number of impassable features to fish located towards the lower end of the system.

Surface Water Discharges

7.4.30 There is one Section 4 of the Local Government (Water Pollution) Act 1977, as amended in 1990, Discharge Licence, issued by the local authority, within the study area, held by the Irish Kennel Club, which permits discharges to surface waters. In this instance, the licence allows for discharges from the National Show Centre Cloghran to Forest Little Stream.

7.4.31 Dublin Airport operates with trade effluent discharge licences which are licensed by the EPA:

- Industrial Emissions License, P0480-02, Dublin Aerospace Limited, located at Hangars 1 and 5
- Integrated Pollution Control License, P0921-01, International Aerospace Coatings Limited, located at Hangar 3

7.4.32 The original licensed area for Dublin Aerospace Limited (P0480-01, issued by the EPA in 1999) encompassed Hangars 1 to 6 but the licensed area was reduced on several occasions. Hangar 3 was removed from the licensed area in 2010. The licence P0480-02[18] pertains to airport motive equipment maintenance.

7.4.33 Storm water is discharged to the nearby Sluice River (via tributary streams) from three surface discharge points, SWI, SW2 and SW3. Each of these emission points is associated with an area of the licenced site. for organic matter and pH. The main potential area for contamination is in the vicinity of the Garage

[16] NA – Not Applicable, NC – No Criteria for good status, µg/L – micrograms per litre, mg./L – milligrams per litre.
[17] WFD Cycle 2. Catchment Liffey and Dublin Bay. Sub-catchment Mayne_SC_010. Available online: https://www.catchments.ie/wp-content/files/subcatchmentassessments/09_17%20Mayne_SC_010%20Subcatchment%20Assessment%20WFD%20Cycle%202.pdf Accessed February 2022
[17] Ground Investigations Ireland Limited, Additional Airfield Boreholes Ground Investigation Report, reference: 7687-04-18, dated: 17 July 2018.
[18] https://epawebapp.epa.ie/terminalfour/ippc/ippc-view.jsp?regno=P0480-02

operation and vehicle fuelling area. The fuelling area and part of the Garage forecourt discharge to sewer (SW3) through an oil interceptor. All other waste and process water is discharged to sewer.

7.4.34 A separate licence (P0921-01)[19] was subsequently issued to International Aerospace Coatings Limited in 2011 for their operations at Hangar 3. The nature of the activity is the aircraft stripping and painting. According to the IPPC application documents uncontaminated storm water from the roof and road surrounding Hangar 3 is discharged from the site to the nearby Sluice River (via tributary streams).

7.4.35 No effluent is discharged from the facility apart from domestic effluent. The wash water from the painting hangar is sent off-site for treatment by a licensed waste contractor.

Geology and Hydrogeology

7.4.36 The baseline geology and hydrogeology beneath the Dublin Airport comprises the following:

- The Malahide Formation, comprising argillaceous limestone and shale, is mapped across the northern and western areas of the airport
- The Tober Colleen Formation, comprising calcareous shale and limestone conglomerate, is mapped across the central and south-eastern areas of the airport
- The Waulsortian Limestones, comprising massive, unbedded limestones, is mapped towards the north-east of the airport
- The Lucan Formation, comprising dark limestone and shale, is located in a small area to the south-east of the airport

7.4.37 Site investigation information from 2022[20] provided by the Applicant, indicates that eleven boreholes were drilled within the area of the Underpass in the Application Site; named BH101 to BH111. Depth to bedrock was found to range between 21.4m below ground level (bgl) (BH102 in the west) and 32.55m bgl (BH111 in the east), with corresponding to top of bedrock elevations ranging between 32.35m OD (BH109 in the east) and 41.25m OD (BH102 in the west). Depth to bedrock tended to increase from west to east.

7.4.38 Another previous site investigation information from 2018[21] provided by the Applicant indicates that boreholes drilled in the area of the taxiways and Runway 16/34, west of Piers 1, 2 and 3, encountered Bedrock at depths between 17.35m and 28.70m below ground level (bgl). There have been no G.I undertaken directly beneath the Proposed Development.

7.4.39 The deepest excavation is expected to be 17.5m, therefore the excavation works are anticipated to be entirely within the superficial deposits.

7.4.40 The mapped superficial geology beneath Bedrock across the central area of the airport comprises till (boulder clay) derived from limestones while the soils have been mapped as made ground.

7.4.41 Hydrogeologically, groundwater is present in the underlying limestone beneath the site, however, there is no mapped gravel aquifer underlying the airport. The overburden was logged as stiff, slightly sandy, gravelly clay. This is consistent with the GSI's classification of low permeability subsoil.

7.4.42 Groundwater vulnerability is designated by the GSI as low across much of the Application Site, including beneath the West Apron, Runway 16/34, the taxiways and the Southern Compound in the west. The GSI's classification increases in the Western Compound, where it is classified by the GSI as 'moderate to high', due to the thinner overburden cover.

7.4.43 The area is highly faulted with a number of north to south and east to west trending faults mapped across the northern and western areas of the site.

7.4.44 In Ireland, aquifers are divided into three categories by the GSI according to their productivity as follows:

[19] https://epawebapp.epa.ie/terminalfour/ippc/ippc-view.jsp?regno=P0921-01
[20] Causeway Geotech Limited, daa Airfield Underpass – Ground Investigation, reference: 21-1219, dated: 10 June 2022
[21] Ground Investigations Ireland, Additional Airfield Boreholes Ground Investigation Report, dated 17 July 2018, reference: 7687-04-18.

- Regionally Important Aquifer: An aquifer capable of supplying regionally important abstractions (e.g. large public water supplies) or excellent yields (>400 m^3/d). This group is subdivided into the following types: (Rk) Regionally Important Karstified Bedrock Aquifer, (Rf) Regionally Important Fissured Bedrock Aquifer, (Rg) Regionally Important Sand/Gravel Aquifer. Regionally important karstified aquifers may be further subdivided based on whether groundwater flows mainly through conduits (Rkc) or more diffusely through solutionally-enlarged fissures (Rkd).
- Locally important Aquifer: An aquifer capable of supplying locally important abstractions (e.g. smaller public water supplies, group schemes), or good yields (100-400 m^3/d). This group is subdivided into the following types: (Lm) Locally Important Bedrock Aquifer - Generally Moderately Productive, (Ll) Locally Important Bedrock Aquifer - Moderately Productive only in Local Zones, (Lk) Locally Important Karstified Bedrock Aquifer, (Lg) Locally Important Sand/Gravel Aquifer.
- Poor Aquifer: An aquifer are capable of supplying small abstractions (e.g. domestic supplies, small group schemes), or moderate to low yields (<100 m^3/d). This group is subdivided into the following types: (Pl) Poor Bedrock Aquifer - Generally Unproductive except in Local Zones, (Pu) Poor Bedrock Aquifer - Generally Unproductive.

7.4.45 The bedrock aquifer beneath the northwestern area of the airport and surrounding area is classified as a *Locally Important Aquifer (Ll)*. Towards the south-eastern area of the airport, the area is classified as a *Poor Aquifer (Pl),* this area corresponds to parts of the Tober Colleen Formation.

7.4.46 No gravel aquifers are mapped beneath the footprint of the airport or within a 1km radius.

7.4.47 The southern area of the airport site, including the Proposed Development area, is characterised as low vulnerability while the northern area is predominantly moderate and high with areas of Extreme E & I, which is outcrop at the surface.

7.4.48 There is one borehole (borehole ID 2923NEW034) mapped by the GSI within the airport boundary, located at the airport business park to the east of the airport. The borehole which is reported to have been drilled in 1991 and is used for industrial use; the borehole has a good yield (300 metres cubic per day (m^3/d)). No borehole log is available to confirm the depth and construction details for this borehole. Additionally, the current condition and operational status are not known.

7.4.49 Two springs and an abstraction well are mapped between 0.6 km and 1 km west of the airport campus. Both springs (spring ID 2923NEW023 & ID 2923NEW024). The current status of the springs is not known. The abstraction well (ID 2923NEW017) was reportedly drilled in 1899 with a 164 m^3/d yield. However, it is not known if this well still exists and is in use.

7.4.50 There is a borehole located approximately 0.8 km south of the South Runway at Merryfalls (Borehole ID 2923NEW035), which was drilled in 1984 with a moderate yield of 48.5 m^3/day recorded. The use of this borehole is not known. There are six boreholes located between 0.6 km to 1 km south-east of the airport, around Ballystruan. Two were drilled in the 19th century; one is for domestic use (2923NEW016) and one for industrial use (2923NEW015); both have a good yield (109m^3/day and 130m^3/day respectively). The other four were drilled in 1988 and were all for industrial use (2923NEW037, 2923NEW036, 2923NEW062, 2923NEW061). No borehole logs are available to confirm the depth and construction details for these boreholes. Additionally, the current condition and operational status are not known.

7.4.51 There are no mapped public supply or group scheme Source Protection Areas mapped within a 2 km radius of the Dublin Airport. Additionally, the nearest mapped source protection zone is located approximately 11 km west of the airport at Dunboyne, Co. Meath.

7.4.52 The topography of the airport is relatively flat, at an approximate elevation of 70m above Ordnance Datum (OD), with the regional topographic gradient being gently sloping to the north-east toward Malahide Estuary and the eastern coastline.

7.4.53 According to the information on GSI online database, groundwater recharge is mapped as between 62 mm/yr and 75 mm/yr and characterised as ‘Made ground’.

7.4.54 Two superficial boreholes were tested within the area of the Underpass in the Application Site; named BH105 to BH107 during April and May 2022. The pre-test groundwater level was noted between 4.46m bgl and 6.32m bgl for BH105 and BH107 respectively. Additionally, the testing undertaken confirmed the limited productivity of the superficial aquifer.

7.4.55 There is no bedrock groundwater level monitoring was undertaken during the 2022 G.I works and therefore the groundwater level in the bedrock is not known. However, it is not anticipated that excavation works will extend into the bedrock aquifer.

7.4.56 Regionally, it is anticipated that the groundwater flow direction within the bedrock aquifer is to the east or north-east towards the coast. However, local variations in groundwater flow direction may occur where shallow groundwater is in hydraulic continuity with surface water streams.

7.4.57 The direction of shallow groundwater flow in the superficial deposits may vary depending on composition, local permeability differences and the proximity to surface watercourses. It is expected that shallow groundwater discharge (baseflow) to surface watercourses will only occur where they are in hydraulic continuity. However, there is no available data to determine the degree of hydraulic continuity. The nearest surface water body to the Proposed Development is the culverted Cuckoo Stream which flows is a south-eastern direction across the Application Site. It is considered that hydraulic connectivity with shallow groundwater in the superficial deposits and Cuckoo Stream is negligible in close proximity to the Proposed Development due the culverted nature of the Stream.

7.4.58 The majority of the Airport is within the Dublin groundwater body (IE_EA_G_008), which contains the Proposed Development site and Southern compound is classified as *Good* under the WFD for the period 2013 to 2018, with a status of *Not at Risk*. The north-western area of the airport is within the Swords groundwater body (IE_EA_G_011), which contains the Western Compound is classified as *Good* under the WFD for the period 2013 to 2018, with a risk status of *Not at Risk*.

7.4.59 The Industrial Facility (P0480-02) groundwater body (IE_EA_G_086), is classified as *Poor* for the period 2013 to 2018, and *At Risk,* lies to the north-west of the Proposed Development.

7.4.60 Industrial Emissions Licence P0480-02 was granted to Dublin Aerospace Limited, which operates out of Hangar 5 at Dublin Airport. It is understood from publicly available monitoring data that chlorinated solvents are detected in groundwater beneath the Dublin Aerospace Limited site.

7.4.61 The Sluice (Sluice_010) River Waterbody also lies within the Mayne sub-catchment. The Sluice River Waterbody has an estimated catchment of 26 km^2 and incorporates the Forest Little Stream in the very north of the airfield, which flows from west-north-west to east-south-east and discharges to the north of Baldoyle Estuary, approximately 7.5 km downstream of the airport. Kealy's Stream is also within the Sluice River Waterbody and like the Forrest Little Stream, flows into the Sluice River.

Designated Sites

7.4.62 The Malahide Estuary SPA (site code 4025) and SAC (site code 205) is located approximately 4 km north-east of northern extent of Dublin Airport and receives flows from the Ward River. The Malahide Estuary is approximately 8 km north-east downstream of the airport boundary. The Malahide Estuary SPA and SAC encompasses the estuary, saltmarsh habitats and shallow subtidal areas at the mouth of the estuary. Following construction of a railway viaduct in the 19th century, the estuary became lagoonal in character and is only partly tidal. There are extensive intertidal flats which are exposed at low tide, with substantial stands of eelgrass (both *Zostera noltii* and *Zostera angustifolia*), and saltmarshes which provide important roost sites at high tide.

7.4.63 The Cuckoo Steam (via the Mayne River) and the Sluice River discharge to the Baldoyle Estuary SPA and SAC (Site Code 000199) which is located approximately 7 km east-south-east from the airport, and approximately 7.4 km downstream of the airport boundary. The Mayne River which flows into the centre of Baldoyle Estuary at Mayne Bridge while the Sluice River discharges to the head of the estuary at Portmarnock Bridge. The aquatic habitat for which the SAC is designated is Annex 1 Habitat 1140 (mudflats and sandflats not covered by seawater at low tide) and specifically in this inner estuarine area for the benthic community type 'Estuarine sandy mud with Pygospioelegans and Tubificoides benedii Community Complex' which also includes Hediste diversicolor as a prominent community member. A different community type is found in the outer estuary i.e., outside Cush Point.

7.4.64 According to the NPWS Map Viewer, there are no designated areas (SACs, SPAs and Natural Heritage Areas (NHAs)), located within a 1 km radius of the airport.

Flood Risk

7.4.65 A 2022[22] Flood Risk Assessment indicated that the main risks of flooding to the Underpass are from surface water/overland flow, sewer/drainage flooding and groundwater. In particular, a rainfall-runoff model of the airport has indicated a number of areas of potentially deep flooding at the West Apron. A summary of the flood risk from each source is summarised as follows:

- Regionally Important Aquifer: An aquifer capable of supplying regionally important abstractions (e.g., large public water supplies) or excellent yields (>400 m^3/d). This group is subdivided into the following types: (Rk) Regionally Important Karstified Bedrock Aquifer, (Rf) Regionally Important Fissured Bedrock Aquifer, (Rg) Regionally Important Sand/Gravel Aquifer. Regionally important karstified aquifers may be further subdivided based on whether groundwater flows mainly through conduits (Rkc) or more diffusely through solutionally-enlarged fissures (Rkd).
- Locally important Aquifer: An aquifer capable of supplying locally important abstractions (e.g., smaller public water supplies, group schemes), or good yields (100-400 m^3/d). This group is subdivided into the following types: (Lm) Locally Important Bedrock Aquifer - Generally Moderately Productive, (Ll) Locally Important Bedrock Aquifer - Moderately Productive only in Local Zones, (Lk) Locally Important Karstified Bedrock Aquifer, (Lg) Locally Important Sand/Gravel Aquifer.
- Surface water/overland flow: High risk to West Apron area with deep flooding possible, and potential route for overland flow into the eastern portal at Pier 3;
- Drainage/sewer flooding: Extensive drainage system present within the airport reflecting large impermeable areas. The client and project team reported existing issues with drainage capacity and flooding; and
- Groundwater: Across testing pits and boreholes groundwater level was found to be variable, and in some cases high leading to a risk that the underpass structure could intersect groundwater levels.

7.4.66 The risk of flooding from all other sources was considered to be low.

Stormwater Drainage Network

7.4.67 Dublin Airport has an existing stormwater drainage network that conveys surface runoff via heavy duty slot drains, fluted channels/ carrier drains and gullies to an underground pipe network and ultimately local watercourses. The Ward River currently drains a minor proportion of the Northern Runway, whilst Kealy's stream drains the majority of the hangars, the North Apron and a significant proportion of the developed landside area of the campus. A portion of the Southern Runway drains to the Mayne River, whilst another portion drains to the Santry River. The stormwater network provides attenuation to most hard-standing and developed areas, with the exception of the Mayne and Santry sub-catchments.

7.4.68 Pollution retention facilities are provided for the runways, the aprons and the taxiways to collect de-icing chemicals. Surface water runoff from other hard-standing areas, including roads and car-parking, do not have any formal treatment prior to downstream discharge. The paved area drainage network is sealed to protect groundwater from contamination. Operational discharges at the airport are controlled under an extant trade effluent licence.

Attenuation

7.4.69 Attenuation, where it is provided, is designed to contain the 1% AEP storm event, with a discharge rate reduced to greenfield in many catchments. There are existing 'global' underground attenuation facilities along the Cuckoo Stream downstream of the Cuckoo culvert, which provides the main facility for attenuating flows from the Cuckoo Stream sub-catchment. There are also 'local' attenuation facilities for various aprons and the other stormwater catchments.

7.4.70 The areas of the Mayne River Catchment and Santry River catchment within the airport complex are currently unattenuated, despite draining part of the main runway which impacts on the rate and quality of the surface water discharge to the receiving watercourse.

[22] Ramboll UK Limited, Dublin Airport West Apron Vehicle Underpass Stage 3 Flood Risk Assessment-, reference: 1620010168-FRA-S3, dated: July 2022

Pollution Control

7.4.71 The existing drainage strategy currently consists of two Pollution Control Facilities (PCF) operating on Cuckoo Stream and Forest Little Stream, which divert runoff to the public sewer when activated manually. The PCF aims to ensure a balance between providing sufficient flows in the stream for ecological purposes and ensuring in so far as is practicable that the minimum amount of organic pollution attributable to airfield de-icing operations is released downstream. The PCF can also be controlled to segregate contaminated runoff in the event of an emergency spill.

Water Supply

7.4.72 Potable water to Dublin Airport is discussed in Chapter 15: Material Assets (Built Services).

Sensitivity of Receptors

7.4.73 The sensitivity or importance of a water receptor needs to be taken into account to assess the significance of potential consequences of a hazard or impact occurring. Definitions of the level of sensitivity of potential receptors are based on their considered value and are presented in Table 7-2 above.

7.4.74 A summary of the sensitivity of the identified water receptors in the study area is provided in Table 7-11. This considers several factors, including the importance, WFD status and the water quality conditions of each receptor.

Table 7-11 Summary of receptors and sensitivity

Type	Receptor	Sensitivity
Surface water	Cuckoo Stream & Mayne River sub-basin	**Low** – watercourse has a Q value of 1-2 indicating Poor ecological status and therefore low environmental value.
	Forest Little / Sluice sub-basin	**Low** – watercourse has a Q value of 1-2 indicating Poor ecological status in most recent WFD Classification Cycle although monitoring suggests improvement, with Q value of 3 reported in May 2019.
	Ward Sub-basin	**High** – watercourse has a Q value of 3, and is a salmonid river
	Santry sub-basin	**Low** - watercourse has a Q value of 1-2 indicating Poor ecological status
Biodiversity sites	Malahide Estuary SPA and SAC	**High** – water dependent designated site
	Baldoyle Estuary SAC	**High** – water dependent designated site
Groundwater	Groundwater aquifers	**Medium** – Bedrock aquifers are not regionally important, are designated as locally and poor aquifers
		Low – superficial aquifers are not regionally important, and recorded abstractions are limited. Discharge from the surface is limited through sealed hardstand and the overlying Till

Note: See Table 7-2 (Classification of the Water Receptors) for criteria of receptor sensitivities per TII's Guidelines

Table 7-12 Screening of Receptors likely to be Impacted by the Proposed Development

Receptor	Screening Outcome	Justification
Cuckoo Stream & Mayne River sub-basin	In	The footprint of the Proposed Development lies within the Cuckoo Stream and Mayne River Catchment. Cuckoo Stream will be diverted to accommodate the installation of the Proposed Development whilst surface water flows will be conveyed to Cuckoo Stream during operation. The Mayne River itself also drains portions of runway.
Forest Little / Sluice sub-basin	Out	Forrest Little stream only drains the northern section of the airport, including the central apron, portions of Pier 1, and Hangars 1 to 4 (primarily airside operations). The Proposed Development will not drain to the Sluice, so it is screened out of further assessment.
Ward Sub-basin	Out	This watercourse no longer receives drainage from the airport, since under the North Runway development, runoff is now diverted away from the Ward Catchment. The Proposed Development will not drain to the Ward, so it is screened out of further assessment.
Santry sub-basin	Out	A minor portion of the South Runway drains to the Santry River, but airport drainage systems and treatment trains intercept and mitigate this drainage before it reaches the river. As such, drainage is managed before it reaches the Santry, it is screened out of further assessment.
Dublin Groundwater Body (IE_EA_G_008)	In	Excavations are being undertaken within this catchment to accommodate the installation of the Proposed Development. Additionally, the Southern compounds is located within this catchment.
Swords Groundwater Body (IE_EA_G_011)	In	The Western compound is located within this catchment.
Industrial Facility Groundwater Body (IE_EA_G_086)	Out	The proposed excavations and works associated with the Proposed Development do not interact with any of these groundwater bodies. Therefore, there is no pathway present. Accordingly, these catchments do not need further assessment.
Malahide Estuary SPA and SAC	Out	Given the distance between the Proposed Development and these biodiversity sites, any pollutants would likely be diluted down upon reaching either site. These sites have therefore been screened out of further assessment.
Baldoyle Estuary SAC		Given the distance between the Proposed Development and these biodiversity sites, any pollutants would likely be diluted down upon reaching either site. These sites have therefore been screened out of further assessment. This is considered in detail in the Natura Impact Statement (Appendix 10-1)
Groundwater supplies	Out	Individual private groundwater supplies mapped in the vicinity of the Proposed Development have been scoped out. This is due to limited available information on their design and current operational status and distance from the Proposed Development. Additionally, Accordingly, potential impacts are unlikely and do not require further assessment.
Bedrock aquifer	Out	No excavation works will be within the Bedrock aquifer. Accordingly, potential impacts on groundwater in the bedrock are unlikely and this receptor does not require further assessment.
Superficial aquifer	In	Excavations are being undertaken within the superficial deposits to accommodate the installation of the Proposed Development. Potential impacts on groundwater in the superficial deposit are likely

Note: Screened 'Out' receptors are considered scoped out of the assessment and therefore will not be considered any further within the impact assessment

7.5 Future Receiving Environment

7.5.1 It is considered that the Future Receiving Environment would not be substantively different to the Current State of the Environment.

7.6 Environmental Design & Management

7.6.1 Best practice measures are set out in the preliminary CEMP to address potential impacts arising during construction. These measures are assumed to be applied before the assessment of effects takes place, as part of the construction site management procedures.

7.6.2 General measures include:

- The construction of proposed infrastructure and decommissioning of existing infrastructure will be phased such that there is no reduction in the total available storage volume of existing systems for either clean or polluted surface water runoff at any point during the project.
- Where possible, all hard surfaces that are positively drained will be installed early stage in the construction of the Underpass to allow permanent drainage facilities to be used to collect silt and hydrocarbons.
- The extent of exposed ground will be minimised where possible at all times during construction and any stockpiles outside areas specifically designed for the purpose will be covered to prevent the creation of any contaminated run-off.
- Areas where stockpiles are located will be positively drained through a grit trap where silt will be collected before water is discharged. Wheel-wash down areas will also be drained through a grit trap.
- The locations of refuelling, storage of oil/fuel, concrete mixing and washing areas should be established where practicable to be situated ideally off site at a designated location coordinated with the Applicant. If these are to be provided within the proposed project boundary then a buffer zone of at least 50 metres between the Airfield Trunk Culvert network should be provided.
- Pollution prevention will be achieved with both physical and procedural measures such as; temporary sediment forebays within a designated attenuation basin during construction, suitable interceptors within the permanent and temporary surface water drainage networks and suitable storage of construction materials.
- Periodic inspections of the construction works will be conducted to address surface water contamination.
- No discharge to existing infrastructure/watercourses/ground shall be permitted to take place without the appropriate consents or approvals.
- The contractor will identify, and risk assess existing drainage systems and put in place measures to prevent possible contamination from surface run-off emanating from the works.
- The contractor shall comply with all national laws and regulations controlling pollution of the environment. Necessary precautions to prevent pollution of streams, lakes, ponds, and reservoirs with fuels, oils, bitumen's, chemicals, or other harmful materials shall be taken.
- Ditches and water streams will be clearly identified on site and shown on method statements and site plans.
- Storage of materials will be located at least 4 metres away from water bodies, within designated and bunded areas.
- Particular care will be taken in the vicinity of the Cuckoo Stream which has been identified as a sensitive receptor.

7.6.3 Silt mitigation:

- As part of the underpass surface water drainage design, appropriate pollution measures will be implemented and in place within the drainage network in form of full retention fuel interceptors, shut-off valves and fire suppression/contaminated water tanks.

- During the construction works, appropriate silt mitigation, straw bales and Terram will be installed, as appropriate, at locations deemed to be at risk from silt pollution during the construction works.
- Wheel wash bays and road sweeping facilities, will further reduce the potential for silt pollution and transfer to and from the construction site.
- Where required, silt fencing will be deployed at the base of stockpiles when storing fine material to prevent runoff outside the designated area.

7.6.4 Water Pumping:

- The contractor shall provide suitable pumps, settlement tanks and filters to filter all water being pumped/discharged from excavations into existing drains. The contractor shall also take measures to ensure that runoff from open excavations does not enter the surrounding drainage system without being treated.
- In the event where pumping of water is required onsite, the requirement for water pumping will be planned in advance (as far as is practicable) and a permit to pump procedure will be in place to ensure that water pumping is controlled.
- All discharged water (rainwater and groundwater) from pumping will be treated and tested before re-infiltration. Such water will be disposed of as construction site run-off having first passed through a settlement tank or filtration system where appropriate.
- An upstream and downstream chamber within the Airfield Trunk Culvert will be required to ensure pumping occurs between a single conveyance point.
- Any pumping of the Cuckoo Stream is to be agreed in advance with FCC and IFI to ensure the watercourse is protected throughout and timeframes and pump rates can be confirmed.

7.6.5 Dewatering:

- Dewatering fluids will be pumped via settlement tanks or collection basins where any solids in the water will settle out. The settled solids will be removed from the tank/basin as required and disposed offsite by licensed hauliers.

7.6.6 Hazardous Materials / Fuels:

- The Principal Contractor will ensure that no concrete is laid during wet weather if achievable to prevent drainage into watercourses.
- Any temporary storage areas for chemicals or fuels will be contained within impermeable bunds constructed in line with current best practice. The Principal Contractor should ensure that staff are trained in the use of spill kits in the event of a leak or spill.
- Any fuel such as diesel shall be stored at least 30m away from any watercourse, where practicable. Oils and lubricants used on the site shall be stored in temporary vessels designed to hold 110% of the container's capacity. No oil or lubricants shall be stored within 50m of a watercourse, where practicable.
- Fuelling of plant and equipment is to be carried out within compound and material storage areas only (unless agreed otherwise with daa - which may be necessary in the case of mobile task lighting or generators) by a trained operative using double skinned bowsers with a designated fuelling area and bunded fuel storage. Refuelling on the site shall be undertaken at least 30m from any given watercourses (where practicable).
- All plant and equipment brought to site shall be in good working order with no leaks and maintained as such during the course of the Works.
- All fuels, chemicals or liquids will be stored in a lockable cabinet that will be located within a bunded area. Toolbox talks will be communicated to site staff and contractors so that they are fully informed of refuelling procedures.

Operational Phase

7.6.7 During the operational phase of the Proposed Development, there will be a need to; attenuate surface water flows due to the increase in impermeable area; maintain existing discharge rates to Cuckoo

Stream and provide treatment for potential contaminates so to prevent adverse impacts upon Cuckoo Stream.

7.6.8 The drainage strategy proposed aims to utilise the existing drainage regime whilst providing betterment by installation of a new surface water network to attenuate surface water flows and maintain existing discharge rates. Surface water flows will be conveyed through the network by a pump at the Proposed Development level and a gravity connection into the existing surface water drainage network. The drainage strategy proposes to limit the Proposed Development run-off to 2 litres per sec for all return periods (Up to and including 1 in 100-year storm +30%, to account for climate change) by providing attenuation in the form of cellular tank storage.

7.6.9 Surface water quality within Cuckoo Stream will be maintained by treating runoff prior to discharging to the watercourse. Runoff associated with the Proposed Development will be passed through an oil interceptor prior to discharging into the existing clean water network. During the event of a fire or spillage, polluted flows will be directed to a tanker via an automated shut-off valve, allowing for spillages to be contained and separated from the rest of the network.

7.7 Assessment of Effects & Significance

7.7.1 There are several ways in which potential impacts could arise from the construction and Operation of the Proposed Development which are outlined in Tables 7-1 and 7-2 and are further discussed below.

Determining Construction Effects

7.7.2 The potential construction impacts in relation to water are described in Table 7-13. It identifies the source of the impact; potential impact pathways (route by which receptors can become impacted) and potential effects arising from the potential impact. For each of the potential effects identified, the likelihood of an effect has been considered to determine whether an assessment should be undertaken.

Table 7-13: Potential Construction Effects

Potential Impact	Potential Impact Pathway	Potential Effect	Significant Effect?
Construction related activities in the bedrock	Mobilisation of contaminants directly to the bedrock groundwater or alteration of bedrock groundwater flow regime	Pollution of bedrock groundwater or impact on bedrock aquifer flow regime	Not significant. No interaction of Proposed Development within bedrock. Construction works will be within the superficial deposits
Construction activities in vicinity of features of Forest Little / Sluice, Ward and Santry sub-basin	Direct impact on any features of geomorphological	Damage or loss of features of geomorphological feature	Not significant. No such features have been identified in the vicinity of the Application Site
Construction activities in vicinity of features of hydrogeological or geomorphological interest and importance	Direct impact on any features of hydrogeological or geomorphological interest and importance	Damage or loss of features of hydrogeological or geomorphological interest and importance	Not significant. No such features have been identified in the vicinity of the Application Site
Pollution of Groundwater & Surface water	Introducing contaminants to the water environment	Pollution of surface water and shallow groundwater	Discussed further below
Diversion of the Cuckoo Stream	Short-term over-pumping	Hydromorphological and ecological impact to the Cuckoo Stream	Discussed further below
Groundwater level, flow and decreased availability impacts of groundwater	Direct impact on any features of geomorphological	Damage or loss of features of geomorphological feature	Discussed further below

Determining Operational Effects

7.7.3 The potential operational impacts on water receptors are described in Table 7-14. It identifies the source of the impact; potential impact pathways (route by which receptors can become impacted) and potential effects arising from the potential impact. For each of the potential effects identified, the likelihood of an effect has been considered to determine whether an assessment should be undertaken.

Table 7-14: Potential Operational Effects

Potential Impact	Potential Impact Pathway	Potential Effect	Significant Effect?
Groundwater level, flow and decreased availability impacts of groundwater	Altered drainage regimes, barrier to flow	Reduced groundwater level and flow alteration and or potential groundwater flood risks, diversion of groundwater-dependent receptors	Discussed further below
Pollution of Groundwater & Surface water	Introducing contaminants to the subsurface	Pollution of surface water and groundwater	Discussed further below

Construction Phase Effects

Pollution of Groundwater

7.7.4 The main pathway that could allow contaminants to enter the superficial aquifers or surface water bodies in the study area is the infiltration of water through underlying superficial deposits to groundwater within open excavations. This is most likely to arise from accidental spillages. In terms of groundwater quality, dependent on the presence and nature of the geology and depth to the groundwater table, and considering the measures outlined in the CEMP, the potential groundwater pollution impacts resulting from incidental spillages, surface run-off or dewatering activities during the construction of the Proposed Development will be localised. Additionally, as no ground contamination has been detected/reported within the Proposed Development area, therefore, the risk of remobilisation of contaminants during excavation will be low.

7.7.5 Accordingly, subject to the CEMP and the management of temporary drainage during construction as outlined in Section 7.6, the magnitude of potential impacts on the groundwater quality during construction within the superficial deposits is Low resulting in an Imperceptible (not significant) effect.

Pollution of Surface Water

7.7.6 The majority of the construction footprint will fall within the Cuckoo Stream Catchment (Figure 7-1) and as such this is where the greatest risk of pollution to a surface watercourse lies. The Mayne River Catchment drains a portion of Runway 10/28 which lies adjacent to the construction footprint and is therefore also considered to be at risk. Conversely, the Forest Little Stream Catchment, Ward River Catchment and Santry Catchments lie outside of the construction footprint and adverse pollution impacts associated with construction of the Proposed Development are not anticipated within these watercourses.

7.7.7 Taking into account the source-pathway-receptor approach, civil works to install the Proposed Development, construct the ramps, portals and plantroom and diver the culvert is likely to generate fine sediments, some of which may become entrained within runoff and discharged into Cuckoo Stream should specific pollution prevention controls be lacking. Risk is highest where works are closest to or involving the channel.

7.7.8 Leaks and spillages of polluting substances used during construction such as concrete, hydrocarbons or chemicals could pollute nearby surface watercourses if their use or removal is not carefully controlled by adherence to the measures in the CEMP. Similarly, excessive fine sediment in runoff, where not

controlled. The risk would be greatest where works occur close to and within waterbodies. Risk would be highest where works are closest to the Cuckoo Stream channel.

7.7.9 Given the diversion is being undertaken upon a culverted section of Cuckoo Stream, no impacts to macrophytes, phytobenthos and invertebrates are likely within the immediate vicinity of any pollution event, although impacts are possible downstream. Impacts would be unlikely propagate downstream to Baldoyle Estuary SAC downstream however, due to the dilution effects of Cuckoo Stream flowing into Mayne River over the distance between the works and the SAC.

7.7.10 Given any impacts of an accidental pollution event would be local and temporary, the magnitude of any impact is considered as Low provided embedded mitigation measured within the CEMP are adhered to resulting in an Imperceptible (not significant) effect.

Diversion of the Cuckoo Stream

7.7.11 To facilitate the installation of the Proposed Development, a temporary diversion of the culverted section of Cuckoo Stream will be required as part of the works, described in Appendix 7-3: Airfield Trunk Culvert Temporary Diversion Pollution Control. As such there is a risk of over pumping to Cuckoo Stream throughout the works until the permanent alignment of the culvert can be reinstated. Flows during construction will be maintained by over pumping from an upstream chamber to a downstream chamber within the Airfield Trunk Culvert. By pumping between chambers to maintain existing drainage conditions, potential adverse effects that can arise from changes in flow rates such as accretion can be prevented. In addition, any pumping will require a permit that will stipulate pump rates ensuring minimal detraction from existing conditions. As such the magnitude of impacts on the Cuckoo Stream is considered to be Low resulting in an Imperceptible effect.

Groundwater level, flow and decreased availability impacts of groundwater

7.7.12 The potential impacts on groundwater level, flow and availability during construction are likely to arise from potential dewatering activities required to facilitate excavations for the Underpass. The extent of the proposed excavation sections for the Underpass is understood to be no more than a maximum depth of 17.5m and will terminate within the superficial deposits and will not extend into the bedrock which is anticipated at a minimum depth of 20.4m below ground level at the site of the proposed development. Information available on the nature of the groundwater conditions/levels beneath the Proposed Development was shown to be between 4.56m bgl and 7.35m bgl during April/May 2022. As such, the groundwater table is likely to be intercepted during excavation works. However, significant dewatering is not anticipated given the limited groundwater potential of the superficial deposits (Till) and will be largely where permeable layers are present. Consequently, localised dewatering with potential groundwater management control during construction would be required.

7.7.13 Temporary dewatering or altered drainage regimes diverting water away from groundwater-dependent receptors, or creating flow barriers, leading to reduced groundwater level and flow alteration and or potential groundwater flood risks. It is considered that the magnitude of any localised altered drainage regimes diverting water away from groundwater-dependent receptors, creating flow barriers or changes in groundwater level and flow due to the temporary dewatering of the excavation is Low resulting in an Imperceptible effect.

7.7.14 Ground investigations indicate that limited dewatering will be required during the excavation works. No excavation works will be undertaken at the Southern and Western Compounds.

Operational Phase Effects

Pollution of Groundwater

7.7.15 The Proposed Development will be covered in hard-standing. This will limit the potential for infiltration of water through to the groundwater. Runoff from these hard-standing areas will diverted to the pollution control system where attenuation will take place prior to being discharged offsite to surface water. As such the magnitude of impact is considered is Low resulting in an Imperceptible effect.

Pollution of Surface Water

7.7.16 Increases in the impermeable area as a result of the Proposed Development will lead to a greater amount of surface water runoff within the catchment and a change in velocity of outfall flows from the

Airfield Trunk Culvert into Cuckoo Stream. Changes in velocity could result in scouring where velocity increases whilst accretion could occur where velocity decreases which can have both adverse hydromorphological and biological impacts downstream. However, increases in velocity will be managed as the drainage strategy proposes to limit the Proposed Development run-off to 2 litres per sec for all return periods.

7.7.17 Given the activities associated with operation of the airfield and Proposed Development, there is potential for pollution and therefore adverse effects upon the water quality of Cuckoo Steam. Pollutants associated with spillages, leaks, fires and di-icing chemicals all provide a risk to water quality without the appropriate treatment, procedures and drainage features in place.

7.7.18 In the event of a pollution event, it is anticipated that the proposed drainage strategy would provide the appropriate treatment to prevent adverse impacts to Cuckoo Stream. As such, the magnitude of impact is considered to be Low resulting in an Imperceptible effect.

Groundwater level, flow and decreased availability impacts of groundwater

7.7.19 The Proposed Development creates an underground structure up to 15m deep that could cause interference or barriers to groundwater flow and or level. Introduction of flow barriers could lead to reduced groundwater level and flow alteration and / or potential groundwater flood risks. Additionally, this could lead to localised altered drainage regimes diverting water away from groundwater-dependent receptors. Information available on the nature of the groundwater conditions/levels beneath the Proposed Development was shown to be between 4.56m bgl and 7.35m bgl during April/ May 2022. As such, the groundwater table is likely to be intercepted during excavation works.

7.7.20 However, there is limited information available on the groundwater table or flow and the relationship between groundwater and surface water in the area. However, groundwater within the superficial deposits is expected to discharge locally to the nearest surface water body which is the Cuckoo Stream. Additionally, the alignment of the Proposed Development it is likely to be orientated parallel to shallow groundwater flow.

7.7.21 Based on the limited groundwater potential of the Till superficial deposits, limited recharge across the airport site due to presence of made ground, and distance to the nearest open water course the disruption of groundwater flow regime will be localised. As such the magnitude of impact is considered Low resulting in an Imperceptible effect.

7.7.22 With regard to groundwater flooding, the Proposed Development will create an underground structure that could cause permanent interference or barriers to groundwater flow and or level which might result to potential groundwater mounding/flood risks. Additionally, this could lead to localised altered drainage regimes diverting water away from groundwater-dependent receptors (such as the Cuckoo Stream) that may be receiving baseflow. This is dependent on the depth to the groundwater table within the superficial deposits. Any minor seepages through the barrier wall will be managed by the proposed drainage plan for the Proposed Development, while any potential groundwater mounding will naturally dissipate into the wider aquifer thereby reducing the risk of groundwater flooding.

7.7.23 Accordingly, based on the above, and considering the limited groundwater available potential of the superficial deposits (Till), limited recharge across the airport site due to presence of made ground, and distance to the nearest open watercourse the magnitude of any potential impacts on groundwater level, flow or risk of groundwater flooding is considered will be Low resulting in an Imperceptible effect.

Summary of Effects

7.7.24 The Proposed Development will have no significant effects on the water environment, either during construction or operation.

7.8 Mitigation & Monitoring

Construction Phase

7.8.1 In order to mitigate the risk of pollution, mitigation measures are required to be in place during the construction period. The extent of exposed ground will be minimised where possible and stockpiles covered so to reduce sediment supply and prevent the creation of any contaminated runoff. The potential

will be further minimised by using grit traps to drain stockpile and wheel-wash areas so silt from these activities can be diverted to the drainage network.

7.8.2 The storage of fuels and hazardous materials during the construction phase provides further potential for pollution incidents. Some removed topsoil and excavated material will be stored for reuse, and it is important that these designated storage areas are strategically located in relation to the watercourses and any other drains, so that there is no risk of topsoil or any other material being washed into the watercourses or drainage network.

7.8.3 The construction dewatering strategy should include a programme of water monitoring and controlled discharges of water abstracted during dewatering. Where necessary, it is proposed that additional monitoring boreholes should be drilled at strategic points around the Proposed Development in order to ensure the monitoring process is effective. Automatic water level data loggers (or other suitable method) to facilitate continuous monitoring would be installed in selected monitoring boreholes at strategic locations.

7.9 Residual Effects & Conclusions

7.9.1 This assessment concludes that the impact of the Proposed Development upon any surface water environment in proximity would be ‘Imperceptible’. Although this assessment identified activities during construction and operation that have potential to generate temporary and local adverse impacts, when the proposed mitigation is considered, no significant effects are anticipated. Effects on the water environment are considered further in Chapter 18: Interactions & Cumulative Effects.

Table 7-15: Water environment summary of potential effects

Receptor	Importance/Sensitivity of Receptor	Nature of Effect	Magnitude of Impact	Additional Mitigation	Residual Effect Significance
Construction phase					
Cuckoo Stream & Mayne River sub-basin	Low	Pollution of Surface water	Low	Discharges from the site will be controlled by implementation of CEMP and agreed Drainage Strategy.	Imperceptible
Cuckoo Stream	Low	Diversion of culverted section of Cuckoo Stream – Over pumping leading to increased flow within the Cuckoo Stream	Low	Diversion of the Cuckoo Stream controlled by implementation of CEMP and agreed Drainage Strategy.	Imperceptible
Superficial Deposits aquifer	Low	Groundwater pollution	Low	Discharges/spillages/runoff from the site will be controlled by implementation of CEMP and agreed Drainage Strategy. Additional groundwater level and quality monitoring during construction.	Imperceptible
		Groundwater availability reduction - dewatering or altered drainage regimes diverting water away from groundwater-dependent receptors, or creating flow barriers, leading to reduced groundwater level and flow alteration and or potential groundwater flood risks.	Low	Dewatering activities as part of the construction of the Proposed Development are anticipated to result in only localised effects on the groundwater flow regime. Limited information is available on the nature of the groundwater conditions beneath the Proposed Development - additional water level and quality monitoring.	Imperceptible
Operational phase					
Cuckoo Stream & Mayne River sub-basin	Low	Pollution of Surface	Low	Discharges from the site will be controlled by implementation of agreed Drainage Strategy. Additional groundwater level and quality monitoring.	Imperceptible
Cuckoo Stream	Low	Diversion of culverted section of Cuckoo Stream	Low	The Cuckoo Stream will be reinstated to its previous state during the operational phase.	Imperceptible

				No additional mitigation required	
Superficial Deposits aquifer	Low	Groundwater pollution leading to deterioration in water quality	Low	Proposed Development will create an impermeable barrier for the infiltration to groundwater. Discharges from the site will be controlled by implementation of agreed Drainage Strategy.	Imperceptible
		Groundwater availability reduction - alteration to groundwater flow regime as a result of the Proposed Development acting as an impermeable barrier	Low	Superficial deposits limited groundwater potential will result in only localised effects on the groundwater flow regime.	Imperceptible

8. Air Quality

8.1 Introduction

8.1.1 This chapter of the EIAR identifies, describes and assesses the direct and indirect significant effects of the Proposed Development on Air Quality. As explained in Chapter 3: Proposed Development, there will be no change in the overall number of vehicle movements crossing from the Eastern Campus to the West Apron once the Underpass is operational compared with the current situation and there are no sources of air pollution proposed as part of the Proposed Development. Therefore, there is no potential for operational air quality effects and this chapter focusses on air quality effects during construction only.

8.1.2 This chapter was written by Izzy Reeves BSc (Hons) MSc, an AECOM air quality consultant (MSc, BSc), and by Charlotte Moore BSc (Hons), MIEnvSc, MIAQM an AECOM Principal Air Quality Consultant with 10 years' experience. The chapter was reviewed by Gareth Hodgkiss BSc (Hons), MSc, MIEnvSc, MIAQM an Associate Director in AECOM's Air Quality & Permitting team, with 20 years' experience.

8.1.3 The EPA Guidance suggests that the matters set out in Table 8-1, below, might be considered in an EIA in respect of the Air factor.

Table 8-1: Matters Considered in the EIA

Matter	Considered further in the EIA?
Air Quality (pollutants and suspended particles)	Yes, air quality impacts arising from construction activity and construction traffic on local roads are considered further below. Emissions from exhausts of non-road mobile machinery construction plant are not considered significant with reference to IAQM guidance[1] and not considered further, however are briefly discussed in paragraph 8.6.15 to 8.6.18.
Odour	No, there are no new sources of odour proposed or no proposed amendments to existing sources of odour as part of the Proposed Development. Therefore, there are no elements of the Proposed Development that would give rise to new or changed odour impacts.
Noise & Vibration	Yes, but addressed in Chapter 9: Noise & Vibration.
Radiation	No, the Proposed Development is fully described in Chapter 3 and it is clear that there are no elements of the Proposed Development that would give rise to any radiation impacts.

Scope of Assessment

8.1.4 The assessment scope includes:

- A qualitative construction dust assessment in line with industry standard guidance published by the Institute of Air Quality Management (IAQM)[1].
- A quantitative assessment to include dispersion modelling of construction phase road traffic emission impacts. This was determined with reference to industry standard guidance[2] screening criteria for further assessment, due to the number of Heavy Goods Vehicles (HGV) movements anticipated and the duration of the construction phase.

8.1.5 The dispersion modelling of the construction phase road traffic emission impacts focuses on the impact and effect of changes to long-term and short-term concentrations of nitrogen dioxide (NO_2) and

[1] Holman et al (2014). IAQM Guidance on the assessment of dust from demolition and construction, Institute of Air Quality Management, London. www.iaqm.co.uk/text/guidance/construction-dust-2014.pdf
[2] Environmental Protection UK (EPUK) – Institute of Air Quality Management (IAQM), (2017); Land-Use Planning & Development Control: Planning for Air Quality.

Particulate Matter (PM_{10} and $PM_{2.5}$), considered the pollutants of greatest concern from road emissions[3,4], at nearby human health sensitive receptors.

8.1.6 The study area (see Figure 8-1) has been defined based on the construction areas and road network predicted to experience changes in traffic flow as a result of Proposed Development construction phase traffic movements, i.e., where there is a potential for a change in air quality.

8.1.7 Representative air quality sensitive receptors within the study area, such as residential properties, schools and hospitals have been identified on Figure 8-1. This information has been incorporated within an ADMS (Advanced Dispersion Modelling System) roads dispersion model, along with road traffic emissions data, to predict future changes to air quality in the peak year of construction (2024). There are no designated conservation sites (Natural Heritage Areas or Natura 2000 sites) located within 1km of the Application Site or roads used by construction vehicles. Therefore, with reference to industry standard guidance[5] [6], there is no further consideration of air quality impacts at conservation sites.

8.1.8 The assessment methodology takes into account relevant national policies, and statutory guidance, listed in Section 8.2 below. Where national guidance and/or data required to inform the assessment is not available, representative data sources and guidance published within the UK have been used and referred to. The effect of predicted impacts and whether significant or not has been determined following guidance set out by the IAQM[7] (in the absence of an appropriate national equivalent). This chapter draws upon measurements of air quality monitoring undertaken by the EPA, which is the competent authority responsible for assessing ambient air quality.

8.2 Legislation, Policy & Guidance

8.2.1 The following legislation, policy and guidance are relevant to methodology in this chapter and were considered during the assessment presented within it. General legislation, policy and guidance were also considered but is not listed as this has been covered in Chapter 4: Methodology.

National Legislation

Air Quality Standards Regulations 2011 (S.I. No. 180 of 2011)

8.2.2 The Air Quality Standard Regulations 2011[8] implement the European Union Directive 2008/50/EC on Ambient Air Quality and Cleaner Air for Europe (CAFE)[9] and designate the EPA as the competent authority responsible for assessing ambient air quality in the territory of the State. The standards also establish Limit Values for concentrations of certain pollutants in ambient air, to prevent or reduce harmful effects on human health and the environment.

8.2.3 The Air Quality Limit Values as set out in the regulations and considered within this assessment are provided in Table 8-2. There are currently no Irish statutory standards or EPA guidelines relating specifically to fugitive dust deposition thresholds; in the absence of these, the TA Luft dust deposition limit value has been recommended for use at site boundaries near quarry developments by The Irish Government 'Quarries and Ancillary Activities - Guidelines for Planning Authorities'[10]. This limit value has been included as a proxy for dust impacts from the Proposed Development.

[3] National Roads Authority / Transport Infrastructure Ireland (2011), Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes. https://www.tii.ie/technical-services/environment/planning/Guidelines-for-the-Treatment-of-Air-Quality-during-the-Planning-and-Construction-of-National-Road-Schemes.pdf
[4] Environmental Protection Agency (2021), Air Quality in Ireland 2020. https://www.epa.ie/publications/monitoring--assessment/air/Air-Quality-in-Ireland-2020.pdf
[5] Holman et al (2014). IAQM Guidance on the assessment of dust from demolition and construction, Institute of Air Quality Management, London. www.iaqm.co.uk/text/guidance/construction-dust-2014.pdf
[6] Environmental Protection UK (EPUK) – Institute of Air Quality Management (IAQM), (2017); Land-Use Planning & Development Control: Planning for Air Quality.
[7] Moorcroft and Barrowcliffe. et al. (2017) Land-use Planning & Development Control: Planning for Air Quality. v1.2. Institute of Air Quality Management, London. https://www.iaqm.co.uk/text/guidance/air-quality-planning-guidance.pdf
[8] Ireland's Statutory Instruments (2011); S.I. No. 180/2011 - Air Quality Standards Regulations 2011.
[9] European Parliament and Council (2008); Ambient Air Quality and Cleaner Air for Europe (CAFE) EU Directive 2008/50/EC.
[10] Government of Ireland (2004) Quarries and Ancillary Activities Guidelines for Planning Authorities

Table 8-2: Air Quality Limit Values Considered in the Assessment

Pollutant	Averaging Period	Concentration	Permitted Exceedances
NO_2	Annual mean	40 µg/m^3	None
	1-hour mean	200 µg/m^3	Not to be exceeded more than 18 times a year
PM_{10}	Annual mean	40 µg/m^3	None
	24-hour mean	50 µg/m^3	Not to be exceeded more than 35 times a year
$PM_{2.5}$	Annual mean	25 µg/m^3	None
Total deposited dust*	30-day daily mean	350 mg/m^2	None

*In the absence of an Irish standard for dust deposition, the TA Luft dust deposition limit value is referred to. The EPA primarily refers to this standard to gauge the likelihood of complaints near to mineral sites, but it is considered that dust emissions associated with the storage and handling of potentially dusty materials during the construction of the Proposed Development could be considered comparable.

8.2.4 The World Health Organisation (WHO) issued New WHO Global Air Quality Guidelines (AQGs) on 22 September 2021[11]. The new guidelines recommend new air quality levels to protect human health, encouraging the reduction of levels of key air pollutants. The four county governments of the Dublin region have signed up to the 'WHO Breathe Life' campaign[12]; this entails making a commitment to meeting the World Health Organisation (WHO) guideline values by 2030.

Air Pollution Act 1987 (Number 6 of 1987)

8.2.5 The Air Pollution Act 1987 provides local authorities with the primary responsibility for monitoring air quality, including the nature, extent, and effects of emissions within their administrative area.

8.2.6 Local authorities are also given powers under the Act to take measures to prevent or limit air pollution in their administrative area. Owners of certain industrial activities must have an air pollution licence from either the local authority or the EPA, to run industries that are responsible for emissions.

Environmental Protection Agency Acts 1992 to 2011

8.2.7 A group of Acts are included within this collective citation, to be construed together as one (Environmental Protection Agency Act 1992 (First Schedule) (Amendment) Regulations 2011 (S.I. No. 308 of 2011), reg. 2). Acts in this group that are relative to air quality are:

- Environmental Protection Agency Act 1992 (7/1992)
- Protection of the Environment Act 2003 (27/2003), Part 2 (ss. 5-18)
- Environmental Protection Agency Act 1992 (First Schedule) (Amendment) Regulations 2011 (S.I. No. 308 of 2011)

8.2.8 The purpose of the Act is to make further and better provision for the protection of the environment and the control of pollution. In doing so it required the formation of the Environmental Protection Agency for this purpose and to regulate, amongst other things, emissions to air.

National Planning Policy

Project Ireland 2040

8.2.9 Project Ireland 2040 is the Government's long-term overarching strategy for future development and infrastructure in Ireland[13]. It consists of several documents, including the National Planning Framework,

[11] World Health Organization. (2021). WHO global air quality guidelines: particulate matter (PM2.5 and PM10), ozone, nitrogen dioxide, sulfur dioxide and carbon monoxide. World Health Organization. https://apps.who.int/iris/handle/10665/345329. License: CC BY-NC-SA 3.0 IGO
[12] Breathelife (2022) Our Global Campaign. Available at: https://breathelife2030.org/about/
[13] Department of Housing, Planning and Local Government (2018); National Planning Framework 2040.

which is the Government's high-level strategic Plan for shaping the future growth and development of Ireland up to 2040.

The National Planning Framework includes the following overarching aims with regards to National Policy Objective 52, that is relevant to this assessment:

"Creating a Clean Environment for a Healthy Society:

…

Promoting Cleaner Air: Addressing air quality problems in urban and rural areas through better planning and design."

8.2.10 For National Policy Objective 52 itself it is stated that:

"The planning system will be responsive to our national environmental challenges and ensure that development occurs within environmental limits, having regard to the requirements of all relevant environmental legislation and the sustainable management of our natural capital."

8.2.11 The National Planning Framework includes National Policy Objective 64, which stresses the importance of improving ambient air quality:

"National Policy Objective 64: Improve air quality and help prevent people being exposed to unacceptable levels of pollution in our urban and rural areas through integrated land use and spatial planning that supports public transport, walking and cycling as more favourable modes of transport to the private car, the promotion of energy efficient buildings and homes, heating systems with zero local emissions, green infrastructure planning and innovative design solutions."

8.2.12 Project Ireland 2040 also includes the Government's National Development Plan[14]. This document is focused on Ireland's long-term economic, environmental and social progress up to 2027, and references improvements in air quality as an additional benefit to improving energy efficiency for the primary purpose of reducing carbon emissions.

Local Planning Policy

Fingal Development Plan 2017-2023

8.2.13 The Fingal Development Plan 2017-2023 (Development Plan) sets out Fingal County Council's (FCC) proposed policies and objectives for the development of the County over the period of 2017 to 2023[15]. The Development Plan seeks to develop and improve, in a sustainable manner, the social, economic, environmental and cultural assets of the county.

8.2.14 The Development Plan includes multiple objectives that target the improvement of ambient air quality, including:

*"**Objective AQ01** - Implement the provisions of EU and National legislation on air, light and noise and other relevant legislative requirements, as appropriate and in conjunction with all relevant stakeholders."*

8.2.15 The Development Plan states that FCC has adopted the Dublin Regional Air Quality Management Plan (DRAQMP):

*"**Objective AQ02** - Implement the recommendations of the Dublin Regional Air Quality Management Plan (or any subsequent plan) and any other relevant policy documents and legislation in order to preserve good air quality where it exists or aim to improve air quality where it is unsatisfactory."*

8.2.16 With relation to the DRAQMP, the Development Plan states that the long-term monitoring of air quality at Dublin Airport and nearby major roads should continue and that as the airport expands, the objectives of the DRAQMP and its monitoring network should be revised to ensure appropriate coverage.

[14] Government of Ireland (2017); National Development Plan 2018-2027.
[15] Fingal County Council (FCC) (2017); Fingal Development Plan 2017 – 2023.

8.2.17 Some of the Development Plan objectives also relate specifically to Dublin Airport. Of relevance to air quality is:

*"**Objective DA18** - Ensure that every development proposal in the environs of the Airport takes account of the current and predicted changes in air quality, greenhouse emissions and local environmental conditions."*

Draft Fingal Development Plan 2023-2029

8.2.18 The Draft Fingal Development Plan 2023-2029 dated 24th February 2022[16], sets out FCC's proposed policies and objectives for the development of the County over the period of 2023 to 2029. With regards to air quality, it references EPA studies and states that there are *"…localised issues in the Dublin area due to pollution from transport and the burning of solid fuel*".

8.2.19 The Draft Development Plan has one policy specific to air quality, as follows:

*"**Policy IUP38 – EPA and Air Quality** - Continue to work proactively with the EPA to monitor and improve air quality in Fingal."*

8.2.20 There are three objectives on air quality monitoring, the monitoring network and implementation of the Dublin Regional Air Quality Management Plan, as follows:

*"**Objective IUO57** – Air Quality Monitoring: Monitor, pro-actively manage and improve air quality in the County through integrated land use and spatial planning measures to avoid, mitigate and minimise unacceptable levels of air pollution in accordance with national and EU policy Directives on air quality and, where appropriate, promote compliance with established targets.*

***Objective IUO58** – Air Quality Monitoring Network: Continue to work with the Dublin Local Authorities and relevant agencies in the collection of local air quality data through the EPA's air quality monitoring network, to maintain good air quality in the County.*

***Objective IUO59** – Dublin Regional Air Quality Management Plan: Implement the recommendations of the Dublin Regional Air Quality Management Plan (and any subsequent Plan) and to implement the relevant spatial planning recommendations and actions of the Dublin Agglomeration Environmental Noise Action Plan 2018–2023 or any superseding action plan"*

8.2.21 With regards to air quality and Dublin Airport, Policy DAP7 - Align with Local Area Plan Objectives - states that it should be ensured that all development within the Dublin Airport Local Area Plan lands comply with the objectives of the Dublin Airport Local Area Plan, 2020, including the air quality objectives.

Dublin Airport Local Area Plan 2020

8.2.22 The Dublin Airport Local Area Plan (LAP) sets out how airport growth can be achieved sustainably[17].

8.2.23 The LAP includes the following objectives relating to air quality, not including those already listed within the Development Plan:

*"**Objective AQ05** - Undertake a review of existing air quality monitoring (and associated appropriate remedial action in the case of breaches) within and surrounding the Airport (including changes in Particulate Matter (PM) at relevant locations). Where relevant, such a review should identify additional monitoring proposals, remedial actions and implementation systems – such needs shall be provided for by Fingal County Council and/or daa."*

8.2.24 The LAP also acknowledges that the Airport impacts on air quality from the following activities:

- Emissions associated with ongoing operations of the Airport, such as aircraft and support services, and surrounding areas as a result of traffic accessing the Airport.

[16] Fingal County Council (FCC) (2022); Fingal Development Plan 2023 – 2029 Draft Plan.
[17] Fingal County Council (2020); Dublin Airport Local Area Plan 2020

Dublin Region Air Quality Plan 2021

8.2.25 Due to exceedance of the NO_2 EU limit value in the Dublin region in 2019, the *Dublin Region Air Quality Plan 2021 - Air Quality Plan to improve Nitrogen Dioxide levels in Dublin Region*[18] was prepared by Dublin City Council, Fingal County Council, South Dublin County Council and Dun Laoghaire-Rathdown County Council. The plan sets out 14 broad measures to address the exceedance of annual mean NO_2. These are summarised as follows:

1. Integrate 15-minute neighbourhoods
2. Public parking controls
3. Residential parking standards
4. Workplace parking standards
5. Continued delivery of the active travel programme
6. Electric vehicle charging strategy
7. Publication of national clear air strategy
8. Enabling legislation for additional legal powers of air quality management
9. Introduction of clean air zones / low emission zones
10. Implementation of national remote work strategy
11. Enhanced air quality monitoring and modelling
12. Public engagement on air quality
13. Collaboration with emerging research on health and air quality
14. A campaign to influence behavioural change on cleaner vehicle fleet and commuting

Other Relevant Policy, Standards & Guidance

8.2.26 In the absence of equivalent guidance published in Ireland, UK guidance documents published by the Department for Environment, Food and Rural Affairs and Institute of Air Quality Management have been referred to in this assessment. Both guidance documents set out accepted industry-standard approaches to the assessment of air quality impacts and the determination of air quality effects. Whilst these documents have not been published for the intention of use outside of the UK, the approach and methods described within them are equally applicable for use in Ireland and any other EU country where the national air quality standards are transcribed from the EU Air Quality Directive.

Local Air Quality Management Technical Guidance 2016

8.2.27 The UK Department for Environment, Food and Rural Affairs published their Local Air Quality Management Technical Guidance[19] to assist local authorities in the UK with their responsibilities to review and assess local air quality in their administrative areas. The technical guidance provides methods and tools that can be applied for air quality assessment, including an approach to dispersion model verification and the conversion of nitrogen oxides (NO_X) to NO_2 for road traffic sources.

Land-Use Planning & Development Control: Planning for Air Quality 2017

8.2.28 The Institute of Air Quality Management and Environmental Protection UK provide guidance for the consideration of air quality within the land-use planning and development control process[20]. The guidance sets out a means of describing air quality impacts based on the relationship between the magnitude of change and total pollutant concentration experienced, relative to the air quality standards. Therefore, a smaller magnitude of change could potentially have a greater impact, where total

[18] Dublin City Council, Fingal County Council, South Dublin County Council and Dun Laoghaire-Rathdown County Council (2021) Dublin Region Air Quality Plan 2021 - Air Quality Plan to improve Nitrogen Dioxide levels in Dublin Region
[19] Department for Environment, Food and Rural Affairs UK (2021); Local Air Quality Management Technical Guidance (TG16).
[20] Environmental Protection UK (EPUK) – Institute of Air Quality Management (IAQM), (2017); Land-Use Planning & Development Control: Planning for Air Quality.

concentrations are close to or above an air quality standard, when compared to a larger magnitude of change, where total concentrations are below and not at risk of exceeding the standard.

8.3 Assessment Methodology

8.3.1 As described in Chapter 4: Methodology, the assessment has been carried out following the below methodology and the EPA Guidance:

- Establishment of the baseline conditions, including identification and assessment of the receiving environment and receptor sensitivity
- Identification of environmental design measures and mitigation measures that form part of the construction methodology
- Identification of the potential impacts, and assessment of the magnitude of potential effects, and their significance
- Consideration of mitigation measures
- Assessment of residual effects

8.3.2 This section of this EIAR Chapter presents the following:

- Information sources that have been consulted throughout the preparation of this chapter;
- The methodology for the assessment of air quality effects, including the criteria for the determination of the sensitivity of receptors and magnitudes of change;
- An explanation as to how the identification and assessment of potential air quality effects has been reached; and
- The significance criteria and terminology for the assessment of air quality residual effects.

8.3.3 The following sources of information with relation to the Proposed Development have been reviewed and form the basis of the assessment of likely significant effects on air quality:

- Current and forecast data was supplied by the Applicant for vehicle traffic sources, see Chapter 5 Traffic & Transport;
- Local air quality monitoring data sourced from the Applicant and the EPA;
- AECOM local air quality monitoring data from 2019; reference Paragraph 8.3.5 for further information;
- Site plans and construction phasing and activities set out in Chapter 3: Proposed Development; and
- Hourly sequential meteorological data sourced from Met Eireann.

Methodology for Baseline Conditions and Sensitive Receptors

8.3.4 The study area (see Figure 8-1) has been defined based on the construction areas and road network predicted to experience changes in traffic flow as a result of Proposed Development construction phase traffic movements, i.e., where there is a potential for a change in air quality.

8.3.5 The year has been selected to represent the Current State of the Environment, or the existing baseline air quality in the study area, being the most recent complete year that has not seen traffic flows affected by the Covid-19 pandemic. 2019 air quality conditions have been identified and reviewed for both total and background concentrations for all of the pollutants of interest. Further information is provided in Section 8.4.

8.3.6 Sensitive receptors have been identified according to Transport Infrastructure Ireland (TII) Guidance[21]. Receptors are classified as locations where members of the public are likely to be regularly present. These include residential housing, schools, hospitals, places of worship, sports centres and shopping areas outside of the Application Site, including users of the airport. In selecting relevant receptors for

[21] National Roads Authority / Transport Infrastructure Ireland (2011), Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes. https://www.tii.ie/technical-services/environment/planning/Guidelines-for-the-Treatment-of-Air-Quality-during-the-Planning-and-Construction-of-National-Road-Schemes.pdf

assessment, consideration has been given to locations that are most likely to be affected by the impact of addition traffic movements on the public road network.

8.3.7 Further details concerning sensitive receptors can be found in Section 8.4.

Methodology for Construction Dust Effects

8.3.8 During the construction phase of the Proposed Development, construction activities have the potential to generate dust and finer particulate (PM_{10}) emissions that could impact on and effect sensitive receptors located close to the construction site boundary, boundaries of the two construction compounds, and receptors located close to public roads used by construction traffic. A qualitative assessment has been undertaken to consider such impacts, in line with guidance published by the Institute of Air Quality Management (IAQM)[22].

8.3.9 The following study area for construction phase dust impacts has been applied, as per the IAQM guidance (Box 1: Screening Criteria), extending:

- Up to 350 m beyond the Application Site boundary including Construction Compounds and 50 m either side of the construction traffic route (for a distance of up to 500 m from the entrance of the proposed works site), for the identification of human health receptors; and
- Up to 50 m from the Application Site boundary including Construction Compounds or either side of the construction traffic route (for a distance of up to 500 m from the entrance of the proposed works site) for the identification of ecological receptors.

8.3.10 According to the IAQM, the main air quality impacts that may arise during construction activities are:

- Dust deposition, resulting in the soiling of surfaces;
- Visible dust plumes, which are evidence of dust emissions;
- Elevated PM_{10} concentrations, as a result of dust generating activities on site; and
- An increase in concentration of airborne particles and NO_2 due to exhaust emissions from diesel powered vehicles and equipment on sire and vehicles accessing the site.

8.3.11 Fugitive emissions of airborne particulate matter (including dust) are readily produced through the action of abrasive forces on materials and therefore a wide range of site preparation and construction activities can have the potential to generate this type of emission, including:

- Demolition;
- Earthworks;
- Construction; and
- Track-out (the transportation of dust and dirt from the construction site onto the public road network, where it may be deposited and then re-suspended by vehicles using the network).

8.3.12 The following steps, as defined by the IAQM, were followed:

- Step 1: Screen the requirement for a detailed assessment. Human and ecological receptors were identified and distance to the scheme and construction routes were determined;
- Step 2: Assess the risk of dust impacts. The potential risk of dust impacts occurring for each activity was determined, based on the magnitude of the potential dust emissions and the sensitivity of the area;
- Step 3: Identify the need for site-specific mitigation. Based on the risk of impacts occurring, site specific mitigation measures were determined; and
- Step 4: Define impacts and their significance. The significance of the potential residual dust impacts (taking mitigation into account) for each activity was determined.

8.3.13 This section describes the technical methodology by which the air quality impact of the Proposed Development from construction phase particulate emissions has been considered.

[22] Holman et al (2014). IAQM Guidance on the assessment of dust from demolition and construction, Institute of Air Quality Management, London. www.iaqm.co.uk/text/guidance/construction-dust-2014.pdf

Step 1: Screen the Requirement for a Detailed Assessment

8.3.14 Sensitive receptors were identified and the distance to the site and construction routes were determined according to the examples of sensitivity shown in Table 8-3. According to the IAQM, an assessment will normally be required where there are sensitive receptors within 350 m of the boundary of a site and/or within 50 m of route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance.

8.3.15 A human receptor, as considered within the IAQM guidance, is any location where a person or property may experience:

- The annoyance effects of airborne dust or dust soiling, e.g.: dwellings, industrial or commercial premises such as a vehicle showroom, food manufacturers, electronic manufacturers, amenity areas and horticultural operations; or
- Exposure to PM_{10} over a period relevant to the air quality objectives

8.3.16 Ecological receptors within 50 m of the boundary of the site or routes used by construction vehicles on the public highway, up to 500 m from the site entrance, also need to be identified.

8.3.17 There are no ecological receptors which need to be considered as part of this assessment

Table 8-3: Examples of Dust Sensitive Receptors

Sensitivity	Dust Soiling	Human Health	Ecological
High	• Dwellings • Museum and other culturally important collections, • Medium and long term car parks • Car showrooms	• Residential properties. • Hospitals, • Schools • Residential care homes	• Locations with an international or national designation (e.g. SAC) and the designated features may be affected by dust soiling
Medium	• Parks • Places of work	• Office and shop workers, but will generally not include workers occupationally exposed to PM_{10}, as protection is covered by Health and Safety at Work legislation.	• Locations with a national designation (e.g. Natural Heritage Areas) where the features may be affected by dust deposition
Low	• Playing fields • Farmland (unless commercially-sensitive horticultural) • Footpaths • Short term car parks • Roads	• Public footpaths • Playing fields • Parks • Shopping streets	• Locations with a local designation where the features may be affected by dust deposition local Nature Reserve with dust sensitive features.

SAC: Special Area of Conservation; SSSI: Site of Special Scientific Interest

Step 2: Assess the Risk of Dust Impacts

8.3.18 The risk of dust arising in sufficient quantities to cause annoyance and/or health effects was determined for each activity (demolition, earthworks, construction works and track out), taking account of:

- The scale and nature of the works, which determines the potential dust emission magnitude (small, medium or large) (Step 2A); and
- The sensitivity of the area (low, medium or high) (Step 2B).

8.3.19 These factors were then combined to give the risk of dust effects with no mitigation applied, as Negligible, Low, Medium or High.

8.3.20 It should be notes that where detailed information was not available to inform the risk category, professional judgement and experience was used and a cautious approach adopted, in accordance with the guidance.

Step 2A – Define the Potential Dust Emission Magnitude

8.3.21 Table 8.4 presents the demolition works dust emission classification. Demolition works will be minimal and restricted to locations hundreds of metres form the construction site boundary and dust sensitive receptors.

Table 8-4: Potential Demolition Dust Emission Classification

Potential Dust Emission Classes	Criteria
Large	• Total building volume >50,000 m^3 • Potentially dusty construction material (e.g. concrete) • On-site crushing and screening • Demolition activities >20 m above ground level
Medium	• Total building volume 20,000 m^3 – 50,000 m^3 • Potentially dusty construction material • Demolition activities 10-20 m above ground level
Small	• Total building volume <20,000 m^3 • Construction material with low potential for dust release (e.g. metal cladding or timber) • Demolition activities <10 m above ground • Demolition during wetter months

8.3.22 Earthworks will primarily involve excavating material, haulage, tipping and stockpiling. The classifications in Table 8-5 are based on examples of suitable criteria. Factors such as existing land use, topography, seasonality, duration and scale were also taken into consideration, where possible.

Table 8-5: Potential Earthworks Dust Emission Classification

Potential Dust Emission Classes	Criteria
Large	• Total site area: >10,000 m^2 • Potentially dusty soil type (e.g. clay) • >10 heavy earth moving vehicle active at any one time • Formation of bunds >8 m in height • Total material moved >100,000 tonnes
Medium	• Total site area: 2,500 - 10,000 m2 • Moderately dusty soil type (e.g. silt) • 5 -10 heavy earth moving vehicle active at any one time • Formation of bunds 4 - 8 m in height • Total material moved 20,000 – 100,000 tonnes
Small	• Total site area: <2,500 m2 • Soil type with large grain size (e.g. sand) • < 5 heavy earth moving vehicle active at any one time • Formation of bunds < 4 m in height • Total material moved <20,000 tonnes • Earthworks during wetter months

8.3.23 The key issues when determining the potential dust emission magnitude during the construction phase include the size of the building(s)/infrastructure, method of construction, construction materials and duration of build. The classifications in Table 8-6 are based on examples of suitable criteria. Factors such as seasonality, building type, duration and scale were also taken into consideration, where possible,

Table 8-6: Potential Construction Works Dust Emission Classification

Potential Dust Emission Classes	Criteria
Large	• Total building volume >100,000 m3 • Piling, on site concrete batching, sandblasting
Medium	• Total building volume 25,000 – 100,000 m^3 • Potentially dusty construction material (e.g. concrete)

Potential Dust Emission Classes	Criteria
	• On-site concrete batching
Small	• Total building volume <25,000 m^3 • Construction material with low potential for dust release (e.g. metal cladding or timber)

8.3.24 Track-out is the transport of dust and dirt from the construction/demolition site onto the public road network, where it may be deposited and then re-suspended by vehicles using the local road network. The classifications in Table 8-7 are based on examples of suitable criteria. Factors such as vehicle size, speed, numbers, geology and duration were also taken into consideration, where possible.

Table 8-7: Potential Track-out Dust Emission Classification

Potential Dust Emission Classes	Criteria
Large	• 50 HGV (>3.5t) outward movements in any one day • Potentially dusty surface material • Unpaved road length > 100 m
Medium	• 25 – 100 HGV (>3.5t) outward movements in any one day • Moderately dusty surface material • Unpaved road length 50 – 100 m
Small	• < 25 HGV (>3.5t) outward movements in any one day • Surface material with low potential for dust release • Unpaved road length < 50 m

Step 2B – Define the Sensitivity of the Area

8.3.25 The sensitivity of the area takes account of the following factors:

- The specific sensitivities of receptors in the area;
- The proximity and number of those receptors;
- In the case of PM_{10}, the local background concentrations; and
- Site specific factors, such as whether there are natural shelters, such as trees to reduce the risk of wind-blown dust.

8.3.26 The sensitivity of the area is determined separately for dust soiling impacts on people and properties (Table 8-8), and human health impacts (Table 8-9).

Table 8-8: Sensitivity of the Area to Dust Soiling Effects on People and Property

Receptor Sensitivity	Number of Receptors	Distance from the Source (m)			
		<20 m	<50 m	<100 m	<350 m
High	>100	High	High	Medium	Low
Medium	10 – 100	High	Medium	Low	Low
Low	1 – 10	Medium	Low	Low	Low

Table 8-9: Sensitivity of the Area to Human Health Impacts

Receptor Sensitivity	Annual Mean PM_{10} Concentration	Number of Receptors	Distance from the Source (m)			
			<20 m	<50 m	<100 m	<350 m
High	>32 µg/m^3	>100	High	High	High	Medium
		10 – 100	High	High	Medium	Low
		1 – 10	High	Medium	Low	Low
		>100	High	High	Medium	Low

Receptor Sensitivity	Annual Mean PM_{10} Concentration	Number of Receptors	Distance from the Source (m)			
			<20 m	<50 m	<100 m	<350 m
	28 – 32 µg/m^3	10 – 100	High	Medium	Low	Low
		1 – 10	High	Medium	Low	Low
	24 – 28 µg/m^3	>100	High	Medium	Low	Low
		10 – 100	High	Medium	Low	Low
		1 – 10	Medium	Low	Low	Low
	< 24 µg/m^3	>100	Medium	Low	Low	Low
		10 – 100	Low	Low	Low	Low
		1 – 10	Low	Low	Low	Low
Medium		>10	High	Medium	Low	Low
		1 – 10	Medium	Low	Low	Low
Low		1 – 10	Low	Low	Low	Low

Step 2C – Define the Risk of Impacts

8.3.27 The dust emission magnitude determined at Step 2A should be combined with the sensitivity of the area determined at Step 2B to determine the risk of effects with no mitigation applied (Table 8-10). This step is undertaken for each activity undertaken on site.

Table 8-10: Risk of Dust Impacts

Activity	Sensitivity of Area	Dust Emission Classification		
		Large	Medium	Small
Earthworks	High	High	Medium	Low
	Medium	Medium	Medium	Low
	Low	Low	Low	Negligible
Construction	High	High	Medium	Low
	Medium	Medium	Medium	Low
	Low	Low	Low	Negligible
Track-out	High	High	Medium	Medium
	Medium	Medium	Low	Negligible
	Low	Low	Low	Negligible

Step 3: Identify the need for Site-Specific Mitigation

8.3.28 Based on the risk of effects determined in Step 2C for each activity, appropriate site-specific mitigation measures were recommended. Appropriate mitigation measures are set out in the IAQM Guidance.

Step 4: Define Impacts and their Significance

8.3.29 Finally, the significance of the potential residual dust impacts, i.e. after mitigation, was determined. According to the IAQM Guidance, the residual impacts assumes that all mitigation measures (recommended in Step 3) to avoid or reduce impacts are adhered to, and therefore the residual impacts should be considered to be 'not significant'.

Determining Significance

8.3.30 Fugitive dust can cause annoyance to nearby sensitive uses; loss of amenity can occur due to dust deposition or dust plumes. For amenity effects from coarser dust (>PM_{10}), the aim of the IAQM guidance is to bring forward a scheme, including mitigation measures if necessary, that would control impacts so

that they give rise to negligible or minor effects at the closest receptors. Measures that reduce dust emissions could also reduce emissions of finer particles (PM_{10}). Determination of whether an effect is likely to be significant or not is based on professional judgement, taking account of whether effects are permanent or temporary, direct or indirect, constant or intermittent and whether any secondary effects are caused (in this instance, secondary effects refer to dust that is generated and deposited (primary impact) and then re-suspended and deposited again by further activity).

8.3.31 With reference to the IAQM guidance, it is not considered appropriate to provide the initial classification of effects prior to mitigation as significant adverse environmental effects are avoided or reduced through the use of the preliminary CEMP, secured by planning condition. This will ensure that the potential significant adverse effect will not occur, and so residual effects will normally be 'not significant'. Even with a comprehensive Construction Environmental Management Plan in place, the IAQM argues that:

"…it is not possible to guarantee that the dust mitigation measures will be effective all the time, and if, for example, dust emissions occur under adverse weather conditions, or there is an interruption to the water supply used for dust suppression, the local community may experience occasional, short-term dust annoyance. The likely scale of this would not normally be considered sufficient to change the conclusion that with mitigation the effects will be 'not significant'.

Methodology for Construction Phase Road Traffic Emissions Effects

8.3.32 Atmospheric Dispersion Modelling System (ADMS) Roads (v5.0.0.1) detailed modelling software has been used to predict concentrations of road transport derived pollutants NO_2, PM_{10} and $PM_{2.5}$, at selected sensitive receptors. ADMS-Roads is a modern dispersion model that has an extensive published track record of use in the UK for the assessment of local air quality impacts, including model validation and verification studies[23]. The following scenarios were considered in this assessment:

- 2019 Baseline Scenario (using 2019 traffic data, 2019 meteorological data, 2019 traffic emissions factors and 2019 backgrounds for NO_2, PM_{10} and $PM_{2.5}$);
- 2024 Future Baseline Scenario (using 2024 traffic data, 2019 meteorological data, 2024 traffic emissions factors and 2019 backgrounds for NO_2, PM_{10} and $PM_{2.5}$); and
- 2024 Future with Construction of Proposed Development Scenario (using 2024 traffic data, 2019 meteorological data, 2024 traffic emissions factors and 2019 backgrounds for NO_2, PM_{10} and $PM_{2.5}$).

8.3.33 In the absence of a dataset projecting 2024 baseline pollutant concentrations, a precautionary approach is considered appropriate with use of monitored 2019 background concentration data in all above scenarios. The use of 2019 air quality background data is considered to be precautionary, as it will not take into account any future improvements due to modernised and evolving emissions technology. Details of general modelling conditions are provided in Table 8-11.

Table 8-11: General ADMS-Roads Model Conditions

Variables	ADMS Roads Model Input
Surface roughness at source	0.5
Minimum Monin-Obukhov length for stable conditions	30
Terrain types	Flat
Receptor location	X, Y and Z coordinates determined by GIS
Emissions	NOx, PM_{10} and $PM_{2.5}$ based on the traffic data supplied
Emission factors	Emission Factor Toolkit (Version 11.0)
Meteorological data	Hourly sequential data from Dublin Airport in 2019
Emission profiles	None assumed for conservatism
Receptors	Selected receptors only
Model output	Long-term annual mean road contributions for NO_x, PM_{10} and $PM_{2.5}$

[23] CERC (2018) Model validation http://www.cerc.co.uk/environmental-software/model-validation.html

Traffic Data and Emissions

8.3.34 Traffic data in the form of annual average daily traffic (AADT) flows, heavy-duty vehicles (heavy goods vehicles plus buses – HDVs) percentages and average speeds for all major road links within the model domain and for all scenarios considered. These figures are set out in Chapter 5: Traffic & Transport.

8.3.35 As prescribed in TII guidance[11], UK Department for Environment Food and Rural Affairs (Defra)'s Emission Factor Toolkit (EFT) (Version 11.0)[24] was used to convert this traffic data into vehicle emission rates (g/km/s) which were input into the dispersion modelling software. The UK fleet projection contained within the EFT are considered to be representative of a fleet mix in Ireland and the Fingal area; this is noted by the TII guidance[25] to be a disadvantage to not use the Irish fleet, but an accepted approach.

8.3.36 Data suitable for input into the model was derived from the figures given in Chapter 3: Proposed Development and Chapter 5: Traffic & Transport for the three phases of the construction phase. The maximum impact of all three phases was derived to ensure that worst case predictions were assessed. The traffic data used in the assessment are shown in Table 8-12.

8.3.37 The speeds on roads were slowed on the approach to- and acceleration from junctions with reference to the TII air quality guidance.

Table 8-12: Traffic Data

Road link	2019 Base			2024 Do Minimum			2024 With Construction of Proposed Development		
	AADT Flow	% HDV	Speed (kph)	AADT Flow	% HDV	Speed (kph)	AADT Flow	% HDV	Speed (kph)
A – Naul Road	17,086	3.3	49.5	21,161	3.9	49.0	21,472	5.29	49.0
B – Barberstown Road	17,882	6.0	48.0	23,146	6.8	46.5	23,457	8.03	46.5
C – Dunbro Lane	175	0.0	68.5	204	0.0	68.0	204	0.0	68.0
D – North Parallel Road	575	0.0	65.5	654	0.0	65.5	869	24.76	65.5
E – R122	17,171	7.8	47.0	21,519	8.9	46.5	21,829	10.2	46.5
F – South Parallel Road	9,468	7.9	52.5	11,797	8.6	51.5	12,108	10.94	51.5
G – Naul Road	16,662	7.7	41.0	20,710	7.9	40.5	21,020	9.26	40.5
H – R122	20,752	8.6	46.0	26,824	10.8	44.5	27,134	11.82	44.5
I – Main Road	7,001	10.2	53.5	8,828	10.2	51.5	8,828	10.2	51.5
J – M50 Northern Cross Route W	161,757	7.0	62.5	200,755	7.0	56.5	200,910	7.07	56.5
K – M50 Northern Cross Route E	145,327	7.0	70.0	179,130	7.0	65.0	179,285	7.08	65.0
L – Naul Road	45,591	4.9	35.5	56,264	4.9	33.5	56,264	4.9	33.5
M - M50 Northern Cross W off slip road	19,005	4.7	70.5	24,495	4.7	67.0	24,573	5.0	67.0
N - M50 Northern Cross E on slip road	9,993	3.9	77.0	12,569	3.9	76.0	12,647	4.49	76.0
O - M50 Northern Cross E off slip road	9,018	4.3	78.0	10,678	4.3	78.0	10,756	4.99	78.0

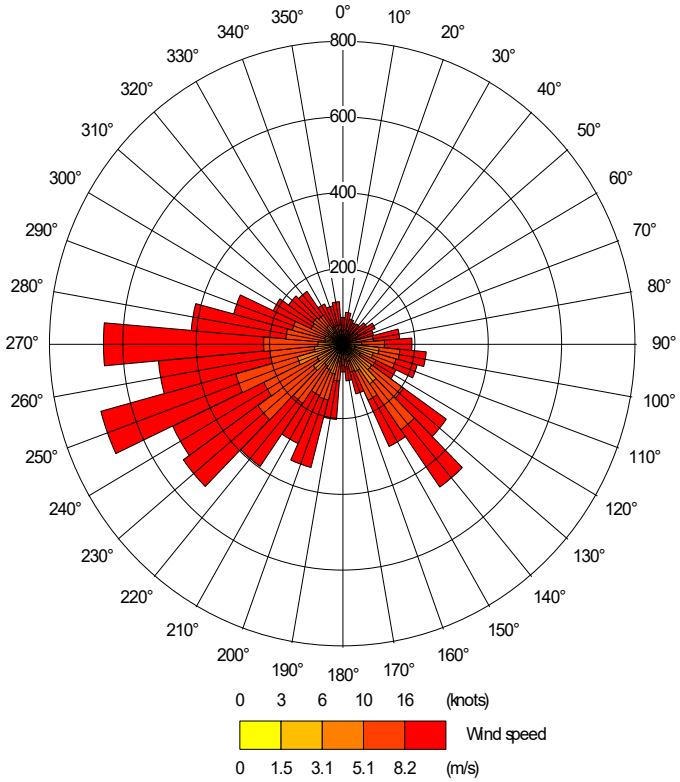
[24] Department for Environment, Food and Rural Affairs, 2021. https://laqm.defra.gov.uk/air-quality/air-quality-assessment/emissions-factors-toolkit/
[25] National Roads Authority / Transport Infrastructure Ireland (2011), Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes. https://www.tii.ie/technical-services/environment/planning/Guidelines-for-the-Treatment-of-Air-Quality-during-the-Planning-and-Construction-of-National-Road-Schemes.pdf

Road link	2019 Base			2024 Do Minimum			2024 With Construction of Proposed Development		
	AADT Flow	% HDV	Speed (kph)	AADT Flow	% HDV	Speed (kph)	AADT Flow	% HDV	Speed (kph)
P - M50 Northern Cross W on slip road	16,438	6.7	70.5	20,372	6.7	68.0	20,449	7.05	68.0
Q – M50 roundabout E	12,355	4.3	31.0	14,742	4.3	30.0	14,820	4.8	30.0
R– M50 roundabout W	21,279	5.7	23.5	27,058	5.7	21.5	27,136	5.97	21.5

Meteorological Data

8.3.38 The meteorological dataset used in the assessment was recorded at the meteorological station at Dublin Airport in 2019, the baseline year for the air quality assessment as described in Paragraph 8.3.5. The TII guidance states in A4.2: *"Wherever possible, the year of meteorological data should correspond with the year of monitoring data that is used for the subsequent model verification*". The meteorological site is therefore considered to be representative of regional meteorological conditions and sufficient to satisfy the requirements of this assessment. The wind rose for this site and further details are provided in Plate 8.1.

Plate 8-1. Wind rose for Dublin Airport in 2019



Conversion of NO_x to NO_2

8.3.39 The proportion of NO_2 in NO_x varies greatly with location and time according to several factors, including the amount of oxidant available and the distance from the emission source. NO_x concentrations are expected to decline in future years due to falling emissions associated with improving and evolving emissions technology as shown by Figure 3.2 in the Dublin Region Air Quality Plan 2021[26], however this would mean that the NO_2/NO_x ratio will likely increase. Also, a trend has been noted whereby roadside NO_2 concentrations have been increasing at specific roadside monitoring sites, despite emissions of

[26] Dublin Region Air Quality Plan 2021 - Air Quality Plan to improve Nitrogen Dioxide levels in Dublin Region

NO_x falling[27]. This phenomenon is having an effect at many urban locations and is relevant to the consideration of methodology when undertaking modelling studies.

8.3.40 For this assessment, modelled road-NO_x concentrations were converted to total NO_2 concentrations using Defra's 'NO_x to NO_2' calculator (V8.1), released in August 2020[28] and considered an acceptable method by the TII guidance[29]. This calculator requires an estimate of the proportion of primary NO_2 (f-NO_2) – the component of total exhaust NO_x that is emitted directly as NO_2 by vehicles. This was calculated individually for each receptor based on the relative contribution of different sources to total locally generated NO_x concentrations. For road vehicles, representative values of f-NO_2 are contained within the 'NO_2 to NO_x calculator' – with further information on the basis of f-NO_2 provided by Defra[30].

8.3.41 The year, region and background NO_2 concentrations were specified in the calculator, as was the selection of "Newry Mourne and Down" as a local authority to derive default values. It was also necessary to specify the "representative traffic mix"; this was assumed to be "all UK traffic". These assumptions have been based on guidance issued by TII, which suggests using values for Northern Ireland local authorities as there are no such mapped background values available for local authorities in Ireland.

Model Verification

8.3.42 When using modelling techniques to predict concentrations, it is necessary to make a comparison between the model results and available measured monitoring data – this is known as model verification. This is to check if the model is reasonably reproducing actual observations and if necessary, allow the adjustment of modelled results to more closely match the monitoring data. The accuracy of the future year modelling results is relative to the accuracy of the model base year results, therefore greater confidence can be placed in the future year concentrations if a good agreement is found for the model base year.

8.3.43 The model has been run to predict the annual mean NOx concentrations during 2019 at a variety of locations where passive monitoring is undertaken using diffusion tubes, (see Figure 8-2) from the Applicant and three sets of monitoring results specific to the study area from a six-month survey commissioned by AECOM in 2019. Diffusion tubes do not need any power supply to absorb the pollutant directly from the surrounding air. 2019 has been selected as the year to represent conditions for model verification as full datasets of meteorological monitoring data and air quality monitoring data, representative of a period when the airport was operating at 32mppa, from both the Applicant and AECOM were available. The data used for model verification covers the study area and therefore is representative of concentrations recorded at locations not only within Dublin airport.

8.3.44 The height and locations of the Applicant's monitors were sourced from data provided by the Applicant. Data from AECOM's monitoring represented a six-month period only, the period mean data were annualised to a represent an annual mean value for 2019 using an annualization factor appropriate for the calculation, with reference to Defra's Local Air Quality Management Technical Guidance (TG16)[31]. This was calculated using relative period mean and annual mean monitoring data gathered at three continuous (automatic) monitoring stations, located within 50 miles of the Proposed Development: Swords, Ballyfermot and Dun Laoghaire. Due to their nature, diffusion tubes may systematically under- or over-read NO_2 concentrations when compared to reference chemiluminescence analysers – this is known as diffusion tube bias. Following annualization, the data was adjusted for diffusion tube bias using an overall national bias adjustment factor of 0.91 sourced from Defra's National Bias Adjustment Factors[32], as per TII guidance.

[27] Air Quality Expert Group (2021) Exhaust Emissions from Road Transport
[28] NO_X to NO_2 Calculator (Department for Environment, Food and Rural Affairs, 2020) <https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html#NOXNO2calc > accessed on February 2022
[29] National Roads Authority / Transport Infrastructure Ireland (2011), Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes. https://www.tii.ie/technical-services/environment/planning/Guidelines-for-the-Treatment-of-Air-Quality-during-the-Planning-and-Construction-of-National-Road-Schemes.pdf
[30] Department for Environment Food and Rural Affairs (2020) NOx to NO2 Calculator. Available at https://laqm.defra.gov.uk/air-quality/air-quality-assessment/nox-to-no2-calculator/
[31] Department for Environment, Food and Rural Affairs (2021) Local Air Quality Management Technical Guidance (TG16) https://laqm.defra.gov.uk/documents/LAQM-TG16-April-21-v1.pdf
[32] Department for Environment, Food and Rural Affairs (2022) National Bias Adjustment Factors. Available at: https://laqm.defra.gov.uk/air-quality/air-quality-assessment/national-bias/

8.3.45 A summary of the monitoring sites within the study area alongside roads included in the dispersion modelling, and therefore relevant to verification and their measured annual mean NO_2 concentrations in 2019 is shown in Table 8-13.

Table 8-13: Diffusion Tube Monitoring Locations and Annual Mean NO_2 data in 2019

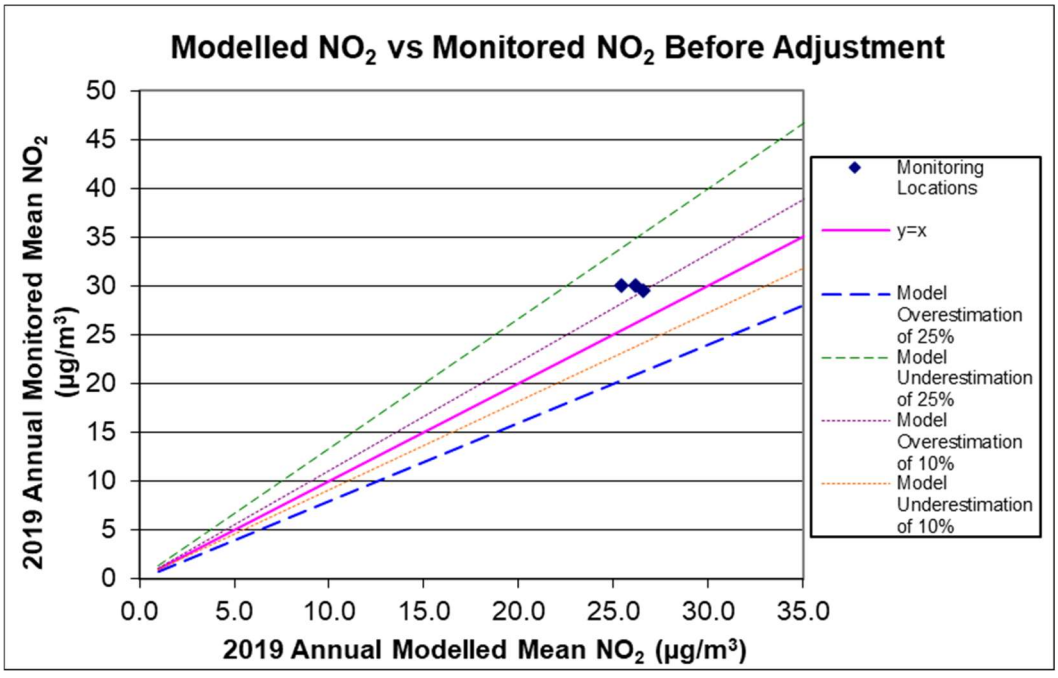
DT ID	X	Y	Height (m)	Source	Annual Mean NO_2 ($\mu g/m^3$)
NO2 (1)	313206	241058	2	AECOM	26.8*
NO2 (2)	313916	241064	2	AECOM	29.6*
NO2 (3)	313558	241032	2	AECOM	30.1*
A1	316399	244629	2.4	daa	18.0
A2	312422	244477	2.4	daa	16.0
A4	312989	243596	2.4	daa	17.0
A5	315613	243257	2.4	daa	25.0
A6	316531	242261	2.4	daa	29.0
A7	312676	242777	2.4	daa	30.0

*Data annualised

8.3.46 Monitoring sites NO2 (1), A1, A2, A4, A5 and A6, have been excluded from the verification procedure. NO2 (1) is located directly behind a fence and therefore is not able to be represented by the model, A1, A4 and A5 are located in background locations further away from major road emissions and A2 and A6 are not on the modelled road network. This left monitors NO2 (2), NO2 (3) and A7 to be used for model verification; this is considered appropriate for verification with reference to Defra's Local Air Quality Management Technical Guidance (TG16)[33], supported for use by the TII guidance[34].

8.3.47 An initial comparison of the predicted NO_2 levels (based on "road-NO_x" emissions, which were converted into NO_2 using Defra's NO_x to NO_2 calculator and added to background values, with the measured NO_2 concentrations) of these three monitors show an average under-prediction of 12.9% compared to measured concentrations, as can be seen in Plate 8-2.

Plate 8-2 Modelled Versus Measured Total NO_2, before model adjustment



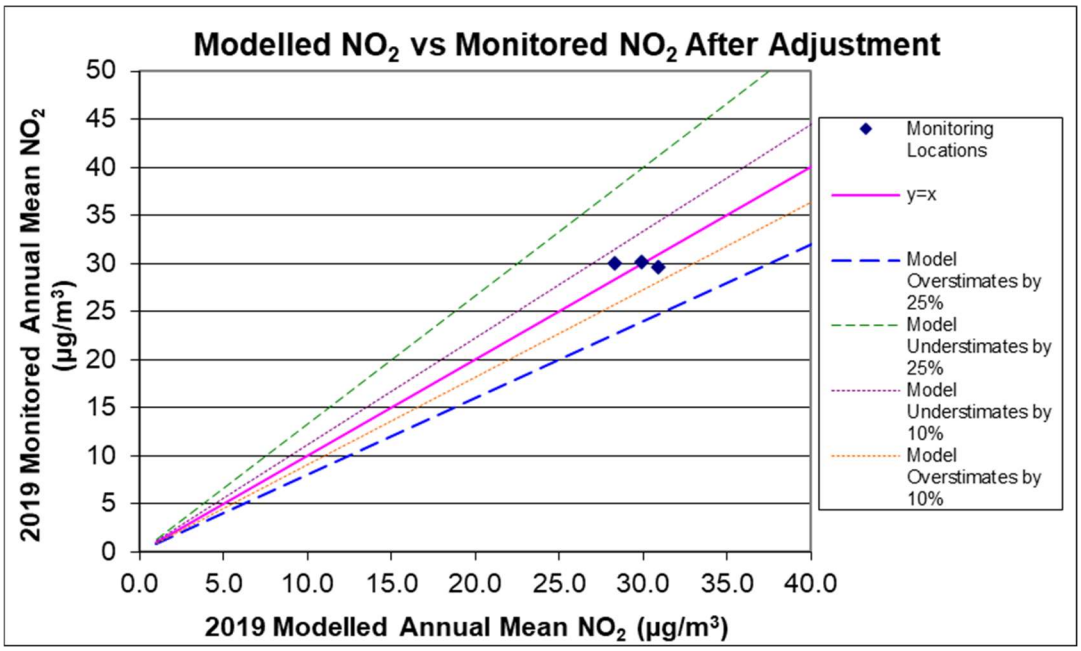
[33] Department for Environment, Food and Rural Affairs (2021) Local Air Quality Management Technical Guidance (TG16) https://laqm.defra.gov.uk/documents/LAQM-TG16-April-21-v1.pdf
[34] National Roads Authority / Transport Infrastructure Ireland (2011), Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes. https://www.tii.ie/technical-services/environment/planning/Guidelines-for-the-Treatment-of-Air-Quality-during-the-Planning-and-Construction-of-National-Road-Schemes.pdf

8.3.48 LAQM.TG16 provides guidance on the evaluation of model performance. Model outputs where the Root Mean Square Error (RMSE) is above 25% of the Air Quality Limit Value (10 µg/m^3 for annual mean NO_2 with reference to Table 8-2) should be checked for improvements. It further notes that *"ideally, an RMSE value with 10% of the Limit Value (4 µg/m^3) should be achieved*" and the ideal value for the Fractional Bias is 0.0. Based on the pre-adjustment RMSE of 3.9, as per the guidance, model adjustment is not required however, as good practice, due to the tendency of the model to under-predict annual mean NO_2 concentrations, a comparison of modelled and monitored road NO_X contributions and all modelled source NO_X outputs was undertaken, then adjusted by the factor calculated from that comparison. The adjustment factor between modelled and monitored concentrations was found to be 2.23 to adjust the predicted "road-NO_x". The factor was then applied to the modelled road-NO_x contribution at all receptor locations considered in this assessment, before being converted into total NO_2 concentrations, again using the NO_x to NO_2 calculator.

8.3.49 Based on the final adjusted modelled NO_2 concentrations, the RMSE is 1.2 µg/m^3 (3% of the air quality standard) and the Fractional Bias is 0.0. Based on LAQM.TG16 guidance, the model performance is considered to be good. The final adjusted modelled versus measured NO_2 comparison is shown in Plate 8-3.

8.3.50 In the absence of measured PM_{10} and $PM_{2.5}$ at roadside locations in the study area, the same factors calculated for the modelled road NO_X contribution were applied to the road PM_{10} and $PM_{2.5}$ contributions.

Plate 8-3: Modelled Versus Measured Total NO_2 - Adjusted Model Comparison



Receptors

8.3.51 With reference to TII guidance, it notes that receptors selected should include relevant locations where the impact of the scheme is expected to be greatest because of significant changes in traffic conditions[35]; sensitive locations are listed as residential housing, schools, hospitals, places of worship, sports centres and shopping areas, i.e. locations where members of the public are likely to be regularly present. Receptors considered in the detailed modelling study therefore include a selection of residential properties and other sensitive locations such as schools and a public house. A total of 19 existing receptors were modelled that may be affected by the Proposed Development, details of which can be found in Table 8-14 and Figure 8-1.

8.3.52 In some instances, a single receptor location has been selected to represent a group of residential properties, as the predicted concentrations would tend to be similar within the cluster of properties, but

[35] National Roads Authority / Transport Infrastructure Ireland (2011), Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes. https://www.tii.ie/technical-services/environment/planning/Guidelines-for-the-Treatment-of-Air-Quality-during-the-Planning-and-Construction-of-National-Road-Schemes.pdf

the receptor chosen was identified to be the worst-case location in terms of exposure to the nearest road emission source.

Table 8-14: Modelled Receptor Information

Receptor	Location	X	Y	Z	Receptor Type
1	Forest Road	316324	244483	1.5	Residential
2	Cooks Road	315764	244749	1.5	Residential
3	The Boot Inn	315404	243791	1.5	Public House
4	Dunbro Lane	313727	243920	1.5	Residential
5	Dunbro Lane	314418	243093	1.5	Residential
6	Harristown Lane	313363	242408	1.5	Residential
7	Silloge Green	315343	241513	1.5	Residential
8	Newtown Cottages	312697	243060	1.5	Residential
9	Main Road, St Margaret's	312936	243456	1.5	Residential
10	Main Road, St Margaret's	313131	243816	1.5	Residential
11	Main Road, St Margaret's	313223	244184	1.5	Residential
12	Mayeston Lawn	313860	241056	1.5	Residential
13	Meakstown Cottages	313205	241075	1.5	Residential
14	Northwood Green	315467	240557	1.5	Residential
15	Charter School Hill	315515	241138	1.5	Residential
16	Parklands	316322	241033	1.5	Residential
17	Old Ballymun Road	315498	241014	1.5	Residential
18	St Margaret's National School	313014	243538	1.5	School
19	R122	313118	243868	1.5	Residential

Significance Criteria

8.3.53 The assessment refers to the EPA Guidelines [36]. It also takes into account the quality of effect (positive, negative or neutral), the duration of effect, the extent and context of the effect, the significance of effect, the probability of effect, duration and frequency.

8.3.54 The assessment refers to guidance issued by Environmental Protection UK and the Institute of Air Quality Management, which provides a means to describe the impact of a proposed scheme at individual receptors based on dispersion model outputs. The Environmental Protection UK and the Institute of Air Quality Management guidance uses the term "impact" to describe a change in pollutant concentration at a specific location, and the term "effect" to describe an environmental response resulting from the impact.

8.3.55 Receptors associated with human health impacts are selected based on the likely exposure of the public to the pollutants of concern for periods that are representative of the air quality standards, such as residential properties, schools and hospitals. Land uses are, therefore either sensitive or not sensitive to air quality impacts. Where sensitive receptors are identified, all are considered to be as highly sensitive as each other.

8.3.56 The Environmental Protection UK and the Institute of Air Quality Management guidance states that an air quality impact can be expressed as the magnitude of change in pollutant concentration (i.e. the change between the Future Base and the With Construction of the Proposed Development Scenario) as a proportion of the relevant assessment level (for example the relevant air quality standards), and then to examine this change in the context of the total pollutant concentration with the Proposed Development in place. This is summarised in Table 8-15.

[36] Environmental Protection Agency (2022), Guidelines on the Information to be Contained in Environmental Impact Assessment Reports

Table 8-15: Air Quality Impact Descriptors at Individual Receptors

Long-term Average Concentration	% Change in Concentration Relative to Air Quality Assessment Level*				
	<1 (imperceptible)	1 – 2 (very low)	2 – 5 (low)	6 – 10 (medium)	>10 (large)
75% or less of Limit Value	Negligible	Negligible	Negligible	Slight	Moderate
76% - 94% of Limit Value	Negligible	Negligible	Slight	Moderate	Moderate
95% - 102% of Limit Value	Negligible	Slight	Moderate	Moderate	Substantial
103% - 109% of Limit Value	Negligible	Moderate	Moderate	Substantial	Substantial
110% or more of Limit Value	Negligible	Moderate	Substantial	Substantial	Substantial

Source: EPUK/IAQM 'Land-Use Planning & Development Control: Planning for Air Quality,2017'. *Magnitude of impact descriptor given in parenthesis

8.3.57 The Environmental Protection UK and the Institute of Air Quality Management guidance[37] includes seven explanatory notes to accompany the terminology for the descriptors listed in Table 6.3 of the document – this table is reproduced as Table 8-15 above. It is noted that the descriptors are for individual receptors only and that overall significance is determined using professional judgement. Additionally, it is also noted that it is unwise to ascribe too much accuracy to incremental changes or background concentrations; this is especially important when total concentrations are close to the Limit Value. For a given year in the future, it is impossible to define the new total concentration without recognising the inherent uncertainty, which is why there is a category that has a range around the Limit Value for annual mean NO_2 (and annual mean PM_{10}), rather than being precisely equal to it.

8.3.58 A change in predicted annual mean concentrations of NO_2 or PM_{10} of less than 0.5% (0.2 µg/m^3) is considered to be imperceptible. A change (impact) that is imperceptible, given reasonable bounds of variation, would not be capable of having a direct effect on local air quality that could be considered to be significant. Likewise, a change in predicted annual mean concentrations of $PM_{2.5}$ of less than 0.5% (0.12 µg/m^3) is also considered to be imperceptible.

8.3.59 Additionally, the guidance also includes the potential for slight air quality impacts as a result of changes in pollutant concentrations between 2% and 5% of relevant air quality standards. For annual average NO_2 and PM_{10} concentrations, this relates to changes in concentrations ranging from 0.6 – 2.1 µg/m^3. In practice, changes in concentration of this magnitude at the lower end of this band are likely to be very difficult to distinguish through any post-operational monitoring regime, due to the number of sources of NO_2 in an urban environment and the interannual effects of varying meteorological conditions. In the overall evaluation of significance, the potential for significant air quality impacts within this band is, therefore, considered in this context.

8.3.60 Changes in concentration of more than 5% (moderate and substantial, the two highest bands) are considered to be of a magnitude which is far more likely to be discernible and as such carry additional weight within the overall evaluation of significance for air quality.

8.3.61 It should be noted that the impact descriptors in Table 8-15, are intended for application at individual modelled sensitive receptors. While there may be a 'slight', 'moderate' or 'substantial' impact at one or more receptors, the overall effect may not necessarily be judged as being significant; this is supported by the EPUK/IAQM guidance[38]. The overall significance of effects is determined using professional judgement, taking this into account and the EPA Guidelines criteria described above.

Assumptions, Limitations & Uncertainty

8.3.62 Model assumptions used during the air quality assessment have been made precautionary where possible to provide a worst-case assessment (for example where data is not available) and these assumptions include:

- Informed assumptions on the model input data through the manipulation of provided AADT, % HDV and speed data for input into ADMS-Roads. Assumptions were made to derive the traffic data for the roads between the slip roads, roundabout, R108 running north and south and M50 motorway

[37] EPUK/IAQM (2017) Land-Use Planning & Development Control: Planning for Air Quality,2017
[38] EPUK/IAQM (2017) Land-Use Planning & Development Control: Planning for Air Quality,2017

running east and west based on the traffic data provided. The speeds on roads were slowed on the approach to- and acceleration from junctions with reference to TII air quality guidance[39]. Lower speeds cause higher emissions of NOx - this will therefore have provided a worst-case situation for annual mean NO_2 concentration impacts from the Proposed Development.

- The maximum traffic impact of all three construction phases was derived to ensure that worst case predictions were assessed.
- Use of the same average speed for 2024 with and without the construction of the Proposed Development
- Assumed no improvement in air quality background concentrations from 2019 to 2024 in the absence of a future baseline
- Conversion of NO_X to NO_2 including the applicability of the 'Newry Mourne and Down' district and 'all UK traffic' traffic mix
- Receptors have been selected at worst-case locations, to represent the closest location to the emission source, based on a review of aerial imagery
- Where any uncertainty exists due to air quality staff not having visited the Application Site, and the use of online data sources such as aerial imagery, any assumptions have been taken on a worst-case basis.
- The use of Defra's Emissions Factor Toolkit (version 11.0) for 2019 and 2024

8.3.63 Potential uncertainty may be associated with the accuracy of assumptions, including those for road traffic forecast data, the accuracy of emissions data and emissions characteristics, the representativeness of baseline monitoring data and meteorological data, and the appropriateness of other model assumptions. To reduce uncertainty, the assessment has followed relevant industry-standard guidance, made use of data sources specifically made available for this assessment, and has verified modelled outputs using air quality monitoring data and meteorological data gathered locally to the airport and representative of the study area.

8.4 Current State of the Environment

Monitoring Data

8.4.1 Existing monitoring data made available by the Applicant[40] and the EPA[41] allow for discussion of current and historic air quality in the vicinity of the airport and study area.

Pollutant Monitoring by the Applicant

8.4.2 The Applicant has undertaken measurements of NO_2 using passive sampling by diffusion tubes at several offsite locations in the vicinity of Dublin Airport (see Figure 8-2. The concentrations measured for NO_2 are reported quarterly, and the annual data are summarised in Table 8-16.

8.4.3 The data presented in this table demonstrates that the Air Quality Limit Values for the pollutants monitored are not being exceeded. Annual mean concentrations of NO_2 are notably higher at locations closest to roads where the primary source of air pollution is the road network itself (i.e. monitors A5 to A7). It is also noted that NO_2 concentrations steadily increased from 2011 to 2018 or 2019 (depending on site) but decreased in recent years since 2018 at all sites, except at monitor A9, possibly due to the Covid-19 pandemic. Concentrations in 2021 generally remain lower than pre-Covid-19 conditions. Locations A5 and A6 are located on the airport boundary, and A11 represents the airport bus station. These do not represent relevant air quality sensitive exposure of the airport area and thus are not representative of sensitive receptor locations as defined relevant to the assessment in for construction dust and construction traffic, or are sited explicitly to support local initiatives, such as monitoring the effects of buses switching engines on/off when idling.

[39] National Roads Authority / Transport Infrastructure Ireland (2011), Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes. https://www.tii.ie/technical-services/environment/planning/Guidelines-for-the-Treatment-of-Air-Quality-during-the-Planning-and-Construction-of-National-Road-Schemes.pdf
[40] daa (2019) Dublin Airport Air Quality Monitoring Annual Report.
[41] EPA (2020) Air Quality in Ireland 2020

Table 8-16: Passive NO_2 Measurement Data – Dublin Airport

Location	Concentration (µg/m³)										
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
A1 - Forrest Little Golf Club	10	12	18	18	18	18	18	20	18	17	17
A2 - Kilreesk Lane, St. Margaret's	8	8	12	12	13	12	12	16	16	12	12
A3 - Ridgewood Estate West, Swords	9	9	17	n/a	n/a	20	17	17	16	13	12
A4 - St. Margaret's School and Parish House	10	11	16	15	16	16	16	19	17	17	14
A5 - Fire Station, Huntstown, Dublin Airport	11	13	18	19	20	22	24	29	25	17	19
A6 - Southern Boundary Fence, Dublin Airport	16	23	29	26	28	30	29	32	29	23	22
A7 - Western Boundary Fence, Dublin Airport	20	17	24	26	25	27	25	30	30	23	25
A8 - St. Nicholas of Myra School, Malahide Road	10	10	14	14	16	15	19	19	19	16	16
A9 - Naomh Mearnóg GAA Club Portmarnock	7	9	15	14	14	13	15	15	15	15	13
A10 - Oscar Papa Site, Portmarnock	9	10	15	14	14	15	15	16	17	12	17
A11 - Airport Bus Depot	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	**43**	30	29
A12 - Portmellick House, Dunbro Lane	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	23	21	n/a
Air Quality Standard	**40**										

Notes: Concentrations rounded to whole numbers
2020 and 2021 concentrations likely influenced by Covid-19 restrictions
2022 data not yet available

Source: Dublin Airport Air Quality Monitoring – Annual Report 2019

A11 – Airport bus depot monitoring location not representative of a sensitive location comparable to the annual mean objective

EPA Pollutant Monitoring

8.4.4 The EPA measure annual mean concentrations of numerous pollutants in the Dublin region, including annual mean concentrations of NO_2, PM_{10} and $PM_{2.5}$. None of these monitoring locations are located close to Dublin Airport. The monitoring location in Swords is the closest, which is over 2 km to the north of the airport. The data gathered over recent years are summarised in Table 8-17 to Table 8-19. Location-specific data available for the most recent years demonstrates further compliance with the air quality standard values for these pollutants at the majority of areas considered by the EPA, with the exception of recent NO_2 monitoring on Pearse Street and St. Johns Road. Neither of these monitoring sites are in close proximity to Dublin Airport. The range in concentrations between measurement sites is likely due to their location and proximity to sources of existing emissions to air, such as busy roads and/or industrial stacks.

Table 8-17: Annual Mean NO_2 Monitoring Results (µg/m³)

Location	2012	2013	2014	2015	2016	2017	2018	2019	2020
Ballyfermot	-	16	16	16	17	17	17	20	12
Blanchardstown	-	-	-	-	-	-	25	31	12
Coleraine Street	-	-	-	-	28	26	-	-	-
Davitt Road	-	-	-	-	-	-	26*	24	14

Location	2012	2013	2014	2015	2016	2017	2018	2019	2020
Dun Laoghaire	18	16	15	16	19	17	19	15	14
Pearse St	-	-	-	-	-	-	-	**49**	**27**
Rathmines	21	19	17	18	20	17	20	22	13
Ringsend	-	-	-	-	-	22	27	24	18
St. Anne's Park	-	12	14	14	-	-	-	-	-
St. Johns Road	-	-	-	-	-	-	**44***	**43**	**30**
Swords	15	15	14	13	16	14	16	15	11
Winetavern St	29	31	31	31	37	27	29	28	15
Air Quality Standard				**40**					

Notes: Concentrations rounded to whole numbers
2020 concentrations influenced by Covid-19 restrictions
2021 data not yet published by EPA
* Monitoring undertaken for less than a year and may not comparable to the annual mean air quality standard.
Source: EPA, Air Quality in Ireland 2020

Table 8-18: Annual Mean PM_{10} Monitoring Results (µg/m^3)

Location	2012	2013	2014	2015	2016	2017	2018	2019	2020
Ballyfermot	-	12	11	12	11	12	16	14	12
Blanchardstown	-	-	-	-	18	15	17	19	15
Davitt Road	-	-	-	-	-	-	14*	15	15
Dun Laoghaire	-	17	14	13	13	12	13	12	12
Finglas	-	15	-	-	-	-	11*	13	12
Marino	-	-	-	-	-	-	12*	14	13
Phoenix Park	11	14	12	12	11	9	11	11	10
Rathmines	14	17	14	15	15	13	15	15	11
Ringsend	-	-	-	-	-	13	20	19	17
St. Anne's Park	-	19	17	15	-	-	11*	12	11
St. Johns Road	-	-	-	-	-	-	14*	14	13
Tallaght	-	-	-	-	14	12	15	12	10
Winetavern St	13	14	14	14	14	13	14	15	13
Air Quality Standard				**40**					

Notes: Concentrations rounded to whole numbers
2020 concentrations influenced by Covid-19 restrictions
2021 data not yet published by EPA
* Monitoring undertaken for less than a year and may not comparable to the annual mean air quality standard.
Source: EPA, Air Quality in Ireland 2020

Table 8-19: Annual Mean $PM_{2.5}$ Monitoring Results (µg/m^3)

Location	2012	2013	2014	2015	2016	2017	2018	2019	2020
Ballyfermot	-	-	-	-	-	-	7*	10	8
Coleraine Street	-	-	-	-	9	8	-	10	-
Davitt Road							8*	11	9
Finglas	-	-	7	8	9	7	8	9	7
Marino	8	9	8	8	7	7	6	9	8
Phoenix Park	-	-	-	-	-	-	6	8	7
Rathmines	11	11	9	10	10	9	9	8	8

Location	2012	2013	2014	2015	2016	2017	2018	2019	2020
Ringsend							8*	10	8
St. Anne's Park	-	-	-	-	-	-	7*	8	7
St. Johns Road	-	-	-	-	-	-	9*	9	7
Air Quality Standard				**25**					

Notes: Concentrations rounded to whole numbers
2020 concentrations influenced by Covid-19 restrictions
2021 data not yet published by EPA
* Monitoring undertaken for less than a year and may not comparable to the annual mean air quality standard.
Source: EPA, Air Quality in Ireland 2020

Background Concentrations

8.4.5 Model outputs are combined with background concentrations to predict total pollutant concentrations at modelled receptors. Background concentrations are those from many sources which individually may not be significant, but collectively, over a large area, need to be considered.

8.4.6 The EPA monitor background pollutant concentrations at some locations in the Fingal and Dublin area, including Swords and Ballyfermot. Annual mean concentration for the pollutants of concern at these sites are provided in Table 8-17 to Table 8-19 above and demonstrate that existing background concentrations are well below the respective air quality standards.

Baseline Predicted Air Quality Concentrations

8.4.7 This section presents the predicted air quality concentration as output from the dispersion model, for the baseline of 2019, to supplement the measured data from the Applicant and the EPA set out in the above sections. Predicted 2019 baseline air quality concentrations at assessed model receptors are presented in Table 8-20. There are no existing exceedances predicted of the air quality standards in the study area.

Table 8-20: Baseline 2019 Air Quality Concentrations (µg/m^3) predicted by Air Quality Dispersion Modelling

Receptor ID	Annual Mean NO_2	Annual Mean PM_{10}	Annual Mean $PM_{2.5}$
1	24.7	11.3	8.2
2	24.8	11.3	8.2
3	23.3	11.1	8.0
4	23.4	11.1	8.0
5	23.4	11.1	8.0
6	23.6	11.1	8.1
7	27.1	11.6	8.4
8	25.6	11.5	8.3
9	25.1	11.4	8.2
10	24.6	11.3	8.2
11	24.7	11.3	8.2
12	30.2	12.0	8.7
13	32.4	12.3	8.9
14	29.7	12.2	8.7
15	27.4	11.7	8.4
16	24.1	11.2	8.1
17	26.7	11.6	8.4
18	24.8	11.4	8.2
19	25.8	11.6	8.3

8.5 Future Receiving Environment

8.5.1 The background pollutant levels for the assessment years can be seen below in Table 8-21. The NO_2 background concentrations were sourced from the Applicant's diffusion tube A12 (Portmellick House, Dunbro Lane) to account for background NO_2 emissions from aircraft related activity, to provide a background representative of assessed sensitive receptors. In the absence of PM_{10} and $PM_{2.5}$ monitors in the same location; background concentrations were taken from the monitoring location of Phoenix Park which was considered to be representative of ambient background concentrations at Dublin Airport.

8.5.2 In the absence of a future air quality baseline, background concentrations for 2024 have been assumed not to improve from 2019, representing a worst-case scenario and a precautionary approach.

Table 8-21: Background Air Quality Concentrations (µg/m^3) used in Air Quality Dispersion Modelling

Pollutant	Year	
	2019	2024
NO_2	23	23
PM_{10}	11	11
$PM_{2.5}$	8	8

Source: EPA, Air Quality in Ireland 2020

8.6 Assessment of Effects & Significance

Determining Construction Effects

8.6.1 The potential construction impacts on air quality are described in Table 8-22 It identifies the potential source of the impact; potential impact pathways (route by which receptors can become impacted) and potential effects arising from the potential impact. For each of the potential effects identified, the likelihood of an effect has been considered to determine whether further assessment should be undertaken.

Table 8-22: Potential Construction Effects

Potential Impact	Potential Impact Pathway	Potential Effect	Significant Effect?
Particulate matter and dust emissions from construction activity	Direct impact on sensitive human receptors	Nuisance to human receptors, or deterioration of human health	No significant effects, with mitigation measures in place. Discussed further below in Paragraphs 8.7.1 to 8.7.4and 8.8.1 to 8.8.5.
	Direct impact on ecologically sensitive receptors	Loss or damage to ecological sites	No significant effects. No designated ecological sites located within 50 m of the Application Site or roads used by construction vehicles.
Emissions from non-road mobile machinery construction plant	Direct impact on human receptors	Deterioration of human health	No significant effects. Discussed further below in Paragraphs 8.6.15 to 8.6.18.
Emissions from construction phase road traffic vehicles	Direct impact on human receptors	Deterioration of human health	No significant effects. Discussed further below in Paragraphs 8.6.19 to 8.6.29.
	Direct impact on ecological receptors	Loss or damage to ecological sites	No significant effects. No designated ecological sites located within 1km of the Application Site or roads used by construction vehicles.

Determining Operational Effects

8.6.2 The potential operational impacts on air quality are described in Table 8-23. It identifies the source of the impact; potential impact pathways (route by which receptors can become impacted) and potential effects arising from the potential impact. For each of the potential effects identified, the likelihood of an effect has been considered to determine whether an assessment should be undertaken.

Table 8-23: Potential Operation Effects

Potential Impact	Potential Impact Pathway	Potential Effect	Significant Effect?
Emissions from traffic associated with the operation of the Proposed Development	Direct impact on human receptors	Deterioration of human health	No significant effects. There will be no change in the overall number of vehicle movements crossing from the Eastern Campus to the Western Campus once the underpass is operational compared with the current situation and there are no sources of air pollution, such as energy centres, integral to the Proposed Development
	Direct impact on ecological receptors	Loss or damage to ecological sites	
Emissions from traffic associated with the operation of the Proposed Development	Direct impact on human receptors	Deterioration of human health	The operation of the Proposed Development does require some power generation to support lighting and signage, as well as intermittent support for ventilation and water pumps during an emergency. However, the overall energy demand is minimal, (see Chapter 16: Material Assets (Built Services) and the plant required to meet it will have a capacity well below the requirements of the Medium Combustion Plant Directive (<1MWth). It is considered that such plant would not emit pollutants to the extent that a significant air quality impact could occur.

Effects During Construction of Proposed Development

Effects from Construction Dust

8.6.3 A four-step process was followed to determine the risk of potential effects during the construction phase as described in Paragraphs 8.3.12 to 8.3.29.

Step 1: Screen the Requirement for a detailed assessment

8.6.4 The nearest sensitive receptors to the planning application red line boundary of the Proposed Development are a dwelling located off R108 approximately 120 m from the Application Site boundary, and car parks located off R108, approximately 20 m and 175 m from the Application Site boundary. There are dwellings approximately 250 m and 180 m to the west and southwest of the Western Compound respectively. There are dwellings to the northeast of the Recycling Compound, with the closest approximately 30 m from the compound boundary. There are therefore receptors defined with 'High' sensitivity with reference to Table 8-3.

8.6.5 As there are sensitive receptors located within 350 m of the relevant Application Site boundaries and 50 m of a road used by construction traffic that is within 500 m of the construction site access/egress points. In line with IAQM construction dust guidance[42], an assessment of construction dust and PM_{10} emissions is required.

8.6.6 There are no locally, nationally or European designated ecological receptors located within 50 m of the Site or within 50 m a road used by construction traffic that is within 500 m of the construction access point.

Step 2: Assess the Risk of Dust Impact

Step 2A: Define the Potential Dust Emission Magnitude

8.6.7 Demolition: It is understood with reference to Chapter 3 that there will be demolition of taxiway surfaces and existing fixed links and nodes at Pier 3, and plant for concrete crushing located within the Application Site boundary at the Main Construction Compound. For the remainder of the Application Site, the

[42] Holman et al (2014). IAQM Guidance on the assessment of dust from demolition and construction, Institute of Air Quality Management, London. www.iaqm.co.uk/text/guidance/construction-dust-2014.pdf

Proposed Development is being built on land that has no existing structures that need to be demolished. At the time of writing, the volume of the material specifically to be demolished was not available and therefore, the potential dust effects during the demolition works are conservatively considered to be up to 50,000m^3 - 'Medium'.

8.6.8 Earthworks: Earthworks will primarily involve excavating material, haulage, tipping and stockpiling. The total Application Site is >10,000 m^2 and therefore according to the IAQM Guidance, the potential dust emission class is considered to be 'Large'.

8.6.9 Construction: The key issues when determining the potential dust emission magnitude during the construction phase include the size of the building(s)/infrastructure, method of construction, construction materials and duration of build. There will be plant for concrete batching located within the Application Site boundary at the Main Construction Compound. The total building volume is anticipated to be in exceedance of >100,000 m3 and therefore according to the IAQM Guidance, the potential dust emission class is considered to be 'Large'.

8.6.10 Track-out: Factors which determine the dust emission magnitude of track-out activity are vehicle size, speed, number and geology and duration. HGV traffic is expected to peak around 1,900 vehicles per week and therefore according to the IAQM Guidance, the potential dust class is therefore considered to be 'Large'.

Step 2B: Define the Sensitivity of the Area

8.6.11 The following were taken into consideration when determining the sensitivity of the area to dust soiling and health impacts of PM_{10}.

- There are approximately 10 residential and farm properties and car parks within the 350 m of the Application Site Boundary of the Proposed Development application and construction compound boundaries. Based on a review of aerial imagery, it is estimated that there will be a maximum of 2 sensitive receptors within 50 m (noting that the sensitivity of the area classification is determined based on between 1 and 10 receptors), but none within 20 m; and
- The EPA background monitoring for Phoenix Park as shown in Table 8-18 is considered representative as per TII air quality guidance[43] - this provides a concentration of 11 µg/m^3 in 2019.

8.6.12 The receptors identified above have 'High' sensitivity with reference to Table 8-3 and the IAQM guidance. Based on the relative distances of these receptors to the Application Site Boundary set out above and with reference to Table 8-8 and Table 8-9, the sensitivity of the area to dust soiling and human health impacts are both 'Low', according to the IAQM Guidance.

Step 2C: Define the Risk of Impacts

8.6.13 Taking into consideration the conclusion from Steps 2A and 2B, the risk of dust impact for each activity are provided in Table 8-24.

Table 8-24: Summary Dust Risk Table to Define Site-Specific Mitigation

Source	Dust Soiling	Human Health	Ecological
Demolition	Low	Low	N/A
Earthworks	Low	Low	N/A
Construction	Low	Low	N/A
Track-out	Low	Low	N/A

8.6.14 Step 3 and Step 4 of the construction dust assessment are considered in Section 8.7 and 8.8.

Effects from Construction Phase Non-Road Mobile Machinery (NRMM)

8.6.15 Emissions from construction Non-Road Mobile Machinery (NRMM) will have the potential to increase NO_2 and PM_{10} concentrations locally when in use on the construction site area associated with the

[43] National Roads Authority / Transport Infrastructure Ireland (2011), Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes. https://www.tii.ie/technical-services/environment/planning/Guidelines-for-the-Treatment-of-Air-Quality-during-the-Planning-and-Construction-of-National-Road-Schemes.pdf

scheme. With reference to Chapter 3 Proposed Development, this source is considered to be temporary (three years duration of construction activity with potential to require NRMM), non-continuous, and localised (within the airfield).

8.6.16 Within the IAQM (2014) guidance[44], it is noted that NRMM are unlikely to make a significant impact on local air quality and it is unlikely that a quantitative assessment would be required in the majority of cases. It is also noted that consideration should be given to the number of plant/vehicles and their operating hours and locations to assess whether a significant effect is likely to occur. Total plant numbers and exact work locations are rare to have been finalised at planning application stage. It is therefore recommended that these are set out in the contractor's Construction Environmental Management Plan.

8.6.17 In the absence of equivalent guidance in Ireland, we refer to the UK Mayor of London publication "The Control of Dust and Emissions during Construction and Demolition – Supplementary Planning Guidance"[45]. The SPG provides a strategy to address emissions from NRMM, targeted at the London area, but the strategy can be a good reference for locations outside of London, and sets out suggested requirements for the operation of NRMM. In order to reduce emissions from NRMM, this equipment is required to meet set emission standards. However, it should be noted that such standards are set in the context of London, where baseline air quality is often in exceedance or at risk of exceeding the air quality limit values for NO_2, and concentrations of PM_{10} and $PM_{2.5}$ are often elevated. The risk of contributions from NRMM emissions to contribute to an exceedance of an air quality objective is significantly greater there than in most other areas.

8.6.18 In this instance, due to background air quality concentrations being much lower than the air quality objective values as described in Paragraph 8.4.6, and with reference to the IAQM (2014) guidance discussed above, emissions associated with NRMM at the Application Site are considered highly unlikely to contribute to an exceedance of an air quality objective value. The construction phase NRMM emissions should therefore not be significant. These emissions have not been modelled and are not considered any further in this assessment.

Effects from Construction Phase Road Traffic Emissions

Nitrogen Dioxide (NO_2)

8.6.19 Table 8-25 shows the predicted annual mean concentrations of NO_2 at each receptor. A concentration of less than 32 µg/m^3 annual mean NO_2 (<20% of the air quality standard) is predicted at all of the modelled receptors.

8.6.20 The highest predicted concentrations during the construction of the Proposed Development in 2024 is 30.3 µg/m^3 (R13 at Meakstown Cottages). All predicted annual mean NO_2 levels fall well below the Limit Value (40µg/m^3) set out in Table 8-2.

8.6.21 Annual mean concentrations of NO_2 during the construction of the Proposed Development are predicted to increase in comparison with the Do Minimum Scenario at the location of maximum impact (i.e., which experiences the greatest magnitude of change between Do Minimum and Proposed Scenarios) (R8 at Newtown Cottages) by 0.07 µg/m^3.

8.6.22 In line with the criteria set out in Section 8.3 and Table 8-15 an impact that accounts for an increase of <0.5% of the air quality standard (see Table 8-2), at a location where total concentrations with the construction of the Proposed Development amount to <75% of the air quality standard, equated to a negligible impact that is not considered significant.

[44] Holman et al (2014). IAQM Guidance on the assessment of dust from demolition and construction, Institute of Air Quality Management, London. www.iaqm.co.uk/text/guidance/construction-dust-2014.pdf
[45] Greater London Authority, (2014); *The Control of Dust and Emissions During Constructions – Supplementary Planning Guidance.* Available at: https://www.london.gov.uk/sites/default/files/gla_migrate_files_destination/Dust%20and%20Emissions%20SPG%208%20July%202014.pdf

Particulate Matter (PM)

8.6.23 Table 8-25 shows the predicted annual mean concentrations of PM_{10} and $PM_{2.5}$ at each receptor. No exceedances of the annual mean Limit Values for PM10 and PM2.5 are predicted at any receptor locations, and the values are all well below the annual mean Limit Values.

8.6.24 All 19 receptors are predicted to experience PM_{10} concentrations falling within the annual mean range of 10 to 20 µg/m^3. For $PM_{2.5}$, all 19 receptors lie within the annual mean range of 5 to 10 µg/m^3.

8.6.25 Predicted concentrations for both PM_{10} and $PM_{2.5}$ fall well below Limit Values for annual mean levels of 40 and 25 µg/m^3 respectively at all assessed receptor locations.

8.6.26 The highest predicted PM_{10} concentration during the construction of the Proposed Development is 12.5 µg/m^3 at location R13 (Meakstown Cottages). The biggest increase is +0.02 µg/m^3 (R8 at Newtown Cottages).

8.6.27 In line with the criteria set out in Section 8.3 and Table 8-15, a PM_{10} impact that accounts for an increase of <1% of the air quality standard (see Table 8-2), at a location where total concentrations in the Proposed Scenario amount to <75% of the air quality standard, equated to a negligible impact that is not considered significant.

8.6.28 The location of maximum impact for $PM_{2.5}$ was receptor (R13 at Meakstown Cottages) with the predicted annual mean concentrations during the construction of the Proposed Development reaching 9 µg/m^3. The highest observed increase associated with the construction of the Proposed Development is +0.012 µg/m^3 (R8 at Newtown Cottages).

8.6.29 In line with the criteria set out in Section 8.3 and Table 8-15 a $PM_{2.5}$ impact that accounts for an increase of <1% of the air quality standard (see Table 8-2), at a location where total concentrations during the construction of the Proposed Development amount to <75% of the air quality standard, equated to a negligible impact that is not considered significant.

Table 8-25: Air Quality Statistics

	Annual Mean NO_2		Annual Mean PM_{10}		Annual Mean $PM_{2.5}$	
Receptor ID	Future Base	With Construction of Proposed Development	Future Base	With Construction of Proposed Development	Future Base	With Construction of Proposed Development
1	24.3	24.4	11.4	11.4	8.2	8.2
2	24.4	24.4	11.4	11.4	8.2	8.2
3	23.2	23.2	11.1	11.1	8.0	8.0
4	23.3	23.4	11.1	11.1	8.1	8.1
5	23.3	23.3	11.1	11.1	8.0	8.0
6	23.4	23.4	11.1	11.1	8.1	8.1
7	26.1	26.1	11.7	11.7	8.4	8.4
8	25.0	25.1	11.6	11.6	8.3	8.3
9	24.6	24.7	11.5	11.5	8.3	8.3
10	24.3	24.3	11.4	11.4	8.2	8.2
11	24.2	24.3	11.4	11.4	8.2	8.2
12	28.5	28.5	12.2	12.2	8.7	8.7
13	30.3	30.3	12.5	12.5	9.0	9.0
14	28.1	28.1	12.4	12.4	8.8	8.8
15	26.4	26.4	11.8	11.8	8.5	8.5
16	23.8	23.8	11.2	11.2	8.1	8.1
17	25.8	25.8	11.7	11.7	8.4	8.4
18	24.4	24.5	11.4	11.5	8.3	8.3

Receptor ID	Annual Mean NO_2		Annual Mean PM_{10}		Annual Mean $PM_{2.5}$	
	Future Base	With Construction of Proposed Development	Future Base	With Construction of Proposed Development	Future Base	With Construction of Proposed Development
19	25.1	25.1	11.7	11.7	8.4	8.4

Effects During Operation of Proposed Development

8.6.30 As the Proposed Development will not alter or uplift in any way the activities currently being undertaken at Dublin Airport or, more specifically, on the East or West Apron, there will be no operational impacts on air quality receptors. There would be no direct or indirect operational effects on nearby air quality sensitive receptors. As a result, the Proposed Development will not result in operation related air quality effects and no further assessment is required.

8.7 Mitigation & Monitoring

Mitigation During Construction of Proposed Development

Construction Dust Mitigation

Step 3: Site Specific Mitigation

8.7.1 Determining site-specific mitigation measures corresponds to Step 3 of the construction dust impact assessment methodology.

8.7.2 A number of mitigation measures can be adopted to reduce the production and/or dispersal of dust to lessen the harm to amenity and limit the human health impacts. Ideally dust should be controlled at the source as once airborne it is more difficult to suppress. Total plant numbers and exact work locations are rare to have been finalised at planning application stage. It is therefore recommended that these are set out in the contractor's Construction Environmental Management Plan, with reference to the sensitive receptors identified in Figure 8-1, with a view to keep separation distances to these receptors as large as possible and time located within 50 m as short as possible, where practicable.

8.7.3 Further mitigation measures are provided in the IAQM 'Guidance on the assessment of dust from demolition and construction'[46].

8.7.4 According to the IAQM Guidance, the dust risk for each of the activities determined in Step 2C should be used to define the appropriate site-specific mitigation measures to be adopted. Where a negligible risk of dust effects was determined, no mitigation measures, beyond those required by legislation are required. However, mitigation measures may be applied as part as good practice. Table 8-26 lists the measures recommended by the IAQM for the level of dust risk identified for the Proposed Development. Measures to mitigate dust from earthworks activity are not required by the IAQM however are recommended to ensure compliance.

Table 8-26: Potential Site Operations and Possible Methods of Controlling Dust

Activity	Possible Dust Control Methods
Communication	• Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary; • Display the head or regional office contact information; and • Develop and implement a Dust Management Plan (DMP).
Site Management	• Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner and record the measures taken; • Make the complaints log available to the local authority when asked; and • Record any exceptional incidents that cause dust and/or air emissions, either on or off Site and the action taken to resolve the situation in the log book.

[46] Holman et al (2014). IAQM Guidance on the assessment of dust from demolition and construction, Institute of Air Quality Management, London. www.iaqm.co.uk/text/guidance/construction-dust-2014.pdf

Activity	Possible Dust Control Methods
Monitoring	• Undertake daily on-site and off-site inspections, where receptors (including roads) are nearby, to monitor dust, record inspection results and make the log available to the local authority when asked; • Increase the frequency of site inspections by the person accountable for air quality and dust issues on Site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions; and • Carry out regular site inspections by the person accountable for air quality and dust issues on Site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.
Preparing and maintaining the site	• Plan site layout so that machinery and dust causing activities are located away from receptors as far as possible; • Erect solid screens or barriers around dusty activities that are at least as high as any stockpiles on Site; • Fully enclose Site or specific operations where there is a high potential for dust production and the site is actives for an extensive period; • Remove materials that have a potential to produce dust from Site as soon as possible unless being re-used on Site; • Cover, seed or fence stockpiles to prevent wind whipping; • Avoid Site run-off of water or mud; and • Keep Site fencing, barriers and scaffolding clean using wet methods.
Operating vehicle/machinery and sustainable travel	• Ensure all vehicles switch off engines when stationary – no idling vehicles; • Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable; • Impose and signpost a maximum speed limit of 25 kph on surfaced and 15 kph on unsurfaced haul roads and work area.
Operations	• Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction; • Ensure an adequate water supply on the Site for effective dust/particulate matter suppression/mitigation; • Use enclosed chutes and conveyors and covered skips; • Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate; and • Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.
Waste Management	• Avoid bonfires and burning of waste materials.
Earthworks	• Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable; • Use Hessian, mulches or tackifiers where it is not possible to re-vegetate or cover the topsoil as soon as practicable; and • Only remove the cover in small areas during work and not all at once.
Construction	• Avoid scabbling, if possible; and • Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out.
Track out	• Use water assisted dust sweeper(s) on the access and local roads, to remove, as necessary any material tracked out of the Site; • Avoid dry sweeping of large areas; • Ensure vehicles entering and leaving the Site are covered to prevent escape of materials during transport; • Record all inspections of haul routes and any subsequent action in a Site log book; • Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned; • Implement a wheel washing system.

Mitigation Associated with the Construction Traffic Emissions

8.7.5 No significant effects have been identified associated with construction phase road traffic emissions; therefore, additional mitigation measures are not required associated with the additional road traffic emissions from HGVs during the construction of the Proposed Development. No monitoring measures are proposed.

8.8 Residual Effects & Conclusions

Construction Dust

Step 4: Residual Effects

8.8.1 Determining the residual dust effects corresponds to Step 4 of the construction dust assessment methodology.

8.8.2 The effects associated with the construction phase of the Proposed Development have been qualitatively assessed with reference to the IAQM 'Guidance on the assessment of dust from demolition and construction'. The assessment of construction dust and PM_{10} emissions defines the level of risk associated with the Proposed Development construction works, and in turn, informs which standard control measures are required in order to mitigate emissions to the extent that a significant impact does not occur.

8.8.3 The IAQM guidance states that:

> *'in the case of demolition/construction it is assumed that mitigation (secured by planning conditions, legal requirements or required by regulations) will ensure that a potential significant adverse effect will not occur, so the residual effect will normally be 'not significant".*

8.8.4 The dust and control measures listed in Table 8.26, will mean that residual effects as a result of construction dust and PM10 emissions are negligible.

8.8.5 Therefore overall, it is considered that the residual dust effects as a result of the Proposed Development's construction are not significant.

Construction Phase Traffic Emissions

8.8.6 The results of the assessment demonstrate that annual mean concentrations of all the pollutants considered are below the relevant Limit Values for all of the assessed receptor locations.

8.8.7 Concentration changes between the Future Baseline and during the construction of the Proposed Development show residual effects to be Not Significant, due to the magnitude of change predicted at locations and total concentrations predicted to be well below the air quality standards.

Summary

8.8.8 A summary of the potential residual effects on air quality is shown in Table 8-27.

Table 8-27: Air Quality Summary of Potential Effects

Description of Effect	*Sensitivity of Receptor*	*Nature of Effect / Geographic Scale*	*Magnitude of Impact*	*Initial Classification of Effect (With Embedded Mitigation)*	*Additional Mitigation*	*Residual Effect Significance*
Construction dust effects	High	Temporary	Large	N/A*	See Table 8.26	Negligible
Changes in annual mean nitrogen dioxide (NO_2) concentrations	High	Temporary	Imperceptible	Negligible	N/A	Negligible
Changes in annual mean Particulate Matter (PM_{10}) concentrations	High	Temporary	Imperceptible	Negligible	N/A	Negligible

Description of Effect	*Sensitivity of Receptor*	*Nature of Effect / Geographic Scale*	*Magnitude of Impact*	*Initial Classification of Effect (With Embedded Mitigation)*	*Additional Mitigation*	*Residual Effect Significance*
Changes in annual mean Particulate Matter ($PM_{2.5}$) concentrations	High	Temporary	Imperceptible	Negligible	N/A	Negligible

* With reference to the IAQM guidance for assessing construction dust impacts, it is not considered appropriate to provide the initial classification of effects prior to mitigation as significant adverse environmental effects are avoided or reduced through the use of a Construction Environmental Management Plan or similar, potentially secured by Planning Condition.

Residual Significant Environmental Effects

8.8.9 The Proposed Development is unlikely to generate any significant effects on air quality, with limited impacts predicted and predicted total pollutant concentrations remaining well below the air quality standard values.

9. Noise & Vibration

9.1 Introduction

9.1.1 This chapter of the EIAR identifies, describes and assesses the direct and indirect significant effects of the Proposed Development on Noise. Noise is not a factor defined in the EIA Directive; however, the EPA Guidance suggests that it is a matter that could be addressed under the general heading the of Air factor.

9.1.2 This chapter was written by Edward Robinson BSc (Hons) MIOA, an Associate Director in AECOM's Acoustics team, with 18 years' experience in environmental noise and vibration. The chapter was reviewed by Dr Yuyou Liu BSc (Hons) BA MEng PhD CEng FIOA, a Regional Director in AECOM's Acoustics team, with 18 years' experience in environmental noise and vibration.

9.1.3 The EPA Guidance suggests that the matters set out in Table 9-1, below, might be considered in an EIA in respect of Noise.

Table 9-1: Matters Considered in the EIA

Matter	Considered in Further the EIA?
Daytime Noise	Yes.
Night-Time Noise	Yes.
Vibration Sources	Yes.
Sensitive Receptors	Yes.

9.1.4 During the three-year construction programme, aircraft operations on the ground may sometimes be diverted from their usual taxiways to enable construction of the Underpass to take place. This will have no effect on noise from take-off and landing on the runways, or from aircraft in flight, and any change in noise patterns on the ground would not be perceptible outside the airfield. Once operational there will be no changes to aircraft operations on the ground or in the air, as a result of the Proposed Development Therefore. an assessment of aviation-related noise is not required.

9.2 Legislation, Policy & Guidance

9.2.1 The following legislation, policy and guidance are relevant to this chapter and were considered during the assessment presented within it. General legislation, policy and guidance were also considered but is not listed as this has been covered in Chapter 4: Methodology.

National Planning Policy

9.2.2 The National Planning Framework (NPF) (Government of Ireland, 2018) is the Irish Government's high-level strategic plan for future growth and planning. This includes Policy Objective 65 which states the following with regards to noise:

"Promote the pro-active management of noise where it is likely to have significant adverse impacts on health and quality of life and support the aims of the Environmental Noise Regulations through national planning guidance and Noise Action Plans".

Regional & Local Planning Policy

9.2.3 The following local planning policy documents are relevant to noise:

- Fingal Development Plan 2017-2023

- Draft Fingal Development Plan 2013-2027
- Dublin Airport Local Area Plan (2020).

Policy, Standards & Guidance

9.2.4 The following guidance documents are relevant to noise:

- EPA Guidelines on the Information to be contained in Environmental Impact Assessment Reports 2022.
- EPA Advice Notes on Current Practice (in preparation of Environmental Impact Statements.
- EPA Advice Notes for Preparing Environmental Impact Statements, (Draft, September 2015).
- CNOSSOS-EU road traffic noise calculation methodology.
- Institute of Environmental Management & Assessment's Guidelines for Environmental Noise Impact Assessment (2014).
- UK Department of Transport / Welsh Office Memorandum 'Calculation of Road Traffic Noise (CRTN).
- British Standard (BS) 5228-1:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites - Noise

9.3 Assessment Methodology

9.3.1 As described in Chapter 4: Methodology, the assessment has been carried out following the below methodology and the EPA Guidance:

- Establishment of the baseline conditions, including identification and assessment of the receiving environment and receptor sensitivity
- Identification of environmental design measures and mitigation measures that form part of the construction methodology
- Identification of the potential impacts, and assessment of the magnitude of potential effects, and their significance
- Consideration of mitigation measures
- Assessment of residual effects

Study Area

9.3.2 To define the study area for construction traffic noise, reference has been the Design Manual for Roads & Bridges (DMRB), which states:

"A construction traffic study area shall be defined to include a 50m width from the kerb line of public roads"

9.3.3 Consequently, the construction traffic study area has been set at 50 m either side of local roads that will be used by construction traffic and shown in Figure 9-1 below.

Sensitive Receptors

9.3.4 Residential buildings whose occupants may be disturbed by adverse noise and vibration levels, and structures that are sensitive to vibration have been taken into consideration when assessing the effects associated with noise from construction traffic. Non-residential receptors that are sensitive to noise and located in the study area consist only of St Margaret's National School, which is located adjacent to the R122. The assessment then considers the impact on those receptors where noise is predicted to increase by over 1 dB, which is the threshold for an adverse impact (see Table 9-2).

9.3.5 Residential receptors in the study area are located at:

- Harristown Lane (south of the R108).

- Newtown Cottages (west of the R122).
- Sandyhill (west of the R122).
- Forest Road (north of Naul Road).

Methodology for Determining Construction Effects

9.3.6 Construction traffic noise from the Proposed Development will be assessed by considering the increase in traffic flows during construction works.

9.3.7 A road traffic noise model has been developed to predict levels of road traffic noise at sensitive receptors. The software applies the CNOSSOS-EU calculation methodology, which is the method developed by the European Union for member states to adopt when calculating road traffic noise. CNOSSOS-EU utilises road traffic data in terms of the hourly average traffic data during the daytime (07:00-19:00), evening (19:00-23:00) and night-time (23:00-07:00) periods.

9.3.8 The assessment of construction traffic noise considers four scenarios as follows:

- 2024 Do-Minimum (DM) – forecast baseline traffic flows for 2024 with no development.
- With traffic generated during Phase 1 of construction.
- With traffic generated during Phase 2 of construction.
- With traffic generated during Phase 3 of construction.

9.3.9 A description of these phases and the works occurring during them are to be found in Chapter 3: Proposed Development.

9.3.10 Each construction phase is compared against the 2024 DM scenario to determine the change in road traffic noise that is likely to be experienced by nearby sensitive receptors. As such, the assessment of construction traffic noise effects is based on predictions and does not rely on measurements to define the baseline.

9.3.11 The terminology that will be used to describe the magnitude of impact of changes in traffic noise has been defined with reference to the Institute of Environmental Management & Assessment's Guidelines for Environmental Noise Impact Assessment, which is an industry standard methodology for assessing changes in road traffic noise and presented in Table 9-2.

Table 9-2 Assessment Criteria for Changes in Traffic Noise

Significance of Effect	Change in Noise Level
No change	0.0 dB(A)
Negligible	0.1 – 0.9 dB(A)
Minor	1.0 – 2.9 dB(A)
Moderate	3.0 – 4.9 dB(A)
Major	5.0 dB(A) or more

9.3.12 Negligible and Minor effects are considered to be not significant. Moderate and Major effects are considered significant.

Limitations & Assumptions

9.3.13 Whilst the baseline environment is likely to be affected by road traffic noise from main roads (i.e., the M1 and M50) in the area, for simplicity the assessment does not consider the influence on noise from these roads. If the noise from the M1 and M50 were included in the model, the background noise in the model would be marginally higher and the predicted change in noise would therefore be smaller. The simpler model used in this assessment can therefore be considered as reasonable worst case.

9.3.14 Traffic data used in the assessment of construction traffic noise is set out in Chapter 5: Traffic & Transport and are presented in Table 9-3. The sections of road that will be affected by construction traffic are illustrated Figure 9-1.

Table 9-3 Road Traffic Data

Road Link	Do Min		Phase 1		Phase 2		Phase 3	
	AADT	%HGV	AADT	%HGV	AADT	%HGV	AADT	%HGV
A	21,161	3.9%	21,161	3.9%	21,213	4.1%	21,508	5.5%
B	23,146	6.8%	23,146	6.8%	23,198	7.1%	23,493	8.2%
C	204	0.0%	204	0.0%	204	0.0%	204	0.0%
D	654	0.0%	1,001	34.7%	949	31.1%	654	0.0%
E	21,519	8.9%	21,866	10.3%	21,866	10.3%	21,866	10.3%
F	11,797	8.6%	12,144	11.2%	12,144	11.2%	12,144	11.2%
G	20,710	7.9%	21,057	9.4%	21,057	9.4%	21,057	9.4%
H	26,824	10.8%	26,824	10.8%	26,876	12.0%	27,171	11.9%

9.3.15 With reference to 2019 baseline data used in Chapter 5: Traffic & Transport, traffic flows for the Do-Minimum scenario were split as follows:

- Day (07:00-19:00) – 70%.
- Evening (19:00-23:00) – 14%.
- Night (23:00-07:00) – 16%.

9.3.16 Construction traffic flows for each phase were split as follows:

- Day (07:00-19:00) – 17%.
- Evening (19:00-23:00) – 30%.
- Night (23:00-07:00) – 53%.

9.3.17 For the purposes of this assessment, it was assumed all road surfaces were well maintained and not prone to causing vibration impacts, which is reasonable given that the R108 was only recently constructed.

9.4 Current State of the Environment

9.4.1 The current noise baseline for all road links in the study area is dominated by road traffic and air traffic. A noise survey was undertaken from 18th to 20th September 2019, to determine representative baseline noise figures on the road network surrounding the airport boundary. These figures are considered representative of 'normal', pre-covid-19 conditions with the airport operating at 32mppa. A noise survey was not carried out specifically for this project during 2021-22 both because the figures obtained may not be fully representative of 'normal' conditions and because the baseline survey itself was not needed to feed into the noise model. Therefore, this is not a limitation to the study.

Baseline Survey

9.4.2 CRTN describes procedures for traffic noise calculation and is suitable for environmental assessments of schemes where road traffic noise may have an impact. CRTN is a valid document for use within the Republic of Ireland and is applied in the *'Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes'* published by the National Roads Authority March 2014. CRTN details the parameters for road traffic noise measurement that have been used in this assessment.

9.4.3 A sound level meter (SLM) was used to measure the acoustic parameter L10(hourly) dB(A), which is the noise level exceeded for 10% of the time over a period of one-hour. Road traffic noise monitoring was undertaken at a location within the study area adjacent to the R122. The SLM logged noise levels

continuously for 3-hours during the daytime, following the shortened CRTN measurement procedure[1]. Details of the road traffic noise monitoring are listed in Table 9-4 and are shown in Figure 9-1.

Table 9-4: Monitoring Results

Location	Grid Ref.	Description	Date / Time	Arithmetic average L_{A10}, (3-hour), dB	L_{A10}, (18-hour), dB
ST3	53.426058, -6.305038	Western edge of the R122, by the entrance of Newton Cottages to measure noise emissions from road traffic on the R122	19/09/19 / 10:00 – 13:00	77	76

9.4.4 Weather conditions were suitable for noise monitoring, with no rain and low wind speeds (<5m/s) during the noise monitoring periods. The sound level meters were field calibrated with an acoustic calibrator both prior to commencement and after completion of the noise measurements.

9.5 Future Receiving Environment

9.5.1 Changes in road traffic flows resulting from natural growth has the potential to influence the evolution of baseline conditions throughout the lifespan of Proposed Development. Future noise conditions are accounted for in the assessment of construction traffic noise effects through forecast traffic data presented in Table 9-3. The construction traffic assessment accounts for the increase in traffic flow associated with natural growth of road traffic that is attributable to new developments in the surrounding area. The 'do minimum' scenario in 2024 which is the baseline for the assessment, where the Proposed Development is not constructed, is illustrated in Figures 9-2 to 9-4.

9.5.2 The closure of Runway 16/34 for six weeks during construction will not significantly affect the noise environment at the airport. Figures supplied by the Applicant indicate that there was a total of 88,818 aircraft movements on the runway in the ten years 2010-2019 (inclusive). This was 4.6% of total aircraft movements in Dublin Airport. Around 2% of the total airport movements were or may have been due to crosswinds, the remainder were for a variety of reasons, primarily operational efficiency and maintenance. Movements such as these will still need to take place during the closure period and would presumably need do so on nearby taxiways instead, closely replicating the noise profile that would have been generated from Runway 16/34.

9.6 Environmental Design & Management

9.6.1 To ensure that no unnecessary noise is generated, good industry standards, guidance and practice procedures will be followed in order to minimise noise and vibration effects during construction, which is set out in the preliminary Construction Environmental Management Plan in Appendix 3-1.

General

9.6.2 The contractor shall develop the CEMP that demonstrates how they comply with the contents and recommendations of BS 5228 - 1:2009 + A1:2014: Code of Practice for Noise and Vibration Control on Construction and Open Sites - Part 1: Noise & Part 2: Vibration. and how they suggest minimizing the risk that people and wildlife are negatively affected by noise and/or vibration during the construction of these works.

9.6.3 The contractor should comply with the noise limits given in Table E.1 in the CEMP following the BS 5228 ABC Assessment Methodology.

9.6.4 The contractor shall regularly inspect the works to ensure that all necessary measures are taken to mitigate and control construction noise and vibration. The contractor shall submit weekly inspection sheets to daa for review.

[1] CRTN details a 'shortened' measurement procedure where the 18-hour daytime traffic noise can be defined by a 3-hour noise measurement between the hours of 10:00 and 17:00.

9.6.5 The contractor shall employ all necessary measures to control noise (and vibration) including, but not limited to:

- Programming of particularly noisy activities to less sensitive times of the day such as late morning or early afternoon, with planned respite breaks.
- The use of mufflers / silencers on pneumatic tools.
- The use of effective exhaust silencers on all items of plant, all diesel engine powered plant shall be fitted with effective air intake silences.
- The use of non-reciprocating plant.
- Machines which are used intermittently shall be shut down or throttled back to a minimum during those periods when they are not in use.
- Locate equipment liable to create noise and/or vibration whilst in operation away from sensitive receptors and use acoustic barriers to absorb and/or deflect noise away from noise sensitive areas.
- The contractor shall not operate any defective equipment or items fitted with noise control equipment until repaired.
- The contractor shall give preference to fixed items of construction equipment that are electrically powered rather than diesel or petrol driven.
- The contractor shall house static noise emitting equipment operating continuously within suitable acoustic enclosure.
- The contractor shall use the 'drill & burst' (coring holes followed by breaking up area with hydraulic splitters) method of breaking out concrete/asphalt/hard stands where practicably possible. Use of a Vacuum Excavator (Vac-Ex) is also favoured over traditional excavation methods.
- Compressors shall be of the 'sound reduced' models fitted with properly lined and sealed acoustic covers which will be kept closed whenever the machines are in use.

9.6.6 The contractor shall implement the following vibration mitigation measures:

- Selection of construction plant with low inherent potential for generation of vibration as per the European Commission Directive 2000/14/EC.
- Contractors will highlight in their method statement and/or risk assessment specific activities that will create significant vibration levels. In addition to this, contractors will demonstrate how they will mitigate/manage these emissions. Where significant vibration levels are expected, the appointed contractor will inform the daa Liaison Officer.

9.6.7 Plant and Machinery:

- The noise levels of this plant, machinery and equipment will be controlled by risk assessments and method statements to ensure it does not exceed noise restrictions.
- Where available, alternative energy sources should be used which reduce fuel consumption, fuel handling risk, carbon emissions and noise levels.
- The contractor shall ensure that each item of equipment complies with the noise limits quoted in the European Commission Directive 2000/14/EC.
- All plant used on the works shall be the quietest of its type, practical for carrying out the work required and shall be maintained in good condition with regard to minimising noise output.
- All plant shall be operated and maintained in accordance with the manufacturer's recommendations including the use and maintenance of any specific noise reduction measures.

9.6.8 Noise Sensitive Locations:

- Control stations shall be established as a minimum in the vicinity of noise sensitive buildings. The contractor shall liaise with daa for their requirements in this regard and the frequency of accessing and reporting this data, which may also be required as a planning condition.
- The contractor shall develop a noise monitoring programme at any receptors where the noise levels exceed the values in table E.1 of the CEMP.

- All measurements shall be carried out using current best practice and shall adhere to the relevant guidance on monitoring set out in the Annex G of BS 5228-1. See the CEMP for more detail.

9.7 Assessment of Effects & Significance

Determining Construction Effects

9.7.1 The potential construction noise impacts are described in Table 9-5. It identifies the potential source of the impact; potential impact pathways (route by which receptors can become impacted) and potential effects arising from the potential impact. For each of the potential effects identified, the likelihood of an effect has been considered using professional judgment to determine whether an assessment should be undertaken.

9.7.2 Noise and vibration emission due to construction activities have the potential to disturb occupants of nearby sensitive receptors. There is no published statutory Irish guidance relating to the maximum permissible noise level that may be generated during the construction phase of a project. In lieu of statutory guidance, reference has been made to guidance in BS 5228-1, which states that adverse levels of noise or vibration only tend to occur within 300 m of a construction site. It should be noted that the nearest sensitive receptor is approximately 350 m away from the closest works (the concrete crushing and batching plant in the main construction compound between the West Apron and South Runway), which is sufficient distance away that significant noise and vibration effects will not occur.

9.7.3 Vibration is generated by construction traffic by the movement of rolling wheels on the road surface and can be perceptible in nearby buildings if heavy vehicles pass over irregularities in the road. Occupants of buildings may be at risk to disturbance from traffic generated vibration if roads have an uneven surface. As public roads used by construction traffic are assumed to be well maintained, vibration generated from construction traffic is unlikely to be perceptible at sensitive receptors.

Table 9-5: Potential Construction Effects

Potential Impact	Potential Impact Pathway	Potential Effect	Significant Effect?
Noise from construction traffic	Noise impact on sensitive receptors.	Annoyance or health effects.	Discussed further below.
Vibration from construction traffic	Vibration impact on sensitive receptors.	Annoyance or health effects.	No significant effects. Vibration unlikely to be generated on good quality road surfaces.
Noise from construction plant / processes	Noise impact on sensitive receptors.	Annoyance or health effects.	No significant effects. Construction plant too distant from sensitive receptors to have an impact.
Vibration from construction plant / processes	Vibration impact on sensitive receptors.	Annoyance or health effects.	No significant effects. Construction plant too distant from sensitive receptors to have an impact.

Determining Operational Effects

9.7.4 The potential operational noise impacts are described in Table 9-6. It identifies the source of the impact; potential impact pathways (route by which receptors can become impacted) and potential effects arising from the potential impact. For each of the potential effects identified, the likelihood of an effect has been considered to determine whether an assessment should be undertaken.

9.7.5 As explained in Chapter 3: Proposed Development, there is no change expected in the current volumes of operational road or air traffic and the anticipated future volumes whilst the airport continues to operate under the 32mppa Cap. Therefore, there is no possibility of any new operational noise impacts or negative health effects.

Table 9-6: Potential Operation Effects

Potential Impact	Potential Impact Pathway	Potential Effect	Significant Effect?
Noise from operational traffic	Noise impact on sensitive receptors	Annoyance or health effects.	No significant annoyance or health effects. No change between current and future operational traffic volumes.
Vibration from operational traffic	Vibration impact on sensitive receptors	Annoyance or health effects. Damage to structures.	No significant annoyance or health effects. No change between current and future operational traffic volumes.
Noise from operational plant / processes	Noise impact on sensitive receptors	Annoyance or health effects.	No significant annoyance or health effects. No noise-generating operational plant proposed.
Vibration from operational plant / processes	Vibration impact on sensitive receptors	Annoyance or health effects. Damage to structures.	No significant annoyance or health effects. No vibration-generating operational plant proposed.

Construction

9.7.6 Results of construction traffic noise predictions are presented in Figures 9-6 to 9-22. The predictions show changes in road traffic noise as a result of construction traffic flows during each construction phase.

Phase 1

9.7.7 During the Phase 1 daytime period, the predicted increase in road traffic noise will be, at worst an increase of marginally over 1 dB at road link D. No sensitive receptors are located along road link D, so noise effects during the daytime period are identified as Negligible and not significant. The predicted Phase 1 daytime noise and the predicted change in noise levels are illustrated in Figure 9-5 and Figure 9-8 respectively.

9.7.8 During the Phase 1 evening period, there is predicted to be a Negligible change in noise at all road links with the exception of road link D. Road traffic noise is predicted to increase by approximately 3 to 5 dB within the study area; however, no sensitive receptors are located within the defined study area. Consequently, construction traffic noise effects during the evening period are identified as Negligible and not significant. The predicted Phase 1 evening noise and the predicted change in noise levels are illustrated in Figure 9-6 and Figure 9-9 respectively.

9.7.9 During the Phase 1 night-time period, there is predicted to be a Negligible change in noise at all road links with the exception of road links D and F. There are no sensitive receptors located along road link D; however, receptors within the study area around road link F are predicted to experience a Minor effect, which is not significant. The predicted Phase 1 night-time noise and the predicted change in noise levels are illustrated in Figure 9-7 and Figure 9-10 respectively.

Phase 2

9.7.10 Construction traffic flows during Phase 2 are broadly comparable to Phase 1 with minor differences in traffic flows on road links A, B, D and H. However, these differences in traffic flows are not substantial enough to result in a material difference in road traffic noise predictions. Consequently, Phase 2 construction traffic noise effects are Negligible during the day and evening, and Minor during the night-time. Construction traffic noise effects during Phase 2 are not significant.

9.7.11 The predicted Phase 2 noise is illustrated in Figures 9-11 to 9-13 and the predicted change in noise levels are illustrated in Figures 9-14 to 9-16.

Phase 3

9.7.12 Construction traffic during Phase 3 use roads with existing high baseline flows so, during the day and evening periods, construction traffic does not increase noise by greater than 1 dB. Consequently, changes in road traffic noise are Negligible and not significant.

9.7.13 During the Phase 3 night-time period, there is predicted to be a Negligible change in noise at all road links with the exception of road link F. Consequently, receptors within the study area around road link F are predicted to experience a Minor effect, which is not significant.

9.7.14 The predicted Phase 3 noise is illustrated in Figures 9-17 to 9-19 and the predicted change in noise levels are illustrated in Figures 9-20 to 9-22[2].

Summary

9.7.15 During each construction phase, changes in road traffic noise are predicted to be Negligible. The exception to this is a Minor effect that are predicted to occur at receptors on Harristown Lane to the south of road link F. The effect of construction traffic noise during all time periods of all phases is not significant.

9.8 Mitigation & Monitoring

9.8.1 As no significant effects are identified, no additional mitigation or monitoring are proposed.

9.9 Residual Effects & Conclusions

9.9.1 Residual noise effects are not significant. Cumulative noise impacts are considered in Chapter 18: Interactions & Cumulative Effects.

[2] Note that the predicted changes in noise shown in these Figures may be difficult to see at first glance as they are very small in magnitude and extent. They occur to the northeast of the airport.

10. Biodiversity

10.1 Introduction

10.1.1 This chapter of the EIAR identifies, describes and assesses the direct and indirect significant effects of the Proposed Development on Biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC (often referred to as the Birds and Habitats Directives).

10.1.2 This chapter was written by Colin Bush, BA (Hons), MSc, CEnv, an Associate Director in AECOM's Environment and Sustainability team. The chapter was reviewed by Susanne Dunne BSc (Hons) CIEEM, a Consultant Ecologist with AECOM's Ecology team with five years' experience in EIA and ecological impact assessment.

10.1.3 The EPA Guidance suggests that the matters set out in Table 10-1, below, might be considered in an EIA in respect of Biodiversity.

Table 10-1: Matters Considered in the EIA

Matter	Considered Further in the EIA?
Habitats	Yes. Landside habitats are considered further below. The airside habitat within the Application Site is managed as an operational airfield and there are no airside habitats of biodiversity value.
Breeding / Feeding / Roosting Areas	Yes, the wildlife management plan on the operational airfield is to discourage the presence of species that might pose a safety threat to aircraft, so there is no suitable habitat airside. Other habitats within the Application Site are not suitable for use by SCI species, but these are discussed further below.
Routes and landscape features	Yes, there are no biodiversity corridors within the operational airfield to be affected by the Proposed Development but hedgerows around the compound sites may be suitable for foraging bats.
Mammals / Birds / Fish / Invertebrates / Reptiles	Yes, the potential for impact on protected species outside the Application Site is considered. The airside habitat within the Application Site is managed as an operational airfield and (for safety reasons) deliberately to avoid use by species that might endanger aircraft operations.
Vascular plants / bryophytes / lichens/fungi	No, there are no important plants / bryophytes / lichens / fungi in the operational airfield to be affected by the Proposed Development. As explained below in the discussion on habitats, there is no habitat suitable for protected / notable species within the Application Site.
Population Stability	No, the Proposed Development will not affect the stability of populations as there are no important species populations within the Application Site. The airside habitat within the Application Site is managed as an operational airfield and (for safety reasons) deliberately to avoid use by species that might endanger aircraft operations.
Population Management	No, the wildlife management plan on the operational airfield is to discourage the presence of species that might pose a safety threat to aircraft. No other population management measures are in place.
Critical Resources	No, as set out below there are no critical biodiversity resources within the Application Site.
Terrestrial / Aquatic / Marine	Yes, aquatic ecology beyond the Application Site is considered. The airside habitat within the Application Site is managed as an operational airfield and (for safety reasons) deliberately to avoid use by species that might endanger aircraft operations.
Seasonality	No, as explained above, the airside habitat within the Application Site is managed as an operational airfield and (for safety reasons) deliberately to avoid use by species that might endanger aircraft operations biodiversity impacts of the Proposed Development are not likely to be affected by seasonality.
Existing Management	No, the wildlife management plan on the operational airfield is to discourage the presence of species that might pose a safety threat to aircraft. The remainder of the Application Site is currently unmanaged.

Matter	Considered Further in the EIA?
Ecosystem Services	No, habitat within the Application Site provides no important ecosystem services.
Legal protection	No, on aviation safety grounds biodiversity within the operational airfield does not enjoy the normal levels of protection accorded elsewhere. According to the IAA: *"Irrespective of the applicable regulatory certification / licencing regime (European or national), operators of aerodromes open to public use are required to take all necessary actions to identify, manage and mitigate the risk posed by wildlife to aircraft operations by adopting measures likely to minimise the risk of collisions between wildlife and aircraft to as low as reasonably practicable."*[1]

10.1.4 Also relevant to this chapter is the Natura Impact Statement (NIS) (see Appendix 10-1) prepared for the Proposed Development. This describes the exercise conducted, in accordance with the requirements of Article 6(3) of the Habitats Directive (see Section 10.2), to determine with the Proposed Development, either individually or in-combination with other plans or projects, would be likely to have a significant effect on a European site in view of the site's Conservation Objectives.

10.1.5 The AA Screening Report concluded that likely significant effects were possible, pending further investigation, for the below impacts due to the hydrological link between the Proposed Development and Baldoyle Bay SAC and SPA via the Cuckoo Stream.

- Waterborne pollution affecting qualifying or supporting habitats during the construction and operational phases of the Proposed Development
- Disruption to flow of groundwater or reduction in volume of groundwater as a result of earthworks during the construction phase

10.1.6 The Appropriate Assessment in the NIS addressed the above two potential impacts. It was concluded that there was no possibility of adverse effects on the integrity of Baldoyle Bay SAC / SPA from the Proposed Development given the pollution control measures which will be adopted during construction and the large dilution effect should any residual pollutants enter the Cuckoo Stream and subsequently the SAC / SPA despite pollution controls

10.1.7 The lack of adverse effects from the Proposed Development on the integrity of European Sites also meant that cumulative effects with other plans or projects were assessed as not possible.

10.1.8 Therefore, in view of best scientific knowledge and on the basis of objective information, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on the integrity of any relevant European site in view of its conservation objectives as a result of the Proposed Development, individually or in-combination with other plans or projects.

10.2 Legislation, Policy and Guidance

10.2.1 The following legislation, policy and guidance are relevant to this chapter and were considered during the assessment presented within it. General legislation, policy and guidance were also considered but is not listed but are listed in Chapter 4: Methodology.

Legislation

10.2.2 The following legislation is relevant to this chapter and has been considered in the assessment:

- Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (the Habitats Directive)
- Directive 2009/147/EC on the conservation of wild birds (the Birds Directive)
- Convention on Wetlands of International Importance ('Ramsar Convention')
- European Communities (Bird and Natural Habitats) Regulations 2011 and 2015 (the 'Habitats Regulations')

[1] Bird and Wildlife Strike Management at Aerodromes, IAA, March 2021: https://www.iaa.ie/docs/default-source/publications/bird-wildlife-strike-management-at-aerodromes-issue-1---march-2021-final.pdf

- The Wildlife Acts 1976 to 2021 and the Wildlife (Amendment) Act 2000 (together known as the 'Wildlife Acts')

10.2.3 Note that Section 42 of the Wildlife Act, 1976 (as amended) provides, *inter alia*, that where protected wild animals or birds are causing serious damage to buildings and other structures and their contents a licence to stop this damage can be obtained from the National Parks & Wildlife Service. The Applicant holds such licences in respect of protected species that pose a risk to aviation safety and takes active measures to discourage the presence of such species.

National Planning Policy and Guidance

10.2.4 The following national planning policies and guidance documents are also relevant to this chapter and have been considered throughout the assessment presented within it:

- Project Ireland 2040 – National Planning Framework (2018)
- National Biodiversity Action Plan 2017 – 2021

Local Planning Policy

10.2.5 The following local planning policies are considered relevant to this assessment.

- Fingal Development Plan 2017-2023
- Draft Fingal Development Plan 2023-2029
- Dublin Airport Local Area Plan (2020)
- Dublin Airport Noise Action Plan 2019-2023

International Guidance

10.2.6 The following international guidance documents are considered relevant to this assessment:

- Chartered Institute of Ecology and Environmental Management (CIEEM) Guidelines for Ecological Impact Assessment in the UK and Ireland (CIEEM, 2018)

10.3 Assessment Methodology

10.3.1 As described in Chapter 4: Methodology, the assessment has been carried out following the below methodology and the EPA Guidance:

- Establishment of the baseline conditions, including identification and assessment of the receiving environment and receptor sensitivity
- Identification of environmental design measures and mitigation measures that form part of the construction methodology
- Identification of the potential impacts, and assessment of the magnitude of potential effects, and their significance
- Consideration of mitigation measures
- Assessment of residual effects

Ecological Impact Assessment

10.3.2 The assessment of ecological impacts described in this chapter has been conducted in accordance with the industry-standard best practice guidelines published by CIEEM (2018). The guidelines require that assessment is only carried out for any ecological features identified within the Zone of Influence (ZoI)

which are sufficiently 'important' (e.g., European sites, or habitats / species which are rare, threatened or rapidly declining (CIEEM, 2018)) and which could be significantly affected[2] by the particular project.

10.3.3 CIEEM (2018) methodology states that it is not necessary to carry out detailed assessment of features such as habitats that are sufficiently widespread, unthreatened and resilient to project impacts and which will remain viable and sustainable, as these can be scoped out at an early stage of the assessment. Likewise, only the impacts of a project which could result in significant effects on important ecological features need to be assessed.

Zone of Influence

10.3.4 In terms of EIA in respect of Biodiversity, the ZoI of a project is the area over which ecological features may be subject to biophysical changes (CIEEM, 2018) as a result of the proposed project and any associated activities.

10.3.5 The ZoI will vary for different ecological features depending on their sensitivity to an environmental change. It is therefore appropriate to identify different ZoI for different features. The features affected could include European sites, habitats, species, and the processes on which they depend.

10.3.6 It is also important to acknowledge, as per the EPA Guidance "*that the absence of a designation or documented feature (e.g., ecological or archaeological) does not mean that no such feature exists within the site*". As such, ZoI should be identified for all features potentially occurring within or near to the Proposed Development, in addition to any known to occur.

10.3.7 For the purposes of identifying biodiversity receptors, a ZoI of 2km from the Application Site was used, noting that the closest designated and European sites are beyond this radius. The 2km boundary was chosen as a conservative measure since noise from construction works and traffic will not propagate over such a distance (see Chapter 9: Noise for the assessment of the changes in the noise environment during construction). For European Sites a wider ZoI was used in line with guidance from the Office of the Planning Regulator (OPR)[3].

Desk Study

10.3.8 A desk study was carried out to identify relevant nature conservation designations potentially relevant to the Proposed Development. The desk study areas were defined using a stratified approach based on the ZoI of the Proposed Development on different ecological features, as set out above. Accordingly, the desk study sought to identify:

- International nature conservation designations (e.g., SACs and SPAs) within the ZoI of the Proposed Development as per OPR guidance
- National statutory nature conservation designations within 2 km of the Application Site
- Local nature conservation designations within 2 km of the Application Site

Baseline Surveys

10.3.9 Surveys covering the Application Site and the wider landscape around Dublin Airport were carried out in 2019.

Habitat Survey

During the habitat survey the Application Site and adjacent habitats were classified according to *A Guide to Habitats in Ireland* (Fossitt, 2000)[4]. Results are discussed below in the Current State of the Environment.

[2] CIEEM (2018) define Significant Effect as follows: "… 'significant effect' is an effect that either supports or undermines biodiversity conservation objectives for 'important ecological features'… In broad terms, significant effects encompass impacts on the structure and function of defined sites, habits or ecosystems and the conservation status of habitats and species (including extent, abundance and distribution)."
[3] https://www.opr.ie/wp-content/uploads/2021/03/9729-Office-of-the-Planning-Regulator-Appropriate-Assessment-Screening-booklet-15.pdf
[4] https://www.npws.ie/sites/default/files/publications/pdf/A%20Guide%20to%20Habitats%20in%20Ireland%20-%20Fossitt.pdf

Breeding Birds

10.3.10 A modified version of the Common Bird Census (CBC), as described in Gilbert *et al*. (1998)[5], was used to survey the breeding bird assemblage within the vicinity of the airport on a survey that took place in 2019. Three CBC survey visits were made in April, June and July 2019 along the route of the Underpass and sites adjacent to the proposed Western and Southern Compound locations[6]. All surveys were carried out during favourable weather conditions of light winds (below Beaufort force 4), with no continuous or heavy rain and good visibility. Surveys were carried out in the morning and afternoon, avoiding the period of one hour after sunrise.

10.3.11 Two greenfinch *Carduelis chloris* were noted within the Application Site, close to the route of the Underpass. Four robin *Erithacus rubecula* were noted in fields between the proposed Western Compound and the R108, the closest observation being some 200m from the Application Site.

Non-Breeding Birds

10.3.12 Non-breeding bird surveys were carried out between November 2018 and March 2019, inclusive, covering, *inter alia*, all accessible / visible lands within the Application Site[7]. Each non-breeding bird survey was conducted for approximately three hours either side of the high or low tide time, so that each survey was of six hours duration. As such, a full 'tidal cycle' of twelve hours (i.e., from high to low tide) was surveyed monthly, reflecting best practice (e.g., as per British Trust for Ornithology research such as Armitage et al, 2002[8]). The total survey effort was approximately 90 hours.

10.3.13 Field survey involved a combination of driven transect and Vantage Point (VP) watches. A driving route was established outside airside lands along which Vantage Points were selected to visually assess fields. Surveyors alternated start locations between surveys to reduce bias in observer effort. Vantage Points included four along Dunbro Lane, one on the R108 to the east of the proposed Western Compound and two further on the R108, one either side of the proposed Southern Compound.

10.3.14 All birds identified during the survey were recorded, including those in flight. Recorded information included the GPS location, date and time, number of individuals of each species, tidal state (low or high), count accuracy (good or poor), species activity (feeding, roosting, in flight, or other), and any relevant comments.

10.3.15 No farmland species of conservation concern were found to be using the Application Site, nor were any wetland species of conservation concern found to be using the Application Site. No raptors were found to be using the Application Site.

Follow-up Surveys

10.3.16 Follow-up walkover surveys were undertaken in 2021 and 2022 to confirm that there have been no substantive changes to biodiversity at the airport. Although undocumented, these surveys have informed the preparation of this chapter.

Limitations and Assumptions

10.3.17 The breeding bird survey in 2019 did not visit the precise location of the construction compounds but did cover locations adjacent to them. The use of compound sites by breeding birds is thus inferred from these results.

10.3.18 It is assumed that there will be no substantive change to the baseline during the period (2023-25) covered in the assessment. Although the baseline for biodiversity is dynamic and conditions can change quite rapidly, this is considered a reasonable assumption as the Application Site has very low biodiversity, is actively managed to exclude wildlife that might constitute a threat to aircraft and the period covered in the study is relatively short.

[5] Bird Monitoring Methods: A Manual of Techniques for Key UK Species, Gilbert, G., Gibbons, D. W. and Evans, J, RSPB 1998
[6] The compound locations were not known in 2019.
[7] The survey covered much of the airport plus a minimum buffer of 500 m, extending in some places to a maximum distance of 1.5 km.
[8] Armitage, M.J.S., Holloway, S.J., Shaw, P. and Rehfisch, M.M. (2002). Through-the-tidal-cycle and Night-time Waterbird Counts as part of the London Gateway Assessment. BTO Research Report 283. British Trust for Ornithology, Thetford

10.4 Current State of the Environment

Statutory designations

10.4.1 Due to the scope and extent of the proposed Underpass it will be necessary to temporarily divert part of the existing Airfield Trunk (Cuckoo) Culvert during the construction period. The proposed diversion will be predominantly via temporary pipework and short-term over-pumping. The Cuckoo stream is hydrologically connected to Baldoyle Bay; thus the following European sites are considered to be within the ZoI of the Proposed Development as per OPR guidance:

- Baldoyle Bay SAC; and,
- Baldoyle Bay SPA.

10.4.2 All construction works will be taking place within the current airport boundary, and largely underground, therefore there is no potential for direct impacts upon the European Sites. Furthermore, the Applicant operates a Wildlife Management Plan which prevents birds from flocking in the vicinity of the airport in order to preserve public safety. There will consequently be no loss of functionally-linked habitat, nor any potential for disturbance of SCI birds occurring outside of European site boundaries Therefore, no other European sites were determined to be within the ZoI of the Proposed Development.

10.4.3 Baldoyle Bay SPA and SAC encompasses the estuary, saltmarsh habitats and shallow subtidal areas at the mouth of the estuary. There are extensive intertidal flats[9] which are exposed at low tide, with substantial stands of eelgrass (both *Zostera noltii* and *Zostera angustifolia*), and saltmarshes which provide important roost sites at high tide. An overview of the European sites within the ZoI of the Proposed Development is given in Table 10-2.

10.4.4 There is one statutory nationally designated site within 2 km of the Proposed Development and is shown in Table 10-2, below. Statutory designated nature conservation sites in Table 10-2 are listed in ascending order of distance from the Proposed Development, with those closest described first.

Table 10-2: Statutory designated nature conservation sites

Site name and code	Approximate distance from the Application Site	Summary of Qualifying Interests / Special Conservation Interests
Santry Demesne pNHA [000178]	1.8 km south	• Contains hairy St.John's-wort *Hypericum hirsutum*, and has a woodland of general ecological interest.
Baldoyle Bay SAC [000199]	7.4 km east	• Mudflats and sandflats not covered by seawater at low tide [1140] • Salicornia and other annuals colonising mud and sand [1310] • Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] • Mediterranean salt meadows (*Juncetalia maritimi*) [1410]
Baldoyle Bay SPA [004016]	7.8 km east	• Light-bellied brent goose *Branta bernicla hrota* [A046] • Shelduck *Tadorna tadorna* [A048] • Ringed plover *Charadrius hiaticula* [A137] • Golden plover *Pluvialis apricaria* [A140] • Grey plover *Pluvialis squatarola* [A141] • Bar-tailed godwit *Limosa lapponica* [A157] • Wetland and waterbirds [A999]

Non-statutory designations

10.4.5 There are no non-statutory designations for nature conservation within 2 km of the Development.

[9] Coastal zone between open sea and land which is under tidal influence.

Landcover and Habitats

10.4.6 The landcover within the airport is industrial / commercial, comprising the terminals, hangers, piers and support facilities. Thus, no natural or semi-natural habitats[10] are present on those parts of the Application Site within the airport boundary which may be affected by the Proposed Development and habitats have negligible value for biodiversity.

10.4.7 Habitat in the area surrounding the airport (outside the Application Site) consists of improved grassland and other agricultural land, dissected by species poor hedgerows and ditches. According to Fossitt, improved grassland is intensively managed or highly modified agricultural grassland that has been reseeded and/or regularly fertilised and is now heavily grazed and/or used for silage making.

10.4.8 The site of the proposed Western Compound was visited on 21st July 2022 and found to comprise is a low-quality grassland (Fossitt: Dry meadows and grassy verges (GS2)) (overgrown with ruderal species e.g., nettles etc) of very low biodiversity value.

10.4.9 The hedgerows/treelines at the field edges include ash *Fraxinus excelsior*, beech *Fagus sylvatica*, oak *Quercus robur*, bramble *Rubus fruticosus*, elder *Sambucus nigra*, and hawthorn *Crataegus monogyna*, and have medium biodiversity value as they have some suitability for foraging and commuting bats. The habitat is not suitable for roosting bats as it contains no suitable trees. A buzzard *Buteo buteo* was seen resting in the treeline while on survey. There are no trees present in the centre of the site, only in the surrounding hedgerows.

10.4.10 The proposed Southern Compound was also visited on 21st July 2022 and comprises spoil and bare ground (Fossitt: ED2) of negligible biodiversity value to the east and improved agricultural grassland (Fossitt: GA1) of low biodiversity value to the west. This field is surrounded by hedgerows with occasional trees, including ash, hawthorn, bramble, and elder, having medium biodiversity value as they could be used by foraging / commuting bats and other mammals. The habitat is not suitable for roosting bats as it contains no suitable trees. There is also a wet ditch along the eastern edge of the spoil and bare ground associated with the treeline. The hedgerow along the R108 is of lesser biodiversity value and only comprises field maple *Acer campestre*.

Watercourses

10.4.11 Dublin Airport lies within several watercourse catchments, as explained in Chapter 7: Water. The main surface water catchment within the airport complex is the Cuckoo stream, whose catchment is directly impacted by the Proposed Development. The Cuckoo stream is within the Mayne sub-catchment and flows from west-north-west to east-south-east, discharging to the centre of Baldoyle Bay SPA and SAC, approximately 7 km east-south-east.

Water Quality, Biotic Quality and WFD Status

10.4.12 The nearest downstream EPA surface water quality monitoring data within the Mayne sub-catchment is immediately downstream of the confluence of the Cuckoo and Mayne streams (station code RS09M030500) which is approximately 5.5 km east-south-east of the airport. At this monitoring point the surface water quality is classified as Poor WFD status with an EPA Q value of 2-3[11] in 2019. This is consistent with results of daa's water biannual biological sampling and water quality monitoring for the Cuckoo and Mayne streams upstream of their confluence which, in May 2019, reported Q values of 1-2 (Bad ecological WFD status) for the Cuckoo stream and 3 (Poor ecological WFD Status) and for the Mayne. Thus, the Cuckoo stream does not have any important fisheries or invertebrate populations, due to its legacy of historically poor water quality.

[10] A semi-natural habitat is defined as: "An ecosystem with most of its processes and biodiversity intact, though altered by human activity in strength or abundance relative to the natural state."
[11] Q Values are an EPA biotic indices which reflect average water quality. A Q Value ranges between 5, which indicates unpolluted status with high WFD status, and 1, which indicates serious polluted status with bad WFD status. See online: https://epawebapp.epa.ie/qvalue/webusers/

10.5 Future Receiving Environment

10.5.1 For the purposes of the assessment, it is assumed that the Future Receiving Environment in the Peak Construction Year (2024) and the Opening Year (2025) would remain as described in Section 10.4 the Current State of the Environment above.

10.6 Environmental Design and Management

10.6.1 The assessment takes into account the Wildlife Management Plan, which is implemented under licence at Dublin Airport[12]. This prevents flocks of hazardous birds[13] including gulls, waders, geese and swans and/or other animals e.g., Irish hare *Lepus timidus hibernicus*, from occurring in areas within which they could present a risk to aircraft.

10.6.2 A preliminary Construction Environmental Management Plan (CEMP) has been prepared and is presented in Appendix 3-1. It states that the contractor shall take precautions to avoid the possibility of bird strike including responsible disposal of all edible waste and covering of all other waste disposal points, using bird scaring techniques where necessary and limiting the period in which bare earth is exposed.

Construction

10.6.3 The CEMP contains a provision for an ecological clerk of works to be consulted on any ecological issues arising during construction. If encountered, appropriate management of noxious weeds and non-native invasive species is required, although there are no records of such within the Application Site.

10.6.4 The CEMP also contains comprehensive measures to govern on site activities to prevent *inter alia* pollution of surface waters. For instance, the CEMP requires the contractor to identify, and risk assess existing drainage systems, and put in place measures to prevent possible contamination from surface run-off emanating from the works. The contractor shall also take measures to ensure that runoff from open excavations does not enter the surrounding drainage system without being treated

10.6.5 The Cuckoo Stream Diversion report presented in Appendix 7-3 provides further details regarding the approach to the temporary diversion of this watercourse and measures to protect it.

Operation

10.6.6 As described in Chapter 3: Proposed Development, the proposed clean surface water drainage is designed to convey the rainfall generated within the Underpass portals / ramps to a sump. The flow will be pumped back up to surface level for discharge to the Cuckoo stream network via a below ground attenuation tank with a flow restriction set to match ‘greenfield’ runoff, or the theoretical rate at which surface water would enter the stream if there were natural surface conditions along the route.

10.6.7 Potentially polluted surface water drainage (by fuel spillage or fire events) will run through the same collection system as the surface water network and will pass through a fuel interceptor prior to discharging to the pumped network.

10.6.8 In addition to the fuel interceptor, a fire suppression system will be installed within the underpass. This will include an automated valve system and separate contaminated storage tank. Should there be a major spillage event or fire, contaminated flow is to be diverted to the contaminated storage tank. The tank will then be emptied via a dry riser by a tanker at surface level.

[12] This is implemented under licence from the National Parks & Wildlife Service
[13] Which are in particular, birds weighing significantly in excess of 110g, birds which flock, and birds which remain at the airfield despite the long-grass maintenance programme.

10.7 Assessment of Effects and Significance

Determining Construction Effects

10.7.1 Construction of the Proposed Development will not directly impact any sensitive ecological receptors; however, excavations will involve diversion of the Cuckoo stream and have the potential to impact groundwater. A pathway from the construction site to the Baldoyle Bay SPA and SAC, as explained in Table 10-3, below.

Table 10-3: Potential Construction Effects

Potential Impact	Potential Impact Pathway	Potential Effect	Significant Effect?
Disturbance of protected species by construction plant	Direct disturbance to protected species in or near the construction site	Harm to protected species	Discussed in more detail below.
Loss of habitat to construction	Loss of habitat from land-take	Loss of valuable ecological habitat	Discussed in more detail below.
Pollution from construction activities	Transport of pollutants via the Cuckoo stream to Baldoyle Bay SAC / SPA	Potential for likely significant effects to Baldoyle Bay SAC / SPA	Discussed in more detail below.
Spread of invasive non-native species.	There is a hydrological link via the Cuckoo stream to Baldoyle Bay SAC / SPA.	Spread of invasive non-native species to European sites.	Not significant. Given the measures in place within the foul and surface water network, invasive non-native plant species will not be able to reach the European sites to the east. Even in a worst-case scenario any viable parts of an invasive non-native plant species (e.g., seeds) which entered the sea would not persist due to the saline environment and could not establish.

Determining Operational Effects

10.7.2 Once constructed the Proposed Development will provide a safe means of crossing from the Eastern to the Western Campus, utilising the underpass rather than the Runway 16/34 Surface Crossing. There will be no change to the numbers or types of vehicles using this new means of access and therefore no change to the potential for impacts on ecological receptors.

10.7.3 Matters considered for assessment are set out in Table 10-4, below.

Table 10-4: Potential Operational Effects

Potential Impact	Potential Impact Pathway	Potential Effect	Significant Effect?
Disturbance as a result of increased noise, artificial lighting and/or the presence of personnel, plant and machinery.	Direct disturbance of species as a result of vehicle movements, maintenance or other operational activity.	None. There are no protected species using the Application Site to be disturbed. An exception is the Irish Hare but, on safety grounds, this does not enjoy the normal protection within the airfield.	Not significant as there are no protected species to be affected.
Pollution from operation of Proposed Development	Transport of pollutants via the Cuckoo stream to Baldoyle Bay SAC / SPA	Potential for likely significant effects to Baldoyle Bay SAC / SPA	Not significant. The drainage system that forms part of the Proposed Development is designed to avoid pollution of the Cuckoo stream.

Construction Impacts

Disturbance of Protected Species

10.7.4 All European sites are beyond the distance at which construction-related disturbance could occur on animals within such a site (>5 km from the Proposed Development). It is highly unlikely that SCI species would occur on the habitats within and immediately surrounding the Proposed Development as the Application Site is largely within the current footprint of Dublin Airport and is a busy commercial area.

10.7.5 An exception is the Irish Hare, which is endemic in the airfield. A Wildlife Management Plan currently implemented by the Applicant permits them to disturb and prevent birds from flocking at or immediately adjacent to Dublin Airport and also covers mammals such as the Irish Hare. It is therefore the case that significant numbers of SCI species will not occur in this area and do not enjoy the protections normally afforded them.

Pollution of Habitats

10.7.6 Pollution of habitats resulting from construction activities is a theoretical possibility. The Cuckoo stream itself will be diverted temporarily to facilitate construction of the Proposed Development, however in this stretch the stream is culverted, no longer a natural watercourse and thus of negligible ecological value. Potential impacts will therefore be limited to the transport of any pollutants via the Cuckoo stream, which empties into Baldoyle Bay SPA and SAC.

10.7.7 However, the best practice construction site practice set out in the preliminary CEMP will be employed and therefore pollution of the Cuckoo stream would only occur by accident. The preliminary CEMP contains measures to manage accidental pollution events, should they occur. Therefore, it is considered that there would not be any significant effects as a result of construction of the Proposed Development.

Loss of Habitat

10.7.8 The Proposed Development will lead to the loss of much of the low-quality grassland within in the proposed Western Compound. This is a high impact on a receptor of very low biodiversity value, which is considered a minor effect and hence not significant.

10.7.9 Other habitats within the proposed Western Compound will not be lost to construction. Hedgerows and trees on the boundary will be unaffected, except for the provision of an access point from the R108.

10.7.10 No habitats in the proposed Southern Compound will be lost to construction.

Disturbance of Protected Species

10.7.11 Hedgerow habitats around the boundary of the two proposed compounds do provide habitat useful for foraging and commuting bats and, although almost all of the hedgerow will be retained, species using these habitats have the potential to be disturbed during construction. This would be considered a low impact on a medium value receptor, resulting in a minor and not significant effect.

10.8 Mitigation and Monitoring

10.8.1 There is the potential for (non-significant) effects on protected species (bats) using the hedgerow boundaries of the two proposed construction compounds. Therefore, during the construction phase any artificial lighting which is required (e.g., for security purposes) will be directed only to required areas and light spill will be minimised by the use of beam deflectors. Lighting will not be used such that there is light spill to the hedgerows / treelines surrounding the compounds which could be used by bats.

10.8.2 No monitoring measures are proposed.

10.9 Residual Effects and Conclusions

There will be no residual significant effects on biodiversity from the construction or operation of the Proposed Development.

11. Climate

11.1 Introduction

11.1.1 This chapter of the EIAR identifies, describes and assesses the direct and indirect significant effects of the Proposed Development on Climate. It was written by Alex McMahon BSc (Hons) MSc, a consultant from AECOM's Climate Change & Sustainability Services team with four years' experience in carbon quantification and management, sustainable design and climate change assessment. The chapter was reviewed by Ian Davies BSc (Hons), a Technical Director in AECOM's Climate Change & Sustainability Services team, with over 20 years' experience in the provision of environmental sustainability assessment, specialising in greenhouse gas (GHG) and climate change resilience assessments.

11.1.2 The EIA Directive 2014/52/EU[1] describes the importance of considering climate change and greenhouse gas emissions within EIAs: "Climate change will continue to cause damage to the environment and compromise economic development. In this regard, it is appropriate to assess the impact of projects on climate (for example greenhouse gas emissions) and their vulnerability to climate change."

11.1.3 In line with Institute of Environmental Management and Assessment (IEMA) guidance[2,3] and EU Commission Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment[4], consideration is given to the following aspects of climate change assessment:

- Lifecycle greenhouse gas (GHG) impact assessment - quantifying the GHG emissions arising from the Proposed Development over its lifetime.
- Climate change resilience (CCR) review - the resilience of the Proposed Development to projected climate change impacts.
- In-combination climate change impact (ICCI) assessment - the combined impact of the Proposed Development and future climate change on receptors in the surrounding environment.

11.1.4 The assessment scope outlined above also covers the climate assessment scope described in the EPA 'Guidelines on the Information to be Contained in Environmental Impact Assessment Reports' (hereafter referred to as the 'EPA Guidelines')[5] - i.e, assessment of GHG emissions and a review of the resilience of the Proposed Development to climate change.

11.1.5 An ICCI assessment is summarised in Table 11-1.

Table 11-1: In-Combination Climate Change Assessment

Climate Parameter	Summary
Extreme weather	The impacts of extreme weather events have been factored into the design, for example as part of the climate change allowances within the drainage design and Flood Risk Assessment[6], and it would not be proportionate or appropriate to assess such effects separately within the EIAR for the purpose of the ICCI assessment. Extreme weather effects are considered in Chapter 16: Major Accidents and Disasters.

[1] European Union (EU) (2014). Directive 2014/52/EU of the European Parliament and of the Council. [Accessed 23/02/2022]. Available at: https://www.legislation.gov.uk/eudr/2014/52/contents. [Accessed 23/02/2022].
[2] IEMA (2020). Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation. Available at: https://www.iaia.org/pdf/wab/IEMA%20Guidance%20Documents%20EIA%20Climate%20Change%20Resilience%20and%20Adaptation.pdf [Accessed 23/02/2022].
[3] IEMA (2022). Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance – 2nd Edition. Available at: https://www.iema.net/resources/blog/2022/02/28/launch-of-the-updated-eia-guidance-on-assessing-ghg-emissions [Accessed 07/07/2022]
[4] EU Commission (2013). Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment. Available at: https://ec.europa.eu/environment/eia/pdf/EIA%20Guidance.pdf [Accessed07/07/2022].
[5] Environmental Protection Agency (EPA) (2022). Guidelines on the information to be contained in environmental impact assessment reports. Available at: https://www.epa.ie/publications/monitoring--assessment/assessment/EIAR_Guidelines_2022_Web.pdf [Accessed 19/05/2022].
[6] The Flood Risk Assessment is presented in Appendix 7-2.

Sea level rise	The Application Site is not located in an area that is susceptible to sea level rise.
Temperature	The Application Site is not within a built-up area, and as such will have a negligible urban heat island effect[7].
Precipitation	The impact of increased rainfall due to climate change has been considered in Chapter 16: Major Accidents and Disasters, and has been factored into the design, for example as part of the 30% climate change allowances within the drainage design.
Wind	It is not considered appropriate to assess wind for the purposes of the ICCI assessment due to a lack of statistically significant climate change projections for increased wind energy. In fact, wind energy is projected to decrease in spring, summer and autumn, and projected increases in wind energy in winter are considered to be statistically insignificant[8].

11.1.6 Table 11-1 demonstrates that further ICCI assessment is not required as the climate parameters considered are either not relevant in the context of the Proposed Development, or are considered separately, as identified in Table 11-1. The IEMA guidance states "*In-Combination Assessment (where climate is exacerbating or conversely diminishing the effect of an existing impact of the project) is largely best analysed in the existing chapters and is suited to using traditional significance criteria from the respective chapters*".

11.1.7 The assessment presented in this chapter provides evidence to assist the competent authority in reaching a conclusion on consistency with climate policy, as outlined in the Climate Action and Low Carbon Development (Amendment) Act 2021[9]:

"*A [planning authority] shall, in so far as practicable, perform its functions in a manner consistent with—*

a) the most recent approved climate action plan,

b) the most recent approved national long term climate action strategy,

c) the most recent approved national adaptation framework and approved sectoral adaptation plans,

d) the furtherance of the national climate objective, and

e) *the objective of mitigating greenhouse gas emissions and adapting to the effects of climate change in the State.*"

11.1.8 Relevant evidence provided in this chapter to assist the competent authority in reaching a conclusion on consistency with climate policy includes the GHG impact assessment in the context of the Climate Action Plan, the CCR review, and appropriate mitigation measures in relation to the GHG impacts and climate change resilience of the Proposed Development.

11.1.9 The policy and guidance cited in this section are discussed in more detail in Section 11.2 Legislation, Policy and Guidance.

11.2 Legislation, Policy & Guidance

11.2.1 The various policies, standards and guidance described in this section outline national and international ambitions and targets for reducing GHG emissions and demonstrate the need for effective GHG reduction measures to be built into future development.

[7] An urban heat island occurs when a city experiences much warmer temperatures than nearby rural areas. The difference in temperature between urban and less-developed rural areas has to do with how well the surfaces in each environment absorb and hold heat.
[8] Environmental Protection Agency (EPA). (2015). Ensemble of regional climate model projections for Ireland. Available at: https://www.epa.ie/publications/research/climate-change/research-159-ensemble-of-regional-climate-model-projections-for-ireland.php [Accessed 28/02/2022].
[9] Government of Ireland (2021). Climate Action and Low Carbon Development (Amendment) Bill 2021. Available at: https://www.gov.ie/en/publication/984d2-climate-action-and-low-carbon-development-amendment-bill-2020/#:~:text=Climate%20Action%20and%20Low%20Carbon%20Development%20(Amendment)%20Bill%202021,-From%20Department%20of&text=The%20Climate%20Action%20and%20Low,by%20no%20later%20than%202050. [Accessed 19/05/2022].

11.2.2 In line with the relevant legislation, policy and guidance, this assessment evaluates the GHG impact of the Proposed Development in the context of Ireland's carbon budgets to provide context and scale in relation to Ireland's trajectory towards net zero. The resilience of the Proposed Development to projected climate change impacts is also reviewed.

International Policy

The Paris Agreement (2016)

11.2.3 The Paris Agreement (enforced since 2016) is a legally binding agreement within the United Nations Framework Convention on Climate Change (UNFCCC) dealing with GHG emissions mitigation, adaptation and finance starting in the year 2020. It requires all signatories to set a target known as the nationally determined contribution (NDC), which strengthens their climate change mitigation efforts to keep global warming to well below 2°C this century and to pursue efforts to limit global warming to 1.5°C. The agreement contains a 'ratchet' mechanism by which NDCs must be strengthened every five years.

Legislation & National Planning Policy

Climate Action and Low Carbon Development (Amendment) Act 2021

11.2.4 The Government published the 'Climate Action and Low Carbon Development National Policy Position' in April 2014[10], committing Ireland to an 80% reduction in carbon emissions in the energy sector compared to 1990 levels by 2050. However, a more ambitious target has since been committed to in law through the Climate Action and Low Carbon Development (Amendment) Act 2021[11], which establishes a 2050 net zero emissions target and a 51% emissions reduction target by 2030, compared to a 2018 baseline. The Act also introduces a system of successive 5-year carbon budgets starting in 2021. As of April 2022, the following three carbon budgets have been approved by the Irish Government and adopted by both Houses of the Oireachtas[12]:

- 2021-2025: 295 Mt CO2e;
- 2026-2030: 200 Mt CO2e; and
- 2031-2035: 151 Mt CO2e

Climate Action Plan (2021)

11.2.5 The objective of the Climate Action Plan13 follows the Climate Action and Low Carbon Development (Amendment) Act 2021, which commits Ireland to a legally binding target of net zero GHG emissions by no later than 2050, and a reduction of 51% (compared to 2018 levels) by 2030. The Climate Action Plan outlines 475 actions that need to be taken across all the key sectors of the Irish economy.

11.2.6 In relation to the transport sector, key actions include encouraging the uptake of biofuels, providing additional public transport and active travel options, and accelerating the uptake of electric vehicles (EVs) to achieve a target of 950,000 EVs on the road by 2030.

11.2.7 Targets also include developing coherent reduction strategies for waste and resource use and increasing the level and quantity of recycling to develop a more circular economy[14].

[10] Government of Ireland (2015). Climate Action and Low Carbon Development Act 2015. Available at: https://www.irishstatutebook.ie/eli/2015/act/46/section/2/enacted/en/html#sec2 [Accessed 23/02/2022].
[11] Department of Environment, Climate and Communications (2021a). Climate Action and Low carbon Development (Amendment) Act 2021. Available at: https://www.gov.ie/en/publication/984d2-climate-action-and-low-carbon-development-amendment-bill-2020/ [Accessed 23/02/2022].
[12] Government of Ireland (2022). Carbon Budgets 2022. Available at: https://www.gov.ie/en/publication/9af1b-carbon-budgets/ [Accessed 19/05/2022].
[13] Department of Environment, Climate and Communications (2021b). Climate Action Plan 2021. Available at: https://www.gov.ie/en/publication/6223e-climate-action-plan-2021/ [Accessed 23/02/2022].
[14] A circular economy is a model of production and consumption, which involves reusing, repairing, refurbishing and recycling existing materials and products as long as possible. In this way, the life cycle of products is extended.

11.2.8 In addition to reducing GHG emissions, the 2021 Climate Action Plan also highlights the importance of considering future climate change, such as increases in severe weather events, increased incidence of flooding, and building climate change resilience into existing and new development

Planning Policy

Fingal Development Plan 2017 - 2023

11.2.9 The Fingal Development Plan 2017 - 2023[15] sets an objective to *"minimise the County's contribution to climate change, and adapt to the effects of climate change, with particular reference to the areas of land use, energy, transport, water resources, flooding, waste management and biodiversity…"*

11.2.10 Recognising the importance of Dublin Airport to the national economy, the Plan nevertheless seeks to *"balance the impact of expansion of aviation and the important strategic issue of reducing carbon emissions"*.

Draft Fingal Development Plan 2023 - 2029

11.2.11 The Draft Fingal Development Plan 2023 - 202916 also describes the importance of mitigating the impact of climate change through reducing carbon emissions, and also building resilience to future climate change impacts.

11.2.12 The Draft Plan also outlines the importance of Dublin Airport to Ireland's economy, but stresses that it is important to balance a number of key issues, including climate change, to make sure future growth of the airport is done in a sustainable way.

Dublin Airport Local Area Plan 2020

11.2.13 The Local Area Plan (LAP)[17] sets out the main challenges and opportunities faced by the airport over the plan period. Within Chapter 5: Transition to a Low Carbon Economy, the LAP highlights the importance of the role of International Civil Aviation Organisations (ICAO) and the Carbon Offset and Reduction Scheme for International Aviation (CORSIA), among other key policy documents, in addressing carbon emissions. The LAP *"seeks to pursue climate mitigation in line with global and national targets and support the transition towards a low carbon economy by seeking to reduce CO2 emissions at the Airport"*.

Guidance

IEMA 2020 – Environmental Impact Assessment Guide to: Climate Change Resilience & Adaptation[18]

11.2.14 This guidance from IEMA provides a framework for the effective consideration of climate change resilience and adaptation in the EIA process, in line with the EIA Directive. The 2020 guidance document is a revision to the previous version released in 2015, and reflects lessons learnt due to emerging practice in this area.

IEMA 2022 – Assessing Greenhouse Gas Emissions and Evaluating their Significance[19]

11.2.15 This guidance was produced to assist GHG practitioners with addressing GHG emissions assessment, mitigation and reporting within EIA. The 2022 guidance document is a revision to the previous version released in 2017 and compliments the IEMA guidance on addressing climate change resilience and adaptation (described above) in providing guidance for the aspects covered within this chapter.

[15] Fingal Development Council (2017) Fingal County Development Plan 2017 – 2023. Available at: https://www.fingal.ie/fingal-development-plan-2017-2023 [Accessed on 01/06/2022]
[16] Fingal Development Council (2022) Fingal County Development Plan 2023 – 2029 [DRAFT]. Available at: https://consult.fingal.ie/en/consultation/draft-fingal-county-development-plan-2023-2029 [Accessed on 08/03/2022]
[17] Fingal county Council (2020). Dublin Airport Local Area Plan 2020. Available at: https://www.fingal.ie/dublin-airport-local-area-plan-2020 [Accessed 23/02/2022].
[18] Ibid.
[19] Ibid.

Sustainable Energy Authority of Ireland (SEAI) Conversion Factors[20]

11.2.16 The SEAI conversion factors list includes the GHG emissions factors for the use of various fuel types and the average grid electricity factor for Ireland. These have been used to estimate carbon emissions associated with fuel and electricity use for the Proposed Development.

UK Government Department for Environment, Food and Rural Affairs (Defra) 2021 conversion factors for GHG reporting[21]

11.2.17 The Defra 2021 GHG conversion factors include emissions factors for fuel use, electricity use (UK grid average), vehicle fuel use, water supply and treatment, material use and waste disposal, among others. Where the SEAI conversion factors were not available for an activity type being assessed, the Defra 2021 conversion factors have been applied.

11.3 Assessment Methodology

Lifecycle GHG Impact Assessment

11.3.1 As described in Chapter 4: Methodology, the assessment has been carried out following the below methodology and the EPA Guidance:

- Identification of environmental design measures and mitigation measures that form part of the construction methodology
- Identification of the GHG emissions, and assessment of their significance
- Consideration of mitigation measures
- Assessment of residual effects

11.3.2 GHG emissions resulting from the construction of the Proposed Development that will impact on the climate are calculated in line with the GHG Protocol[22]. GHG 'hot spots' (i.e. sources and activities likely to generate the largest amount of GHG emissions) have been identified in section 11.7 Assessment of Effects and Significance below to enable priority areas for mitigation to be targeted. This approach is consistent with the principles set out in IEMA guidance.

11.3.3 This lifecycle approach considers emissions from different lifecycle stages of the Proposed Development as a whole, including construction and operation.

11.3.4 Where activity data has allowed[23], expected GHG emissions arising from the construction and operational activities, and embodied carbon in materials of the Proposed Development, have been quantified using a calculation-based methodology, as per the following equation presented in the UK Defra 2021[24] emissions factors guidance:

Activity data x GHG emissions factor = GHG emissions value

11.3.5 In the absence of appropriate emissions factors within the SEAI conversion factors list[25], UK Defra (2021) emissions factors have been used.

11.3.6 In line with the GHG Protocol, when defining potential impacts, the seven Kyoto Protocol GHGs have been considered, specifically:

[20] Sustainable Energy Authority of Ireland (2022). Conversion Factors. Available at: https://www.seai.ie/data-and-insights/seai-statistics/conversion-factors/ [Accessed 07/07/2022].
[21] DEFRA (2021). UK Government GHG Conversion Factors for Company Reporting, Department for Environment, Food and Rural Affairs and Department of Business, Energy and Industrial Strategy. Available at: https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2021 [Accessed 23/02/2022].
[22] WBCSD & WRI. (2012). The Greenhouse Gas Protocol, A Corporate Accounting and Reporting Standard, World Business Council for Sustainable Development and World Resources Institute. Available at: https://ghgprotocol.org/sites/default/files/standards/ghg-protocol-revised.pdf [Accessed 23/02/2022].
[23] Omissions, exclusions and assumptions are outlined in the Limitations and Assumptions section below.
[24] Ibid.
[25] Ibid.

- Carbon dioxide (CO_2)
- Methane (CH_4)
- Nitrous oxide (N_2O)
- Sulphur hexafluoride (SF_6)
- Hydrofluorocarbons (HFCs)
- Perfluorocarbons (PFCs)
- Nitrogen trifluoride (NF_3)

11.3.7 These GHGs are broadly referred to in this chapter under an encompassing definition of 'GHG emissions', with the unit of tonnes of CO_2 equivalent (tCO_2e).

11.3.8 Where data is not available, a qualitative approach to addressing GHG impacts has been followed using professional judgement from experience assessing similar infrastructure projects[26], in line with the IEMA guidance.

Construction Effects

11.3.9 Table 11-2 summarises the key anticipated GHG emissions sources associated with the construction phase of the Proposed Development and whether they require further assessment.

Table 11-2: Scope of Potential GHG Emissions Sources from the Construction Stage

Lifecycle Stage	Activity	Primary Emission Sources	Further Assessment Required?
Land use change	Land clearance.	Loss of carbon sink[27].	No. Land use remains largely the same, although a small amount of land will be used for a construction compound, there is no loss of vegetation that could act as a carbon sink.
Product stage	Raw material extraction, transportation and manufacturing of products/materials.	Embodied GHG emissions.	Yes
Construction process stage	Onsite construction activity. Transport of construction workers.	Energy (electricity, fuel, etc.) consumption from plant, vehicles and generators onsite. GHG emissions from fuel consumption for transportation of construction workers.	Yes
	Transportation of construction materials.	GHG emissions from fuel consumption for transportation of construction materials.	Yes
	Disposal and transportation of construction waste.	GHG emissions from energy use and from fuel consumption for transportation of waste.	Yes
	Provision and treatment of water.	GHG emissions from the supply of potable water, and the disposal and treatment of wastewater.	No. Emissions from the provision and treatment of water during construction are expected to be minimal in proportion to the overall construction GHG emissions footprint of the Proposed Development[28]. As such, emissions from the provision and treatment of water are not considered material.

[26] Assumptions made are outlined in Table 11-2, Table 11-3 and the Assumptions and Limitations section below.
[27] A 'carbon sink' is vegetation that absorbs carbon dioxide in useful quantities. There is very little vegetation within the Application Site and far less than would be required to absorb material amounts of carbon dioxide.
[28] $180m^3$ of water use per year during construction (as reported in the Utilities Requirements Report), multiplied by the Defra 2021 combined emissions factor for water supply and treatment ($0.421\ kgCO_2e/m^3$), equates to $75.8kgCO_2e$, or $<0.1tCO_2e$.

Operational Effects

11.3.10 Table 11-3 summarises the key anticipated GHG emissions sources associated with the operational phase of the Proposed Development and whether they require further assessment.

Table 11-3: Scope of Potential GHG Emissions Sources from the Operation Stage

Lifecycle Stage	Activity	Primary Emissions Sources	Further Assessment Required?
Operation stage	Use of vehicles	GHG emissions from vehicle use from potential additional journeys due to the operation of the Proposed Development.	No, as there will be no change in the operational use of vehicles.
	Energy use	GHG emissions from operational energy use (e.g. road lighting, traffic lights etc.)	Yes, discussed further below.
	Infrastructure maintenance	GHG emissions from maintenance of infrastructure/assets in operation stage (including embodied carbon in materials, maintenance activities, transportation of materials, worker commuting and waste disposal)	No. Only limited maintenance and no replacement of the asset will be required. Therefore, associated emissions are not expected to have a material impact on the assessment outcome.
	Provision and treatment of water	GHG emissions from the supply of water, and the disposal and treatment of wastewater	Yes
Decommissioning	Decommissioning of the Proposed Development	Potential GHG emissions from decommissioning	Not possible owing to insufficient information. Assessment of the decommissioning stage is not practically possible with any certainty due to future changes to decommissioning processes (e.g. methods and fuels used), and therefore associated emissions, so far in the future.

Significance of Effect

Lifecycle GHG Impact Assessment

11.3.11 The IEMA guidance on GHG in EIAR states that "*any GHG emissions or reductions from a project might be considered to be significant*". The guidance also states it is down to the professional judgment of the practitioner to determine how best to contextualise and assess the significance of a project's GHG impact. The guidance identified two major considerations when assessing the significance of a project's GHG emissions: alignment to a trajectory towards net zero by 2050, and mitigation of GHG emissions.

Alignment to 2050 net zero trajectory

11.3.12 The guidance states that the crux of assessing significance is "*not whether a project emits GHG emissions, nor even the magnitude of GHG emissions alone, but whether it contributes to reducing GHG emissions relative to a comparable baseline consistent with a trajectory towards net zero by 2050*". The trajectory of GHG emissions associated with the Proposed Development has therefore been factored into the assessment criteria.

GHG mitigation

11.3.13 The IEMA guidance also emphasises the importance of implementing GHG mitigation measures to help minimise GHG emissions, regardless of the magnitude of emissions, and states that the level of mitigation should be used to assess the significance of GHG emissions. This has therefore also been factored into the assessment criteria for the GHG assessment.

Significance criteria

11.3.14 Based on the above two considerations, and in line with specific criteria29 and terminology outlined in the IEMA guidance, the following significance matrix will be used to assess the significance of GHG emissions arising as a result of the Proposed Development.

Table 11-4: GHG assessment significance matrix

		GHG mitigation		
		None	Some	Well beyond policy requirements
2050 net zero trajectory	No meaningful contribution to Ireland's trajectory towards net zero	Major adverse	Major adverse	Moderate adverse
	Short of the net zero trajectory	Major adverse	Moderate adverse	Moderate adverse
	In line with the net zero trajectory, with minimal residual emissions	Minor adverse	Minor adverse	Negligible

11.3.15 While all emissions contribute to climate change and could therefore be considered significant, as noted above, for the purposes of this EIAR major adverse, moderate adverse and beneficial effects are considered to be significant. Minor adverse and negligible effects are not considered to be significant. This is in line with definitions provided in the IEMA guidance.

Further contextualisation

11.3.16 It is suggested in the IEMA guidance that sectoral, local, or national carbon budgets can be used, as available and appropriate, to contextualise a project's GHG impact. Ireland's national carbon budgets (as outlined in Section 11.2 Legislation, Policy and Guidance) have therefore been used to contextualise the magnitude of GHG emissions from the Proposed Development, demonstrating the level of impact of the additional GHG emissions on Ireland's ability to meet its reduction targets.

Climate Change Resilience Review

11.3.17 As there is no single prescribed format for undertaking the CCR, the approach adopted for the CCR review of the Proposed Development has drawn on good practice from other similar developments and studies and is aligned with existing guidance such as that published by IEMA.

11.3.18 In consideration of the nature and scale of this Proposed Development, a quantitative approach to CCR has not been undertaken. Therefore, significance criteria to review CCR measures have not been applied.

Limitations & Assumptions

11.3.19 Due to gaps in available data as is anticipated at this stage in the design, site enabling works were not included in the GHG Assessment for the Proposed Development. Data for embodied carbon in materials used for construction of ancillary aspects (such as Pier 3 amendments, cladding, staircases, and for the

[29] The criteria used to generate this matrix can be found in Section 6.3 of the IEMA 2022 Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance – 2nd Edition. Available at: https://www.iema.net/resources/blog/2022/02/28/launch-of-the-updated-eia-guidance-on-assessing-ghg-emissions [Accessed 07/07/2022]

construction compounds) were not available at this stage in the design. However, based on professional judgement and previous experience of assessing similar infrastructure projects, the associated volume of embodied carbon is expected to be minimal in comparison to the embodied carbon in the Underpass, which has been included in the assessment.

11.3.20 As a detailed breakdown of construction activities is not available at this stage, data relating to the excavation of soils and backfill was calculated using benchmarking data from the Civil Engineering Standard Method of Measurement Fourth Edition (CESMM 4)[30], which contains emissions factors for excavation of soils. The excavation of soils and backfill is expected to make up the majority of GHG emissions from construction activities on site (e.g., from plant fuel use).

11.3.21 Due to insufficient data, GHG emissions relating to construction worker commuting were calculated using 2021 Defra Emission factors for an average-sized car of unknown fuel type and prorated based on an assumed commuting distance of 25km each way (based on a Google Maps journey search from Dublin Airport to various areas within and around Dublin), assuming the majority of workers will be based in the Dublin area. The number of construction workers commuting to the site was based on available data provided in the CEMP which is to be found in Appendix 3-1.

11.3.22 The UK Defra 2021 emissions factor for 'All Rigids' (HGV) - 100% laden'[31] has been used to estimate GHG emissions associated with HGV transportation during construction, calculated on a tonne.km basis based on the total material quantities and an assumed transportation distance of 100 km to site (based on professional judgement, taking a conservative approach). This distance is considered to be a conservative estimate as many of the materials are expected to come from closer to the site than 100 km.

11.3.23 Construction Waste GHG emissions was calculated from the figures presented in Chapter 3: Proposed Development. It was assumed that 10% of this waste goes to landfill and 90% is recycled. The UK Defra 2021 emission factors for construction material waste was used to determine the GHG emissions related to construction waste.

11.3.24 The design life for the Proposed Development was assumed to be 60 years. The time period was used to determine the operational GHG emissions relating to Energy Usage, Water Use and Water Treatment. In the absence of appropriate emissions factors within the Sustainable Energy Authority of Ireland (SEAI) conversion factors list. Defra 2021 Emission Factors was used instead for water usage and treatment. The UK Treasury's Green Book guidance on projected UK Electricity decarbonisation was used to determine the GHG emissions for energy usage over the assumed design life. Data relating to operational energy usage was sourced from the Proposed Development's Utilities Requirements Report.

11.3.25 As outlined in Table 11-3 above, emissions associated with maintenance and vehicle use during operation are not included in the assessment. However, based on experience of similar schemes, only minimal additional emissions are expected from these activities, it is not anticipated that this will have a material impact on the overall outcome of the assessment. Assessment of the Decommissioning stage is not practically possible with any certainty due to the anticipated change of the decommissioning landscape (e.g., methods for deconstruction, treatment of waste materials and types of fuels used, and therefore associated emissions), so far in the future.

11.4 Current State of the Environment

Lifecycle GHG Impact Assessment

11.4.1 The GHG baseline includes current activities within the Application Site that result in GHG emissions. The land within the Application Site boundary primarily lies within the existing Dublin Airport campus. Existing grassed areas within the Application Site currently act as a carbon sink but are considered too

[30] Institution of Civil Engineers (ICE) (2012). CESMM4: Civil Engineering Standard Method of Measurement, Fourth edition. Available at: https://www.icevirtuallibrary.com/doi/book/10.1680/cesmm.57517 [Accessed 07/07/2022].
[31] This term is taken from the Defra emissions factor database and represents an emissions factor for an average sized rigid HGV that is 100% laden (i.e. at carrying capacity).

small to have a meaningful impact on overall GHG emissions, as can be seen from their extent in Figure 3-1. Emissions relating to airport operations occur within the Application Site.

11.4.2 Quantification of baseline GHG emissions is not considered necessary or appropriate to enable quantification of the additional GHG emissions associated with the Proposed Development (the GHG impact) for the purposes of this assessment. All construction emissions are considered to be additional to the baseline, and operational emissions are either expected to remain the same (e.g., operational vehicle emissions), or are considered additional to the baseline (e.g., lighting in the tunnel) and have been quantified as such.

11.4.3 Ireland's GHG emissions inventory for 2020 (the latest year for which data is available) was 57,716,100 tCO_2e[32]. Ireland's emissions inventory has been used as a proxy for the global climate, and Ireland's future carbon budgets have been used to contextualise the magnitude of GHG emissions from the Proposed Development, demonstrating the level of impact of the additional GHG emissions on Ireland's ability to meet its reduction targets.

Climate Change Resilience Review

11.4.4 The current baseline for the climate resilience assessment is the current climate in the Application Site. Historical climate data obtained from the Met Éireann website[33] recorded at Dublin Airport meteorological station (the closest station to the site for which sufficient historic data was available) for the 30-year period of 1981-2010, summarised in Table 11-5.

Table 11-5: Historic Climate - Current Baseline

Climatic Factor	Month	Figure
Average annual maximum daily temperature (°C)	-	13.3
Warmest month on average (°C)	July	19.5
Coldest month on average (°C)	January	2.4
Mean annual rainfall levels (mm)	-	758.0
Wettest month on average (mm)	October	79.0
Driest month on average (mm)	February	48.8

11.5 Future Receiving Environment

Lifecycle GHG Impact Assessment

11.5.1 Ireland's future carbon budgets (presented below) have been used to contextualise the magnitude of GHG emissions from the Proposed Development (as a proxy for global climate), demonstrating the level of impact of the additional GHG emissions on Ireland's ability to meet its reduction targets.

- 2021-2025: 295 Mt CO_2e
- 2026-2030: 200 Mt CO_2e
- 2031-2035: 151 Mt CO_2e

[32] Environmental Protection Agency (EPA). (2022). Ireland's National Inventory Report 2022 – Greenhouse Gas Emissions 1990-2020. Available at: https://www.epa.ie/publications/monitoring--assessment/climate-change/air-emissions/Ireland-NIR-2022_Merge_v2..pdf [Accessed 28/07/2022].
[33] Met Eireann. (2021). Historical Data: Display and Download Historical Data from Current Stations. Available at: https://www.met.ie//climate/available-data/historical-data [Accessed 28/02/2022].

Climate Change Resilience Review

11.5.2 The future resilience baseline will be used to determine the resilience of the Proposed Development to climate change and to identify potential climate adaption measures. An EPA-funded report[34] on the regional climate model projections for Ireland presents the following climate change projections for mid-century (2041-2060), against a baseline period of 1981-2000:

11.5.3 Temperature projections suggest an increase in mean annual temperatures of 1.2-1.6°C under the high-emissions scenario, with the most significant largest increases expected in the eastern regions of Ireland.

11.5.4 Mean winter temperature projections indicate an increase of 1.2°C in the southwest and, to 1.7°C in the north, while mean summer temperature projections indicate an increase of 1.1°C in the southwest and to 1.7°C in the north.

11.5.5 Rainfall projections indicate a significant decrease in average precipitation levels for summer. "Likely" (where over 66% of the ensembles agree[35]) reductions in summer rainfall of 3% to 20% are anticipated for the high emissions scenario.

11.5.6 While the projections for average winter precipitation are less certain (no "likely" projections are defined due to large variations in projections), robust increases in the number of wet days are reported, which is of particular relevance to flooding impacts. "Likely" increases in the number of 'wet days' and 'very wet days'[36] for winter of 24% and 30%, respectively, are reported under the high emissions scenario.

11.5.7 Average annual rainfall is projected to decrease over the assessment period.

11.5.8 The number of extended dry periods (defined as at least 5 consecutive days for which the daily precipitation is less than 1 mm) is also expected to increase over the year, particularly in summer and autumn, with "likely" values ranging from a 12% to 40% increase.

11.5.9 Storms affecting Ireland are anticipated to decrease in frequency but increase in severity, increasing the risk of damage to infrastructure.

11.5.10 Wind energy is projected to decrease in spring, summer and autumn, while projected increases in wind energy in the winter were found to be statistically insignificant.

11.5.11 It is considered that the Future Receiving Environment during the peak construction year (2024) or in the opening year (2025) would not be substantively different than at present as emissions and climate are not likely to change rapidly enough to make a difference to the baseline.

11.6 Environmental Design and Management

GHG Mitigation Measures

11.6.1 As outlined in the preliminary Construction Environmental Management Plan (CEMP) the following measures will be taken by the appointed contractor to mitigate GHG emissions relating to the construction of the Proposed Development:

- To the extent possible, material excavated from the site will be re-used to minimise the volume of imported fill

[34] Environmental Protection Agency (EPA). (2015). Ensemble of regional climate model projections for Ireland. Available at: https://www.epa.ie/publications/research/climate-change/research-159-ensemble-of-regional-climate-model-projections-for-ireland.php [Accessed 28/02/2022].
[35] These definitions are as defined in the EPA report referenced above – further detail can be found in the report.
[36] A “wet day” is defined as one on which the daily precipitation amount is greater than 20 mm. A “very wet day” is defined as one on which the daily precipitation is greater than 30 mm.

- Pavement demolished on-site as part of the works where practicable will be taken off-site to a dedicated facility, tested for contamination, crushed, and brought back to be reused in the construction works, reducing the quantity of waste and construction materials.
- Pavement demolition material will be reused to reconstruct the new pavement.
- Where available, alternative energy sources will be used which reduce fuel consumption.
- The contractor shall develop the Construction Traffic Management Plan (CTMP) to minimise the disruption and GHG emissions from construction traffic.

Climate Change Resilience Measures

11.6.2 A 30% increase in rainfall intensities, to allow for future climate change, has been built into the Underpass drainage design.

11.7 Assessment of Effects & Significance

GHG Emissions During Construction

11.7.1 The total GHG emissions from construction are estimated to be approximately 79,889 tCO2e. The primary GHG emissions sources and the breakdown of the calculated GHG emissions are shown in Table 11-6.

11.7.2 The greatest contribution to construction emissions is the embodied carbon within the estimate, as described in the methodology above, quantity of construction materials, accounting for 57% of construction GHG Emissions.

Table 11-6: Estimated GHG emissions from construction

Emissions Source	Total GHG Emissions (tCO_2e)	% of construction Emissions
Materials	67,043	83.9%
Construction Activities	817	1.0%
Transport of materials	10,307	12.9%
Commuting of construction workers	613	0.8%
Waste (include transport)	1,108	1.4%
Total	**79,889**	

11.7.3 GHG emissions from construction will be limited to the anticipated duration of the construction programme where all enabling, construction and landscaping will be taking place (that is, workers are onsite, and plant is running). The average annual GHG emissions for construction equate to 53,259 tCO_2e/yr, assuming a 1.5-year construction programme.

11.7.4 Although not taken into account in the assessment, it is anticipated that additional GHG reductions could be made through the implementation of further mitigation measures, such as the specification of low carbon concrete, utilisation of recycled materials, and utilisation of hybrid or electric plant. Transport GHG Emissions can be reduced through using local procurement of construction materials.

GHG Emissions During Operations

11.7.5 The total GHG emissions from operations across the assumed 60-year design life are estimated to be approximately 6,934 tCO_2e. The primary GHG emissions sources and the breakdown of the calculated GHG emissions are shown in Table 11-7.

11.7.6 The greatest contribution to operational emissions is the carbon emissions from Operational energy use, accounting for 99.9% of operational GHG emissions.

Table 11-7: Estimated GHG emissions from operation

Emissions Source	Total GHG Emissions (tCO_2e)	% of Operational Emissions
Operational energy use	6,930	99.9%
Water and Wastewater	5	0.1%
Total tCO_2e across the 60-year design life.	**6,934**[37]	

11.7.7 Annually, the average operational GHG emissions will decrease over the operational design life of the Proposed Development from approximately 806 tCO_2e in 2025 to 45 tCO_2e from 2050 onwards. This decrease of time is due to expected decarbonisation of the national electricity grid.

11.7.8 In the absence of electricity grid decarbonisation projections for Ireland, the UK electricity grid projections[38] have been used to model grid decarbonisation in Ireland. As the GHG intensity and historical decarbonisation trajectory of the grids in the UK and Ireland are broadly similar[39], and as both countries have a decarbonisation target of net zero by 2050, use of the UK figures is not expected to have a material impact on the outcome of the assessment.

Significance of Effect

11.7.9 In light of Ireland's national climate objective to achieve net zero carbon by 2050, and in line with IEMA guidance on *Assessing Greenhouse Gas Emissions and Evaluating their Significance*, Ireland's first, second and third carbon budgets are presented in **Error! Reference source not found.**, with a straight-line projection to net zero by 2050. Operational GHG emissions associated with the Proposed Development are also presented in Plate 11-1 to compare the two and determine alignment to the 2050 net zero trajectory.

[37] Total does not add up to the sum of the emissions reported above due to rounding.
[38] UK Government (2021). Data tables 1 to 19. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1024043/data-tables-1-19.xlsx [Accessed 07/07/2022].
[39] Our World in Data (2021). Carbon intensities of electricity, 2000 to 2021. Available at: https://ourworldindata.org/grapher/carbon-intensity-electricity?tab=chart&time=2000..2021&country=IRL~GBR [Accessed 07/07/2022].

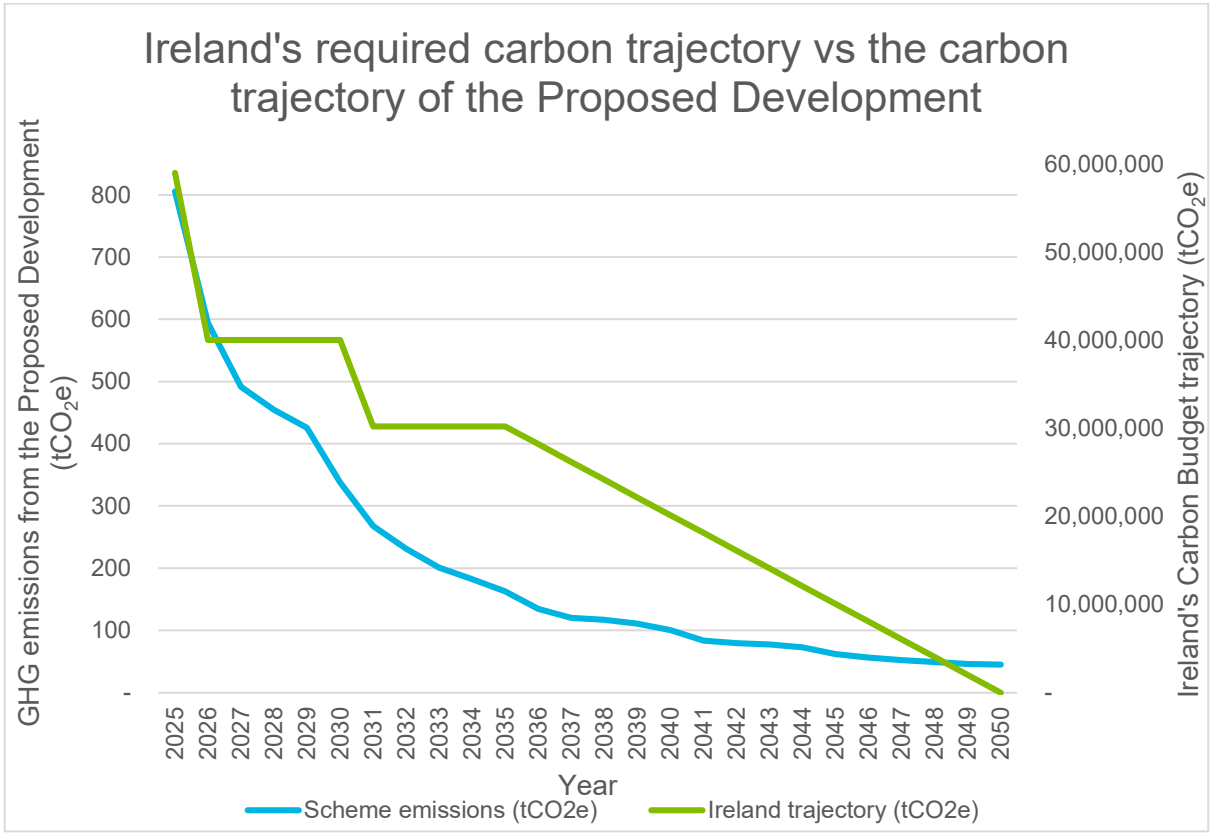


Plate 11-1: Ireland's carbon budgets and projected trajectory to next zero by 2050 vs the GHG emissions trajectory of the Proposed Development

11.7.10 Please note, Plate 11-1 uses two very different scales for Ireland's projected carbon trajectory and the trajectory of the Proposed Development. Plate 11-1 has been produced primarily to compare the two trajectories, and not the magnitudes.

11.7.11 The trajectory of the Proposed Development is largely in line with the net zero trajectory, with some residual emissions by 2050 (approx. 45 tCO2e). The vast majority of these residual emissions, however, are from grid electricity use, the carbon intensity of which is outside the scope of influence of the Proposed Development. Therefore, the quantity of residual emissions will depend on the success of the Irish Government's energy policy.

11.7.12 If Ireland is to meet its net zero target, the GHG intensity of the grid will either need to be reduced more than has been modelled here, or residual emissions associated with grid electricity use across Ireland will need to be offset through offset schemes or removals. Therefore, it is anticipated that the two trajectories will be aligned by 2050.

11.7.13 Ireland's 1st, 2nd and 3rd carbon budgets have also been used to contextualise the magnitude of GHG emissions from the Proposed Development in Table 11-8, depending on the years in which the emissions are expected to occur.

Table 11-8: Estimated GHG emissions as a proportion of the estimated carbon budgets to 2035

Carbon budget period	Lifecycle Stage	Carbon budget (tCO_2e)	Proposed Development GHG emissions (tCO_2e)	% of carbon budget emissions
1st Carbon Budget (2021 to 2025)	Construction & Operation	295,000,000	80,695	0.0274%
2nd Carbon Budget (2026 to 2030)	Operation	200,000,000	2,304	0.0012%

Carbon budget period	Lifecycle Stage	Carbon budget (tCO_2e)	Proposed Development GHG emissions (tCO_2e)	% of carbon budget emissions
3rd Carbon Budget (2031 to 2035)	Operation	151,000,000	1,045	0.0007%

11.7.14 The GHG emissions associated with the Proposed Development are not considered to be material in the context of Ireland's carbon budgets, representing <0.03% of the 1st carbon budget (mostly driven by construction emissions) and <0.001% for the subsequent carbon budgets (operational emissions only).

Significance

11.7.15 Construction emissions are not considered to be material in the context of Ireland's relevant carbon budget, and some mitigation has been implemented during the construction stage (as presented in Section 11.6), which is where the majority of GHG emissions occur. As outlined above, operational emissions are considered to be in line with Ireland's net zero trajectory.

11.7.16 Therefore, as some GHG mitigation will be implemented through the CEMP (see Section 11.6 Environmental Design and Management), and as the GHG trajectory of the Proposed Development is in line with the Irish Government's net zero trajectory with minimal residual emissions, GHG emissions associated with the Proposed Development are considered to be minor adverse.

Climate Change Resilience

11.7.17 The design of the Proposed Development will take account of current climate change projections, for example including an additional contingency to account for increased precipitation in the drainage strategy and flood risk assessment and considering increases in year-round temperatures through the ventilation design. As the Proposed Development will largely be enclosed underground and not exposed to extreme weather conditions, climate impacts such as increased storms are not expected to have a material impact.

Summary

11.7.18 The Proposed Development will not have any significant effects in relation Climate.

11.8 Mitigation & Monitoring

11.8.1 Mitigation which forms part of the Proposed Development and construction methodology is identified in Section 11.6 Environmental Design & Management. As the Proposed Development will not have any significant effects no additional mitigation measures are recommended. No monitoring measures are proposed.

11.9 Residual Effects & Conclusions

11.9.1 Residual impacts are defined as those impacts that remain following the implementation of mitigation measures. As per the EPA Guidelines, the effects from the impacts that remain after all assessment and mitigation are referred to as 'Residual Effects'[40]. This section identifies the residual impacts and associated effects, following the implementation of mitigation measures.

11.9.2 As assessed above, there will be unavoidable GHG emissions resulting from both the construction phase and the operational phase of the Proposed Development as materials, energy use, fuel use, and transport will be required. The residual effects are set out in Table 11-9 below.

[40] Environmental Protection Agency (EPA) (2022). Guidelines on the information to be contained in environmental impact assessment reports. Available at: https://www.epa.ie/publications/monitoring--assessment/assessment/EIAR_Guidelines_2022_Web.pdf [Accessed 19/05/2022].

Table 11-9: Summary of Residual Effects

Description of Residual Impact	Sensitivity of Receptor	Nature of Effect/ Geographic Scale	Magnitude of Effect	Initial Classification of Effect (with embedded control)	Additional Mitigation	Residual Effect Significance
Construction						
GHG emissions	High	Long term/Global	Low	Minor	None	**Minor (Not Significant)**
Complete and Operational						
GHG emissions	High	Long term/Global	Low	Minor	None	**Minor (Not Significant)**

12. Cultural Heritage

12.1 Introduction

12.1.1 This chapter of the EIAR identifies, describes and assesses the direct and indirect significant effects of the Proposed Development on Cultural Heritage.

12.1.2 This chapter was written by Colin Bush, BA(Hons), MSc, CEnv, an Associate Director in AECOM's Environment and Sustainability team. The chapter was reviewed by David Kilner, BA (Hons), PG Dip, MSc, MIAI a Senior Archaeological Consultant in AECOM's Heritage team.

12.1.3 The EPA Guidance suggests that the matters set out in Table 12-1, below, might be considered in an EIA in respect of cultural heritage.

Table 12-1: Matters Considered in the EIA

Matter	Considered further in the EIA?
Archaeology	Yes. There is potential for the survival of buried remains in the Application Site. This is considered further below.
Architectural Heritage	No. There are no architecturally important buildings in the Application Site or whose setting might be affected by the works, as can be seen in Figure 12-1.
Folklore and History	No, there are no folklore or historic connections to the Application Site.

12.1.4 Accordingly, the potential for significant effects on archaeological remains is the focus of this chapter.

12.2 Legislation, Policy & Guidance

12.2.1 The following legislation, policy and guidance are relevant to methodology in this chapter and were considered during the assessment presented within it. General legislation, policy and guidance were also considered but is not listed as this has been covered in Chapter 4: Methodology.

Legislation & National Planning Policy

- National Monuments Act 1930-2004 as amended
- The Heritage Act 1995 (as amended
- Heritage Ireland: 2030 (2022)
- Planning and Development Acts 2000 (as amended)

Regional & Local Planning Policy

- Draft Fingal Development Plan 2022, Fingal County Council
- Fingal Development Plan, 2017 – 2023, Appendix 2 (Record of Protected Structures), Fingal County Council
- Fingal Development Plan, 2017 – 2023, Appendix 3 (Recorded Monuments), Fingal County Council
- Fingal Heritage Plan, 2018 – 2023, Fingal County Council, 2018 (includes the Record of Protected Structures for Fingal County)
- Dublin Airport Local Area Plan, Fingal County Council (2020)

Standards & Guidance

- Department of Arts, Heritage, and the Gaeltacht, 1999, Frameworks and Principles for the Protection of the Archaeological Heritage

- Department of Arts, Heritage and the Gaeltacht, 2011, Architectural Heritage Protection, Guidelines for Planning Authorities
- Demesnes, Estates and their Settings, An Action of the County Cork Heritage Plan 2005/2010. Cork County Council, Cork. This document was prepared by Cork County Council in response to increasing adaptation and redevelopment of planned landscapes within the county. While written for County Cork, the guidance presented is applicable to sites throughout Ireland
- Institute of Archaeologists of Ireland ("IAI") (2006a) Code of Conduct for Archaeological Assessment Excavation
- IAI (2006b) Code of Conduct for the Treatment of Archaeological Objects in the context of an archaeological excavation. Institute of Archaeologists of Ireland
- IAI (2007) Environmental Sampling: Guidelines for Archaeologists. Institute of Archaeologists of Ireland

12.3 Assessment Methodology

12.3.1 As described in Chapter 4: Methodology, the assessment has been carried out following the below methodology and the EPA Guidance:

- Establishment of the baseline conditions, including identification and assessment of the receiving environment and receptor sensitivity
- Identification of environmental design measures and mitigation measures that form part of the construction methodology
- Identification of the potential impacts, and assessment of the magnitude of potential effects, and their significance
- Consideration of mitigation measures
- Assessment of residual effects

Study Area

12.3.2 The 1km study area has been defined according to the sensitivity of the receiving environment and the potential impacts of the project. The study area, shown in Figure 12-1, has been identified as the appropriate study area because it includes the Application Site plus any land outside that footprint which includes any heritage assets which could be physically affected or affected through changes to their settings.

12.3.3 Recorded heritage assets gleaned from the records of the National Monuments Service, Fingal County Council and the Heritage Council have been used to determine the Current State of the Environment in the study area. Archaeological sites, and architectural heritage (Protected Structures and National Inventory of Architectural Heritage) were identified within this study area.

12.3.4 Having identified the assets forming the cultural heritage baseline, the next step was to identify any potential pathways for impacts that could affect the identified heritage receptors. Consideration was then given to the effect(s) to which the impact pathways might give rise. Lastly, the identified effects were assessed for their magnitude and resulting significance (if any).

Method of Assessment

12.3.5 As set out in the EPA Guidance, the significance of an effect or impact has been determined by undertaking two distinct assessments:

- The sensitivity of the receptor likely to be affected, namely:
  - The value of the receptor
  - The susceptibility of the receptor to the type of change arising from the Proposed Development
  - The sensitivity to change is related to the value attached to the receptor

- The magnitude of the effect likely to occur, namely:
  - The size and scale of effect
  - The geographical extent of the areas that will be affected
  - The duration of the effect and its reversibility
  - The quality of the effect – whether it is neutral, positive or negative

12.3.6 In order to have a significant effect in isolation, the impact will generally need to be large and / or the receptor sensitive. This is discussed more fully in Chapter 4: Methodology.

Limitations & Assumptions

12.3.7 There are no limitations to the assessment of potential effects on cultural heritage presented in this chapter.

12.4 Current State of the Environment

Designated Heritage Assets

12.4.1 There are three designated heritage assets identified in the Register of Protected Structures and the National Inventory of Architectural Heritage within the study area and form part of the airport complex. The closer of these is the Old Central Terminal Building built in 1937 (RPS 612) and consists of a detached, multiple-bay, four-storey terminal building built in the International Modern style. It is also recorded on the National Inventory of Architectural Heritage (NIAH) where it is listed as NIAH 11349006.

12.4.2 The second designated heritage asset is the Church of our Lady Queen of Heaven (RPS 864) which dates to 1964 and is still in use. It is also listed as NIAH 11349001. The designated heritage assets are shown in Figure 12-1.

12.4.3 Lastly, a thatched dwelling (RPS 604) is an architectural structure which is also recorded as NIAH 11349003 is located on the Swords Road 135 m south of Dublin Airport. It consists of a detached three-bay, single-storey house with a central projecting entrance porch dating to around 1800. The cottage is post-medieval in date.

Undesignated Heritage Assets

12.4.4 There are eleven recorded undesignated heritage assets within 1km of the Application Site. None of these assets are located within the footprint of the Proposed Development. Three of these assets are associated with one another but are no longer visible, being beneath the footprint of Terminal 2. The closest of these was the location of the planned landscape associated with the former Corballis House (NIAH 11349002), which was located in the north-west corner of the planned landscape while the third asset, Corballis Castle (DU014-011) was located within the south-east corner.

12.4.5 Corballis Castle was a medieval tower house which is marked on the 1837 OS map as ‘Corballis Castle, in ruins’. The tower house is believed to have been razed in late 1641 or early 1642 by the forces of the Duke of Ormond in retaliation for the castle’s occupant provisioning confederate troops who were besieging Drogheda at that time. Dressed stone from the tower house was used in the construction of the mid-17th century vernacular cottage at Corballis House. Archaeological monitoring of groundworks was carried out within the vicinity of Corballis Castle during the construction of Terminal 2 in 2007 and early 2008. While the basal remains of a post-medieval ditch were identified, no further archaeological deposits were recorded.

12.4.6 Corballis House consisted of a detached seven-bay, two-storey house on an irregular plan with three canted bays to the left side and a two-storey return to the rear. Archaeological investigations were carried out at the house in 2006 in advance of the construction of Terminal 2 and these revealed that the original Corballis Cottage dating to the 17th century was contained within the late 18th/ early 19th century house. The earlier building appeared to be a simple rectangular stone structure which corresponded with the structure shown on the 17th century Down Survey map.

12.4.7 The investigations revealed the sequence of construction with the house modified and expanded over the subsequent centuries. All of these assets (Corballis Castle, Corballis House and planned landscape associated with it) were built upon during the construction of Terminal 2 and there are no longer any visible traces of them.

12.4.8 The last undesignated asset within 1km of the Proposed Development is the Boot Inn (DU014-090) which is a located to the immediate west of the airport at Pickardstown. It consists of a two-storey, four bay building dating to post 1700. The undesignated heritage assets are also shown in Figure 12-1.

12.4.9 As described in Chapter 3: Proposed Development, the Application Site comprises an operational airfield, including the West Apron and Pier 3. It is crossed by Runway 16/34 and several taxiways, which largely consist of made ground. Outside the made ground there are grassed areas where remains could continue to exist, however these areas are also likely to have been disturbed during the construction of the runways and taxiways, or by construction of services, so the potential is low[1].

12.4.10 Extensive archaeological investigations were carried out in 2017 prior to the construction of the North Runway, the closest section of which is 800m to the north of the Proposed Development. These investigations uncovered nine archaeological sites including settlement activity dating from the Late Neolithic (3000-2500 BC), Bronze Age (2500-700 BC), Early Medieval (AD 400-1500), Medieval (AD 1150-1450) and Post-Medieval (AD 1450-1650) periods. While the majority of this activity was located within fields previously outside the airport boundaries, one site comprising remains covering an area 60m x 46m was located within the airport grounds.

12.4.11 Three distinct phases of activity were identified within the site of the investigation - prehistoric, early medieval and post-medieval activity representing the remains of a small multi-period site that was indicative of occupation and settlement at various intervals including the prehistoric period (most likely the Bronze Age), the 7th-8th century AD and the post-medieval period

12.4.12 The enclosure (DU014-008) and house (DU014-040) are located in close proximity to one another at the west end of the South Runway. The enclosure (DU014-008) is not marked on OS map sheets. It appeared as a circular single ditched enclosure with a diameter of 35m in an area of low-lying pasture on an aerial photograph taken in 1971. This asset may be a levelled ringfort dating to the Early Medieval period. The location is now under the South Runway and the asset has been destroyed.

12.4.13 DU014-108 is a circular enclosure visible as a crop mark on an aerial photograph. DU014-109 is a sub-circular enclosure visible as a crop mark on an aerial photograph. Both are possibly early medieval, and no surface remains are visible in either case.

12.4.14 DU014-123 was identified from geophysical survey and confirmed by test excavation as part of the proposed Metro West development. It is a circular enclosure (30m diameter) characterised by a U-shaped ditch (1.1m-2.2m wide by 0.45m deep). Although undated its form, size and shape are consistent with that of a severely truncated early medieval ringfort.

12.4.15 A bronze age burnt mound DU014-119 was also identified and excavated as part of the proposed Metro West development. An oval-shaped (5m x 7.5m N-S) deposit of dark-black sandy silt with frequent inclusions of heat-shattered burnt stones was identified

12.4.16 DU014-120 is thought to be a cremation pit, formed of a cluster of three E-W aligned pits (0.25m – 0.50m diameter). Each pit contained a charcoal-rich fill with occasional burnt bone. A single find of possible prehistoric pottery with slag or similar material adhering to its interior side was recovered from the topsoil in this area. This asset was identified from geophysical survey and confirmed by test excavation as part of the proposed Metro West development.

12.4.17 Enclosure (DU014-121) was located 212m south of the airport at Merryfalls. It consisted of an area 30 m in diameter enclosed by a ditch between 1.1 m and 2.2 m wide and 0.45 m deep. No dating evidence was recovered during the excavation although the form, size and shape of the enclosure were consistent with a ringfort dating to the early medieval period.

[1] In AECOM's experience most archaeological features are typically found less than 1m below ground level. Some features, such as ditches and walls can be deeper, sometimes 2-3m below ground level. Remains can be encountered at deeper levels still, for example within wetland or areas that historically have been infilled, but this is rare. Thus, the potential for survival of remains is considered low and they are unlikely to exist undisturbed within the Application Site.

12.4.18 A further unclassified ring fort DU011-043 is also within the study area, north of the R108, Barberstown Road.

12.5 Future Receiving Environment

12.5.1 It is considered that the Future Receiving Environment during the peak construction year (2024) or in the opening year (2025) would not be substantively different than at present, given that new heritage receptors cannot simply appear. Therefore, the archaeological baseline will be unchanged and, unless new designations are applied to structures, this baseline too will remain unaltered.

12.6 Environmental Design & Management

12.6.1 No mitigation measures have been built into the design to address cultural heritage impacts.

12.7 Assessment of Effects & Significance

Determining Construction Effects

12.7.1 The potential construction impacts on cultural heritage are described in Table 12-2. It identifies the potential source of the impact; potential impact pathways (route by which receptors can become impacted) and potential effects arising from the potential impact. For each of the potential effects identified, the likelihood of an effect has been considered to determine whether further assessment should be undertaken.

Table 12-2: Potential Construction Effects

Potential Impact	Potential Impact Pathway	Potential Effect	Significant Effect?
Direct construction works	Direct impact on heritage receptors	Loss or damage to heritage receptors	No significant effects. No heritage receptors in the vicinity of construction works (see Figure 12-1),
	Direct impact on buried archaeology	Loss or damage to buried archaeology	No significant effects. Discussed further below in this section.
Noise from Construction Plant	Noise impact on heritage receptors	Setting effect on heritage receptors	No significant effects. No heritage receptors within aural range of works (see Figure 12-1), noise impacts especially unlikely given the already high high-noise baseline at the airport.
Vibration from Construction Plant	Vibration impact on heritage receptors	Damage to heritage receptors	No significant effects. No heritage receptors within vibration range of works (see Figure 12-1),
Visual Impact from Construction Plant	Visual impact on heritage receptors	Setting effect on heritage receptors	No significant effects. No heritage receptors within visual range of construction works (see Figure 12-1). Setting of heritage receptors within the airport already impacted by existing airport infrastructure.

Determining Operational Effects

12.7.2 The potential operational impacts on cultural heritage are described in Table 12-3. It identifies the source of the impact; potential impact pathways (route by which receptors can become impacted) and potential effects arising from the potential impact. For each of the potential effects identified, the likelihood of an effect has been considered to determine whether an assessment should be undertaken.

Table 12-3: Potential Operational Effects

Potential Impact	Potential Impact Pathway	Potential Effect	Significant Effect?
Noise from traffic	Noise impact on heritage receptors	Setting effect on heritage receptors	No significant effects. No heritage receptors within aural range of traffic using new infrastructure and no change to the number of internal vehicle movements as a result of the Proposed Development. Setting of nearby heritage receptors already impacted by traffic and noise associated with the existing taxiways and aprons.
Visual Impact from new infrastructure	Visual impact on heritage receptors	Setting effect on heritage receptors	No significant effects. No heritage receptors within visual range of new infrastructure. Setting of nearby heritage receptors already impacted by existing taxiways and aprons.
Visual Impact from traffic	Visual impact on heritage receptors	Setting effect on heritage receptors	No significant effects. No heritage receptors within visual range of traffic using new infrastructure. Setting of nearby heritage receptors already impacted by existing taxiways and aprons.

Construction

12.7.3 The Proposed Development requires ground works which have the potential to impact on buried archaeological remains. However, the Application Site is mainly airside, and this area comprises ground formed of airport-built infrastructure including taxiways and aprons. The construction of these would have caused previous disturbance and it is likely that any sub-surface archaeological remains that may have existed within these areas have been heavily truncated or destroyed.

12.7.4 There are two construction compounds landside, the Western Compound and the Southern Compound, as described in Chapter 3: Proposed Development. Of these, only the Western Compound will require ground works that could potentially affect archaeology. However, the site of the Western Compound has already been subject to extensive archaeological excavations following the granting of the North Runway Planning Permission. An archaeological compliance report[2] prepared prior to construction of the North Runway, concluded that sufficient work had been done, including *"full excavation of all identified features"*, to allow the North Runway to be constructed "*without the requirement for further archaeological monitoring on the landside portion of the development*". Therefore, it is concluded that use of this site for the construction of the Proposed Development also could go ahead without further testing and would not result in any impact on remains at this location.

12.7.5 The Proposed Development will result in additional construction traffic on the road network within and in the vicinity of the airport. The traffic, noise and landscape and visual assessments (refer to Chapter 5: Traffic & Transport, Chapter 9: Noise & Vibration and Chapter 13: Landscape & Visual respectively) have identified no significant effects from increases in construction traffic or noise and no significant landscape or visual effects associated with construction.

12.7.6 As a result, the Proposed Development will not result in new construction related Cultural Heritage effects.

Operation

12.7.7 As the Proposed Development will not alter or uplift in any way the activities currently being undertaken at Dublin Airport or, more specifically, on the West Apron, there will be no operational impacts on heritage receptors. There would be no direct or indirect operational effects on nearby heritage receptors and their

[2] Fingal County Council planning application F04A/1755, Dublin Airport North Runway Archaeological Testing, Archaeological Consultancy Services Unit (2017) https://planning.agileapplications.ie/fingal/application-details/37968

setting would remain unchanged. As a result, the Proposed Development will not result in operation related Cultural Heritage effects.

Summary

12.7.8 The Proposed Development will have no significant effects on Cultural Heritage in either construction or operation.

12.8 Mitigation & Monitoring

12.8.1 As the Proposed Development will not have any effect on Cultural Heritage, there is no requirement for mitigation to be implemented. No monitoring measures are proposed.

12.9 Residual Effects & Conclusions

12.9.1 There will be no significant residual Cultural Heritage effects as a result of the Proposed Development in construction or operation. Cumulative effects are considered in Chapter 18: Cumulative Effects.

13. Landscape & Visual

13.1 Introduction

13.1.1 This chapter of the EIAR identifies, describes and assesses the direct and indirect significant effects of the Proposed Development on the Landscape & Visual factor.

13.1.2 This chapter was written by Colin Bush, BA(Hons), MSc, CEnv, an AECOM Associate Director from the Environment and Sustainability team with over 18 years' experience in leading and managing EIA projects. The chapter was reviewed by Joerg Schulze Dipl. Ing. (FH) LA, MILI, an Associate Director in AECOM's Landscape team.

13.1.3 The EPA Guidance suggests that the matters set out in Table 13-1, below, might be considered in an EIA in respect of Landscape & Visual impact.

Table 13-1: Matters Considered in the EIA

Matter	Considered Further in the EIA?
Landscape Appearance and Character	Yes.
Landscape Context	Yes.
Views & Prospects	Yes.
Historical Landscapes	Yes.

13.2 Legislation, Policy and Guidance

13.2.1 The following legislation, policy and guidance are relevant to methodology in this chapter and were considered during the assessment presented within it. General legislation, policy and guidance were also considered but is not listed as this has been covered in Chapter 4: Methodology

Legislation and National Planning Policy

13.2.2 The following national planning policy is relevant to this chapter and has been considered in the assessment.

- The National Landscape Strategy (NLS) for Ireland 2015-2025.

Regional and Local Planning Policy

13.2.3 The following local planning policy is considered relevant to this assessment.

- Fingal Development Plan 2017-2023, Fingal County Council
- Draft Fingal Development Plan 2023-2029, Fingal County Council
- Dublin Airport Local Area Plan (2020), Fingal County Council

Policy, Standards and Guidance

13.2.4 The following policies, standards and guidance documents are considered relevant to this assessment.

- The European Landscape Convention

- Environmental Protection Agency 'Guidelines on the information to be contained in Environmental Impact Assessment Reports', May 2022
- 'Guidelines for Landscape and Visual Impact Assessment' (GLVIA3), Landscape Institute / Institute of Environmental Management and Assessment (IEMA), 2013, 3rd Edition
- 'Visual Representation of Development Proposals', Landscape Institute, Technical Guidance Note 06/19, 17 September 2019

13.3 Assessment Methodology

13.3.1 This section sets out the methodology adopted for the Landscape and Visual Impact Assessment (LVIA). As described in Chapter 4: Methodology, the assessment has been carried out following the below methodology and the EPA Guidance:

- Establishment of the baseline conditions, including identification and assessment of the receiving environment and receptor sensitivity
- Identification of environmental design measures and mitigation measures that form part of the construction methodology
- Identification of the potential impacts, and assessment of the magnitude of potential effects, and their significance
- Consideration of mitigation measures
- Assessment of residual effects

Landscape and Visual Impact Assessment Criteria

13.3.2 This chapter has been prepared in accordance with the EPA guidance document '*Guidelines on the Information to be contained in Environmental Impact Assessment Reports, 2022*[1]. Best practice guidance, such as the *"Guidelines for Landscape and Visual Impact Assessment, 3rd Edition, 2013, Landscape Institute & IEMA"* provide specific guidelines for landscape and visual impact assessments. Therefore, a combination of the EPA guidelines, the Landscape Institute guidelines and professional experience has informed the methodology for the assessment herein.

13.3.3 The Landscape Institute guidelines require the assessment to identify, predict and evaluate the significance of potential effects to landscape characteristics and established views. The assessment is based on an evaluation of the sensitivity to change and the magnitude of change for each landscape or visual receptor. For clarity, and in accordance with best practice, the assessment of potential effects on landscape character and visual amenity, although closely related, are undertaken separately.

13.3.4 The assessment acknowledges that landscape and visual effects change over time as the existing landscape external to the Proposed Development will change independently as a result of external factors.

13.3.5 The significance of an effect or impact is determined by two distinct considerations:

- The **nature** of the receptor likely to be affected, namely:
  - The value of the receptor or view;
  - The susceptibility of the receptor to the type of change arising from the Proposed Development; and
  - The sensitivity to change is related to the value attached to the receptor.
- The **magnitude** of the effect likely to occur, namely:
  - The size and scale of the landscape and visual effect (for example, whether there is a complete or minor loss of a particular landscape element);

- The geographical extent of the areas that will be affected;
- The duration of the effect and its reversibility; and
- The quality of the effect – whether it is neutral, positive, or negative.

13.3.6 The significance of effects is assessed by considering the sensitivity of the receptor and the predicted magnitude of effect in relation to the baseline conditions.

13.3.7 Effects are assessed for all phases of the Proposed Development. Construction effects are considered to be temporary, short-term effects which occur during the construction phase only. Operational/residual effects are those long-term effects, which will occur as a result of the presence or operation of the development.

13.3.8 The quality of each effect is based on the ability of the landscape character or visual receptor to accommodate the Proposed Development, and the impact of the development within the receiving context. Once this is done, the quality of the effect is then assessed as being neutral, beneficial, or adverse. A change to the landscape or visual resource is not considered to be adverse simply because it constitutes an alteration to the existing situation.

Study Area

13.3.9 The study area has been defined according to the sensitivity of the receiving environment and the potential impacts of the Proposed Development. It has been established based upon of the potential visibility of the Proposed Development. Based on these criteria the study area is restricted to the boundary of Dublin Airport and adjacent public roads, namely sections of the Old Airport Road, R108, Naul Road and the R132 / Swords Road.

Limitations and Assumptions

13.3.10 There are no limitations to the assessment of potential effects in relation to Landscape & Visual effects presented in this chapter.

13.4 Current State of the Environment

General Landscape Conditions

13.4.1 The Application Site is located within the confines of the airport environs. Figure 13-1 shows the character areas in the vicinity of the airport. The airfield is a large expanse of generally flat terrain comprising of visible and dominating terminals, runways, control towers, auxiliary built structures, and lighting systems. The airport layout and infrastructure has evolved to facilitate air traffic operations. The landscape is transport dominant, providing the structures and systems required of an international airport.

13.4.2 In the wider study area, the Landscape Character Assessment in the Draft Fingal County Development Plan 2023-2029 describes the airport as lying within the ‘Low-Lying’ landscape character type which is described as being of ‘modest value’ and ‘low sensitivity’. To the west of the airport, the ‘Rolling Hills’ landscape character type encompasses St Margaret’s is also described as being of ‘modest value’ but of ‘medium sensitivity’.

Sensitive Landscapes

13.4.3 There are no sensitive landscapes located within the boundary of Dublin Airport and adjacent public roads. The Landscape Character Assessment included in the Fingal County Development Plan 2017-2023 states that the nearest ‘Highly Sensitive Landscapes’ are located within 4 km of Dublin Airport. Some of these have a very high or high landscape value and high or very high landscape sensitivity, these are of county or national importance and are designated as Highly Sensitive Landscapes (HSL) but remain entirely unaffected by the Proposed Development.

Historic Landscapes

13.4.4 There are no historic landscapes within the boundary of Dublin Airport. The Fingal County Development Plan identifies "*Historic Landscape Characterisation*" areas (HLC). A portion of the Swords designated HLC Area borders the northern boundary of Dublin Airport, as shown in Figure 13-1.

Views & Prospects

13.4.5 Objective NH 40 within the Fingal Development Plan states: *"Protect views and prospects that contribute to the character of the landscape, particularly those identified in the Development Plan, from inappropriate development*".

13.4.6 There are no designated views or views to be preserved located within the study area or within 500m outside of the study area boundary.

Visual Receptors

13.4.7 Visual receptors of low sensitivity include people engaged in airport work, carrying out airport operations, vehicle drivers, and a large transient population of passengers who may be interested in the activities and functions of the airport.

13.4.8 A number of residents located along the Old Airport Road, the R108 and Dunbro Lane will have a medium sensitivity to changes in their views as they already experience open views of the airport infrastructure.

13.5 Future Receiving Environment

13.5.1 It is considered that the Future Receiving Environment during the peak construction year (2024) or in the opening year (2025) would not be substantively different than at present, given the short period of time during which any changes could occur.

13.6 Environmental Design and Management

13.6.1 An Architectural Design Statement (reference 5196988-ATK-DT1-ZZ-ZZZ-RP-Z-XXX-1100, 19 August 2022) has been prepared for Pier 3 Fixed Links and Nodes to provide details on the design proposals on this element of the Proposed Development. This is in response to local policies and plans highlighting the need for high standards of design within the airport, including Objective DA21 of the County Development Plan and Objective DS01 of the Dublin Airport Local Area Plan (January 2020) as well as daa's Dublin Airport 'Architectural Design Framework'. The Architectural Design Statement is included as Appendix 13-1.

13.7 Assessment of Effects and Significance

Determining Construction Effects

13.7.1 The potential construction impacts in relation to landscape character and visual impact are described in Table 13-2. It identifies the source of the impact; potential impact pathways (route by which receptors can become impacted) and potential effects arising from the potential impact. For each of the potential effects identified, the likelihood of an effect has been considered to determine whether further assessment should be undertaken.

Table 13-2: Potential Construction Effects

Potential Impact	Potential Impact Pathway	Potential Effect	Significant Effect
Direct construction works	Direct impact on landscape character	Loss or damage to existing landscape character	No significant effects. No areas of high landscape character or historic

			landscape are located within vicinity of construction works.
Construction activity	Indirect impact on landscape character	Change to existing landscape character	No significant effects. No areas of high landscape character or historic landscape within study area.
	Impact on visual receptors	Change to views of visual receptors	Discussed further below.
Noise from construction plant	Noise impact on landscape	Setting effect on landscape character	No significant effects. The Application Site is an existing high-noise environment. No areas of high landscape character or historic landscape within study area.

Determining Operational Effects

13.7.2 The potential operational impacts in relation to landscape character and visual effects are described in Table 13-3. It identifies the source of the impact; potential impact pathways (route by which receptors can become impacted) and potential effects arising from the potential impact. For each of the potential effects identified, the likelihood of an effect has been considered to determine whether further assessment should be undertaken.

Table 13-3: Potential Operational Effects

Potential Impact	Potential Impact Pathway	Potential Effect	Significant Effect
Operational impact of new infrastructure	Direct impact on landscape character	Loss or damage to landscape character	No significant effects. No areas of high landscape character or historic landscape within vicinity. The new underpass will not be visible during operation and the addition of new approach roads and ramps and changes to existing airport stands/ aprons and Pier 3 will not be noticeable within the context of the operational airport, and therefore not alter the existing landscape character.
	Indirect impact on landscape character	Change to existing landscape character	No significant effects. The landscape character will remain unchanged following the implementation of the Proposed Development as it will integrate into the existing character of the study area.
	Impact on visual receptors	Change to views of visual receptors	Discussed further below.
Traffic using new infrastructure	Impact on visual receptors	Change to views of visual receptors	No significant effects. No change in the number of vehicles using the crossing. Traffic using the new underpass will no longer be visible during operation except at approach roads and ramps.

Construction (Visual Effects)

Airside views

13.7.3 Visual receptors (airport workers and passengers) will notice an increase in heavy machinery associated with civil infrastructural construction, which will be evident from airside viewing points in the vicinity of the Proposed Development. This activity is not unusual to facilitate the phased growth and development of the airport.

13.7.4 There will be relatively large earthworks visible to receptors airside within the airport as excavation proceeds along the proposed route of the Underpass, together with construction-related plant and vehicles. However, the impact will be limited in scale since the concrete twin cells are to be constructed sequentially, not along the whole route (see Chapter 3: Proposed Development). Other works, to Pier 3 and to the Fixed Links and Nodes, will also be visible airside but will be less obvious owing to their much smaller scale.

External views

13.7.5 Views to the works from beyond the airport campus, from sections of the Old Airport Road, the R108, Naul Road and the R132 / Swords Road, will be limited and distant. No vegetation removal is proposed as part of the works and therefore there will be no opening up of new views into the site from visual receptors along this road network. The receptor group along these roads are a small number of residents located along the Old Airport Road and the R108, motorists and spectators interested in the operation of the airport itself. The distance between such receptors and the main construction site will range between approximately 650m-1.4km. The majority of middle- and long-distance views will be screened by intervening topography and vegetation. Where this is not the case the works will be only one component of many in open distant views.

13.7.6 Residents, located along the western end of the Old Airport Road, will experience oblique views of the main construction site. While discernible in the distance, available views will not be altered considering the open and panoramic nature of existing views.

13.7.7 Compounds external to the airport but within the Application Site and study area are described in Chapter 3: Proposed Development. These are the Western Compound and the Southern Compound. Both compounds will be visible from the R108 to traffic approaching and passing them, although views will be partially screened by intervening hedgerows. Views from further afield, such as residents of Dunbro Lane (the closest of whom are within 200m of the Western Compound), will often be screened by intervening topography and vegetation.

13.7.8 Middle distance views from the Old Airport Road, sections of the R132 and R108 will allow for open views through the fence surrounding the airport. Construction works will be one component of many in the middle distance. While visible, they will not be prominent due to the distance between them and the viewer.

Summary

13.7.9 Visual effects will be localised and confined to locations within or in close proximity to the Application Site and construction traffic. As a result, the impact of the Proposed Development during construction will be low and temporary to the visual amenity. The magnitude of visual effects is considered to be minor for nearby residents (high sensitivity) or negligible for others (low sensitivity) and not significant.

Operation (Visual Effects)

13.7.10 Views of the Underpass will only be possible in the above ground sections at each end of the Underpass and will not be considered inappropriate or intrusive in the operational airport environment. The changes to the fixed links and nodes will be very low in magnitude or even imperceptible amongst the existing airport infrastructure. The Proposed Development is designed to support existing operations and does not alter or uplift the activities currently being undertaken at Dublin Airport beyond the existing 32mppa Cap or, more specifically, on the West Apron.

13.7.11 Changes to views of the Southern Compound once the Proposed Development is operational will also be negligible as no infrastructure will be constructed at this location. The Western Compound will continue to be visible from traffic passing on the R108 but hidden to more distant views.

13.7.12 As a result, there will be no material change to views. The introduction of a new piece of operational infrastructure to the airport environs is appropriate and will facilitate safe access between the Eastern and Western campuses.

13.8 Mitigation and Monitoring

13.8.1 Considering that the Proposed Development will result in minor or negligible (not significant) landscape and visual effects during the construction phase, and negligible (not significant) during the operational phase, there is no requirement for landscape and visual mitigation measures to be implemented. No monitoring measures are proposed.

13.9 Residual Effects and Conclusions

13.9.1 The Proposed Development will result in temporary, but not significant, landscape and visual effects during the construction works for receptors located close to the construction site. There will be no significant operational landscape and visual effects arising from the Proposed Development, and therefore no significant residual effects.

14. Material Assets (Waste)

14.1 Introduction

14.1.1 This chapter of the EIAR identifies, describes and assesses the direct and indirect significant effects of the Proposed Development on waste arisings and waste management capacity. Indirect impacts associated with the management of waste, for example on environmental factors such as water resources, air quality or noise are addressed in the relevant chapters where relevant.

14.1.2 This chapter was written by Dr Annette Hill BEng PhD MCIWM CEnv, a Principal Consultant in AECOM's Waste, Materials and Resources team with over 20 years' experience in preparing waste and recycling impact assessments. It was reviewed by Mike Bains BSc (Hons) MRSC, a Technical Director in AECOM's Waste, Materials and Resources team with over 25 years' experience in waste and recycling impact assessments.

14.1.3 For the purpose of this EIAR, waste is defined as per the European Waste Framework Directive (Directive 2008/98/EC)[1] as *'any substance or object which the holder discards or intends or is required to discard'*.

14.2 Legislation, Policy & Guidance

14.2.1 The following legislation, policy and guidance is relevant to this chapter and was considered during the assessment presented within it. General legislation, policy and guidance was also considered but is not listed as this has been covered in Chapter 4: Methodology.

Legislation & National Planning Policy

European Communities (Waste Directive) Regulations, 2011

14.2.2 The European Communities (Waste Directive) Regulations S.I. No. 126/2011[2] transpose the requirements of the European Waste Framework Directive (Directive 2008/98/EC)[1], as amended by Directive (EU) 2018/851[3], into Irish legislation. The Regulations require that waste prevention programmes and waste management plans are established and that they apply the waste hierarchy. The waste hierarchy prioritises waste prevention, followed by preparing for re-use, recycling, other recovery (including energy recovery) and finally disposal.

14.2.3 For construction and demolition waste, the Regulations[2] also require measures to be taken to achieve the following target:

- By 2020, the preparing for re-use, recycling and other material recovery, including backfilling operations using waste to substitute other materials, of non-hazardous construction and demolition waste excluding naturally occurring material defined in category 17 05 04 in the list of waste is required to have been increased to a minimum of 70% by weight.

14.2.4 To support the implementation of the waste hierarchy, the Regulations[2] also:

- Article 27 - give provision for an operator to determine that a material is a by-product and not a waste, where certain conditions are met and if approved by the Environmental Protection Agency (EPA).
- Article 28 – give provision for determining end-of-waste status, when a waste may cease to be a waste when it has undergone a recovery operation.

[1] The European Parliament and The Council of the European Union (2008) Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02008L0098-20180705
[2] Government of Ireland (2011) S.I. No. 126/2011 - European Communities (Waste Directive) Regulations 2011. Available at: https://www.irishstatutebook.ie/eli/2011/si/126/made/en/print
[3] European Union (2018) Directive (EU) 2018/851 of the European Parliament and of the Council of 30 May 2018 amending Directive 2008/98/EC on waste. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32018L0851

14.2.5 The assessment of waste within this chapter has taken account of the waste hierarchy in the management of waste, including the provisions under Article 27 and Article 28, and of the targets for recovery of non-hazardous construction and demolition waste.

A Waste Action Plan for a Circular Economy

14.2.6 A Waste Action Plan for a Circular Economy, Ireland's National Waste Policy 2022-2025[4] sets out Ireland's approach to transitioning to a circular economy.

14.2.7 For construction and demolition waste, the plan supports the provisions and targets of the European Communities (Waste Directive) Regulations[2] by undertaking to streamline the decision-making processes for by-product notifications and end-of-waste and updating best practice guidance in line with the waste hierarchy.

14.2.8 This document has been considered within the assessment as it sets out the priority approaches for the construction sector to support delivery of the national construction and demolition waste recovery target.

Regional & Local Planning Policy

Waste Management Plan for the Eastern-Midlands Region 2015 - 2021

14.2.9 For the purposes of waste management planning, Ireland is divided into three regions: Southern, Eastern-Midlands and Connacht-Ulster. Waste Management Plans for the three regions were published in May 2015. The Proposed Development is located within the Eastern-Midlands region and the Waste Management Plan for the Eastern-Midlands Region 2015 - 2021[5] provides the framework for the prevention and management of wastes in a safe and sustainable manner.

Fingal Development Plan 2017-2023

14.2.10 Fingal Development Plan 2017-2023[6] sets out the policies and objectives for the development of the County over the plan period.

14.2.11 The Plan supports the adoption of policies that have regard to the waste hierarchy. For construction and demolition waste, objectives include ensuring that waste management plans for new developments meet the relevant recycling / recovery targets for such waste, in accordance with the national legislation and regional waste management policy. The Plan also supports the recycling of construction and demolition waste to reduce the need for extraction of aggregates.

Draft Fingal Development Plan 2023 – 2029

14.2.12 The Draft Fingal Development Plan 2023 - 2029[7] sets out the spatial framework to guide future development within Fingal County.

14.2.13 Policies support the principles of the waste hierarchy, a shift towards the circular economy approach and the use of waste management plans for construction and demolition projects.

Dublin Airport Local Area Plan 2020

14.2.14 The Dublin Airport Local Area Plan[8] (LAP) sets out the main challenges and opportunities faced by the airport over the plan period.

14.2.15 The LAP sets out circular economy and waste management objectives that support the provision of proposals to aid the transition from a waste management economy to a green circular economy and promote a waste prevention and minimisation programme to target all aspects of waste in the LAP boundary area.

[4] Government of Ireland (2020) Waste Action Plan for a Circular Economy, Ireland's National Waste Policy 2022-2025. Available at: https://www.gov.ie/en/publication/4221c-waste-action-plan-for-a-circular-economy/
[5] Eastern Midlands Waste Region (2015) Waste Management Plan 2015-2021. Available at: http://emwr.ie/emwr-plan/
[6] Fingal County Council (2019) Fingal Development Plan 2017-2023. Available at https://www.fingal.ie/fingal-development-plan-2017-2023
[7] Fingal County Council (2022) Fingal Development Plan 2023 – 2029. Draft Plan. 24 February 2022. Available at: https://www.fingal.ie/fingal-development-plan-2023-2029-0
[8] Fingal County Council (2020). Dublin Airport Local Area Plan 2020. January 2020. Available at: https://www.fingal.ie/dublin-airport-local-area-plan-2020

Standards & Guidance

IEMA guide to Materials and Waste in Environmental Impact Assessment. Guidance for a proportionate approach

14.2.16 The IEMA guide to Materials and Waste in Environmental Impact Assessment. Guidance for a proportionate approach[9] provides guidance on the key terms, concepts and considerations for assessing the environmental impacts and effects of materials and waste, as part of the Environmental Impact Assessment process. The guide is focused on the UK regulatory framework, although the principles are broadly applicable to EU jurisdictions, and have been used to inform the assessment methodology.

Best Practice Guidelines for the Preparation of Resource & Waste Management Plans for Construction and Demolition Projects

14.2.17 The Best Practice Guidelines for the Preparation of Resource & Waste Management Plans for Construction and Demolition Projects[10] provides a practical approach which is informed by best practice in the prevention and management of construction and demolition wastes and resources from design through to construction and deconstruction. The guidelines provide clients, developers, designers, practitioners, contractors, sub-contractors and competent authorities with a common approach to preparing resource and waste management plans.

14.2.18 The guidelines address the best practice approach both prior to construction, including the stages of design, planning and procurement in advance of works on site, and during construction, relating to the effective management of resources and wastes during construction or demolition operations.

14.2.19 The guidelines have informed the preparation of the Proposed Development Construction Environmental Management Plan (CEMP).

14.3 Assessment Methodology

14.3.1 This section sets out the methodology adopted for the assessment. As described in Chapter 4: Methodology, the assessment has been carried out following the below methodology:

- Establishment of the baseline conditions, including identification and assessment of the receiving environment and receptor sensitivity
- Identification of environmental design measures and mitigation measures that form part of the construction methodology
- Identification of the potential impacts, and assessment of the magnitude of potential effects, and their significance
- Consideration of mitigation measures
- Assessment of residual effects

Study Area

14.3.2 The study area for waste arising from the construction of the Proposed Development comprises the area defined by the Application Site (including any temporary land requirements during construction), as defined in Chapter 3: Proposed Development.

14.3.3 The study area for assessing impacts of non-hazardous waste on waste arisings and waste management capacity comprises the whole of the Republic of Ireland due to the need to consider all available waste management infrastructure capacity.

[9] IEMA (2020) IEMA guide to: Materials and Waste in Environmental Impact Assessment. Guidance for a proportionate approach.
[10] EPA (2021) Best Practice Guidelines for the Preparation of Resource & Waste Management Plans for Construction and Demolition Projects. Available at: https://www.epa.ie/publications/circular-economy/resources/CDWasteGuidelines.pdf

14.3.4 The study area for assessing impacts of hazardous waste on waste arisings and waste management capacity also comprises the whole of Ireland, although it is noted that a proportion of hazardous waste arising in Ireland is managed outside of Ireland (see Table 14-6, below).

Methodology for Determining Construction Effects

14.3.5 The potential impacts of the Proposed Development with regards to waste are the effects that waste arisings generated on site will have on the capacity of waste management infrastructure in the study area and on meeting national targets for waste recovery.

14.3.6 The main construction phase impacts will be associated with the management of surplus excavated materials arising from excavation of the tunnel. Additional impacts from the construction of the Proposed Development (as set out in Chapter 3: Proposed Development) will be associated with the management of waste from:

- Demolition, site clearance and removal of areas of the existing apron and taxiway
- Surplus or damaged construction materials
- Construction material packaging
- Maintenance of plant and equipment used for construction
- Construction workforce activities

14.3.7 In the absence of waste-specific guidance or requirements to determine the magnitude and significance of effects, professional judgement and guidance available in other jurisdictions[9] has been used to define the following approach:

- Establishing the baseline waste arisings and infrastructure capacity for the study areas
- Estimating the likely types and quantities of waste that will be generated by the Proposed Development and the likely extent to which these will be recycled or recovered or require disposal
- For each category of waste, comparing the likely waste arisings from the Proposed Development to the baseline waste arisings and confirming whether sufficient management capacity is expected to be available
- Assessing whether the Proposed Development conforms to relevant Irish and European waste policies and strategies, specifically regarding targets for the recovery of non-hazardous construction and demolition waste (excluding naturally occurring soil and stones (waste code 17 05 04))

14.3.8 The criteria used for assessing the magnitude of impacts and significance of effects have been adapted from the methodology set out within the IEMA guide to Materials and Waste in Environmental Impact Assessment[9] to align with the availability of baseline data that is published in Ireland. In the absence of the specific baseline data required to assess the sensitivity of receptors (in line with the IEMA guidance[9]), medium receptor sensitivity is assumed. The assessment criteria are set out within Table 14-1.

Table 14-1 Magnitude of Impact and Significance of Effect Criteria (adapted from[9])

Magnitude of Impact	Effect (medium receptor sensitivity)	Significance of Effect	Criteria
No change	Neutral	Not significant	• Zero waste generation and disposal from the development. • Project achieves 100% overall material recovery/recycling (by weight) of non-hazardous construction and demolition waste (CDW) excluding naturally occurring soil and stones (waste code 17 05 04).
Negligible	Neutral or slight	Not significant	• Project waste for disposal is <1% of national waste arisings (for the relevant categories of waste). • Project achieves 90-99% overall material recovery/recycling (by weight) of non-hazardous construction and demolition waste (CDW) excluding naturally occurring soil and stones (waste code 17 05 04).
Minor	Slight	Not significant	• Project waste for disposal is 1-5% of national waste arisings (for the relevant categories of waste).

Magnitude of Impact	Effect (medium receptor sensitivity)	Significance of Effect	Criteria
			• Project achieves 60-89% overall material recovery/recycling (by weight) of non-hazardous construction and demolition waste (CDW) excluding naturally occurring soil and stones (waste code 17 05 04).
Moderate	Moderate	Significant	• Project waste for disposal is 6-10% of national waste arisings (for the relevant categories of waste). • Project achieves 30-59% overall material recovery/recycling (by weight) of non-hazardous construction and demolition waste (CDW) excluding naturally occurring soil and stones (waste code 17 05 04).
Major	Moderate or large or very large	Significant	• Project waste for disposal is >10% of national waste arisings (for the relevant categories of waste). • Project achieves <30% overall material recovery/recycling (by weight) of non-hazardous construction and demolition waste (CDW) excluding naturally occurring soil and stones (waste code 17 05 04).

Methodology for Determining Operational Effects

14.3.9 Operational waste impacts from the Proposed Development will be negligible as there will be no uplift in operational activities and will be confined to occasional maintenance and repair. Operational waste impacts do not need further assessment to demonstrate there will be no significant effects.

Limitations & Assumptions

14.3.10 This assessment has been developed based on the following limitations and assumptions:

- All third-party data used to generate the baseline is assumed to accurately reflect the current status of waste arisings and management in the adopted study areas.
- There is no collated published information on the potential changes to the national waste management capacity for the period within which the Proposed Development would be constructed. Accordingly, the current baseline is assumed to apply, as set out in paragraph 14.5.1.
- Waste arising from the offsite extraction, processing and manufacture of plant and materials used in the construction of the Proposed Development do not require further assessment to confirm that no significant effects are likely since such activities are undertaken within a manufacturing environment that are subject to their own waste management plans, facilities, and supply chain.

14.4 Current State of the Environment

14.4.1 The Current State of the Environment comprises baseline information on waste arisings and waste management in the Republic of Ireland. The baseline information has been sourced from the most recent data collated and published by the Environmental Protection Agency (EPA).

Construction and Demolition Waste Arisings

14.4.2 Table 14-2 summarises the types and quantities of construction and demolition waste collected by authorised waste collectors in Ireland in 2019, as reported by the EPA[11]. It shows that approximately 8,825,130 tonnes of construction and demolition waste was collected, with the majority comprising soil, stones and dredging spoil (84.8%).

Table 14-2 Construction and Demolition Waste Collected in Ireland in 2019[11]

Construction and demolition waste type	Quantity collected (tonnes)	Proportion of total (%)
Bituminous mixtures	113,454	1.3%
Concrete, brick, tile and gypsum	608,746	6.9%

[11] Environmental Protection Agency (2021) Construction & Demolition Waste Statistics for Ireland. Available at: https://www.epa.ie/our-services/monitoring--assessment/waste/national-waste-statistics/construction--demolition/

Metal	190,904	2.2%
Mixed construction and demolition waste	393,247	4.5%
Segregated wood, glass and plastic	30,423	0.3%
Soils, stones and dredging spoil (Note 1)	7,488,357	84.8%
Total	**8,825,130**	**100%**

Note 1: Hazardous contaminated soil generated in Ireland in 2019 amounted to 90,595 tonnes

Construction and Demolition Waste Management

14.4.3 Table 14-3 and Table 14-4 set out the treatment methods used for managing construction and demolition waste in Ireland in 2019, as reported by the EPA[11]. Waste treatment by backfilling (a recovery operation, carried out at authorised facilities, where suitable waste is used for land improvement, for reclamation purposes in excavated areas or for engineering purposes in landscaping; and where waste is a substitute for non-waste materials[11]) was the most utilised treatment method, managing 82.4% of construction and demolition waste, and mainly comprising of soils, stones and dredging spoil waste type.

Table 14-3 Construction and Demolition Waste Treatment (Tonnes) in Ireland in 2019[11]

Construction and demolition waste type	Treatment type				
	Recycling (tonnes)	Energy recovery (tonnes)	Backfilling (tonnes)	Disposal (tonnes)	Total (tonnes)
Bituminous mixtures	64,599	0	36,932	164	101,694
Concrete, brick, tile and gypsum (Note 1)	284,265	0	330,940 (Note 2)	15,164 (Note 2)	630,370
Metal waste	193,242	0	0	0	193,242
Mixed construction and demolition waste	10,407	857	48,825	20,826	80,915
Segregated wood, glass and plastic	13,999	19,177	2,317	14	35,507
Soils, stones and dredging spoil	29,649	0	6,764,078	643,041	7,436,769
Waste treatment residues	39	14,262	25,671	227,115	267,086
Total	**596,200**	**34,296**	**7,208,763**	**906,324**	**8,745,584**

Note 1: No gypsum was backfilled or landfilled

Note 2: The source data contains an error in the quantity of 'concrete, brick, tile and gypsum' reported as treated via backfilling and disposal. These order of magnitude errors have been amended in the above table

Table14-4 Construction and Demolition Waste Treatment (Percentage) in Ireland in 2019[11]

Construction and demolition waste type	Treatment type				
	Recycling (%)	Energy recovery (%)	Backfilling (%)	Disposal (%)	Total (%)
Bituminous mixtures	63.5	0	36.3	0.2	**100**
Concrete, brick, tile and gypsum (Note 1)	45.1	0	52.5	2.4	**100**
Metal waste	100	0	0	0	**100**
Mixed construction and demolition waste	12.9	1.1	60.3	25.7	**100**
Segregated wood, glass and plastic	39.4	54.0	6.5	0.04	**100**
Soils, stones and dredging spoil	0.4	0	91.0	8.6	**100**
Waste treatment residues	0.01	5.3	9.6	85.0	**100**
Total	**6.8**	**0.4**	**82.4**	**10.4**	**100**

Note 1: No gypsum was backfilled or landfilled

14.4.4 In 2019 approximately 96% of construction and demolition waste underwent final treatment in Ireland with approximately 4% (359,812 tonnes) exported for final treatment[11]. Exports mainly comprised soil and stone material and waste metals[11].

14.4.5 It should be noted that the reported quantities of construction and demolition waste collected (Table 14-2) and treated (Table 14-3) in Ireland may differ somewhat. The EPA identifies that the differences are due to the data being collated from different datasets. Waste collectors record waste as it enters the waste treatment network, whereas the final treatment data indicates what happens to waste at the end of its journey through the waste treatment network. This can lead to differences in waste classifications and quantities.

14.4.6 The EPA's 'Progress to EU Targets[12] reports Ireland's performance against targets set out in European Directives. In terms of the Waste Framework Directive (2008/98/EC)[1] target of *'Preparing for reuse, recycling and other material recovery (incl. beneficial backfilling operations using waste as a substitute) of 70% by weight of non-hazardous construction and demolition waste (excluding natural soils & stone), by 2020'*, a performance of 84% was reported for 2019, exceeding the 70% target.

Article 27 – By-product Notifications

14.4.7 Article 27 of the European Communities (Waste Directive) Regulations, 2011[2] allows an operator to decide, under certain circumstances, that a material is a by-product and not a waste. This provision is often invoked in connection with construction and demolition material, and particularly soil and stone. It allows materials to be used elsewhere in construction projects as a by-product and not discarded as a waste. Decisions made by economic operators under Article 27 must be notified to the EPA. The EPA may determine to agree with the economic operator's decision, as notified; alternatively, after consultation with the notifier and the relevant local authority, the EPA may determine that the notified material is waste[11].

14.4.8 Table 14-5 summarises the soil and stone by-product notifications submitted to the EPA in 2019. In 2019, the EPA received by-product notifications for 5,983,137 tonnes of soil and stone material. The EPA determined that 2,773,930 tonnes of the soil and stone notified were by-product, as notified, and that 49,020 tonnes were waste[11].

14.4.9 It is important to note that by-product notifications do not necessarily mean that any or all of the material was generated or indeed moved. Notifiers of by-product may not have proceeded with the activities related to the by-product notifications. However, if they did proceed, the materials would not have entered the waste management network or be included in the 2019 construction and demolition waste statistics.

Table 14-5 Soil and Stone By-Product Notifications Submitted, 2019[11]

Soil and stone by-product notifications	Quantity (tonnes)
Notifications withdrawn	1,048,180
By-product as notified	2,773,930
Determined as waste	49,020
No determination made	2,112,007
Total	**5,983,137**

Hazardous Waste Arisings and Management

14.4.10 The EPA reported that 557,221 tonnes of hazardous waste were generated in Ireland in 2020[13] and managed via the management routes shown in Table 14-6. The construction sector produced 32% of Ireland's hazardous waste in 2020. This mainly comprised dredging spoil (90,164 tonnes) and contaminated soil (78,474 tonnes), but also included smaller quantities of asbestos, asphalt, and

[12] Environmental Protection Agency (2021) Progress to EU Waste Targets. 1 December 2021. Available at: https://www.epa.ie/our-services/monitoring--assessment/waste/national-waste-statistics/progress-to-eu-targets/

[13] Environmental Protection Agency (2021) Hazardous Waste Statistics for Ireland. Available at: https://www.epa.ie/our-services/monitoring--assessment/waste/national-waste-statistics/hazardous/

contaminated wood, concrete, bricks, metals and tiles. There is no hazardous waste landfill capacity in Ireland[14].

Table 14-6 Hazardous Waste Generation and Management in 2020[13]

Waste type and management route	Quantity (tonnes)
Hazardous waste - treated at Irish hazardous waste treatment facilities	98,061
Hazardous waste - treated at EPA licenced facilities	148,445
Hazardous waste (excluding soils) – exported for treatment	260,945
Contaminated soil - treated in Ireland	5,871
Contaminated soil - exported for treatment	43,889
Total	**557,211**

14.5 Future Receiving Environment

14.5.1 There is no collated published information on the potential changes to the national waste management capacity for the period within which the Proposed Development would be constructed. The Construction & Demolition Waste - Soil and Stone Recovery / Disposal Capacity - Update Report 2020[15] presents a forecast of potential construction and demolition waste arisings to the year 2029 that takes account of the sharp reduction in arisings due to the impact of the Covid-19 pandemic. These forecasts indicate that construction and demolition waste arisings may return to pre-pandemic levels by 2025 / 2026, at the end of the Proposed Development construction period. Accordingly, the current baseline is assumed to apply between the planned commencement of construction of the Proposed Development through to its opening year (2022 to 2025).

14.6 Environmental Design & Management

14.6.1 The Applicant has developed a Dublin Airport draft Waste Minimisation Plan that has been submitted to Fingal County Council (FCC) as required by the Dublin Airport Local Area Plan[8] policies WM01 and WM02. These cover waste management and the circular economy and are to "*support, where appropriate, the provision of proposals to aid the transition from a waste management economy to a green circular economy*" and "*promote a waste prevention and minimisation programme to target all aspects of waste in the LAP boundary area, focusing on all airport, commercial and domestic waste producers*" respectively.

14.6.2 A preliminary Construction and Environmental Management Plan (CEMP) has been prepared for the Proposed Development to identify the minimum standards of environmental controls together with monitoring, inspection and reporting mechanisms to be adopted for all construction works.

14.6.3 The preliminary CEMP will be provided as part of the tender documents to tendering contractors for them to adopt all the recommendations and best practices outlined. The appointed contractor will be required to develop a detailed CEMP. The development of the detailed CEMP shall be in conjunction with the preliminary CEMP and with the Applicant's standard contract documentation (specifications, appendices and airport directions) and any associated planning conditions imposed to the Proposed Development.

14.6.4 The preliminary CEMP includes design and construction measures that apply the waste hierarchy principles and minimise effects on waste. These include:

- Designing the new fixed links to make use of current fixed link infrastructure connecting to the existing Pier along the same façade facets reusing the existing structural supports, thereby reducing waste.

[14] Environmental Protection Agency (2022) Waste infrastructure in Ireland. Available at: https://www.epa.ie/our-services/monitoring--assessment/waste/national-waste-statistics/infrastructure/
[15] Government of Ireland (2020) Construction & Demolition Waste - Soil and Stone Recovery / Disposal Capacity - Update Report 2020. Available at: http://southernwasteregion.ie/sites/default/files/National%20C%20%20D%20Report%20Dec%202020%20for%20Publication.pdf

- Planning for the temporary on-site storage of soils, excavated materials and other materials to facilitate reuse.
- Reusing excavated materials within the construction of the Proposed Development, where possible, to minimise the need to import and export material.
- Considering the extent to which pavement demolition material may potentially be reused or recycled for use in reconstructing the new pavement.
- Considering the importation to site of recycled aggregate material, as an alternative to primary aggregate, and establishing procedures to ensure it is uncontaminated.
- Establishing Key Performance Indicators (KPIs) for monitoring and reporting data on waste arising and diversion from landfill.

14.6.5 The preliminary CEMP contains a preliminary Waste Management Plan which sets out measures relating to waste management that would be implemented during construction of the Proposed Development. Contractors will be required to develop a Detailed Construction and Demolition Waste Management Plan (CDWMP) that complies with the requirements of the preliminary Waste Management Plan and updated in accordance with good practice guidance, where appropriate, including the best practice guidelines for the preparation of resource and waste management plans for construction and demolition projects, published by the EPA[10].

14.6.6 The contractor will regularly review and updated where required the assumptions on waste arisings and management and record and implement procedures for assessing, managing and recording waste arising on site. Opportunities for on-site and off-site reuse, recycling and recovery of excavated material and waste will be identified where feasible. Where required, an Article 27 by-product notification will be prepared and submitted for the necessary approvals prior to the commencement of construction works.

14.7 Assessment of Effects & Significance

14.7.1 Table 14-7 summarises the main types of materials that would be used and the wastes that are likely to arise during the construction of the Proposed Development.

Table 14-7 Estimated Material Use and Waste Arising (Construction)

Activity	Material Use	Waste Arising
Site remediation, preparation and earthworks, including excavation required for the tunnel	Fill material for construction purposes. Primary / secondary / recycled aggregates for ground stabilisation. Topsoil and subsoil for landscaping and restoration.	Surplus excavated materials. Surplus topsoil and subsoil. Unsuitable and contaminated soils and excavated materials. Vegetation from site clearance. Clearance of redundant operational infrastructure.
Demolition	Materials are not required for demolition works.	Waste arisings from the required demolition of existing buildings and infrastructure, including: • Asphalt planings • Concrete • Aggregates • Steel • Timber • Other materials, from strip out of buildings, structures and infrastructure.
Construction	Main construction materials including: • Aggregates (including well graded materials, granular fill, backfill, pipe bedding and drainage media) • Asphalt and bituminous materials • In-situ cast concrete (underpass, foundations and pavements) • Steel reinforcing bar (for reinforced concrete) • Precast concrete products (components, kerbs, drainage pipes, chambers and channels) • Structural steelwork (Fixed Links and Nodes) Other construction materials and construction products including: • Drainage pipework • Cladding (Fixed Links and Nodes) • Glazing (Fixed Links and Nodes) • Lifts (Fixed Links and Nodes) • Staircases (Fixed Links and Nodes)	Excess, offcuts and broken / damaged construction materials. Packaging from materials delivered to site. Construction worker wastes from offices and rest areas / canteens. Waste oils from construction plant.

14.7.2 The estimated main types and quantities of waste expected to arise from the construction of the Proposed Development are set out in Table 14-8 for excavated materials, Table 14-9 for demolition waste and Table 14-10 for construction waste. The quantities of excavated materials and demolition waste are estimated from the design of the Proposed Development and are as reported in the preliminary CEMP. The quantities of construction waste have been estimated by applying good practice guidance wastage rates[16] to the project-specific construction material estimates reported in the preliminary CEMP.

14.7.3 The ground investigation work undertaken on the site of the Proposed Development has not identified any potential sources of hazardous waste within the excavated materials expected to arise during construction. Hazardous waste arisings are therefore expected to comprise only very small quantities (compared to the total national hazardous waste management shown in Table 14-6) of oils, chemicals and similar materials typically used as part of construction activities. These wastes will be managed in line with legal requirements and standard procedures, as defined within the CEMP.

Table 14-8 Estimated Quantities of Excavated Materials Arising (Construction)

Material / waste type	Assumed density[16] (t/m^3)	Arisings		Proposed for reuse on site		Manage off site	
		Quantity (tonnes)	Quantity (m^3)	Quantity (tonnes)	Quantity (m^3)	Quantity (tonnes)	Quantity (m^3)
Excavated soils and stones	1.90	600,400	316,000	133,000	70,000	467,400	246,000

Table 14-9 Estimated Quantities of Demolition Waste Arising (Construction)

Material / waste type	Assumed density[16] (t/m^3)	Arisings		Proposed for reuse on site		Manage off site	
		Quantity (tonnes)	Quantity (m^3)	Quantity (tonnes)	Quantity (m^3)	Quantity (tonnes)	Quantity (m^3)
Concrete	2.50	27,375	10,950	Not confirmed	Not confirmed	27,375	10,950
Granular fill	1.90	13,870	7,300	Not confirmed	Not confirmed	13,870	7,300
Asphalt	2.40	20,880	8,700	Not confirmed	Not confirmed	20,880	8,700
Total		**62,125**	**26,950**			**62,125**	**26,950**

14.7.4 The estimated quantities of excavated materials, demolition waste and construction waste requiring off site management have been assessed against the total construction and demolition waste managed in Ireland in 2019, as presented in Table 14-3. As a worst-case scenario, it is assumed that all materials and waste that is not specifically identified for reuse on site is required to be managed off site. The assessment is shown in Table 14-11 and indicates that total waste arising from the construction of the Proposed Development would account for 6.4% of annual national construction and demolition waste management, indicating a moderate impact, which is significant. A more detailed assessment has therefore been undertaken to consider the specific materials and waste types and their proposed management routes in line with the waste hierarchy.

[16] Waste & Resources Action Programme (undated) Designing Out Waste Tool for Civil Engineering.

Table 14-10 Estimated Quantities of Construction Waste Arising (Construction)

Material / waste type	Assumed density[16] (t/m^3)	Quantity required for construction		Good practice wastage rate[16] (%)	Waste arisings		Proposed for reuse on site	Manage off site	
		Quantity (tonnes)	Quantity (m^3)		Quantity (tonnes)	Quantity (m^3)		Quantity (tonnes)	Quantity (m^3)
Concrete (Underpass)	2.7	204,120	75,600	2.5	5,103	1,890	Not confirmed	5,103	1,890
Concrete (Fixed Links & Nodes - Foundations)	2.7	2,039	755	2.5	51	19	Not confirmed	51	19
Reinforcement bars (Underpass)	7.85	12,100	1,541	5	605	77	Not confirmed	605	77
Steelwork (Fixed Links & Nodes – Including Node A, B and C)	7.85	50	6	5	3	0	Not confirmed	3	0
Asphalt (Underpass)	2.4	40,560	16,900	2.5	1,014	423	Not confirmed	1,014	423
Asphalt (Taxiways & Aprons)	2.4	7,920	3,300	2.5	198	83	Not confirmed	198	83
Pavement Quality Concrete (Taxiways & Aprons)	2.5	19,000	7,600	2.5	475	190	Not confirmed	475	190
Granular fill (Taxiways & Aprons)	1.9	19,760	10,400	5	988	520	Not confirmed	988	520
Granular fill (Underpass)	1.9	21,280	11,200	5	1,064	560	Not confirmed	1,064	560
Imported Backfill	1.9	380,000	200,000	5	19,000	10,000	Not confirmed	19,000	10,000
Total		**706,829**	**327,303**		**28,500**	**13,761**		**28,500**	**13,761**

Table 14-11 Assessment of Waste Arising (Construction) against Total Construction and Demolition Waste Managed in Ireland in 2019

Waste Type	Ireland Construction and Demolition Waste Managed in 2019 (tonnes)	Proposed Development				Proportion of Ireland's Total Construction and Demolition Waste Managed in 2019 (%)
		Excavation Waste (tonnes)	Demolition Waste (tonnes)	Construction Waste (tonnes)	Total (tonnes)	
Bituminous mixtures	101,694	-	20,880	1,212	22,092	21.7
Concrete, brick, tile and gypsum	630,370	-	27,375	5,629	33,004	5.2
Metal waste	193,242	-	-	608	608	0.3
Mixed construction and demolition waste	80,915	-	-	-	-	-
Segregated wood, glass and plastic	35,507	-	-	-	-	-
Soils, stones and dredging spoil	7,436,769	467,400	13,870	21,052	502,322	6.8
Waste treatment residues	267,086	-	-	-	-	-
Total	**8,745,584**	**467,400**	**62,125**	**28,500**	**558,025**	**6.4**

14.7.5 The treatment methods for waste arising from the Proposed Development that is forecast to require off site management, has been assessed by applying national waste treatment trends for each waste type, as presented in Table 14-4.

14.7.6 Outputs from the ground investigation work undertaken on the site of the Proposed Development indicate that the excavated materials arising during construction are expected to be suitable for management via backfilling at soil recovery facilities. Further consideration of the management options and capacity for excavated materials arising from the construction of the project are addressed within Appendix 14-1 Sustainable Management of Excavated Materials, which provides further support to the assessment.

14.7.7 The assessment shown in Table 14-12 includes all waste types forecast to require off-site disposal. The assessment shown in Table 14-12 estimates that total waste requiring disposal is likely to comprise approximately 44,000 tonnes, which equates to 4.9% of annual national construction and demolition waste treated via disposal, indicating a minor impact on finite disposal infrastructure capacity, which is not significant.

14.7.8 The assessment shown in Table 14-13 excludes naturally occurring soil and stones (waste code 17 05 04) i.e., non-hazardous excavated materials, as they are excluded from the Waste Framework Directive non-hazardous construction and demolition waste recovery target and therefore from the assessment of waste recovery. The assessment shown in Table 14-13 estimates that a total recovery rate (including recycling, energy recovery and backfilling) for non-hazardous construction and demolition waste (excluding naturally occurring soil and stones (waste code 17 05 04)) of about 95% is estimated to be achievable, indicating a negligible impact, which is not significant.

Table 14-12 Assessment of the Off-site Treatment of Waste Arising from Construction against National Waste Treatment Trends in 2019

Waste Type	Proposed Development – Waste Treatment Method				Proposed Development
	Recycling (tonnes)	Energy recovery (tonnes)	Backfilling (tonnes)	Disposal (tonnes)	Total (tonnes)
Bituminous mixtures	14,033	-	8,023	36	22,092
Concrete, brick, tile and gypsum	14,883	-	17,327	794	33,004
Metal waste	608	-	-	0	608
Mixed construction and demolition waste	-	-	-	-	-
Segregated wood, glass and plastic	-	-	-	-	-
Soils, stones and dredging spoil	2,003	-	456,885	43,435	502,322
Waste treatment residues	-	-	-	-	-
Total	**31,527**	**-**	**482,235**	**44,264**	**558,025**
% of Proposed Development total	**5.6**	**-**	**86.4**	**7.9**	**100**
% of national (by management route)	**5.3**	**-**	**6.7**	**4.9**	**6.4**

Table 14-13 Assessment of the Off-site Treatment of Waste Arising from Construction against National Waste Treatment Trends in 2019 (Excluding Naturally Occurring Soil and Stones (Waste Code 17 05 04))

Waste type	Proposed Development – Waste Treatment Method				Proposed Development
	Recycling (tonnes)	Energy recovery (tonnes)	Backfilling (tonnes)	Disposal (tonnes)	Total (tonnes)
Bituminous mixtures	14,033	-	8,023	36	22,092
Concrete, brick, tile and gypsum	14,883	-	17,327	794	33,004
Metal waste	608	-	-	-	608
Mixed construction and demolition waste	-	-	-	-	-
Segregated wood, glass and plastic	-	-	-	-	-
Soils, stones and dredging spoil	139	-	31,763	3,020	34,922
Waste treatment residues	-	-	-	-	-
Total	**29,663**	**-**	**57,113**	**3,849**	**90,626**
% of Proposed Development total	**32.7**	**-**	**63.0**	**4.3**	**100**
% of national (by management route)	**5.0**	**-**	**0.8**	**0.4**	**1.0**

14.8 Mitigation & Monitoring

14.8.1 The CEMP (see Appendix 3-1) sets out monitoring to be undertaken during the construction stage to ensure that the mitigation measures embedded in the Proposed Development, and those considered essential to mitigate the effects of construction activities, are appropriately implemented.

14.9 Residual Effects & Conclusions

14.9.1 Following implementation of mitigation and monitoring measures, the residual effects are as follows:

- Total waste requiring disposal is likely to comprise approximately 44,000 tonnes, which equates to 4.9% of national construction and demolition waste treated via disposal (Table 14-12), indicating a minor impact on finite disposal infrastructure capacity, which is not significant.
- A total recovery rate (including recycling, energy recovery and backfilling) of approximately 95% is likely to be achievable for non-hazardous construction and demolition waste (excluding naturally occurring soil and stones (waste code 17 05 04)) managed off site (Table 14-13), indicating a negligible impact, which is not significant.

15. Material Assets (Built Services)

15.1 Introduction

15.1.1 The EPA Guidance defines Material Assets as comprising:

- Waste management
- Roads and traffic
- Built services

15.1.2 The impact of traffic on the road network is considered in Chapter 5: Traffic & Transport and the impact on waste and waste management is addressed in Chapter 14: Material Assets (Waste). This chapter of the EIAR identifies, describes and assesses the direct and indirect significant effects of the Proposed Development on Material Assets (Built Services), including the consumption of resources provided by those assets such as gas, electricity and water. The temporary diversion of the culverted Cuckoo stream is assessed in Chapter 7: Water.

15.1.3 This chapter was written by Colin Bush, BA (Hons), MSc, CEnv, an Associate Director in AECOM's Environment and Sustainability team with over 18 years' experience in leading and managing EIA projects.

15.2 Legislation, Policy & Guidance

15.2.1 The following legislation, policy and guidance is relevant to this chapter and has been considered during the assessment. General legislation, policy and guidance has also been considered but is not listed as this has been covered in Chapter 4: Methodology.

Local Planning Policy

- Fingal County Development Plan 2017-2022, Fingal County Council (2017)
- Draft Fingal County Development Plan 2023-2029, Fingal County Council (2022)
- Dublin Airport Local Area Plan, Fingal County Council (2020)

15.3 Assessment Methodology

15.3.1 This section sets out the methodology adopted for the assessment. As described in Chapter 4: Methodology, the assessment has been carried out following the below methodology and the EPA Guidance:

- Establishment of the baseline conditions, including identification and assessment of the receiving environment and receptor sensitivity
- Identification of environmental design measures and mitigation measures that form part of the construction methodology
- Identification of the potential impacts, and assessment of the magnitude of potential effects, and their significance
- Consideration of mitigation measures
- Assessment of residual effects

15.3.2 Some of the baseline information used in this chapter to determine the Current State of the Environment and the Future Receiving Environment was supplied by the Applicant. The significance of effect is determined by comparing the impact of the Proposed Development with the baseline, in other words, the Future State of the Environment.

15.3.3 The significance of an effect or impact is determined by two distinct considerations:

- The sensitivity of the receptor likely to be affected, namely:
  - The value of the receptor
  - The susceptibility of the receptor to the type of change arising from the Proposed Development
  - The sensitivity to change is related to the value attached to the receptor
- The magnitude of the effect likely to occur, namely:
  - The size and scale of effect
  - The geographical extent of the areas that will be affected
  - The duration of the effect and its reversibility
  - The quality of the effect – whether it is neutral, positive or negative

15.3.4 In order to have a significant effect in isolation, the impact will generally need to be large and / or the receptor sensitive. This is discussed more fully in Chapter 4: Methodology.

15.3.5 For the purposes of this assessment, a change in annual consumption of resources of 1% or more over the total annual consumption in Ireland is considered a significant effect The 1% threshold was chosen to represent the point at which a material impact on resource availability might be apparent. A comparison of the change in annual consumption 'in airport terms' (i.e., the percentage change in consumption at Dublin Airport) is also provided for context purposes.

Limitations & Assumptions

15.3.6 There are no limitations to the assessment of potential effects on Material Assets (Built Services) presented in this chapter.

15.4 Current State of the Environment

15.4.1 Built services at Dublin Airport principally comprise mains gas, electricity and water hence the chapter focuses on this services and baseline data relating to them is set out below.

Gas

15.4.2 The Applicant has stated that Dublin Airport imported some 51,652,782 kWh of gas in 2019. This figure includes gas used by the Applicant and other third-party consumption across the airport campus.

15.4.3 By comparison, networked gas consumption in Ireland in 2018 was 57,129 GWh[1]. (Note a gigawatt hour, GWh, is equivalent to one million kilowatt hours, kWh.)

Electricity

15.4.4 In terms of electricity, the Applicant owns and operates a substation at Dardistown with dual supply 100kVA power lines to the airport was completed. This provides power to the airport directly. In 2018, the Applicant, in partnership with ESB, installed 268 solar panels on top of the airport's reservoir system which will provide more than half of the reservoir's annual energy requirements. The solar panels are connected directly to the airport's reservoir system.

15.4.5 According to data provided by the Applicant, electricity imported in 2019 was 68,459,564 kWh. Again, this figure includes consumption by the Applicant and other third-party consumption across the airport campus.

15.4.6 Total metered electricity consumption in Ireland was 26,505 GWh in 2019 and 27,056 GWh in 2020[2].

[1] https://www.cso.ie/en/releasesandpublications/er/ngc/networkedgasconsumption2018/
[2] https://www.cso.ie/en/releasesandpublications/er/mec/meteredelectricityconsumption2020/

Potable Water

15.4.7 Dublin Airport straddles the Blanchardstown High Level Water Supply Area (Ballycoolin Reservoir Source, via elevated storage) and the Airport Water Supply Area (Ballycoolin Source via the 24" (600mm) diameter Forrest Little Main). A 36" (900mm) diameter trunk main supplies the Supply Area and delivers roughly 660 litres per second. Distribution pipework from the reservoir supplies cold water to the existing terminal, hangers, workshops, Aer Lingus offices and fire hydrants on the fire ring main across the airport.

15.4.8 In 2019 some 570,949 m^3 of water was used by the Applicant and third parties at Dublin Airport, according to data provided by the Applicant.

15.5 Future Receiving Environment

15.5.1 It is considered that the Future Receiving Environment during the peak construction year (2024) or in the opening year (2025) is likely to be closer to, if not actually at, the 2019 levels. The aviation sector is recovering rapidly from the Covid-19 pandemic and consumption, whilst currently lower than in 2019, would return to the levels experienced then if passenger numbers return to the 32mppa Cap during this period.

15.5.2 That said, there is currently a live planning application by the Applicant (FW22A/0021) to the southeast of the airport for a large solar energy project. If permitted the project will provide up to 11% of the airport's annual electrical needs and up to 62% of its current maximum import, so reducing demand for electricity imported from the grid compared with 2018.

15.6 Environmental Design & Management

15.6.1 A preliminary Construction Environmental Management Plan (CEMP) has been prepared and is presented in Appendix 3-1. This contains comprehensive measures to govern on site activities during the construction phase and aims to prevent environmental impacts through best construction practice.

15.6.2 During the design process, studies to identify the location of services in the Application Site were undertaken and preliminary measures to safely address any impacts on such services were developed. These measures will be developed further during detailed design.

15.6.3 Estimates of monthly water consumption based on key materials and activities will be developed for general construction activities. Monthly environmental reporting will be completed to record water consumption and report on this as required.

15.7 Assessment of Effects & Significance

Determining Construction Effects

15.7.1 The potential construction impacts on Material Assets (Built Services) are described in Table 15-1. It identifies the potential source of the impact; potential impact pathways (route by which receptors can become impacted) and potential effects arising from the potential impact

Table 15-1: Potential Construction Effects

Potential Impact	Potential Impact Pathway	Potential Effect	Significant Effect?
Physical impact on built services	Construction impact on built services	Disruption to supply	No significant effect. Any necessary service diversions have been identified in the construction methodology.
	Accidental impact on built services	Accidental damage to unidentified below ground services	No significant effect. Contractors will be required to follow construction industry standard safety procedures and undertake risk assessments during

			construction as set out in the CEMP.
Consumption of resources	Use of gas, electricity and water during construction	Overuse of limited supplies of gas, electricity and water	No significant effect. Construction will not require use of gas, and only electricity for use in powering hand tools. The Applicant estimates 3,000 litres of water per day would be required during construction, mainly for vehicle washdown.

15.7.2 The table above makes clear that there are not likely to be any significant disruptions to built services or accidental damage to currently unidentified services at the construction site. The construction methodology does it require large volumes of gas, electricity or water to be consumed. Therefore, there are unlikely to be significant effects on Material Assets (Built Services) during construction.

Determining Operational Effects

15.7.3 The relevant potential operational impacts on built services material assets are set out in Table 15-2.

Table 15-2: Potential Operational Effects

Potential Impact	Potential Impact Pathway	Potential Effect	Significant Effect?
Consumption of resources	Use of gas, electricity and water during operation	Overuse of limited supplies of gas, electricity and water	Discussed further below.

Construction

15.7.4 As explained above, there is no likelihood of significant environmental effects on Material Assets (Built Services) during construction.

Operation

Use of Gas and Electricity

15.7.5 The estimated electricity demand and consumption for the proposed underpass is presented in Table 15-3. Gas is not required for operation of the Proposed Development.

Table 15-3: Energy Demand and Consumption Requirements

Utility Type	Peak Demand (kW)	Energy Consumption (kWh/year)
Luminaries (Lighting)	50	280,000
Drainage sump pumps	100	30,000
Other day-to-day consumers	45	200,000
Day-to Day total	**-**	**510,000**
Emergency consumers	1,000	20,000

15.7.6 Comparison of the figures in Table 15-3 with the electricity consumption of 68,459,564 kWh by the airport as a whole in 2019 shows that the demand as a result of the Proposed Development would increase by some 510,000 kWh (day-to-day demand, not including emergency situations). This is an increase of less than 1% of total baseline demand and a negligible increase compared with total Irish consumption (see Section 15.4, above). It is therefore not considered a significant effect.

Use of Water

15.7.7 The use of water by the Proposed Development is estimated be to as set out in Table 15-4.

Table 15-4: Water Consumption Requirements

Use	Total Consumption (m^3/year)
Wash water	60
Fixed Firefighting System water	90
Miscellaneous	30
Total	**180**

15.7.8 The total estimate of 180m^3 water consumption per annum is less than 0.04% of total consumption in 2019, which was 570,949 m^3. This is a negligible increase even in airport terms, let alone by comparison with national water consumption, and would not lead to significant environmental effects.

Summary of Effects

15.7.9 The Proposed Development will have no significant environmental effects on Material Assets (Built Services).

15.8 Mitigation & Monitoring

15.8.1 As the Proposed Development will have not any significant effects on Material Assets (Built Services), there is no requirement for mitigation to be implemented. No monitoring measures are proposed.

15.9 Residual Effects & Conclusions

15.9.1 There will be no significant residual effects on Material Assets (Built Services) as a result of the Proposed Development.

16. Major Accidents & Disasters

16.1 Introduction

16.1.1 The 2014 revision to the EIA Directive introduced the requirement for an assessment of the risk of major accidents and disasters into the scope of an EIA. As explained the recital of the Directive:

> *"In order to ensure a high level of protection of the environment, precautionary actions need to be taken for certain projects which, because of their vulnerability to major accidents, and/or natural disasters (such as flooding, sea level rise, or earthquakes) are likely to have significant adverse effects on the environment. For such projects, it is important to consider their vulnerability (exposure and resilience) to major accidents and/or disasters, the risk of those accidents and/or disasters occurring and the implications for the likelihood of significant adverse effects on the environment."*

16.1.2 Article 3 of the EIA Directive requires that the vulnerability of a project to *"the expected effects deriving from the vulnerability of the project to risks of major accidents and/or disasters that are relevant to the project concerned"* is assessed.

16.1.3 In Annex IV of the EIA Directive, this requirement is extended to cover *"… (d) the risks to human health, cultural heritage or the environment (for example due to accidents or disasters) …"*. Annex IV point 8 of the EIA Directive requires a "*description of the expected significant adverse effects of the project on the environment deriving from the vulnerability of the project to risks of major accidents and/or disasters which are relevant to the project concerned*".

16.1.4 Therefore, this chapter examines the degree to which the Proposed Development is at risk from, or of causing, major accidents and disasters including taking account of existing assessments under other regimes where applicable, e.g., Seveso designations relevant to the Airport site. The chapter thus covers the following matters:

- The vulnerability of the Proposed Development to natural disasters or a major accident from on- and off- site, existing and future sources of hazards
- The risk of the Proposed Development creating a new source of a major accident
- The environmental consequences, if any, of these events

16.1.5 This chapter was written by Colin Bush, BA(Hons), MSc, CEnv, an AECOM Associate Director from the Environment and Sustainability team with over 18 years' experience in leading and managing EIA projects.

16.2 Legislation, Policy & Guidance

16.2.1 The following legislation, policy and guidance is relevant to this chapter and has been considered during the assessment presented within it. General legislation, policy and guidance is described in Chapter 4: Methodology.

Legislation

- Directive 2004/54/EC on Minimum Safety Requirements for Tunnels
- Seveso-III Directive (2012/18/EU)

Guidance

- Guide to Risk Assessment in Major Emergency Management (Department of the Environment, Heritage and Local Government, 2010)

16.3 Assessment Methodology

16.3.1 This chapter provides an assessment of the risks to the Proposed Development from natural disasters or major accidents from existing sources of hazard. It also assesses the risk of the Proposed Development introducing a new hazard to the existing environment.

16.3.2 The approach draws on the guidance provided by the Department of the Environment, Heritage and Local Government on Risk Assessment in Major Emergency Management[1]. This advocates a four-stage approach:

- Establishing the context - describe the characteristics of the area for which the risk assessment is being completed, as this will influence both the likelihood and the impact of a major emergency
- Hazard Identification - review and note the generic hazards
- Risk Assessment - consider the overall risks presented by these hazards
- Recording potential hazards on a risk matrix - using the scales for impact and likelihood given in Table 16-1 and 16-2, respectively

16.3.3 The risk assessment is set out in Table 16-3, and comprises:

- Vulnerability of the Proposed Development to natural disasters during construction
- Vulnerability of the Proposed Development from on-site sources during construction
- Vulnerability of the Proposed Development from off-site sources during construction
- Vulnerability of off-site receptors during construction
- Vulnerability of the Proposed Development to natural disasters during operation
- Vulnerability of the Proposed Development from on-site sources during operation
- Vulnerability of the Proposed Development from off-site sources during operation

16.3.4 The risk assessment notes the risks that exist for each category of hazard (natural disaster, on- or off-site hazards and from the Proposed Development itself). The likelihood of each risk occurring is assessed, with supporting evidence where this can be obtained, and the likely impact is documented. Where mitigation measures are available to lessen the severity of impact, these are noted, and a residual impact is determined. This residual impact is then combined with the likelihood of the risk occurring to determine the residual risk.

16.3.5 A residual risk score of 8 or above, equivalent to a limited impact (ranking of 2) that is likely to occur (ranking of 4) is considered significant.

Table 16-1: Impact of Risk

Ranking	Category	Impact	Description
1	Minor	Life, Health, Welfare Environment Infrastructure Social	Small number of people affected; no fatalities and small number of minor injuries with first aid treatment. No contamination, localised effects <0.5M Euros Minor localised disruption to community services or infrastructure (<6 hours).
2	Limited	Life, Health, Welfare Environment Infrastructure Social	Single fatality; limited number of people affected; a few serious injuries with hospitalisation and medical treatment required. Localised displacement of a small number of people for 6-24 hours. Personal support satisfied through local arrangements. Simple contamination, localised effects of short duration 0.5-3M Euros Normal community functioning with some inconvenience.

[1] https://www.gov.ie/en/publication/37414-a-guide-to-risk-assessment-in-major-emergency-management-january-2010/

3	Serious	Life, Health, Welfare Environment Infrastructure Social	Significant number of people in affected area impacted with multiple fatalities (<5), multiple serious or extensive injuries (20), significant hospitalisation. Large number of people displaced for 6- 24 hours or possibly beyond; up to 500 evacuated. External resources required for personal support. Simple contamination, widespread effects or extended duration 3-10M Euros Community only partially functioning,
4	Very Serious	Life, Health, Welfare Environment Infrastructure Social	5 to 50 fatalities, up to 100 serious injuries, up to 2000 evacuated Heavy contamination, localised effects or extended duration 10-25M Euros Community functioning poorly, minimal services available
5	Catastrophic	Life, Health, Welfare Environment Infrastructure Social	Large numbers of people impacted with significant numbers of fatalities (>50), injuries in the hundreds, more than 2000 evacuated. Very heavy contamination, widespread effects of extended duration. >25M Euros Serious damage to infrastructure causing significant disruption to, or loss of, key services for prolonged period. Community unable to function without significant support.

Table 16-2: Likelihood of Risk Occurring

Ranking	Category	Description
1	Extremely Unlikely	May occur only in exceptional circumstances; once every 500 or more years
2	Very Unlikely	Is not expected to occur; and/or no recorded incidents or anecdotal evidence; and/or very few incidents in associated organisations, facilities or communicates; and / or little opportunity, reason or means to occur; May occur once every 100-500 years.
3	Unlikely	May occur at some time; and /or few, infrequent, random recorded incidents or little anecdotal evidence; some incidents in associated or comparable organisations worldwide; some opportunity, reason or means to occur; may occur once per 10-100 years.
4	Likely	Likely to or may occur; regular recorded incidents and strong anecdotal evidence and will probably occur once per 1-10 years
5	Very Likely	Very likely to occur; high level of recorded incidents and/or strong anecdotal evidence. Will probably occur more than once a year.

Limitations & Assumptions

16.3.6 There are limitations to the availability of data to support the assessment of potential effects on the risk of Major Accidents & Disasters presented in this chapter. By definition, such incidents are rare and may never have occurred in the past. The assessment of their likelihood of occurrence in future is therefore based on a reasonable worst case in some instances.

16.4 Current State of the Environment

16.4.1 This section describes the potential sources of threat to the Application Site in terms of its vulnerability to natural disasters and other potential sources of hazard off site.

Potential Sources of Natural Disasters

16.4.2 There are several categories of weather-related hazard with the potential to cause a natural disaster:

- Extreme rainfall events and subsequent flooding
- Strong winds, tornadoes

- High temperatures, heat waves and drought
- Snow and ice
- Lightning

16.4.3 Storm events typically occur four or five time per year in Ireland, with western areas most affected[2]. An extreme rainfall event, affecting northern and eastern areas of Ireland and occurring in October 2011, saw heavy rainfall combined with high rainfall totals the previous day, lead to a saturation of soils and flooding occurred in some eastern areas. Dublin Airport reported a 9-hour rainfall of 66.8 mm, leading to some flights being delayed or cancelled, but no disaster occurred. This rainfall had an annual probability of 1 in 100[3].

16.4.4 From the middle of November 2010, the weather turned progressively colder across Ireland. By the end of the month, there were accumulations of snow over most of the country, accompanied by extremely low temperatures. At -8.4°C, Dublin Airport recorded its lowest November temperature on record on the 28th.

16.4.5 Certain geological hazards may also cause natural disasters in some circumstances:

- Ground instability
- Landslides
- Ground collapse and sinkholes

16.4.6 However, according to Geological Survey Ireland (GSI) Dublin Airport is not susceptible to ground instability and landslides[4].

16.4.7 Related to these are seismic hazards:

- Earthquakes
- Tremors

16.4.8 Data from the Irish National Seismic Network indicate that earthquakes in Ireland are rare and of minor strength. Since 1980 the largest earthquakes have had a magnitude of three, which can be felt by people but rarely cause any damage, and none have occurred near Dublin Airport[5].

16.4.9 Space weather may also cause natural disasters:

- Geomagnetic storms
- Radiation storms
- Solar flares

16.4.10 The European Space Agency notes that space-based telecommunications, broadcasting, weather services and navigation, power distribution and terrestrial communications, can be affected by space weather[6]. These effects come about owing to activity on the surface of the sun, which peaks about every 11 years or so, with the next peak expected in 2025[7].

16.4.11 Other hazards that could cause natural disasters include:

- Wildfires
- Sea level rise
- Tsunamis

16.4.12 According to University College Cork, wildfires are commonly associated with periods of dry weather, and may be started accidentally or as a result of controlled burns which become uncontrolled. Setting fire to vegetation is prohibited between March 1st and August 31st each year but wildfires can occur at other times of year – for example there were large gorse fires in the Dublin Mountains and Wicklow

[2] Government of Ireland, Draft National Risk Assessment, Overview of Strategic Risks 2021/2022
[3] https://www.met.ie/cms/assets/uploads/2017/08/HeavyRain241011.pdf
[4] https://www.gsi.ie/en-ie/data-and-maps/Pages/Geohazards.aspx#landslides
[5] https://www.insn.ie/confirmed/
[6] https://www.esa.int/ESA_Multimedia/Images/2018/01/Space_weather_effects
[7] https://www.nasa.gov/feature/goddard/2021/five-questions-about-space-weather-and-its-effects-on-earth-answered

Mountains in February 2019[8]. Hotter, drier summers associated with climate change would increase the risk of wildfires breaking out.

16.4.13 Sea level rise is not likely to affect Dublin Airport which is located away from the coast. According to GSI, the Irish coast is vulnerable to tsunamis from distant earthquakes and submarine landslides. For example, the Lisbon earthquakes of 1755 and 1761 caused tsunamis that reached Ireland. GSI believes that the likely worst-case tsunamis around Ireland would be similar to the level of coastal flooding seen during storm surges, although they would occur much more quickly leaving little time to react[9]. If this is correct, Dublin Airport would be unaffected by tsunamis.

Potential Sources of Offsite Hazards

16.4.14 Two main offsite (i.e. beyond the Application Site) hazards exist. These are aircraft movements, including taxiing, take-offs and landings, and the fuel farm facility, on Corballis Road South operated by CLH Aviation Ireland Ltd. On behalf of the Applicant.

16.4.15 The risk of aviation accidents was investigated recently as part of the North Runway Relevant Action application and this exercise concluded that the risk of aviation accidents was "well within the level that is considered acceptable"[10]. This is supported by the historical record as the Bureau of Aircraft Accident Archives lists only two crashes at Dublin Airport, both in the 1960s[11].

16.4.16 The fuel farm is a known hazard regulated by the Health and Safety Authority as a lower tier Seveso establishment[12]. This requires the operator to operate the site in accordance with a major accident prevention policy and notify the regulator of any accidents that occur.

16.5 Future Receiving Environment

16.5.1 The Future Receiving Environment is likely to be similar to the Current State of the Environment. However, an important known change once the North Runway becomes operational in August 2022 is that on safety grounds the West Apron Surface Crossing can no longer be used. Instead, a crossing utilising the Northern Perimeter Road must be used until the Proposed Development is constructed.

16.6 Environmental Design & Management

16.6.1 Safety was the key consideration in the design of the Underpass and its twin cell configuration (see Chapter 3: Proposed Development for more details) was chosen with this in mind.

16.6.2 IAA SRD is the Irish Aviation safety regulator and is mandated to review and approve any proposed changes to the airfield infrastructure to ensure operational safety during both construction and on completion[13]. It will ensure compliance with European Aviation Safety Authority (EASA) Regulations.

16.6.3 Further, the EU Directive (2004/54/EC)[14], applicable to the Trans-European Road Network provides overall high-level requirements for road tunnel safety.

16.6.4 There are several incorporated safety measures, such as mechanical ventilation, which neither document states as mandatory for all tunnels in the same category as the Proposed Development. However, the Applicant specified that these items should be included.

16.6.5 A Flood Risk Assessment has been carried out for the Underpass itself, which concludes that with the implementation of identified mitigation measures such as fitting of a waterproof membrane to prevent ingress of groundwater, design measures to minimise the volume of rainwater that can enter via the

[8] https://www.ucc.ie/en/flares/thescienceofwildfires/
[9] https://www.gsi.ie/en-ie/programmes-and-projects/geohazards/activities/Pages/Tsunami-Hazard-and-Response.aspx
[10] https://www.dublinairport.com/docs/default-source/north-runway---public-information/2-environmental-impact-assessment-report.pdf?sfvrsn=f1ad464b_4
[11] https://www.baaa-acro.com/crash-archives
[12] https://www.hsa.ie/irish/irl%20-%20Sectors/Seveso_11/List_of_Establishments/Lower_Tier_Establishments_by_Region1/Lower_Tier_Establishments_in_Dublin_Louth/
[13] https://www.iaa.ie/safety/state-safety-programme/iaa-safety-policy-statement
[14] Directive 2004/54/EC of the European Parliament of 29 April 2004 on Minimum Safety Requirements for Tunnels.

tunnel portals and adequate pumping / storage, there is only a residual risk of flooding. The residual risk would be managed by closure of the Underpass pending investigations and maintenance.

16.6.6 The design of the stand reconfigurations around Pier 3 and the West Apron was subject to strict guidance from International Civil Aviation Organisation (ICAO) and therefore meet internationally recognised levels of safety.

16.6.7 A preliminary Construction Environmental Management Plan (CEMP) (see Appendix 3-1) has been prepared to set out the standard measures being taken to govern the activities on the construction site and minimise environmental impacts. This also covers matters of safety and response to potential environmental incidents.

16.7 Assessment of Effects & Significance

16.7.1 The full assessment of major accidents and disasters is set out in Table 16-3. The following summarises the main findings. The highest residual risk score is 4, meaning that none of the residual risks are considered significant.

Vulnerability of the Proposed Development to Natural Disasters

16.7.2 The Proposed Development is assessed as being at risk of **minor** impact from a variety of natural disasters during construction. The likelihood of such disasters occurring is assessed as **unlikely** (once in 10-100 years).

16.7.3 The operational Proposed Development is assessed as being at risk of **minor** impact from natural disasters, principally flooding and high winds. The likelihood of such disasters occurring is assessed as **likely** (once in 1-10 years).

Vulnerability of the Proposed Development to Onsite Hazards

16.7.4 The Proposed Development is assessed as being at risk of **minor** impact from on-site risks, principally the risks of fire, explosion or other accidents, during construction. The likelihood of such disasters occurring is assessed as **likely** (once in 1-10 years).

16.7.5 Once operational, the Proposed Development is assessed as being at risk of **minor** impact from onsite hazards, road traffic accidents being considered the main threat. The likelihood of such disasters occurring is assessed as **unlikely** (once in 10-100 years).

Vulnerability of the Proposed Development to Offsite Hazards

16.7.6 The Proposed Development is assessed as being at risk of **minor** impact from offsite hazards during both construction and operation. The likelihood of such disasters occurring is assessed as **unlikely** (once in 10-100 years).

Vulnerability of the Offsite Receptors to the Proposed Development

16.7.7 Offsite receptors are assessed as being at risk of **limited** impact from the Proposed Development, in particular road traffic accidents, during construction. The likelihood of such disasters occurring is assessed as **unlikely** (once in 10-100 years).

16.7.8 Once operational the Proposed Development will improve the safety of offsite receptors. It will have no impacts outside the airport as there will be no change to aircraft operations or operational ground traffic generated as a result of the Proposed Development. However, as safety critical infrastructure, the Proposed Development is designed to reduce risk and improve the safety of crossing to and from the West Apron compared with the current temporary arrangements (see Chapter 2: Alternatives for details of these).

Table 16-3: Risk Assessment

Risk	Risk Effect (Examples)	Likelihood	Unmitigated Impact	Evidence / Mitigation	Residual Impact	Residual Risk
VULNERABILITY OF PROPOSED DEVELOPMENT TO NATURAL DISASTERS DURING CONSTRUCTION						
Extreme rainfall events and subsequent flooding	• Flooding of the Application Site	3	1	Known incidences of extreme weather https://www.met.ie/climate/weather-extreme-records Mitigation is existing drainage at airport, warnings of storms etc.	1	3
Strong winds, tornadoes	• Creation of Foreign Object Debris hazard	3	3	Known incidences of extreme weather https://www.met.ie/climate/weather-extreme-records Mitigation is existing aviation safety measures to protect taxiways and runways	1	3
High temperatures, heat waves and drought	• Heat • Dust from construction site due to dry weather	3	1	Known incidences of extreme weather https://www.met.ie/climate/weather-extreme-records Mitigation is health and safety measures at site to avoid risks to workers	1	3
Snow and ice	• Extreme cold weather including snowfall • Cold weather resulting in icy surfaces	3	1	Known incidences of extreme weather https://www.met.ie/climate/weather-extreme-records Mitigation is health and safety measures at site to avoid risks to workers	1	3
Lightning	• Damage to tall equipment which may attract lightning (e.g., cranes).	3	2	Known incidences of extreme weather https://www.met.ie/climate/weather-extreme-records Mitigation is health and safety measures at site to avoid risks to workers	1	3
Geological hazards, e.g., ground instability, landslides, ground collapse and sinkholes	• Application Site is not located within an area at risk of geological hazards	n/a	n/a	n/a	n/a	n/a
Seismic hazards, e.g., earthquakes, tremors	• Application Site is not located within an area at risk of seismic hazards	n/a	n/a	n/a	n/a	n/a
Space weather (e.g., geomagnetic storms, radiation storms and solar flares)	• Disruption of telecommunications • Increased radiation	1	1	None specifically; Proposed Development not vulnerable to the effects of space weather	1	1
Wildfires	• Application Site is not located within an area at risk of wildfires	n/a	n/a	n/a	n/a	n/a
Sea level rise, tsunamis	• Application Site is not located within an area at risk of sea level rise or tsunamis	n/a	n/a	n/a	n/a	n/a
VULNERABILITY OF PROPOSED DEVELOPMENT FROM ON-SITE SOURCES DURING CONSTRUCTION						
Fire and/or explosion at the construction site, or other accident	• Cutting or drilling into unidentified utilities • Release of landfill gas as a result of construction activities • Storage and handling of fuel or other flammable and combustible material • Explosion risk associated with fuel pipeline, e.g., due to leaks, over pressurisation, drilling, cutting, welding • Electrical faults and faulty wiring • Hot work operations (e.g., welding, smouldering, grinding etc) • Smoking	4	2	Mitigation is health and safety measures at site to avoid risks to workforce	1	4
Ground instability	• Potential instability of excavations	3	3	Mitigation is health and safety measures at site to avoid risks to workers and proposed construction methodology	1	3
Major leaks and spillages at the construction site resulting in contamination or release of hazardous substances	• Handling and storage of hazardous substances, i.e., chemicals and fuels • Loss of containment • Contaminated run-off from site • Creation of new drainage pathways to sensitive receptors	3	2	Mitigation is health and safety measures at site to avoid off-site risks	1	2
VULNERABILITY OF PROPOSED DEVELOPMENT FROM OFF-SITE SOURCES DURING CONSTRUCTION						
Fire at a neighbouring site	• Fire at a neighbouring site impacting on the construction of the Proposed Development	3	3	Biggest risk would be from fuel storage facility nearby, but this is regulated under the Seveso Directive to ensure safety	1	3
Explosion and structural collapse at neighbouring sites	• Explosion and structural collapse impacting on the construction of the Proposed Development	3	3	Biggest risk would be from fuel storage facility nearby, but this is regulated under the Seveso Directive to ensure safety	1	3

Vandalism/crime/terrorism leading to increased risk to the safety of members of public and site workers	• Criminal damage/ vandalism • Theft • Terrorist acts • Hijacked aircraft • Unauthorised vehicles accessing the construction site	3	2	Mitigation is existing aviation safety measures and position of most of the Proposed Development in the secure, airside location	1	2
Civil unrest or protest	• Members of the public protesting • Airport staff industrial action	3	1	Mitigation is existing aviation safety measures and position of most of the Proposed Development in the secure, airside location	1	2
Disease outbreak and infestation	• Disease outbreak or epidemics impacting the construction workers	3	1	Mitigation is existing health and safety measures	1	1
VULNERABILITY OF OFF-SITE RECEPTORS DURING CONSTRUCTION						
Loss of utilities	• Unidentified utilities, including gas, electricity, water and broadband impacted by excavation or other works	3	2	Mitigation is health and safety measures at site to avoid off-site risks and utilities surveys to detect unknown below ground utilities		
Construction of the Proposed Development impacting on the vulnerability of a receptor to a MA&D hazard	• Increased response time of emergency services	1	2	Unlikely that emergency services would need to cross the Application Site in an emergency situation given that most of the Proposed Development is located in the airfield	1	2
Impacts on road safety caused by the construction traffic of the Proposed Development	• Road traffic accidents involving Proposed Development's construction traffic	3	2	Mitigation is health and safety measures at site to avoid off-site risks	2	4
Emergency response activities implemented on the Application Site impacting on sensitive receptors	• Water from fire extinguishing draining into environmentally sensitive areas and/ or controlled waters	3	1	Mitigation is health and safety measures at site to avoid off-site risks	1	1
Accidents resulting from the interface of existing airport operations and the construction activities associated with the Proposed Development (under normal or emergency conditions)	• Construction activities causing an aircraft accident due to infringement of clearance zones • Construction works causing electronic interference to airport radio and telecommunications systems • Construction lighting disrupting visibility • Collision of aircraft or airport vehicles with construction traffic.	3	1	Mitigation is health and safety measures at site to avoid off-site risks and existing aviation safety measures to protect aircraft operations	1	3
VULNERABILITY OF PROPOSED DEVELOPMENT TO NATURAL DISASTERS DURING OPERATION						
Extreme rainfall events and subsequent flooding	• Flooding of the Application Site	4	1	Known incidences of extreme weather https://www.met.ie/climate/weather-extreme-records Mitigation is existing drainage at airport, design of the Underpass, warnings of storms etc.	1	4
Strong winds, tornadoes	• Creation of Foreign Object Debris hazard	4	3	Known incidences of extreme weather https://www.met.ie/climate/weather-extreme-records Mitigation is existing aviation safety measures to protect taxiways and runways	1	4
High temperatures, heat waves and drought	• Proposed Development is not vulnerable to high temperatures, heat waves or drought	n/a	n/a	n/a	n/a	n/a
Snow and ice	• Proposed Development is not vulnerable to snow and ice	n/a	n/a	n/a	n/a	n/a
Geological hazards, e.g., ground instability, landslides, ground collapse and sinkholes	• Unstable ground conditions, landslides, sinkholes following heavy rainfall leading to ground collapse	n/a	n/a	n/a	n/a	n/a
Seismic hazards, e.g., earthquakes, tremors	• Earthquakes, tremors resulting in physical damage	n/a	n/a	n/a	n/a	n/a
Space weather (e.g., geomagnetic storms, radiation storms and solar flares)	• Disruption of telecommunications • Increased radiation	2	1	None specifically; Proposed Development not vulnerable to the effects of space weather	1	1
Wildfires	• Application Site is not located within an area at risk of wildfires	n/a	n/a	n/a	n/a	n/a
Sea level rise, tsunamis	• Application Site is not located within an area at risk of sea level rise or tsunamis	n/a	n/a	n/a	n/a	n/a
VULNERABILITY OF PROPOSED DEVELOPMENT FROM ON-SITE SOURCES DURING OPERATION						
Fire and/or explosion at the operational site	• Road traffic accidents	3	3	Mitigation is twin-cell design of the Underpass and other fire safety measures	1	3

Ground instability	• Application Site is not located within an area at risk of ground instability	n/a	n/a	n/a	n/a	n/a
Major leaks and spillages at the Application Site resulting in contamination or release of hazardous substances	• Proposed Development does not comprise any infrastructure posing a risk of major leaks or spillages	n/a	n/a	n/a	n/a	n/a
Impacts on road safety due to an increase in traffic movements associated with the Proposed Development	• Proposed Development does not alter the number of vehicles using the internal airport roads or external highways in the operational situation	n/a	n/a	n/a	n/a	n/a
Aircraft accidents	• Proposed Development does not alter the number of aircraft movements in the operational situation	n/a	n/a	n/a	n/a	n/a
Emergency response activities implemented on the Application Site impacting on sensitive receptors	• Water from fire extinguishing draining into environmentally sensitive areas and/ or controlled waters	2	1	None specifically; likelihood of fire is not high and only important receptor that might be so affected is the Cuckoo stream which is culverted in the Application Site	1	2
VULNERABILITY OF PROPOSED DEVELOPMENT FROM OFF-SITE SOURCES DURING OPERATION						
Fire at a neighbouring site	• Fire at a neighbouring site impacting on the construction of the Proposed Development	3	3	Biggest risk would be from fuel storage facility nearby, but this is regulated under the Seveso Directive to ensure safety	1	3
Explosion and structural collapse at neighbouring sites	• Explosion and structural collapse impacting on the construction of the Proposed Development	3	3	Biggest risk would be from fuel storage facility nearby, but this is regulated under the Seveso Directive to ensure safety	1	3
Vandalism/crime/terrorism leading to increased risk to the safety of members of public	• Criminal damage/ vandalism • Theft • Terrorist acts • Hijacked aircraft • Unauthorised vehicles accessing the construction site	3	2	Mitigation is existing aviation safety measures and position of most of the Proposed Development in the secure, airside location	1	2
Civil unrest or protest	• Members of the public protesting • Airport staff industrial action	3	1	Mitigation is existing aviation safety measures and position of most of the Proposed Development in the secure, airside location	1	2
Aircraft accidents	• Proposed Development does not alter the number of aircraft movements in the operational situation	n/a	n/a	n/a	n/a	n/a

16.8 Mitigation & Monitoring

16.8.1 As the Proposed Development will not have any significant effects on the potential for Major Accidents & Disasters, there is no requirement for mitigation to be implemented. No monitoring measures are proposed.

16.9 Residual Effects & Conclusions

16.9.1 There will be no significant residual effects as a result of the Proposed Development on the potential for Major Accidents & Disasters in construction or operation.

17. Population & Human Health

17.1 Introduction

17.1.1 This chapter of the EIAR identifies, describes and assesses the direct and indirect significant effects of the Proposed Development on Population & Human Health.

17.1.2 This chapter was written by Colin Bush, BA(Hons), MSc, CEnv, an AECOM Associate Director from the Environment and Sustainability team with over 18 years' experience in leading and managing EIA projects.

17.1.3 The EPA Guidance suggests that the matters set out in Table 17-1, below, might be considered in an EIA in respect of Population & Human Health.

Table 17-1: Matters Considered in the EIA

Matter	Considered further in the EIA?
Employment	No. There will be a peak of about 150 construction jobs created by the construction of the Proposed Development, which would thus have a beneficial impact. The effect will be temporary and there will be no long-term job creation, thus the effect will not be significant.
Settlement Patterns	No. The operational Proposed Development is located primarily airside at Dublin Airport, provides only airport-related infrastructure and consequently has no potential to affect settlement patterns away from the airport.
Land-Use Patterns	Yes. Construction of the Western Compound will result in a minor land use change. The environmental effects of this land use change are considered in Chapter 6: Land & Soils, Chapter 7: Water, Chapter 8: Air Quality and Chapter 9: Noise.
Baseline Population	No. The Proposed Development will have no effect on population since it provides only airport-related infrastructure.
Demographic Trends	No. The Proposed Development will have no effect on demographics since it provides only airport-related infrastructure.
Human Health (considered with reference to other headings such as water and air)	Yes. There is potential for indirect heath impacts upon sensitive receptors from construction traffic noise along the public road network. This is primarily assessed in Chapter 9: Noise but potential impacts on health are discussed here. No residual significant effects are identified in Chapter 6: Land & Soils, Chapter 7: Water, Chapter 8: Air Quality or Chapter 16: Major Accidents & Disasters (being the other chapters which could identify indirect impacts on human health as a result of construction work).
Amenity	No. The Proposed Development will be constructed primarily within the Airport campus and will not affect public amenity.

17.1.4 Accordingly, the potential for indirect effects on health resulting from noise is the focus of this chapter.

17.2 Legislation, Policy & Guidance

17.2.1 The following legislation, policy and guidance are relevant to methodology in this chapter and were considered during the assessment presented within it. General legislation, policy and guidance were also considered but is not listed as this has been covered in Chapter 4: Methodology.

Legislation & National Planning Policy

17.2.2 The National Planning Framework (NPF) (GoI, 2018) is the Irish Government's high-level strategic plan for future growth and planning. This includes Policy Objective 65 which states the following with regards to noise:

"Promote the pro-active management of noise where it is likely to have significant adverse impacts on health and quality of life and support the aims of the Environmental Noise Regulations through national planning guidance and Noise Action Plans".

Regional & Local Planning Policy

- Fingal Development Plan 2017-2023
- Draft Fingal Development Plan 2023-2029
- Dublin Airport Local Area Plan (2020)

Policy, Standards and Guidance

- Institute of Environmental Management & Assessment's Guidelines for Environmental Noise Impact Assessment (2014).

17.3 Assessment Methodology

17.3.1 As described in Chapter 4: Methodology, the assessment has been carried out following the below methodology and the EPA Guidance:

- Establishment of the baseline conditions, including identification and assessment of the receiving environment and receptor sensitivity
- Identification of environmental design measures and mitigation measures that form part of the construction methodology
- Identification of the potential impacts, and assessment of the magnitude of potential effects, and their significance
- Consideration of mitigation measures
- Assessment of residual effects

17.3.2 This chapter reports the findings of Chapter 9: Noise (with which it should be read in conjunction) and considers whether these could have implications for human health.

Limitations & Assumptions

17.3.3 There are no limitations to the assessment of potential effects on Population & Human Health presented in this chapter.

17.4 Current State of the Environment

17.4.1 Key health baseline statistics are presented below concerning the overall life expectancy and self-assessed health of people living in the vicinity of the airport. Baseline conditions in terms of air quality and noise, which are recognised in the EPA Guidance as health determinants, are presented in Chapter 8: Air Quality and Chapter 9: Noise.

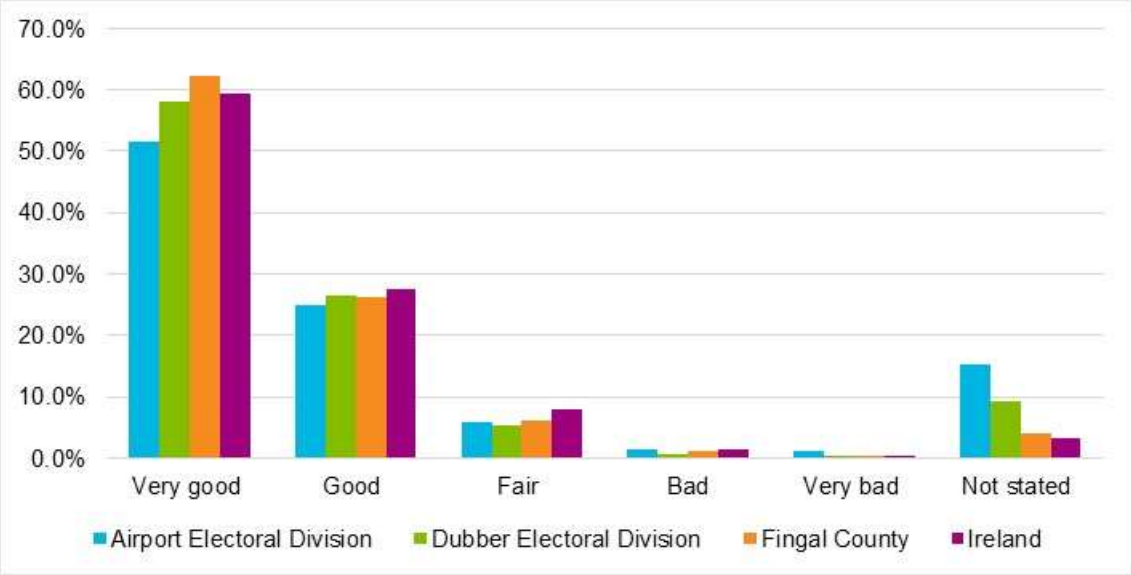
17.4.2 The life expectancies in Dublin and Ireland have been increasing in recent years creating an ageing population, a trend that is currently being experienced across most developed countries. In 2016, male residents in the Dublin Regional Authority were expected to live to 80.1 years whilst female residents were expected to live to 83.4 years, compared to 78.3 years and 82.7 years respectively in 2011[1]. The life expectancies in 2016 are broadly in line with the country's averages (79.6 years for males and 83.4 years for females).

17.4.3 The health conditions in Dubber Electoral Division (ED), Fingal County and across the country are positive, but they appear slightly worse within the Airport ED. In 2016, 89% of the population aged 15 years and over in Fingal County considered themselves to be in very good or good health, compared to

[1] Central Statistics Office, (2019); Irish Life Tables: Period Life Expectancy by Sex, Age, Region and Year.

Ireland's average of 88%[2]. In comparison, around 84% of residents in Dubber ED and 77% of residents in the Airport ED were in very good or good health[3].

17.4.4 It is worth noting that Ireland has the highest self-perceived health status of all EU countries, with 83% of people rating their health as good or very good, considerably above the EU average (69%)[4]. Only 1% of residents in Dubber ED and Fingal were in bad or very bad health, which is the fourth lowest proportion of the 31 counties and cities across Ireland[5]. However, this proportion increases to 3% for Airport ED, which is high for the country. Plate 17-1 presents the health conditions in the Airport ED, Dubber ED and Fingal County, compared to the conditions across Ireland.



Source: Central Statistics Office (Ireland) (2017), Census 2016.

Plate 17-1: Health conditions for all persons aged 15 years and over (2015)

17.5 Future Receiving Environment

17.5.1 The public health baseline is not likely to change substantively from that outlined in the Current State of the Environment in the period covered by the assessment, namely the peak construction year of 2024, owing to the short interval between now and the Assessment Year considered.

17.6 Environmental Design & Management

17.6.1 The Proposed Development has been designed to comply with all relevant health and safety legislation. A preliminary Construction Environmental Management Plan has been prepared and requires the contractor to implement measures *inter alia* to safeguard public health and amenity during the construction process. This is presented in Appendix 3-1.

17.7 Assessment of Effects & Significance

Determining Construction Effects

17.7.1 The potential construction impacts on human health are described in Table 17-2. It identifies the potential source of the impact; potential impact pathways (route by which receptors can become impacted) and potential effects arising from the potential impact. For each of the potential effects identified, the likelihood of an effect has been considered to determine whether an assessment should be undertaken.

[2] Central Statistics Office (Ireland), (2016), Census 2016.
[3] These statistics may not be wholly representative of the health conditions in the Electoral Divisions (ED), particularly the Airport ED, as 15% of respondents in the Airport ED and 9% of respondents in Dubber ED did not state an answer (country's average is 3%).
[4] Government of Ireland: Prepared by Department of Health, (2019); Health in Ireland: Key Trends 2019.
[5] Central Statistics Office (Ireland), (2016), Census 2016.

Table 17-2: Potential Construction Effects

Potential Impact	Potential Impact Pathway	Potential Effect	Significant Effect?
Noise from Construction Traffic	Noise impact on sensitive receptors	Indirect health effect on sensitive receptors	Discussed further below.

Determining Operational Effects

17.7.2 The potential operational impacts on Population & Human Health are described in Table 17-3. It identifies the source of the impact; potential impact pathways (route by which receptors can become impacted) and potential effects arising from the potential impact. For each of the potential effects identified, the likelihood of an effect has been considered to determine whether an assessment should be undertaken.

Table 17-3: Potential Operation Effects

Potential Impact	Potential Impact Pathway	Potential Effect	Significant Effect?
Noise from traffic	Noise impact on sensitive receptors	Indirect health effect on sensitive receptors	No. There is no change to the volume of activities being carried out or traffic movements at Dublin Airport as a result of the Proposed Development. Journeys will begin and end in the same locations but will use the Underpass rather than the Northern Perimeter Road as they do at present, any noise generated will be further from sensitive receptors and thus be less impactful.

Construction

17.7.3 Construction of the Proposed Development would lead to construction traffic generation along the road links shown in Plate 17-2. Details of the volumes of traffic concerned, which peak at 1,900 vehicles for several weeks, are discussed in Chapter 5: Traffic & Transport and also in Chapter 9: Noise.

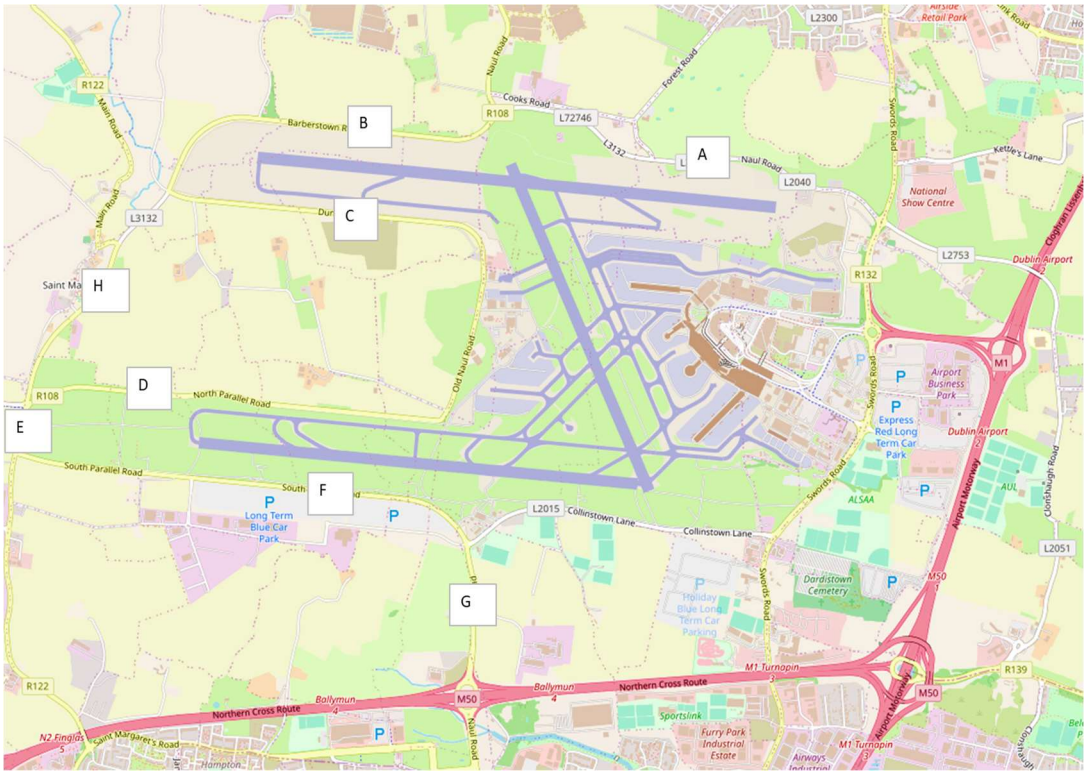


Plate 17-2: Road Links

17.7.4 During all three construction phases, as described in the 'Assessment of Effects & Significance' section of Chapter 9: Noise, the residual effects of changes in road traffic noise are predicted to be Negligible.

The exception to this is a Minor effect between 1 dB and 3 dB during the night-time period in construction phase 2, predicted to occur at receptors on Harristown Lane to the south of road link F. The effect of construction traffic noise during all time periods of all phases is not significant, as determined by the noise impact assessment and thus no indirect effects on health. As a result, the Proposed Development will not result in construction related Population & Human Health effects

Operation

17.7.5 As explained in Chapter 3: Proposed Development and Chapter 5: Traffic & Transport, the Proposed Development will not alter the character or intensify in any way the activities currently being undertaken at Dublin Airport or, more specifically, on the West Apron, there will be no change in operational noise impacts on sensitive receptors and thus no indirect effects on health. As a result, the Proposed Development will not result in operation related Population & Human Health effects.

Summary

17.7.6 The Proposed Development will have no significant effects on Population & Human Health in either construction or operation.

17.8 Mitigation & Monitoring

17.8.1 As the Proposed Development will not have any significant effects on Population & Human Health, there is no requirement for mitigation to be implemented. No monitoring measures are proposed.

17.9 Residual Effects & Conclusions

17.9.1 There will be no significant residual Population & Human Health effects as a result of the Proposed Development in construction or operation.

18. Interactions & Cumulative Effects

18.1 Introduction

18.1.1 The EIA Directive[1] states an Environmental Impact Assessment Report (EIAR) should contain:

'*A description of the likely significant effects of the project on the environment resulting from…the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources*.'

18.1.2 The Environmental Protection Agency's 'Guidelines on the information to be contained in Environmental Impact Assessment Reports'[2] (hereafter referred to as 'the EPA Guidelines') explains that cumulative effects are '*the addition of many minor or significant effects, including the effects of other projects, to create larger, more significant effects*.

18.1.3 The EIA Directive also requires *"the interaction between the [environmental] factors"* to be assessed. These interactions occur when a single receptor or group of receptors experience an impact from more than one environmental factor, for example a single receptor may be affected by noise, air quality and visual impacts from a proposed development at the same time.

18.1.4 Thus, two types of effect are assessed in this chapter:

- Interactions of several impacts arising from the Proposed Development: these are effects resulting from the interaction of several different impacts (e.g., noise, air quality etc.) arising from the Proposed Development that may collectively cause an effect / effects of greater magnitude, on any single environmental receptor. Individually the effects resulting from these impacts may not be significant, but the accumulation of effects may collectively cause an overall significant effect; and
- Cumulative effects of Proposed Development with other existing or permitted projects: these occur when the environmental impacts and effects of the Proposed Development (and interactions) cumulate with those associated with other planned projects and developments located within a realistic geographical scope where environmental impacts could act together to result in a greater magnitude of effect on environmental receptors.

18.1.5 The cumulative effects assessment considers developments which have potential for cumulative effects with the Proposed Development and which have planning permission and/ or which are in the planning system but where a planning decision is not expected to have been made by the time the Proposed Development is operational. Those developments that already exist, including existing facilities in the airport itself, are part of the Current State of the Environment and therefore are already part of the assessment baseline.

18.1.6 As described in Chapter 5 Traffic & Transport, traffic assessments take into account background growth and committed public transport / road schemes; therefore, those assessments are inherently cumulative and are not assessed further in this chapter.

18.1.7 The assessments of interactions and cumulative effects presented in this chapter draw on the method of assessment and assessment findings reported in Chapters 5 to 17 and information available in the public domain relating to other known schemes within the study area (as described below).

18.1.8 This chapter was written by Colin Bush, BA(Hons), MSc, CEnv, an AECOM Associate Director from the Environment and Sustainability team with over 18 years' experience in leading and managing EIA projects.

[1] *Directive 2011/92/EU of the European Parliament and of the Council of 13th December 2011 on the assessment of the effects of certain public and private projects on the environment* (as amended by Directive 2014/52/EU)
[2] *Guidelines on the information to be contained in Environmental Impact Assessment Reports*, Environmental Protection Agency (2022)

18.2 Legislation, Policy & Guidance

21.2.1 Chapter 4: Methodology sets out the overall approach to the EIA, including overarching legislation, policy and guidance. The following is guidance relevant to the cumulative impact assessment specifically.

21.2.2 The EIA Directive was transposed into domestic law on the 1st September 2018 in the form of the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018[3].

21.2.3 In addition to the EPA Guidelines, further guidance is available from the European Commission which has published 'Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions'[4].

18.3 Assessment Methodology

Study Area

18.3.1 The assessment of interactions considers the residual effects for each factor, the significance of each individual identified effect and the duration over which these effects would be experienced by an individual receptor / group of receptors, where interactions are identified. However, it is important to note that the assessment considers the likely worst case upon representative receptors only (typically those closest to the source of environmental impacts), and not on every receptor that could conceivably be affected.

18.3.2 As evidenced throughout this EIAR, the operational phase of the Proposed Development has no perceptible environmental effects. Therefore, the cumulative effects assessment focuses on the construction phase only. The study area for the assessment is defined as the area 500m from the Application Site boundary which encompasses the routes through which vehicles carry construction materials or wastes will pass and may interact cumulatively with vehicles from other projects. A 500m boundary also captures receptors closest to the Application Site which therefore would experience the effects of the highest magnitude from the Proposed Development during construction, owing to their proximity. More remote receptors would experience lesser effects and therefore need not be considered to determine the worst-case.

Interactions Assessment - Methodology

18.3.3 The assessment of interactions due to the interaction of different types of impact from the Proposed Development on particular receptors (shown in Figure 18-1) considers each of the environmental factors reported in Chapters 5 to 17 of this EIAR.

18.3.4 This assessment considers all residual effects which have been identified, excluding those which are classified as 'negligible' (refer to Chapter 4: Methodology). It thereby includes residual effects which, whilst not significant individually, may, in combination with other residual effects, result in a significant interaction. As only residual effects are considered, the assessment of interactions takes into account any mitigation measures identified in each technical assessment (Chapters 5 to 17). Table 18-1 lists these residual effects and states whether there is any potential for interactions with impacts from other factors.

18.3.5 Table 18-2 (below) provides a matrix that shows where interactions could theoretically occur. This shows that in theory there could be interactions during construction between land impacts and water impacts, for example accidental pollution affecting soils could also affect water. There is also a theoretical potential for air pollution in the form of dust, to combine with noise during construction to affect the amenity of individuals, hence (again theoretically) having an effect in terms of health. Where these theoretical interactions are identified for a given environmental factor, they are noted in Table 18-1 as potential interactions.

[3] European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018.
[4] European Commission: Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions, May 1999. https://ec.europa.eu/environment/archives/eia/eia-studies-and-reports/pdf/guidel.pdf

Table 18-1 Potential for Interactions

EIAR Chapter	Residual Effects Due to Proposed Development	Potential for Interactions?
5: Traffic & Transport	None	No
6: Land & Soils	Imperceptible / Slight	Yes
7: Water	Imperceptible	Yes
8: Air Quality	Negligible	No
9: Noise	Negligible / Minor	Yes
10: Biodiversity	Minor	No
11: Climate	Minor	No
12: Cultural Heritage	None	No
13: Landscape & Visual	Minor	Yes
14: Material Assets (Waste)	Negligible / Minor	No
15: Material Assets (Built Services)	Negligible	No
16: Major Accidents	Not Applicable	No
17: Population & Human Health	Negligible	Excluded

18.3.6 The only factors experiencing greater than negligible effects are land & soils, noise, biodiversity, climate, landscape & visual and waste. No other types of effect have been classified as having greater than 'negligible' effects, i.e., they would not be perceptible or would not occur and are excluded from the assessment of interactions. For example, as the residual air quality effects described in Chapter 8: Air Quality are negligible, there is no potential for receptors to be subject to significant effects due to interactions between the residual noise effects of the Proposed Development and the air quality effects.

18.3.7 Impacts on the population & human health factor would be as a result of noise or air quality effects, therefore, it would be double counting to consider this factor in addition to factors that act upon it, and it is excluded from the assessment.

Cumulative Effects Assessment - Methodology

18.3.8 Cumulative effects consider the impacts of other schemes which have potential for cumulative effects with the Proposed Development. As explained above, this chapter focusses on developments which have planning permission and / or which are in the planning system pending a planning decision, but which do not form part of the Current Receiving Environment or the Future Receiving Environment.

18.3.9 The potential for other schemes to result in cumulative effects with the Proposed Development is dependent upon the location, type and scale of development and associated activities, and the type and duration of any likely environmental effects of the other developments. This includes any known permitted or planned projects by third parties.

Scope of the Assessment

18.3.10 Three representative sensitive residential receptors are identified in Figure 18-1. These are:

- People living in St Margarets (R1)
- A residential dwelling on Dunbro Lane (R2)
- A residential dwelling on the R108 (Old Naul Road) (R3)

18.3.11 These receptors were selected for their location close or relatively close to the proposed haul routes and also to the construction site (R3).

18.3.12 The receptor assessed for cumulative effects from the water or land & soils factor is the Cuckoo stream, which is the waterbody most likely to be affected by any impacts from the Proposed Development and thus represents a worst case in this respect.

18.3.13 For the purposes of this assessment, cumulative effects are only considered possible where the Proposed Development itself has an effect. If no effect has been identified for a given environmental factor, then the factor is excluded from the cumulative effects assessment.

18.3.14 As shown in Table 18-1, the only factors having effects are air, land & soils, water, noise and material assets (built services and waste).

18.3.15 The long list identified in the search for schemes that could interact cumulatively with the Proposed Development is given in Appendix 18-1. This list was subject to an initial screening exercise to eliminate those which, by virtue of timing (for example, the construction programmes do not interact) or the small or localised scale of any impacts (for example, small projects such as minor housing developments with fewer than 50 units), had no capacity to interact with the Proposed Development. Following this screening exercise, a shortlist was drawn up comprising those schemes with a remaining potential for such combined effects. This is given in Table 18-3 and discussed below in Section 18.5.

Impact Assessment & Significance Criteria

18.3.16 The significance of interactions upon environmental receptors and resources has been determined using professional judgment, assisted by the views and opinions of the competent experts responsible for undertaking the technical assessments.

18.3.17 The significance of effects for the cumulative effects assessment uses the same methodologies as set out in the technical chapters themselves. As discussed in above, cumulative effects are only considered to be possible where receptors would experience residual effects as a result of the Proposed Development that are greater than 'negligible'.

18.3.18 In determining the possible significance of cumulative effects in conjunction with each of the other developments, the type of development, location of the development and timing of activities associated with the other relevant developments and their associated impacts/ effects have been taken into account wherever possible.

Limitations & Assumptions

18.3.19 The identification of third-party developments for inclusion in the cumulative effects assessment has been based on information available at the time of the assessment (April 2022). It is only possible to consider those developments currently in the planning system.

18.4 Assessment of Effects & Significance

Interactions

18.4.1 Six factors in Table 18-1 that have higher impacts than negligible are land & soils, noise, biodiversity, climate, landscape & visual and waste. The effects are:

- Land & soils: accidents / spills and use of natural resources
- Noise: minor impacts at points along the R108
- Biodiversity: loss of hedgerow with potential to be used by foraging bats
- Climate: minor GHG emissions (no interactions with other factors possible)
- Landscape & visual: temporary minor impact on residents' views
- Waste: minor impact on waste disposal capacity (no interactions with other factors possible)

18.4.2 Interactions between landscape & visual and noise are possible (for example, construction noise and impact on views leading to amenity effects) but the minor noise impacts are identified at night when views are not available, so in practice there is no interaction possible. Similarly, accidents / spills in the construction site or use of natural resources would not, in practice, interact with the identified biodiversity impact affecting bats.

18.4.3 Minor noise impacts on the R108 could however, interact with the loss of commuting and forage habitat for bats. However, the relevant road link C (see Plate 5-2 in Chapter 5: Traffic & Transport) does not itself experience higher than negligible effects, so a significant cumulative effect is not likely.

Cumulative Effects

Water

18.4.4 In the case of impacts from the Proposed Development on water, the mitigation is adherence to the mitigation measures set out in the CEMP (see Appendix 3-1) during the construction phase. Third-party projects will likely have their own CEMPs in place and may be assumed also to adopt best practice measures that will avoid significant effects on the water environment during construction. Cumulative significant effects with other schemes cannot be ruled out entirely but it is highly improbable that best practice measures would fail at the same time on enough schemes to allow for a significant pollution event to occur that would affect the Cuckoo stream.

18.4.5 As set out in Chapter 15: Material Assets (Built Services) the predicted operational usage of water by the Proposed Development is very low at only 180m^3 annually and so significant cumulative operational effects can be ruled out.

Land & Soils

18.4.6 Similarly, there is no potential for cumulative effects on land & soils as such effects would require a pollution pathway between the scheme(s) and the Cuckoo stream. Generally, no such pathway exists for any of the schemes as they are almost all remote from the Cuckoo stream. Those that are close by are discussed further in Table 18-3.

Waste

18.4.7 In terms of waste, the Sustainable Waste Report (see Appendix 14-1) has demonstrated that there is sufficient capacity to manage waste generated from the Proposed Development alongside waste generated from other developments and thus no further assessment of this matter is required.

Built Services

18.4.8 As set out in Chapter 15: Material Assets (Built Services) the predicted construction and operational usage of water, gas and electricity by the Proposed Development is negligible in terms of natural resource usage in Ireland as a whole and the cumulative effect of shortlisted schemes would also be negligible given the scale of national consumption.

Air

18.4.9 In Chapter 8: Air Quality the Proposed Development is predicted to have a negligible effect. Given the generally good baseline levels of air quality that exist around the airport it is not considered possible for the schemes identified to have a cumulative effect that would exceed or even approach the relevant air quality standards.

Noise

18.4.10 Analysis of the shortlist assessments in Table 18.3 indicates that the main potential for cumulative effects exists from construction traffic noise along the route, or part of the route (R108), that it is expected will be used for traffic engaged in construction of the Proposed Development.

18.4.11 With the information available about the shortlisted schemes, which generally does not include a traffic noise impact assessment, it is not feasible to carry out a quantitative assessment of the cumulative traffic noise impact. However, it is noted that the construction of the Proposed Development, and therefore related construction traffic movements, will take place mainly at night to ensure minimal interference with airport operations. On the other hand, it is reasonable to assume that the construction work on potential cumulative schemes is likely to be mainly during the day. Thus, there is limited possibility for a cumulative impact of any kind, even assuming the construction programmes do in fact overlap.

18.4.12 The biggest change in noise identified in Chapter 9: Noise is during Phase 2 of the construction of the Proposed Development the southern section of the R108 (identified as link D in Chapter 9: Noise). This

link is assessed to experience an increase of 3-5dB as a result of construction traffic. However, as noted in Chapter 9: Noise, there are no sensitive receptors along link D and therefore significant effects, cumulative or otherwise, are not possible.

18.5 Summary

18.5.1 No significant effects have been identified as a result of potential interactions between impacts identified in the technical chapters of the EIAR and in most cases such interactions cannot occur.

18.5.2 The analysis above shows that the potential for cumulative effects in combination with other schemes is, in practice, limited to construction traffic noise. Whilst it is not possible to quantify the extent of any cumulative effect, the likelihood of it actually occurring is limited given that other schemes would probably be constructed during the day while construction of the Proposed Development is expected to take place mostly at night. Any cumulative effect would be temporary and very unlikely to be considered significant.

Table 18-2 Possible Interactions

EIAR Chapter	Traffic & Transport	Land & Soils	Water	Air Quality	Noise	Biodiversity	Climate	Cultural Heritage	Landscape & Visual	Material Assets (Waste)	Material Assets (Built Services)	Major Accidents	Population & Human Health
5: Traffic & Transport	n/a	0	0	0	0	0	0	0	0	0	0	0	0
6: Land & Soils	0	n/a	Construction	0	0	0	0	0	0	0	0	0	0
7: Water	0	Construction	n/a	0	0	0	0	0	0	0	0	0	0
8: Air Quality	0	0	0	n/a	Construction	Construction	0	0	0	0	0	0	0
9: Noise	0	0	0	Construction	n/a	Construction	0	0	Construction	0	0	0	Construction
10: Biodiversity	0	0	0	Construction	Construction	n/a	0	0	0	0	0	0	Construction
11: Climate	0	0	0	0	0	0	n/a	0	0	0	0	0	0
12: Cultural Heritage	0	0	0	0	0	0	0	n/a	0	0	0	0	0
13: Landscape & Visual	0	0	0	0	Construction	0	0	0	n/a	0	0	0	0
14: Material Assets (Waste)	0	0	0	0	0	0	0	0	0	n/a	0	0	0
15: Material Assets (Built Services)	0	0	0	0	0	0	0	0	0	0	n/a	0	0
16: Major Accidents	0	0	0	0	0	0	0	0	0	0	0	n/a	0
17: Population & Human Health	0	0	0	Construction	Construction	0	0	0	0	0	0	0	n/a

Table 18-3 Shortlist of Schemes

Applicant	Address	Application Ref.	Reg.	Description	Decision	Potential Effects
daa plc	Departures routes to and from the Terminal 1 & Terminal 2 - Part of the central section of the Express Red Long-Term Car Park, Townlands of Corballis / Collinstown & Toberbunny, Dublin Airport, Dublin	F21A/0518		alterations to section of the existing internal road network and associated works, on the Departures routes to and from the Terminal 1 and Terminal 2 forecourts	Granted by Fingal County Council. Currently subject to a 3rd party appeal	The scheme would generate construction noise and construction traffic noise but given the location of the scheme on the other side of the Terminal buildings from the Proposed Development, construction noise will not act cumulatively with construction noise from the Proposed Development at any of the receptors R1, R2 or R3. Construction traffic may be assumed to take one of the direct routes to the M1 and M50, hence avoiding cumulative interactions with construction traffic from the Proposed Development using the roads to the north and west of the airport. **Therefore, no cumulative effects are likely.**
Arora Dublin T2 Limited	Site A - Hotel Site adjoins the T2 Multi-Storey Car Park to the north, Dublin Airport, townland of Corballis: Site B - Skybridge House (former TASC Building), Dublin Airport, townland of Collinstown; Site C-Site Compound 1 is bounded by the T2 Departure Road to the west and T2 Multi-storey Car Park to the east, Dublin Airport, townland of Corballis; Site D-Site Compound 2 is located to the east of Swords Rugby Club in the townland of Stockhole	F21A/0255		The erection of a new part 3-, part 11- and part 12-storey terminal-linked 410 bedroom hotel; new replacement weather radome; and temporary use (for a period of 5 years) of two sites as construction compounds	Granted	The scheme would generate construction noise and construction traffic noise but given the location of the scheme on the other side of the Terminal buildings from the Proposed Development, construction noise will not act cumulatively with construction noise from the Proposed Development at any of the receptors R1, R2 or R3. Construction traffic may be assumed to take one of the direct routes to the M1 and M50, hence avoiding cumulative interactions with construction traffic from the Proposed Development using the roads to the north and west of the airport. **Therefore, no cumulative effects are likely.**
Alan & Yvonne Fitzachary	Hillcrest, St Margarets, Co Dublin	FW21A/0240		Retention permission for as constructed agricultural dairy milk pasturising shed, & Permission to complete the development works	At RFI stage	Over 1km from the construction site boundary, this scheme is too distant from the Proposed Development for there to be cumulative interactions in terms of noise at any of the receptors R1, R2 or R3. It appears construction of this scheme has already occurred in any case and so it is part of the baseline. **Therefore, no cumulative effects are likely.**
daa plc	Dublin Airport, Co Dublin	FS5/036/21		The construction of a new concrete pavement area connecting the existing Runway 10 and the existing northern Taxiway S to facilitate a new runway line-up point and associated drainage infrastructure, signage, road markings and lighting	At RFI stage	The EIA Screening Opinion Request for the scheme notes that the works would mainly take place during the day, which states that most construction traffic would likewise be on the roads during the, unlike the Proposed Development which will use the night-time hours for construction. This suggests construction activity and construction traffic (although it would likely use the same routes) would not interact cumulatively with the

Applicant	Address	Application Ref.	Reg. Description	Decision	Potential Effects
					Proposed Development to create a significant noise effect at any of the receptors R1, R2 or R3. **Therefore, no cumulative effects are likely.**
CG Hotels Dublin Airport Limited	Radisson Blu Hotel, Corballis Way / East Link Road, Dublin Airport, Swords, Co. Dublin	F20A/0638	a new standalone 8-12 -storey (over partial basement) hotel	Granted	The scheme would generate construction noise and construction traffic noise but given the location of the scheme on the other side of the Terminal buildings from the Proposed Development, construction noise will not act cumulatively with construction noise from the Proposed Development at any of the receptors R1, R2 or R3. Construction traffic may be assumed to take one of the direct routes to the M1 and M50, hence avoiding cumulative interactions with construction traffic from the Proposed Development using the roads to the north and west of the airport. **Therefore, no cumulative effects are likely.**
CG Hotels Dublin Airport Limited	Radisson Blu Hotel, Corballis Way / East Link Road, Dublin Airport, Swords, Co. Dublin	F20A/0636	a 1-6 storey extension (over lower ground) to the existing hotel	Granted	The scheme would generate construction noise and construction traffic noise but given the location of the scheme on the other side of the Terminal buildings from the Proposed Development, construction noise will not act cumulatively with construction noise from the Proposed Development at any of the receptors R1, R2 or R3. Construction traffic may be assumed to take one of the direct routes to the M1 and M50, hence avoiding cumulative interactions with construction traffic from the Proposed Development using the roads to the north and west of the airport. **Therefore, no cumulative effects are likely.**
daa plc	Airfield in the townlands of, Cloghran, Corballis, Forrest Great, Forrest Little, Collinstown & Rock, Dublin Airport, Co Dublin	F20A/0550	Full planning permission to extend the North Apron in the Airfield at Dublin Airport, Co Dublin to facilitate the provision of twelve aircraft stands and a ground servicing equipment area	Granted by Fingal County Council. Currently subject to a 1st party (contribution only) appeal	The scheme would generate construction noise and construction traffic noise but as the scheme is located about 1200m from the Application Site, construction noise will not act cumulatively with construction noise from the Proposed Development at any of the receptors R1, R2 or R3. According to the Traffic Assessment in the application, construction traffic will join the M1 at Junction 2, thus avoiding cumulative interactions with construction traffic from the Proposed Development using the roads to the north and west of the airport. **Therefore, no cumulative effects are likely.**
Dublin Port Company	Dublin Inland Port, South of Dublin Airport Logistics Park, Off Maple Avenue, Coldwinters, St Margarets, Co Dublin	FW20A/0021	The development will consist of storage and logistic facilities comprising yards, warehouses, workshops and ancillary offices at Plots 1, 3, 4, 5, 6, 7, and 9 and amendment to permitted development (Reg. Ref. FW19A/0101 and F18A/0139) at Plot 8 and internal road network at Dublin Inland Port	Granted	The scheme would generate construction noise and construction traffic noise but given the location of the scheme on the other side of the N2 from the Proposed Development, construction noise will not act cumulatively with construction noise from the Proposed Development at any of the receptors R1, R2 or R3. Construction traffic would not use the same routes as the Proposed Development, hence avoiding cumulative interactions with construction traffic from the Proposed Development using the roads to the north and west of the airport. **Therefore, no cumulative effects are likely.**
Rohan Holdings Ltd	Dublin Airport Logistics Park, St Margaret's Road, St Margaret's, Co. Dublin	FW20A/0209	the construction of two single storey units (Unit 23 and 27) for Industrial and/ or Warehouse use with associated ancillary two storey offices	Granted	The scheme would generate construction noise and construction traffic noise but given the location of the scheme on the other side of the N2 from the Proposed Development and the small scale of the scheme, construction noise will not act cumulatively with construction noise from the Proposed Development at any of the receptors R1, R2 or R3. Construction traffic would not use the same routes as the Proposed Development, hence avoiding cumulative interactions with construction traffic from the Proposed Development using the roads to the north and west of the airport. **Therefore, no cumulative effects are likely.**
HPREF Dublin Office DevCo1 Limited	Horizon Logistics Park (Site N), Off the R108, Harristown, St. Margarets, Swords, Co. Dublin.	FW20A/0187	The construction of 8 no. light industrial/warehouse (including wholesale use) / logistics units including ancillary office use and entrance/reception areas over two levels, with maximum height of c. 15.5 m and combined total gross floor area (GFA) of 39,732 sq.m. (units N1-N8)	Granted	The scheme is located on the R108, south of the airport, at least 800m from the Proposed Development in line of sight, so cumulative construction noise effects are unlikely at receptors R1, R2 or R3, but these are unlikely to be significant owing to the distance between the scheme and the Proposed Development. Construction traffic would need to use the R108 to reach the M50 and thus the potential for cumulative effects from construction traffic noise exists but is not likely in practice as daytime HGV movements would not interact with the Proposed Development construction traffic. **Therefore, no cumulative effects are likely.**

Applicant	Address	Application Reg. Ref.	Description	Decision	Potential Effects
IPUT	Newtown, Kilshane Cross, Co. Dublin.	FW20A/0126 (ABP-309855-21)	4 No. warehouses with marshalling offices, ancillary office space, staff facilities and associated development.	Granted	The scheme would generate construction noise and construction traffic noise but is located at least 2km from the Proposed Development. Therefore, construction noise will not act cumulatively with construction noise from the Proposed Development at any of the receptors R1, R2 or R3. Construction traffic and Operational traffic may use part of the same route as the Proposed Development (R108), so the potential for cumulative effects from construction traffic noise exists but is not likely in practice as daytime HGV movements would not interact with the Proposed Development construction traffic. **Therefore, no cumulative effects are likely.**
daa plc	Dublin Airport, Co. Dublin	FS5/024/20	The construction of new and rehabilitated taxiway pavement along with all associated ancillary development including surface water drainage and attenuation, road markings and signage, and Aircraft Ground Lighting.	Declared Exempted Development	The scheme is for works in the same vicinity as the Proposed Development and there would be potential for cumulative effects from construction noise. However, there are no nearby sensitive receptors to experience this noise. Construction traffic may use the same route as the Proposed Development (R108), so the potential for cumulative effects from construction traffic noise exists but the volumes of vehicles movements is assumed to be relatively small and unlikely to result in a significant effect. As this scheme is located close to the Cuckoo stream there is potential for cumulative effects on the water environment, however the application of best practice construction methods set out in the CEMP make this unlikely to occur in practice. **Therefore, no cumulative effects are likely.**
Rohan Holdings Ltd	Dublin Airport Logistics Park, St Margaret's Road, St Margaret's, County Dublin	FW19A/0143	The construction of 2 no. Single-Storey Units for industrial and/or Warehouse use with ancillary Two-Storey offices with a gross floor area 11,157.90 square meters.	Granted	The scheme would generate construction noise and construction traffic noise but is located at least 2km from the Proposed Development. Therefore, construction noise will not act cumulatively with construction noise from the Proposed Development at any of the receptors R1, R2 or R3. Construction traffic may use part of the same route as the Proposed Development (R108), so the potential for cumulative effects from construction traffic noise exists but is not likely in practice as daytime HGV movements would not interact with the Proposed Development construction traffic. **Therefore, no cumulative effects are likely.**
Rohan Holdings Ltd	Dublin Airport Logistics Park, St Margaret's Road, St Margaret's, County Dublin	FW19A/0170	Construction of a two-storey unit for training facility use, with ancillary offices.	Granted	The scheme would generate construction noise and construction traffic noise but is located at least 2km from the Proposed Development. Therefore, construction noise will not act cumulatively with construction noise from the Proposed Development at any of the receptors R1, R2 or R3. Construction traffic may use part of the same route as the Proposed Development (R108), so the potential for cumulative effects from construction traffic noise exists but the volumes of vehicles movements is assumed to be relatively small given the small size of the scheme and is unlikely to result in a significant effect. **Therefore, no cumulative effects are likely.**
Dublin Port Company	Plot 8, Dublin Inland Port, South of Dublin Airport Logistics Park, Off Maple Avenue, Coldwinters, St Margarets, Co Dublin	FW19A/0101	Development of Plot 8 for storage and logistic use comprising stacked shipping container storage	Granted	The scheme would generate construction noise and construction traffic noise but is located at least 2km from the Proposed Development. Therefore, construction noise will not act cumulatively with construction noise from the Proposed Development. The application states that construction traffic will use a different route to the Proposed Development (R122). **Therefore, no cumulative effects are likely.**
daa plc	Dublin Airport, Corballis, Co. Dublin.	FS5/017/19	The construction of new taxiway pavement and rehabilitation of existing taxiway pavement along with all associated ancillary development including surface water drainage and attenuation, road markings and signage, and Aircraft Ground Lighting.	Declared Exempted Development	The application is for works in the same vicinity as the Proposed Development and, if construction took place at the same time, there would be potential for cumulative effects from construction noise. However, there are no nearby sensitive receptors to experience this noise. Construction traffic may use the same route as the Proposed Development (R108), so the potential for cumulative effects from construction traffic noise exists but the volumes of vehicles movements is assumed to be relatively small and unlikely to result in a significant effect. **Therefore, no cumulative effects are likely.**

Applicant	Address	Application Reg. Ref.	Description	Decision	Potential Effects
Darragh Hall	Corballis Cottage, Old Airport Road/Swords Road (R132), Co. Dublin.	F18A/0436	Completion of partially constructed part-two, part-three storey Core Aviation type office building as approved under Reg. Ref. F07A/1659 (subsequently extended under F07A/1659/E1). Permission is also sought for alterations and extensions to previously approved building to result in a four-storey office building	Granted	The scheme would generate construction noise and construction traffic noise but given the location of the scheme on the R132 at least 1km from the Proposed Development with the Terminal buildings in between, construction noise will not act cumulatively with construction noise from the Proposed Development at any of the receptors R1, R2 or R3. Construction traffic would not use the same routes as the Proposed Development, hence avoiding cumulative interactions with construction traffic from the Proposed Development using the roads to the north and west of the airport. **Therefore, no cumulative effects are likely.**
Killeen Properties Ltd	Newtown, Kilshane Cross, Co Dublin	F18A/0146	A storage and distribution centre for new imported vehicles with a total capacity for 5,951 no. vehicles	Granted	The scheme would generate construction noise and construction traffic noise but given the location of the scheme at least 2km from the Proposed Development, construction noise will not act cumulatively with construction noise from the Proposed Development at any of the receptors R1, R2 or R3. Construction traffic would not use the same routes as the Proposed Development (it is located adjacent to the R135), hence avoiding cumulative interactions with construction traffic from the Proposed Development using the roads to the north and west of the airport. **Therefore, no cumulative effects are likely.**
Keelings UC	Lands at Food Central (off the main internal access road), Roslin, St. Margaret's, Co. Dublin.	F17A/0513	New food market building for the preparation, packaging, storage, sale and distribution of seasonally sourced (local and imported) fruit, vegetables, food and fresh produce.	Granted	The scheme would generate construction noise and construction traffic noise but is located at least 2km from the Proposed Development. Therefore, construction noise will not act cumulatively with construction noise from the Proposed Development at any of the receptors R1, R2 or R3. The application states that construction traffic will use part of the same route as the Proposed Development (R122), so the potential for cumulative effects from construction traffic noise exists but it would be logical for construction traffic to use the Naul Road to reach the M1 and potential for cumulative effects would only exist along the R108 Barberstown Road. **Therefore, no cumulative effects are likely.**
Kool 4 Logistics T/A Oakland Int.	Lands at Food Central (off the main internal access road), Roslin, St. Margaret's, Co. Dublin.	F17A/0158	A new temperature-controlled food processing plant with single storey ancillary offices	Granted	The scheme would generate construction noise and construction traffic noise but is located at least 2km from the Proposed Development. Therefore, construction noise will not act cumulatively with construction noise from the Proposed Development at any of the receptors R1, R2 or R3. The application states that construction traffic will use part of the same route as the Proposed Development (R122), so the potential for cumulative effects from construction traffic noise exists but it would be logical for construction traffic to use the Naul Road to reach the M1 and potential for cumulative effects would only exist along the R108 Barberstown Road. **Therefore, no cumulative effects are likely.**
daa plc	Corballis Drive, Dublin Airport, Corballis, Swords, Co. Dublin.	F16A/0155/E1	Extension of duration: Dublin Airport Central the construction of 4 No. office blocks, ranging in height from 6 to 7 storeys	Granted (to 16th May 2027)	The scheme would generate construction noise and construction traffic noise but given the location of the scheme with the Terminal buildings in between it and the Proposed Development, construction noise will not act cumulatively with construction noise from the Proposed Development at any of the receptors R1, R2 or R3. Construction traffic would not use the same routes as the Proposed Development, hence avoiding cumulative interactions with construction traffic from the Proposed Development using the roads to the north and west of the airport. **Therefore, no cumulative effects are likely.**
Dublin Aerospace Limited	Vacant lot between Hangars 5 and 6, North Apron, Dublin Airport, Corballis, Co. Dublin.	F13A/0402/E1	Extension of duration: two-bay aircraft maintenance hangar, designed to accommodate a range of code C aircraft types, with a plan are of 4,233m^2.	Granted (to 25th September 2024)	The scheme would generate construction noise and construction traffic noise but given the location of the scheme on the North Apron with the Terminal buildings in between it and the Proposed Development, construction noise will not act cumulatively with construction noise from the Proposed Development at any of the receptors R1, R2 or R3.

Applicant	Address	Application Ref.	Reg.	Description	Decision	Potential Effects
						Construction traffic would not use the same routes as the Proposed Development, hence avoiding cumulative interactions with construction traffic from the Proposed Development using the roads to the north and west of the airport. **Therefore, no cumulative effects are likely.**

19. Future Development Plans

19.1 Introduction

19.1.1 The growth of Dublin Airport is mandated by government policy, as well as national, regional and local planning policy[1]. The Proposed Development does not propose this growth as it is intended to address the immediate need for a safe and reliable means of accessing the West Apron from the Eastern Campus. However, the Proposed Development is designed to ensure that it will have capacity to cater for the planned growth subject to planning permission being granted for such growth at a future point in time. Best practice in design of large infrastructure, in terms of practical, operational and financial considerations, means such infrastructure is designed not just to cater for existing requirements, but that it is fit for purpose over the entire life of that infrastructure so far as practically foreseeable.

19.1.2 Accordingly, given there is a long-term policy to expand Dublin Airport as a whole, it is considered appropriate that the competent authority assessing the Proposed Development would have an overview of those longer-term plans, so that the Proposed Development can be viewed and assessed in that wider context, with account being taken of planned future development at Dublin Airport as appropriate and as far as practically possible at this stage.

19.1.3 There are development proposals currently being prepared which will seek planning permission for future airport growth to 40 mppa. These will include proposals for airport infrastructure required to accommodate this growth. These future development proposals will require a grant of planning permission in order to be realised, which in itself will entail planning and environmental impact assessment.

19.1.4 The Proposed Development is a standalone proposal and is not reliant on future airport growth in order to be realised, nor does future airport growth require the Proposed Development. Future airport growth can occur (subject to planning permission being granted) in the absence of the Proposed Development because the Proposed Development does not provide any extra capacity to the airport and is required only to address a safety issue which would exist irrespective of the permitted airport capacity.

19.1.5 However, an awareness of future airport plans is relevant in considering the Proposed Development given the potential for interaction in the future. In this respect, this chapter is intended to give an overview of future development plans so that, consistent with the purpose of the EIA Directive and case law, account be taken of the impacts of future plans in the context of the assessment of the environmental effects of the Proposed Development.

19.1.6 The future development plans discussed in this chapter do not form part of the Proposed Development, nor is this chapter intended to undertake an EIA of these future development plans. Such an EIA is neither possible nor required at this stage; the environmental implications of such future projects will be fully assessed in future when consent is sought for them; they will be the subject of planning application(s) with any relevant supporting environmental information.

19.1.7 This chapter was written by Colin Bush, BA (Hons), MSc, CEnv an AECOM Associate Director from the Environment and Sustainability team with over 18 years' experience in leading and managing EIA projects.

19.2 Assessment Methodology

19.2.1 The Current State of the Environment has been discussed in preceding chapters. Desk studies and surveys have informed the understanding of current environmental conditions and, insofar as possible, this has been projected forward in those chapters to determine the Future Receiving Environment.

19.2.2 The general approach to the assessment in this chapter is to describe the Future Receiving Environment as it appears from the vantage point of 2022. The Applicant's own planned development is then

[1] A National Aviation Policy for Ireland (2015), https://www.gov.ie/en/publication/4de76f-national-aviation-policy/

described, setting out the main aspirations for Dublin Airport and what these would entail for the assessment of environmental effects of the Proposed Development.

Limitations & Assumptions

19.2.3 Importantly, future proposals for Dublin Airport, which include a planning application to grow to 40mppa, are still under development. While the Applicant can anticipate the required airport infrastructure to a reasonable degree, final proposals are likely to change in scale, scope and/or nature from those presented below. Proposals have not yet been the subject of formal preplanning consultations or other stakeholder engagement which will affect the final designs.

19.2.4 Other influencing factors include budgetary constraints, safety and security reviews, and the need to ensure proposals meet the constantly evolving needs of passengers and airlines. The current Covid-19 pandemic demonstrates that circumstances—and hence plans—can change unexpectedly and significantly. The pace of the aviation sector's recovery from the pandemic is still uncertain. Overall, development of large airports tends to be ongoing and organic. With these influencing factors in mind, it is likely that the plans for infrastructure discussed below will change over time.

19.2.5 While change is likely, what is set out below represents the best currently available information on which to form a view as to what an airport of 40mppa might comprise.

19.3 Future Receiving Environment

19.3.1 This EIAR has a relatively small study area, as befits the nature of the Proposed Development which, in environmental terms, is mainly about construction-related impacts which are largely confined within the airport boundary. However, future development plans include projects listed in Section 19.4, whose potential impacts could be more wide-ranging. Therefore, this section considers a Future Receiving Environment when the airport has expanded to 40mppa passenger throughput (assumed to be after 2030, which aligns with future projections for passenger growth and the necessary infrastructure to support this).

19.3.2 The Future Receiving Environment within the Application Site is likely to be broadly similar to the Current State of the Environment discussed elsewhere in the EIAR. However, the North Runway will be operational and the means of reaching the Western Campus of the airport will be limited to the Northern Perimeter Road and other routes will be unavailable.

19.3.3 At the strategic level, the Future Receiving Environment will be shaped by several key drivers. Firstly, population growth: population in the Dublin area is projected to rise significantly over the period addressed in this chapter. Secondly, climate change and the response to it, both in terms of emissions and adaptation, with ambitious plans[2] to reduce emissions. Thirdly, technology is likely to affect society and the environment in ways which are difficult to predict but may be profound.

19.3.4 There will likely be a substantial increase in population in the Dublin area. The Metropolitan Area Strategic Plan (MASP) of the Regional Spatial and Economic Strategy[3] for the Eastern and Midland Region envisages a population of 1.65 million in the metropolitan area by 2031, an increase of 250,000 people or 18% from 2016. Strategic development along key transport links such as the DART (Clongriffin, Baldoyle) and the proposed Metrolink will see increased populations in these parts of Dublin City and Fingal.

19.3.5 Projections in the Environmental Protection Agency's (EPA's) Greenhouse Gas Emissions Projections Report 2019-2040[4], indicate that a strong surge in demand for electricity, at a rate faster than the introduction of renewables, will mean Ireland's Emissions Trading Scheme (ETS) sector emissions will continue to increase up to 2025, after which policies contributing to fuel switching in power generation will contribute towards stronger emissions reduction to the end of the decade.

[2] Climate Action and Low Carbon Development (Amendment) Act 2021
[3] Eastern and Midland Regional Assembly RSES https://emra.ie/final-rses/.
[4] Environmental Protection Agency, Ireland's Greenhouse Gas Emissions Projections 2019-2040 https://euagenda.eu/publications/ireland-s-greenhouse-gas-emissions-projections-2019-2040.

19.4 Future Development Overview

Context

19.4.1 There are a number of emerging documents and studies being prepared by the Applicant, which will shape the future development of Dublin Airport. The key reports and studies are discussed in this section.

Capital Investment Programme 2020+

19.4.2 Since 2011, Dublin Airport has been a regulated entity, required periodically to submit its proposals for capital investment to the Commission for Aviation Regulation (CAR). In February 2019, the plans for investment to commence the next stage of Dublin Airport's development were submitted to CAR as the Capital Investment Programme (CIP 2020+)[5], with the objective of transforming the airport into a major European airport, welcoming 40 mppa. Following a Dublin Airport led consultation, CAR made a determination for the next price control period, which was published in October 2019. This determination is used as the basis for the identification of future infrastructure investment at the airport, although the timescales for growth set out in the CIP have clearly been impacted by the Covid-19 pandemic.

Drainage Master Plan

19.4.3 In 2018, the Applicant embarked on the Dublin Airport Drainage Masterplan (DMP) as part of its Sustainability Strategy. The DMP is a holistic long-term masterplan for drainage infrastructure at Dublin Airport. It is intended to examine existing and future drainage infrastructure requirements and develop a long-term phased and coherent approach to improvements in drainage infrastructure, including a long-term development horizon.

19.4.4 The overarching objectives of the DMP are:

1. Establish a detailed understanding of the existing airport drainage system, its effect on the surrounding environment and the legislative requirements Dublin Airport must comply with in this context.

2. Monitor and assess the existing drainage network and receiving watercourses on an ongoing basis to enable improvements in systems and practices and ensure compliance.

3. Provide drainage design guidelines and policies for Dublin Airport to ensure consistency of approach to both the development and operation of infrastructure across Dublin Airport, in line with the Applicant's Sustainability Policy.

4. Provide a holistic long-term drainage infrastructure investment plan to guide future development consistent with planning and environmental requirements, which, through a series of incremental improvements phased to align with the Applicant's cyclical funding structure, will deliver the flexibility, resilience and responsiveness required to enhance capacity of the airport's surface water management system and respond appropriately to extreme weather events.

5. Through stakeholder engagement, ensure the DMP is aligned with national, regional and local legislation, development plans and policies.

Draft Drainage Management Plan

19.4.5 As part of the DMP, the Applicant has prepared a Draft Drainage Management Plan (DMaP) for Dublin Airport. The DMaP is a best-practice model that involves an inter-agency Technical Working Group[6] setting objectives and targets and monitoring water quality trends on an ongoing basis. The framework proposed in the DMaP represents the Applicant's commitment, through a series of incremental actions in implementing the DMP, to making a positive contribution to achieving the objectives of the Water Framework Directive for each catchment surrounding the airport. A copy of the Draft DMaP document was previously provided to officials of Fingal County Council's Water Pollution Section of the Department of Environment, Climate Action and Water Services in March 2021, and to officers of FCC's Planning

[5] https://www.dublinairport.com/corporate/airport-development/cip-2020
[6] Comprising the Applicant, Fingal County Council, and other agencies such as Inland Fisheries Ireland and the Environmental Protection Agency

Department in June 2021. As part of consultation programme, it has been circulated (July 2021) to other key stakeholders including Inland Fisheries Ireland (IFI), Local Authority Waters Programme (LAWPRO), and the EPA.

Draft Carbon Reduction Strategy

19.4.6 In 2021, the Applicant prepared a draft Carbon Reduction Strategy (CRS) for Dublin Airport[7] with a view to setting a roadmap to reach a long-term Net Zero Carbon goal. It outlines the approach to reducing absolute Scope 1+2 emissions[8] by 30% below a 2019 baseline by 2030, aligned with the government's 2019 Climate Action Plan target to reduce Greenhouse Gas emissions by 30%.

19.4.7 The draft CRS identifies a range of carbon reduction actions, including integration of energy efficiency measures, use of 100% renewable electricity, electrification of Dublin Airport vehicle fleets, fuel-switching and electrification of onsite thermal energy plant, and circular economy practices.

19.4.8 Since the preparation of the draft CRS however, the Climate Action and Low Carbon Development Act 2021 revisited governmental targets, prescribing a new interim target of 51% reduction in GHG emissions by 2030 relative to a baseline of 2018. Achieving the revised target will require a revision of the draft CRS to incorporate additional measures to ensure any future growth proposals for Dublin Airport go far enough in terms of effective and affordable emission reduction measures to achieve the ambitious targets. The draft CRS is currently under review and the final document will accompany future planning applications to grow Dublin Airport to 40mppa.

Reasonably Foreseeable Future Development Plans

19.4.9 In addition to a rolling programme of infrastructure rehabilitation, maintenance and upgrades of existing facilities, much of which is outlined in the CIP 2020+, there are three reasonably foreseeable major projects planned at Dublin Airport.

Airport Drainage Projects Arising from the DMP

19.4.10 As outlined above, the DMP will result in a series of recommendations for incremental improvements in the drainage system at Dublin Airport. These improvements will ensure the flexibility, resilience, and responsiveness required to enhance the capacity of the airport's surface water management system to achieve environmental improvements in response to extreme weather.

19.4.11 The developments likely to be complete by 2030 comprise:

- A central pollution control facility to collect and manage contaminated surface water from the airfield as a whole to mitigate additional demand and improve environmental baseline conditions
- Segregation of clean and contaminated flows through implementation of a contamination detection and response system across the existing and proposed surface water network
- Additional hydraulic capacity through the construction of additional network pipelines for the separate conveyance of clean and contaminated surface water flows, as well as foul flows
- Greater operational flexibility in the network
- Clean surface water attenuation

19.4.12 Post-2030 further development would include:

- Additional pollution control infrastructure
- Additional hydraulic capacity
- Further clean surface water attenuation

19.4.13 The goal of the DMP would be a permanent improvement in the water environment, in particular of the watercourses leaving the airport campus. During construction, which it appears likely would occur in

[7] https://www.dublinairport.com/corporate/corporate-social-responsibility/sustainability
[8] Scope 1 emissions are direct greenhouse (GHG) emissions that occur from sources that are controlled or owned by an organization (e.g., emissions associated with fuel combustion in boilers, furnaces, vehicles). Scope 2 emissions are indirect GHG emissions associated with the purchase of electricity, steam, heat, or cooling. Although Scope 2 emissions physically occur at the facility where they are generated, they are accounted for in an organization's GHG inventory because they are a result of the organization's energy use.

phases over an extended timeframe, there would be spoil generated from excavations, leading to additional HGV traffic on the major roads around the airport to remove this spoil. However, this impact is thought unlikely to lead to significant noise or air quality impacts given that additional HGV movements would be minimal for much of the construction programme with occasional short-term peaks, due to the phased nature of the developments arising.

Infrastructure Application

19.4.14 The Infrastructure Application (IA) is a project to increase the passenger capacity of the airport to 40mppa and the infrastructure required to facilitate that growth likely to be reached sometime after 2030, whilst maintaining service levels at the airport. No single item of infrastructure will provide a capacity increase in isolation, rather the combined effect of new infrastructure will provide overall airport capacity.

19.4.15 Currently at the design stage, in broad terms the IA would:

- Expand the existing South Apron with new remote stands, taxiways, pre-boarding zone and apron space
- Extend Pier 1 on the North Apron to increase passenger capacity and the number of boarding gates
- Create a new Apron 7 on the western side of the airport with additional aircraft stands
- Increase space internally inside Terminal 1 by relocating the security hall to the mezzanine level
- Internal changes to enable Pier 3 for pre-cleared US-bound passengers
- Expand of staff car park (north)
- Expand long-term car park (red)
- Expand the existing Terminal 1 and Terminal 2 multi-story car parks by adding three and two levels respectively
- Ancillary works such as construction compound(s)

19.4.16 Importantly, the IA would also seek permission to raise the annual passenger cap, currently 32mppa, to 40mppa. The environmental impact assessment of the IA has not yet reached the scoping stage and, whilst extensive environmental baseline surveys were undertaken in 2019-2020, a great deal of work remains to be done on the assessment of effects, so the assessment presented below has been undertaken as far as reasonably practicable at this stage and with the information available.

19.4.17 The principal operational environmental impact of the IA is likely to be the increase in air and ground traffic movements from Dublin Airport, with associated aircraft / ground noise and greenhouse gas emissions. During construction, there will be construction wastes generated and this would involve additional HGV traffic on the major roads around the airport. It is unclear, because data on the numbers of vehicles and volume of waste concerned is not available, whether this would lead to significant but temporary air or noise effects in the vicinity of the airport during the construction period but mitigation of any such impacts is a key focus for the environmental assessment work to be undertaken for the IA, with phasing of the likely 10 - 15 year construction programme offering opportunities to manage the timing of potential impacts to limit their cumulative effects.

Other Projects

19.4.18 Other ‘business as usual’ projects are planned by the Applicant to ensure that Dublin Airport remains a safe and efficient airport. These include many projects set out in the CIP 2020+, concerning maintenance of runways and taxiways, ongoing upgrade and replacement of aging infrastructure in the airfield, the terminals, and other parts of the airport.

19.5 Assessment of Future Development Plans

Airport Drainage Projects Arising from the DMP

19.5.1 Airfield drainage projects are currently being developed towards planning approval. The proposals include construction of trunk pipelines from the West Apron designed to convey flows from future developments to the west and north-west of the airfield. Further detail would be required to enable an

assessment at this stage. However, it can be said that the purpose of these projects is to improve the surface water management system to achieve environmental improvement in response to extreme weather and so the operational effect on water and biodiversity is likely to be beneficial.

19.5.2 Construction of these projects will take place over an extended period with planning permission being required before this can commence, likely in early 2024 when planning permission is anticipated. Drainage infrastructure will interconnect with the pre-positioned inert pipelines that form part of the Proposed Development, as described in Chapter 3: Proposed Development. Other than this, there will be no changes to the assessed effects of the Proposed Development as a result of this future project.

Infrastructure Application

19.5.3 According to the latest projections, provided by the Applicant potential passenger demand at Dublin Airport will reach 40mppa between 2027 and 2031. Thus, it is probably reasonable to assume that the Applicant would seek to have permission for and have aimed to complete construction of the IA, providing the infrastructure necessary to allow the airport to operate at 40mppa whilst maintaining service levels, by 2030.

19.5.4 A full Environmental Impact Assessment of the likely significant environmental effects of an airport operating at 40mppa and appropriate mitigation, as required by the EIA Directive, will be presented if and when a planning application for the IA is made to FCC.

19.5.5 Table 19-1 summarises how the above future airport development might inform the environmental effects assessed in this EIAR.

Other Projects

19.5.6 It is unlikely that any of the ‘business as usual’ projects will lead to significant environmental effects, although they may generate noise and some traffic on the surrounding roads during construction. Although the information to carry out a detailed analysis is not available, as these projects are ‘business as usual’, it is reasonable to conclude that, as the works are of similar scale to current and previous works, the effects arising from their construction would not differ markedly from those arising from similar ongoing upgrade and maintenance projects being undertaken at present. In other words, their effects on noise and traffic are already part of the Current State of the Environment.

19.5.7 Table 19-2 lists these projects and gives a brief description of what they comprise, highlighting any potential environmental effects in the comments section. In some cases, there is potential for interaction with construction of the Proposed Development, as they would occur close to or within the Application Site. It is not likely that significant environmental effects would occur as a result of interaction of construction effects however, given the remoteness of any sensitive receptors from the Application Site and adjacent works. The conclusions of this EIAR would be unaffected.

Table 19-1: Potential Environmental Effects of the Infrastructure Application

Environmental Factor	Potential Demolition Effect	Potential Construction Effect	Potential Operational Effect	Comments
Population and Human Health	Not known	Likely to be beneficial employment effects	Not known	There is the potential for the future airport developments including the IA to have beneficial effects from airport operations, construction and supply chain jobs created due to increased spending in the local area by employees. There is also potential for loss of amenity associated with traffic, noise, dust and vibration during construction, however this would be minimised through the introduction of construction environmental management and construction traffic management measures. Effects upon the actual and perceived health and well-being of local residents are possible, owing to additional air traffic movements associated with an increase to 40mppa. This is not easy to quantify at this stage; although the number of passengers passing through the airport would be 25% higher than in 2018 this would not necessarily translate into 25% more flights, and aircraft in future are likely to be quieter than at present. A full assessment of the noise impacts and those on population and human health will be undertaken as part of any future planning application. Taking into account this information it is unlikely that there would be a change to the conclusion of this EIAR. i.e., that effects from the Proposed Development on the Population & Human Health factor would not be significant.
Traffic and Transport	Not known	Likely to be adverse effects from construction traffic	Not known	Traffic around the airport is likely to increase as a result of construction traffic and operation of a 40mppa airport, however the extent is not known and could be offset / reduced by the introduction of more sustainable transport options such as BusConnects and Metrolink and implementation of the forthcoming campus Mobility Management Plan. A modelling exercise is being undertaken to determine the effect. This is being prepared for the IA itself but is not available currently. The conclusions of this EIAR in respect of construction traffic would be unaffected, since it is probable that the Proposed Development would be constructed by the end of 2025, in advance of permission being granted to exceed the 32mppa Cap and construction of the IA. This EIAR states that there will be no change to the number of vehicles crossing between the Eastern and Western Campuses after the Proposed Development is constructed. It is probable that this conclusion would have to change in the context of an increase from 32mppa to 40mppa, which would likely see some increase in activity on the West Apron.
Major Accidents and Disasters	Probably none	Probably none	Not known	A modelling exercise would need to be undertaken to determine the effect of changes to the number of operational air traffic movements. This will be prepared for the IA but is not available currently. There would be no change to the conclusions of this EIAR in respect of Major Accidents & Disasters however, as risks of such to the Proposed Development from offsite hazards are considered unlikely and the nature of such offsite hazards would not change. Similarly, risk from the Proposed Development to offsite receptors is considered unlikely.
Air Quality	Not known	Not known	Not known	There is potential for increase in public exposure to short-term concentrations of small particles and pollutants most commonly associated with road traffic emissions during construction, although construction impacts would be managed by a CEMP. There is potential for increase in public exposure to pollutants most commonly associated with combustion during operation of the IA, but the likelihood is that there would be little change in assessed air quality if the airport was operating at 40mppa. However, the data to undertake the modelling is not currently available. An air quality model will be prepared for the IA in due course. The conclusions of this EIAR in terms of the Air Quality factor would be unaffected since the operational Proposed Development is not a significant source of pollution and still would not be if the traffic using the Underpass were to increase by 25% in line with the PAX uplift. It is probable that the Proposed Development would be constructed by the end of 2025, in advance permission being granted to exceed the 32mppa Cap and construction of the IA. Operational emissions from the Proposed Development would remain negligible, as the nearest sensitive receptors are too distant to experience any effects.

Environmental Factor	Potential Demolition Effect	Potential Construction Effect	Potential Operational Effect	Comments
Noise	Not known	Not known	Adverse	Noise from the airport operating at 40mppa would be expected to increase given the growth in air traffic movements and changes in aircraft movements on the ground, taxiing and engine testing. Overall noise effects are likely to reduce over time if past trends are continued as the fleet is modernised. A full noise impact assessment will be undertaken for the IA in due course. The conclusions of this EIAR in terms of noise would be unaffected. It is probable that the Proposed Development would be constructed by the end of 2025, in advance permission being granted to exceed the 32mppa Cap and construction of the IA. Operational noise from the Proposed Development would remain negligible, as the nearest sensitive receptors are too distant to experience any effects.
Climate and Carbon	Probably none	Not known	Not known	Scope 1+2 carbon emissions from the airport operating at 40mppa would tend to increase, however this would be offset by measures in the Applicant's CRS and incorporated in the IA. The exact balance between these effects is not clear at present but could be expected to represent an improvement overall in the medium term, in line with the CRS and government policy. Emissions will be modelled for the IA in due course. The conclusions of this EIAR in terms of the Climate factor would be unaffected. Carbon emissions from the construction of the Proposed Development would not be affected by the IA. Operational emissions from the Proposed Development would increase in proportion to the increase in traffic using it, however the volume of emissions concerned is negligible and would be ameliorated by improvements in engine technology and the switch to electric vehicles.
Landscape and Visual	None	None	None	Unlikely that there would be significant landscape or visual effects as development would be primarily confined to the airport campus. The conclusions of this EIAR in terms of the Landscape & Visual factor would be unaffected as no effects are predicted.
Cultural Heritage	Not known	Not known	Not known	There is potential for physical and setting impacts on known cultural heritage assets, and possible physical impacts on unknown archaeological assets. However, it is unlikely that there would be significant cultural heritage effects as development would be primarily confined to the airport campus. The conclusions of this EIAR in terms of the Cultural Heritage factor would be unaffected as no effects are predicted.
Land and Soils	None	None	None	There is potential for the mobilisation of contaminants via numerous pathways to subsurface during construction, but such impacts are capable of mitigation through the application of a CEMP. Also potential for loss of soil cover, soil erosion and compaction during construction, but again this can be mitigated through application of a CEMP. The conclusions of this EIAR in terms of the Land & Soils factor would be unaffected. It is probable that the Proposed Development would be constructed by the end of 2025, in advance permission being granted to exceed the 32mppa Cap and construction of the IA. Operational effects from the Proposed Development would remain negligible.
Biodiversity, Flora and Fauna	Not known	Not known	Not known	There is potential for increased disturbance of wintering birds using functional land at the airport by increased noise / visual disturbance from increased aircraft flights and possible increase in bird strikes. Effects on European Sites are also possible with an increase in flights over such locations. An Appropriate Assessment will be undertaken for the IA in due course to determine whether such effects might occur. The conclusions of this EIAR in terms of the Biodiversity factor would be unaffected as no effects are predicted.
Water	None	None	None	There is potential for the mobilisation of contaminants via numerous pathways to surface waters and groundwater during construction, but such impacts are likely to be capable of mitigation through the application of a CEMP. The conclusions of this EIAR in terms of the Water factor would be unaffected. It is probable that the Proposed Development would be constructed by the end of 2025, in advance permission being granted to exceed the 32mppa Cap and construction of the IA. Operational effects from the Proposed Development would remain negligible.

Environmental Factor	Potential Demolition Effect	Potential Construction Effect	Potential Operational Effect	Comments
Material Assets	Not known	Not known	Not known	There is potential for additional waste to be generated during construction and operation, as well as the use of materials during the construction process. Details to assess the extent of such impacts are not yet known. The conclusions of this EIAR in terms of Material Assets (Built Services) would be unaffected as no effects are predicted. The conclusions of this EIAR in terms of Material Assets (Waste) would be unaffected as is probable that the Proposed Development would be constructed by the end of 2025, in advance permission being granted to exceed the 32mppa Cap and construction of the IA. Operational waste generation by the Proposed Development is negligible.

Table 19-2: Other Projects

Project	Description	Comments
Apron Rehabilitation Programme	Annual apron rehabilitation programme that addresses aprons with a remaining life of between 1 & 5 years. The apron areas included in this category are primarily the South Apron, stands associated with Pier 2 & Pier 3, and Apron Taxiway 1 and Apron Taxiway 3 & Apron Taxiway 6.	May be some interaction with construction work on the Proposed Development which, if consented, would likely be under construction adjacent to Pier 3 in approximately the same timeframe. Noise and air quality effects are not likely to be significant owing to the absence of nearby sensitive receptors.
Airfield Maintenance Base Improvement Programme	Upgrade facility to improve the efficiency scope also includes moving the potassium acetate tanks into a new purpose build bunded area that is not congested and allows for the larger delivery and distribution equipment.	None – this is not considered likely to affect the current baseline owing to the relatively small scale of the activities
Cross Wind Runway (Runway 16/34) Lighting for Low Visibility Procedures (LVP)	This project proposes to install LVP taxiing guidance lighting on Cross Wind Runway (16/34) to allow it to be used as a formal LVP Taxiway route.	This project is likely to be complete before the end of 2022 so interaction with construction work on the Proposed Development is not anticipated.
Airport Water and Foul Sewer Upgrade	This project entails the replacement, upgrade and refurbishment of critical airport campus utility mains and foul water service. Installation of underground pipework to complete the mains water Ring Main. Installation of a reservoir mains bypass to allow mains direct feeding of the mains water Ring Main and installation of a mains water interconnection from the T2 domestic water storage to the T1 domestic water storage tanks to increase the T1 water storage capacity and replacement of end of life and defective sluice valves, fire hydrants and sections of underground water mains.	Likely to lead to an improvement in water efficiency at the airport however the effect is unlikely to be significant since water demand is likely to rise over time.
Hydrant enablement - Pier 2 & 3	The project proposes the installation of a fuel hydrant system to service aircraft parked on Pier 2 and Pier 3. This proposed Pier 2 & 3 fuel hydrant system consists of a network of underground piping that transports fuel from tanks in the fuel farm to aircraft while managing fuel intake.	Likely to marginally reduce the risk of accidents in fuel deliveries to aircraft. Unlikely to be significant as the current procedure is governed by strict safety protocols. Potential for interaction with construction work on the Proposed Development, although timescales for this project are not certain

Project	Description	Comments
Airfield Taxiway Rehabilitation Programme	Annual airfield taxiway rehabilitation programme and address taxiways with a remaining life of between 1 and 5 years. The main focus of this project will be Taxiway F1, Taxiway F-Outer, Taxiway B1, Taxiway E1 and Taxiway M2.	This is not considered likely to affect the conclusions of the EIAR
De-icing pad at South Runway (Runway 10R)	It is proposed to build a purpose-built de-icing facility as an enhancement to the previously approved PACE South Runway Line Up Points (LUP) project. This pad will allow the de-icing of a single code E or code C aircraft. The optimised layout of the pad allows for full circulation of de-icing trucks around the aircraft. The design includes a reserved area for de-icing trucks and ancillary equipment.	This is not considered likely to affect the conclusions of the EIAR
Airfield southern perimeter road upgrade programme	This project proposes to rehabilitate and upgrade the southern perimeter maintenance road. This will involve upgrade and partial widening of the perimeter & access roadways associated with the South Runway to make them suitable for their current use and the increased traffic on them (minor airfield security fence improvements are also captured as part of this project).	This is not considered likely to affect the conclusions of the EIAR
Advance visual docking guidance system (5G, Pier 1 & Pier 2) - CIP	This project entails the installation of Advanced Visual Docking Guidance System (A-VDGS) technology to aircraft parking stands on Apron 5H and stands 102-104.	This is not considered likely to affect the conclusions of the EIAR
AGL fibre optic communication network improvement programme	This project proposes to provide a ring configuration for the airfield fibre optic network (complete ring around South Runway). Scope includes pit and duct system, installation of fibre network and reconfiguring of fibre network.	This is not considered likely to affect the conclusions of the EIAR
Second Medium Voltage (MV) connection point	This project proposes that a second electrical supply point be provided at Dublin Airport to protect the entire airport campus from the risk of a single-point failure at the current electrical connection point at Dardistown Substation.	This is not considered likely to affect the conclusions of the EIAR
Critical taxiways	Several the airfield taxiways are in a relatively poor condition and will need to be rehabilitated within the next few years as part of ongoing maintenance.	This is not considered likely to affect the conclusions of the EIAR
South Apron taxiway widening	Widening of a portion of the South Runway (Runway 10/28) Taxiway.	This is not considered likely to affect the conclusions of the EIAR
Runway 10 Line-up Points (LUP)	Comprises an additional South Runway (Runway 10/28) line-up point, bypass taxiway and associated infrastructure.	This is not considered likely to affect the conclusions of the EIAR
Terminal 1 façade, roof and spirals	A full refurbishment of Terminal 1 Facade. Re-life existing Façade including: 8-bay Terminal 1 Façade, Terminal 1 Roof upgrade, Phase 3b(8-Baysection), rectify balcony drainage issues, repair of spiral ramps and relocation of Antenna Mounting Facility.	This is not considered likely to affect the conclusions of the EIAR
Office consolidation and refurbishment	This project will fund the refurbishment of levels 4 and 5 located in Terminal 1. It will increase the capacity allowance for staff in that location by 100%, which will allow the Applicant to vacate staff from Cloghran House and Cargo 6 buildings.	This is not considered likely to affect the conclusions of the EIAR
Skybridge rehabilitation	Full structural survey and assessment of the current condition of the structural cables and floor joints, remedial works to all identified structural defects in suspension cables, replace/upgrade joints and replace Terrazzo flooring where defective.	This is not considered likely to affect the conclusions of the EIAR
Campus buildings critical maintenance	This project entails delivery of several essential improvement works to the structure and roofs of existing campus properties and supplementary safety works.	This is not considered likely to affect the conclusions of the EIAR

Project	Description	Comments
Airport roads critical maintenance	6km of pavement have been identified as having very low skid resistance which will need immediate re-surfacing. A further 3km of pavement require re-strengthening works.	This is not considered likely to affect the conclusions of the EIAR
Staff car parks critical maintenance	Essential improvement and rehabilitation and upgrade works to staff car park spine roads at Dublin Airport.	This is not considered likely to affect the conclusions of the EIAR
Public carpark critical maintenance	Essential upgrade and improvement works to public car park spine roads at Dublin Airport. Project will also implement structural and waterproofing improvement works required at both multi-storey carparks.	This is not considered likely to affect the conclusions of the EIAR
Electric charger network facilities	This project proposes to install publicly accessible electrical vehicle charging facilities. Works include: feasibility study, provision of underground ducting network and futureproofing, associated civil works and electric charger network facilities	Will have beneficial effects on carbon emissions but these will be negligible in the context of global emissions.
Small energy projects	This project proposes using new energy efficient and sustainable equipment and control systems for the purposes of improving energy consumption, reducing energy cost, reducing carbon emissions, improving air quality and reducing noise	Will have beneficial effects on carbon emissions but these will be negligible in the context of global emissions.
Terminal 1 kerbs	This project proposes to build the following components as a first phase to developing the Ground Transportation Centre to become the new gateway to the airport: Relocation and increase in the Terminal kerbs drop off to the other side of the multi-storey carpark where bussing services are currently located; Refurbished multi-storey carpark atrium space with passenger segregation to become the new entrance to Terminal1; and Reconfiguration of vehicle access and pedestrian routes to and from the Ground Transportation Centre and the main road network around the airport.	May have non-significant, temporary adverse effects in terms of noise and air quality in the area of the Ground Transportation Centre.
Large energy project - photovoltaic (PV) farm	This project entails developing and integrating a solar PV Farm to generate electricity at Dublin Airport. The installation will provide operating cost reduction, facilitate long term price certainty, secure revenue generation capacity and help obtain compliance with regulatory energy and carbon emissions targets.	Will have a significant effect in assisting the Applicant achieve the airport-wide carbon reduction targets. Will also have beneficial effects on carbon emissions, but these will be negligible in the context of global emissions.
Early bag store	The proposed project will construct an early bag store on the mezzanine of Terminal 2. The lane-based system will have the capacity of 950 bags.	This is not considered likely to affect the conclusions of the EIAR

19.6 Summary

19.6.1 An overview and broad assessment of the possible environmental impacts of reasonably foreseeable future development plans has been provided, insofar as this is practically possible at this stage given the information available on these plans at time of writing. It was noted that these proposals are likely to change as many have not yet been the subject of preplanning consultations or other stakeholder engagement which will affect the final designs. Other influencing factors include budgetary constraints, safety and security reviews, and the need to ensure proposals meet the constantly evolving needs of passengers and airlines.

19.6.2 The future development plans discussed in this chapter do not form part of the Proposed Development and would all require further consents (and environmental assessments as required) before they can be implemented.

19.6.3 The overview above does not give rise to any concern about the likely environmental effects of the Proposed Development when viewed in the context of policy and plans for the future expansion of Dublin Airport and their environmental impact. In addition, it provides the local authority with an overview of future development plans so that, consistent with the purpose of the EIA Directive and case law, account be taken of the impacts of future plans in the context of the assessment of the environmental effects of the Proposed Development.

20. Summary of Mitigation Measures

20.1 Introduction

20.1.1 This chapter of the EIAR contains a summary of the mitigation which will be implemented during construction and operation of the Proposed Development.

20.2 Summary Table

20.2.1 Table 20-1 lists the mitigation proposed as part of the Proposed Development.

Table 20-1 Summary of Mitigation Measures

Chapter	Mitigation
Chapter 5: Traffic & Transport	General: • Periodic inspections of the construction works will be conducted to address any traffic issues. • The contractor will develop a Construction Traffic Management Plan (CTMP). The CTMP is particularly required to prepare for the following situations: Large/high volume deliveries and removal of materials; construction works requiring traffic management to facilitate utility/drainage connections; construction phases which re-configure existing traffic flows to facilitate the works. • Southern Construction Compound as dedicated parking for HGVs waiting to make deliveries whilst they are unable to enter the construction site. • The contractor will need to coordinate all deliveries with appointed daa liaison so as not to delay passenger journeys. • Dilapidation surveys will be undertaken on all construction access routes
Chapter 6: Land & Soils	Excavation, Infilling and Dewatering: • Temporary storage of excavated soil will be carefully managed in such a way as to prevent potential negative impact on the receiving environment. Spoil and temporary stockpiles will be positioned in locations which are distant from drainage systems and away from areas subject to flooding, so as not to cause potential run off to soil and groundwater. • The contractor shall provide suitable pumps, settlement tanks and filters to filter all water being pumped/discharged from excavations into existing drains. The contractor shall also take measures to ensure that runoff from open excavations does not enter the surrounding drainage system without being treated. • Excavated soil and stone that is surplus to requirements will be managed through the contractor's Waste & Resource Management Plan. The excavated soil will be tested for potential contaminants and waste acceptance criteria to determine whether it can be stockpiled on site for future reuse; sent to a soil recovery facility; or disposed as inert, non-hazardous or hazardous waste. • Where possible, material excavated from site will be reused to minimise the volume of imported fill required. Where imported fill is required, the source will be carefully selected and vetted to ensure that it is of a reputable origin and that it is 'clean' (i.e., will not introduce contamination to the environment). Procurement procedures will be developed to ensure that aggregates are sourced from reputable suppliers who are vetted for their environmental management status, as well as regulatory and legal compliance • Given the nature of the site, a significant part of existing pavements demolished to allow construction of the Proposed Development will need to be eventually reconstructed in the same location. Pavement demolition material may potentially be reused to reconstruct the new pavement. The extent of re-usability will be determined during the works. Any such site-won material will be carefully processed to ensure that no contamination is released to the environment. • If recycled aggregate is used as imported fill, rigorous chemical testing will be undertaken to confirm that it is 'clean' (i.e., will not introduce contamination to the environment). • Handling of materials, such as soils, will be kept to a minimum and materials shall be stockpiled at a minimum practicable height. For topsoil, a 2 m height is recommended to prevent the soil compressing under its own weight, all other stockpiles will not exceed 10 m in height and will be suitably graded. • Where required, silt fencing will be deployed at the base of stockpiles when storing fine material, to prevent runoff outside the designated area. • If, during the excavation works, either groundwater or surface water run-off enters the excavation, there will be a requirement to dewater the excavation. This will be achieved by pumping water from the excavation to the nearest watercourse or drain. To ensure that no silt or sediment is transferred to the drains or watercourses, the water will be pumped via settlement tanks or collection basins, where any solids in the water will settle out. The settled solids will be removed from the tank/basin as required and disposed of offsite by appropriately licensed hauliers.

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- All discharged water (rainwater and groundwater) from pumping will be treated and tested before re-infiltration. Such water will be disposed of as construction site run-off, having first passed through a settlement tank or filtration system where appropriate. No discharge to existing infrastructure / watercourses / ground shall be permitted to take place without the appropriate consents or approvals.
- It is proposed to operate the excavation dewatering system as a closed loop system to avoid aeration of the re-injected groundwater. Should it prove possible to manage drawdown effects on existing structures without injecting 100% of the abstracted groundwater, discharge to the nearby stream or sewer system will be required, subject to necessary consents. It is expected that simple treatment, such as sedimentation and aeration, will be required before discharge.
- Chemical testing of groundwater will be conducted to determine appropriate discharge options. Groundwater from the monitoring network and dewatering system, if required, will be regularly monitored before, during and after construction for a range of organic and inorganic parameters.
- All construction materials shall be responsibly sourced, with assurances provided that goods and services are legitimately secured from legal and well-managed sources and from suppliers and contractors who can demonstrate responsible sourcing of their materials.
- The source of imported fill material will be carefully selected and vetted to ensure that it is of a reputable origin and that it is 'clean' (i.e., will not introduce contamination to the environment). To the extent possible, material excavated from site will be reused to minimise the volume of imported fill required.
- If recycled aggregate is used as imported fill, rigorous chemical testing will be undertaken to confirm that it is 'clean' (i.e., will not introduce contamination to the environment).
- Imported fill materials will be brought to the Application Site on the public road network, prior to being distributed along the path of the Underpass via the designated haul routes for each Phase.
- Temporary drainage during the construction phase will be addressed in the CEMP and will be managed so as to reduce the direct runoff to ground and to watercourses.
- Periodic inspections of the construction works will be conducted by the appointed contractor, documented and reported to daa on a monthly basis. daa shall also conduct audits or spot checks to ascertain whether works comply with the requirements of the preliminary CEMP and the contractor's detailed CEMP.

Accidental Spills and Leaks:

- In order to prevent spillages to ground of fuels or other liquid chemicals, and to prevent consequent soil or groundwater quality impacts, it will be necessary to adopt mitigation measures during the construction phase.
- Pollution prevention will be achieved with both physical and procedural measures. The contractor shall comply with all national laws and regulations controlling pollution of the environment. Necessary precautions to prevent pollution occurring to ground of fuels, oils, chemicals, or other harmful materials shall be taken.
- The locations of refuelling, storage of oil/fuel, concrete mixing and washing areas should be established, where practicable, at a designated bunded location in the Main Compound. A buffer zone of at least 50 m between the Cuckoo stream culvert network should be provided.
- Oil and fuel storage tanks will be bunded to the greater volume of either 110% of the capacity of the largest tank/container within the bunded area or to a volume of 25% of the total capacity of all the containers.
- Drainage from the bunded area will be diverted for collection and safe disposal.
- All containers within the bunded storage area will be clearly labelled, so that appropriate remedial action can be taken in the event of a spillage. When moving drums from the bunded storage area to locations within the Application Site, a suitably-sized spill pallet will be used for containing any spillages during transit.
- A spill response kit will be available onsite and accessible to all to control pollution incidents. These spill kits will contain absorbent pads, absorbent granules and methods of disposal of materials and used kit. These kits will be located at appropriate points around the site which are considered to be at a higher risk of pollution (e.g., refuelling area and next to fuel tanks). Further spill kits and supplies will be located in the stores within the site, where replacements for used kits will be found. The spill kits will need to be regularly inspected and immediately

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	replaced if used. Any used spill kit materials will be disposed of using a licensed hazardous waste contractor in accordance with relevant legalisation. • Refuelling of construction vehicles and the addition of hydraulic oils or lubricants to vehicles, will be conducted by appropriately-trained personnel and take place in designated areas, which will be away from surface water gullies or drains (unless agreed otherwise with daa - which may be necessary in the case of mobile task lighting or generators). • Where mobile fuel bowsers are used on the Proposed Development, in the event of a machine requiring refuelling outside of the designated area, fuel will be transported in a mobile double skinned tank. Any flexible pipe, tap or valve will be fitted with a lock where it leaves the container and locked shut when not in use. Each bowser will carry a spill kit and each bowser operator will have spill response training. • Pumps and generators used on the site will have integral drip trays where possible. All items of plant without an integral drip tray shall be stored over a portable drip tray. Drip trays shall be inspected and kept free of accumulated rainwater as necessary. Any oily water shall be disposed of at an appropriate licensed facility. Any cleaning/arisings from drip trays etc. to be disposed of as hazardous waste in accordance with EPA guidance and legislation. • All plant and equipment shall be checked for leaks of fuel and lubricants before being allowed onto the site. The Principal Contractor will allow for regular checks and maintenance as required. • No discharge to existing infrastructure/watercourses/ground shall be permitted to take place without the appropriate consents or approvals. • The contractor shall provide suitable pumps, settlement tanks and filters to filter all water being pumped/discharged from excavations into existing drains. The contractor shall also take measures to ensure that runoff from open excavations does not enter the surrounding drainage system without being treated. • Ditches and water streams will be clearly identified on site and shown on method statements and site plans. The Principal Contractor carrying out the works shall identify all watercourses, drains and potential conduits for silt-laden run-off and where necessary, measures shall be taken to minimise direct sediment run-off from the working site into watercourses. • Use of Concrete and Lime • The risks from concrete works when constructing the Proposed Development will be managed and mitigated by the Contractor ensuring that no concrete is laid during wet weather, if achievable, so that there is no risk of concrete being washed off the site and into the surface water drains or nearest watercourse. • Ready-mixed concrete will be brought to the Application Site by truck. A suitable risk assessment for wet concreting will be completed prior to works being carried out which will include measures to prevent discharge of alkaline wastewaters or contaminated water to the underlying subsoil and groundwater. • The pouring of concrete will take place within a designated area protected to prevent concrete runoff into the soil/groundwater media. Washout of concrete transporting vehicles will take place at an appropriate facility, offsite where possible, alternatively, where wash out takes place onsite, it will be carried out in carefully managed onsite wash out areas.
Chapter 7: Water	General: • The construction of proposed infrastructure and decommissioning of existing infrastructure will be phased such that there is no reduction in the total available storage volume of existing systems for either clean or polluted surface water runoff at any point during the project. • Where possible, all hard surfaces that are positively drained will be installed early stage in the construction of the Underpass to allow permanent drainage facilities to be used to collect silt and hydrocarbons. • The extent of exposed ground will be minimised where possible at all times during construction and any stockpiles outside areas specifically designed for the purpose will be covered to prevent the creation of any contaminated run-off. • Areas where stockpiles are located will be positively drained through a grit trap where silt will be collected before water is discharged. Wheel-wash down areas will also be drained through a grit trap.

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	• The locations of refuelling, storage of oil/fuel, concrete mixing and washing areas should be established where practicable to be situated ideally off site at a designated location coordinated with the Applicant. If these are to be provided within the proposed project boundary then a buffer zone of at least 50 metres between the Airfield Trunk Culvert network should be provided. • Pollution prevention will be achieved with both physical and procedural measures such as; temporary sediment forebays within a designated attenuation basin during construction, suitable interceptors within the permanent and temporary surface water drainage networks and suitable storage of construction materials. • Periodic inspections of the construction works will be conducted to address surface water contamination. • No discharge to existing infrastructure/watercourses/ground shall be permitted to take place without the appropriate consents or approvals. • The contractor will identify, and risk assess existing drainage systems and put in place measures to prevent possible contamination from surface run-off emanating from the works. • The contractor shall comply with all national laws and regulations controlling pollution of the environment. Necessary precautions to prevent pollution of streams, lakes, ponds, and reservoirs with fuels, oils, bitumen's, chemicals, or other harmful materials shall be taken. • Ditches and water streams will be clearly identified on site and shown on method statements and site plans. • Storage of materials will be located at least 4 metres away from water bodies, within designated and bunded areas. • Particular care will be taken in the vicinity of the Cuckoo Stream which has been identified as a sensitive receptor. Silt Mitigation: • As part of the underpass surface water drainage design, appropriate pollution measures will be implemented and in place within the drainage network in form of full retention fuel interceptors, shut-off valves and fire suppression/contaminated water tanks. • During the construction works, appropriate silt mitigation, straw bales and Terram will be installed, as appropriate, at locations deemed to be at risk from silt pollution during the construction works. • Wheel wash bays and road sweeping facilities, will further reduce the potential for silt pollution and transfer to and from the construction site. • Where required, silt fencing will be deployed at the base of stockpiles when storing fine material to prevent runoff outside the designated area. • The storage of fuels and hazardous materials during the construction phase provides further potential for pollution incidents. Some removed topsoil and excavated material will be stored for reuse, and it is important that these designated storage areas are strategically located in relation to the watercourses and any other drains, so that there is no risk of topsoil or any other material being washed into the watercourses or drainage network. • In order to mitigate the risk of pollution, mitigation measures are required to be in place during the construction period. The extent of exposed ground will be minimised where possible and stockpiles covered so to reduce sediment supply and prevent the creation of any contaminated runoff. The potential will be further minimised by using grit traps to drain stockpile and wheel-wash areas so silt from these activities can be diverted to the drainage network. Water Pumping: • The contractor shall provide suitable pumps, settlement tanks and filters to filter all water being pumped/discharged from excavations into existing drains. The contractor shall also take measures to ensure that runoff from open excavations does not enter the surrounding drainage system without being treated. • In the event where pumping of water is required onsite, the requirement for water pumping will be planned in advance (as far as is practicable) and a permit to pump procedure will be in place to ensure that water pumping is controlled.

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	• All discharged water (rainwater and groundwater) from pumping will be treated and tested before re-infiltration. Such water will be disposed of as construction site run-off having first passed through a settlement tank or filtration system where appropriate. • An upstream and downstream chamber within the Airfield Trunk Culvert will be required to ensure pumping occurs between a single conveyance point. • Any pumping of the Cuckoo Stream is to be agreed in advance with FCC and IFI to ensure the watercourse is protected throughout and timeframes and pump rates can be confirmed. Dewatering: • Dewatering fluids will be pumped via settlement tanks or collection basins where any solids in the water will settle out. The settled solids will be removed from the tank/basin as required and disposed offsite by licensed hauliers. • The construction dewatering strategy should include a programme of water monitoring and controlled discharges of water abstracted during dewatering. Where necessary, it is proposed that additional monitoring boreholes should be drilled at strategic points around the Proposed Development in order to ensure the monitoring process is effective. Automatic water level data loggers (or other suitable method) to facilitate continuous monitoring would be installed in selected monitoring boreholes at strategic locations. Hazardous Materials / Fuels: • The Principal Contractor will ensure that no concrete is laid during wet weather if achievable to prevent drainage into watercourses. • Any temporary storage areas for chemicals or fuels will be contained within impermeable bunds constructed in line with current best practice. The Principal Contractor should ensure that staff are trained in the use of spill kits in the event of a leak or spill. • Any fuel such as diesel shall be stored at least 30m away from any watercourse, where practicable. Oils and lubricants used on the site shall be stored in temporary vessels designed to hold 110% of the container's capacity. No oil or lubricants shall be stored within 50m of a watercourse, where practicable. • Fuelling of plant and equipment is to be carried out within compound and material storage areas only (unless agreed otherwise with daa – which may be necessary in the case of mobile task lighting or generators) by a trained operative using double skinned bowsers with a designated fuelling area and bunded fuel storage. Refuelling on the site shall be undertaken at least 30m from any given watercourses (where practicable). • All plant and equipment brought to site shall be in good working order with no leaks and maintained as such during the course of the Works. • All fuels, chemicals or liquids will be stored in a lockable cabinet that will be located within a bunded area. Toolbox talks will be communicated to site staff and contractors so that they are fully informed of refuelling procedures.
Chapter 8: Air Quality	Dust Management: • Periodic inspections of the construction works will be conducted to address any dust issues. • Dust shall be controlled by the use of water spray during the works. Wheel washing at site exits will reduce dirt on the local roads. • Dust suppression measures shall be used to reduce the potential for dust on site. These will include but not be limited to: – Plant will be fitted with appropriate dust control measures, such as enclosed conveyors, rubber chutes and water suppression, where reasonably practicable, to reduce potential dust emissions. – Plant and equipment will be regularly maintained to ensure emissions are kept to a minimum. – A Non-Road Mobile Machinery (NRMM) register will be maintained to record off road emissions. – Stockpiles of materials will be sited and shaped to prevent dust arisings. If necessary, these will be treated with a 'dustbuster' or similar or using sheeting.

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	– Handling of materials, such as soils, will be kept to a minimum and materials shall be deposited onto the stockpile at a minimum practicable height (2m height is recommended for topsoil to prevent the soil compressing under its own weight). All other stockpiles will not exceed 10m in height and will be suitably graded. – Dust gauges will be installed, and results will be reviewed at least monthly and kept on site. – Carrying out earthworks in close proximity to sensitive receptors during dry and/or windy conditions will be avoided if reasonably practicable, having regard to programme and contracting arrangements for the relevant works. Where this is unavoidable, appropriate water suppression to control dust will be used. – Spoil materials extracted from the site will be recycled elsewhere on site, when and where appropriate. – The storing of potentially dusty materials will be undertaken away from site boundaries and/or potentially sensitive receptors. – Spoil materials will be removed away from site as soon as is practicable, minimising the need to stockpile potentially dusty material. – If unavoidable, spoil stockpiles will be regularly dampened down, sheeted or sealed before being removed from site at the earliest opportunity. – Slopes on stockpiles will be no steeper than the natural angle of repose of the material and will maintain a smooth profile. – Designed/prefabricated materials will be used where reasonably practical to reduce the need for grinding, sawing and cutting on site. – Where cutting, grinding or sawing equipment is required, this will be done in conjunction with suitable dust suppression techniques, such as water sprays or local extraction, and where possible undertaken in an area that is away from the sensitive receptors identified. – Bulk cement and other fine powder materials will be delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent the escape of material and overfilling during delivery. – Manipulation of fine materials, such as the mixing of cement, will take place in an enclosed area that is remote from the site boundary and potentially sensitive receptors. – Handling large quantities of potentially dusty material will be done in an enclosed or shielded environment. – Vehicles entering and leaving the site with loose or potentially dusty material will be adequately sheeted. – Unsurfaced areas of the site will be regularly dampened down during periods of dry and/or windy conditions. – Public roads and access routes adjacent to the site will be regularly cleaned using wet sweeping methods. Sweepings and cleanings shall be immediately removed and disposed of offsite to a suitably licensed waste management facility. – Shutting down of all plant and equipment when not in use. – Minimizing engine idling of vehicles when stationary. – Minimizing delivery volumes through use of off-site prefabrication. – Introduction of a wheel wash for construction traffic. – Mitigating measures including cleaning of areas and vehicles in the event of dust pollution.
Chapter 9: Noise & Vibration	General: • The contractor shall develop the CEMP that demonstrates how they comply with the contents and recommendations of BS 5228 – 1:2009 + A1:2014: Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 1: Noise & Part 2: Vibration. and how they suggest minimizing the risk that people and wildlife are negatively affected by noise and/or vibration during the construction of these works. • The contractor should comply with the noise limits given in Table E.1 in the CEMP following the BS 5228 ABC Assessment Methodology. • The contractor shall regularly inspect the works to ensure that all necessary measures are taken to mitigate and control construction noise and vibration. The contractor shall submit weekly inspection sheets to daa for review. • The contractor shall employ all necessary measures to control noise (and vibration) including, but not limited to:

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- Programming of particularly noisy activities to less sensitive times of the day such as late morning or early afternoon, with planned respite breaks.
- The use of mufflers / silencers on pneumatic tools.
- The use of effective exhaust silencers on all items of plant, all diesel engine powered plant shall be fitted with effective air intake silences.
- The use of non-reciprocating plant.
- Machines which are used intermittently shall be shut down or throttled back to a minimum during those periods when they are not in use.
- Locate equipment liable to create noise and/or vibration whilst in operation away from sensitive receptors and use acoustic barriers to absorb and/or deflect noise away from noise sensitive areas.
- The contractor shall not operate any defective equipment or items fitted with noise control equipment until repaired.
- The contractor shall give preference to fixed items of construction equipment that are electrically powered rather than diesel or petrol driven.
- The contractor shall house static noise emitting equipment operating continuously within suitable acoustic enclosure.
- The contractor shall use the 'drill & burst' (coring holes followed by breaking up area with hydraulic splitters) method of breaking out concrete/asphalt/hard stands where practicably possible. Use of a Vacuum Excavator (Vac-Ex) is also favoured over traditional excavation methods.
- Compressors shall be of the 'sound reduced' models fitted with properly lined and sealed acoustic covers which will be kept closed whenever the machines are in use.

- The contractor shall implement the following vibration mitigation measures:
  - Selection of construction plant with low inherent potential for generation of vibration as per the European Commission Directive 2000/14/EC.
  - Contractors will highlight in their method statement and/or risk assessment specific activities that will create significant vibration levels. In addition to this, contractors will demonstrate how they will mitigate/manage these emissions. Where significant vibration levels are expected, the appointed contractor will inform the daa Liaison Officer.

Plant and Machinery:

- The noise levels of this plant, machinery and equipment will be controlled by risk assessments and method statements to ensure it does not exceed noise restrictions.
- Where available, alternative energy sources should be used which reduce fuel consumption, fuel handling risk, carbon emissions and noise levels.
- The contractor shall ensure that each item of equipment complies with the noise limits quoted in the European Commission Directive 2000/14/EC.
- All plant used on the works shall be the quietest of its type, practical for carrying out the work required and shall be maintained in good condition with regard to minimising noise output.
- All plant shall be operated and maintained in accordance with the manufacturer's recommendations including the use and maintenance of any specific noise reduction measures.

Noise Sensitive Locations:

- Control stations shall be established as a minimum in the vicinity of noise sensitive buildings. The contractor shall liaise with daa for their requirements in this regard and the frequency of accessing and reporting this data, which may also be required as a planning condition.

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	• The contractor shall develop a noise monitoring programme at any receptors where the noise levels exceed the values in table E.1 of the CEMP. • All measurements shall be carried out using current best practice and shall adhere to the relevant guidance on monitoring set out in the Annex G of BS 5228-1. See the CEMP for more detail.
Chapter 10: Biodiversity	General: • An Ecological Clerk of Works (ECoW) will be consulted on any ecological issues. Bats: • Any artificial lighting which is required (e.g., for security purposes) will be directed only to required areas and light spill will be minimised by the use of beam deflectors. • Lighting will not be used such that there is light spill to the hedgerows / treelines surrounding the compounds which could be used by bats Bird Strike: • The contractor shall take all possible precautions to avoid the possibility of bird strike including responsible disposal of all edible waste and covering of all other waste disposal points, using bird scaring techniques where necessary and limiting the period in which bare earth is exposed.
Chapter 11: Climate & Carbon	General: • To the extent possible, material excavated from the site will be re-used to minimise the volume of imported fill. • Pavement demolished on-site as part of the works where practicable will be taken off-site to a dedicated facility, tested for contamination, crushed, and brought back to be reused in the construction works, reducing the quantity of waste and construction materials. • Pavement demolition material will be reused to reconstruct the new pavement. • Where available, alternative energy sources will be used which reduce fuel consumption. • The contractor shall develop the Construction Traffic Management Plan (CTMP) to minimise the disruption and GHG emissions from construction traffic.
Chapter 13: Landscape & Visual	Architectural Design Statement for Pier 3.
Chapter 14: Material Assets (Waste)	Contamination: • If recycled aggregate is used as imported fill, rigorous chemical testing will be undertaken to confirm that it is ‘clean’ (i.e. will not introduce contamination to the environment). • Pavement demolished on site as part of the works may potentially be taken off site to a dedicated facility, tested for contamination, crushed, and brought back to be reused in the construction works. • A secure, lockable and controlled store (in the compound and materials storage area unless agreed otherwise) shall be provided for the storage of chemicals and other hazardous materials to be used in the Works. Waste: • Periodic inspections of the construction works will be conducted to address any litter issues. • The contractor will be required to issue a detailed Resource & Waste Management Plan (RWMP) in line with the daa RWMP and will cover the protocol for all spills and environmental incidents. The RWMP will provide an estimate of expected volumes for each waste stream, reductions following above approach and on completion final tally for each waste stream.

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	• The contractor will identify all likely waste streams arising from these works and put in place an appropriate plan for the management of each. • Each waste type will be segregated and removed via licensed hauliers to licensed facilities. • The potential management route for each waste type will be considered in accordance with the waste hierarchy. Good working practices and takeback schemes etc. will be used to reduce the amount of waste generated as an initial step. The waste management route for each waste stream will be recorded in the Site Waste Management Plan, with a high target for diversion from landfill to be achieved. • A record of all waste leaving site, who is hauling it and receiving waste disposal facility shall be maintained and provided to daa regularly during the Works. Other mitigation measures include but are not limited to: – All sub-contractors should provide a waste forecast for waste types and quantities expected to be generated. – Waste generation should be reduced as much as possible. Offcuts, surplus materials and packaging should be returned to suppliers for closed loop recycling where possible. – Single-use plastics should be avoided where possible. – Re-use materials where possible. – Avoid waste generation from incorrect storage of materials causing damage and contamination. – Cover skips to prevent dust, wind-blown litter and rainwater accumulation where possible. – All waste emanating from site will be controlled, recorded, transferred and disposed of in accordance with the Waste Management Act 1996 (S.I. No. 10 of 1996) and Waste Management (Amendment) Act 2001 and associated regulations. • Licence documentation for all waste carriers removing waste and for all waste destinations receiving waste shall be held on file. Waste consignment notes (for a minimum 3 years) for hazardous waste and Waste transfer notes (for a minimum 2 years) for non-hazardous waste shall be held on file and readily available for inspection and auditing purposes. Foreign Objects Debris: • All waste containers shall be enclosed and lockable to prevent FOD (Foreign Objects Debris). Each container shall have a temporary nameplate attached identifying the waste stream and bearing the contractor's name. FOD should be addressed using the following mitigation measures to prevent damage to aircrafts: – Provision of facilities for the collection and disposal of FOD such as FOD bins and compactors. – FOD hazard and control process implemented by contractor. – Removal of any FOD observed. – Fix and store objects that may cause a FOD hazard if blown. – Vehicles and equipment airside should be maintained in a clean and serviceable condition, not only for reasons of safe vehicle operation but also to minimise the leakage of fluids and depositing of FOD from these vehicles.
Chapter 15: Material Assets (Built Services)	Identification of built services: • During the design process, studies to identify the location of services in the Application Site were undertaken and preliminary measures to safely address any impacts on such services were developed. These measures will be developed further during detailed design Material Re-use: • Estimates of monthly water consumption based on key materials and activities will be developed for general construction activities. Monthly environmental reporting will be completed to record water consumption and report on this as required.

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Chapter 16: Major Accidents & Disasters	General: • Where available, alternative energy sources should be used which reduce fuel consumption, fuel handling risk, carbon emissions and noise levels. Bird Strike: • The contractor shall take all possible precautions to avoid the possibility of bird strike including responsible disposal of all edible waste and covering of all other waste disposal points, using bird scaring techniques where necessary and limiting the period in which bare earth is exposed. Foreign Objects Debris: • FOD should be addressed using the following mitigation measures to prevent damage to aircrafts: – Provision of facilities for the collection and disposal of FOD such as FOD bins and compactors. – FOD hazard and control process implemented by contractor. – Removal of any FOD observed. – Fix and store objects that may cause a FOD hazard if blown. – Vehicles and equipment airside should be maintained in a clean and serviceable condition, not only for reasons of safe vehicle operation but also to minimise the leakage of fluids and depositing of FOD from these vehicles. • Before proceeding from one part of the airport to another via a route that crosses the airfield, all vehicles shall be inspected to ensure that anything carried in or on the vehicle is secured. All doors and tail or side boards shall be securely shut and no part of the vehicle or trailer is loose and likely to become detached. Environmental Incidents: • The contractor's CEMP shall set out site specific procedures outlining how spillages should be dealt with and emergency responses (see CEMP for indicative procedure to be followed). • Sufficient types and quantities of spill response equipment should be available on site and should be kept where spills may occur. The quantity of spill response equipment should be sufficient to contain any likely spill that may occur on site. • The detailed CEMP shall include an Emergency Incident Response Plan which will contain emergency phone numbers and the method of notifying daa, local authorities, statutory authorities and stakeholders. Contact numbers for key personnel of the contractor shall also be included therein. Contractors will be required to adhere to and implement these procedures and ensure that all staff and personnel on site are familiar with the emergency arrangements. • In the event of an emergency incident occurring, the Environmental Manager will be required to investigate and provide a report to daa including the following, as a minimum: – A description of the incident, including location, the type and quantity of contaminant and the likely receptor(s). – Contributory causes. – Negative effects. – Notification to relevant statutory authorities and relevant parties. – Consultation with appropriate environmental specialists when relevant. – Measures implemented to mitigate adverse effects. – Any recommendations to reduce the risk of similar incidents occurring.

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	• The appropriate corrective actions shall be implemented as soon as possible on detection of the incident. All incidents shall be reported on the reporting system. Where there has been direct damage to the environment it may be necessary to report this to the Regulator (Environmental Protection Agency). daa shall be informed as soon as an incident has occurred and any contact to the Regulator coordinated through daa. • For larger incidents the project environmental coordinator / Project Owner shall complete an Environmental Incident Report with the Sustainability Manager, fully detailing actions undertaken and review to prevent recurrence. • Spill response kits will be available onsite and accessible to all to control pollution incidents. • During construction, site staff will be trained in mitigating impacts to the environment, resulting from a pollution incident. • Pollution control equipment will be available in high-risk areas and will be checked regularly to ensure the equipment is available and re-stocked if used. • Any used pollution control equipment will be disposed of in accordance with EPA guidance and legislation. • Toolbox talks will be communicated to site staff and contractors so that they are fully informed of dealing with environmental incidents.