AIRFIELD DRAINAGE PROJECT

Volume II - Environmental Impact Assessment Report

October 2023

NICHOLAS O'DWYER
an RSK company

daa plc

VOLUME II

Part 1: Main Report

NICHOLAS O'DWYER

daa

Contents

Dublin Airport Authority

Environmental Impact Assessment Report

Airfield Drainage Project

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NICHOLAS O'DWYER

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1 INTRODUCTION

1.1 Introduction

This Environmental Impact Assessment Report (EIAR) for the Airfield Drainage Project (ADP) has been prepared by Nicholas O'Dwyer Ltd. (NOD) and associated specialists (*i.e.*, Altemar Ltd., AWN Consulting Ltd., Courtney Deery Heritage Consultancy Ltd., Pinnacle Consulting Ltd., and Stephenson Halliday Ltd.) on behalf of Dublin Airport Authority (daa plc) in support of a planning application to the Fingal County planning authority under Section 34 of the Planning and Development Act, 2000 (as amended).

The EIAR refers throughout to engineering reports and other supporting documentation prepared by Nicholas O'Dwyer to accompany the planning application, as listed hereunder.

- Section 9 Drainage Overview Document
- Section 10 Planning Report
  - Appendix 10A – Drainage Management Plan (DMaP)
  - Appendix 10B – Surface Water Monitoring Plan
- Section 11 Engineering Design Report
  - Appendix 11A: Operational Control Philosophy
  - Appendix 11B: Pollution Control Facility Tank Sizing Report
  - Appendix 11C: Energy Statement
  - Appendix 11D: Technical Memorandum - Review of de-icers impacts & mitigation measures
  - Appendix 11E: Utility Correspondence
- Section 12 Construction Environmental Management Plan (CEMP)
  - Appendix 12A: Construction Traffic Management Plan (CTMP)

A Natura Impact Statement (NIS), a Water Framework Directive (WFD) Screening Assessment and a Flood Risk Assessment (FRA) also accompany the planning application. This EIAR cross refers to these additional assessments as relevant to facilitate the decision-maker.

The ADP site is located within the Dublin Airport boundary as shown in **Figure 1.1**. The proposed development is within the airfield in the townlands of Pickardstown, Coultry, Huntstown, Forrest Great, Forrest Little, and Collinstown, and to the east of the airfield in the townlands of Cloghran, Corballis, Commons, Toberbunny, Stockhole and Clonshagh. The proposal site is entirely within the administrative area of Fingal County Council.

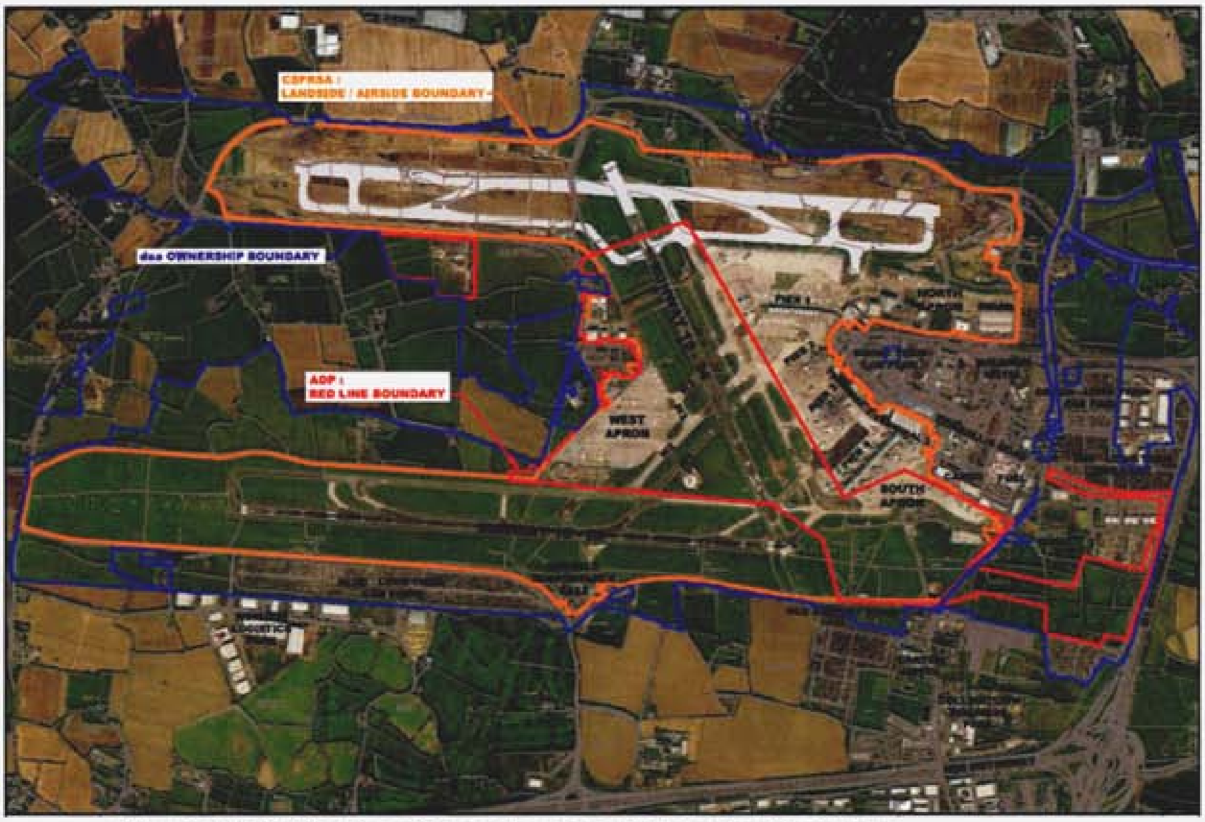

Figure 1.1 Dublin Airport Boundary and ADP project boundary

1.2 The Proposed Development

The ADP proposes significant upgrades to the surface water management infrastructure at Dublin Airport. It comprises a series of drainage system enhancement measures and infrastructure proposals, including the upgrade of existing drainage infrastructure and the construction of additional infrastructure to improve the performance of the existing surface water management system.

The proposed new infrastructure includes a new Contamination Detection and Response (CD&R) System, the provision of additional pollution control facilities and the construction of additional hydraulic capacity in the network. The ADP proposals include local network improvements at West Apron as well as reconfiguration works at South Apron to ensure that they are fully integrated with the proposed airfield-wide surface water management system.

1.3 Context of the Project & Need for the Scheme

A detailed project description is presented in **Chapter 4**.

1.3.1 Project Objectives

The purpose of the ADP is to:

- Provide a nett improvement in the degree of protection afforded to the receiving waters by the surface water management system, in accordance with the planning and environmental requirements of the relevant EU Directives, national and local plans and legislation, as well as daa's Sustainability Strategy;
- Optimise the performance of the surface water management system at Dublin Airport for improved efficiency, greater operational flexibility, and resilience to a broad range of extreme weather events; and
- Increase the hydraulic capacity of the surface water network and alleviate historic capacity and flooding issues.

1.3.2 Drainage Masterplan and Dublin Airport Vision

The ADP drainage system enhancements and infrastructure proposals have been aligned to the daa's Dublin Airport Vision (DAV) 2040 and the Drainage Masterplan (DMP). Where practical, safeguarding measures to complement the longer-term vision have been incorporated into the design of the proposed ADP infrastructure. The purpose of this safeguarding is to ensure the sustainability and coordination of future developments at Dublin Airport.

The DAV is intended as an accessible guide to Dublin Airport's planned infrastructure investment, set within the context of the immediate operational needs, the prevailing planning policy context and, a longer-term strategic vision for future growth.

The DMP is a holistic long-term plan for drainage infrastructure at Dublin Airport, prepared by NOD, in collaboration with daa. The DMP outlines a long-term phased and coherent approach to improvements in surface water and foul drainage infrastructure, consistent with planning and environmental requirements. The DMP considered hydraulic and surface water quality requirements having regard to the Water Framework Directive 2000/60/EC (WFD) (transposed into Irish law in the European Communities Environmental Objectives (Surface Waters) Regulations 2009) (as amended) and the European Communities Environmental Objectives (Groundwater) Regulations 2010 (as amended). The DMP is aligned with the Airport's investment strategy.

1.3.3 Drainage Management Plan

The ADP proposals have been developed in consultation with the targets set out in the Dublin Airport Drainage Management Plan (DMaP). The DMaP was developed by daa following consultation with Fingal County Council (FCC), Inland Fisheries Ireland (IFI), the Local Authority Waters Programme (LAWPRO) and the Environmental Protection Agency (EPA). The DMaP establishes a systematic, evidence-based approach to the design and operation of pollution control infrastructure with the aim of facilitating the achievement of *"Good"* status in receiving waters surrounding the airfield complex.

The water quality objectives for the waterbodies surrounding the airport campus are set out in the WFD and Ireland's River Basin Management Plan (RBMP). The proposed upgrades to the surface water management system at Dublin Airport are also subject to the Surface Water Quality objectives of the Dublin Airport Local Area Plan (LAP) 2020.

The DMaP shall contribute to the programme of measures for Areas of Action for the Santry/Mayne waterbodies in the Third Cycle RBMP for the period 2022-2027, which is currently being prepared by the Department of Housing, Local Government and Heritage.

The ADP proposals will contribute to the attainment of the following DMaP objectives, to:

- Increase clean flows to the Cuckoo Stream;
- Contribute to improvement of the ecological condition of the Cuckoo Stream downstream of all pollution control facilities;
- Minimise the occurrence of contamination overflow events;
- Monitor the impact of overflow events;
- Improve system response to emergency events (*e.g.*, fuel spillage or a leakage of de-icing chemical storage tanks).

The DMaP has established a Technical Working Group (TWG) made up of representatives from daa, FCC, IFI, LAWPRO and the EPA. The main function of the TWG is to review and provide comment on the targets, measures and performance criteria set out for each waterbody for the initial phase and each subsequent phase of the DMaP, in line with the 6-yearly reviews of the RBMP. The targets, measures and performance criteria set for the Third Cycle RBMP (in consultation with the TWG), along with TWG meeting minutes and supporting DMaP documentation, have been published on daa's website at the following address https://www.dublinairport.com/corporate/corporate-social-responsibility/surface-water.

1.4 The Requirement for an EIAR

The proposed ADP exceeds the relevant Environmental Impact Assessment (EIA) threshold, as detailed in the Planning and Development Regulations, 2001 (as amended) (the "EIA Regulations"), Schedule 5, Part 2, Class 10 (b) (iv), "Infrastructure projects". The ADP site boundary exceeds the threshold of 10 hectares for Class 10 (b) (iv) ("Urban Development"), therefore an EIA is required. Refer to **Chapter 2** for further detail. In accordance with the Planning and Development Regulations, 2001 (as amended), where it is determined that an EIA is required, the applicant must prepare an EIAR containing information to enable the Competent Authority to undertake an EIA under and in accordance with the EIA Directive and EIA Regulations, 2001.

1.5 The EIAR Team

Article 5(3)(a) of the EIA Directive (as amended) (EIA Directive) states that *"the developer shall ensure that the environmental impact assessment report is prepared by competent experts"*. The Guidelines on the Information to be contained in Environmental Impact Assessment Reports issued by the EPA in May 2022 further highlight the need for competent experts to be involved in the EIA process and in the preparation of the EIAR (EPA, 2022a).

The following environmental specialists from NOD coordinated and managed the preparation of this EIAR and led a team of competent experts in preparing specialist chapters:

- Laurie McGee, Principal Environmental Consultant within the Environment and Planning Team at NOD. She has over 30 years of experience in town and environmental planning consultancy in Ireland, the UK and the USA, and planning and community and stakeholder engagement in Ireland and Northern Ireland since 2006; and

- Krista Farrugia, Principal EIA Consultant within the Environment and Planning Team at NOD. She has 20 years of experience in the field of EIA and environmental management. She has extensive experience in EIA coordination, Strategic Environmental Assessment (SEA), Appropriate Assessment, and landscape and visual assessment. Krista has worked extensively in Malta and more recently in Ireland.

Each contributing expert provides a statement of authority, and an explanation of the methods of data collection and assessments that were carried out with reference to applicable discipline or industry standards and guidance in the relevant specialist EIAR chapters. **Table 1.1** lists the competent experts who were involved in the preparation of each chapter of the EIAR.

Table 1.1: EIA Chapters and Competent Experts

EIA Chapter	Company	Expert	Qualifications & Experience
Chapter 1 - Introduction	Nicholas O'Dwyer Ltd.	Krista Farrugia	BSc (Hons) (University of Malta) in Biology & Chemistry, MSc (University of Bath) in Integrated Environmental Management, PgDip (Edinburgh Napier University) in Wildlife Biology & Conservation Practitioner of the Institute of Environmental Management and Assessment Principal EIA Consultant within the Environment and Planning Team 20 years experience in EIA and environmental management including SEA, AA, landscape and visual assessment, and environmental auditing. Coordinated EIAs for a wide range of developments including residential and commercial, waste management facilities, infrastructure including roads, ports, and coastal developments.
Chapter 2 - The EIA Process		Krista Farrugia	
Chapter 3 - Alternatives		Mark Armstrong	Mark Armstrong BEng,CEng BE (Hons) Civil Engineering from National University of Ireland, Galway (NUIG) Mark has significant experience over a wide range of projects spanning over a ten-year period. He is experienced in Drainage Design and Master-planning Projects, specifically in Airport settings, as well as major drainage infrastructure projects for World Bank, Asian Infrastructure Investment Bank (AIIB), Uisce Eireann and Local Authorities. He is experienced in preparing consent applications to statutory authorities and has been responsible for preparation of comprehensive site / route selection reports, as well as technology optioneering exercises, for inclusion in statutory consent applications relating to major capital infrastructure projects.

EIA Chapter	Company	Expert	Qualifications & Experience
Chapter 4 – Project Description & Site Characteristics		Ayodeji Oyelami Mark Armstrong Martin Hickey	Ayodeji Oyelami BSc (Hons) (Obafemi Awolowo University, Nigeria) in Microbiology, MSc (University of Lancaster, UK) in Ecology and the Environment, PhD (University of Lancaster, UK) in Environmental Science. Senior Environmental Consultant within the Environment and Planning Team. 8 years' experience in preparing environmental reports including Environmental Impact Assessments, Sustainability Appraisal, Environmental Constraints and Habitat Assessments. Coordinated EIAs for a wide range of developments including oil and gas infrastructure, industrial complexes, roads and ports. Martin Hickey BEng,CEng BE (Hons) Civil and Environmental Engineering from University College Cork Chartered Engineer with over 10 years' experience on a wide range of major infrastructure projects including main drainage & sewerage schemes, wastewater networks, flood alleviation schemes and airfield drainage design. Martin has significant experience delivering Irish Water/Uisce Eireann projects having been involved in the end-to-end delivery of multiple complex projects. He is experienced in preparing consent applications to statutory authorities. Mark Armstrong - see above.
Chapter 5 – Policy Context		Laurie McGee	BA (Hons), Pg Dip and MA. Corporate member of the Irish Planning Institute and the Royal Town Planning Institute.

EIA Chapter	Company	Expert	Qualifications & Experience
			Principal Environmental Consultant within the Environment and Planning Team. Over 30 years of experience in town and environmental planning consultancy in Ireland, the UK and the USA, with specialist experience in wind and renewable energy EIA and planning and community and stakeholder engagement in Ireland and Northern Ireland since 2006
Chapter 6 – Disasters and Emergencies		Mark Armstrong	See above
Chapter 7 – Future Developments		Laurie McGee	See above
Chapter 8 – Population & Human Health		Laurie McGee	See above
Chapter 9 - Biodiversity	Altemar Ltd.	Bryan Deegan	BSc in Applied Marine Biology, MSc in Environmental Science, Diploma in Applied Aquatic Science, Certificate in Science. Member of the Chartered Institute of Ecology and Environmental Management 26 years' experience working in Irish terrestrial and aquatic environments, providing ecological consultancy.
- **Aquatic Ecology**	Invas Biosecurity Ltd	Prof Joe Caffrey	PhD (University College Dublin) in aquatic plant biology, ecology and management. Almost 40 years' experience working with IFI and its predecessors, conducting and managing freshwater and riparian surveys.
- **Ornithology**		Hugh Delaney	Hugh Delaney is an ecologist (ornithologist primarily) having completed work on numerous sites with ecological consultancies over 10+ years. Hugh is local to the Dun Laoghaire-Rathdown area in Dublin and is especially familiar with the bird life and its ecology in the environs going back over 30 years.
Chapter 10 – Hydrology	AWN Consulting Ltd.	Marcelo Allende Teri Hayes	Marcelo Allende BSc, BEng Water Resources Engineer

EIA Chapter	Company	Expert	Qualifications & Experience
			Senior Environmental Consultant (Hydrologist) Member of the International Association of Hydrogeologists (Irish Group) Member of Engineers Ireland Over 15 years' experience in environmental consultancy and water resources studies. Teri Hayes BSc, MSc, PGeol, EurGeol Member and former President of the International Association of Hydrogeologists Professional member of the Institute of Geologists in Ireland and European Federation of Geologists. Teri is a hydrogeologist and an environmental consultant with over 30 years' experience managing EIA, water resource assessment, contaminated land, and licencing projects.
Chapter 11 – Land, Soils, Geology & Hydrogeology	AWN Consulting Ltd.	Marcelo Allende Teri Hayes	See above
Chapter 12 – Noise and Vibration	AWN Consulting Ltd.	Alistair Maclaurin	BSc in Creative Music and Sound Technology, Diploma in Acoustics and Noise Control. Member of the Institute of Acoustics. Over 10 years of experience working in the field of acoustics. Alistair has been the lead noise consultant across various sites in major infrastructure projects and has undertaken various environmental noise assessments.
Chapter 13 – Material Assets (Waste Management)	AWN Consulting Ltd.	Niamh Kelly Chonaill Bradley	Niamh Kelly BA (Hons) in Earth Sciences, MSc In International Disaster Management Affiliate member of the Chartered Institute of Waste Management. 2 years' experience in environmental consultancy and has completed operational waste management plans, resources and waste

EIA Chapter	Company	Expert	Qualifications & Experience
			management plans, CEMPs, sections of EIAR and EIA screening reports for a variety of developments including residential, commercial and industrial. Chonaill Bradley BSc in Environmental Science Associate member of the Institute of Waste Management Principal Environmental Consultant Over 7 years' experience in the environmental consultancy sector, completing numerous waste management strategies and CEMPs for residential, commercial and industrial developments in the Dublin area and has experience in developing waste strategies, detailed waste design and conducting waste audits.
Chapter 14 – Material Assets (Traffic & Utilities)	AWN Consulting Ltd. Pinnacle Consulting Engineers	Niamh Kelly Ronan Kearns	Niamh Kelly - As above. Ronan Kearns, BA BAI MSc MBA CEng MIEI Chartered Engineer with almost 20 years post graduate experience. Ronan specialises in transportation planning and site assessment, preliminary design and detail development design. Ronan has completed several Traffic and Transportation chapters for EIARs.
Chapter 15 – Air Quality & Climate	AWN Consulting Ltd.	Niamh Nolan Aisling Cashell Dr Avril Challoner	Niamh Nolan BSocSi (Hons) (University College Dublin) in Social Policy & Geography Associate member of the Institute of Air Quality Management Associate member of the Institution of Environmental Science. Environmental Consultant with 2 years' experience working in environmental consultancy focusing on air quality. Niamh specialises in air quality, climate and sustainability. She has prepared air quality and climate impact assessments for numerous

EIA Chapter	Company	Expert	Qualifications & Experience
			EIARs for a range of projects including commercial, residential and industrial developments. Aisling Cashell BA and MAI in Civil, Structural and Environmental Engineering (Trinity College Dublin) Member Engineers Ireland Environmental Consultant with less than one years' experience working in environmental consultancy focusing on air quality. She has prepared air quality and climate impact assessments for numerous EIARs for a range of projects including commercial, residential and industrial developments. Dr Avril Challoner BEng (Hons) (National University of Ireland Galway) in Environmental Engineering, HDip (Trinity College Dublin) in Statistics, PhD (Trinity College Dublin) in Environmental Engineering (Air Quality). Chartered Environmentalist, Chartered Scientist, Member of the Institute of Environmental Management and Assessment, Member of the Institute of Air Quality Management Principal Environmental Consultant in Air Quality and Climate with 10 years' experience in air quality consulting. She specialises in the fields of air quality, climate assessment, EIA and air dispersion modelling.
Chapter 16 – Archaeology & Cultural Heritage	Courtney Deery Heritage Consultancy Ltd.	Dr Clare Crowley	Certificate in Condition Surveys of Historic Buildings (University of Oxford), Certificate in Repair and Conservation of Historic Buildings (Dublin Civic Trust), BA (Hons) in Ancient History, Archaeology & French (Trinity College

EIA Chapter	Company	Expert	Qualifications & Experience
			Dublin) PhD (Dublin Institute of Technology) in Archaeology. Senior Archaeologist and Heritage Consultant More than 20 years' experience in cultural heritage management and assessment. Clare has extensive experience in completing cultural heritage impact assessments for major infrastructural projects.
Chapter 17 – Landscape and Visual	Stephenson Halliday Ltd.	Ross Allan Daniel Leaver	Both Ross Allan and Daniel Leaver are Chartered Members of the Landscape Institute. Both have over 20 years' of experience of landscape and visual impact assessment, landscape planning and have worked on renewables and utilities projects across the UIK and Ireland. Ross, the lead author, is a Chartered Landscape Architect. He has considerable experience in LVIA, townscape and visual impact assessments, landscape sensitivity and capacity studies and feasibility studies.
Chapter 18 – Interactions & Cumulative Effects	Nicholas O'Dwyer Ltd.	Krista Farrugia	As above
Chapter 19 – Schedule of Mitigation Measures	Nicholas O'Dwyer Ltd.	All	N/A

The consultant team undertook an informal voluntary EIA scoping exercise. The purpose of the exercise was to determine the content and extent of the matters which should be covered in the EIAR. The agencies consulted in the exercise were selected from among the statutory consultees listed in article 28 of the Planning and Development Regulations 2000 (as amended), as considered appropriate to the proposed development, its location, and potential impacts. The information and findings from the consultations are presented in **Chapter 2**.

1.6 Availability of the EIAR

There are three different ways in which the EIAR may be accessed: online on Fingal County Council's website, online on the Department of Housing, Local Government and Heritage's EIA Portal; and at the Fingal County Council's planning offices.

This EIAR and documentation associated with the planning application will be available for viewing on Fingal County Council's website under the relevant planning reference number once assigned by the planning authority on lodgement of the planning application.

The EIAR can also be accessed *via* the Department of Housing, Local Government and Heritage's EIA Portal, which will provide a link to the planning application on the planning authority's website. The EIA Portal can be accessed at https://housinggovie.maps.arcgis.com/apps/webappviewer/index.html?id=d7d5a3d48f104ecbb206e7e5f84b71f1.

The EIAR may also be inspected free of charge and copies of same purchased by members of the public during normal opening hours at the following address:

Planning Department
Fingal County Council
County Hall
Main Street, Town Parks
Swords, Co. Dublin, K67 X8Y2

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2 The EIA Process

2.1 General

The process by which the likely significant effects of a project on the environment are assessed is set out in the EIA Directive 2011/92/EU on the assessment of the effect of certain public and private projects on the environment (codification) (transposed to Irish law through the Planning and Development Regulations 2001, as amended), as amended by EIA Directive 2014/52/EU (transposed to Irish law through the European Union (Planning and Development) (Environmental Impact Assessment) Regulations S.I. 296 of 2018.

As noted in the Department of Environment, Heritage, and Local Government's *Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment* (August 2018)[1]:

> *1.4 The amended Directive provides a definition of EIA for the first time. It is defined as a process consisting of:*
>
> *(a) the preparation of an Environmental Impact Assessment Report (EIAR) by the developer*
>
> *(b) the carrying out of consultations*
>
> *(c) the examination by the competent authority of the EIAR, any supplementary information provided, where necessary, by the developer and relevant information received through consultations with the public, prescribed bodies and any affected Member States*
>
> *(d) the reasoned conclusion of the competent authority on the significant effects of the project on the environment, and*
>
> *(e) the integration of the competent authority's reasoned conclusion into any development consent decision.*
>
> *1.5. The definition of EIA provides for a clear distinction between the process of environmental impact assessment to be carried out by the competent authority and the preparation by the developer of an Environmental Impact Assessment Report (EIAR).*

The general sequence of EIA follows the EPA EIAR Guidelines (2022) as illustrated in **Figure 2.1**. The process is summarised succinctly as follows:

- screening – determines whether EIA is required;
- scoping – determines what aspects of the environment should be considered and to what extent; and

[1] Department of Environment, Heritage, and Local Government (now Department of Housing, Planning and Local Government) 2018. Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment. Government of Ireland.

- preparation of an EIAR – a tool to inform the decision-maker, which presents baseline information, impact assessment, and mitigation measures.

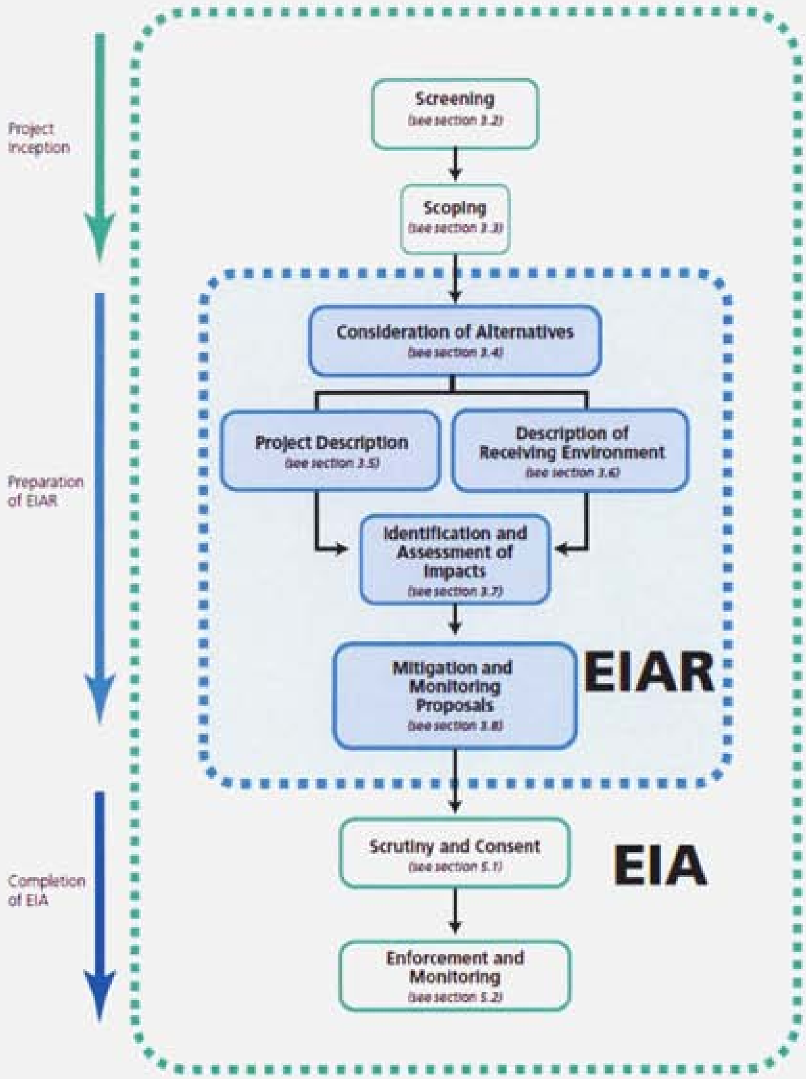

Figure 2.1. The position of the EIAR within the EIA process[2]

2.1.1 EIA Directive, Legislation and Guidelines

This EIAR has been prepared in compliance with the EIA Directive, National Legislation, EU and EPA guidelines and other guidelines and circulars. This EIAR adheres to the fundamental principles outlined in the EU Guidelines (2017)[3] and EPA EIAR Guidelines (2022). The Guidelines set out the matters that must be addressed in an EIAR, which include:

- anticipating, avoiding, and reducing significant adverse effects;
- assessing and mitigating effects;

[2] Environmental Protection Agency, Guidelines on the Information to be Contained in Environmental Impact Assessment Reports, May 2022.

[3] European Commission. 2017. 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.

- maintaining objectivity;
- ensuring clarity and quality;
- providing relevant information to decision makers; and
- facilitating consultation.

2.2 EIA Screening

As mentioned in **Chapter 1**, the proposed ADP has been screened against the project classes and thresholds set out in Schedule 5 of the Planning and Development Regulations, 2001 (as amended). The ADP falls within Class 10, Part 2 of Schedule 5 which prescribes:

> *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. (In this paragraph, "business district" means a district within a city or town in which the predominant land use is retail or commercial use.)*

The ADP is considered both '*urban*' and *'infrastructure'* due to (i) its location within and adjacent to an operational airfield which is urban in character; and (ii) the nature of the proposed development constitutes infrastructure. Land use within the land ownership boundary, and surrounding the proposed development includes land used for airport operations, grassland, and agricultural land. Other developments not essential to this purpose are strictly controlled in the interest of aviation safety. It is considered that the site is within a built-up area where a threshold of 10 hectares applies. The site of the proposed development is the total area of the site contained within the redline boundary of the planning application for which planning permission is sought, including the area for temporary works, which is approximately 207ha. This exceeds the threshold of 10 hectares for Class 10 (b) (iv); therefore an EIA is required.

2.3 EIA Scoping

The scoping stage of the EIA is a process to determine the content and extent of the matters which should be covered in the EIAR. The EPA EIAR Guidelines (2022) state:

> *'All parties should be aware of the need to keep the EIAR as tightly focussed as possible. This focusses the effort and resources of all parties on the key significant issues. Scoping is usually guided by the following criteria: -*
>
> - *Use 'Likely' and 'Significant' as the principal criteria for determining what should be addressed. Any issues that do not pass this test should be omitted (scoped out) from further assessment. A section of the EIAR should describe the scoping process explaining why such issues have been scoped out and they are not being considered further. All the prescribed environmental factors need to be listed in the scoping section of the EIAR. It is important to note that the environmental factors themselves cannot be scoped out and must feature in the EIAR. Only topics and headings related to each factor can be scoped in or out. Each environmental factor should be clearly covered by one or more specific section headings in the EIAR. If scoping determines that no likely significant issues arise under any heading, then an explanatory text should be included.*

- *Precedence - where EIARs for similar projects on similar sites or for other project proposals for the same site are available, these can be useful references.*
- *Interactions – careful consideration of pathways – direct and indirect – that can magnify effects through the interaction or accumulation of effects – for instance the potential for cumulative significant effects to arise from multiple non-significant impacts.*

This EIAR identifies, describes, and assesses in an appropriate manner, the direct and indirect potential significant effects that may arise during construction and operation of the ADP on each of the environmental factors listed in Article 3 of the Directive as below:

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;

(b) biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC;

(c) land, soil, water, air and climate;

(d) material assets, cultural heritage and the landscape;

(e) the interaction between the factors referred to in points (a) to (d).

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.

2.3.1 Scoping Consultation Document

NOD on behalf of daa, prepared a Scoping Consultation Document providing an overview of the ADP project, the project scope, and for each environmental factor as listed in the EIA Directive, an overview of the baseline environment, proposed assessment methodology and potential significant effects. The Scoping Consultation Document was sent to the following consultees on 10th November 2022:

- Environmental Protection Agency (EPA);
- Department of Housing, Planning and Local Government;
- Department of Agriculture, Food and the Marine;
- Department of Communications, Climate Action & the Environment;
- Department of Culture, Heritage and Gaeltacht / Development Applications Unit;
- Inland Fisheries Ireland (IFI);
- Office of Public Works (OPW);

- Irish Aviation Authority;
- An Taisce;
- Heritage Council;
- Fingal County Council (FCC);
- Dublin City Council (DCC);
- Local Authorities Waters Programme Office;
- Transport Infrastructure Ireland (TII); and
- National Transport Authority (NTA).

2.3.2 Scoping Responses

Comments were received from TII, IFI and DAU. **Table 2.1** lists the comments received in relation to the EIAR and provides a response including how they are addressed in the EIAR as relevant. **Appendix 2.2: Consultee Responses on the Scoping Consultation Document** contains copies of the correspondence in full.

Table 2.1: Comments on scoping consultation document and responses

Comment	Consultants' response
Transport Infrastructure Ireland (received 25th November 2022)	
Consultations should be had with the relevant Local Authority/National Roads Design Office with regard to locations of existing and future national road schemes.	The Scoping Consultation Document was sent to FCC for its feedback/comments. A preliminary planning meeting was then held with FCC on 14th November 2022 to discuss the ADP. **Chapter 7** of the EIAR considers future developments that are planned for that could influence or be influenced by the ADP. **Chapter 18** summarises the assessment of potential cumulative effects and interactions of effects from other projects as relevant.
TII would be specifically concerned as to potential significant impacts the development would have on the national road network (and junctions with national roads) in the proximity of the proposed development.	**Chapter 14** of the EIAR describes, and assesses potential impacts on Material Assets, including Traffic. Given the nature of the development, the impact assessment was carried out for the construction phase. The operational phase was scoped out because the Project will not generate any traffic during operation.
The developer should assess visual impacts from existing national roads.	**Chapter 17** of the EIAR presents the Landscape and Visual Impact Assessment. Methodology applied is described in the chapter including the identification and assessment of impacts on sensitive receptors. It is noted that most of the proposed infrastructure is below ground.
The developer should have regard to any Environmental Impact Statement and all conditions and/or modifications imposed by An Bord Pleanála regarding road schemes in the area. The developer should in particular have regard to any potential cumulative impacts.	**Chapter 18** of the EIAR addresses cumulative impacts that may arise from ADP and other projects that are existing, are in the pipeline and have planning permission, and for which planning applications have been submitted.
The developer, in conducting Environmental Impact Assessment, should have regard to TII Publications (formerly DMRB and the Manual of Contract Documents for Road Works)	Noted.
The developer, in conducting Environmental Impact Assessment, should have regard to TII's Environmental Assessment and Construction Guidelines, including the Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes (National Roads Authority, 2006)	Noted. Air Quality is addressed in **Chapter 15** of the EIAR.
The EIAR should consider the Environmental Noise Regulations 2006 (SI 140 of 2006) and, in particular, how the development will affect future action plans by the relevant competent authority. The developer may need to consider the incorporation of noise barriers to reduce noise impacts (see Guidelines for the Treatment of Noise and Vibration in National Road Schemes (1st Rev., National Roads Authority, 2004))	Noted. Noise and Vibration in **Chapter 12** of the EIAR.
It would be important that, where appropriate, subject to meeting the appropriate thresholds and criteria and having regard to best practice, a Traffic and Transport Assessment (TTA) be carried out in accordance with relevant guidelines, noting	Noted. Traffic and Transport Assessment, as required by TII, is a separate process to EIAR. It is a comprehensive review of all the potential transport impacts of a proposed development with an agreed plan to mitigate any adverse consequences. The EIAR did

Comment	Consultants' response
traffic volumes attending the site and traffic routes to/from the site with reference to impacts on the national road network and junctions of lower category roads with national roads. TII's Traffic and Transport Assessment Guidelines (2014) should be referred to in relation to proposed development with potential impacts on the national road network. The scheme promoter is also advised to have regard to Section 2.2 of the NRA/TII TTA Guidelines which addresses requirements for sub-threshold TTA.	not identify requirement for TTA, noting that the threshold requiring TTA will not be reached. Traffic to be generated by the ADP is considered in **Chapter 14** of the EIAR.
The designers are asked to consult TII Publications to determine whether a Road Safety Audit is required.	The ADP does not constitute a new road scheme or a permanent change to the existing road or roadside layout, therefore, a Road Safety Audit is not required.
In the interests of maintaining the safety and standard of the national road network, the EIAR should identify the methods/techniques proposed for any works traversing/in proximity to the national road network.	This is addressed in the Construction Environmental Management Plan (CEMP) and the Construction Transport Management Plan (CTMP).
In relation to haul route identification, the applicant/developer should clearly identify haul routes proposed and fully assess the network to be traversed. Separate structure approvals/permits and other licences may be required in connection with the proposed haul route, including where temporary modification to the road network may be required. Consultation with relevant PPP Companies and MMaRC Contractors may also be required. All structures on the haul route should be checked by the applicant/developer to confirm their capacity to accommodate any abnormal load proposed, including abnormal weight load.	Noted.
In relation to any cabling and potential connection routing, the scheme promoter should note locations of existing and future national road schemes and develop proposals to safeguard proposed road schemes. In the context of existing national roads, alternatives to the provision of cabling along the national road network, such as alternative routing or the laying of cabling in private lands, should be considered in the interests of safeguarding the investment in and the potential for future upgrade works to the national road network. The cable routing should avoid all impacts to existing TII infrastructure such as traffic counters, weather stations, *etc.*, and works required to such infrastructure shall only be undertaken in consultation with and subject to the agreement of TII, any costs attributable shall be borne by the applicant/developer. The developer should also be aware that separate approvals may be required for works traversing the national road network and motorway network.	Noted.
Inland Fisheries Ireland (received 29th November 2022)	

Comment	Consultants' response
IFI have published the following guidelines which should be referred to at the design stage of a project to ensure protection of the aquatic environment. *GUIDELINES ON PROTECTION OF FISHERIES DURING CONSTRUCTION WORKS IN AND ADJACENT TO WATERS*	Noted. The CEMP presents measures to be adopted during construction to reduce the potential for adverse impacts on the Cuckoo Stream. Potential effects on hydrology during both construction and operation are assessed in **Chapter 10** of the EIAR.
IFI are opposed to any culverting or re-routing of any surface water course, temporary or otherwise, pre or post construction phases, except for in extreme or emergency situations. We would also encourage that the application of nature-based solutions (where feasible) be incorporated as part of the drainage attenuation design for surface water management as opposed to hard engineering solutions, such as underground attenuation tanks.	Noted. By way of clarification, the ADP does not propose to culvert any additional watercourses and the ADP diverts existing culverting. **Chapter 3** and **Chapter 4** provide details about the proposal including where the preferred option is to select closed pipes. In summary, having closed pipes and underground tanks is required for aviation safety in the context of bird strike risk effects. In addition, clean water avoids risk of contamination when the water traverses the airfield. A Water Framework Directive (WFD) Screening Assessment accompanies the planning application, and the EIAR itself assesses potential impacts resulting from the implementation of the ADP on the receiving water bodies in **Chapter 10**. **Chapter 3** of the EIAR includes assessment of alternatives, including the Do-Nothing option. Given the nature of the site, in particular, the risk to aviation safety from bird strikes (refer to **Chapter 9** of the EIAR), nature-based solutions that include enhancing or creating surface water features are not suitable for this location because of the need to avoid features that could attract birds.
All discharges from the site must follow the European Communities (Surface Water) Regulations 2009 and the European Communities (Groundwater) Regulations 2010.	Noted. **Chapter 10** of the EIAR addresses surface water (hydrology), and **Chapter 11** addresses groundwater (hydrogeology).
Pipe laying activities, general ground works and pipe connections poses a high risk of suspended solids and other deleterious matter entering surface waters, especially where there is existing connections on-site to the surface water drainage network, which is hydraulically connected to water courses. If pumping is required from excavations such as thrust and reception pits or land trenches along the route, then water must be treated before discharge to any existing drainage network. There can be no direct pumping of contaminated water from the works to a watercourse at any time.	The CEMP describes how works will be carried out and the measures that will be taken to prevent/reduce impact on the surrounding environment during construction. Potential impacts on the watercourse during construction (and operation), are presented in **Chapter 10**.
Ground preparation and associated construction works, including large-scale topographic alteration, the creation of roads, buildings, and footpaths, have significant potential to cause the release of sediments and various pollutants into surrounding watercourses. Pollution of the adjacent freshwaters from poor on-site construction practices could have a significantly negative impact on the fauna and flora of surface water systems. A comprehensive and integrated approach for achieving stream protection during construction and operation (in line with international best practice) should be implemented. Construction works must be planned in a manner which prevents extensive tracts of soils from being exposed at	Noted. **Chapter 11** addresses potential effects on the watercourse during construction and operation; **Chapter 9** addresses effects on biodiversity; **Chapter 19** presents a Summary of Mitigation Measures.

Comment	Consultants' response
any time and arrangements must be made for the control and management of any contaminated water resulting from construction.	
Department of Housing, Local Government and Heritage (27th January 2023)	
A desktop assessment that addresses the underwater archaeological and built (including riverine/fishing/industrial) heritage of the proposed development area. The assessment shall include a full inventory and mapping of the sites of all identified archaeological/cultural heritage features and structures (including those identified underwater and bridges, fording points) and shall also include maps/drawings that clearly indicate any proposed impacts on these assets/areas of archaeological potential arising from the proposed project. The UAIA shall assess all proposed in-water development and shall also assess any proposed Site Investigation impacts and potential secondary or indirect impacts such as construction works to facilitate access and areas of scouring as a result of potential changes in hydrology.	**Chapter 16** addresses potential effects on archaeology and cultural heritage at the site.
The EIAR should comment on the degree to which the extent, location and levels of all proposed works and other sub-surface/in-water works required for a development may impact upon any underwater cultural or archaeological remains. This report should be illustrated with appropriate plans, sections and photographs. Where archaeological materials are shown to be present, further mitigation measures will be required. These may include recommendations for institution of appropriate buffer zones, redesign to allow for preservation in situ, dive surveys, metal detection surveys or excavation and/or monitoring as deemed appropriate. The Department will advise the developer with regard to these matters. No construction works shall commence until the Department has had the opportunity to fully evaluate the findings of the UAIA and the Department's recommendations have been received by the Planning Authority.	**Chapter 16** addresses potential effects on archaeology and cultural heritage at the site.

2.4 EIAR Structure

This EIAR has been prepared with consideration of the EPA's EIAR Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (May 2022), and the "Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment", Department of Housing, Planning and Local Government (August 2018). In so doing, this EIAR accords with Article 3(1), Article 5(1) including additional information specified in Annex IV of Directive 2014/52/EU.

The EIAR is presented as follows:

- **Volume I. Non-Technical Summary** provides a non-technical summary of the EIAR laid out in a similar but condensed format to the main EIAR.

- **Volume II. Main Report of the EIAR** comprising two parts**. Part 1** provides a general introduction and background to the proposed project, describes the EIA process, provides a project description, including alternatives considered, and the policy and legislative context (**Chapters 1 to 5**). **Chapter 6** assesses risks of major accidents and/or disasters, and **Chapter 7** considers future developments prescribed for in overall strategic planning of the airport. **Part 2** of the EIAR contains **Chapters 8 to 17** which describe the potential environmental impacts of the proposed project in relation to each environmental factor. **Chapter 18** is a summary of how the different environmental effects interact, including consideration of potential cumulative impacts. **Chapter 19** provides a summary of mitigation measures, representing the environmental commitments associated with implementation of the ADP during construction and operation phases.

    - Chapter 1 - Introduction
    - Chapter 2 – The EIA Process
    - Chapter 3 – Project Need and Alternatives
    - Chapter 4 – Project Description
    - Chapter 5 – Policy Context
    - Chapter 6 – Disasters and Emergencies
    - Chapter 7 – Future Developments
    - Chapter 8 – Population and Human Health
    - Chapter 9 – Biodiversity
    - Chapter 10 – Hydrology
    - Chapter 11 – Land, Soils, Geology & Hydrogeology
    - Chapter 12 – Noise and Vibration
    - Chapter 13 – Material Assets (Waste Management)
    - Chapter 14 – Material Assets (Traffic & Utilities)
    - Chapter 15 – Air Quality and Climate Change
    - Chapter 16 – Archaeology and Cultural Heritage
    - Chapter 17 – Landscape and Visual Amenity
    - Chapter 18 – Interactions & Cumulative Effects
    - Chapter 19 – Summary of Mitigation Measures

- **Volume III. Technical Appendices** contains, in a separate volume, the technical appendices related to each EIAR chapter as relevant, listed as follows:

- Technical Appendix 2 – Scoping
  - 2.1: Scoping Consultation Document; and
  - 2.2: Scoping Responses
- Technical Appendix 4 –Construction and Environmental Management Plan
- Technical Appendix 9: Biodiversity
  - 9.1 Breeding & Winter Birds;
  - 9.2 Aquatic walkover survey report; and
  - 9.3 Bats
- Technical Appendix 11: Land, Soil, Geology, Hydrogeology
  - 11.1: Historical Site Investigation Borehole Logs
  - 11.2: Historical Soil Quality Results
- Technical Appendix 12: Noise and Vibration
  - 12.1: Sound Level Meter Calibration Certificates
- Technical Appendix 13: Waste
  - 13.1 Resources and Waste Management Plan
- Technical Appendix 16: Archaeology & Cultural Heritage
  - 16.1 Summary of Relevant Legislation; and
  - 16.2 Methodology
- Technical Appendix 17: Landscape and Visual Amenity
  - 17.1 Methodology; and
  - 17.2 Photopanels

2.4.1 Outline of Environmental Factor Chapters

Each environmental factor chapter contained within this EIAR has been structured according to EPA Guidelines (2022) as outlined below:

- **Introduction**: Introduces the environmental factor to be assessed and the areas to be examined in the assessment.
- **Methodology**: Describes how data was gathered to obtain the baseline scenario, and how impact assessment, including reference to assessment criteria, was carried out.
- **Baseline**: Includes desktop reviews of existing data sources for each specialist area, depending on scope. In general, the literature review includes published reference reports and datasets. Desktop studies, as required, were supplemented by field surveys to confirm the accuracy of the desktop study or to gather further, site-specific baseline environmental information. The sensitivity of the receiving environment and sensitive receptors were identified as relevant.
- **Characteristics of the development/key issues**: Summarising those aspects/activities of the development that may have an effect on the environmental factor.
- **Description of likely significant effects**: Predicts how the proposed ADP will impact the receiving environment and describes the potential significance of the effect. Impact interactions and cumulative effects are also considered, as relevant.
- **Mitigation measures**: Provides the recommendations for mitigation measures to reduce or eliminate any significant negative effects identified, including mitigation by design.

- **Residual effects** are predicted effects remaining after mitigation measures have been applied. The predicted effects are discussed having regard to their character, magnitude, duration, consequences, and significance, and also their cumulative effects. **Table 2.2** outlines the approach to describing environmental impacts and effects in this EIAR.
- **Monitoring:** Provides a description of any proposed project monitoring of effects on the environment which might be deemed necessary.

2.5 Assessment of Effects

The purpose of this EIAR is to present an assessment of the likely potential significant effects of the proposed ADP on the environment. Annex IV (5) of the EIA Directive defines how significance of effects should be described.

Table 2.2 is extracted from the EPA's EIAR Guidelines (2022) and presents the approach to describing environmental impacts and effects[4] in this EIAR. In determining effect significance, magnitude of change is considered in relation to the sensitivity of the receiving environment, as shown in **Figure 2.2**. This table informs the assessment methodology that is presented per environmental factor in the respective chapters. From this table, effects that are described as Imperceptible, Not Significant and Slight, are considered to be not significant. Those effects that are defined as Moderate, Significant, Very Significant or Profound, are significant effects. Where relevant, environmental factor chapters have further adapted the criteria to be specific to the environmental factor assessed (including in the context of relevant and specific guidance). The assessment methodology adopted is described within each chapter.

[4] Although these terms are used interchangeably in the EPA EIAR Guidance (2022), the EU EIA Directive emphasises the identification of environmental effects, with only brief mention of impacts in Article 7 and Annex III. Although related, a distinction can be made between impacts and effects. Impacts are best defined as changes resulting from an action. Effects are defined as consequences of impacts.

Table 2.2 Description of Effects

Quality of Effects It is important to inform the non-specialist reader whether an effect is positive, negative or neutral.	**Positive 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).
	Neutral Effects No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error.
	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).
Describing the Significance of Effects 'Significance' is a concept that can have different meanings for different topics – in the absence of specific definitions for different topics the following definitions may be useful (also see *Determining Significance*).	**Imperceptible** An effect capable of measurement but without significant consequences.
	Not Significant An effect which causes noticeable changes in the character of the environment but without significant consequences.
	Slight Effects An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
	Moderate Effects An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
	Significant Effects An effect which, by its character, magnitude, duration or intensity, alters a sensitive aspect of the environment.
	Very Significant An effect which, by its character, magnitude, duration or intensity, significantly alters most of a sensitive aspect of the environment.
	Profound Effects An effect which obliterates sensitive characteristics.
Describing the Extent and Context of Effects Context can affect the perception of significance. It is important to establish if the effect is unique or, perhaps, commonly or increasingly experienced.	**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?)

Describing the Probability of Effects Descriptions of effects should establish how likely it is that the predicted effects will occur so that the CA can take a view of the balance of risk over advantage when making a decision.	**Likely Effects** The effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented.
	Unlikely Effects The effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented.
Describing the Duration and Frequency of Effects 'Duration' is a concept that can have different meanings for different topics – in the absence of specific definitions for different topics the following definitions may be useful.	**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).

Describing the Types of Effects	**Indirect Effects (a.k.a. Secondary or Off-site Effects)** Effects on the environment, which are not a direct result of the project, often produced away from the project site or because of a complex pathway.
	Cumulative Effects The addition of many minor or insignificant effects, including effects of other projects, to create larger, more significant effects.
	'Do-nothing Effects' The environment as it would be in the future should the subject project not be carried out.
	'Worst-case' Effects The effects arising from a project in the case where mitigation measures substantially fail.
	Indeterminable Effects When the full consequences of a change in the environment cannot be described.
	Irreversible Effects When the character, distinctiveness, diversity or reproductive capacity of an environment is permanently lost.
	Residual Effects The degree of environmental change that will occur after the proposed mitigation measures have taken effect.
	Synergistic Effects Where the resultant effect is of greater significance than the sum of its constituents (e.g. combination of SOx and NOx to produce smog).

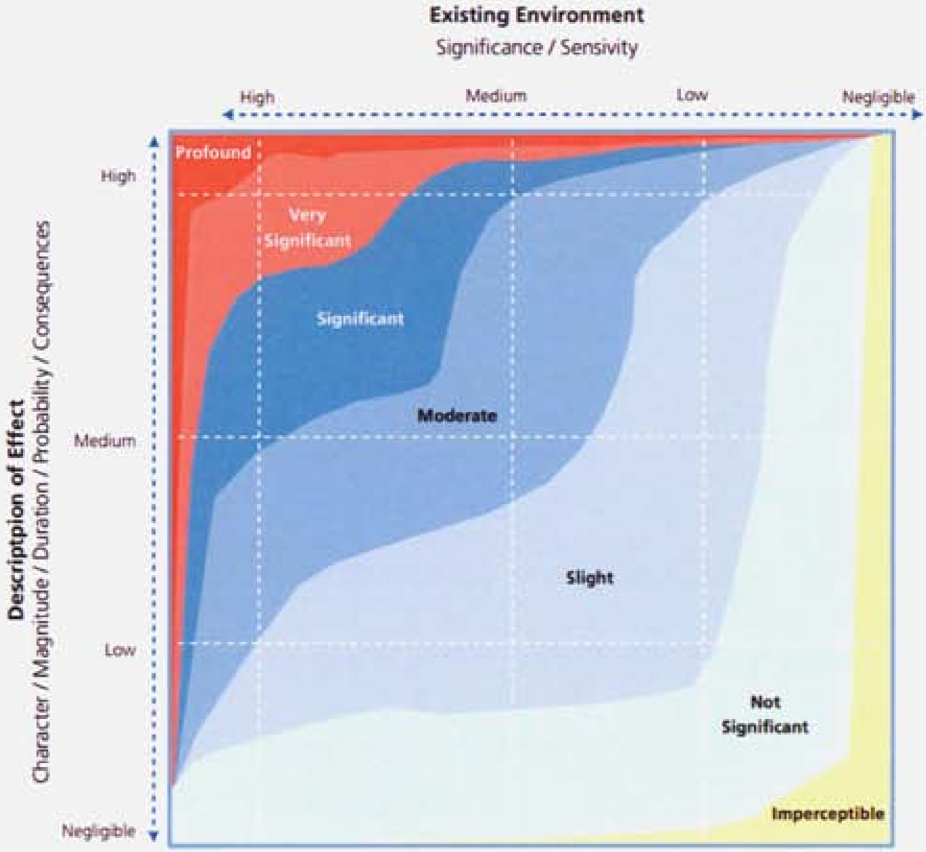

Figure 2.2 Determining significance of effects

2.5.1 Transboundary effects

The ADP is entirely within the administrative boundary of FCC. Potential transboundary effects with another Member State were not identified.

2.5.2 Cumulative effects and interactions

It is recognised that Dublin Airport is constantly undergoing development and renewal, with a multiple of planning applications pending with the local planning authority at any one time. The assessment of cumulative effects included: (i) identifying a long list of projects that could result in interactions and cumulation (see also **Chapter 7**); (ii) shortlisting those projects where potential significant cumulative effects were considered likely; (iii) conducting a more detailed investigation on the short-listed projects; and (iv) assessment of potential cumulative effects that may arise from short-listed projects where relevant. Each environmental factor chapter includes a cumulative assessment of the ADP with other proposed developments within proximity to the project boundary and wider area, including planning proposals by others. Similarly, interactions of effects are considered throughout the EIAR.

Chapter 18 of the EIAR summarises the findings of the potential cumulative effects arising from the proposed ADP, as well as interaction of effects where several different effects may collectively give rise to additional or greater impacts on environmental receptors.

3

3

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TABLES

FIGURES

3 PROJECT NEED AND ALTERNATIVES

3.1 Introduction

This section describes the need for the ADP (**Section 3.3**) and details the alternative solutions (**Section 3.4**) which were considered during the preparation of the ADP design. A description of the 'do nothing' scenario is also provided in **Section 3.2**.

3.2 Do Nothing Option

The ADP proposes significant upgrades to the surface water management infrastructure at Dublin Airport. It comprises a series of drainage system enhancement measures and infrastructure proposals, including the upgrade of existing drainage infrastructure and the construction of additional infrastructure to improve the performance of the existing surface water management system. As presented in **Chapter 1**, the objectives of the ADP are to:

- To provide a nett improvement in the degree of protection afforded to the receiving waters by the surface water management system, in accordance with the planning and environmental requirements of the relevant EU Directives, national and local plans and legislation, as well as daa's Sustainability Strategy;
- To optimise the performance of the surface water management system at Dublin Airport for improved efficiency, greater operational flexibility, and resilience to a broad range of extreme weather events; and
- To increase the hydraulic capacity of the surface water network and alleviate historic capacity and flooding issues.

The 'Do Nothing' scenario would retain the current surface water management system and would not include any system upgrades. Failure to implement the proposed ADP upgrades would result in the existing, inefficient drainage infrastructure, continuing to operate and serve Dublin airport. This poses an ongoing risk to receiving waters as well as flood risk within the airfield.

3.3 Project Need

It is proposed to address the project objectives as descried in **Section 3.2** by delivering an integrated airfield-wide surface water management system which is operationally flexible, responsive, and resilient, and which provides robust protection to receiving waters from potential contaminants. The key features of this system include the segregation of clean and contaminated flows, so that clean flows can be used to increase flows to the receiving waters, without mixing with contaminated runoff from other areas. Additional pollution control infrastructure is required to identify, capture, and store contaminated runoff before discharge to the public sewer, so that it is not allowed to enter the receiving waters. These proposals will operate as part of an integrated airfield-wide surface water management system designed to achieve the core objectives detailed above.

The ADP also proposes hydraulic upgrades to the existing network. This will provide the network connectivity needed to facilitate the proposed flow segregation system, increase the hydraulic capacity of the network, and alleviate historic capacity issues. Some local upgrades and reconfiguration of existing drainage networks at West Apron and South Apron will be necessary to integrate these networks into the airfield-wide surface water management system.

The proposed ADP includes an airfield-wide SCADA system to provide operational control for all existing and proposed drainage infrastructure. This system will facilitate the improved efficiency, operational flexibility and resilience required under the ADP.

3.4 Consideration of Alternatives

This section describes the consideration of alternatives which was undertaken during the development of the ADP design. **Section 3.4.1** details some of the alternative design solutions considered, including alternative design / operational philosophies, and design considerations to suit potential construction methodologies. **Section 3.4.2** addresses the alternative layouts which were considered (*i.e.*, alternative pipeline corridor routes and infrastructure locations). In assessing alternatives, technical, operational, and environmental constraints were considered, and a comparison of the potential environmental effects undertaken.

3.4.1 Alternative Design Solutions

3.4.1.1 Contamination Detection and Response System

This section describes the alternative design solutions which were considered during the design of the contamination detection and response (CD&R) system. This includes alternative approaches for the detection of contaminated runoff and for the segregation of clean and contaminated runoff, both of which are detailed hereunder.

<u>**Detection Approach**</u>

The proposed detection system includes a combination of weather-based monitoring and real-time surface water monitoring. During the design of this system, the following alternative approaches were considered:

- real-time surface water monitoring only; and
- weather-based monitoring only.

If real-time surface water monitoring only was implemented, this would mean that the response of the system to contamination events would be dependent on the time required to retrieve and test the surface water sample, return a result, and open / close the flow control mechanisms at the network decision points. This type of reactive system carries the inherent risk of the first flush of contaminated runoff not being successfully captured and instead flowing to the receiving waters. The first flush of contaminated runoff typically contains a peak of COD concentration in the runoff. If these high COD concentration flows were to flow to the receiving waters, this would result in contamination of the receiving waters. This was deemed a sub-optimal solution and was therefore eliminated from consideration.

If only weather-based pre-emptive detection were provided, the resultant system would provide improved protection of receiving waters from first flush runoff during normal operations. The detection of contamination events would operate in the same manner as the system proposed for the ADP. However, without real-time monitoring of surface water, it would not be possible to verify when the contamination event had ceased. This could result in significant volumes of clean flow being sent to the pollution storage tanks, which would reduce flows in the receiving waters and fill the pollution storage tanks quicker than necessary. The overall effect of this would be a reduction in the storage volume which is available for subsequent contamination events (*i.e.*, a lower degree of protection to receiving waters). Furthermore, the system would not have sufficient operational flexibility to respond efficiently to non-default or emergency conditions.

For the reasons outlined above, it was concluded that a combination of pre-emptive and real-time detection devices would offer the best protection to the receiving waters. It is therefore proposed to use the weather-based monitoring to pre-empt contaminated runoff, and real-time monitoring to verify when contamination has started and ceased. Real-time monitoring can also be used to adjust operation locally or centrally to optimise the overall performance of the system. The real-time monitoring data can also be collected over time to review the system's performance so that opportunities for refinements and improvements can be identified.

Flow Segregation Approach

Three potential approaches were considered for the segregation of flows. These three alternative approaches were the implementation of local, intermediate, and central decision points. A decision point is a chamber which can convey incoming flows to either a clean or contaminated outlet pipeline, depending on whether the incoming flow is clean or contaminated. **Table 3-1** explains the differences between these three approaches.

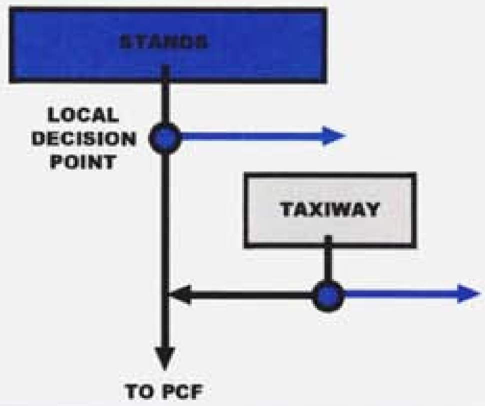
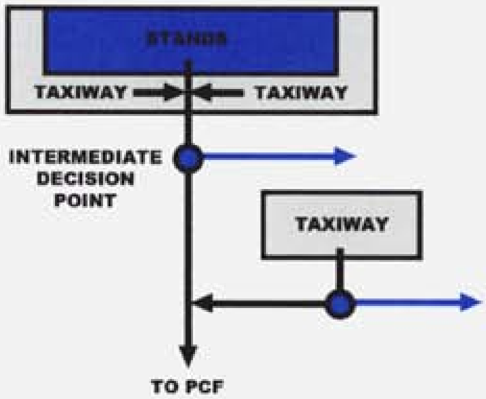
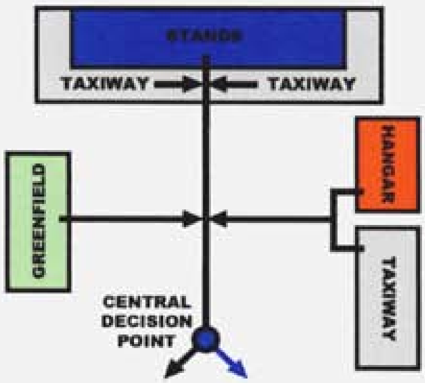
Assessment of these approaches required consideration of the different contamination risk levels throughout the airfield. This enabled an assessment of the level of flow segregation that each approach would provide between areas of different risk levels. The potential for clean runoff from lower risk areas to mix with contaminated runoff from higher risk areas is a key consideration in ensuring effective flow segregation.

The contamination risk level for runoff from a given area is determined by the land use and activities at that location. For example, aircraft de-icing and anti-icing occurs on apron areas, hence, runoff from these areas will have a greater contamination risk from these pollutants than that from taxiways/runways.

The runoff contamination risk level from anti-icing and de-icing chemicals for an area can be broadly classified as follows:

- High: Aircraft de-icing occurs in this area (aircraft stands and apron hardstand);
- Medium: Aircraft de-icing does not occur in this area, but this area is likely to have contaminated runoff due to de-icer losses during aircraft movements (*e.g.*, taxiways); and
- Low: Aircraft de-icing does not occur in this area, nor does it border areas where de-icing application does occur but may be subject to pavement de-icing (*e.g.*, aircraft hangars).

Table 3-1: Decision Point Approach- Alternatives Considered

Decision Point Approach	Description	Diagrammatic Representation
Local Decision Point	Decision Points (DPs) which are located such that areas of different contamination risk levels are fully segregated *e.g.*, all runoff from a given set of stands are served by a dedicated decision point, while adjacent taxiways are served by a separate decision point.	
Intermediate Decision Point	The intermediate DP approach divides the airfield into zones, based on the configuration of the network and the airport operations in that zone. This approach is designed to ensure that runoff from that zone is segregated into clean and contaminated runoff before it is allowed to mix with runoff from other zones. A zone may potentially include areas of different contamination risk level (*e.g.*, medium and high), but a low risk area and a high risk area would not be in the same zone.	
Central Decision Point	Decision points where runoff from several areas of different contamination risks is combined before passing through a DP. This would mean that, during a contamination event, all clean and contaminated runoff would become mixed together. This would lead to the runoff from all contributing areas becoming contaminated and then diverted to pollution control.	

A qualitative assessment of each of these alternatives was undertaken and is presented in **Table 3-2**. As well as assessing the level of segregation provided, this assessment considered factors relating to the potential construction and operational impacts of each approach, as well as the suitability of each approach for retrofitting on the existing surface water network.

Table 3-2: Decision Point Locations Assessment of Alternatives

Option Description	Disadvantages	Advantages
Local	The existing drainage network serving the airfield has been developed over a number of decades and it was not designed to isolate runoff from areas of different contamination risk levels. The establishment of local DPs in existing areas would require reconstruction of most of the existing drainage network. This would result in major impacts to airport operational activities. Providing local decision points would involve positioning numerous decision points in busy areas for airport operations. The requirement for regular inspection and maintenance of these numerous DPs at busy locations could lead to significant operational disruption. Access to these busy areas for emergency maintenance at short notice would not be guaranteed.	This option provides the greatest level of flow segregation, of the three approaches assessed. This approach would thus have the lowest pollution storage volume requirement of the three approaches, due to the reduced mixing of clean and contaminated runoff. This approach presents the opportunity to achieve significant clean flow to the receiving water.
Intermediate	Given that runoff from areas of different contamination risk level will mix under this approach, it may result in slightly less effective segregation of clean and contaminated flow than the Local DP solution. While this approach would have a far lower impact on airfield operations than the local DP approach, it would present a greater operational impact than the Central DP approach, due to the number of decision points requiring regular access.	This approach would ensure that clean runoff from one zone is not allowed to mix with contaminated runoff from another zone. The zone boundaries are designed to segregate areas that are impacted by regular de-icing activity from areas which are not. This presents the opportunity to decrease the volume of contaminated runoff and increase the supply of clean flow to the receiving water (compared to central DPs). DPs do not need to be as close to the runoff source for this approach as they do for local DPs. This would mean DPs could be positioned in more easily accessible areas, meaning easier access for routine maintenance or emergency response. This would result in a lower operational impact on airport activities than the Local DP approach (although still a higher impact than Central DPs). Retrofitting this approach onto existing developments would require significantly less construction than the local DP approach. This approach would involve locating the DPs at strategic locations on the existing network to serve an entire zone, rather than needing to reconstruct sections of local network, which would be required under the local DP approach.
Central	As central decision points involve the mixing of flows from multiple areas of different contamination risk level, this approach provides the lowest levels of segregation between clean and contaminated runoff. This approach would frequently lead to the mixing of clean and contaminated runoff. As a result, the volume of contaminated runoff would be much greater than the other alternatives considered.	This approach provides the lowest level of disruption to airport operations during the construction phase and would not require any significant reconstruction of the existing network. It also has the lowest impact to airport operations during the operational phase as it has less DPs to be accessed for inspection and maintenance purposes.

Option Description	Disadvantages	Advantages
	This approach places a high reliance on a relatively small number of DPs. This means that there is less fail-safe contingency and less operational flexibility, all of which makes this approach more susceptible to potential contamination events. This approach would result in the lowest supply of clean flow to the receiving waters.	

The central DP approach provides the least effective segregation of flows and would therefore result in a much higher overall volume of contaminated runoff, compared to the other options. This approach would also result in a much lower clean flow to the receiving waters, potentially resulting in significant disruption to hydrological flows of the stream. This approach was therefore deemed unsuitable and was screened out.

While the Local DPs offer effective segregation of flows, such an approach would involve major redevelopment of existing networks to segregate each area of different contamination risk levels, if applied to existing developments. This approach could also result in major disruption to airport operations during construction and would be a more difficult solution from a maintenance perspective, throughout the operation phase, due to the number and locations of decision points. Furthermore, runoff from high-risk areas is likely to impact adjacent medium-risk areas, unless their respective networks are completely isolated from each other (which would require significant upgrade works). The benefit of providing local DPs may therefore be limited as these adjacent high-risk and medium-risk areas are likely to have the same contamination status anyway, under most circumstances. This is because contaminated runoff from de-icing events in high-risk areas would typically also lead to contamination in medium-risk areas, wherever they flow to the same pipeline. The limited benefit of this approach combined with the potential significant disruptions to operations, led to the conclusion that local decision points were not the preferred approach and were screened out.

Following the above, it was concluded that intermediate decision points are the preferred flow segregation strategy for the Surface Water Management Plan (SWMP). This approach would provide the best balance between the effective segregation of flows, ease of access for maintenance and emergency response, operational flexibility, and mitigation of disruption to airport operations.

Notwithstanding the outcomes of this assessment for the ADP, it is acknowledged that the local DP approach may potentially be a suitable approach for future developments. These can be designed to serve networks which are fully isolated from areas of different contamination risk. Where new DPs are needed in future to serve new developments, which are located at a distance from existing developments, there would be less potential impact to airport operations and local DPs may therefore be a suitable solution.

The resultant intermediate decision point approach is illustrated in **Figure 3.1** which shows how the airfield was divided into zones, each one served by at least one network decision point.

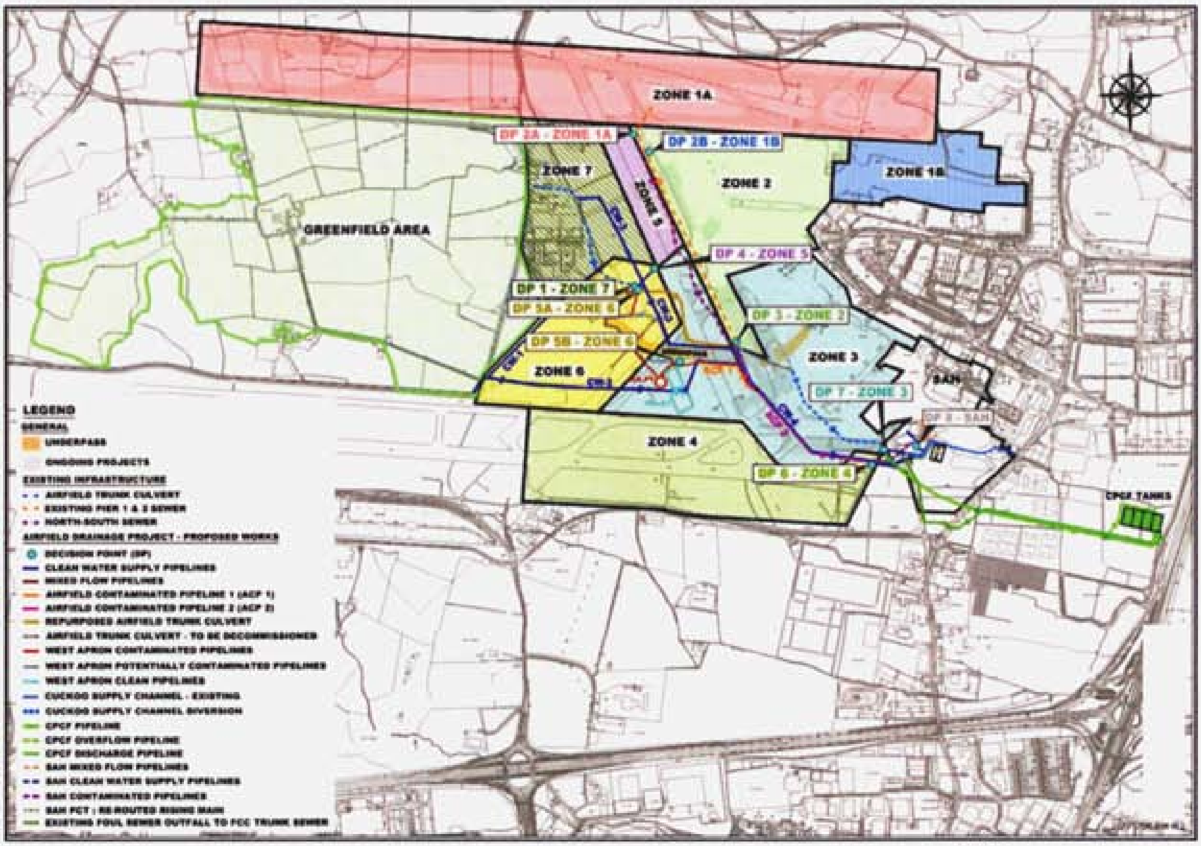


Figure 3.1. Zones for network decision points

3.4.1.2 Trunk Pipeline Design

The design of the trunk pipelines involved consideration of the potential construction techniques which could be applied (trenchless vs open-cut excavation). This applies to Clean Water Supply Pipelines (CWSPs), Airfield Contaminated Pipelines (ACPs), and the Central Pollution Control Facility (CPCF) Pipeline.

The design of the CWSPs also considered the option to apply an open-channel solution instead of a closed conduit solution, as well as the alternative solution to provide a separate greenfield inflow pipeline instead of conveying them via the clean water supply pipelines. The consideration of these alternatives is described hereunder.

<u>Construction Technique</u>

The design of construction methodology does not form part of this planning application, this would be carried out during the detailed design stage. Nonetheless, it is necessary to consider potential construction technologies during the design of the Permanent Works Planning Corridor to ensure that it is compatible with the anticipated construction techniques which may be implemented, and to enable each type of construction methodology which could potentially be chosen by the Design-Build Contractor to be assessed in the context of this application.

The consideration of alternative construction techniques looked at the option of trenchless construction versus the traditional open-cut excavation method of construction. Open-cut excavation is typically used for pipeline construction unless there are specific constraints or obstacles which necessitate trenchless construction. Trenchless construction provides benefits at crossings of key infrastructure as the crossing can be completed with a significantly reduced impact, if any, to the operation of that infrastructure. At Dublin Airport, this reduced impact is of particular importance at crossings of critical airport infrastructure such as Runways, Taxiways, Airport Traffic Hotspots, and other highly restricted and regulated locations, such as Obstacle Limitation Surfaces (OLS). Trenchless construction also reduces the volume of material to be excavated.

Notwithstanding these potential benefits, trenchless construction may not always be possible where downstream elevation constraints exist. This is because trenchless construction has a larger minimum depth requirement than open-cut excavation. This is required to ensure that there is sufficient over-burden to the trenchless equipment during construction and so that the required separation depth is achieved between the tunnel / bore and the existing infrastructure, to prevent settlement or other negative impact to the surrounding ground.

Given the elevation constraints which exist at Dublin Airport, it will not be possible to apply trenchless construction at all locations throughout the airfield. This is because the increased depth requirement would mean that the pipeline would be too low to discharge to the fixed downstream point of discharge. As a result, the system could not work as intended if trenchless construction were applied at all locations.

It is therefore recommended that open-cut excavation is used, except where this would result in an unacceptable or an avoidable impact to airport operational activities (*e.g.*, at crossings of Aircraft Traffic Hotspots) or at crossings of public roads (*e.g.*, R132). At such locations, it is recommended to use trenchless construction. Notwithstanding this, it is acknowledged that the construction methodologies will be determined, at detailed design stage, by the Design-Build Contractor. For this reason, the Permanent Works Planning Corridor has been designed such that either open-cut excavation or trenchless construction is possible at certain crossings of key airport infrastructure. The Contractor's construction methodology will be required to comply with the applicable environmental and airport operational constraints.

By implementing this combined approach, it will be possible to minimise impact to airport operations while still staying within the required elevation range, ensuring an effective system is delivered with the minimum impact to airport operations. This approach has been taken into consideration during the selection of the pipeline route corridors.

<u>Open-channel vs closed conduit</u>

The design of the Clean Water Supply Pipelines involved consideration of alternative conveyance methods, namely, open-channel and closed-conduit solutions (*e.g.*, underground pipelines). An open-channel solution is not considered suitable for contaminated pipelines as it is necessary to keep contaminants within a closed conveyance system to ensure that they do not impact the surrounding ground and / or receiving waters. For this reason, the open-channel solution was only considered for clean water supply pipelines.

The assessment of these two alternative solutions noted the following key points:

- The proposed pipelines are required to cross key airport infrastructure at several locations. Closed conduits are the only viable means of crossing such infrastructure;
- Numerous existing services would need to be crossed along the selected corridors. It is preferable to cross under such infrastructure using closed conduits to avoid constructing pipe bridges or similar support structures for the existing services. Closed conduits also reduce the need for working in or adjacent to water. An open-channel solution would

need to be accessed regularly to carry out routine maintenance, which presents an added safety risk.

- Open channels would require multiple deep channels throughout the airport. Trenchless crossings of airport infrastructure are likely required, these crossings need to have sufficient overburden be sufficiently deep to facilitate the tunnelling operations to avoid "heave" (tunnel fails to stay horizontal and breaks ground level). The inclusion of deep open channels throughout the airfield would introduce an increased health and safety risk. The excavations for closed conduit solutions would be backfilled and reinstated so that this risk would be avoided. Constructing open channel solutions would also result in a larger volume of excavated material.

Therefore, closed conduits were selected as the preferred conveyance system. The only open-channel section included in the ADP design is the localised diversion of the Cuckoo Supply Channel. The Cuckoo Supply Channel is an existing open-channel via which runoff leaves the airfield and flows to the Cuckoo Stream. The proposed localised diversion does not present an increased safety risk and does not involve a crossing of airport infrastructure or utilities and is therefore considered an acceptable solution.

Greenfield Inflow Pipeline

The design of greenfield inflow conveyance considered the following alternatives:

- The provision of a dedicated pipeline to serve the clean greenfield inflows and separate clean pipelines to serve the airfield "clean" runoff.

- Provision of clean water supply pipelines which can convey greenfield inflows and airfield "clean" runoff in the same conduit.

As detailed in **Figure 3.2**, the interception points associated with the greenfield inflows are located to the west of the airfield. The discharge point to the Cuckoo Supply Channel is also shown in this figure.

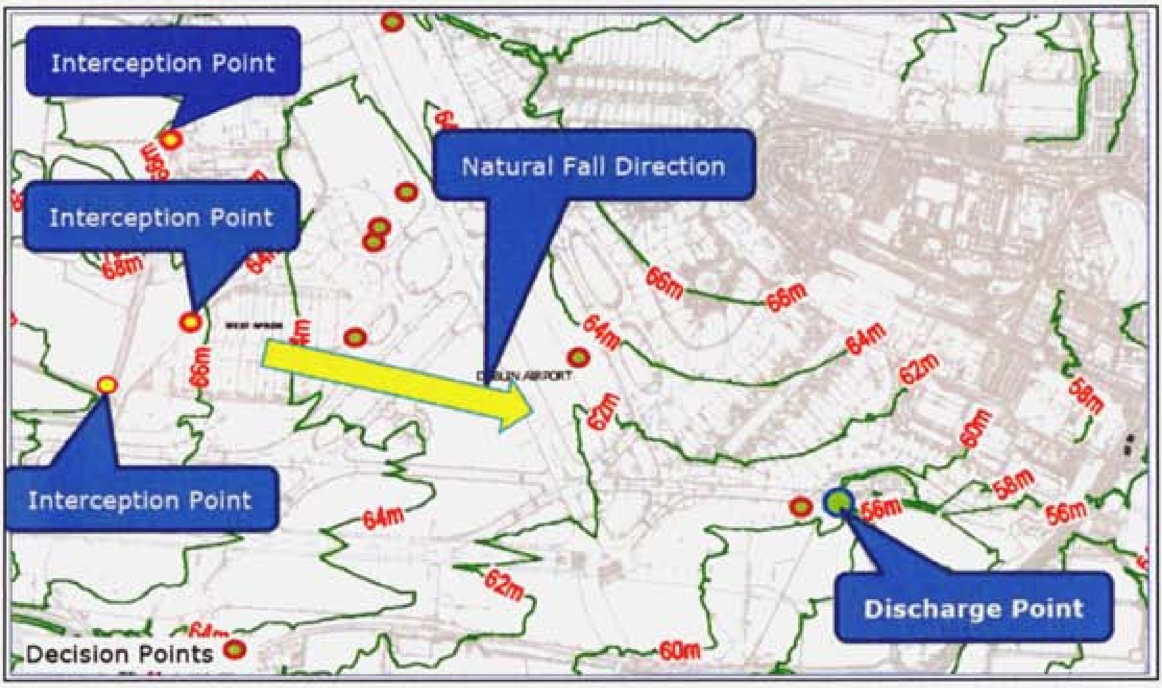


Figure 3.2. Interception points

Given the topography of the site and the location of the discharge point, the route of the dedicated greenfield pipeline would have to pass through the airfield campus from west to east. This pipeline would be required to pass through the campus as far as the proposed discharge point to the Cuckoo Supply Channel, which would also be the point of discharge for the CWSPs. This means that the greenfield inflows and CWSPs would be required to follow a similar route in many locations.

It was determined that the provision of separate pipelines for greenfield inflows and the clean runoff from the airfield, along a similar route, would be an inefficient design. The provision of dedicated pipelines would require significantly more materials (*i.e.*, pipes, bedding, manholes, *etc.*,) when compared to a single pipeline/culvert solution.

The main benefit of a dedicated greenfield inflow pipeline is to separate this runoff from potentially contaminated airfield runoff. However, the CD&R system proposed as part of the ADP is already designed to ensure that greenfield inflows are not contaminated by potentially contaminated runoff from the airfield. The proposed CD&R system (detailed in the **Engineering Design Report, Appendix 11A: Operational Control Philosophy**) is a sophisticated system with numerous safeguards built into the design to ensure the risk of contaminated runoff entering the clean system is kept to a minimum. This means that a dedicated greenfield inflow pipeline is not required.

The clean water supply pipelines have therefore been designed to convey both greenfield inflows and airfield "clean" runoff. The proposed approach balances the need for an efficient design with the need to protect the receiving waters from contaminated runoff, which the CD&R system is itself designed to achieve.

3.4.1.3 Pollution control approach – existing airfield developments

The following alternatives were considered during the design of Pollution Control Facilities (PCFs):

- Separate or combined storage:
- Separate storage of clean and contaminated runoff; or
- Combined storage of clean and contaminated runoff in the same tank;

and

- Local or central storage philosophy;
- Local storage philosophy;
- Central PCF; or
- Combined approach.

<u>Separate or combined storage</u>

The combined storage approach would result in mixing of clean and contaminated runoff (*i.e.*, clean runoff from a previous rainfall event may still be present in the tank when the next contaminated runoff is received). This would lead to contamination of previously clean runoff, resulting in an increased volume of contaminated runoff. This would also result in a reduction in the clean flows which can be discharged to the receiving waters. This approach does not comply with the proposed flow segregation approach which is designed to address the core objectives of the project and was therefore eliminated from consideration. The separate storage of clean and contaminated runoff is consistent with the project objectives and project needs and is therefore the preferred alternative.

Local or central storage

Applying a local storage philosophy involves providing storage tanks close to the source of runoff to attenuate flow from the zone it serves. The attenuated outflow from the local storage tanks (*i.e.*, local PCF) is then conveyed downstream at a restricted flow rate which results in a smaller pipeline diameter.

Under a central storage philosophy, all runoff is conveyed directly to a centralised downstream storage facility (*e.g.*, the CPCF). This means that the network pipelines must be designed for the critical design rainfall event, thus requiring a larger pipeline diameter. The benefit of a central storage approach is that cost efficiencies can be gained by constructing attenuation volume for several (or all) zones at a single centralised location.

It is also possible to apply a combined storage philosophy, where some developments are served by local tanks, with other developments served by a centralised tank, depending on location-specific constraints / requirements.

An analysis was carried out of the above potential approaches for pollution storage to determine the preferred solution. This analysis considered the potential environmental impact that could arise from the construction phase (considering the extent of the works) as well as the operational phase under each approach.

The local storage approach results in a reduced pipeline construction impact, although the central storage approach would have a lower construction impact in terms of storage tanks. The two approaches can be expected to have a roughly similar construction impact as their respective benefits offset one another.

The key remaining impact to be considered is the impact to airport operations. The impact on airport operations will be greater at a location in the airfield where there are live airport operational activities than for a location which is away from the live airfield.

It was decided to implement a central storage approach to serve the majority of existing developments. This is because there is not sufficient available land to construct tanks in many parts of the airfield without a prolonged and significant impact to airport operations during construction and / or operation. Under a central storage approach, the storage tanks could potentially be constructed outside of the airfield, thereby reducing the operational impact.

However, a local storage approach is proposed at West Apron. This is because the alternative central storage approach would require larger diameter downstream pipelines to convey outflows from West Apron. This would result in an increased pipeline construction impact throughout the central airfield, across some of the busiest airport operational areas (including Runway 16/34 and several Taxiways). It was determined that the increased pipeline construction would have a greater impact on airport operations than constructing a local storage tank adjacent to West Apron.

In conclusion, it was determined that a combined approach should be implemented with most of existing developments to be served by central storage, except for West Apron which would be served by local storage (WA-PT).

3.4.1.4 CPCF Discharge Options

The proposed CPCF is designed to capture contaminated runoff and discharge it to the public foul sewer. This section describes the alternative discharge solutions which were considered during the design of the proposed CPCF as summarised in **Table 3-3**.

Consideration had been given to the treatment of runoff onsite. Cost and operational risk factors resulted in conventional wastewater treatment approaches being screened out. Conceptually, a constructed wetland to treat contaminated runoff may be possible (although subject to technical design and operational challenges). It is noted, however, that Section 6.4.5 of the Dublin Airport Local Area Plan (LAP) states that "*Putting in new open water/ponds/wetlands will significantly increase the attractiveness to birds[…] this additional habitat will come an increase in birds and therefore an unnecessary increase in severity and risk […] A continued policy of avoidance is therefore recommended under which it is considered to restrict the creation of any new open ponds/wetlands*". Such an onsite solution was therefore deemed not appropriate.

Foul flows from Dublin Airport are currently discharged to the existing North Fringe Sewer and this is currently the only wastewater discharge option available for the proposed ADP.

The development of the Greater Dublin Drainage Project (GDD) (by Uisce Éireann) would present a future discharge option via the proposed Future Orbital Sewer. The development of the proposed ADP is, however, not dependent on the GDD Project being advanced. The vertical profile of the proposed Future Orbital Sewer presents an opportunity for the contents of the CPCF storage tank to be emptied partially via gravity.

Table 3-3: Consideration of CPCF Discharge alternatives

CPCF Discharge Option	Gravity Only	Pumped	Combined
Short-term Solution			
North Fringe Sewer (NFS)	**Not feasible:** gravity discharge is not possible as the invert level of the NFS is too high to allow the CPCF to empty by gravity flow.	**Feasible**: This option is feasible. It would, however, require more energy to operate when compared to the gravity or combined options.	**Not feasible:** gravity discharge is not possible as the invert level of the NFS is too high to allow the CPCF to empty by gravity flow.
Long-term Solution			
Future Orbital Sewer	**Not feasible** - Gravity discharge to the Orbital Sewer could not be achieved based on the proposed tank footprint. It could potentially be done by reducing the tank depth and increasing the tank footprint, however, this was not feasible due to the area requirement.	**Feasible**: However, this option would require more energy to operate when compared to the gravity or combined options.	**Feasible**: This option is feasible as the elevation of the proposed discharge point to the future Orbital Sewer is lower than that of the NFS, allowing a partial emptying of the CPCF by gravity flow. Pumping would still be required to empty the bottom portion of the tank. This option has the lowest energy demand of the feasible solutions and is the preferred long-term discharge solution.

The short-term discharge solution did not consider any alternatives as there is only one currently available discharge option, *i.e.*, the North Fringe Sewer. As a long-term discharge solution the two potential discharge points (NFS and Future Orbital Sewer) were considered, where that future alternative discharge option becomes available. Three discharge methods were considered for these long-term discharges:

- Gravity only Discharge;
- Pumped Discharge; and
- Combination of Gravity and Pumped.

The preferred option for overall management of the discharge from the CPCF is summarised hereunder.

- Short-term: pumped discharge to the NFS until such time as the GDD Project is delivered by Uisce Éireann.
- Long-term: Following development of the GDD, it is proposed to implement a combination of gravitational and pumped discharge to the Orbital Sewer. It is noted that the pumped discharge to the NFS would be the long-term solution if the GDD Project is not delivered. This solution is completely independent of and not reliant on the GDD project, should it not proceed for any reason.

3.4.1.5 Clean Storage Approach (West Apron)

It is proposed to construct clean storage tanks to attenuate clean runoff from West Apron. The following alternative design solutions were considered for the attenuation of runoff from West Apron:

- Local storage of the design flood event (1:100 year + 30% Climate Change factor);
- Central storage of the design flood event (1:100 year + 30% CC); and
- Combined storage approach: Partial Local storage (up to 1:30 year) and provide central storage for the remainder of the design flood event (up to 1:100 year + 30% CC).

If central storage were implemented at West Apron, larger downstream pipelines would be required to convey outflows from West Apron. This would result in an increased pipeline construction impact throughout the central airfield, across some of the busiest airport operational areas (including Runway 16/34 and the Aircraft Traffic Hotspots).

The local storage approach results in a reduced pipeline construction impact, although it would have a slightly larger impact than the central storage approach in terms of attenuation tanks. The two approaches can be expected to have a similar scale of infrastructure as their respective benefits offset one another. However, at West Apron, it was determined that the increased pipeline construction associated with central storage approach would have a greater impact on airport operations than constructing a local storage tank.

It is noted that the central storage approach would also result in deeper pipelines. This is because the larger diameters need to be constructed at a lower elevation to maintain the required separation between the proposed pipelines and existing infrastructure. The increased pipeline depth could further constrain the vertical alignment design, with the consequent risk that it may not be feasible to convey West Apron outflows to the Cuckoo Supply Channel by gravitational flow under a central storage approach.

Overall, providing central attenuation for West Apron would be more constrained in terms of vertical alignment and it would have a greater impact to airport operations. Local storage is therefore preferred to central storage at West Apron.

There is no clear advantage to the combined storage approach, in terms of hydraulic performance, construction impact or operational performance. This approach would result in a larger outflow pipeline than local storage, however, it would still require both a new local storage tank to be constructed and an increase to the volume of the central attenuation tanks (regional attenuation facility). This is the least efficient design of the alternatives considered and was therefore eliminated.

The local storage approach was therefore considered to be the most efficient design with the lowest impact on airport operational activities. For these reasons, local storage was identified as the preferred approach for West Apron.

3.4.2 Alternative Layouts

3.4.2.1 Pipeline Corridor Route Selection

Pipeline corridor route selection was conducted for the following pipeline routes:

- Clean Water Supply Pipelines;
- Airfield Contaminated Pipelines; and
- CPCF Pipeline

The following steps were undertaken at the start of each route selection process:

- Establish **upstream interception points** and **downstream discharge points**. These will dictate the start and finish locations of each pipeline.

- Review of design constraints to screen out unsuitable areas through which to route pipelines. The review of design constraints considered factors such as topography, airport regulations and restrictions, land ownership, including habitat, biodiversity and cultural heritage, and interface with planned and proposed developments. These are shown in **Figure 3.3**.

Figure 3.3: Exclusion Zones

When the above steps were complete, alternative route corridors were established between the fixed upstream interception points and the downstream discharge points. The alternative corridors were then assessed to determine the preferred route corridor for each trunk pipeline. The consideration of alternative route corridors for each trunk pipeline is detailed below.

Clean Water Supply Pipelines

Most of the CWSPs are routed through the airport campus and alternatives were developed with consideration for the highly restricted and regulated airport environment. Once the above-detailed constraints review and screening process was completed, potential corridors were established for the CW3 and CW4 pipelines. As the surrounding areas had been screened out, largely due to proximity to key airport infrastructure, there are no alternatives to the selected Permanent Works Planning Corridors for CW3 and CW4. As detailed in the Planning Report (**Section 10** of this Planning Application), the Permanent Works Planning Corridor is defined, for the purpose of this application, as the maximum area within which permanent works can be sited (*i.e.*, pipeline corridors, tunnelling shafts).

The main alternatives considered for the CWSPs were for the CW1 and CW2 pipeline routes. In particular, the route selection process considered alternatives for the interception of greenfield inflows at two interception points (separated by a distance of ca. 150m) to the west of West Apron. These flows would then be conveyed to the east of Runway 16/34 and, ultimately, to the

Cuckoo Supply Channel. In addition to the previously outlined constraints, the selection of CW1 and CW2 pipeline corridors aimed to avoid / minimise impacts to road users of the R108 public road and impacts on third party lands in the vicinity of the interception points. **Figure 3.4** shows the alternative corridors considered during this route selection process.

Figure 3.4: Alternative Corridors for CW 1 and CW2

Corridor alternative 2 was excluded on the basis that this route would require a longer crossing of the West Apron. This crossing would most likely have to be constructed by trenchless means to minimise disruption to airport operations. Given the distance across the apron along this route it is anticipated that intermediary tunnelling infrastructure would be required in the apron to facilitate the construction. This means that there would be a larger impact to the operational activities at West Apron under this alternative.

Corridor alternative 3 would intercept the greenfield inflow on the R108 carriageway, upstream at the point of entry to the airfield and route the flows in a southern direction to Interception Point 1. At this point, the flows would be routed east into the airfield, where flows would follow the same route as Corridor 1. Alternative 3 was ruled out as it would require extensive works on the public road with road closure/lane closures required to facilitate the development.

Corridor Alternative 1 was determined to be a more suitable route as it would require a shorter crossing of West Apron, reduced impact to airport operations and significantly less interface with the R108 public road.

This process culminated in the selection of Corridor 1, as shown indicatively above and further detailed on the **Planning Drawings**. Corridor 1 includes two sub-options described as follows:

- The proposed horizontal alignment of the CWSPs is designed to facilitate the crossing of the 16/34 runway in the same excavation as that proposed for the Underpass development, which at the time of writing is with An Bord Pleanála on appeal. This approach would follow **Corridor 1A** and would be the most efficient construction method and would minimise the cumulative impact of these projects on airport operations.

- Provision has been made in the horizontal and vertical alignments to facilitate the crossing of the 16/34 runway via trenchless construction methods in case the construction timelines of the ADP and the Underpass project do not align. This approach would follow **Corridor 1B,** which involves a shorter route than Corridor 1A.

The proposed Permanent Works Planning Corridor has taken these optional variations of Corridor 1 into account for the crossing of Runway 16/34.

Airfield Contaminated Pipelines

Airfield Contaminated Pipeline (ACP 1) is designed to intercept runoff from West Apron and convey it to ACP 2, which in turn will convey it to the CPCF Pipeline. The consideration of alternatives for ACP 1 largely matches those previously detailed for CW2 because these pipelines would have similar upstream interception points and their downstream discharge points would also be in close proximity to one another. Furthermore, it is more efficient to construct these two pipelines along the same corridor for reasons relating to construction efficiency and impact on airport operations. The route of ACP 1 is therefore proposed to follow the preferred route corridor determined for CW2.

ACP 2 is required to intercept flows from the Re-Purposed Airfield Trunk Culvert (RATC) to provide additional hydraulic capacity for contaminated runoff. The existing Airfield Trunk Culvert (ATC) conveys greenfield inflows as well as potentially contaminated run-off from the airfield. It is proposed to re-purpose the ATC to a contamination conduit with "clean" flows to be conveyed via the proposed CWSPs. The existing ATC also displays hydraulic capacity issues and is a contributing factor to predicted flood risks in the airfield, in particular around the West Apron.

This additional capacity is needed to facilitate the required segregation of clean and contaminated flows. The key factor in the consideration of alternative routes for ACP 2 was to determine the most suitable location at which it should intercept flows from the RATC. Initially there were two potential interception locations identified, refer to **Figure 3.5** for details. These points were selected to coincide with major connection points to the existing ATC:

- Location 1: West of the 16/34 runway - just downstream of the discharge for runoff from the northern section of West Apron to the RATC; and

- Location 2: East of the 16/34 runway – at the point where the Ø1200mm Pier 1 & 2 pipeline connects to the RATC.

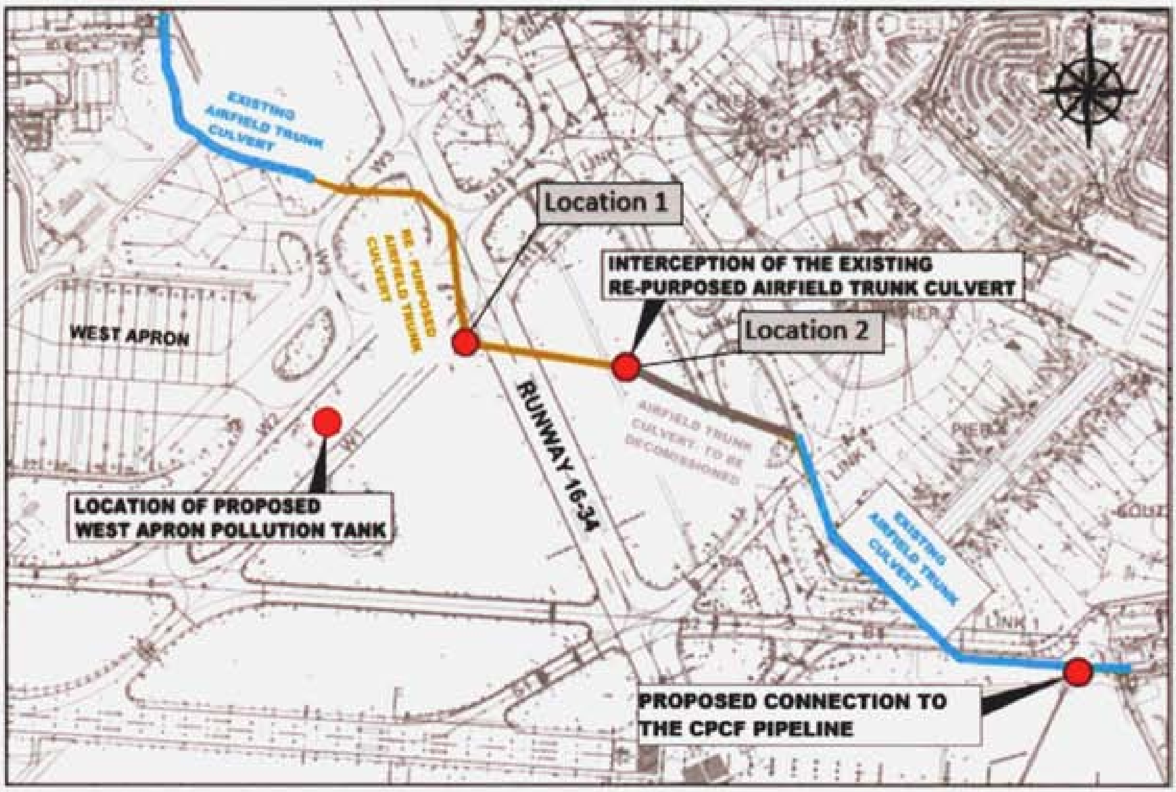


Figure 3.5: Interception Locations Considered

A third point downstream of Location 2 was also considered but ruled out. The ATC downstream of Location 2 is located beneath the aprons and stands which serve Pier 3 and Pier 4. An interception point downstream of Location 2 was ruled out due to the impact the construction would have on the airport operations and aircraft movements. Such an approach would also be less effective from a flow segregation perspective as potentially contaminated inflows would mix with the runoff in the RATC which has already been confirmed as contaminated.

A hydraulic assessment was undertaken to compare the effectiveness of Locations 1 and 2 in terms of alleviating hydraulic capacity issues with the ATC. The two locations had a relatively significant impact on the predicted flood volumes associated with the long duration events analysed. Both Location 1 and Location 2 had a similar impact in terms of reducing the predicted flood volumes.

As Location 1 would require a longer ACP 2 pipeline and would involve additional construction in close proximity to Runway 16/34, it was determined that Location 2 was the preferred interception point.

As previously explained for CW3 and CW4, there is only one feasible corridor through the downstream network due to the extent of the exclusion zones around key airport infrastructure. Therefore, once the upstream interception and downstream discharge points were established for ACP 2, there was no need for any further consideration of alternatives.

<u>**CPCF Pipeline**</u>

The selection of a Permanent Works Planning Corridor for the CPCF Pipeline was carried out as part of the CPCF consideration of alternatives and is described in **Section 3.4.2.4**.

3.4.2.2 Contamination Detection and Response System:

Many alternative layouts were considered during the design of the CD&R system. However, the locations of network decision points were dictated by the outcomes of the consideration of alternatives carried out for the flow segregation approach and the route corridor selection:

- Flow segregation approach: the selection of intermediate DPs helped to define the zone boundaries, each of which would include at least one network decision point; and
- Route corridor selection: The locations of existing network pipelines and the routes of proposed pipelines dictated where the network decision points would be located within each zone. The existing network is to be incorporated into the proposed system so the network decision points were typically located just upstream of discharge points from the existing trunk pipelines to the ATC, or to the proposed clean / contaminated pipelines.

Once the above decisions had been made, the possible locations of DPs were narrowed down to such an extent that it was not necessary to conduct further consideration of alternatives. The proposed locations of DPs and the zones which they serve are shown in **Figure 3.5**.

3.4.2.3 West Apron

This section outlines the consideration of alternatives during the selection of locations for the West Apron Attenuation Tank (WA-AT) and the West Apron Pollution Tank (WA-PT).

The first step undertaken was to screen out unsuitable sites based on the existing physical constraints in the airfield (aircraft stands, taxiways) and the development of the Underpass for which planning has been granted but which at the time of writing is before the Board on appeal (Planning Ref: F22A/0460). Having applied these screening measures, four potential local locations were considered for the proposed clean attenuation tank as shown in **Figure 3.6.**

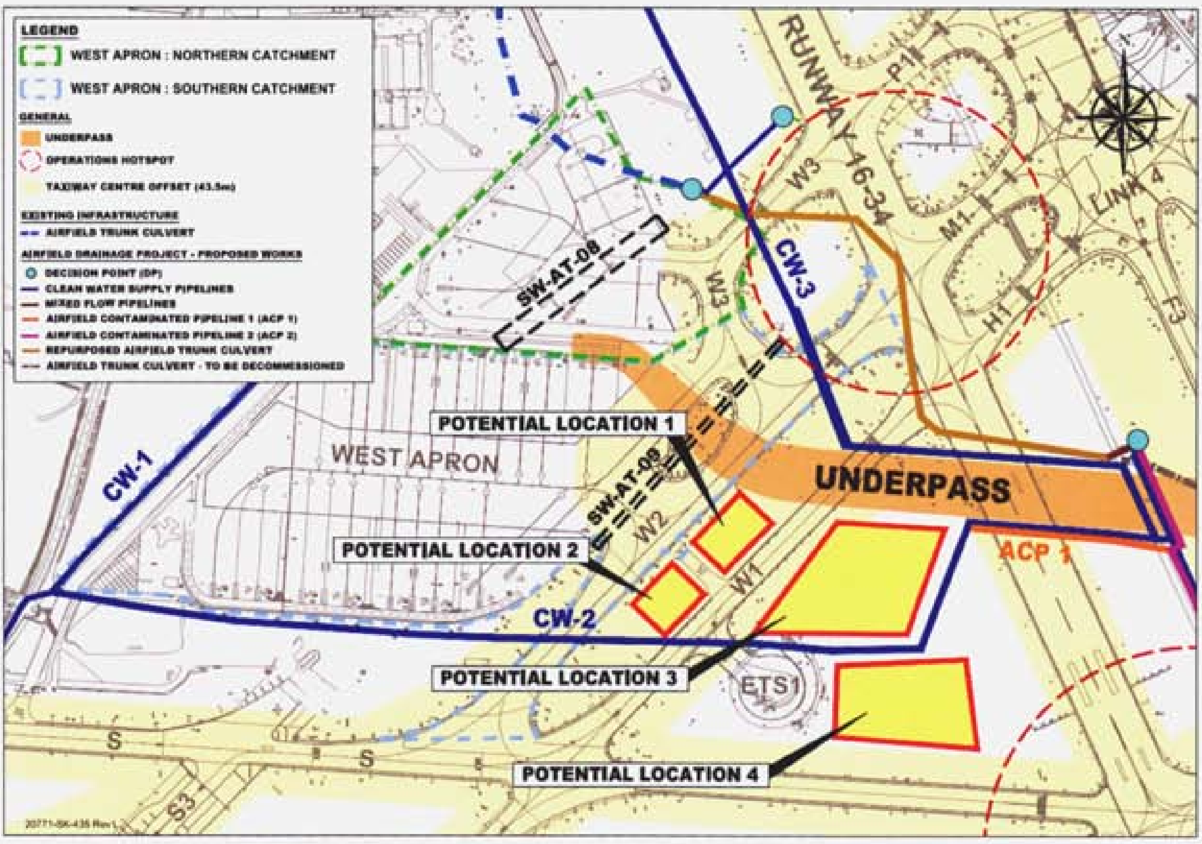


Figure 3.6: Potential locations for clean attenuation tanks

These potential locations were then subject to further assessment, based on their technical feasibility and their potential impact on airport operational activities. This assessment is summarised for WA-AT and WA-PT below.

WA-AT

The assessment for WA-AT began with an analysis of the technical feasibility of constructing a 15,000m^3 attenuation tank at each of the potential locations. These locations were initially considered as potential standalone locations for the full required storage volume. Additionally, consideration was given to using more than one of the potential locations to increase the available footprint, thereby reducing the tank depth. For the tank to empty by gravity, the maximum depth of the attenuation tank would be constrained by the elevations of the downstream discharge point to the CWSPs. Considering this constraint, there is insufficient space at Location 1 and Location 2 to construct a tank which receives clean flows from West Apron and discharges them by gravity to the CWSPs.

A combination of Location 3 and Location 4 is the only solution where it would be technically feasible to construct the required attenuation storage volume and discharge by gravity. Location 3 and Location 4 would also have the lowest impact on airport operations. All four locations require construction within the minimum offset distance from the nearby Taxiways. However, Location 3 would only impact one taxiway (Taxiway W1) and Location 4 would not require construction within the minimum offset distance of any taxiways. Location 1 and 2 would impact both Taxiway W1 and W2. A solution incorporating both Location 3 and Location 4 was identified as the preferred location for WA-AT, for the above reasons.

The Attenuation Tank is proposed to consist of multiple rows of pipelines installed in parallel. Since the CW2 pipeline traverses the proposed location for the WA-AT, it is necessary to construct the WA-AT tank in two sections. One section will be located to the north of CW2 (Location 3) and this will be referred to as WA-AT-1. The other section will be located to the south of CW2 (Location 4) and will be referred to as WA-AT-2.

WA-PT

Locations 1, 2, 3 and 4 were assessed in terms of their suitability for locating WA-PT. All four potential locations have sufficient footprint for the construction of the required 3,800m^3 storage tank and pumping equipment (it is not possible to discharge by gravity to the downstream ACPs due to elevation constraints).

For the reasons outlined above, locating the proposed WA-PT at Location 3 or Location 4 would have a lower impact on airport operations. These locations have the largest available area for construction, and they have the greatest potential for future expansion, if required to serve future airfield developments. Location 1 and Location 2 are close to existing drainage infrastructure at West Apron and construction at these locations would have a greater impact on the existing network than construction at Location 3 or Location 4.

For the above reasons, it was decided to locate both WA-AT and WA-PT at Location 3 and Location 4. WA-PT can fit within either of these locations. However, it is not possible to fit WA-AT within only one of these locations with a gravity discharge solution, due to spatial and elevation constraints. Therefore, WA-AT requires construction at both locations, regardless of where WA-PT is located.

This means that the key remaining decision is whether to site WA-PT at Location 3 or Location 4. Location 3 is situated the closest to DP5A and to the proposed point of discharge (ACP1) which means it would require shorter pipeline lengths than the other locations. It was therefore decided to locate WA-PT at Location 3. WA-AT is proposed to be constructed as a two-part attenuation solution; the first section will be located in the remaining area of Location 3 and the second section will be in Location 4.

3.4.2.4 Central Pollution Control Facility

This section describes the alternatives considered during the design of the Permanent Works Planning Corridor for the following:

- Location of the proposed CPCF storage tanks; and
- CPCF Pipeline Route.

The consideration of alternatives for the layout of the above infrastructure involved an assessment of lands currently in the ownership of daa. The process for shortlisting potential locations included a screening exercise based on the physical constraints of the site, environmental constraints, locations of existing infrastructure and the airport regulations and restrictions such as construction constraints associated with the Obstacle Limitation Surfaces (OLS).

CPCF Location:

The first constraint considered during this process is land availability in the airfield. A high-level review determined that there is insufficient land available in the airfield for a development of the CPCF.

The natural topography of the airfield falls downwards from west to east, towards Eastlands, so runoff will naturally flow to Eastland by gravity. This means that to locate the CPCF outside of Eastlands would require additional pumping infrastructure, a longer pipeline route and a greater operational energy demand.

Eastlands is bordered to the north by the Cuckoo Stream, to the south by Dardistown Cemetery and to the east by the M1 Motorway. This further constrained the potential locations for the CPCF as the areas directly surrounding Eastlands were not feasible.

For these reasons, Eastlands was identified as the most suitable area for the proposed CPCF. The size of the Eastlands area means that a further analysis was required to establish the most suitable location within Eastlands.

The next step was to review the existing design constraints which apply at Eastlands, to rule out unsuitable locations before carrying out the consideration of alternative sites. The following constraints within Eastlands were considered when selecting the CPCF location:

- Land Ownership;
- Topography;
- Airport Regulations and Restrictions;
- Cuckoo Stream;
- Existing Developments, Infrastructure and / or Utilities;
- Cultural/Ecological Interfaces;
- Uisce Éireann Wayleave.

These constraints are detailed in full in the **Engineering Design Report** and summarised visually in **Figure 3.7** which illustrates the combined set of physical constraints at this location.

Construction working height restrictions will apply at Eastlands due to the OLS associated with Runway 10/28. Working heights will vary from 25-30m along the portion of the Eastlands site nearest to the R132. Further to the east, nearer to the M1, the maximum working height would be in the range of 30-40m. These height restrictions have been considered when determining the site for the CPCF storage tank.

In addition to the existing physical constraints, there is a strip of land along the southern boundary of the safeguarded area which is the subject of a wayleave associated with the planned GDD Project (by Uisce Éireann). This wayleave area is shown in **Figure 3.7**. This figure also shows an area in the southern portion of the safeguarded area for potential long-term development that was considered in the selection of a location for the proposed storage tank(s).

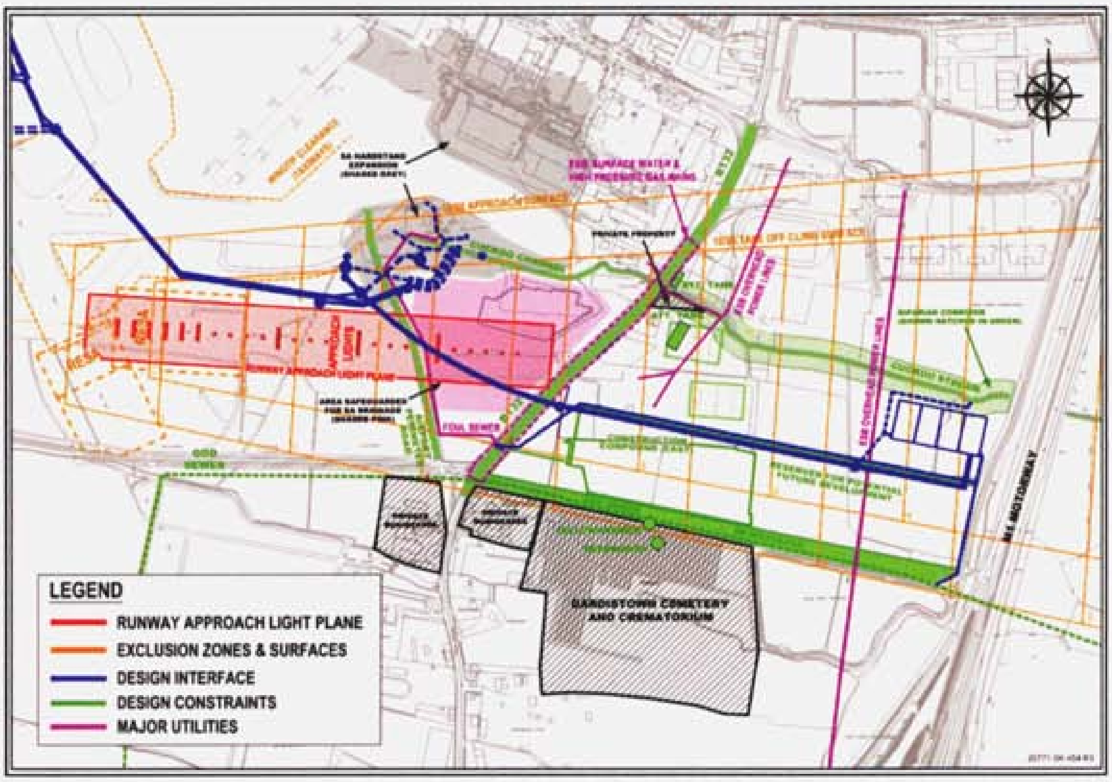


Figure 3.7: Combined Existing Constraints at Eastlands

Having established the above-detailed constraints, three potential locations were identified for the proposed storage tank(s) as shown in **Figure 3.8**.

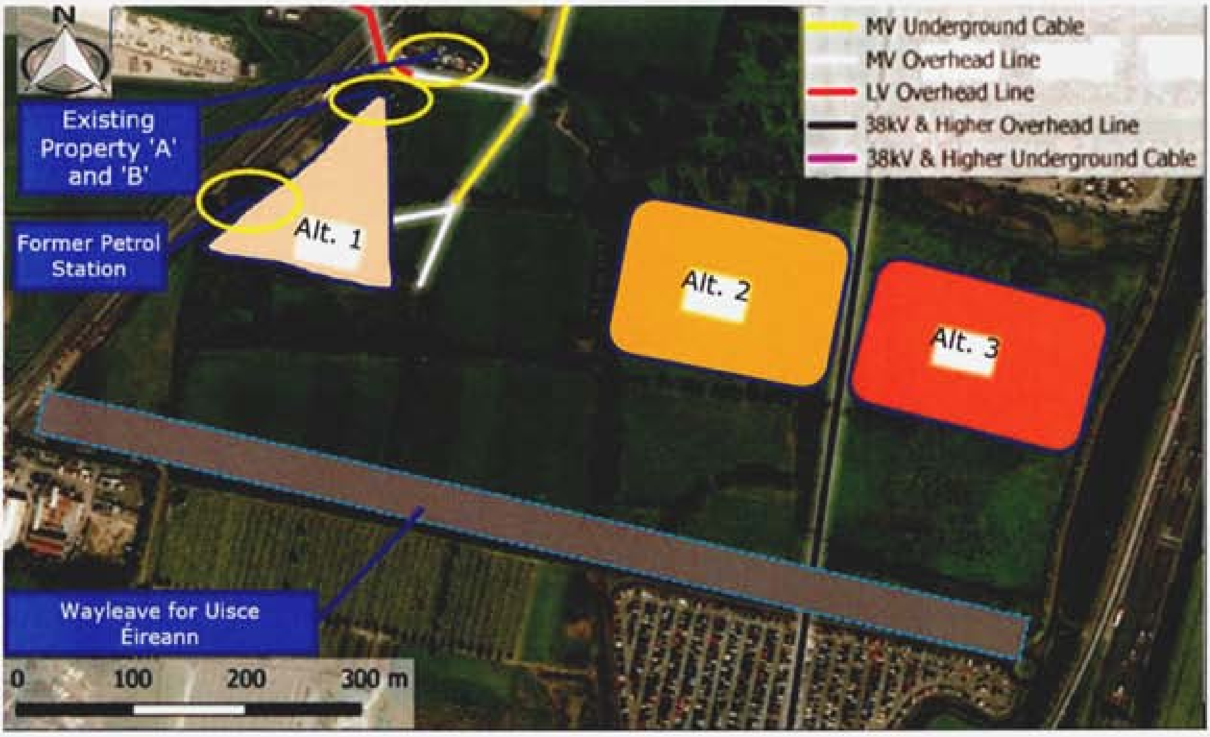


Figure 3.8: Alternative Site Locations

Alternative site location 1 is immediately to the east of the Swords Road (R132). This site was eliminated from further consideration for several reasons, including because:

- The site is more spatially constrained than the other alternatives, due to the following factors:
    - The geometry (triangular) of the site limits the available construction options available at design-build/design-build-operate (DB/DBO) stage; and
    - The CPCF Pipeline would require a significant area for the proposed pipeline construction via tunnelling methods which would further restrict the area available for construction of the CPCF tank(s); and
- The site would have more restrictive working heights than Alternatives 2 and 3 due to its relative proximity to Runway 10/28 and its position within the associated obstacle limitation surfaces.

Alternative site locations 2 and 3 have similar characteristics in terms of site area and similar constraints such as the overhead powerlines and proximity to the Cuckoo Stream. Alternative site location 3 was selected as the preferred site because it is best suited for potential future expansion to deliver the long-term drainage requirements envisaged by the DMP. The lower elevation of this location means that the pumping equipment provided as part of the CPCF could easily be upgraded to serve future expansions of the tank to the west, with minimal upgrade works. If alternative location 2 were chosen, any future expansion to the east would require additional pumping infrastructure, due to the lower elevation farther to the east, with the associated higher operational energy demand.

CPCF Pipeline

The route selection of the Permanent Works Planning Corridor for the CPCF Pipeline is dictated by the following interface points:

- The starting point of the pipeline is dictated by the need to intercept flows from the following three flow sources:
    - Airfield Contaminated Pipeline 2 (ACP 2) which will convey contaminated runoff from the upstream airfield network;
    - Downstream Airfield Trunk Culvert which will convey runoff from the apron surrounding Pier 3 and Pier 4 to DP7, from where runoff identified as contaminated will be conveyed to the proposed CPCF Pipeline; and
    - South Apron runoff which is identified as contaminated at DP8.
- The downstream end of the pipeline is dictated by the proposed discharge to the CPCF in Eastlands (east of the R132).

The next step was to establish a shortlist of alternative route corridors for the CPCF Pipeline, by assessing the key constraints which apply between the upstream interception point and the CPCF inlet. Some of the key design constraints are shown in **Figure 3.9** and further detailed in the **Engineering Design Report**.

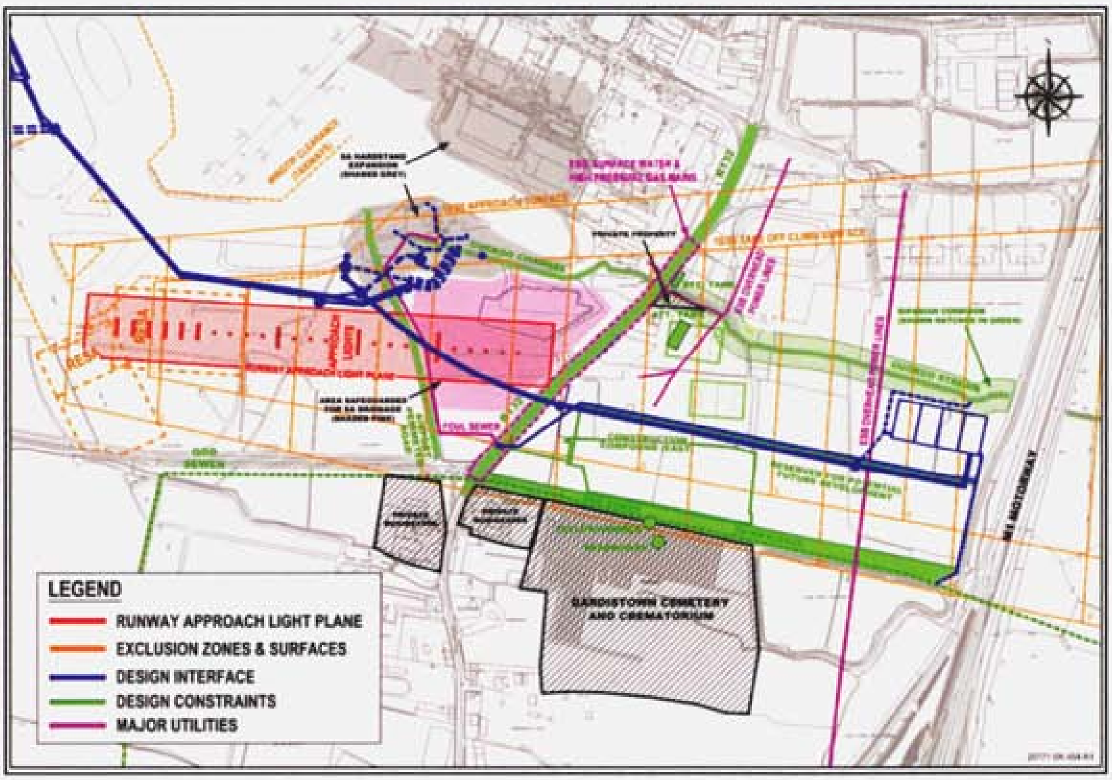


Figure 3.9: CPCF Contamination Pipeline Major Design Interfaces

The constraints study enabled the identification of an outline design corridor, depicted by the yellow hatched area on **Figure 3.10**. The next step involved the identification and assessment of individual routes within this outline design corridor. Four alternative routes for the CPCF Pipeline were identified and assessed during this step, as shown below.

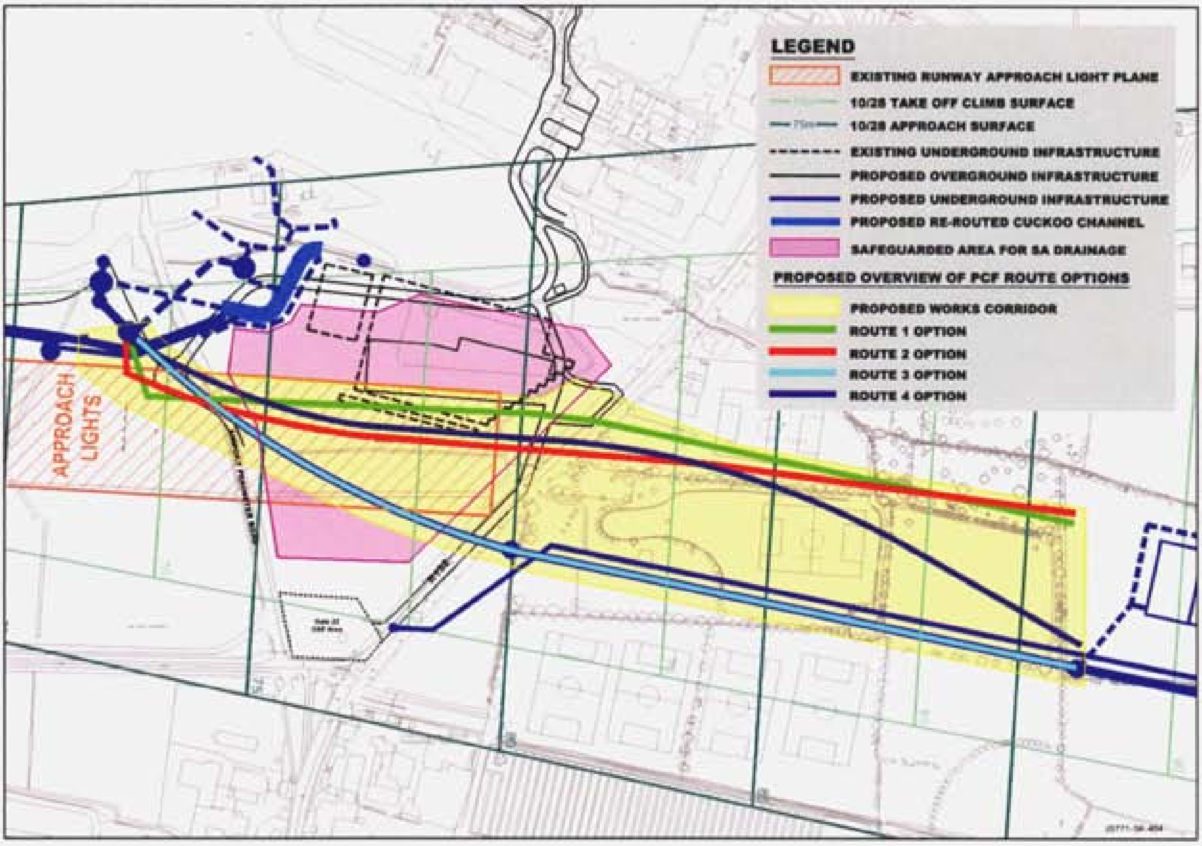


Figure 3.10: CPCF Pipeline – Alternative Routes (Indicative)

Route 1 (shown in green) was proposed to follow the northern boundary of the outline design corridor. Construction of the Route 1 pipeline would require the construction of a shaft in the Runway Approach Light Plane (RALP) for trenchless construction across the R132. This would result in onerous construction constraints and a longer construction duration. This would also necessitate a large construction compound with a high-volume of machinery and vehicular movements within the RALP which would not be the preferred solution from an airport operations perspective. The extent of construction in the RALP would also have a significant capital cost impact. This option was therefore deemed unsuitable and eliminated from further consideration.

Route 2, Route 3, and Route 4 would all involve trenchless construction through the RALP and across the R132, with the western shaft located outside of the RALP and the eastern shaft located in Eastlands. These routes are all technically feasible and each one mitigates the potential impact on airport operations. These routes therefore proceeded for more detailed analysis.

The alignment of Route 4 (shown in navy) would be more technically complex due to the relatively complex curved alignment and long drive lengths. This route would also result in significant sterilisation of land, due to the angle at which it traverses Eastlands. Route 4 would also have the highest cost impact of the three remaining routes. Route 4 was thereby identified as the least preferred of the remaining three alternative routes.

Route 2 was identified as a less favourable corridor than Route 3 for several reasons, including the following:

- It is located closer than Route 3 to the Cuckoo Stream, drainage ditches and hedgerows. These were identified in the Biodiversity study (**Chapter 9** of this EIAR) as the most important habitats on site.
- It is in closer proximity to a private property (existing property A) and would present greater disruption than Route 3.
- It would involve construction of a large shaft in a more spatially constrained location, between the proposed CWSPs and the RALP. This means that more onerous construction constraints would apply to this route compared to Route 3.

In conclusion, Route 3 has the lowest impact on nearby sensitive receptors, including environmental (Cuckoo Stream) and human (private properties) receptors. Route 3 also has a less complex alignment, which is well suited to trenchless construction through the most restricted areas in the airfield (*e.g.,* RALP). For these reasons, Route 3 was established as the preferred route for the proposed CPCF Pipeline.

Once the preferred route was established, it was possible to refine the corridor for the CPCF Pipeline. Having established the preferred CPCF location and CPCF Pipeline route, the proposed Permanent Works Planning Corridor was developed, as shown in **Figure 3.11**. This corridor also includes for ancillary works such as the interception of flows at the upstream CPCF Pipeline and the proposed discharge pipeline from the CPCF to the NFS.

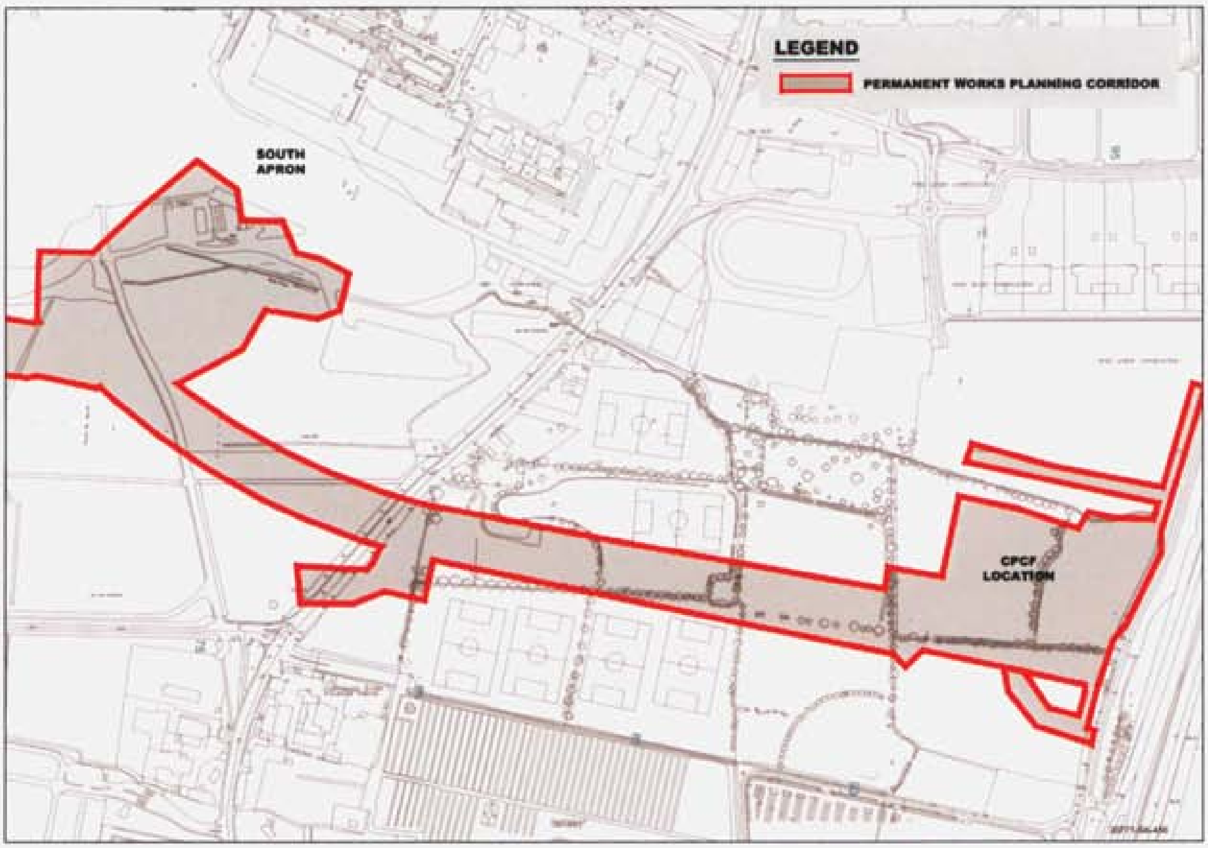


Figure 3.11: Permanent Works Planning Corridor – Airfield to Eastlands

3.5 Preferred Option

The consideration of alternatives described established a preferred design solution, which defines the infrastructure required and the intended design philosophy, as well as Permanent Works Planning Corridors for the construction of the associated infrastructure.

The preferred design solution can be summarised as follows:

- Weather-based pre-emptive and real-time surface water monitoring CD&R system for the identification and segregation of clean and contaminated runoff.
- CWSPs to convey greenfield inflows and runoff identified as clean by the CD&R system.
- Contaminated pipelines, including the ACPs and CPCF Pipeline, to convey contaminated runoff from the airfield to the proposed CPCF.
- Provision of a CPCF to capture and store contaminated runoff from the airfield, providing centralised storage for contaminated runoff from the existing developments. The CPCF will discharge contaminated runoff to the public foul sewer. The near-term discharge will involve a pumped discharge solution, whereas the long-term solution will involve a combination of pumped and gravitational flow. This discharge arrangement is further described in the Engineering Design Report provided in **Section 11** of this Planning Application.
- The WA-PT will provide local storage of contaminated runoff from West Apron. All other contaminated runoff will be stored by the CPCF.
- The proposed West Apron Attenuation Tank (WA-AT) will be constructed to locally attenuate clean runoff from West Apron.
- An airfield-wide SCADA system will be implemented to allow inspection and operational control of the proposed infrastructure and the existing infrastructure with which it shares operational interfaces, to ensure a fully integrated system across the entire airfield surface water network.

The proposed infrastructure will be constructed within the extents of the Permanent Works Planning Corridor, as shown in **Figure 3.12**.

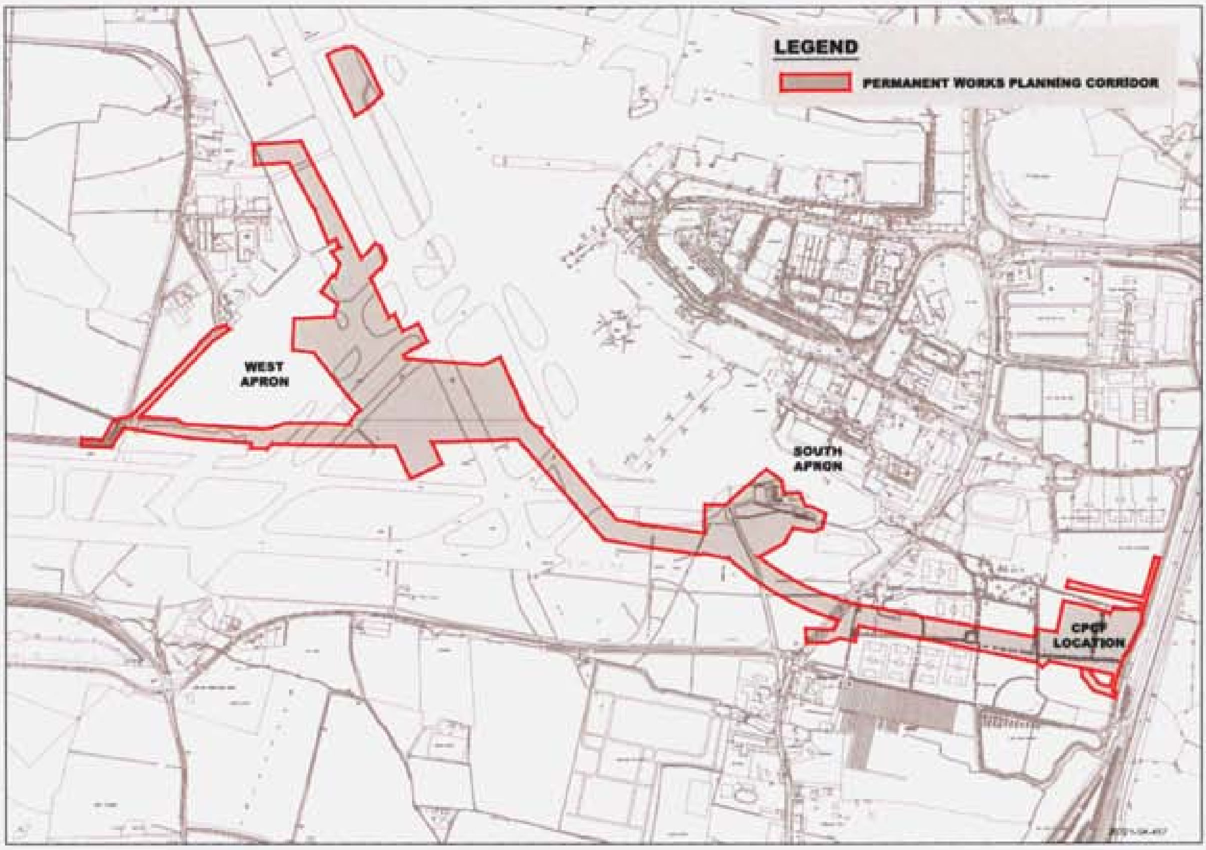


Figure 3.12 Permanent Works Planning Corridor – Full Extents

4

4

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FIGURES

4 PROJECT DESCRIPTION

4.1 Introduction

This chapter of the EIAR describes the existing site and the main components of the proposed project including details on the construction and operation of the ADP. The ADP proposes significant upgrades to the surface water management infrastructure at Dublin Airport. It comprises a series of drainage system enhancement measures and infrastructure proposals, including the upgrade of existing drainage infrastructure and the construction of additional infrastructure to improve the performance of the existing surface water management system. The proposed drainage infrastructure associated with the ADP is described in **Section 4.4**. This is followed by a description of construction methodology to be employed in implementing the project (**Section 4.5**) and traffic management (**Section 4.5.6**).

4.2 Statement of Authority

This chapter was prepared by Mark Armstrong and Martin Hickey, on behalf of Nicholas O'Dwyer Consulting Engineers Ltd. Mark is a Chartered Engineer from Engineer's Ireland and has more than ten years of experience on major civil engineering projects in the drainage sector and holds a Bachelor's Degree in Civil Engineering (National University of Galway, 2011). Martin Hickey is also a Chartered Engineer from Engineer's Ireland and has more than ten years of experience on major civil engineering projects in the drainage sector and holds a Bachelor's Degree in Civil and Environmental Engineering (University College Cork, 2012).

4.3 Characteristics of the Existing Environment

Dublin Airport is located north of Dublin city and lies within the Fingal County Council administrative area. Dublin City Centre is located approximately 10 km south of the airport, while the town of Swords is located approximately 2 km north. A high-capacity road network surrounds the airport with the M1 to the east, the M50 to the south and the N2 to the west. Primary strategic road access to Dublin Airport is from the M1 motorway. Road access to the airport is via the M1 spur route and the existing R132 roundabout, see **Figure 4.1.**

The airport includes various land uses. Aspects associated with its operation include terminal buildings, aprons, taxiways, runways, hangars, and carparks. There is also a mix of other land use classes ancillary to the dominant operational uses including offices, car parking, logistics, industrial, and hospitality and leisure. An outer perimeter essentially defines Dublin Airport and delineates the airside-landside interface, as described in Fingal County Council's Dublin Airport Central Masterplan (2016).

The ADP boundary is defined by the red line boundary as shown in **Figure 4.2.** The site, which totals *ca.* 194 ha, comprises lands within the 'airside' area of the airport campus, in the 'landside' area commonly known as 'Eastlands', and on public carriageways (R108 and R132). For reference:

- 'Airside' refers to areas in the Dublin Airport campus which are within the Critical Part of the Security Restricted Area (CPSRA) boundary.

- 'Landside' refers to areas in the Dublin Airport campus which are outside the CPSRA boundary.
- 'Eastlands' refers to the area Landside which is to the east of the R132 carriageway, which is bounded to the east by the M1 motorway, to the south by the Dardistown Cemetery and to the north by the ALSAA complex and car hire facilities.

The upper Cuckoo sub-catchment is the largest sub-catchment at Dublin Airport and includes a large proportion of the operational airfield area at Dublin Airport. There is also a large greenfield area (approx. 170 ha), which currently consists of mostly agricultural land, located in the upper reaches of the catchment. Stormwater runoff from this area is drained by the existing Airfield Trunk Culvert, which discharges these flows to the open channel section of the Cuckoo Supply Channel. Flows continue across the R132 to the Cuckoo Stream which conveys flows toward the Mayne River before ultimately discharging to Dublin Bay at the Baldoyle Special Area of Conservation (SAC) / Special Protection Area (SPA).

Refer to **Figure 4.3** for details of the Cuckoo sub-catchment and areas which contribute flows to the Airfield Trunk Culvert and the greenfield area as described above.

Figure 4.1: Location of Dublin Airport

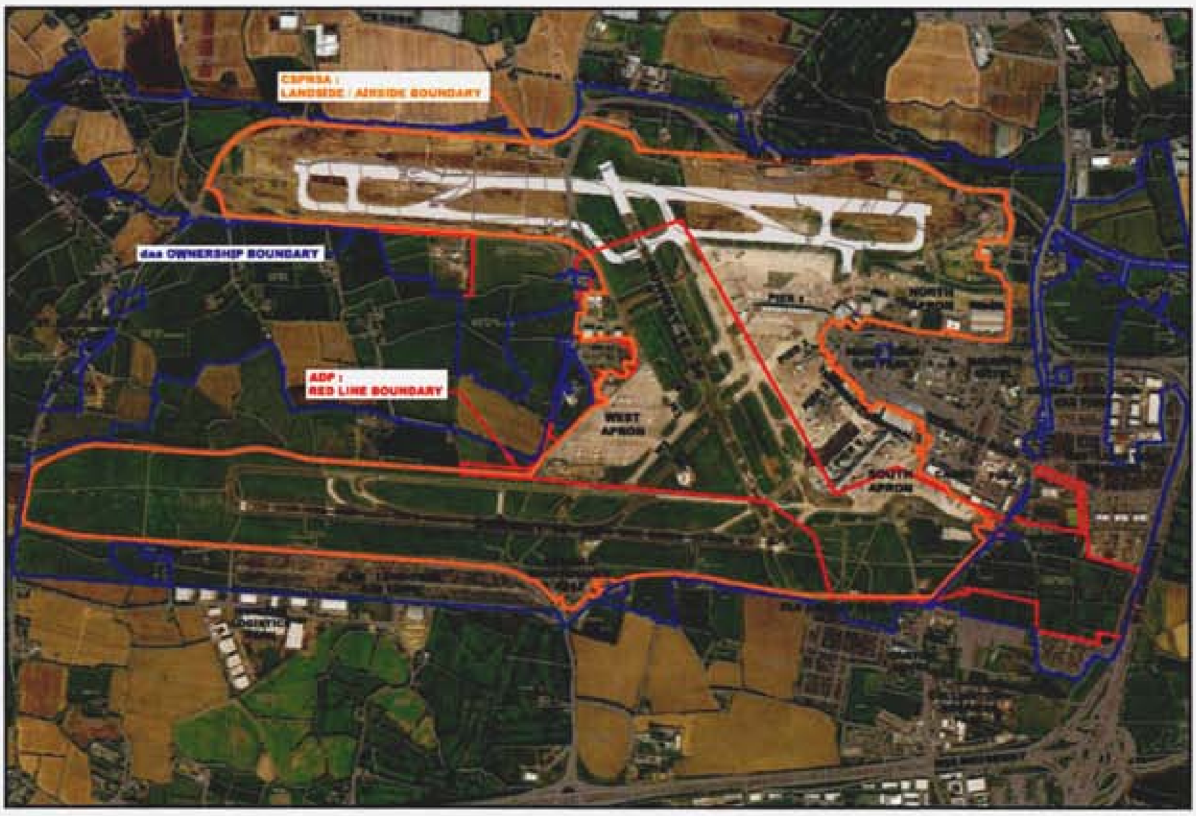

Figure 4.2 Project boundary

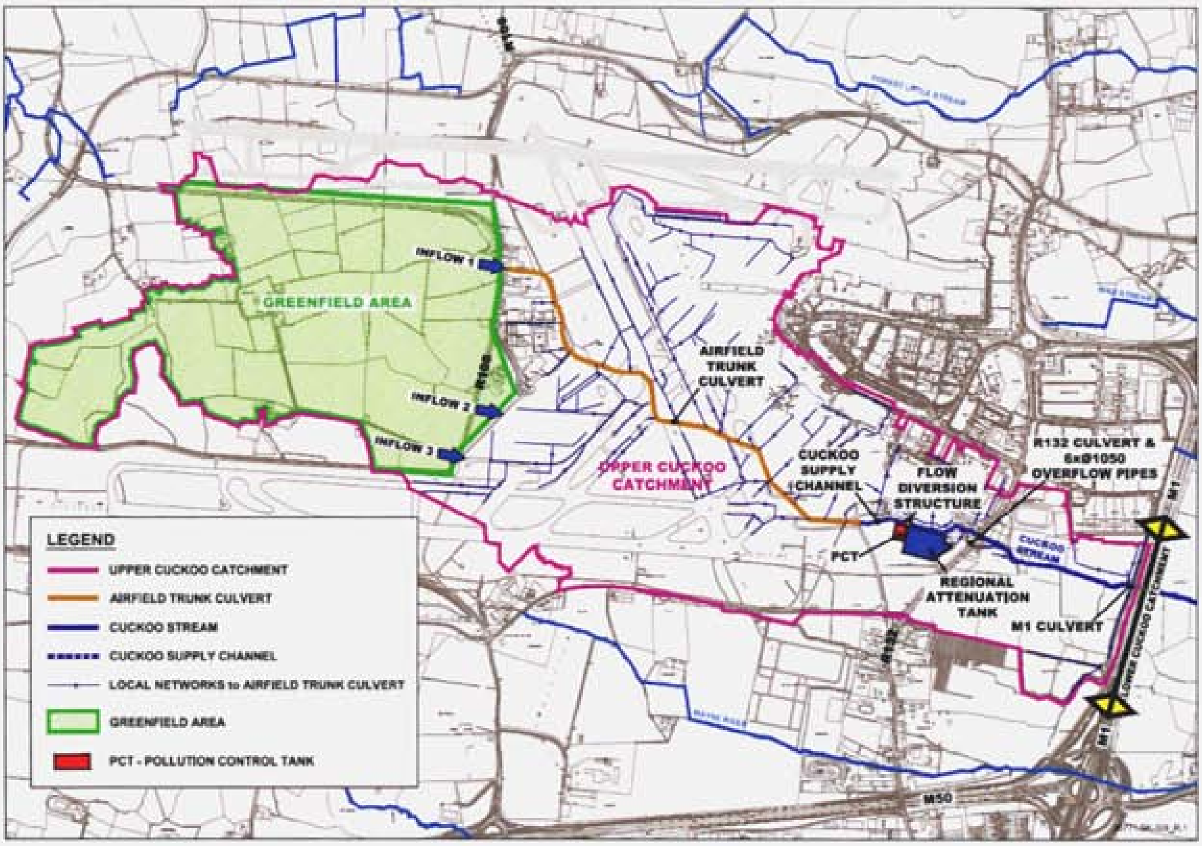

Figure 4.3: Upper Cuckoo catchment and indicative surface water network

4.4 Proposed Project

As mentioned in **Chapter 1**, the purpose of the ADP is described as follows:

- To provide a nett improvement in the degree of protection afforded to the receiving waters by the surface water management system, in accordance with the planning and environmental requirements of the relevant EU Directives, national and local plans and legislation, as well as daa's Sustainability Strategy.
- To optimise the performance of the surface water management system at Dublin Airport for improved efficiency, greater operational flexibility and resilience to a broad range of extreme weather events.
- To increase the hydraulic capacity of the surface water network and alleviate historic capacity issues.

It is proposed to achieve this through a series of drainage system enhancement measures and infrastructure proposals. The implementation of a new Contamination Detection and Response (CD&R) System and the provision of additional pollution control facilities are designed to provide robust protection to receiving waters. The network enhancements also intend to intercept greenfield inflows at points upstream of the airport campus and convey them directly to the receiving waters. These proposals will operate as part of an integrated airfield-wide surface water management system designed to protect water quality in the receiving waters. These proposals will operate as part of an integrated airfield-wide surface water management system designed to achieve the core objectives detailed above.

It is also proposed to provide hydraulic upgrades to the existing network. This will provide the network connectivity needed to facilitate the proposed flow segregation system, increase the hydraulic capacity of the network and alleviate historic capacity issues. Some local upgrades and reconfigurations of existing drainage networks at West Apron and South Apron Hub will be necessary to integrate these networks into the airfield-wide surface water management system.

The proposed ADP includes an airfield-wide SCADA system which will provide operational control for all existing and proposed drainage infrastructure.

The proposed layout of ADP drainage infrastructure is shown in **Figure 4.4.** The following sub-sections describe each element of drainage infrastructure proposed as part of the ADP.

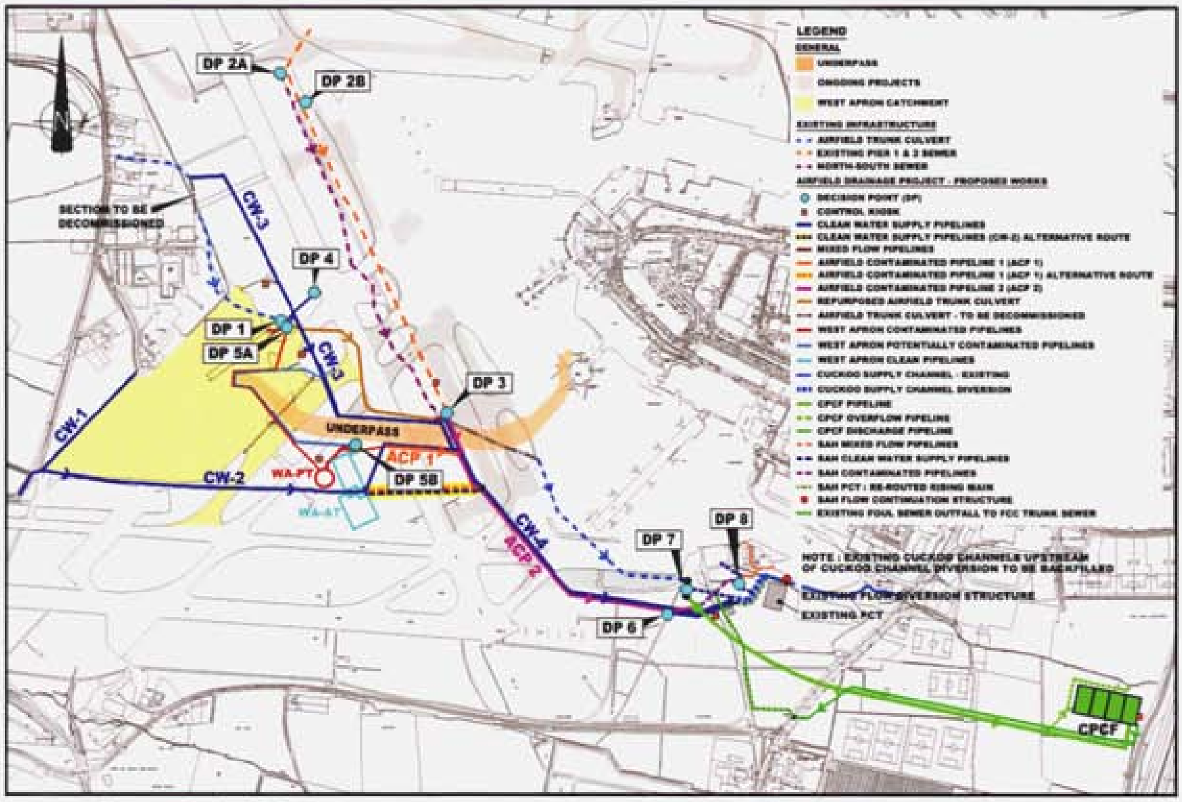

Figure 4.4: ADP layout

4.4.1 Contamination Detection and Response System

The primary purpose of the proposed contamination detection and response (CD&R) system is to enhance the operation of the surface water management system, thereby improving protection of the receiving waters. Surface water runoff from airfield hardstand areas can become contaminated by airport operational activities (*e.g.*, aircraft and pavement de-icing operations). This can result in contaminants being mobilised from airfield hardstand to the surface water network following rainfall.

The fundamental principle behind the proposed CD&R system is that the airfield surface water network would be segregated into distinct zones, each of which would be served by at least one decision point. A decision point is a chamber which can convey incoming flows to either a clean or contaminated outlet pipeline, depending on whether the incoming flow is clean or contaminated. The system will identify whether runoff from a given "zone" (see **Figure 4.5** for "zone" boundaries) is clean or contaminated and to segregate the runoff into clean or contaminated pipelines accordingly at each decision point. This would mean that, if a contamination event happens in a given zone, flows from that zone can be diverted to a designated contaminated pipeline so that they do not mix with, or contaminate, clean flows from other zones. The result will be a comprehensive flow segregation system which applies across existing and proposed developments.

Reducing the mixing of clean and contaminated flows will in turn increase the availability of storage volume in pollution control facilities and improve the protection of receiving waters against potential contamination events. Additionally, improved flow segregation helps to increase the volume of clean surface water which can be supplied to the downstream receiving waters.

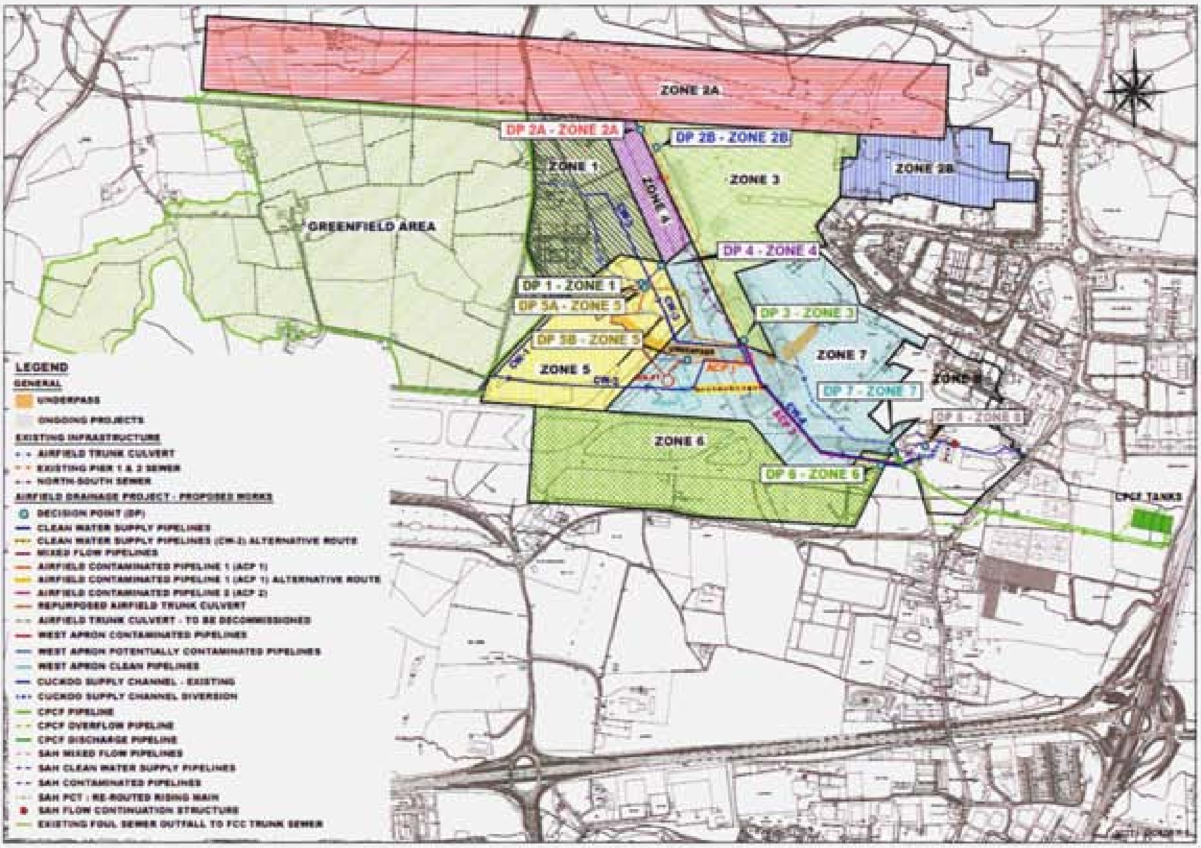

Figure 4.5: Proposed locations of network decision points

The CD&R System includes a combination of pre-emptive monitoring devices, to detect imminent contamination events, and real-time monitoring devices which verify the current contamination status of surface water runoff. These monitoring devices will be installed upstream of network decision points. This will include analysers to detect the presence of contaminants in the runoff, temperature gauges (temperature triggers de-icing activities), and rainfall gauges (to analyse the depth of rainfall, which mobilises contaminants to the network). The diversion of flows is achieved by the response system, which consists of network decision point chambers with clean flow and contaminated flow outlets. These flow outlets are controlled by valves that open and close according to whether the runoff is identified as clean or contaminated. Clean flows are diverted to the designated clean pipes and are conveyed to the Cuckoo Supply Channel before continuing onward to the Cuckoo Stream. Contaminated flows will be conveyed, via designated contaminated pipelines, to the CPCF to be stored before being pumped to the public foul sewer.

The CD&R system will operate under a safety-first approach which is designed to prioritise the protection of the environment in its decision-making process. For instance, the inclusion of pre-emptive monitoring devices is designed to pre-emptively engage the contamination system response when weather conditions indicate de-icing operations are imminent (or ongoing). This pre-emptive approach means that the system is ready to capture the start of the contamination event before it occurs *i.e.*, the 'first flush' of contaminated flow. The first flush typically contains the highest concentration of contaminants and this system is specifically tailored to ensure that this highly contaminated flow is captured and not allowed to enter the receiving waters.

4.4.2 Central Pollution Control Facility

A Central Pollution Control Facility (CPCF) is proposed to collect and manage contaminated surface water runoff from the airfield. Runoff identified as contaminated by the CD&R system will be diverted to the proposed CPCF, from where it will be discharged to the public foul sewer for treatment by public wastewater infrastructure. The CPCF is designed to protect water quality in the downstream receiving waters, from contaminated runoff which can sometimes arise in the airfield. The facility will serve to increase the resilience of the overall surface water management system against contaminated runoff, including during extreme weather events (*e.g.*, de-icing and anti-icing activities).

The CPCF is designed to serve all existing operations in the Upper Cuckoo sub-catchment, where de-icing activities take place. The CPCF also includes additional safeguarded storage capacity to serve future developments at Dublin Airport.

The proposed CPCF will be located at Eastlands, to the east of the R132. It will consist of a large below ground storage tank, which will hold contaminated runoff from the airfield prior to discharge to the public sewer. Flows will be discharged from the tank *via* a combination of a pumped rising main and a gravity pipeline, at discharge rates agreed with Uisce Éireann. Initially, the flows will be discharged to the existing North Fringe Sewer. However, safeguarding measures have been allowed for to allow for flows to be sent to the proposed Orbital Sewer associated with the Greater Dublin Drainage project in the future (note the system is designed to work in a similar fashion for both scenarios). The CPCF will also include pumping equipment to facilitate the required pumped discharge.

- Local operational controls for the CPCF and associated pumping equipment, will be provided at a proposed control kiosk to the east of the CPCF. It is proposed to house all instrumentation and controls associated with the CPCF in this Control Kiosk. All instrumentation and controls associated with the CPCF will be integrated with the site-wide central SCADA system.

In addition to the pollution storage tanks and pumping infrastructure, the CPCF will also include the following ancillary developments:

- Interconnecting pipework and flow control mechanisms;
- CPCF control kiosk and associated equipment and instrumentation;
- Ancillary monitoring equipment and instrumentation;
- Emergency overflow pipelines;
- Passive odour control / ventilation facilities (including proposed vent stacks);
- Operational access facilities, including an access road and car parking area;
- An electrical substation; and
- Surface reinstatement and landscaping works.

The locations of the proposed CPCF developments are shown in **Figure 4.7.**

Figure 4.6: Central Pollution Control Facility layout

4.4.2.1 Sewer Discharge Arrangements

The proposed CPCF pumping station will pump flows from the CPCF to the public foul sewer at a controlled discharge rate, in accordance with the Trade Effluent Discharge Licence granted by Uisce Éireann. The proposed physical sewer discharge infrastructure involves a phased approach, with a near-term foul sewer connection to be constructed initially, followed by a long-term foul sewer connection.

The near-term sewer discharge will involve a pumped discharge to the existing North Fringe Sewer (NFS). This will remain in place until such time as Uisce Éireann's Greater Dublin Drainage (GDD) project constructs and commissions the proposed orbital sewer. If the GDD project is not implemented, the NFS option will remain in place as the long-term solution.

If the GDD orbital foul sewer does proceed as planned, the proposed long-term sewer discharge pipelines from the CPCF will discharge to the GDD orbital foul sewer. The proposed long-term sewer discharge solution would involve a combination of both gravity and pumped discharge pipelines. The combined gravity and pumped discharge solution means that, when contaminated water builds up to a sufficient height within the CPCF storage tank, flows can discharge via gravity to the public foul sewer, thereby minimising pumping costs and energy consumption.

4.4.3 Additional Hydraulic Capacity

Additional hydraulic capacity will be provided through the construction of additional network pipelines for the separate conveyance of clean and contaminated surface water flows.

4.4.3.1 Clean Water Supply Pipelines

It is proposed to construct clean water supply pipelines to collect clean surface water flows and convey them to the downstream receiving waters. This approach is designed to address the stakeholder requirement to increase the supply of clean water to the receiving waters, which was identified during the development of the DMP. The clean water supply pipelines will serve two key functions:

- To intercept greenfield inflows from grassed areas upstream of Dublin Airport and convey them through the airfield to the Cuckoo Channel; and
- Convey surface water flows from within the airfield which are identified as clean by the CD&R System detailed above.

The proposed clean water supply pipelines comprise four trunk pipelines, labelled as CW1, CW2, CW3, and CW4 in **Figure 4.4** and **Figure 4.5.** The proposed clean water supply pipelines also include additional sections of pipeline to provide connectivity between the proposed network decision points and the trunk clean water supply pipelines. All flows within clean water supply pipelines will be discharged to the re-configured Cuckoo Supply Channel and, ultimately, across the R132 to the Cuckoo Stream.

4.4.3.2 Airfield Contaminated Pipeline

The purpose of the Airfield Contaminated Pipeline (ACP) is to receive contaminated outflows from the CD&R system and provide additional hydraulic capacity to the airfield surface water network for the conveyance of contaminated runoff to the proposed CPCF Pipeline.

There will be two Airfield Contaminated Pipelines (labelled ACP 1 and ACP 2 in **Figure 4.4** and **Figure 4.5**). The proposed Airfield Contaminated Pipeline construction will involve reconfiguration of the Airfield Trunk Culvert (ATC), as described in **Section 4.4.5**.

4.4.3.3 CPCF Pipeline

It is proposed to construct a new CPCF Pipeline to convey contaminated runoff from the airfield to the proposed CPCF, which will be located at Eastlands. The proposed CPCF Pipeline (indicatively shown in green on **Figure 4.1**) is designed to collect flows from the Airfield Contaminated Pipelines as well as existing network pipelines, and convey them to the proposed CPCF.

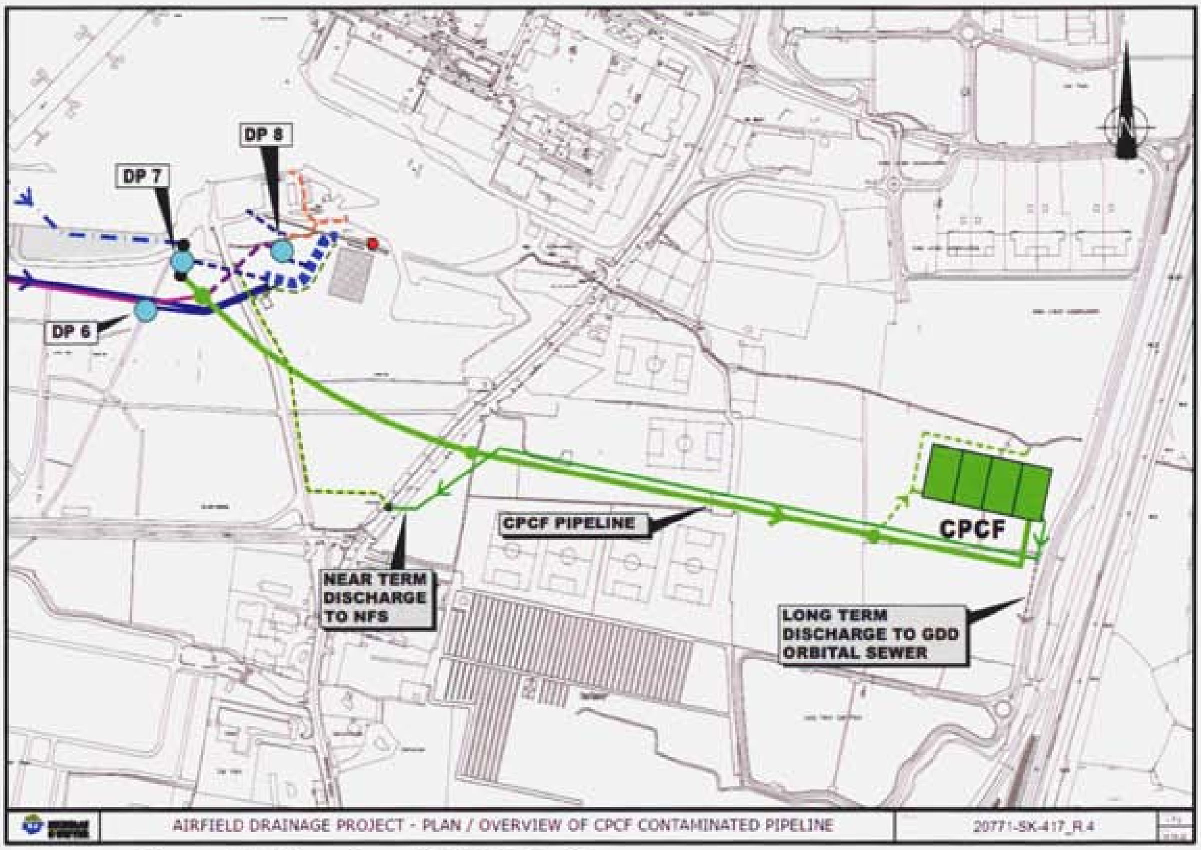

Figure 4.7: Overview of CPCF Pipeline

4.4.3.4 West Apron

It is proposed to upgrade the existing surface water network at West Apron as part of the ADP. The purpose of the West Apron network upgrades can be described as follows, to:

- Provide segregation of clean and contaminated flows from the local West Apron network, before they mix with flows from other areas in the downstream network;
- Improve pollution control measures to protect receiving waters from West Apron contaminated runoff;
- Enhance the operational control and performance of the network, in order to achieve a nett positive contribution to the overall surface water management system at Dublin Airport; and
- Alleviate existing hydraulic capacity issues. A hydraulic assessment of the existing surface water drainage system indicates existing capacity issues, with the eastern extent of West Apron, in particular, at risk of flooding. This risk will be addressed by the proposed upgrades to the collection, conveyance and attenuation infrastructure.

In order to address the project purpose, the following West Apron network upgrades are proposed:

- Installation of local CD&R devices, to identify whether runoff from West Apron is clean or contaminated, and network decision points to divert these flows to designated clean or contaminated pipelines according to their status;
- Construction of the proposed local West Apron Pollution Tank (WA-PT), comprising an underground storage tank (volume = 3,800m³), for the capture and storage of contaminated runoff, and a pumping station. The pumping station will discharge contaminated outflows to the proposed ACP1. The WA-PT will also include ancillary

pipelines and MEICA equipment, as well as communication links to the airfield-wide SCADA system, for the purpose of operational control;

- Construction of local network upgrades, including slot drains and pipelines, to provide additional hydraulic capacity in the West Apron and to facilitate the proposed segregation of flows; and
- Upgrade of the local West Apron clean attenuation system to attenuate all of West Apron locally to Q100 greenfield runoff rates for the peak design rainfall event. This includes the construction of new West Apron Attenuation Tank (WA-AT), comprising an underground storage tank (volume = 15,000m³). The existing Regional Attenuation facility is designed to attenuate a portion of the West Apron. The introduction of this additional attenuation volume at West Apron will free up capacity in the existing regional attenuation facility, thereby enhancing the level of attenuation provided across the airfield as a whole.

The layout of the proposed West Apron network upgrades is shown on **Figure 4.8**.

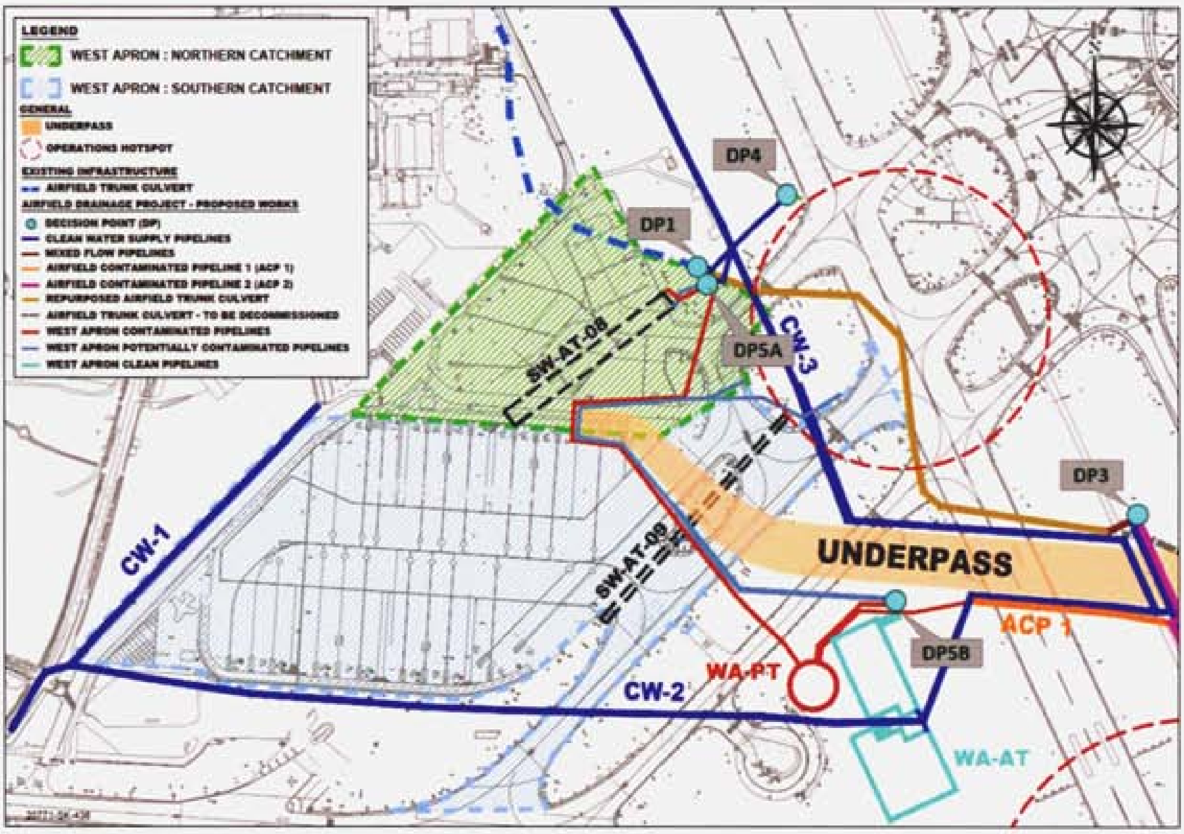

Figure 4.8. West Apron surface water network upgrades

4.4.3.5 *Downstream Network Reconfiguration*

As part of the ADP, it is proposed to carry out some reconfiguration of the existing downstream surface water network, in the vicinity of South Apron, Pier 3 and Pier 4. These reconfigurations are required for the following reasons:

- To provide segregation of clean and contaminated flows from these areas, before they mix with flows from other zones.
- To provide hydraulic upgrades to alleviate existing capacity in the downstream network.

As shown in **Figure 4.9**, the proposed works in the area include:

- reconfiguration of the South Apron (SA) network pipelines;
- construction of a network decision point (DP8), to provide segregation of clean and contaminated runoff from South Apron;
- localised diversion of the existing Cuckoo Supply Channel;
- decommissioning of existing sections of the channel; and
- upgrade of the existing Flow Diversion Structure, including the addition of a proposed flow continuation weir, to alleviate existing capacity issues.

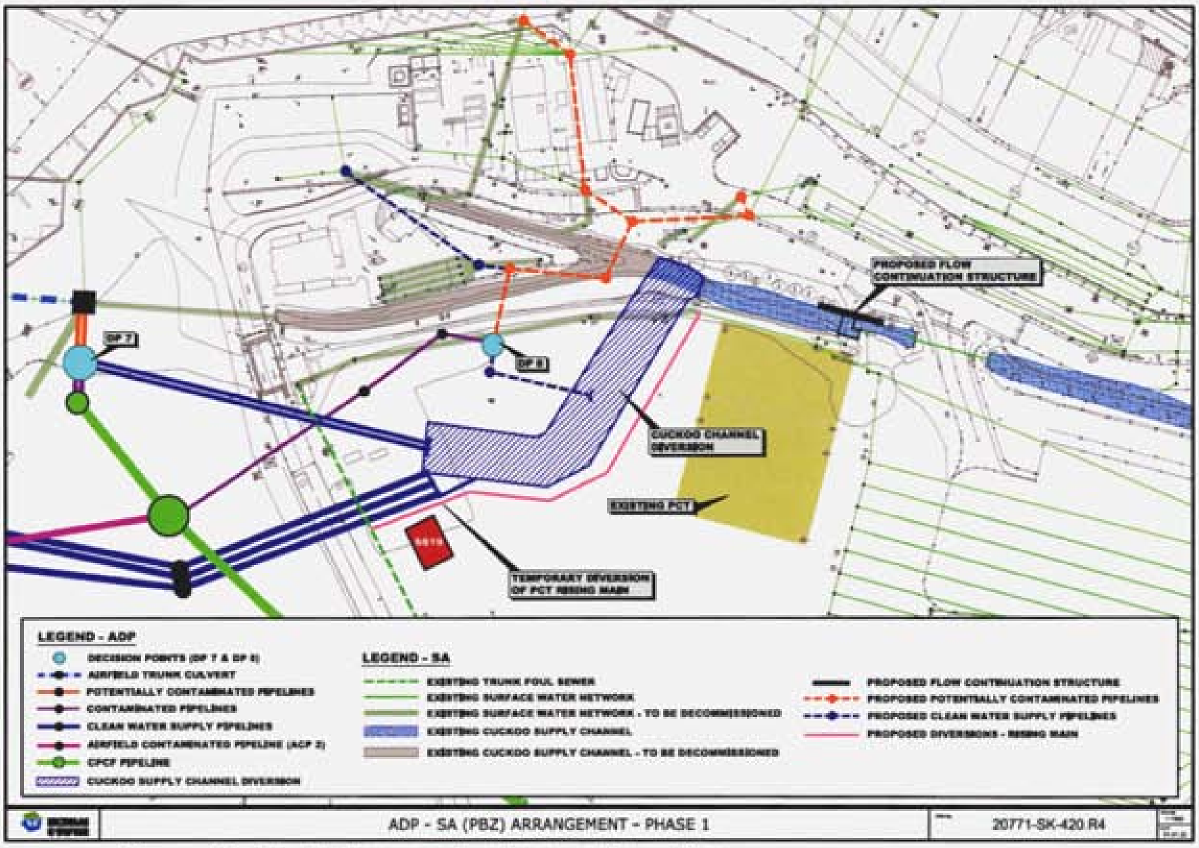

Figure 4.9: South Apron network reconfiguration

4.4.4 Airfield-wide SCADA System

It is proposed to install an airfield-wide SCADA system to enable communication between each of the following elements of the surface water drainage network, in order to achieve an integrated airfield-wide system for surface water runoff management at Dublin Airport:

- The proposed CD&R System;
- The proposed CPCF, including associated pumping equipment and pipelines;
- The proposed West Apron Pollution Tank (WA-PT); and
- Ancillary MEICA equipment throughout the surface water network.

The airfield-wide SCADA system will provide sufficient operational flexibility to enable the system to respond to the real-time weather and flow conditions experienced at Dublin Airport. This means that the performance of the above-listed infrastructure can be optimised as required to protect the receiving waters from potential contamination.

The proposed SCADA system will be controlled by Programmable Logic Controllers (PLCs). These PLCs will feed data to control panels which are to be housed in control kiosks for inspection, and intervention as required, by operations personnel.

In addition to the proposed ADP developments, the airfield-wide SCADA system will also provide operational control of existing drainage infrastructure and future planned developments which have drainage network interfaces with the ADP network.

The Engineering Design Report (**Appendix 11** of the Planning Pack) provides further details of the existing and future planned developments to be integrated to the airfield-wide SCADA system. The central SCADA PLC will be capable of making adjustments to the operation of local and / or central infrastructure as required to optimise the performance of the overall system (refer to **Section 11A** Operational Control Philosophy of the Planning Documentation).

It is proposed to provide back-up power arrangements contingencies in order to ensure the continuous effective operation of the SCADA system and the surface water network during emergency events. Further details of power supply arrangements are provided in the Engineering Design Report (refer to **Section 11** of the Planning Documentation).

It is also proposed to provide server redundancy and contingency communication arrangements to enable effective communication of critical data during an emergency event / system failure.

The proposed locations of SCADA control kiosks and associated electrical power supplies are shown in **Figure 4-10.**

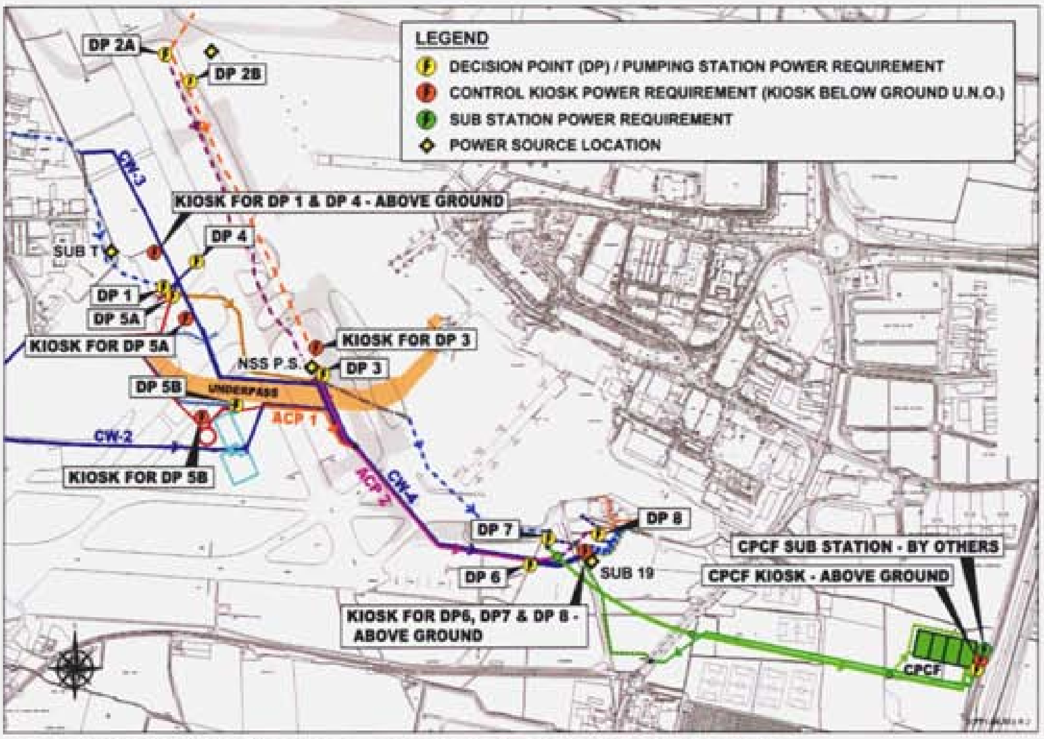

Figure 4-10: ADP facilities requiring electrical power supplies

4.4.5 Re-Purposed ATC and NS Sewer

Part of the existing Airfield Trunk Culvert (ATC) will be reconfigured as part of the proposed flow segregation approach. The existing ATC currently serves as the main trunk pipeline for all surface water generated within the airfield at Dublin Airport, and it also conveys the greenfield inflows from areas outside of the airfield in the upper Cuckoo Stream catchment. This currently leads to the mixing of clean and contaminated runoff from different zones.

Under the proposed arrangement, greenfield inflows from outside the airfield and clean flows from the airfield will be diverted away from this pipeline, via the proposed network decision points and Clean Water Supply Pipelines. This will result in the central section of the ATC being re-purposed as a contaminated surface water pipeline. The section of the ATC between DP1 and the proposed connection point with ACP2 (shown in **Figure 4 11**) will become known as the Re-purposed Airfield Trunk Culvert (RATC) as it will only convey contaminated flows. The RATC will convey these contaminated flows to ACP2, which in turn flows to the proposed CPCF Pipeline and, ultimately, to the proposed CPCF.

The section of the existing ATC upstream of DP1 will be unchanged. The section of the existing ATC immediately downstream of the proposed ACP connection point will be decommissioned as all flows from the RATC will be diverted to the ACP instead of continuing along the ATC. Further downstream, the existing ATC will be retained and will continue to collect potentially contaminated runoff from the hardstand surrounding Pier 3 and Pier 4 (Zone 7). This is referred to throughout the Planning Documentation as the downstream ATC. Flows in the downstream ATC will be conveyed to a proposed network decision point (DP7), which will convey clean flows to the Cuckoo Supply Channel and contaminated flows to the CPCF Pipeline.

The ADP also proposes to re-purpose the existing North-South (N-S) Sewer. The N-S Sewer currently receives contaminated flows from the North Runway Pollution Control Facility (PCF) and includes sufficient hydraulic capacity to receive contaminated flows from the planned development of Apron 5H. However, the ADP proposes to make an adjustment to the operation of the network such that flows from Zones 2A and 2B can discharge to either the re-purposed N-S sewer or the existing Pier 1 sewer. The system would monitor the average concentration of contaminated surface water in the North Runway PCF and North Apron PCF via TOC (total organic carbon) analysers. The changes will enable flows from the North Runway and North Apron PCFs to be directed to either the re-purposed N-S Sewer for discharge to the Cuckoo Stream, or to the Pier 1 sewer for discharge to public sewer via the CPCF depending on the measured concentration at the PCF's and the diversion concentration limits set out in the Drainage Management Plan. This change of function is designed to integrate the North Runway and Apron 5H systems into the proposed airfield-wide CD&R system, ensuring a consistent overall approach to flow segregation.

4.4.6 Safeguarding for Future Developments

The proposed ADP developments include safeguarding measures to facilitate planned and potential future developments. These safeguarding measures include the provision of additional hydraulic capacity in the network and the CPCF, as well as the futureproofing of infrastructure for future expansion. This holistic, coordinated approach is designed to support the efficiency and sustainability of future developments at Dublin Airport. The inclusion of these safeguarding measures will reduce the need for future repeat construction at a given location, with the result that the combined impact of current and future developments on airport operations is reduced. This means there would be less operational disruption and fewer temporary closures of airport infrastructure (*e.g.*, taxiways and runways) during future developments, as well as an increased efficiency of construction works and reduced cumulative environmental impact.

4.5 Construction

A Construction and Environmental Management Plan (CEMP) is contained in **Appendix 12**. The CEMP sets out the key environmental management measures associated with the construction, and operation of the proposed project, to ensure that during these phases of the project, the environment is protected, and any potential impacts are minimised. The final CEMP will be developed further at the construction stage, on the appointment of the main contractor to the project to address the requirements of any relevant planning conditions, including any additional mitigation measures that are conditioned.

4.5.1 Construction Methodology

This section provides a high-level overview of the construction methodology to be utilised to deliver the elements described in **Section 4.4.**

Construction Methodology for Pipelines:

The envisaged construction methods for the pipelines on the ADP include:

- Open cut methodologies; and
- Tunnelling methodologies.

Generally, through open grassed areas in the airport it would be envisaged that the open cut methodologies would be employed by the appointed contractor. Pipeline construction in West Apron would also be envisaged to be constructed using open cut methods either in conjunction with an open cut construction methodology for the proposed Underpass or independent of the Underpass.

Tunnelling methodologies would be envisaged in the construction of pipeline crossing of taxiways, runways and the R132 crossing with the CPCF Contaminated Pipeline.

Construction Methodology Pollution Tanks (CPCF & WA-PT):

It is anticipated that the pollution tanks will be constructed as poured in-situ reinforced concrete structures or pre-cast segments. The tanks are designed to be a fully below ground structures with the areas above the tank being backfilled with soil and re-planted post construction, it is proposed that the same grass species which are currently in place are re-planted.

To facilitate the construction bulk excavations will be required. Material will be re-used where possible, however, material will need to be stockpiled and removed from the site to licenced facilities for disposal. Excess material will be treated as a by-product as much as possible under Regulation 15 (By-products) (Previously Article 27 of the European Communities (Waste Directive) Regulations 2011) of S.I. No. 323/2020 - European Union (Waste Directive) Regulations 2020. Temporary works to facilitate the safe construction for the excavation will also be required, these temporary works may include battered back excavations, sheet piles or caisson (or a combination of the three).

The proposed CPCF site overlaps with an area of potential flooding from the Cuckoo Stream to the north. In order to protect the excavation for the CPCF from ingress of water, a temporary berm will be constructed along the southern bank of the Cuckoo Stream in this area using excavated material from the CPCF.

Ancillary elements associated with the pollution tanks would include:

- Below ground pumping stations: constructed using cast in-situ RC techniques or alternatively the use of package pumping stations would be considered at detailed design stage;
- Substation: a substation is proposed as part of the CPCF facility. This would be a traditional blockwork facility with a rendered painted finish;
- Access Roads / Parking: Access roads will be required which would be constructed as tarmacadam or concrete roads. Drainage and attenuation will be provided to positively drain the surface via piped networks or filter drains. Landscaping will also take place which would include kerbing, re-seeding and planting of trees; and
- CPCF Overflow Headwall: The headwall will be constructed using a pre-cast unit to minimise impact on the existing Cuckoo Stream in the area.

Construction Methodology for West Apron Attenuation Tank:

The proposed West Apron Attenuation Tank (WA-AT), is a below ground structure storage system. The proposed storage would be provided in a series of large diameter pipes laid in series. A bulk excavation would be required to facilitate the construction. Temporary works would likely consist of battered back excavations or a sheet pile system. The excavated material will be re-used where possible or removed offsite to a licenced facility in accordance with European Union (Waste Directive) Regulations 2020.

Construction Methodology for Decision Point Chambers and Kiosks:

The decision point chambers are to be constructed as reinforced concrete below ground structures at various locations within the airport complex. The envisaged construction method for the decision point chambers is an open dig method with stepped / battered sides.

Associated with the decision point chambers are monitoring kiosks. Dependent on their location within the airfield, for operational reasons, some are proposed as below ground structures these will be reinforced concrete structures either cast in situ or pre-cast chambers. Where they are permitted, above ground kiosks are proposed, these would be made out of pre-fabricated Glass Reinforced Plastic (GRP) which would be installed on concrete plinths at ground level. The below ground structures would be constructed using an open dig method with stepped / battered sides.

Cuckoo Supply Channel Diversion;

The proposed Cuckoo Supply Channel Diversion will be constructed through excavation and reprofiling of the soil levels in South Apron (SA). The channel would be constructed *via* open cut techniques with surplus material stored locally for use in the backfilling of the existing channels (if determined to be suitable). The backfilling of the existing channels would only take place once it is proven that all connections to the existing channels have been removed and transferred to the proposed diverted Cuckoo Supply Channel.

The reconfiguration of the pipeline network in SA (construction of new pipes, relaying of existing pipes) will require raising the existing ground levels to achieve the required cover above the pipelines. Surplus material will be used if possible.

Headwalls associated with the CW4 and DP7 connection to the Diverted Cuckoo Supply channel would be cast in-situ. Given the size of the structure it would not be feasible to install a pre-cast structure. The headwall construction would take place in the dry *i.e.*, before connection to the existing channel is completed or flows are turned upstream.

Flow Continuation Structure;

The Flow Continuation Structure to be integrated into the existing Flow Diversion Structure will consist of a Flow Continuation Weir and a Flow Continuation Channel. All the elements of the Flow Continuation Structure (Weir + Channel) will be made of reinforced concrete and will either be cast in situ or pre-cast.

4.5.2 Construction Working Hours

Construction working hours on the Dublin Airport campus would normally be between 08:00 and 19:00 Monday to Friday and 08:00 to 14:00 Saturday, with no activities taking place on Sundays or Bank Holidays. However, there are times that the proposed works would require working hours that are outside those stated above. There shall be a necessity for tunnelling operations to be undertaken on a 24-hour basis. Night working may also be required due to height restrictions in certain parts of the airport campus and when working on the R132. Other works, such as large concrete pours for the CPCF, may require out-of-hours working including extended weekend working.

4.5.3 Construction Numbers

The total number of construction operatives on-site will vary considerably throughout the duration of the ADP. Based on the outline construction programme, the estimated average number of people employed during construction is expected to be 92 site operatives, with the peak estimated at approximately 160 site operatives. In general, this estimate is based on a single pipelaying crew for each of the pipelines (*i.e.*, CW1, CW2, CW3, CW4, ACP1, ACP2, CPCF Pipeline, CPCF Outlet Line). It also assumes two concrete shuttering crews and two concrete placing gangs for the CPCF and West Apron tank construction works.

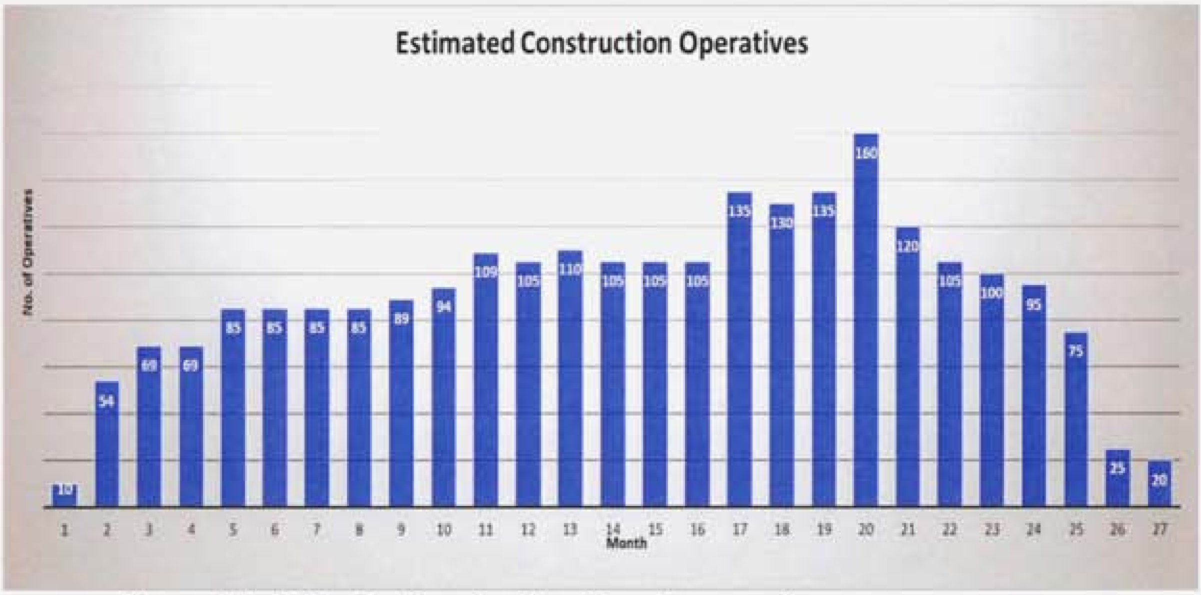

Figure 4-11: Estimated Construction Operatives on site

4.5.4 Construction programme

A construction programme has been prepared to reflect the construction works as described above. The programme has been broken down into each area of construction (*i.e.*, various pipelines, West Apron and the CPCF pollution tank). **Figure 4-12** is an indicative programme for the drainage pipelines, West Apron drainage works and the CPCF Tank.

Figure 4-12: Indicative Construction Programme in Months

		Months																										
Ref	Description	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
A	***Clean Water Supply Pipelines and Contaminated Pipelines***																											
A1	Mobilisation																											
A2	Pipeline Delivery																											
A3	CW4 Pipeline including river channel works																											
A4	DP6, DP7 & DP8 Pipework and Chambers																											
A5	MEICA Works for CW4																											
A6	CW3 Pipeline																											
A7	DP1A Pipework and Chambers																											
A8	DP4 Pipework and Chambers																											
A9	DP5A & DP5B Pipework and Chambers																											
A10	DP3 Pipework																											
A11	MEICA Works for CW3																											
A12	CW1 and CW2 Pipeline																											
A13	MEICA Works for CW2																											
A14	Contaminated Pipeline																											
A15	South Apron Network Re-configuration																											
A16	Testing and Commissioning																											
A17	Demobilisation																											
B	***CPCF Contamination Lines***																											
B1	Mobilisation																											
B2	CPCF Contamination Lines																											
B3	Testing and Commissioning																											
B4	Demobilisation																											
C	***CPCF Tank***																											
C1	Mobilisation																											
C2	CPCF Tank / PS / Substation																											
C3	MEICA Works																											
C4	Rising Main & Gravity Sewer to NFS																											
C5	Futureproofing pipework to orbital sewer																											
C6	Testing and Commissioning																											
C7	Demobilisation																											
D	***West Apron Works***																											
D1	Mobilisation																											
D2	West Apron Pipework and Tanks																											
D3	MEICA, Testing and Commissioning																											
D4	Demobilisation																											

4.5.5 Compounds

4.5.5.1 Main Compounds

Two areas have been identified as the main construction compounds, namely the West Compound and the East (Eastlands) Compound, as shown **Figure 4-13**. These compounds shall be utilised by the ADP.

Figure 4-13: Construction/Material Storage Compounds

Figure 4.14 and **Figure 4.15** show the proposed indicative layouts of the East and West compounds for the purpose of the ADP works. Each compound typically contains offices, canteen, welfare facilities, pipe storage, plant storage and storage for miscellaneous construction materials. Car parking for site operatives will be located in the vicinity of the offices / canteen / welfare facilities. Internal roads will be provided within the compound layout linked to the proposed access point.

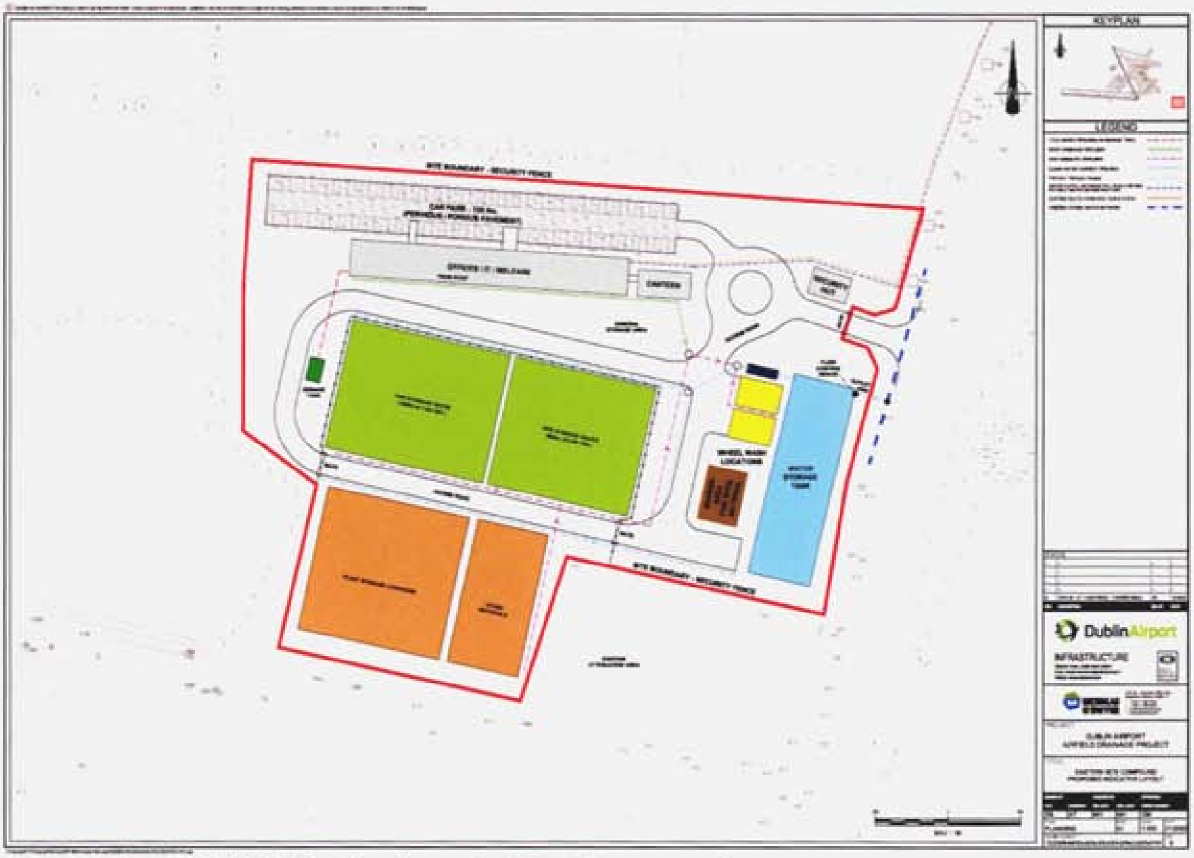

Figure 4.14: Indicative Layout of East Compound

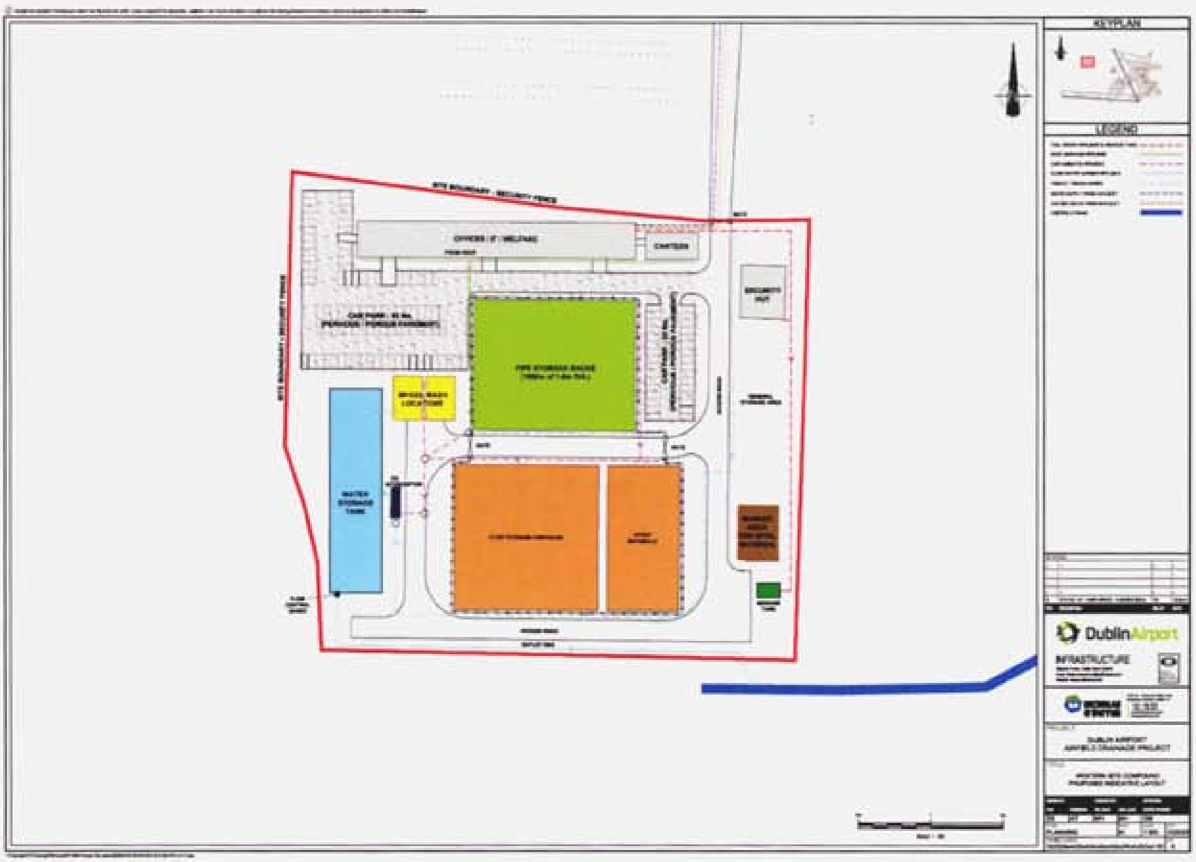

Figure 4.15: Indicative Layout of West Compound

4.5.5.2 Local Compounds

Given the linear nature of the development local compounds will be required close to the works sites. It is envisioned that local compounds will be required for:

- Tunnelling Compounds: set up at the drive and reception shafts for the potential tunnelling of pipelines in some locations. The proposed locations of these potential compounds are shown in **Figure 4-13;**
- Open Cut Areas: For open cut areas, the works area is expected to be a corridor along the proposed pipeline section. Materials shall be transported from the main construction compounds to the open cut areas for use as required. The main materials would be pipes, pipe fittings and pre-cast manholes. Within the corridor, there will be a requirement for plant and equipment associated with excavation and pipelaying;
- CPCF Storage Tank Area: The proposed CPCF storage tank is located immediately to the north of the East Compound, and it is not anticipated that there would be any additional compound associated with this works area;
- West Apron Reconfiguration: A local compound will be required close to the proposed development in West Apron. This local compound would include welfare facilities as well as set down areas for construction materials; and
    - South Apron Reconfiguration: A local compound will be required close to the proposed development in South Apron. This local compound would include welfare facilities as well as set down areas for construction materials.

4.5.5.3 Hazardous Materials

All fuels and oils to be stored in compounds shall be stored in a manner that is safe and that is in line with best industry practice and will be stored in an appropriately bunded area/within double skinned tanks.

4.5.5.4 Energy Consumption

There will be energy consumption associated with the temporary offices, canteen, welfare facilities and lighting of the storage areas. It is assumed that the energy supply will be available from existing sub-stations within the airport complex.

The estimate of monthly energy consumption is set out as follows:

Table 4.1: Monthly estimate of energy consumption

Compound Facility	Estimated Monthly Energy Consumption
Offices – lighting and heating / cooling	32,000 kWh / month
Canteen – lighting and heating / cooling	
Welfare facilities – lighting and heating / cooling	
Storage Areas – lighting (envisaged use under poor visibility conditions in mornings, evenings and poor weather conditions)	1,500 kWh / month

4.5.6 Traffic Management

A careful approach will be taken to planning the entirety of the works associated with the proposed project to ensure minimal impacts on road users and the public. A Construction Traffic Management Plan (CTMP) has been developed to assess the construction traffic impacts associated with the development of the ADP, and to provide a safe environment for road users and construction workers. The CTMP is presented in **Appendix 12A**.

The total number of construction operatives on-site will vary considerably throughout the duration of the ADP. The average number of construction operatives is estimated to be 90 site operatives, with peak estimated at 160, see **Figure 17.**

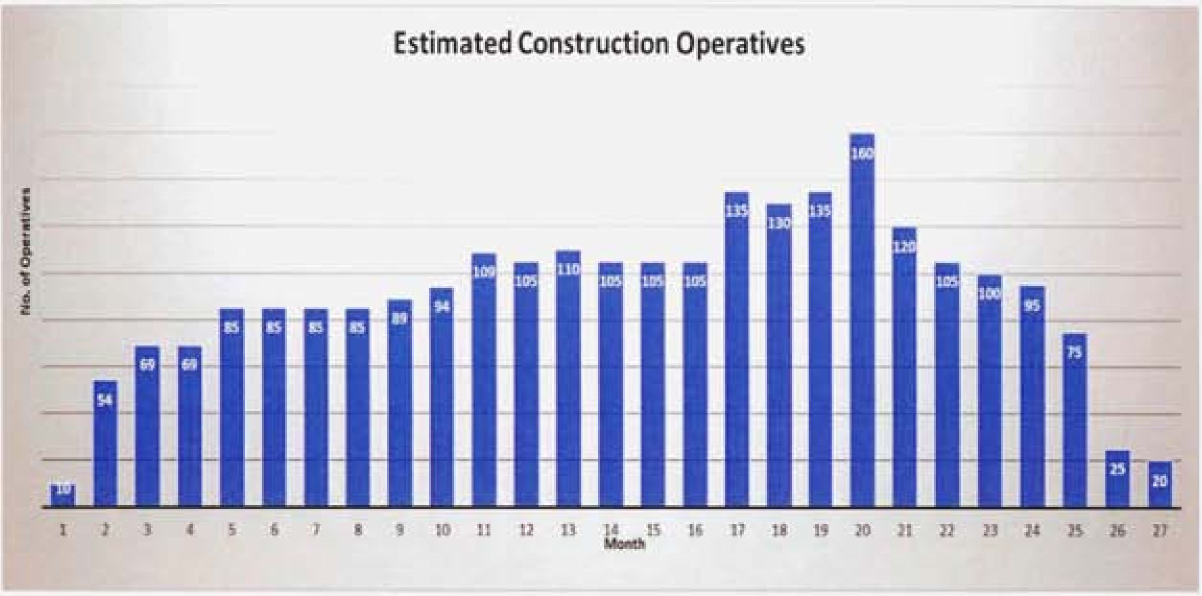

Figure 4-16: Estimated Construction Operatives on Site (Source: CEMP Figure 7-2)

Construction traffic movements to and from the two works zones will take place for various construction related activities including but not limited to:

- Disposal of surplus excavated materials from pipeline trenches, manholes, chambers, tunnel shafts, tunnelled pipelines, the West Apron tanks and the CPCF storage tank.

- Delivery of construction materials such as pipes, backfill material, concrete, steel, precast materials, mechanical equipment, *etc.*, either direct to the works zone or from the compounds.
- The estimated construction traffic volumes are variable depending on phasing of the works and the work type. **Figure 4.17** shows the monthly variation in traffic movements (one-way) over the duration of the works.

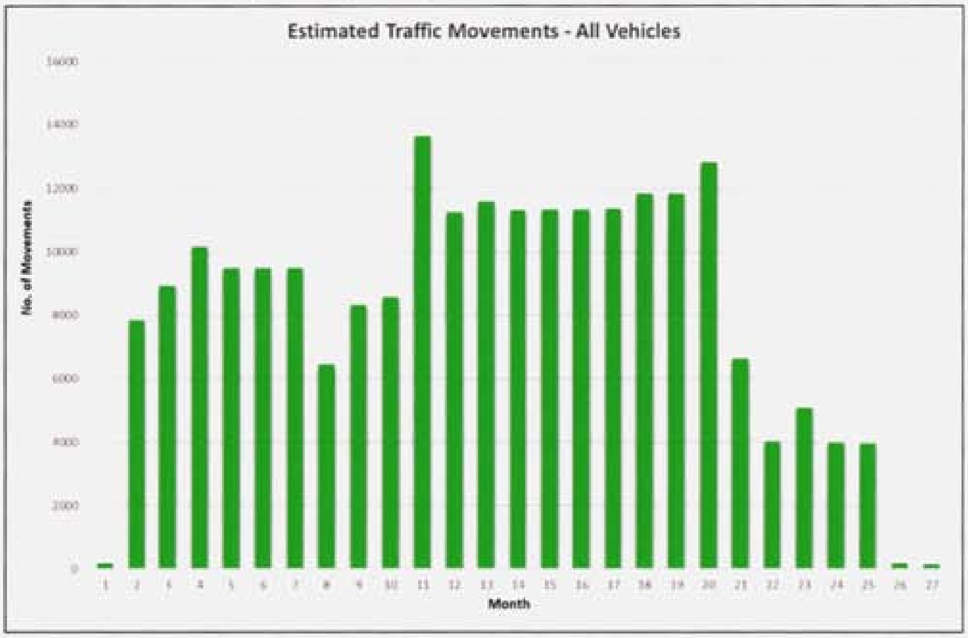

Figure 4-17: Estimated Traffic Movements (one way)

The construction works will also interface with two public roads as follows:

- R108: This regional road is a single carriageway. The construction works are located in the vicinity of site Gate 11, running northbound on the R108 towards Gate 7 for the construction of an open cut gravity pipeline;
- R132: This regional road is an urban dual carriageway. The construction works are located north of the R132/R108 signalised junction with two crossings required:
  - Outlet to NFS via rising main / gravity sewer, from lands to the east of the R132, connecting to an existing manhole in the southbound carriageway; and
  - CPCF Contaminated Pipeline constructed via tunnelling methods under the dual carriageway. This pipeline and associated construction method will not impact on road users.

4.5.7 Site Access

Access to and from the work zones is via the existing road network in the vicinity of the airport campus. The different works areas will require separate access routes as summarised below.

Western Works

For the pipelaying works to the western side of the site and works at West Apron (West Works Zone, it is proposed to access the airfield via Gate 9, off the R108.

Eastern Works – Airside

For the proposed works to the eastern side of the site (CW4, Airfield Contaminated Pipeline, works at South Apron and part of the CPCF contamination line), it is proposed to access the airfield via Gate 1B, off the R132 and Naul Road.

Eastern Works – Landside/Eastlands

For the tank and pipeline construction works in Eastlands, and access to the east compound, it is proposed to access the site via the road to the car hire facility / Y+Z access road off the R132.

4.6 Operation of the Project

The operation of the ADP drainage infrastructure, and interfacing (non-ADP) drainage infrastructure, will be controlled by the proposed airfield-wide SCADA system, to ensure that the overall surface water management system operates as a single integrated system. As described in **Section 4.4.4** of this Report, the airfield-wide SCADA system will control the operation of the CD&R, PCFs (CPCF and all local PCFs) and ancillary MEICA equipment and instrumentation.

An operational control philosophy has been prepared for the airfield-wide surface water management system, which outlines the function of drainage infrastructure and the decision-making logic which will be implemented by the airfield-wide SCADA system.

The primary purpose of this over-arching operational control philosophy is to improve the degree of protection afforded to the receiving waters. In order to achieve this, the operational control philosophy of the integrated surface water management system has been designed to achieve the following:

- Segregate clean and contaminated flows within the airfield.
- Optimise the performance of pollution control facilities (PCFs).

The system will operate under a safety-first approach which is designed to prioritise the protection of the environment in its decision-making process. The system is designed to provide pre-emptive responses to protect the environment from potential contaminants arising from routine airport operations (*e.g.*, de-icing and anti-icing). This means that the system will forecast surface water contamination, based on weather conditions (temperature triggers de-icing activities). The system will then change the configuration of the system automatically so that the contaminants do not reach the receiving waters.

A key requirement of the proposed integrated control system is to facilitate operational flexibility in the performance of each constituent element. This operational flexibility enables the system to adjust and optimise performance in response to the real-time conditions (*e.g.*, weather, flow, contamination status) experienced at Dublin Airport.

Non-default interventions may be required when operational issues arise, which require additional intervention beyond the typical response. Some such examples include failure of the pollution control automated system to operate as required for any reason, an unforeseen incident / event occurs, extreme weather conditions. Non-default intervention is required in these cases to adjust the system operation in response to the exceptional conditions experienced.

The system has been subjected to a rigorous scenario-based assessment to ensure that it can effectively respond to the broad range of possible scenarios. This scenario-based assessment considered the various flow conditions, weather conditions and / or operational scenarios which can arise at Dublin Airport. The following Operational Procedures (OPs) have been prepared to describe the operation of the system, under a range of default and non-default operational conditions:

- OP 1.1: De-icing and anti-icing operations.
- OP 1.2: De-icer chemical spillage events.
- OP 2: Fuel / oil spillage events.
- OP 3: Snow melt events.
- OP 4.1: PCF tank exceedance mitigation and emergency responses.
- OP 4.2: Sewer discharge rate adjustment to optimise system performance.

The Operational Control Philosophy also details the proposed contingency arrangements for emergency scenarios such as a power outage, equipment failure, a SCADA communication failure or a SCADA server crash. These contingency measures are included to minimise the impact of these emergency scenarios, with a priority of preventing emergency overflows to the receiving waters and preventing flooding of the airfield. Where it is not possible to prevent an overflow to the receiving waters, there are provisions in place to mitigate the impact of any such overflow.

Details of the operational control philosophy, including the above-listed OPs, are provided in **Section 11** of the Planning Documentation. The mitigation of "disasters and emergencies" is also addressed in **Chapter 6** of this EIAR.

4.6.1 Operational Access and Parking

Access will be required to several surface water infrastructure assets throughout the operation phase, in order to facilitate their operation, inspection and maintenance. Access will be required to surface water infrastructure assets within the airfield (airside) and also to those located at the Eastlands site (landside), during the operational phase. The requirement for access to surface water assets within the airfield during the operational stage, can be summarised as follows:

- Vehicular access will be required to all pollution control infrastructure, including associated pumping facilities and control kiosks, to facilitate inspection, calibration and maintenance of equipment and devices.
- Access points will be required for operations personnel to access surface water manhole inspection chambers, attenuation and pollution storage tanks, network decision points and associated monitoring devices and instrumentation, for the purpose of inspections, routine maintenance work and non-routine maintenance / repair / replacement work.

Routine access for regular maintenance will typically be carried out by a van or small truck. Non-routine access to the above-mentioned assets may also be required occasionally, in the event of a breakdown or failure of equipment. In such instances, larger vehicles (*e.g.*, large truck and trailer or a mobile crane) may be required for the removal and / or replacement of equipment.

The surface water assets within the airfield can be accessed, during the operational phase, via existing access points to the airfield. Local access to individual surface water infrastructure assets will be gained via the existing airfield road network. Details of these access points and the existing airfield road network are provided in the CEMP.

At the Eastlands site, regular access of operational personnel to the CPCF will be required for routine inspection and maintenance of the CPCF control kiosk, storage cells, pumping stations and ancillary MEICA equipment. Non-routine access for larger plant and equipment could also potentially be required, in the event that repair or replacement of large elements of plant / equipment is necessary.

The existing access road which serves the existing car hire facility, will be modified to provide access to the Eastlands site. Local access to surface water assets within the Eastlands site will be provided in the form of a new access road to be constructed as part of the ADP. It is proposed to construct parking spaces at the CPCF for operational vehicles.

The specific access arrangements which will serve each of these areas are detailed further in the ADP Engineering Design Report (refer to **Section 11** of the Planning Documentation).

5

5

CONTENTS

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FIGURES

5 POLICY CONTEXT

5.1 Introduction

This section of the Environmental Impact Assessment Report sets out the policy and guidance relevant to, and considered in the assessment of, the proposed development, and relevant legislation in the context of the ADP.

5.2 Legislation, Policy and Guidance

Table 5.1 presents a non-exhaustive list of the legislation, policy and guidance at the local, regional, and national level, along with daa corporate policies and strategies, which include strategic objectives and environmental protection policies that are relevant to the ADP. The environmental policy objectives in the legislation, policy and guidance which are most relevant to the ADP include those relating to biodiversity, water, cultural heritage and climate mitigation and adaptation.

Section 5.3 onwards sets out the key national, regional and local planning policies of relevance to the proposed development.

Table 5.1: List of Relevant Legislation, Policy and Guidance

Environmental Aspect	Legislation, Policy and Guidance
All Aspects	• UN Sustainable Development Goals • Our Sustainable Future, a Framework for Sustainable Development for Ireland (2012) • Environmental Impact Assessment Directive 2011/92/EC as amended and associated Irish legislation • EC Environmental Liability Directive (2004/35/EC) as amended • European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296/2018) • Planning and Development Act 2000 (as amended) • Planning and Development Regulations 2001 (as amended) • Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (Department of Housing, Planning & Local Government, 2018) • Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report (European Commission, 2017) • Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, 2022) • Climate Action Plan 2023 • Ireland 2040: Our Plan - National Planning Framework • Eastern and Midland Regional Spatial and Economic Strategy 2018 (RSES)

	• Metropolitan Area Strategic Plan for Dublin (MASP) (June 2019) • Fingal Development Plan 2023-2029 • Dublin Airport Local Area Plan 2020 • Greater Dublin Strategic Drainage Study • daa's Sustainability Policy
Population and Human Health	• Healthy Ireland Framework • Environmental Noise Directive (2002/49/EC) as amended • Environmental Protection Agency Act 1992 to 2011 • Noise Action Plan for Dublin Airport 2019-2023 • Institute of Environmental Management & Assessment's Guidelines for Environmental Noise Impact Assessment (2014).
Biodiversity	• International and EU Conventions • EU Biodiversity Strategy, 2011 • The Habitats Directive (92/43/EEC) as amended • The Birds Directive (2009/147/EC) • Wildlife Act 1976 - 2021 • European Communities (Birds and Natural Habitats) Regulations 2011 as amended • Other National Biodiversity related regulations • National Biodiversity Plan2 017-2021 • Fingal Biodiversity Action Plan 2018-2023 • Draft Fingal Biodiversity Action Plan 2022 - 2030 • Fingal Heritage Plan 2018-2023 • daa specific Wildlife and Habitat Management Plan (WHMP, 2022)
Land, Soils, Geology and Hydrology	• National River Basin Management Plan 2018-2021 • Third Cycle Draft River Basin Management Plan 2022-2027 • The Planning System and Flood Risk Management, Guidelines for Planning Authorities (DEHLG, OPW 2009) • Relevant Eastern Catchment Flood Risk Assessment and Management (CFRAM) Flood Reports • Eastern Regional Fisheries Board. Requirements for the Protection of Fisheries Habitat During Construction and Development Works at River Sites • Greater Dublin Drainage Strategy (DCC, 2005) • Greater Dublin Regional Code of Practice for Drainage Works: Version Draft 6.0 (Wicklow County Council, South Dublin County Council, Meath County Council, Kildare County Council, Fingal County Council, Dún Laoghaire-Rathdown County Council & Dublin City Council) • Construction Industry Research and Information Association (CIRIA) (2001). Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors, (C532) • Water Framework Directive (2000/60/EC)

	• Floods Directive (2007/60/EC) • Groundwater Directive (2006/118/EC) as amended • Transposing Regulation for the above Directives • Water Services Strategic Plan • Wildlife (Amendment) Act 2000 [County Geological sites] • The National Water Resource Management Plan • The Regional Water Resources Plan for the Eastern and Midlands Region • Dublin Airport Local Area Plan Strategic Flood Risk Assessment and Surface Water Management Plan
Noise and Vibration	• Environmental Noise Directive as amended • S.I. No. 549/2018 – European Communities (Environmental Noise) Regulations 2018 as amended by S.I. No. 663/2021 - European Communities (Environmental Noise) (Amendment) Regulations 2021 • S.I. No. 241/2006 - European Communities Noise Emission by Equipment for Use Outdoors (Amendment) Regulations 2006 • Noise Action Plan for Dublin Airport 2019-2023 • Dublin Local Authorities including Dublin City Council (DCC), Fingal County Council (FCC), South Dublin County Council (SDCC) and Dún Laoghaire Rathdown County Council (DLRCC) Dublin Agglomeration Third Environmental Noise Action Plan December 2018 – July 2023
Material Assets	• Waste Framework Directive (2008/98/EC)a s amended • Waste Management Acts 1996 (as amended) • Department of Communications, Climate Action and Environment (DCCAE), Waste Action Plan for the Circular Economy - Ireland's National Waste Policy 2020-2025 (2020) • Draft Waste Action Plan for the Circular Economy 2023 • Department of Environment and Local Government (DELG) (1998). Waste Management – Changing Our Ways, A Policy Statement • EPA's 'Best Practice Guidelines for the Preparation of Resource and Waste Management Plans for Construction & Demolition Projects' (2021) • Eastern Midlands Regional Waste Management Plan 2015 – 2021 • BS 5906:2005 Waste Management in Buildings – Code of Practice, • Sectoral Plan for Accessible Transport; Transport Access for All 2006 • Traffic and Transport Assessment Guidelines' (Transport Infrastructure Ireland (TII), 2014)

Air Quality and Climate	• Ambient Air Quality and Cleaner Air for Europe (CAFÉ) Directive (2008/50/EC)as amended • Environmental Protection Agency Act 1992 to 2011 • S.I. No. 739/2022 - Ambient Air Quality Standards Regulations 2022 • Clean Air Strategy Ireland (2023) • EU Energy and Climate (2020) Package 2009 • The Climate Action and Low Carbon Development Act 2015 as amended by the Climate Action and Low Carbon Development (Amendment) Act 2021 • Climate Change Adaptation Framework • Climate Action Plan 2023 • National Adaptation Framework 2018 • National Policy Framework for Alternative Fuels Infrastructure for Transport in Ireland 2017 - 2030 • Energy White Paper: Delivering a Sustainable Energy Future for Ireland – The Energy Policy Framework 2007-2020 • National Renewable Energy Action Plan • National Energy Efficiency Action Plan (2009-2020) (DCENR, 2009) and Ireland's Second National Energy Efficiency Action Plan to 2020 (DCENR, 2012) • Fingal Climate Action Plan 2019-2024 • Catchment-Based Flood Risk Management Plans (CFRMP) • National Energy and Climate Plan 2021-2030 • Climate Action Plan 2023 • Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment (European Commission, 2013) • Guidance on the Assessment of Dust from Demolition and Construction Version 1.1 (Institute of Air Quality Management (IAQM), 2014)
Archaeology and Cultural Heritage	• Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act, 1999 • Built and Archaeological Heritage: Climate Change Sectoral Adaptation Plan, Department of Cultural, Heritage and the Gaeltacht, September 2019 • Code of Practice for Archaeology agreed between the Minister for Arts, Heritage, Regional, Rural and Gaeltacht Affairs and Transport Infrastructure Ireland, 2017 • Council of Europe (1985). Convention for the Protection of the Architectural Heritage of Europe (ratified by Ireland 1997), 'Granada Convention' • Council of Europe (1992). European Convention on the Protection of the Archaeological Heritage (ratified by Ireland 1992), 'Valletta Convention' • Council of Europe (2005). Framework Convention on the Value of Cultural Heritage for Society, 'Faro Convention'

	• Department of Arts, Heritage, Gaeltacht and the Islands (DAHG) (1999). Framework and Principles for the Protection of the Archaeological Heritage • Heritage Act, 1995 (as amended) • National Monuments Act, 1930 to 2020
Landscape and Visual	• Guidelines for Landscape and Visual Impact Assessment, 3rd Edition (GLVIA 3). Landscape Institute (LI) and the Institute for Environmental Management and Assessment (IEMA) (2013) • Technical Guidance Note 6/19 Visual Representation of Development Proposals. Landscape Institute (2019) • Landscape Sensitivity Assessment Guidance. NatureScot (2022) • Technical Guidance Note 02/21 Assessing landscape value outside national designations. Landscape Institute (2021)

5.3 National Planning Framework

The National Planning Framework (NPF), published in February 2018, is the Government's high-level strategic plan for shaping the future growth and development of Ireland to the year 2040.

The NPF is supportive of growth and development of the Airport.

National Strategic Outcome 6: International Connectivity (pg. 145 of the NPF), recognises that "*as an island, the effectiveness of our airport and port connections to our nearest neighbours in the UK, the EU and the wider global context is vital to our survival, our competitiveness and our future prospects". In this context, the importance of the "careful land-use management of land-side areas to focus on the current and future needs of the airports*" is set out.

The NPF also sets out environmental and sustainability goals, and water quality and resource management goals to address Ireland's environmental challenges.

National Policy Objective 54 (pg. 120 of the NPF) seeks to reduce Ireland's carbon footprint by integrating climate action into the planning system in support of national targets for climate policy mitigation and adaptation objectives, as well as targets for greenhouse gas emissions reductions.

National Policy Objective 57 (pg. 124 of the NPF) seeks to enhance water quality and resource management by, among others, integrating sustainable water management solutions, such as Sustainable Urban Drainage (SUDS), nonporous surfacing and green roofs, to create safe places.

The ADP will achieve further improvement in land-use management insofar as on-site drainage is concerned, improving water quality entering the environment from Dublin Airport and thereby improving the enhanced effectiveness of the Airport's operations. The ADP design will:

- reduce the volume of contaminated run-off by increasing the segregation *via* the delivery of the Contamination Detection and Response system and interception of greenfield inflows;

- improve flow in the Cuckoo Stream. Existing flow diversion structure diverts all flows from the upper Cuckoo catchment to the existing pollution control tank when flows are contaminated.

In doing so, it achieves the collective National Policy objectives set out above.

5.4 Regional Spatial and Economic Strategy for the Eastern and Midland Region

In the Regional Spatial and Economic Strategy (RSES) for the Eastern and Midland Region, Dublin Airport is named as a key national asset to Ireland's economic success which is linked with its global connectivity to trade and tourism markets.

Section 7.3 A Clean and Healthy Environment recognises that, in order to ensure sustainable development, it is important to manage natural capital *i.e.,* our stock of renewable and non-renewable resources (*e.g.*, plants, animals, air, water, soils, minerals) so that it can continue to deliver the ecosystem services that give us a number of benefits including, but not limited to, clean water and habitat for wildlife. Unmanaged natural capital risks the continued degradation and depletion of these assets and, in turn, their capacity to provide the economy and society with the ecosystem benefits that they depend on. It is noted that most sources of environmental pollution are caused by human activities such as transportation, construction, industrial and agriculture activities and domestic waste.

With regard to water quality, it is noted (pg. 156 of the RSES) that most public water comes from surface water sources including rivers and lakes, groundwater and springs and it is vital that it does not contain pollutants that might endanger public health, aquatic systems and the amenity value of our waters. Pollution from urban wastewater is one of the key threats to water quality, due to inadequate urban wastewater treatment (UWWT), storm water overflow or direct discharges into watercourses.

In relation to water quality, **RPO 7.10** of the RSES seeks to:

"Support the implementation of the Water Framework Directive in achieving and maintaining at least good environmental status for all water bodies in the Region and to ensure alignment between the core objectives of the Water Framework Directive and other relevant Directives, River Basin Management plans and local authority land use plans".

Section 7.4 Flood Risk Management (pg. 158 of the RSES) notes that the long-term land use planning of the Region must consider the likelihood of higher flood risks both inland and in coastal locations due to climate change.

In relation to flooding, the RSES seeks the following:

RPO 7.13: *EMRA will work with Local Authorities, the OPW and other relevant Departments and agencies to implement the recommendations of the CFRAM programme to ensure that flood risk management policies and infrastructure are progressively implemented.*

RPO 7.14: *Local Authorities shall take account of and incorporate into the development of local planning policy and decision making the recommendations of the Flood Risk Management Plans (FRMPs), including planned investment measures for managing and reducing flood risk.*

***RPO 7.15:** Local Authorities shall take opportunities to enhance biodiversity and amenities ensuring the protection of environmentally sensitive sites and habitats, including where flood risk management measures are planned.*

Section 10.2: Infrastructure (pg. 223) of the RSES notes that SuDS can play a role in reducing and managing runoff from new developments to surface water drainage systems, reducing the impact of such developments on flood risk downstream, as well as improving water quality and contributing to local amenity. The incorporation of the principle of Sustainable Urban Drainage (SuDs) in all public and private developments in urban areas is recommended as is the need for diversion of storm water from combined sewers where possible in order to overcome challenges in relation to management of surface water and its separation from foul sewage.

In relation to Surface Water, **RPO 10.18** of the RSES states:

"Local authorities shall ensure adequate surface water drainage systems are in place which meet the requirements of the Water Framework Directive and the associated River Basin Management Plans".

The RSES supports the improved management of surface water and urban drainage systems and flood risk. The ADP is aligned with National policy and the Regional Policy Objectives outlined in the RSES, in that, it is designed to achieve sustainable management of water, waste and other environmental resources.

5.5 Local Policy Context

This section describes how the design of the proposed ADP has considered policy objectives contained in the key local planning and policy documents including:

- Fingal Development Plan 2023-2029 (County Development Plan CDP).
- Dublin Airport Local Area Plan (LAP) 2020.
- Fingal County Council Climate Change Action Plan (CCAP) 2019 – 2024

The proposed ADP has been designed to meet the requirements of policy objectives related to surface water management, water quality and environmental protection in the above development plans.

5.5.1 Fingal Development Plan 2023-2029

The current County Development Plan (CDP) for Fingal is the CDP 2023-2029, which came into effect on 5th April 2023. The CDP sets out the spatial framework to guide future development within the County.

5.5.1.1 Strategic Context

The strategic vision of the plan seeks (in part) that *"Fingal will embrace healthy place-making and economic prosperity through building cohesive and sustainable communities, where our cultural, natural and built environment is protected"*. The vision for the Plan is underpinned by four key cross cutting themes; climate action, healthy place-making and sustainable development, social inclusion and high-quality design, and a number of interlinked strategic objectives. The objectives constitute inter-related and essential elements of a sustainable approach to future development of Fingal. These objectives are embedded throughout the Plan, cascading from the vision, Core Strategy, policies, objectives and standards through to implementation. The strategic objectives of the Plan include the following (among others), to:

- Transition to an environmentally sustainable carbon neutral economy.
- Protect, enhance and ensure the sustainable use of Fingal's key infrastructure, including water supplies and wastewater treatment facilities, energy supply including renewables, broadband and transportation.
- Protect, enhance and connect areas of natural heritage, green infrastructure and open space for the benefits of quality of life, biodiversity, protected species and habitats, while having the potential to facilitate climate change adaptation and flood risk measures.
- Protect, conserve and enhance the built and cultural heritage of Fingal, through promoting awareness, utilising relevant heritage legislation and ensuring good quality urban design principles are applied to all new developments. The principle that well planned and integrated development enhances the sustainability, attractiveness and quality of an area should be at the centre of any proposal.

5.5.1.2 Planning Policies and Objectives

The planning policies and objectives relevant to the proposed development at Dublin Airport are contained in Chapter 5: Climate Action, Chapter 8: Dublin Airport, Chapter 9: Green Infrastructure and Natural Heritage, Chapter 10: Heritage, Culture and Arts, Chapter 11: Infrastructure and Utilities and Chapter 14: Development Management Standards.

Chapter 5 – Climate Action

According to Chapter 5, the CDP presents an opportunity to focus on particular land use aspects of climate action and how the planning system can be utilised to effect positive change and action. Climate action is an overarching and cross-cutting theme across the CDP in line with the policies and objectives contained in the NPF, the RSES, FCC's Climate Change Action Plan 2019–2024, as well as other relevant national and European legislation and agreements in relation to climate action. The CDP plays an important role through the implementation of its policies and objectives to help address mitigation and adaptation requirements and move towards a low carbon, resilient County.

Section 5.3 of the CDP sets out that the CDP *"aims to influence a reduction in carbon emissions and the negative impacts of climate change by promoting compact urban growth and sustainable transport as well as measures to minimise coastal erosion and flooding, enhance green infrastructure and biodiversity, minimise energy use, promote energy conservation and use of renewable energy sources"*. The CDP provides for effective management of Fingal's resources to ensure that the County's carbon footprint is reduced.

Key climate action policies and objectives relevant to the proposals include:

*"**Policy CAP5** Ensure the built environment is equipped for the impacts of climate change by supporting climate change mitigation and adaptation measures as part of new and existing developments".*

*"**Policy CAP10** Promote low carbon development within the County which will seek to reduce carbon dioxide emissions and which will meet the highest feasible environmental standards during construction and occupation. New development should generally demonstrate/provide for* [among others]:

b. Sustainable building/services/site design to maximise energy efficiency;

f. Minimising the generation of site and construction waste and maximising reuse or recycling; and

g. The use of construction materials that have low to zero embodied energy and CO2 emissions".

*"**Policy CAP11** Development proposals should demonstrate sustainable design principles for new buildings/services/site. The Council will promote and support development which is resilient to climate change. This would include* [among others]:

b. Ensuring the efficient use of natural resources (including water) and making the most of natural systems both within and around buildings;

c. Minimising pollution by reducing surface water runoff through increasing permeable surfaces and use of Sustainable Drainage Systems (SuDS);

d. Reducing flood risk, damage to property from extreme events– residential, public and commercial;

e. Reducing risks from temperature extremes and extreme weather events to critical infrastructure such as roads, communication networks, the water/drainage network, and energy supply;

f. Promoting and protecting biodiversity and green infrastructure".

*"**Policy CAP26** Have regard to existing Best Practice Guidance on Waste Management Plans for Construction and Demolition Projects as well as any future updates to these Guidelines in order to ensure the consistent application of planning requirements".*

*"**Policy CAP28** Support the delivery of soft, green and grey adaptation measures to enhance flood and water resource resilience where appropriate in the County".*

*"**Policy CAP30** Encourage the use* [of] *natural flood risk mitigation or nature-based solutions including integrated wetlands, green infrastructure, and Sustainable Drainage Systems (SuDS) as part of wider adaptation and mitigation responses to achieve flood resilience".*

*"**Policy CAP35** Protect, connect and expand the County's Green Infrastructure while optimising the climate change adaptation and mitigation services it provides".*

Chapter 8 – Dublin Airport

This chapter of the CDP confirms that Dublin Airport is of vital importance to the Irish economy and acts as the principal international gateway for trade, inward investment and tourism. The aviation sector is one of the most important components of Fingal's local economy, as well as being nationally significant due to its employment base, passenger throughput and air freight services.

Section 8.5.2 of the CDP deals with safeguarding Dublin Airport and notes that as the airport grows in size and importance, it is imperative that a balance is achieved between promoting the potential of the aviation sector and safeguarding the primary operational role of Dublin Airport as the country's main international airport. In order to meet the demand forecast (as detailed in the CDP), enabling infrastructure will have to be provided and it is important that all future development proposals shall not prejudice the orderly operation and continued growth at Dublin Airport. All proposals shall take into account safeguarding associated with key operational features of the airport which include runways, taxiways, obstacle surfaces, radar and control tower sightlines.

Section 8.5.7 of the CDP notes that the LAP considers the likely direct and indirect effects of the future development of Dublin Airport on the local environment, including the communities surrounding the Airport. Noise, flood risk management, sustainable urban drainage, foul drainage and water supply, surface water quality, groundwater and air quality are dealt with in the LAP, each with its own specific objectives. In addition, the built and natural heritage including archaeology and architectural heritage are examined in the context of Dublin Airport, with specific objectives relating to the protection of same. The Plan supports the objectives relating to environmental issues, referred to above, as indicated in the Dublin Airport LAP.

The Dublin Airport policies and objectives relevant to the proposed development are as follows:

*"**Policy DAP1** Continue to support Dublin Airport as a key national asset to Ireland's economic success by ensuring that all future development complies with the strategic aims and objectives contained within the Dublin Airport Local Area Plan, 2020 or any subsequent LAP or extension of same".*

*"**Objective DAO1** Facilitate the operation and future development of Dublin Airport, in line with Government policy and the Dublin Airport Local Area Plan 2020, or any subsequent LAP or extension of same, recognising its role in the provision of air transport, both passenger and freight".*

*"**Objective DAO2** Safeguard the current and future operational, safety, technical and developmental requirements of Dublin Airport and provide for its ongoing development in accordance with the Dublin Airport Local Area Plan 2020, or any subsequent LAP or extension of same, having regard to both the environmental impact on local communities and the economic impact on businesses within the area".*

*"**Policy DAP4** Ensure that the required infrastructure and facilities are provided at Dublin Airport, in accordance with Dublin Airport LAP 2020, or any subsequent LAP or extension of same, so that the airport can develop further and operate to its maximum sustainable potential, whilst taking into account the impact on local communities, the environment and climate change".*

*"**Objective DAO4** Ensure that the required infrastructure and facilities are provided at Dublin Airport so that the aviation sector can develop further and operate to its maximum sustainable potential, whilst taking into account the impact on local residential areas, and any negative impact such proposed developments may have on the sustainability of similar existing developments in the surrounding area, and the impact on the environment, including the climate".*

*"**Objective DAO5** Facilitate the on-going augmentation and improvement of terminal facilities at Dublin Airport".*

*"**Policy DAP4** Ensure that all developments comply with the Climate Actions Objectives and the Circular Economy and Waste Management Objectives in the Dublin Airport Local Area Plan 2020, or any subsequent LAP or extension of same".*

*"**Policy DAP10** Ensure that all development within the Dublin Airport Local Area Plan lands will comply with the Design Objectives of the Dublin Airport Local Area Plan, 2020, or any subsequent LAP or extension of same".*

*"**Objective DAO26** Ensure that all development within the Dublin Airport Local Area Plan lands will be of a high standard of design and sustainability, to reflect the prestigious nature of an international gateway airport, and its location adjacent to Dublin City".*

Chapter 9 – Green Infrastructure and Natural Heritage

This chapter of the CDP seeks to develop the County in a way which maintains and enhances biodiversity for future generations. Fingal's response to habitat loss and species decline is the development of an Ecological Network that spans the entire County. The Ecological Network is made up of core nature conservation areas, buffer zones, and nature development areas and ecological corridors. Section 9.4 of the CDP confirms the promotion of healthy ecosystems. Green Infrastructure and nature-based solutions should be systematically integrated into urban planning, including in public spaces, infrastructure, and the design of buildings and their surroundings. Section 9.5.2 of the CDP states all proposals for development must take account of the County's strategic Green Infrastructure resources and ensure that these are protected, managed and enhanced as new development takes place.

Section 9.6 of the CDP confirms that it is important that all development proposals include measures to protect and enhance biodiversity. This will be achieved through the Development Management process (refer to Chapter 14 – Development Management Standards set out below).

The Green Infrastructure and Natural Heritage policies and objectives relevant to the proposed development are as follows:

*"**Policy GINHP2** Ensure that areas and networks of green infrastructure are identified, protected, enhanced, managed and created to provide a wide range of environmental, social and economic benefits to communities".*

*"**Policy GINHP3** Encourage measures for the "greening" of new developments including the use of green roofs, brown roofs, green walls and water harvesting. Where feasible require new developments to incorporate greening elements such as green roofs, brown roofs, green walls, green car parking and SuDs (e.g. clean water ponds fed by rainwater via downpipes".*

*"**Policy GINHP5** Develop the green infrastructure network to ensure the conservation and enhancement of biodiversity, including the protection of European Sites, the provision of accessible parks, open spaces and recreational facilities (including allotments and community gardens), the sustainable management of water, the maintenance of landscape character including historic landscape character and the protection and enhancement of archaeological and heritage landscapes".*

*"**Objective GINHO4** Resist development that would fragment or prejudice the County's strategic green infrastructure network".*

*"**Policy GINHP7** Protect and enhance the natural, historical, amenity and biodiversity value of the County's watercourses, flood plains, riparian corridors, wetlands and coastal area through long-term and liaison with relevant Prescribed Bodies where appropriate".*

*"**Objective GINHO15** Limit surface water run-off from new developments through the use of appropriate Sustainable Urban Drainage Systems (SuDS) using nature-based solutions and ensure that SuDS is integrated into all new development in the County".*

*"**Policy GINHP10** Seek a net gain in green infrastructure through the protection and enhancement of existing assets, through the provision of new green infrastructure as an integral part of the planning process, and by taking forward priority projects including those indicated on the Development Plan Green Infrastructure maps during the lifetime of the Development Plan".*

*"**Objective GINHO22** Resist development that would fragment or prejudice the County's strategic green infrastructure network".*

*"**Policy GINHP12** Protect areas designated or proposed to be designated as Natura 2000 sites (i.e. Special Areas of Conservation (SACs) and Special Protection Areas (SPAs), proposed Natural Heritage Areas (pNHAs), Natural Heritage Areas (NHAs), Statutory Nature Reserves, and Refuges for Fauna".*

*"**Policy GINHP13** Support the development of the Fingal Ecological Network in line with the Fingal Biodiversity Action Plan".*

*"**Policy GINHP16** Promote and support rewilding and pollinator initiatives in Fingal".*

*"**Objective GINHO27** Support the National Parks and Wildlife Service, in the maintenance and achievement of favourable conservation status for the habitats and species in Fingal by taking full account of the requirements of the Habitats and Birds Directives, in the performance of its functions".*

*"**Objective GINHO28** Ensure that development does not have a significant adverse impact on proposed Natural Heritage Areas (pNHAs), Natural Heritage Areas (NHAs), Statutory Nature Reserves, Refuges for Fauna, Habitat Directive Annex I sites and Annex II species contained therein, and on rare and threatened species including those protected by law and their habitats".*

*"**Objective GINHO30** All greenway and infrastructure projects are to have a net biodiversity gain and this principle shall be incorporated from the start of the project".*

*"**Objective GINHO32** Ensure that proposals for development do not lead to the spread or introduction of invasive species. If developments are proposed on sites where invasive species*

are or were previously present, the applications will be required to submit a control and management program for the particular invasive species as part of the planning process and to comply with the provisions of European Communities (Birds and Natural Habitats) Regulations 2011 and EU Regulations 1143/2014".

*"**Policy GINHP17** Strictly protect areas designated or proposed to be designated as Natura 2000 sites (i.e. Special Areas of Conservation (SACs) and Special Protection Areas (SPAs); also known as European sites) including any areas that may be proposed for designation or designated during the lifetime of this Plan".*

*"**Policy GINHP18** The Council will seek to protect rare and threatened species, including species protected by law and their habitats by requiring planning applicants to demonstrate that proposals will not have a significant adverse impact on such species and their habitats".*

*"**Objective GINHO33** Ensure that development does not have a significant adverse impact on proposed Natural Heritage Areas (pNHAs), Natural Heritage Areas (NHAs), Statutory Nature Reserves, Refuges for Fauna, Habitat Directive Annex I sites and Annex II species contained therein, and on rare and threatened species including those protected by law and their habitats".*

*"**Policy GINHP19** Protect the functions of the ecological buffer zones and ensure proposals for development have no significant adverse impact on the habitats and species of interest located therein".*

*"**Objective GINHO35** In accordance with Appropriate Assessment of Plans and Projects in Ireland, Guidance for Planning Authorities (2010), any plans or projects that are likely to have a significant effect on a Natura 2000 site, either individually or in combination with other plans or projects, are subject to a screening for Appropriate Assessment unless they are directly connected with or necessary to the management of a Natura 2000 site.*

*"**Policy GINHP20** Protect the ecological corridor function along rivers by including mammal ledges or tunnels in new bridges over any of the main rivers: Liffey, Tolka, Pinkeen, Mayne, Sluice, Ward, Broadmeadow, Ballyboghil, Corduff, Matt and Delvin. New bridge structures will also cater for Dipper boxes and Bats where possible. Where new road infrastructure crosses significant urban ecological corridors, tunnels shall be installed underneath the road to facilitate movement of small mammals and amphibians".*

*"**Objective GINHO40** Protect the ecological functions and integrity of the corridors indicated on the Plan Green Infrastructure maps. An ecological assessment may be required for any proposed development likely to have a significant impact on habitats and species of interest in an ecological corridor or stepping stone".*

*"**Objective GINHO41** Protect rivers, streams and other watercourses and maintain them in an open state capable of providing suitable habitat for fauna and flora, including fish".*

*"**Objective GINHO42** Take full account of Inland Fisheries Guidelines on the Protection of Fisheries during Construction works in and adjacent to Waters (2016) and Planning for Water Courses in the Urban environment (2020) when undertaking, approving or authorising development or works which may impact on rivers, streams and canals and their associated habitats and species".*

*"**Objective GINHO43** Remove existing revetments and/or gabion baskets along river and streams and restore a minimum of 10m of natural streamside riparian zone, where possible. If existing hard bank structures cannot be removed, provide instream river rehabilitation works in consultation with Inland Fisheries Ireland to improve the overall habitat quality of the river".*

*"**Objective GINHO44** Set back new surface water drainage outfalls from the main river channel on the landward edge of the floodplain or a designed wetland feature to cater for water quality improvement before the surface discharges into the river".*

*"**Policy GINHP21** Protect existing woodlands, trees and hedgerows which are of amenity or biodiversity value and/or contribute to landscape character and ensure that proper provision is made for their protection and management in line with the adopted Forest of Fingal-A Tree Strategy for Fingal".*

*"**Policy GINHP22** Provide for appropriate protection of trees and hedgerows, recognising their value to our natural heritage, biodiversity and climate action and encourage tree planting in appropriate locations".*

*"**Objective GINHO46** Ensure adequate justification for tree removal in new developments and open space management and require documentation and recording of the reasons where tree felling is proposed and avoid removal of trees without adequate justification".*

Chapter 10 – Heritage, Culture and Arts

This chapter of the CDP confirms that the Council will ensure the conservation, management, protection and enhancement of the archaeological, architectural and cultural heritage of the County, which are valuable and finite resources, through good management, sensitive interventions and sympathetic development. The Council acknowledges, supports and reinforces the integral role heritage, culture and the arts play in sustaining and creating attractive, vibrant and engaging places to live, work and enjoy.

The Heritage, Culture and Arts policies and objectives relevant to the proposed development are as follows:

*"**Policy HCAP3** Safeguard archaeological sites, monuments, objects and their settings listed in the Record of Monuments and Places (RMP), Sites and Monuments Record (SMR, underwater cultural heritage including protected wrecks and any additional newly discovered archaeological remains".*

*"**Policy HCAP4** Favour the preservation in-situ (or at a minimum preservation by record) of all sites and features of historical and archaeological interest".*

*"**Objective HCAO1** Favour the preservation in situ or at a minimum preservation by record, of archaeological sites, monuments, features or objects in their settings. In securing such preservation the Council will have regard to the advice and recommendations of the National Monuments Service of the Department of the Housing, Local Government and Heritage".*

*"**Objective HCAO2** Protect all archaeological sites and monuments, underwater archaeology, and archaeological objects, which are listed in the Record of Monuments and Places, Wreck Inventory of Ireland and all sites and features of archaeological and historic interest discovered*

subsequent to the publication of the Record of Monuments and Places, and to seek their preservation in situ (or at a minimum, preservation by record) through the planning process".

*"**Objective HCAO3** Encourage and promote the appropriate management and maintenance of the County's archaeological heritage, including historical burial grounds, in accordance with conservation principles and best practice guidelines".*

*"**Policy HCAP5** Incorporate heritage features into infrastructure design at an early stage in the development planning and management process to protect and promote the cultural heritage resource and create awareness and interpretation".*

*"**Objective HCAO7** Ensure archaeological remains are identified and fully considered at the very earliest stages of the development process, that schemes are designed to avoid impacting on the archaeological heritage".*

*"**Objective HCAO8** Require that proposals for linear development over one kilometre in length; proposals for development involving ground clearance of more than half a hectare; or developments in proximity to areas with a density of known archaeological monuments and history of discovery; to include an Archaeological Impact Assessment and refer such applications to the relevant Prescribed Bodies".*

*"**Objective HCAO10** Ensure that development within the vicinity of a Recorded Monument or Zone of Archaeological Notification does not seriously detract from the setting of the feature and is sited and designed appropriately".*

*"**Objective HCAO11** Ensure that proposals for large scale developments and infrastructure projects consider the impacts on the archaeological heritage and seek to avoid them".*

*"**Policy HCAP12** Ensure that direct or indirect interventions to Protected Structures or adjoining development affecting them are guided by architectural conservation principles so that they are sympathetic, sensitive and appropriate to the special interest, appearance, character, and setting of the Protected Structure and are sensitively scaled and designed".*

Chapter 11 – Infrastructure and Utilities

The policies and objectives in this chapter are intended to address a wide range of supporting infrastructure and services, including improvements in water services, water quality, the promotion of sustainable waste management in the transition to a circular economy, diversity in energy supply and improved energy efficiency, enhanced digital connectivity and SMART technologies, and a holistic approach to flood risk and surface water management, while safeguarding environmental quality and providing for climatic resilience.

Section 11.3 of the CDP notes Fingal County Council has recently prepared a SuDS Guidance Document – "Green/ Blue Infrastructure for Development" (Appendix 11), which will guide applicants in the provision of SuDS for new development through the planning process and will promote and support the strategic planning of surface water management in Fingal. Increased flooding associated with climate change, rising sea levels and severe rainfall episodes require Fingal and the wider Dublin area to adapt the flood risk management response to address these events. The Council will continue to work with the OPW and Uisce Éireann and other statutory bodies to address the strategic planning and management of surface water to reduce run off, improve the drainage network, and protect the water quality in the County's rivers, streams and coastal waters.

The Infrastructure and Utilities policies and objectives relevant to the proposed development are as follows:

*"**Policy IUP10** Promote the inclusion of water conservation and SuDS measures in all developments, to reduce the level of surface water run-off, improve water quality and contribute to adaptation to climate change through natural solutions".*

*"**Objective IUO9** Maintain and enhance existing surface water drainage systems in the County and to require SuDS in new developments where appropriate, as set out in the Greater Dublin Strategic Drainage Study (Vol 2: New Development) / Greater Dublin Regional Code of Practice for Drainage Works)".*

*"**Objective IUO10** SuDS shall incorporate nature-based solutions and have regard to the objectives set out in Fingal's Guidance Document – "Green/ Blue Infrastructure for Development", as amended (Appendix 11) and 'Nature Based Solutions to the Management of Rainwater and Surface Water Runoff in Urban Areas, Water Sensitive Urban Design Best Practice Interim Guidance Document' (November 2021, DHLGH)".*

*"**Objective IUO14** Implement policies relating to the buffer zones for riparian corridors and SuDS, having regard to Fingal's SuDS Guidance document "Green/ Blue Infrastructure for Development", as amended".*

*"**Objective IUO15** Require the preparation of a Surface Water Management Plan as part of all new developments which shall include the following:*

- *Identify and assess the existing surface water movements through the development before considering and developing a surface water management system using SuDS, having regard to our Fingal Guidance Document – "Green/ Blue Infrastructure for Development", as amended. (Appendix 11).*
- *Incorporate SuDS along the route of the water movement to enhance the water quality effects of nature-based systems at the different stages - Treatment Train approach from source to discharge".*

*"**Policy IUP12** Ensure the continued incorporation of Flood Risk Management into the spatial planning of the County of Fingal, to meet the requirements of the EU Floods Directive and the EU Water Framework Directive and to promote a climate resilient County".*

*"**Policy IUP13** Protect and enhance the County's floodplains, wetlands and coastal areas subject to flooding as vital green infrastructure which provides space for storage and conveyance of floodwater, enabling flood risk to be more effectively managed and reducing the need to provide flood defences in the future".*

*"**Policy IUP14** Continue to support and assist the OPW in implementing and delivering the relevant Flood Risk Management Plans for rivers, coastlines and estuaries within Fingal".*

*"**Objective IUO16** Have regard to the OPW Flood Risk Management Guidelines (2009), as revised by Circular PL 2/2014, when assessing planning applications and in the preparation of*

statutory and non-statutory plans and to require site specific flood risk assessments are to be considered for all new developments within the County. All development must prepare a Stage 1 Flood Risk Analysis and if the flooding risk is not screened out, they must prepare a Site Specific Flood Risk Assessment (SSFRA) for the development, where appropriate".

*"**Objective IUO17** Implement and comply fully with the recommendations of the Strategic Flood Risk Assessment prepared as part of the Fingal Development Plan 2023–2029".*

*"**Objective IUO18** All Flood Risk Assessments must comply with the recommendations from the SFRA report".*

*"**Objective IUO19** Surface water designs must include Medium Range Future Scenario Climate Change Predictions".*

*"**Objective IUO21** Require all developments in the County to be designed and constructed in accordance with the "Precautionary Principle" as detailed in the OPW Guidelines and to minimise the flood risk in Fingal from all potential sources of flooding as far as is practicable, including coastal, pluvial, fluvial, reservoirs and dams, and the piped water system".*

*"**Objective IUO22** Support and facilitate the provision of new or upgrading of existing flood alleviation measures where appropriate".*

*"**Objective IUO23** Ensure that where flood protection or alleviation works take place that the natural and cultural heritage of rivers, streams and watercourses are protected and enhanced to the greatest extent possible".*

*"**Policy IUP15** Support initiatives to improve water quality and to achieve good ecological status in compliance with the Water Framework Directive and associated River Basin Management Plans, particularly those which employ nature-based management measures, and explore opportunities for targeted watercourse improvement interventions which are designed to deliver a wider range of environmental benefits".*

*"**Policy IUP16** Protect inland and sea fisheries and take full account of Inland Fisheries Ireland Guidelines "Planning for Watercourses in the Urban Environment" 2020, when undertaking, approving or authorising development or works which may impact on rivers streams, watercourses, estuaries, shorelines and their associated habitats".*

*"**Policy IUP17** Strive to achieve 'good status' in all waterbodies and protect and develop, in a sustainable manner, the existing groundwater sources and aquifers in the County and control development in a manner consistent with the proper management of these resources in compliance with the Water Framework Directive, the Eastern River Basin Management Plan 2017–2021 and any subsequent plan".*

*"**Policy IUP18** Promote the reduction of groundwater pollution and to protect and improve the aquatic environment and water-dependent ecosystems through proactive discharge and emissions management and through the enhancement of the physical condition of waterbodies and to implement the recommendations contained in any Groundwater Protection Scheme prepared under EU Ground Water Directives".*

*"**Objective IUO25** Maintain, improve and enhance the environmental and ecological quality of our surface waters, groundwater and aquifers by implementing the EU Water Framework*

Directive through the relevant programme of measures set out in the River Basin Management Plans and to take into consideration the River Basin Management Plan and Programme of Measures when considering new development proposals".

*"**Objective IUO26** Establish riparian corridors free from new development along all significant watercourses and streams in the County:*

- *Ensure a minimum 10m wide riparian buffer strip measured from the top of the bank either side of all watercourses. This minimum 10m wide riparian buffer strip applies to lands within development boundaries – i.e. within designated settlement boundaries (as per Fingal County Council's Settlement Hierarchy set out in Chapter 2, Planning for Growth, Table 2.20).*
- *A minimum 48m wide riparian buffer strip is required in all other areas outside of development boundaries.*
- *Where lands encompass urban and rural areas, a transitional approach from the urban riparian requirements to the rural riparian requirements may be appropriate and will be assessed on a case-by-case basis.*
- *Notwithstanding the above, cognisance must be taken of Flood Zone A and B, as outlined in the SFRA.*

See also Chapter 14 Development Management Standards (Section 14.20.5 Riparian Corridors) and the SFRA".

*"**Policy IUP21** Have regard to European Union, National and Regional waste and related environmental policy, legislation, guidance and codes of practice to improve management of material resources and wastes".*

*"**Objective IUO28** Implement the provisions of the Eastern Midlands Region Waste Management Plan 2015–2021 or any subsequent Waste Management Plan applicable within the lifetime of the Development Plan. All prospective developments in the County will be expected to take account of the provisions of the Regional Waste Management Plan and adhere to the requirements of that Plan".*

*"**Objective IUO58** 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 IUO60** 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".*

*"**Policy IUP42** Support the pro-active management of noise in the County and to continue to work with the Dublin Local Authorities and relevant statutory agencies, through the implementation of measures to avoid, mitigate and minimise noise in accordance with the Noise Action Plan for the County of Fingal 2018–2023 and the Dublin Agglomeration Environmental Noise Action Plan 2018–2023 (and any subsequent plans)".*

*"**Objective IUO64** Require that the design of lighting schemes minimises the incidence of light spillage or pollution into the surrounding environment and new schemes shall ensure that there is no unacceptable adverse impact on neighbouring development, visual amenity and biodiversity in the surrounding areas".*

Chapter 13 – Land Use Zoning

The site subject of the planning application is contained entirely in the area zoned 'DA – Dublin Airport' in the CDP 2023 – 2029. For each zoning designation, the Development Plan lists Use Classes which are permitted in principle, and those which are not permitted. For those uses which do not fall into either category of 'Permitted in Principle' or 'Not Permitted', the Development Plan states that these *"will be assessed in terms of their contribution towards the achievement of the zoning objective and vision".*

Section 13.5 of the Fingal CDP sets out the zoning objective, vision and related use classes for the various zoning designations. The objective for the "DA" zoning is to *"Ensure the efficient and effective operation and development of the Airport in accordance with an approved Local Area Plan."*

The Vision for this zoning is to *"Facilitate air transport infrastructure and airport related activity/uses only (i.e., those uses that need to be located at or near the Airport). All development within the Airport area should be of a high standard reflecting the status of an international airport and its role as a gateway to the country and region. Minor extensions or alterations to existing properties located within the Airport area which are not essential to the operational efficiency and amenity of the Airport may be permitted, where it can be demonstrated that these works will not result in material intensification of land use".*

The proposed ADP development would fall under the use class 'Utility Installations' which is listed as a use that is permitted in principle in the "DA" zoning objective. As such, the proposed development subject of the planning application is compliant with, and supported by, the zoning designations in the CDP 2023-2029.

Chapter 14 – Development Management Standards

This chapter sets out the development standards and criteria to ensure development occurs in an orderly and efficient manner, but also in terms of how it contributes to the achievement of the Core Strategy and related policies and objectives. Proposals must comply with the standards and criteria that apply to particular development types, be consistent with the objectives set out in the CDP and be compliant with relevant legislative guidance. The planning application and accompanying documentation has been prepared to meet with these standards.

The Development Management Standards, policies and objectives relevant to the proposed development are as follows:

*"**Objective DMS01** Ensure that all plans and projects in the County which could, either individually or in combination with other plans and projects, have a significant effect on a European site or sites are subject to Screening for Appropriate Assessment".*

*"**Objective DMSO104** All proposed developments within Dublin Airport (DA) shall have regard to the strategic aims and objectives detailed in the Dublin Airport Local Area Plan 2020 or any subsequent LAP or extension of same".*

*"**Objective DMSO125** Protect, preserve and ensure the effective management of trees and groups of trees and hedgerows".*

*"**Objective DMSO126** Ensure during the course of development, trees and hedgerows that are conditioned for retention are fully protected in accordance with BS5837 2012 Trees in relation to the Design, Demolition and Construction – Recommendations or as may be updated and are monitored by the appointed arboriculture consultant".*

*"**Objective DMSO128** Ensure trees, hedgerows and other features which demarcate townland boundaries are preserved and incorporated where appropriate into the design of developments".*

*"**Objective DMSO134** Regardless of development size or type, applicants must submit an overall site summary quantifying and detailing the following:*

- *tree and hedgerow removal,*
- *tree and hedgerow retention and*
- *new tree and hedgerow planting.*

This information will be submitted in a digital format agreed with the Council to allow amalgamation and reporting on tree and hedgerow cover within the County over time".

*"**Objective DMSO138** Ensure all development and infrastructure proposals include measures to protect and enhance biodiversity leading to an overall net biodiversity gain".*

*"**Objective DMSO139** Ensure that an ecological study is carried out of the development site covering habitats and flora, breeding birds, bats and amphibians to identify existing ecological valuable features and the species composition of the site".*

*"**Objective DMSO140** Protect existing landscape features such as scrub, woodland, large trees, hedgerows, meadows, ponds and wetlands which are of biodiversity or amenity value and/or contribute to landscape character and ensure that proper provision is made for their protection and management".*

*"**Objective DMSO141** Incorporate habitat features (new or existing) and other conservation measures for species of conservation interest (e.g. legally protected species or Amber & Red listed bird species) in the Integrated Green Infrastructure Plan".*

*"**Objective DMSO142** Where invasive plant species such as Japanese Knotweed, Giant Hogweed, Himalayan Balsam, Rhododendron Ponticum and three-cornered leek are present on a development site, the developer shall submit an invasive species control plan as part of the planning process. This control plan will describe what and where invasive species are present and what control measures will be implemented, who will implement these and when they will be implemented. Annual monitoring reports on the control program are to be submitted to the planning authority until the invasive species is eradicated".*

*"**Objective DMSO143** Require all new developments to incorporate habitat facilities for wildlife species as appropriate including Kestrel, Peregrine, Swifts, House Sparrows, Swallow, Starling, Bats and insects in or on buildings facades".*

*"**Objective DMSO144** Ensure Screening for Appropriate Assessment and, where required, full Appropriate Assessment is carried out for all plans and projects in the County which, individually, or in combination with other plans and projects, are likely to have a significant direct or indirect impact on any European site or sites".*

*"**Objective DMSO145** Ensure that sufficient information is provided as part of development proposals to enable Screening for Appropriate Assessment to be undertaken and to enable a fully informed assessment of impacts on biodiversity to be made".*

*"**Objective DMSO146** Ensure that Natura Impact Statements (NIS) and any other ecological impact assessments submitted in support of proposals for development are carried out by appropriately qualified professionals and that any necessary survey work takes place in an appropriate season".*

*"**Objective DMSO147** Ensure planning applications for proposed developments likely to have significant direct or indirect impacts on any European Site or sites are accompanied by a Natura Impact Statement prepared in accordance with the Guidance issued by the Department of the Environment, Heritage and Local Government (Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities, 2009)".*

*"**Objective DMSO148** Ensure ecological impact assessment is carried out for any proposed development likely to have a significant impact on proposed Natural Heritage Areas (pNHAs), Natural Heritage Areas (NHAs), Statutory Nature Reserves, Refuges for Fauna, Habitat Directive Annex I sites and Annex II species contained therein, or rare and threatened Flora Protection order & Red Data Book species and their habitats. Ensure appropriate avoidance and mitigation measures are incorporated into development proposals as part of any ecological impact assessment".*

*"**Objective DMSO150** Minimise the environmental impact of external lighting and noise at sensitive locations to achieve a sustainable balance between the needs of an area, the public safety of walking and cycling routes and the protection of sensitive species such as bats".*

*"**Objective DMSO151** Applicants should consult the Fingal Biodiversity Action Plan to ascertain its implications for any planning proposals".*

*"**Objective DMSO154** Protect and enhance the ecological corridors along the following rivers in the County by ensuring that no development takes place, outside development boundaries, within a minimum distance of 48m from each riverbank along the main channels of following rivers Liffey, Tolka, Pinkeen, Mayne, Sluice, Ward, Broadmeadow, Ballyboghil, Corduff, Matt and Delvin, Bracken River, Daws River, Richardstown River, Turvey River (see Green Infrastructure Maps). A minimum 10 m wide riparian buffer strip applies to lands within development boundaries. Additional width may be required to provide for additional protections of sensitive habitats, as appropriate".*

*"**Objective DMSO156** Ensure that no development, including clearance and storage of materials, takes place within 10m as a minimum, measured from each bank of any river tributary or small stream or watercourse in the County (see Green Infrastructure Maps)".*

*"**Objective DMSO158** Protect rivers and streams and maintain them in an open state capable of providing suitable habitat for fauna and flora, including fish. Deculvert or 'daylight' existing culverts where appropriate and in accordance with relevant river catchment proposals restore the*

watercourse to acceptable ecological standards for biodiversity wherever possible improving habitat connection and strengthening the County's green infrastructure network. Clear Span structures should be used on fisheries waters, where possible".

*"**Objective DMSO160** Require development proposals that are within riparian corridors to demonstrate how the integrity of the riparian corridor can be maintained and enhanced having regard to flood risk management, biodiversity, ecosystem service provision, water quality and hydromorphology".*

*"**Objective DMSO162** Require a landscape/Visual assessment to accompany all planning applications for significant proposals that are likely to affect views and prospects".*

*"**Objective DMSO168** Where a development site is in proximity to recorded monuments (RMPs)/sites and monuments record (SMR) and/or areas with a density of known archaeological monuments and history of discovery; within a Zone of Archaeological Notification, is over 0.5 hectares in size, or for linear developments more than 1 km in length, the applicant shall employ a suitably qualified archaeologist to carry out an Archaeological Impact Assessment (AIA) at pre-planning stage and report on any necessary site investigation works prior to an application being lodged".*

*"**Objective DMSO169** All development proposals which may have implications for archaeological heritage shall be accompanied by an Archaeological Impact Assessment. This assessment will consist of the following:*

- *Site inspection/walk-over survey,*
- *Archaeological heritage of the receiving area,*
- *Examination of upstanding or visible features or structures,*
- *Topographical assessment including historic townland boundaries,*
- *Physical description and photographic record of the archaeological feature, site or object,*
- *Examination of existing or new aerial photographs or satellite or other remote sensing imagery.*
- *Geophysical survey, archaeological test excavation, where appropriate, which should be carried out by suitable qualified professionals (geophysicists and archaeologists),*
- *Identification of potential direct and in-direct impacts of the proposed development on archaeological remains.*
- *Identification of climate change vulnerability*
- *Mitigation measures to ameliorate any such impacts of the proposed development on the definition of the buffer area surrounding the monument which will preserve the setting and visual amenity of the site.*
- *Provision of details on protection measures to be used on site".*

*"**Objective DMSO183** All planning applications for works to a Protected Structure shall have regard to the direction in Table 14.21 and provide the documentation set out in Table 14.22".*

*"**Objective DMSO202** SuDS shall incorporate nature-based solutions and have regard to the objectives set out in Fingal's Guidance Document – "Green/ Blue Infrastructure for Development", as amended. (Appendix 11)".*

*"**Objective DMSO206** Require the preparation of a Surface Water Management Plan as part of all new developments which shall include the following:*

- *Identify and assess the existing surface water movements through the development before considering and developing a surface water management system using SuDS, having regard to our Fingal Guidance Document – "Green/ Blue Infrastructure for Development", as amended. (Appendix 11).*
- *Incorporate SuDS along the route of the water movement to enhance the water quality effects of nature-based systems at the different stages –Treatment Train approach from source to discharge".*

*"**Objective DMSO211** Establish riparian corridors free from new development along all significant watercourses and streams in the County:*

- *Ensure a minimum 10 m wide riparian buffer strip measured from the top of the bank either side of all watercourses. This minimum 10m wide riparian buffer strip applies to lands within development boundaries – i.e. within designated settlement boundaries (as per Fingal County Council's Settlement Hierarchy set out in Chapter 2, Planning for Growth, Table 2.20: Fingal Settlement Hierarchy).*
- *A minimum 48m wide riparian buffer strip is required in all other areas outside of development boundaries.*
- *Where lands encompass urban and rural areas, a transitional approach from the urban riparian requirements to the rural riparian requirements may be appropriate and will be assessed on a case-by-case basis.*
- *Notwithstanding the above, cognisance must be taken of Flood Zone A and B, as outlined in the accompanying SFRA.*

See also Chapter 14, Development Management Standards (Section 14.20.5 Riparian Corridors) and the SFRA".

*"**Objective DMSO212** Have regard to the OPW Flood Risk Management Guidelines (2009), as revised by Circular PL 2/2014, when assessing planning applications and in the preparation of statutory and non-statutory plans and to require site specific flood risk assessments be considered for all new developments within the County. All development must prepare a Stage 1 Flood Risk Analysis and if the flooding risk is not screened out, they must prepare a Site Specific Flood Risk Assessment (SSFRA) for the development, where appropriate".*

*"**Objective DMSO213** Implement and comply fully with the recommendations of the SFRA prepared as part of the Fingal Development Plan 2023–2029".*

*"**Objective DMSO214** Surface water designs must include Medium Range Future Scenario Climate Change Predictions".*

*"**Objective DMSO215** Require all developments in the County to be designed and constructed in accordance with the Precautionary Principle as detailed in the OPW Guidelines and to minimise the flood risk in Fingal from all potential sources of flooding as far as is practicable, including coastal, pluvial, fluvial, reservoirs and dams, and the piped water system".*

*"**Objective DMSO241** Require that Construction and Demolition Waste Management Plans be submitted as part of any planning application for projects in excess of any of the following thresholds:*

- *New residential development of 10 units or more.*
- *New developments other than above, including institutional, educational, health and other public facilities, with an aggregate floor area in excess of 1,250 sqm*
- *Demolition / renovation / refurbishment projects generating in excess of 100m3 in volume of C&D waste.*
- *Civil engineering projects in excess of 500m3 of waste materials used for development of works on the site".*

*"**Objective DMSO242** Require that Construction and Demolition Waste Management Plans include the following:*

- *Hours of operation.*
- *Construction/phasing programme.*
- *Traffic Management Plan including employee parking and movements.*
- *Noise, Vibration, Air Quality and Dust Monitoring and Mitigation Measures.*
- *Details of any construction lighting including appropriate mitigation measures for lighting specifically designed to minimise impacts to biodiversity, including bats.*
- *The management of construction and demolition waste included as part of a Construction and Demolition Waste Management Plan.*
- *Containment of all construction-related fuel and oil within specially constructed bunds to ensure that fuel spillages are fully contained (such bunds shall be roofed to exclude rainwater).*
- *A water and sediment management plan, providing for means to ensure that surface water runoff is controlled such that no silt or other pollutants enter local water courses or drains".*

*"**Objective DMSO248** Require that the design of lighting schemes minimises the incidence of light spillage or pollution into the surrounding environment. New schemes shall ensure that there is no unacceptable adverse impact on neighbouring residential or nearby properties; visual amenity and biodiversity in the surrounding areas".*

5.5.2 Dublin Airport Local Area Plan (LAP) 2020

5.5.2.1 Strategic Context

The Dublin Airport Local Area Plan (LAP) 2020 provides a strategy for the continued growth of Dublin Airport in line with relevant aviation, planning and environmental policy within the context of a sustainable growth framework.

The LAP recognises that environmental and aviation policy has substantially changed since the adoption of the previous LAP in 2006. There is now a far greater emphasis on managing environmental effects, climate change mitigation and adaptation, environmental protection and sustainability. This emphasis stems from a range of United Nations and European Union directives and initiatives and associated changes in Irish planning and environmental legislation.

The LAP specifically considers the environmental effects associated with airport growth at global level (the need to reduce emissions, tackle climate change and build resilience to the impacts of climate change) and at local level (noise, air quality, water quality, waste, traffic, natural and built heritage and community). The LAP includes measures intended to mitigate and manage environmental effects.

Strategic aims (as set out in Section 4.1 of the LAP) include, among others:

- Support for airport safeguarding.
- Support the continued sustainable growth of Dublin Airport and connectivity as a hub airport whilst ensuring protection of the environment.
- Support the timely delivery of required infrastructure to facilitate airport growth.

The key strategic objectives (Section 4.2 of the LAP) seek to give effect to the strategic aims of the LAP. These include, among others, to:

- Safeguard the current and future operational, safety, technical and development requirements of Dublin Airport and provide for its ongoing development within a sustainable development framework, having regard to both the environmental impact on local communities and the economic impact on businesses within the area.
- <u>Provide for the necessary airside and landside infrastructure to facilitate the projected increase in passengers over the life of the LAP whilst safeguarding for longer term growth [Emphasis added].</u>
- Adopt a sustainable approach to airport development which responds to important environmental constraints associated with future development and includes mitigation where necessary and appropriate.
- Reduce environmental impacts, build climate resilience and promote quality of life for neighbouring communities.
- All development proposals at Dublin Airport shall have regard to the requirement for environmental assessment including screening for Appropriate

Assessment, Environmental Impact Assessment and Flood Risk Assessment in accordance with relevant legislation and guidelines.

- All proposals for development shall demonstrate compliance with relevant Fingal Development Plan provisions relating to sustainable development and the protection of the environment.
- Maintain and improve surface water quality at the Airport.

5.5.2.2 Planning Objectives

Chapter 5 – Transition to a Low Carbon Economy

In support of the transition towards a low carbon society, Section 5.1.8 of the LAP sets outs relevant climate action objectives, including **Objective CA01**, which seeks to *"support relevant provisions contained in the Fingal County Council Climate Change Action Plan 2019-2024, the National Climate Action Plan 2019 and any subsequent plan(s), National Climate Change Adaptation Framework 2018 and any subsequent plan(s) and the National Mitigation Plan 2017 and any subsequent plan(s)"*.

Chapter 7 – Airport Infrastructure

Section 7.5 – Other Utilities

Section 7.5 of the LAP notes that the key utility services at the Airport include water services infrastructure comprising foul water, water supply and surface water discharge and the supply of electrical power, gas and information communications technology (ICT). Section 7.5.3 acknowledges that as Dublin Airport continues to grow, additional supporting utility infrastructure will be required. This is confirmed by **Objective UT01**, which seeks to *"**support and facilitate the development and upgrade of** strategic information telecommunications technology, electricity network and **other required utilities infrastructure**". [Emphasis added]*

Chapter 9 – Environment and Community

Section 9.2 – Flood Risk Management

Section 9.2 of the LAP sets out that future development should comply with the associated subsequent plan objectives to ensure sustainable development in so far as the avoidance of any increased flood risk and to ensure any impacts on water quality are positive. This is in line with the ADP objectives. The Flood Risk Management objectives relevant to the proposed development are as follows:

*"**Objective FRM01** Have regard to The Planning System and Flood Risk Management, Guidelines for Planning Authorities (DoEHLG/OPW 2009) and Circular PL2/2014, through the use of the sequential approach and application of the Justification Tests for Development Plans and Development Management".*

*"**Objective FRM02** Protect existing flood risk management infrastructure and safeguard planned future infrastructure".*

*"**Objective FRM03** Implement and comply fully with the recommendations of the Dublin Airport Local Area Plan Strategic Flood Risk Assessment and Surface Water Management Plan".*

*"**Objective FRM04** Ensure that a Flood Risk Assessment is carried out for any development proposal, in accordance with The Planning System and Flood Risk Management, Guidelines for Planning Authorities (DoEHLG/OPW 2009) and the recommendations of the Dublin Airport Local Area Plan Strategic Flood Risk Assessment and Surface Water Management Plan. This assessment should be appropriate to the scale and nature of risk to the potential development".*

Section 9.3 – Sustainable Urban Drainage

Section 9.3 of the LAP deals with sustainable urban drainage and notes that it is an objective of the Council to implement Sustainable Urban Drainage Systems (SuDS) on all new developments throughout the County and to encourage, where feasible, the retrofit of sustainable drainage systems within existing developments. The Sustainable Urban Drainage objectives relevant to the proposed development are as follows:

*"**Objective SW01** Require all applications for development at Dublin Airport to demonstrate compliance with the Dublin Airport Local Area Plan Strategic Flood Risk Assessment and Surface Water Management Plan".*

*"**Objective SW02** Introduce SUDS to new greenfield and brownfield development sites by adoption of the SUDS Management train approach".*

*"**Objective SW03** That Dublin Airport examine the feasibility of incorporating SUDS features into existing areas for the flooding and water quality benefits of same".*

*"**Objective SW04** Recharge the ground and reduce storm volumes by the use of suitable SUDS measures".*

*"**Objective SW05** Alleviate local flooding issues within the LAP area by providing positive drainage to affected areas. Proposals should take into account objective FRM04 and that a Flood Risk Assessment is also conducted to ensure no increase in risk to third parties".*

*"**Objective SW06** Reduce risk of bird strike when developing new sites and implementing SUDS measures".*

*"**Objective SW07** Establish riparian corridors free from new development along all significant watercourses and streams. Ensure a riparian buffer strip either side of all watercourses within the LAP lands".*

*"**Objective SW08** Develop a robust surface water management system in compliance with the recommendations of the Dublin Airport Local Area Plan Strategic Flood Risk Assessment and Surface Water Management Plan associated with this LAP, to meet future development needs and providing resilience to the effects of climate change. The implementation of these plans and policy documents shall have regard to the outcomes of drainage studies undertaken for Dublin Airport, and any site specific, or industry specific information and requirements that may occur including consideration of upstream or downstream impacts".*

*"**Objective SW09** Develop a policy on sustainable drainage systems in proximity to the Airport, to ensure aircraft safety".*

Section 9.5 Surface Water Quality

Section 9.5 of the LAP deals with surface water quality and states future development should comply with the Dublin Airport Local Area Plan and Surface Water Management Plan objectives to ensure that any impacts on water quality will be positive. All discharges to surface water and to ground water must support compliance with the European Communities European Objectives (Surface Waters) Regulations 2009 and with the European Communities (Groundwater) Regulations 2010 (and all amendments thereto) respectively, both of which give effect to the Water Framework Directive. Improvement of surface water quality is expected through implementation of SuDS objectives. The surface water management plan should include, among others;

a. Proposals to intercept and collect, for separate treatment and disposal, run-off contaminated with de-icing chemicals, aviation fuels and other contaminants.

b. Provision for a surface water quality monitoring system and on-going monitoring of attenuation areas and storm water retention facilities.

c. Identify measures to prevent spillage or leakage from fuel storage and refuelling areas.

d. Incorporate a pollution contingency plan.

e. Consider impacts on groundwater.

The Dublin Airport Local Area Plan Strategic Flood Risk Assessment and Surface Water Management Plan should strive to achieve 'good status' in all of its associated waterbodies in compliance with the Water Framework Directive, the River Basin Management Plan for Ireland 2018-2021 and the associated Programme of Measures (second cycle) and in cooperation with the development and implementation of the third cycle River Basin Management Plan 2022-2027 and any subsequent plans. Accordingly, development proposals at the Airport will be required to demonstrate compliance with the following objectives:

*"**Objective SWQ01** Applications for development shall demonstrate that they comply with the Water Framework Directive. Where appropriate, permissions shall be conditioned to require the developer to undertake actions in order to improve the status of water bodies, in line with the Water Framework Directive".*

*"**Objective SWQ02** The Dublin Airport Local Area Plan Strategic Flood Risk Assessment and Surface Water Management Plan should strive to achieve 'good status' in all its associated waterbodies in compliance with the Water Framework Directive, the River Basin Management Plan for Ireland 2018-2021 and the associated Programme of Measures (second cycle) and in cooperation with the development and implementation of the third cycle River Basin Management Plan 2022-2027 and any subsequent plans".*

Section 9.6 – Ground Water

Section 9.6 of the LAP states the Water Framework Directive requires as an objective the achievement of 'good status' for groundwater. Accordingly, the following objectives are relevant for Dublin Airport:

"***Objective WQ01*** *Strive to achieve 'good status' in all waterbodies in compliance with the Water Framework Directive, the River Basin Management Plan for Ireland 2018-2021 and the associated Programme of Measures (second cycle) and in cooperation with the development and implementation of the third cycle River Basin Management Plan 2022-2027".*

"***Objective WQ02*** *Protect and develop, in a sustainable manner, the existing groundwater sources and aquifers in the County and control development in a manner consistent with the proper management of these resources in conformity with the River Basin Management Plan for Ireland 2018-2021 and the associated Programme of Measures (second cycle) and to cooperate with the development and implementation of the third cycle River Basin Management Plan 2022-2027 and any subsequent plans".*

"***Objective WQ03*** *Implement the recommendations of the Groundwater Protection Scheme".*

Section 9.8.1 – Archaeology

In Section 9.8.1 of the LAP, it is noted that the following archaeology objectives will be applied in assessing any development proposals at the Airport:

"***Objective AR01*** *Ensure archaeological remains within the LAP area are identified and fully considered at the very earliest stages of the development process and that schemes are designed to avoid impacting on the archaeological heritage".*

"***Objective AR02*** *Protect the archaeological resource by favouring the preservation in situ or at a minimum, preservation by record of archaeological sites, monuments, features or objects in their settings".*

Section 9.8.2 Architectural Heritage

Section 9.8.2 confirms that the Airport lands contain several Protected Structures listed on Fingal County Council's Record of Protected Structures. As such, the following architectural heritage objectives will be applied in assessing any development proposals at the Airport:

"***Objective AH01*** *Have particular regard to the conservation and protection of the 1937 Old Central Terminal Building and its setting".*

"***Objective AH02*** *Ensure as far as is consistent with the development of necessary airport facilities, the conservation of the architectural heritage within the LAP area and in the areas immediately adjoining the plan area".*

"***Objective AH03*** *Seek the reuse and retention of the Protected Structures within the LAP lands".*

Section 9.8.3 – Natural Heritage

Section 9.8.3 of the LAP notes it is the Council's policy as set out in the Fingal Development Plan to protect, conserve and enhance the County's natural heritage including its biodiversity, landscapes and geological heritage. In the context of this LAP, it is important to ensure, in the first instance, that land-take is minimised through careful integrated planning and that a strategic approach is taken to biodiversity and landscape management within the LAP area. The following natural heritage objectives will be applied in assessing any development proposals at the Airport:

*"**Objective NH01** Require that any development proposal involving significant removal of trees, hedgerow or which otherwise might impact on existing ecology including wildlife habitat, shall be accompanied by proposals for compensatory habitat either within the LAP boundary or on alternative lands in the general vicinity of the Airport".*

*"**Objective NH02** Mitigation should take place within the LAP area, wherever possible, and where this is not possible, outside this area but within the local area. Mitigation will include, inter alia, the provision of compensatory habitat, and should be aimed at ensuring there is no net loss of habitats and those populations of species of conservation concern are maintained".*

*"**Objective NH03** All development proposals shall have regard to the Fingal Heritage Plan 2018-2023 and the Fingal Biodiversity Plan 2010-2015 and any subsequent plan(s) where appropriate".*

5.5.3 Fingal Climate Change Action Plan 2019 – 2024

Along with the other Dublin regional local authorities, Fingal County Council has produced its Climate Change Action Plan (CCAP) in accordance with national guidelines on adaptation strategies. The Fingal CCAP presents the Council's commitments to reducing the causes and impacts of climate change to make Fingal climate resilient. Climatic trends for the next 30 years indicate a high risk of heat waves and dry spells; and sea level rises and increased high tides with a resultant increase in coastal flooding and river flooding. These climatic trends will have an impact on critical infrastructure and the built environment which will result in the greatest risk of cold snaps, dry spells, and extreme rainfall in future.

The five key action areas for the CCAP are Energy & Buildings, Transport, Flood Resilience, Nature-Based Solutions, and Resource Management. The actions most relevant to the proposed ADP relate to flood resilience, with an emphasis on nature-based solutions. Actions on flood risk management in the CCAP include implementing national guidelines in planning and finalising a SuDS policy for the County. Actions on flood defence include OPW flood protection schemes at various locations in the County.

5.6 Dublin Airport Authority Policies and Guidelines

5.6.1 Dublin Airport Environmental Sustainability Policy

The overarching policy for sustainable development at Dublin Airport is contained in daa's Sustainability Policy. Since 2013, as part of its corporate and social responsibility charter, daa has a Sustainability Policy which has as its aims to minimise negative impacts on the environment; consume as few resources as possible and communicate with the public. As part of its Environmental, Social and Governance (ESG) Strategy for the period 2021 – 2023, daa has adopted an Environmental Sustainability Policy Statement (2021) which is aligned with six of the UN Sustainable Development Goals to achieve its vision of being a national exemplar and European airport leader by 2030 and achieve zero emissions at our airports by 2050.

With regard specifically to preventing pollution and protecting the environment, the daa takes an active approach to environmental management, with regular evaluation of its Environmental Management System (EMS) at the Airport.

The targets to achieve the vision are included in seven core pillars: Carbon, Energy, Waste, Water, Noise, Air and Biodiversity, as set out in the Environmental Policy Statement reproduced below.

As part of its ongoing Sustainability Strategy, this Policy Statement is reviewed on an annual basis.

	OUR AIM	BY 2030, WE WILL
Carbon	Deliver on our landmark commitment to achieve Net Zero Carbon Emissions at both Dublin & Cork Airports by 2050	• Deliver a **50% reduction** in our carbon footprint vs. 2019 • Be a **Top 10 European Airport** for CO_2 emissions reduction per pax • Achieve **ACI Level 4+ accredition** for our airports
Energy	Position daa as an airport leader on 'Clean Energy'	• Exceed **public sector target** for energy reduction by **15%** • Produce **10%** of Dublin Airport's **annual energy** on-site • Reduce **fossil fuels** by **25%** vs. 2019
Waste	Transition to a truly 'Green Circular' business	• Send **zero waste to landfill** across daa • Drive a **30% reduction** in general waste vs. 2019 • **Recycle 90%** construction waste (60% operational)
Water	Deliver best-in-class water systems, which significantly reduce usage	• Reduce **water usage** per pax by **15%** vs. 2019 • Ensure **>40% rainwater** capture
Noise	Adopt a 'balanced approach' to noise - and effectively reduce exposure in our communities	• Fully implement ICAO **'Balanced Approach'** • Deliver key **Noise Abatement Measures** • Deliver **environment-related** Airport Charges
Air Quality	Create 'Clean Air' airports and environments	• Ensure **zero air quality pollution** exceedances • Convert entire light fleet to **Low Emission Vehicles** • Have **Fixed Electrical Ground Power** - all contact stands
Biodiversity	Protect and revitalise our airport ecosystems	• Achieve **pesticide** and **herbicide-free airports** • Protect, and create new, **ecosystems** • Plant native **woodlands** and **wildflowers**

Figure 5.1. daa sustainability targets

Since 2013, daa has regularly published its Dublin Airport Sustainability Report. In its most recent Sustainability Report (2020), daa reported that:

- Good progress was being made to achieve a 10-point reduction in water usage when compared to the 2016 baseline per passenger, through the improvement of daa's water network and the implementation of more efficient operational and control equipment. However, this has been interrupted by the decrease in passenger numbers since 2019. By 2030, daa has targeted to achieve a 15-+point decrease in water usage compared to the 2016 baseline.

- Dublin Airport became the first airport in Ireland to achieve a status of Level 3+ (Carbon Neutrality) under the Airports Council International (ACI) Airport Carbon Accreditation (ACA) Programme. The expansion of the use of Light Electric Vehicles (LEV), where almost one quarter of the fleet of commercial light vehicles are now LEV, will assist the Airport in achieving Level 4+ Carbon Neutrality accreditation by 2025.

5.6.2 Dublin Airport Carbon Reduction Strategy

Further to its ESG Strategy, daa published its Carbon Reduction Strategy in 2022 as part of its overall goal to "*Decarbonise all aspects of our operations and future development. Continue to work with our partners, passengers and stakeholders to reduce or even eliminate their emissions*".

1. By 2030, absolute Carbon Reduction by 51% (tCO2e/year) on the average 2016-2018 baseline. Net Zero Carbon by 2050.

2. Exceed public sector target of 50% energy efficiency improvement by 15%.

3. 10% onsite generated renewable electricity.

The primary objective of these targets is to optimise and, where practicable, reduce the inevitable increase in energy use, consumption of materials, emissions and associated cost of expanding, modernising and improving Dublin Airport.

Dublin Airport has made significant reductions in energy use and carbon emissions to date. This strategy sets out how Dublin Airport will achieve carbon reductions to 2030 and beyond as it moves towards Net Zero Carbon emissions by 2050. Short-term, medium-term and long-term projects have been identified and outlined which will enable Dublin Airport to move to a more efficient, low carbon and sustainable economy. In addition to carbon reduction focused projects, as it works towards increasing passenger capacity and in accordance with its policy, Dublin Airport is committed to ensuring that all of its infrastructure expansion and development is designed and delivered with carbon reduction as a key driver.

5.6.3 Dublin Airport Drainage Policy

Arising from the work on the DMP, daa has adopted its Dublin Airport Drainage Policy which acts as a framework for the design and delivery of all future drainage developments and / or upgrades of existing drainage systems at Dublin Airport to ensure adherence to consistent design standards and specifications and to a consistent design philosophy. The Dublin Airport Drainage Policy includes the following key components:

- **Dublin Airport Drainage Design Guide (DDG)**: The DDG establishes a guidance document for the design of future drainage developments at Dublin Airport in a sustainable coordinated manner, reflective of the objectives of the DMP and in accordance with the latest statutory requirements and design specifications;

- **Standard details**: A consolidated set of standard detail drawings which are to be used on all projects which require external drainage elements at Dublin Airport, as well as any projects which will upgrade existing drainage systems;

- **Reference Clauses for Civil Specifications:** This document provides a guidance document for the preparation of full Civil Construction Specifications which will need to be developed for individual projects;

- **SUDS Policy:** daa has prepared a SUDS policy which considers the application of Sustainable Urban Drainage Systems on Dublin Airport Environs and will act as a guideline for the design of SuDS schemes in the airport.

5.6.4 Dublin Airport Drainage Management Plan

The outcome of the stakeholder engagement process for the DMP informed the establishment of a proposed new progressive regulatory compliance framework, entitled the Drainage Management Plan (DMaP). The DMaP has been developed to ensure surface water management measures taken across the airport campus ensure airfield activity does not impede the achievement of "good" status of waterbodies/sub-basins around the Airport, in line with the objectives of the WFD. The DMaP outlines a phased approach, wherein it is proposed that measures to be taken to manage airfield runoff in each catchment over each RBMP cycle will form part of the catchment-wide programme of measures for the relevant waterbodies or sub-catchments in the RBMP. The DMaP has established a Technical Working Group, the main function of which is to review and provide comment on the targets, measures and performance criteria set out for each waterbody.

In support of the DMP, and as noted in the DMaP, daa has implemented an enhanced chemical and biological surface water monitoring programme. The enhanced monitoring programme will provide higher resolution water quality data across the campus. This will allow for rapid determination of potential contamination sources and timely deployment of mitigation measures, should they be required. Through time, in line with the WFD, data collected from the enhanced monitoring programme will contribute to a better understanding of how airport activities impact the catchments and will assist in identifying further measures required to facilitate the attainment of WFD objectives for each waterbody.

5.7 Conclusion

Since 2019, daa has been engaged in preparing the DMP for Dublin Airport, and has committed to implementing an enhanced surface water monitoring programme and a Drainage Management Plan. The latter sets targets directed at airport development and operations and aims to make a significant contribution to improving water quality in the waterbodies surrounding the airport campus. The DMP and the commitments made in the DMaP, will support a programme of measures for waterbodies, whereby daa will work towards achieving its sustainability targets in relation to environmental management of surface water at the airport.

6

6

CONTENTS

TABLES

6 DISASTERS & EMERGENCIES

6.1 Introduction

This Chapter has been prepared by Nicholas O'Dwyer Ltd. and presents a risk assessment of major accidents and/or disasters relevant to the Airfield Drainage Project (ADP) proposal, analysing the surface water management system to determine its resilience and operational flexibility.

The 2014 EIA Directive requires the assessment of risk of major accidents and disasters to be included within the scope of EIA. The aim is to determine any potential major accidents and/or natural disasters that the Project could (i) cause, and (ii) be vulnerable to; the potential for these major accidents and/or natural disasters to result in significant adverse environmental effects; and to determine appropriate measures required to prevent or mitigate likely significant adverse effects.

6.2 Statement of Authority

This chapter was prepared by Mark Armstrong, Chartered Civil Engineer, on behalf of Nicholas O'Dwyer Ltd. Mark has more than ten years of experience on major civil engineering projects in the drainage sector and holds a Bachelor's Degree in Civil Engineering (National University of Galway, 2011). Mark has completed training for Designing for Safety in Construction (DSC) and for the role of Project Supervisor for the Design Process (PSDP). Mark has extensive experience in the design and delivery of major civil engineering projects such as the Cork Lower Harbour Main Drainage Scheme.

6.3 Methodology

Generally, environmental risk occurs when there is a means, or pathway by which a hazard (source) results in a negative impact to the surrounding environment, *i.e.*, receptor/s. Risk assessment includes identification, classification, and evaluation.

The following reference materials were used to inform and guide the assessment:

- EU (2017) Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report;
- EPA (2022) Guidelines on the information to be contained in Environmental Impact Assessment Reports;
- EPA (2014) Guidance on Assessing and Costing Environmental Liabilities;
- DoEHLG (2010) Guidance Document 1: A Guide to Risk Assessment in Major Emergency Management;
- Dept of Defence (2017) A National Risk Assessment for Ireland 2017;

- IEMA, ARUP (2020) Major Accidents and Disasters in EIA: A Primer; and
- ISO31010 Risk Assessment Techniques.

6.3.1 Risk Identification

Risks were identified through review of the EIAR environmental factor chapters and consultation with experts, as required. As set out in the EU guidance document, risks are identified both in respect of (i) the potential vulnerability of the Project to major accidents and disasters; and (ii) the potential for the Project to cause accidents and/or disasters.

6.3.2 Risk Classification

6.3.2.1 Risk Assessment Criteria

The risk criteria applied in this assessment are based on a consequence/likelihood matrix consistent with *ISO31010: Risk Management: Risk Assessment Techniques*, a supporting standard for the international risk standard ISO31000. Reference was made to the Department of Housing, Local Government and Heritage (DoEHLG) and the EPA (2014) guidance documents and the following risk criteria were adapted for the purposes of this assessment. **Table 6.1** lists the criteria used for assessing environmental consequences. **Table 6.2** presents the criteria to determine the likelihood of an event occurring.

Table 6.1 Criteria for Assessing Scale of Environmental Consequences

Rating	Classification	Effects on natural environment
1	Insignificant	No contamination; localised, short-term effects to land, biodiversity, ecosystem services, water resources, human health
2	Minor	Limited contamination, short duration, localised effects to land, biodiversity, ecosystem services, water resources, human health
3	Moderate	Moderate, medium-term impacts with widespread effects to land, biodiversity, ecosystem services, water resources, human health
4	Major	Medium- to long-term, serious environmental effects with some impairment to ecosystem function and human health, widespread impacts
5	Catastrophic	Permanent, severe impacts to land, biodiversity, ecosystem services, water resources, human health

Table 6.2 Criteria for Assessing Likelihood of Event Occurring

Rating	Classification	Effects description
1	Extremely unlikely	Consequence may only occur in exceptional circumstances
2	Unlikely	Consequence could occur at some time
3	Occasionally	Consequence should occur at some time
4	Likely	Consequence will probably occur in most circumstances
5	Almost certain	Consequence is expected to occur in most circumstances

6.3.3 Risk Evaluation

The risk matrix was developed with reference to the guidelines, listed above, in particular, the EPA (2014) and the DoEHLG (2010) guidance documents. **Table 6.3** presents the matrix that was applied in carrying out the risk assessment.

Table 6.3 Risk Matrix

	Environmental Consequence				
Likelihood	**1: Insignificant**	**2: Minor**	**3: Moderate**	**4: Major**	**5: Catastrophic**
1: Extremely Unlikely	Low	Low	Low	Low	Low
2: Unlikely	Low	Low	Low	Moderate	Moderate
3: Occasional	Low	Low	Moderate	Moderate	High
4: Likely	Low	Moderate	Moderate	High	High
5: Almost Certain	Low	Moderate	High	High	High

6.4 Existing Environment

6.4.1 Natural Disasters

Given its geographical location, Ireland is relatively less vulnerable to natural disasters such as earthquakes or tsunamis. However, recently there has been an increase in the number of extreme weather events, particularly those leading to flooding and flash flood incidents. In October 2011, an exceptional heavy rainfall event occurred where Dublin Airport reported a 9-hour rainfall event of 66.8mm. This event resulted in some flight delays and cancellations. Such an event has an annual probability of 1 in 100 (Met Eireann, 2011).

Periods of extreme cold weather at Dublin Airport, while rare, have been observed to occur. These events lead to widespread, continuous de-icing / anti-icing operations which can generate large quantities of contaminated surface water runoff, and this can impact the quality of receiving waters if not adequately mitigated. The worst-case scenario impacts of extreme cold weather events have been rigorously assessed during this analysis.

6.4.2 Potential Sources of Offsite Hazards

The following potential hazards have been identified: (i) aircraft movements; and (ii) the fuel farm facility on Corballis Road South operated by CLH Aviation Ireland Ltd on behalf of daa. The latter is a lower tier Seveso establishment. This requires the operator to operate the site in accordance with a major accident prevention policy and to notify the regulator of any accidents that occur.

6.5 Risk Assessment

A range of scenarios were identified which have the potential to lead to disaster or emergencies. The potential disaster / worst-case scenarios which could occur as a result of these disaster and / or emergencies include the following:

- Contaminated overflow causing pollution of receiving waters; and
- Flooding of the airfield, causing an impact to airport operations.

The proposed surface water management includes a robust suite of measures which are designed to avoid the disaster / worst-case scenarios outlined in this section. These measures form an integral part of the ADP proposals and are described below as primary mitigation measures.

Nonetheless, it is a necessary part of design to consider the residual risk that these disaster / worst-case scenarios may still occur, despite the safeguards in place to prevent them. A risk assessment was therefore carried out using the classification and evaluation criteria described in **Table 6.1** to **Table 6.3**. This risk assessment assessed the primary mitigation measures included in the ADP design, established the consequence and likelihood of each worst-case scenario, and then used this information to determine the resultant risk level (see **Table 6.4**).

Worst-case scenarios whose resultant risk level is determined to be "moderate" or higher were then subject to further risk assessment (see **Table 6.5**). This involved the identification of further mitigation measures to be implemented during the detailed design and subsequent operation of the proposed ADP developments, with the aim of reducing the resultant risk level to a low rating.

It should be noted that the ADP Operational Control Philosophy (**Appendix 11A** of this Planning Application) includes Operational Procedures (OPs) for the pollution control infrastructure, under a range of operational scenarios. Each OP includes details of the following:

- The optimal operation path (OOP) and the steps to be taken to remain on the OOP, for a range of default and non-default scenarios. Many of the default system responses are automated, however, the OPs also outline the circumstances where human intervention is needed;
- System optimisation procedures which allow the system's operation to be adjusted to suit current conditions and reduce the likelihood of a future contamination or flooding event;
- The emergency intervention procedures needed to return to the OOP, if the system has not been functioning correctly and is no longer on the OOP; and
- The worst-case or 'disaster' scenario whereby the corrective action was not sufficient to avoid a contamination event, or action was not taken on time. Under this scenario, a contamination or flooding event is either imminent or ongoing and will continue until the necessary emergency intervention has been carried out and / or the extreme weather event has ceased.

These OPs were used to inform the development of the risk assessment in this report.

Table 6.4 Risk Assessment

Event	Disaster / Worst-case Scenarios	Primary Mitigation Measures (Included in ADP Design)	Enviro. Consequence	Likelihood	Resultant Risk Level
Power outage	Potential contamination of receiving waters due to failure of pollution control infrastructure or flow control mechanisms (if power outage coincides with contaminated runoff event). Flooding of the airfield due to failure of pumping equipment or flow control mechanisms (if power outage coincides with extreme rainfall event).	Dublin Airport has two separate power sources to supply its own isolated network. If one of these supplies were to fail, then the second supply would automatically take-over within 4 seconds. In the unlikely event that both power sources suffer an outage simultaneously, additional contingency power arrangements exist: 1. The system will initiate the appropriate failed-state configuration. The failure-states are designed to ensure that contaminated runoff does not reach the receiving waters and that flows do not surcharge in the network or cause flooding. 2. The airfield-wide Supervisory Control and Data Acquisition (SCADA) system includes an alarm dial-out function, which will notify the relevant personnel of the power outage / failure. They will initiate the emergency response protocol to address the issue. A dedicated uninterrupted power supply (UPS) is to be provided to all Programmable Logic Controllers (PLC) and SCADA control stations connected to the airfield-wide SCADA system. The UPS back-up will maintain the operation of the alarm notifications, the instrumentation, data recording and all PLC / SCADA functions. This will enable remote inspection so that the required interventions can be quickly identified and actioned.	**Minor.** Any outage is likely to be of short duration as power would have to be quickly restored to Dublin Airport. However, contaminated flows may reach the surface water during this time, impact will be of short duration with localised effects to land, biodiversity, ecosystem services, water resources, human health.	**Unlikely.** Due to the dual power supply, it is unlikely that a power outage would occur. Design includes primary mitigations to avoid worst-case scenarios even if the outage does occur.	**Low**
Equipment Failure	Failure of equipment, potentially resulting in: 1. contaminated runoff reaching the receiving waters (if	When an equipment failure occurs, early identification and response is key to avoiding a negative impact. The airfield-wide SCADA system is designed to enable inspection of the system status so that	**Moderate.** Typically, the impact should be short-term but, if the	**Occasionally.** Despite the scheduled maintenance and	**Moderate**

Event	Disaster / Worst-case Scenarios	Primary Mitigation Measures (Included in ADP Design)	Enviro. Consequence	Likelihood	Resultant Risk Level
	equipment failure coincides with contaminated runoff event), or 2. flooding of the airfield and an impact to airport operations (if equipment failure coincides with extreme rainfall event).	operations personnel can verify whether an equipment failure has caused the system to function incorrectly. OPs have been developed (see Operational Control Philosophy **Appendix 11A** of the Planning Documentation) to indicate the OOP and to outline the interventions required to return to the OOP when an equipment failure occurs.	failure cannot be quickly remedied, there could be a moderate, medium-term impact to water quality.	replacement of equipment, failures will likely occasionally occur.	
SCADA Communication Failure	A communication failure could cause system errors / malfunctions not to be identified. Prolonged periods of incorrect system function could result in 1. Contamination of the receiving waters (if equipment failure coincides with contaminated runoff event), or 2. Flooding of the airfield (if equipment failure coincides with extreme rainfall event).	Firstly, it should be noted that a UPS will be provided to prevent a communication failure from occurring, even during a power outage. In the event where there is a temporary failure of the internet connection, the central PLC loses communication with satellite PLCs. However, each PLC is designed such that it will continue to operate the local equipment and instrumentation associated with it. In the unlikely event that a communication failure occurs, early identification and response is key to avoiding a negative impact. During normal system operation, a 'Heart beat' signal will be transmitted from each system element to the central SCADA PLC. Once the 'Heart Beat' signal is not received for a pre-determined period of time, an alarm will be generated to notify a communication failure. This will trigger the emergency response protocol which should typically allow the issue to be identified and resolved so that the disaster / worst-case impact does not occur. Additionally, when the communication failure alarm is activated, the affected equipment will initiate failed-state configurations, which are designed to prevent disaster / worst-case impacts.	**Minor.** Any communication failure should be quickly identified due to the Heart-Beat signal and alarm system. Any negative impact should be of short-term.	**Unlikely**. SCADA communication failures could occur occasionally but it would need to coincide with an extreme weather event for the worst-case impact to occur. The primary mitigations further reduce the likelihood of this occurrence.	**Low**

Event	Disaster / Worst-case Scenarios	Primary Mitigation Measures (Included in ADP Design)	Enviro. Consequence	Likelihood	Resultant Risk Level
Extreme rainfall event	Exceedance of network hydraulic capacity, resulting in flooding which impacts airport operations. If this occurs during a contamination event, this could contaminate the surrounding environment, including receiving waters.	The proposed network pipelines and attenuation tanks have been designed to convey the 1 in 100-year peak design rainfall event, with an additional uplift factor of 30% to cater for the future effects of climate change. When an exceedance of the system's hydraulic capacity cannot be avoided, the following avoidance measures will be implemented to prevent flooding in the airfield: 1. Runoff above the capacity of the system will continue to overflow to the downstream Cuckoo Supply Channel, *via* the flow continuation weir, and to the Cuckoo Stream. This is designed so that any flooding which cannot be avoided would not impact airport operations within the airfield. 2. The network decision points (DP) include overflow weirs so that, should the flow control valves fail, flows can surcharge and overflow to the downstream network. 3. There is a series of overflow culverts which will be used to bypass the culvert across the R132 if its capacity is exceeded. This is designed to prevent flooding of the airfield and the R132. 4. If contaminated runoff is encountered during a flooding event, the mitigation measures outlined under "extreme weather or de-icer related events" below will also be implemented, to control the overflow and to mitigate the contamination of the receiving waters.	**Minor**. The ADP provides significant hydraulic capacity upgrades and includes emergency measures for exceedance events, with the result that any impact should be short-duration. Also, any contaminants would be significantly diluted due to the large flow rate.	**Unlikely**. The ADP provides significant hydraulic capacity upgrades and includes emergency measures for exceedance events, to avoid airfield flooding.	Low

Event	Disaster / Worst-case Scenarios	Primary Mitigation Measures (Included in ADP Design)	Enviro. Consequence	Likelihood	Resultant Risk Level
Extreme weather or de-icer related event(s): • **De-icing operations (single large event or multiple events)** • **Large-scale de-icer spillage** • **Large-scale snow-melt event**	Pollution Control Facilities (PCF) exceedance due to extreme weather or de-icer related event(s), leading to contaminated overflow to the receiving waters.	The surface water management system includes a comprehensive suite of measures to counteract the risk of contaminated runoff entering the receiving waters, including: • Source control measures to prevent contamination at source; • Contamination Detection and Response system, to identify and segregate contaminated runoff; and • Pollution control facilities (Central PCF and West Apron Pollution Tank (WA-PT)), to capture contaminated runoff and discharge it to sewer. The pollution control facilities have been designed based on de-icing pollution modelling. The design basis is such that there should be no contaminated overflow to receiving waters on 95% of de-icing seasons. The system includes further optimisation measures and operational control adjustments which can be applied to avoid contamination of receiving waters. These are detailed in the Operational Procedure diagrams in the Operational Control Philosophy (**Appendix 11A** of the Planning Documentation). In exceptional circumstances, where an exceedance of PCF capacity cannot be avoided, additional contingency measures are included to reduce the severity of the impact. 1. The system can potentially use the trunk contaminated pipelines as a form of online storage to mitigate the extent of overflow to the receiving waters.	**Moderate**. Primary mitigations will typically avoid contamination events but any contamination which occurs could still have a moderate impact, if the event persists for a medium duration.	**Unlikely**. Given the robust suite of primary mitigation measures included in the ADP design, this worst-case scenario is unlikely to occur.	Low

Event	Disaster / Worst-case Scenarios	Primary Mitigation Measures (Included in ADP Design)	Enviro. Consequence	Likelihood	Resultant Risk Level
		2. The sewer discharge rates can be temporarily adjusted under certain circumstances, within the conditions of the sewer discharge licence (TEDL), to maximise the system's output. This increased discharge rate will empty the tanks quicker, allowing more runoff to be pumped to sewer instead of the receiving waters. 3. The system has operational flexibility to choose from more than one overflow route such that the runoff with the lowest concentration is allowed to overflow, thereby mitigating the extent of receiving water contamination.			
Fuel / oil spillage or leakage	Fuel / oil spillages or leakages being conveyed to the surface water network and to the receiving waters, causing contamination.	The surface water management system includes the following measures to prevent contamination of receiving waters when a fuel / oil spillage occurs: 1. The emergency response to a spillage / leakage includes at-source pollution control measures to prevent hydrocarbons from entering the network. 2. Oil interceptors are placed throughout the network to remove hydrocarbons which are not successfully controlled at source. 3. Hydrocarbon monitoring is provided to identify any remaining hydrocarbons, downstream of the interceptors, triggering a further system response to prevent receiving water contamination. This involves	**Moderate**. The primary mitigations should remove the majority of the contaminants. The residual contaminants would be anticipated to cause a medium-term	**Occasionally**. Despite primary mitigations, this event is likely to occur occasionally. This is because fuel spillages are unplanned, emergency events which cannot be predicted in	**Moderate**

Event	Disaster / Worst-case Scenarios	Primary Mitigation Measures (Included in ADP Design)	Enviro. Consequence	Likelihood	Resultant Risk Level
		diversion of contaminated flows to a PCF to be removed for safe disposal. In exceptional circumstances, where a disaster / worst-case impact cannot be avoided, remote inspection of the SCADA system will enable swift identification of the source of the contaminated runoff. The alarm would notify the relevant action owners who would then implement the necessary corrective actions. Additionally, it should be noted that the system has more than one potential overflow route. This provides operational flexibility so that the system can allow the runoff with the lowest level of contamination to overflow, thereby mitigating the contamination of receiving waters.	impact as a worst case.	advance (unlike de-icing events).	
Blockage of a Trunk Pipeline	A blockage of a major drainage artery could result in flooding of the airfield. If the runoff is contaminated, this could lead to contamination of the surrounding environment.	Level sensors will be provided at key junctions in the network to identify when water levels are rising due to a blockage or restriction along the pipeline. When a blockage is observed, an alarm will be notified to the relevant personnel to initiate their investigation, to identify the location and nature of the blockage. This will enable the required corrective action to be established and actioned. Furthermore, the design of the Cuckoo Supply Channel and the DPs include flow continuation weirs, as described in "Extreme rainfall event" above, to mitigate the risk of flooding in the airfield. When an exceedance of the system's hydraulic capacity cannot be avoided, the primary mitigation measures outlined under "Extreme rainfall event" above will be implemented. If the runoff is contaminated, the primary mitigation measures outlined under "extreme weather or de-	**Moderate**. The worst-case scenario would be anticipated to have a moderate, medium-term impact.	**Unlikely**. Pipeline blockages could occur occasionally but this event would need to coincide with an extreme weather event for the worst-case impact to occur. The primary mitigations further reduce the likelihood of the worst-case occurrence.	Low

Event	Disaster / Worst-case Scenarios	Primary Mitigation Measures (Included in ADP Design)	Enviro. Consequence	Likelihood	Resultant Risk Level
		icer related events" above will also be implemented, to control the overflow and mitigate the contamination of the receiving waters.			
Fire or explosion on site	Damage to the surface water management system, potentially resulting in failure of pollution control infrastructure and consequent contamination of receiving waters.	If a fire damages the surface water management system, equipment failure is likely. The primary mitigation measures outlined under "equipment failure" above would be implemented for the affected equipment. Also, it should be noted that the SCADA system would continue to operate the remaining infrastructure, meaning that the impact would be localised to the area directly affected by the fire damage.	**Major.** Potential serious impact to human health if operatives are impacted by fire. Potential medium-term, environmental effects if the drainage system malfunctions as a result of fire.	**Unlikely**. Given the highly regulated and restricted nature of the airfield, a fire event is considered to be unlikely. Furthermore, the majority of ADP proposals are located outside of aircraft trafficked areas and away from buildings where fires could occur, further reducing the likelihood.	**Moderate**

Event	Disaster / Worst-case Scenarios	Primary Mitigation Measures (Included in ADP Design)	Enviro. Consequence	Likelihood	Resultant Risk Level
Incident at nearby Seveso site	An off-site incident at the nearby Seveso site, which could include fire/explosion or leakage of fuel into the surface water network.	N/A	**Catastrophic**. Potentially permanent and severe impact to human health in the event of a fire / explosion, given the large volume of fuel stored at the Seveso site.	**Extremely Unlikely**. Such an event would be an exceptionally rare occurrence given the preventative procedures in place at the Seveso site.	**Low**

The conclusions of the above risk assessment can be summarised as follows:

- A robust suite of primary mitigation measures has been incorporated into the ADP design to reduce the risk level attached to each of the events assessed.
- The majority of worst-case scenario events were deemed to have a Low resultant risk level. "Low" risk events do not require further mitigation at this stage. Nonetheless, these risks will be continuously monitored through all stages of the project.
- Events whose resultant risk level is moderate or greater require further mitigation. This includes the following events:
    - Equipment failure.
    - Fuel / oil spillage or leakage.
    - Fire or explosion on-site.

Table 6.5 presents the residual risk assessment for these events, with consideration during detailed design stage and operation, there will be ongoing refinement of the risk management strategy and mitigation measures.

Table 6.5 Further Risk Assessment with Additional Mitigation Measures

Event	Disaster / Worst-case Scenarios	Mitigation Measures	Enviro. Consequence	Likelihood	Resultant Risk Level
Equipment Failure	Failure of equipment, potentially resulting in: 1. contaminated runoff reaching the receiving waters (if equipment failure coincides with contaminated runoff event), or 2. flooding of the airfield and an impact to airport operations (if equipment failure coincides with extreme rainfall event).	• Provision of redundancy / back-up supplies of critical equipment with long lead-in times. This will enable quicker replacement of equipment and reduce the likelihood and severity of the worst-case environmental consequence. • Communication of design data and risk assessments completed in support of this planning application to the future detailed designers. This will enable them to ensure that all residual risks are comprehensively addressed by the detailed design solution. • A detailed Hazard and Operability (HAZOP) study should be carried out at detailed design stage. The HAZOP should evaluate the mitigation measures in place and address the potential for refinement to reduce the risk associated with this event to a "low" resultant risk level. • An Emergency Response Protocol should be developed for this event. The emergency response planning requirements should include the following requirements at a minimum: o Response hierarchy: a hierarchy of the roles and responsibilities of	**Minor.** With the provision of redundancy of critical equipment will reduce the duration of any impact, thereby reducing the severity to a short-term minor impact.	**Unlikely.** The additional mitigation measures would serve to reduce the duration of the equipment failure, thereby reducing the likelihood that the failure will coincide with a contaminated runoff event or an extreme rainfall event, leading to this worst-case scenario.	**Low**

Event	Disaster / Worst-case Scenarios	Mitigation Measures	Enviro. Consequence	Likelihood	Resultant Risk Level
		the relevant personnel under each category of emergency event. o Response assessment: the initial assessment of the emergency event and the required actions, which will be carried out once the alarm / alert has been raised. o Response procedures: the procedure for the implementation of emergency response actions, as determined by the initial response assessment.			
Fuel / oil spillage or leakage	Fuel / oil spillages or leakages being conveyed to the surface water network and to the receiving waters, causing contamination.	• The planned installation of an underground fuel system will reduce the risks around fuel handling and transport, reducing the likelihood of a spillage or leakage occurring. This would likely be subject to planning permission. • Communication of design data and risk assessments completed in support of this planning application to the future detailed designers. This will enable them to ensure that all residual risks are comprehensively addressed by the detailed design solution. • A detailed Hazard and Operability (HAZOP) study should be carried out at detailed design stage. The HAZOP should	**Minor**. The additional mitigation measures would reduce the duration and impact of a spillage / leakage, resulting in a minor impact.	**Unlikely.** The provision of an underground fuel supply and the preparation of a HAZOP study and emergency response protocols will mean that spillages / leakages will be unlikely.	**Low**

Event	Disaster / Worst-case Scenarios	Mitigation Measures	Enviro. Consequence	Likelihood	Resultant Risk Level
		assess options and identify refinements to the risk management strategy and mitigation measures to reduce the risk associated with this event to a "low" resultant risk level. • Airport operational procedures for fuelling / de-fuelling operations and spillage responses to be updated for the upgraded ADP Contamination Detection and Response (CD&R) system. • An Emergency Response Protocol should be developed for this event. The emergency response planning requirements should include the following requirements at a minimum: o Response hierarchy: a hierarchy of the roles and responsibilities of the relevant personnel under each category of emergency event. o Response assessment: the initial assessment of the emergency event and the required actions, which will be carried out once the alarm / alert has been raised. o Response procedures: the procedure for the implementation of emergency response actions,			

Event	Disaster / Worst-case Scenarios	Mitigation Measures	Enviro. Consequence	Likelihood	Resultant Risk Level
		as determined by the initial response assessment.			
Fire or explosion on site	Damage to the surface management system, potentially resulting in failure of pollution control infrastructure and consequent contamination of receiving waters.	• Provision of fire alarms and fire extinguishers at control kiosks where operations personnel will be stationed. • Communication of design data and risk assessments completed in support of this planning application to the future detailed designers. This will enable them to ensure that all residual risks are comprehensively addressed by the detailed design solution. • A detailed Hazard and Operability (HAZOP) study should be carried out at detailed design stage. The HAZOP should assess options and identify refinements to the risk management strategy and mitigation measures to reduce the risk associated with this event to a "low" resultant risk level. • An Emergency Response Protocol should be developed for this event. The emergency response planning requirements should include the following requirements at a minimum: o Response hierarchy: a hierarchy of the roles and responsibilities of	**Moderate** Effective implementation of emergency response procedures will reduce the severity of the consequence.	**Unlikely**. Given the highly regulated and restricted nature of the airfield, a fire event is considered to be unlikely.	**Low**

Event	Disaster / Worst-case Scenarios	Mitigation Measures	Enviro. Consequence	Likelihood	Resultant Risk Level
		the relevant personnel under each category of emergency event. o Response assessment: the initial assessment of the emergency event and the required actions, which will be carried out once the alarm / alert has been raised. o Response procedures: the procedure for the implementation of emergency response actions, as determined by the initial response assessment.			

6.6 Conclusions

In conclusion, the primary mitigation measures included in the design of the ADP surface water management system, with additional mitigation results in low risk levels of identified risks as presented in **Table 6.4** and **Table 6.5**.

The likelihood of disaster / worst-case scenarios is likely to be lower under the proposed arrangement than under the current arrangement, due to the proposed infrastructure upgrades, system optimisations and additional contingency measures / safeguards.

The severity of any impact would be reduced under the proposed system, due to the primary mitigation measures which will be implemented.

In summary, most of the identified and assessed worst-case scenarios were deemed to have a Low resultant risk level given the primary mitigation measures included in the ADP design. While "low" risk events do not require further mitigation at this stage, nonetheless, they will be further refined at detailed design stage to identify any opportunities for further risk reduction. For those events with a "moderate" resultant risk level, while all reasonably practicable measures have been incorporated at this stage of design, further refinements are required for implementation at detailed design stage and during the operation of the system to reduce the risk level to a rating of "low".

daa will regularly assess the risk of major accidents and/or disasters throughout the operational phase and will periodically review emergency response protocols.

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7.1 Introduction

The growth of Dublin Airport is mandated by government policy[1], and is supported in national, regional and local planning policy, including the extant Fingal Development Plan (2023 – 2029) and the Dublin Airport Local Area Plan 2020. The proposed ADP does not propose any uplift in the current 32 million passenger per annum capacity (mppa) limit in place at Dublin Airport. However, the ADP is designed to ensure that the drainage proposed for delivery, which passes through strategic portions of the Airport, is sufficiently safeguarded to cater for future flows. 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 practicably foreseeable.

The ADP drainage system enhancements and infrastructure proposals have been informed by the DMP and the Dublin Airport Vision (DAV) 2040. The DMP considered the 40mppa design horizon (as well as the 55mppa horizon). Accordingly, given that there is a long-term policy to expand Dublin Airport as a whole, it is considered appropriate that the proposed ADP is considered in that wider context, with account being taken of planned future development at Dublin Airport as appropriate and as far as practicably possible at this stage. The DAV 2040 is intended as an accessible guide to Dublin Airport's planned infrastructure investment, set within the context of the immediate operational needs, the prevailing planning policy context and, importantly, a longer-term strategic vision for future growth. It details how Dublin Airport intends to develop the necessary facilities and infrastructure to meet its obligations to deliver and grow international connectivity as prescribed by Ireland's national policies.

Planned future development is that which is currently envisaged as potentially being required to meet the future needs of an expanded airport. These proposals may be altered and refined and perhaps some may even be abandoned as the requirements for airport capacity evolve.

Development proposals are currently being prepared for Airport infrastructure to accommodate future growth to 40mppa. These future development proposals will be subject of future planning permission applications and supported by reports to demonstrate the relevant project's compliance with EU Directives on EIA, AA, WFD, and Flooding, as applicable.

The proposed ADP is a standalone proposal and is not needed because of, or reliant on, future airport growth or developments to be realised. However, an awareness of future airport proposals is relevant in considering the proposed ADP given the potential for interaction with future developments. In this respect, this chapter is intended to give an overview of plans for future developments so that, consistent with the purpose of the EIA Directive and case law, account can be taken by the competent authority, in this case, Fingal County Council, of future projects in the context of the assessment of the environmental effects of the proposed development.

[1] National Aviation Policy for Ireland (2015), https://www.gov.ie/en/publication/4de76f-national-aviation-policy/

The future development plans discussed in this chapter do not form part of the proposed ADP. This chapter sets the context of planned airport growth, and potential associated effects, noting, however, that none of these plans are yet the subject of a planning application. It is not the scope of this chapter to assess effects, rather, an initial scoping exercise is presented.

7.2 Methodology

The current state of the environment is discussed in relation to each environmental factor in Part 2 of the EIAR. Desk studies and surveys have informed an understanding of current environmental conditions and, insofar as possible, this has been projected forward to determine the Future Receiving Environment, as presented in this chapter.

The general approach in this chapter is to describe the Future Receiving Environment as it appears from the vantage point of 2023. The Applicant's own planned development is then described, setting out the main aspirations for Dublin Airport and what these would entail. This is followed by consideration of the future development plans (**Section 7.5**).

7.2.1 Limitations and Assumptions

Future proposals for Dublin Airport, which include making a planning application for projects to enable the airport 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. While change is likely, what is set out below represents the best current available knowledge on which to form a view as to what an airport of 40mppa might comprise.

7.3 Future Receiving Environment

This section considers a Future Receiving Environment in 2027 from the vantage point of 2023, when the proposed ADP developments are due to come into operation. After this time, it is assumed that the airport would expand to 40mppa (assumed to be after 2030, which aligns with future projections for passenger growth and the necessary infrastructure to support this).

The Future Receiving Environment in 2027 is likely to be broadly similar to the Current State of the Environment discussed elsewhere in the EIAR. However, the planned Underpass Project, currently on appeal with An Bord Pleanála (F22A/0460), and the ADP, the subject of this planning application, would be operational (if permission is granted).

At a strategic level, the Future Receiving Environment will be shaped by several key drivers. Firstly, in relation to population growth. The Dublin metropolitan area is projected to rise significantly over the period addressed in this chapter. Over the period between 2023 and 2027, 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[2] 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), BusConnects and the proposed Metrolink will see increased populations in these parts of Dublin City and Fingal.

[2] Eastern and Midland Regional Assembly RSES https://emra.ie/final-rses/.

Secondly, climate change and the national response to it, both in terms of emissions and adaptation, with ambitious plans[3] to reduce emissions in the Climate Action Plan 2023. 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.

Thirdly, technology is likely to affect society and the environment in ways which are difficult to predict but may be profound.

7.4 Future Development Overview

There are a number of assessments being undertaken and studies underway by the Applicant which will shape the future development of Dublin Airport.

Key reports and studies are discussed in this section.

7.4.1 Dublin Airport Vision

The Dublin Airport Vision (DAV) 2040 is intended as an accessible guide to Dublin Airport's planned infrastructure investment, set within the context of the immediate operational needs, the prevailing planning policy context and, importantly, a longer-term strategic vision for future growth. It details how Dublin Airport intends to develop the necessary facilities and infrastructure to meet its obligations to deliver and grow international connectivity as prescribed by Ireland's national policies. This need is acknowledged by the National Aviation Policy (NAP) and National Planning Framework (NPF), which describes connectivity as "vital to our survival, our competitiveness and our future prospects". daa must ensure this national strategic objective is achieved through investment in Dublin Airport in a sustainable and coordinated manner. This means ensuring what is delivered now does not compromise wider policy goals or future longer-term sustainable opportunities.

The DAV 2040 sets a flexible, holistic guide to the near, medium and longer-term development of the airport, which maintains flexibility to respond to the ever-changing national needs, as well as those of the Airport's stakeholders, neighbouring communities and passengers. The three core principles of the DAV are:

- *'**Meet the Needs of Today**: Continued safe and efficient operation of our national airport – allowing us to provide a good standard of service to our passengers and airline customers, while respecting our local communities and the environment;*
- ***Deliver Infrastructure for Tomorrow**: Coherent, sustainable and plan-led growth of Dublin Airport to 40mppa in line with aviation and planning policy at national, regional and local levels in the medium term; and*

[3] Climate Action and Low Carbon Development (Amendment) Act 2021

[4] Environmental Protection Agency, Ireland's Greenhouse Gas Emissions Projections 2019-2040 https://euagenda.eu/publications/ireland-s-greenhouse-gas-emissions-projections-2019-2040.

- ***Safeguard for the Future:*** *Safeguard for future development, ensuring that the way in which the airport develops now does not compromise future airport operations, including provision of a potential future third terminal, if required. Given our national reliance on foreign travel and the pace of change in the air travel industry, daa must set an adaptive framework to allow it to respond to any future requirements in the national interest if so required.'*

7.4.2 Capital Investment Programme 2020+

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+), 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.

7.4.3 Drainage Masterplan

The DMP is a holistic long-term plan for drainage infrastructure at Dublin Airport. It examines existing and future drainage infrastructure requirements and presents a long-term phased and coherent approach to improvements in drainage infrastructure, including the 40mppa and 55 mppa development horizons. This approach to drainage developments ensures that a coherent design philosophy is implemented across all future drainage projects at Dublin Airport.

The overarching objectives of the DMP project were to:

- 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.
- Monitor and assess the existing drainage network and receiving watercourses on an ongoing basis to inform improvements in systems and practices and ensure compliance.
- Provide drainage design guidelines and policies for Dublin Airport to ensure consistency of approach to both the development and operation of infrastructure across the site, in line with daa's Sustainability Policy and planning and water management policies.
- 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 daa'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.
- Stakeholder engagement ensured the DMP is aligned with national, regional and local legislation, development plans and policies.

7.4.4 Drainage Management Plan

The DMaP was developed by the Applicant following extensive engagement, during the preparation of the DMP, with Fingal County Council (FCC), Inland Fisheries Ireland (IFI) Local Authorities Waters Programme Office (LAWPRO) and the Environmental Protection Agency (EPA). The DMaP was submitted to the Department of Housing, Local Government and Heritage in response to public consultations on Significant Water Management Issues on the Third Cycle River Basin Management Plan for Ireland. This submission included highlighting the contribution that the targets and measures specified in the DMaP would make within each programme of measures for the waterbodies surrounding the Airport.

The DMaP establishes a phased, systematic, evidence-based approach to the design and operation of pollution control infrastructure at Dublin Airport with the aim of contributing to the achievement of "Good" status in receiving waters in line with the Water Framework Directive 2000/60/EC (WFD) through the phased development of new and upgraded drainage infrastructure and improvements in the operation of the Airport's surface water management infrastructure.

As mentioned, the DMaP involves an inter-agency Technical Working Group working with daa to set objectives and targets and monitor water quality trends on an ongoing basis. This Technical Working Group was first convened on 17th May 2023, with the resulting targets and measures published on 24th July 2023. The framework in the DMaP aims to contribute to achieving the WFD objectives for all waterbodies affected by the Airport.

7.4.5 Carbon Reduction Strategy

Further to its ESG Strategy, daa published its Carbon Reduction Strategy in May 2021 as part of its overall Sustainability Policy to "*Decarbonise all aspects of our operations and future development, and continue to work with our partners, passengers and other stakeholders to reduce or even eliminate their emissions*".

1. Absolute Carbon Reduction by 30% (tCO2e/year) on 2019 baseline.
2. Exceed public sector target for energy reduction by 15%.
3. 10% onsite generated renewable electricity.

The primary objective of these targets is to optimise and, where practicable, reduce the inevitable increase in energy use, consumption of materials, emissions and associated cost of expanding, modernising and improving Dublin Airport.

These targets align with worldwide and national efforts to meet the 1.5 °C global warming limit and meet the challenges of Ireland's National Climate Change Action Plan 2023. When measuring against the IPCC's 2010 baseline, daa's 2030 target will position Dublin Airport ahead of IPCC's recommended interim target milestone of -45% reduction of emissions to provide acceptable alignment with the IPCC 1.5 °C limit.

In line with daa's carbon reduction hierarchy, as illustrated below, the greenhouse gas emissions arising from infrastructure developments, must be offset in the context of the overall carbon emissions reduction strategy for the Airport.

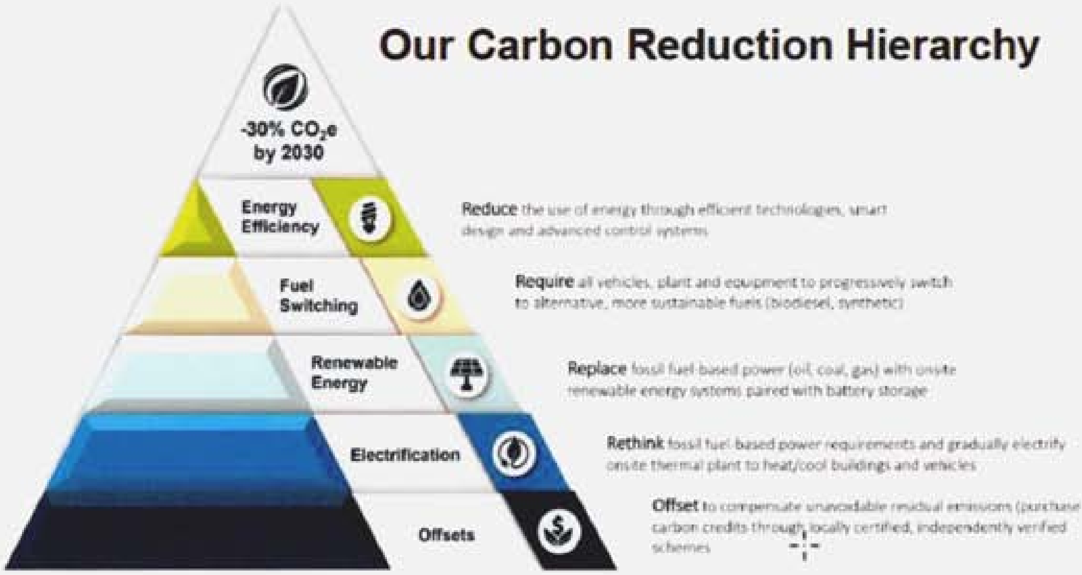

Figure 7.1 Dublin Airport Carbon Reduction Hierarchy

7.5 Reasonably Foreseeable Future Development Plans

This section outlines the planned developments in the vicinity of Dublin Airport and the proposed ADP project, see **Table 7.1**. These plans are considered to fall under one of the following four "Buckets":

- Bucket 1: Projects Consented and being implemented;
- Bucket 2: Projects Consented but not yet implemented;
- Bucket 3: Lodged and pending applications which have not yet been determined; and
- Bucket 4: Future planned developments not submitted for consent.

The planned developments can be further sub-divided into Business As Usual (BAU) projects and Major Developments. The BAU projects which are planned by the Applicant are required 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.

Major developments are planned developments which are not considered to be BAU projects. These planned projects represent significant works within the airport and are close to the proposed ADP project.

Table 7.1 presents the relevant identified projects that could result in interaction of effects with those arising from the ADP. This chapter considers those projects that fall into Bucket 4. **Chapter 18 – Interactions & Cumulative Effects** considers the projects that fall into Buckets 1-3 and indicates which of these were scoped in for cumulative assessment throughout each of the environmental factor chapters as relevant. The findings of the cumulative assessment are summarised in **Chapter 18**.

Table 7-1: Reasonably Foreseeable Future Development Plans

Bucket	P.A. Reg. Ref.	Description of the Proposed Development	Status	Type
1	F20A/0550	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 on a site of 19.2ha.	Planning permission granted on 13 July 2022. Construction underway.	BAU
1	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.	Section 5 application declared exempt development on 31 July 2019. Construction underway.	BAU
1	F19A/0168	An extension of the existing Terminal 1 baggage hall in two locations to facilitate the mandatory upgrade of the airport security screening system for passenger baggage.	Planning permission granted on 16 July 2019. Construction underway.	BAU
1	F18A/0638	The development will consist of enabling works to facilitate the mandatory upgrade of the airport security screening system for passenger baggage. This will include the demolition and clearance of the Carousel No. 4 Building, totaling 996 sqm, making good the remaining Terminal 1 facade; and all associated fencing and site works.	Planning permission granted on 19 February 2019. Construction underway.	BAU
1	F21A/0232	The development will consist of a temporary (5 year lifespan) construction contractor 'West Compound' on a 5.9 ha site adjoining the R108 public road. The proposed development will include the continuation of use of the existing North Runway contractor compound (including existing office cabins, vehicle workshop, security gatehouse, soil mounding and foul sewer tank) along with a number of amendments and additions to the existing facility to provide a consolidated 'West Compound' for airside development contractors.	Planning permission granted on 14th June 2021. Project constructed.	Major Development

Bucket	P.A. Reg. Ref.	Description of the Proposed Development	Status	Type
		The amendments and additions to the existing facility include: reduced car parking (150 no. spaces), new truck parking (25 no. spaces) and trailer set down area, new bus stop, cycle parking provision, a new hardstanding area for skip set down, new streetlighting and electrical switchroom. The proposal includes all associated ancillary development, site works and services including underground attenuation system.		
1	**F20A/0638**	New hotel Radisson Blu, 8-12 storeys.	Planning permission granted 22nd November 2021.	N/A
1	**F20A/0636**	Extension to the existing hotel.	Planning permission granted 22nd November 2021.	N/A
1	**F20A/0331**	Green Car Park / Red Express North	Planning permission granted 29th October 2020.	BAU
1	**F20A/262**	Amendment to Planning Permission reference F19A/0049 as granted which is for: a) a single-storey extension of Pier 1 and Pier 2 Immigration Hall by 673 sq m to the North East (currently 1607 sq m., proposed 2,280 sq.m.) to provide additional internal passenger queuing space; b) partial recladding with timber feature cladding; c) rooftop plant with screening louvers; d) demolition and relocation of an existing fire escape stairs; e) re-organisation of the adjoining surface car park resulting in a net loss of 22 spaces (currently 74 no. spaces, proposed 52 no.	Planning permission granted 29th July 2020.	BAU

Bucket	P.A. Reg. Ref.	Description of the Proposed Development	Status	Type
		spaces) and new coach turning route; f) new glazed single-storey entrance porch to the rear of the VIP lounge (16 sq.m); g) two emergency escape doors; and h) a gas skid (7sq.m), landscaping and all associated site development works. The amendment relates to the provision of a solid roof canopy structure, clad with black PPC metal fascia and soffit with incorporated signage and supported by black painted steel columns (34.5 sq.m) in place of previously approved "new glazed single-storey entrance porch to the rear of the VIP Lounge (16sqm)". The application is also to include the addition of a freestanding entrance signage totem 2.0m high by 0.9m wide (1.8 sqm) and all associated site development work, all on a site of 0.696ha.		
1	FW20A/0160	Permission for temporary (12 months up to the end of 2021) change of use of 9.22 ha of existing Holiday Blue Car park for the development of a facility to provide for parking of Heavy Good Vehicles (HGV). The development comprises the reconfiguration of the existing car-parking area to provide 250 no. HGV parking spaces, as well as resurfacing of parking areas and internal roads. The development includes 10 no. prefabricated buildings comprising 2 no. 2.7m x 8.0m office units, 2 no. 2.7m x 8.0m canteen units, 4 no. 2.7 m x 5.0m bathroom units, 2 no. 2.7m x 6.0m shower units, proprietary waste-water treatment unit with percolation area, water connection to existing Irish Water service and ancillary works.	Planning permission granted 18th November 2020.	BAU

Bucket	P.A. Reg. Ref.	Description of the Proposed Development	Status	Type
1	F19/0023	Amend the North Parallel Runway (North Runway)(permitted under FCC Reg. Ref. F04A/1755; An Bord Pleanála Ref: PL06F.217429), on this site of c.265.7 hectares at Dublin Airport, Co. Dublin, in the townlands of Millhead, Kingstown, Dunbro, Barberstown, Pickardstown, Forrest Great, Forrest Little, Cloghran, Collinstown, Corballis, Rock and Huntstown. The permitted runway is located to the north and north-west of terminal 1 and Terminal 2, Dublin Airport.	Planning permission granted on 9th August 2019 by Fingal County Council. Subsequently, an appeal was lodged on 29th August 2019 and a decision to grant permission was made by An Bord Pleanala on 18th March 2020.	BAU
1	FW19A/0097	Erection of warehouses / logistics unit; development of an extension to the previous warehouses; and Amendments to the warehouse/logistics building.	Planning permission granted on 7th August 2019.	N/A
2	F23A/0121	The development is a modification to a previous permission for Airside Operation Facilities (Reg. Ref. F19A/0426) which approved the development of an animal welfare facility, airside operation facilities and the provision of a substation.	Application pending determination with Fingal County Council.	BAU
2	F23A/0132	Extension of North Apron, to include the construction of new apron pavement and the rehabilitation of existing apron pavement, along with associated ancillary development.	Application pending determination with Fingal County Council.	BAU
2	F21A/0008	Development of an airside single-storey free-standing General Aviation dispatch hut and Tug Shelter and storage shelter (approx. 10.7m x 9.9m). The application includes all associated site works and services.	Planning permission granted on 15 June 2021. Works have not yet commenced.	BAU
2	F20A/0058	The removal of all existing portacabins and the construction of a vehicle maintenance building comprising of 2 no. units with mezzanine levels, 2 no. storage areas, a new boundary wall and all associated site development works. The proposed storage areas will each consist of 3 no.	Planning permission granted on 2 July 2020. Project not intended for commencement.	BAU

Bucket	P.A. Reg. Ref.	Description of the Proposed Development	Status	Type
		oil tanks, 2 no. bunded storage units and a refuse store.		
2	**F19A/0426**	The development will consist of: i. Animal Welfare Facility ii. Airside Operations Facilities iii. 'Substation 19' site, a greenfield ca. 0.05 hectare site southwest of the South Apron incorporating a single storey electrical substation (c. 168 sqm) with a maximum height of c. 3.4m. and overall dimensions of c. 11m. in width and c. 15.5m. in length. Ancillary site development works and services including lighting and drainage and all ancillary site development works.	Planning permission granted on 12 December 2019. Works have not yet commenced.	BAU
2	**FW22A/0022**	Development shall consist of the construction of a single storey unit (Unit 26) for industrial and/or Warehouse use with ancillary two storey office with a gross floor area 5,480 square meters. The development will also include an ESB substation, service yard, associated car parking, signage to the proposed unit, the extension of the existing road Cedar Drive to the new proposed unit, service access roads, and all associated landscaping and ancillary site works for underground duct work, drainage and utility services.	Planning permission granted on 14th July 2022. Works have not yet commenced.	BAU
2	**FW22A/0029**	Rehabilitation works to existing 'Purple Zone' staff car park to include resurfacing, lighting, road markings and signage, ducting for EV charging points, and all associated site works and ancillary development. No increase in parking capacity is proposed. It is proposed that staff parking will be facilitated within the northern section of the 'Express Red' long term car park (also known as the 'Express Green' car park), located to the east of the 'Purple Zone' staff car park in the townland of Cloghran, Co.	Planning permission granted on 10th March 2022 by Fingal County Council. Subsequently, an appeal was lodged on 5th April 2022 and a decision to Remove Condition(s) & Amend Condition(s) was made by An Bord Pleanala on 10th March 2023 (ABP-313225-22).	BAU

Bucket	P.A. Reg. Ref.	Description of the Proposed Development	Status	Type
		Dublin, for the duration of the works.		
2	F21A/0518	Planning permission for development which will consist of 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 in the townlands of Corballis and Collinstown, Dublin Airport, Co. Dublin.	Planning permission granted on 3rd March 2022 by Fingal County Council. Subsequently, an appeal was lodged on 30th March 2022 and a decision to grant permission was made by An Bord Pleanala on 16th March 2023. Works have not yet commenced.	BAU
2	F21A/0255	For development at these site addresses: 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. 410 bedroom hotel with pedestrian link.	Planning permission granted on 4th January 2022. Works have not yet commenced.	BAU
3	F22A/0460	The proposed development will consist of the construction of a subterranean Underpass of Runway 16/34, a critical airfield operational safety project.	Planning Permission granted on 27 February 2023. An appeal has subsequently been lodged (on 24th March 2023) and is now under consideration by An Bord Pleanála (ABP. Reg. Ref. ABP-316138-23).	Major Development
3	FW22A/0021	Planning permission for a new solar photovoltaic solar farm at site bounded by Harristown Lane (L3151), St Margaret's Road (R122), and South Parallel Road (R108) in the townland of Sanganhill Td, Finglas ED, Co. Dublin. The development will consist of the installation of a ground mounted solar photovoltaic (PV) array with	Permission granted 3rd November 2022. Works have not yet commenced.	Major Development

Bucket	P.A. Reg. Ref.	Description of the Proposed Development	Status	Type
		associated development and ancillary works including inverters, modules and transformers; site cabling; 2 no. substation building; a storage container on a concrete base; an internal access road and attendant surface water drainage; the formation of a new site entrance onto South Parallel Road (R108); security boundary fencing and landscaping; and a security controlled entry gate and lighting.		
4	N/A	The Infrastructure Application (IA) is a proposal currently under development 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.	Planning request not submitted	Major Development
3	F20A/0668	A proposed development comprising the taking of a 'relevant action' only within the meaning of Section 34C of the Planning and Development Act 2000, as amended, at Dublin Airport, Co. Dublin, in the townlands of Collinstown, Toberbunny, Commons, Cloghran, Corballis, Coultry, Portmellick, Harristown, Shanganhill, Sandyhill, Huntstown, Pickardstown, Dunbro, Millhead, Kingstown, Barberstown, Forrest Great, Forrest Little and Rock on a site of c. 580 ha. The proposed relevant action relates to the night-time use of the runway system at Dublin Airport.	Planning permission granted on 8th August 2022 by Fingal County Council. An appeal was lodged on 24thAugust 2022 and is under Consideration by An Bord Pleanala.	N/A

The Bucket 2 Underpass project is considered as a reasonably foreseeable major project. **Chapter 18** highlights where there is potential for cumulative effects of the proposed ADP with the planned Underpass project, as summarised from the findings of the factor chapter assessments. It also considers the potential for interactions and inter-relationships between the factors of the environment that have been examined individually throughout this EIAR which could give rise to new or additional effects or could result in an impact being either positive or negative, as well as having varying levels of significance.

7.5.1 Infrastructure Application

As mentioned, this section is concerned with Bucket 4 projects, of which, there is one, *i.e.*, the Infrastructure Application (IA).

The Bucket 4 Infrastructure Application is also considered to be a reasonably foreseeable major project at Dublin Airport. The Infrastructure Application (IA) is currently at the design stage, in broad terms the IA is likely to include development in the North Apron, South Apron, terminal, airfield and landside of the Dublin Airport. The planned developments are described below, briefly:

- The North Apron including demolition of hangars and ancillary service building, extension of pier 1 extension to increase passenger capacity and number of boarding dates and upgraded drainage network including attenuation;
- Expand the existing South Apron with new remote stands, taxiways, pre-boarding zone, apron space, CBP building, South Apron Support Centre and upgraded drainage network including additional attenuation;
- Create a new Apron 7 on the western side of the airport with additional aircraft stands and upgraded drainage network including attenuation;
- Increase space internally inside Terminal 1 by relocating the security hall to the mezzanine level;
- Expand Terminal 2 multi-storey car parks;
- Expand temporary long-term car park (red);
- Construction of staff car park (North); and
- Ancillary works such as construction compound(s).

Importantly, the IA would also seek permission to raise the annual passenger cap, currently 32mppa, to 40mppa. The Environmental Impact Assessment (EIA) for the IA has not yet reached the scoping stage and, whilst extensive environmental baseline surveys were undertaken in 2019-2020, work remains to be done on the assessment of effects, so this project has been considered in a level of depth that is as far as reasonably practicable at this stage in the light of current knowledge.

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. However, 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.

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.

A full EIA 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.

Table 7.2 below summarises a preliminary scoping exercise in relation to the future airport development and associated potential environmental effects.

Table 7.2: 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 physical and mental health and well-being of local residents are possible, owing to additional air traffic movements associated with an increase to 40mppa. This is difficult 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.
Biodiversity	Not known	Not known	Not known	The location of the proposed works is within the Airport boundary. The Airport has an active wildlife management to deter birds due to the potential bird strike risk. The proposed works are not within or proximate to a site that has been identified as important for bird species that are qualifying interests of Baldoyle SPA. It should be noted, however, that the airside portion of the proposed site includes active runways, apron and managed airside lands and is actively managed to deter biodiversity. The management of biodiversity within the airport is covered under the daa specific Wildlife and Habitat Management Plan (WHMP, 2022) and is in line with the European Union Aviation Safety Agency Wildlife Hazard Management Guide. An Appropriate Assessment will be undertaken for the IA in due course to determine whether such effects might occur and how they might be mitigated.
Hydrology	None	Not known	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. Systems will be designed to operate in accordance with the design standards and guidance set out in the DMP.
Land, Soils, Geology & Hydrogeology	None	None	None	There is potential for the mobilisation of contaminants via numerous pathways to subsurface during construction, but such impacts can be mitigated through the application of a CEMP. Also, there is the potential for loss of soil cover, soil erosion and compaction during construction. Such impacts can be mitigated through application of a CEMP. It is anticipated that the IA would introduce new areas of hardstanding which may have affect local recharge to groundwater, however, the systems will be designed in accordance with the latest design policies so the impact should be mitigated.
Noise and Vibration	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 as part of the EIA.
Material Assets (Waste)	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.
Material Assets (Traffic & Utilities)	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. No likely significant effects on traffic are expected during operation of the ADP.
Air quality and Climate	Probably none	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. However, the data to undertake the modelling is not currently available. An air quality model will be prepared for the IA in due course. 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. It is expected that emissions will be modelled for the IA in due course.
Archaeology & Cultural Heritage	Not known	Not Known	Not known	There is potential for physical 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.
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 and in line with current use/operations.

7.6 Summary

The proposed ADP is a standalone proposal and is not needed because of, or reliant on, future airport growth or developments to be realised. However, an awareness of future airport proposals is relevant in considering the proposed ADP given the potential for interaction with future developments. In this respect, this chapter is intended to give an overview of plans for future developments so that, consistent with the purpose of the EIA Directive and case law, account can be taken by the competent authority, in this case Fingal County Council, of future projects in the context of the assessment of the environmental effects of the proposed development.

An overview and broad assessment of the possible environmental impacts of reasonably foreseeable future development plans has been provided, insofar as this is practicably possible at this stage given the information available on these proposals at the time of writing. 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 evolution of 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.

The future development plans discussed in this chapter do not form part of the proposed ADP itself and would all require further consents (and environmental assessments as required) before they can be implemented.

8

8

VOLUME II

PART 2: ENVIRONMENTAL FACTORS

NICHOLAS O'DWYER

daa

CONTENTS

FIGURES

No table of figures entries found.

8 POPULATION AND HUMAN HEALTH

8.1 Introduction

This chapter of the EIAR assesses the potential impacts and resulting effects likely to occur from the construction, operation and decommissioning of the proposed Airfield Drainage Project (ADP) on the population and human health in the area.

The ADP proposes significant upgrades to the surface water management infrastructure at Dublin Airport. It comprises a series of drainage system enhancement measures and infrastructure proposals, including the upgrade of existing drainage infrastructure and the construction of additional infrastructure to improve the performance of the existing surface water management system.

A full description of the proposed development can be found in **Chapter 4** of this EIAR. The proposed new infrastructure includes a new Contamination Detection and Response (CD&R) System, the provision of additional pollution control facilities and the construction of additional hydraulic capacity in the network. The ADP proposals include local network improvements at West Apron as well as reconfiguration works at South Apron to ensure that they are fully integrated with the proposed airfield-wide surface water management system.

8.2 Statement of Authority

This chapter was prepared by Laurie McGee, Principal Environmental Consultant with Nicholas O'Dwyer Ltd. (part of the RSK Group). Laurie is a corporate member of the Irish Planning Institute and the Royal Town Planning Institute and has over 30 years of experience in town and environmental planning consultancy. Laurie has considerable experience in EIA, planning and environmental reports for infrastructure projects including wind farms, flood alleviation projects, ports and harbours, and water and wastewater treatment plants. She has authored forerunning EIAR chapters on planning policy, project description, examination of alternatives and project design, and compiled Non-Technical Summaries.

8.3 Legislation, policy and guidance

The following legislation, policy and guidance are relevant to this chapter.

8.3.1 Legislation

- EU EIA Directive (Directive 2011/92/EU) as amended by Directive 2014/52/EU;
- Planning and Development Act, 2000 (as amended);
- Planning and Development Regulations 2001 to 2023;
- Safety, Health and Welfare at Work Act 2005 (as amended); and
- Safety, Health and Welfare at Work (Construction) Regulations 2013.

8.3.2 National policy

The National Planning Framework (NPF) (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".

8.3.3 Regional and local planning policy

- Eastern and Midlands Regional Spatial and Economic Strategy (2019)
- Fingal Development Plan 2023 - 2029
- Dublin Airport Local Area Plan (2020)

8.3.4 Policy, standards and guidance

- European Union, Guidance on the preparation of the Environmental Impact Assessment Report, 2017
- Department of Housing, Planning and Local Government, Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment, August 2018
- Environmental Protection Agency, Guidelines on the information to be contained in Environmental Impact Assessment Reports, May 2022
- Advice Notes for Preparing Environmental Impact Statements (Draft) September 2015
- Institute of Environmental Management & Assessment's Guidelines for Environmental Noise Impact Assessment (2014).
- Guidance on the Assessment of Dust from Demolition and Construction Version 1.1 (Institute of Air Quality Management (IAQM), 2014)
- UK Design Manual for Roads and Bridges (DMRB), Volume 11, Environmental Assessment, Section 3 Environmental Assessment Techniques, Part 1 LA 105 Air quality (UK Highways Agency, 2019a)

8.4 Methodology

8.4.1 Introduction

This chapter has been completed having regard to the Environmental Protection Agency's Guidelines on the information to be contained in Environmental Impact Assessment Reports (May 2022) and Advice Notes for Preparing Environmental Impact Statements (Draft, September 2015). These guidelines identify the topics which may typically be addressed in an EIAR under this environmental factor (*i.e.*, employment, settlement patterns, land use patterns, baseline population, demographic trends, human health, and amenity). What is scoped in for assessment will depend on the nature of the proposals.

In relation to population, this chapter considers the potential direct and indirect effects both positive and negative of the ADP on human beings living, working, and visiting in the vicinity of the site. To provide a clear assessment of potential impacts and effects, this chapter describes the demography, employment aspects, land use and settlement patterns of the receiving community. The receiving community for the ADP is identified as persons residing and engaging in activities within the study area.

In relation to human health, the European Commission (EC) has published Guidance on the Preparation of the Environmental Impact Assessment Report (2017). This document defines human health as *"a very broad factor that would be highly Project dependent. The notion of human health should be considered in the context of the other factors in Article 3(1) of the EIA Directive and thus environmentally related health issues (such as health effects caused by the release of toxic substances to the environment, health risks arising from major hazards associated with the Project, effects caused by changes in disease vectors caused by the Project, changes in living conditions, effects on vulnerable groups, exposure to traffic noise or air".*

The EPA Guidelines on the Information to be contained in Environmental Impact Assessment Reports (2022) states that the EIAR should assess the of potential impacts on population and human health under the environmental categories addressed elsewhere in the EIAR, using the source-receptor pathways of air, water and soil and other health and safety issues as relevant.

Accordingly, the potential impacts of the ADP on the population and human health of the study area have been assessed, considering the conclusions of the various other chapters of this EIAR including: Noise & Vibration (**Chapter 12**), Material Assets (Traffic and Utilities) (**Chapter 14**) and Air Quality & Climate (**Chapter 15**), with which it should be read in conjunction and considers the likely significant effects of the proposed development on population and human health.

8.4.2 Study Area

As described in **Chapter 1**, the proposed ADP development site, indicated by the red line boundary in **Figure 8.1,** is located within the townlands of Cloghran, Pickardstown, Coultry, Huntstown, Forrest Great, Forrest Little, Collinstown, Corballis, Commons, Toberbunny, Stockhole and Clonshagh. The study area for this EIA factor is the Dublin Airport lands identified by the blue line boundary in **Figure 8.1**.

Dublin Airport is located 7km north of Dublin city and 3km south of the town of Swords. The study area is bound by the M50 motorway to the south and the M1 motorway to the east. The study area is within the administrative area of Fingal County Council. The nearest settlements to the study area are the town of Swords and the rural settlement of St. Margaret's which is adjacent to the west (**Figure 8.2**).

Figure 8.1. Project boundary

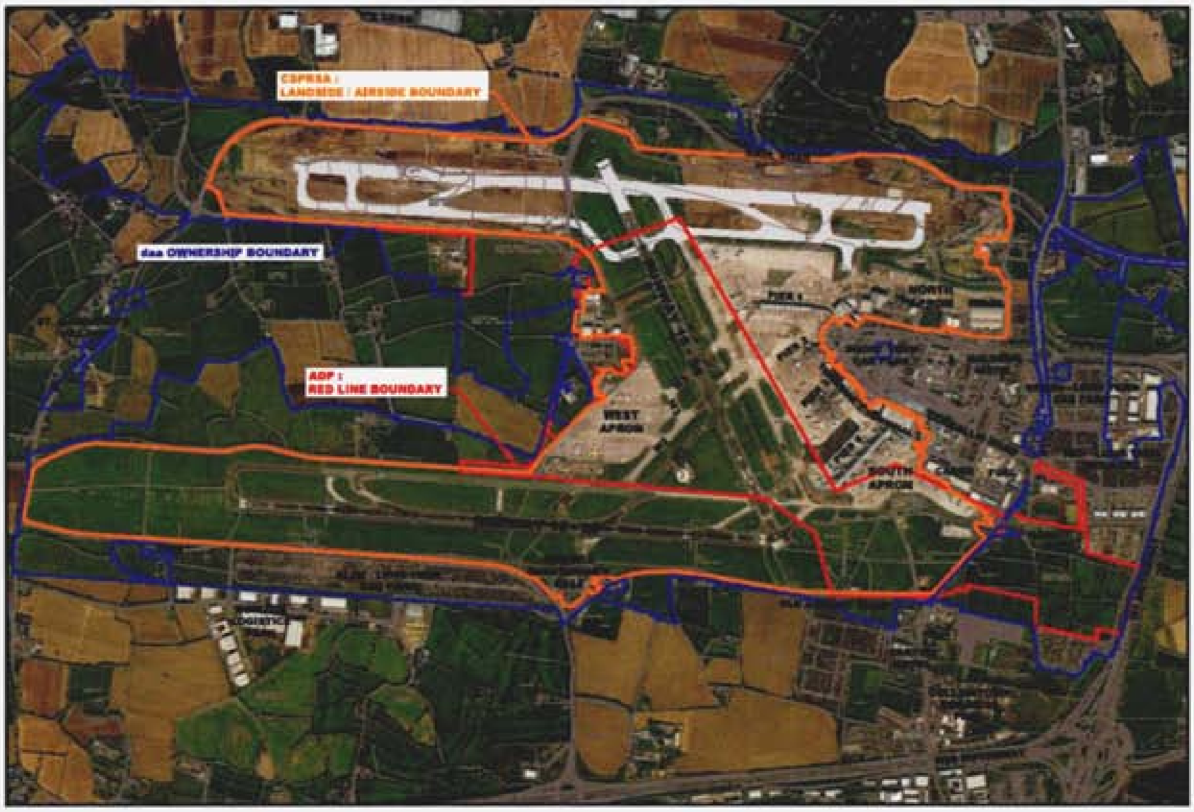

Figure 8.2. Location of Dublin Airport

8.4.3 Information sources

The assessment of likely environmental effects on population and human health involves the identification of relevant characteristics of the population in the receiving community that may be affected by the proposed development from quantifiable documentary research. The scope of the evaluation is based on a review of data available from the Central Statistics Office (CSO), legislation, guidance documents and any relevant EIARs that are in the public domain.

The principal sources of information for this EIAR chapter are:

- Census and employment information published by the Central Statistics Office (CSO). Available at https://data.cso.ie/
- Fingal Development Plan 2023-2029, available at: https://www.fingal.ie/development-plan-2023-2029
- Environmental Protection Agency (EPA) Maps, available at: https://gis.epa.ie/EPAMaps/
- EPA spatial data (including Corine Land Cover mapping), available at: https://gis.epa.ie/GetData/Download
- Fáilte Ireland records and spatial data, available at: https://www.failteireland.ie/Research-Insights/Open-data.aspx
- Ordinance Survey Ireland (OSi) mapping and aerial photography along with administrative boundaries spatial data, available at: https://data-osi.opendata.arcgis.com/

A desk-based study was undertaken in March 2023 to gather information regarding population, age structure, economic activity, and employment within the study area from the 2016 Census of Ireland. The aim of the desktop study was to present the characteristics of the baseline environment in relation to population and human health for the relevant Electoral Divisions, Dubber and Airport.

The preliminary results from the 2022 Census of Ireland (conducted on Sunday 3rd April 2022) were released on 23rd June 2022 and the full results from the Small Areas Population Statistics (SAPS) (*i.e.*, at the Electoral Division level) are not expected to be published by the CSO until September 2023.[1] The preliminary 2022 Census results do not contain the required level of information for the demographic profile of the study area. As such, the SAPS from the 2016 Census have been used to characterise the baseline for the purposes of this assessment, with reference to the 2022 preliminary results as relevant.

8.4.4 Environmental Design & Management

The proposed development has been designed to comply with all relevant health and safety legislation. A Construction Environmental Management Plan (CEMP) (Section 12 of the Planning Documentation) has been prepared and requires the contractor to implement measures inter alia to safeguard public health and amenity during the construction process. Health and Safety are at the forefront of the project, and Contractors, designers and other construction stakeholders for the ADP must comply with all the rules and take on board all recommendations outlined in daa's Construction Contractors Health & Safety and Environmental Rules for working on daa Infrastructure Manual.

8.4.5 Assessment of Effects & Significance

The potential significant environmental effects of the proposed ADP before and after mitigation on the population and human health of the study area are assessed based on generalised degrees of effect significance as per Figure 3.4 of the EPA EIAR Guidelines (May 2022) (reproduced as **Table 2.2** in EIAR **Chapter 2 – The EIA Process**. This considers the significance/sensitivity of the receiving environment and the character / magnitude / duration / probability / consequences of the effects on a scale that ranges from Negligible to High.

8.5 Current State of the Environment

8.5.1 Population

According to the Small Area Population Statistics from the 2016 Census of Population (the latest date for which such statistics are available), for the study area which extends from St. Margaret's to Ballgriffin was 3,038. In the 2022 Census, Swords (adjacent to the key gateway of Dublin Airport) had a population of 40,776 and is the third largest town in the State. This was an increase of 3.89% from the 2016 Census. According to Fingal Development Plan's Core Strategy, Swords is identified as the 'Key Town" in the Metropolitan area of Fingal, with the population projected to increase to 54,188 in 2023, and to 60,265 by 2029 (Table 2.14 Fingal County Development Plan 2023 – 2029). St. Margaret's is a small linear settlement located

[1] Central Statistics Office, Census 2022 Publication Schedule, https://www.cso.ie/en/census/census2022/census2022publicationschedule/, accessed 20/06/2023.

immediately west of the Airport lands. St. Margaret's is defined as a 'Special Policy Area' in the Dublin Airport Local Area Plan 2020, given its proximity to Dublin Airport infrastructure.

8.5.2 Employment

According to the Dublin Airport Economic Impact Study (April 2017)[2], in 2016, Dublin Airport handled 86% of the country's total passenger traffic. Based on 2016 traffic levels, Dublin Airport provides the international connectivity that underpins a diverse national economy and supports jobs via:

- Direct employment in ongoing operations at Dublin Airport (*e.g.*, daa, airlines, air traffic control, ground handlers, airport security, immigration, customs, airport retail, *etc.*), when adjusted for part-time and seasonal employment, totals 17,100 Full-Time Equivalent jobs (FTEs). The total direct Gross Value Added (GVA) from this employment is estimated to be over €1.5 billion.

- Adding in multiplier impacts (indirect and induced), the total employment supported by activities at Dublin Airport is estimated to be 45,600 jobs (or 40,500 FTEs), earning a total of €1.7 billion.

- Catalytic impacts by enabling tourists to visit Ireland, facilitating the transportation of high-value exports around the world, and enabling employees of Irish and multinational businesses to travel to clients, regional offices and global headquarters, providing an estimated to total 71,700 jobs (63,300 FTEs) and €5.0 billion in GVA in 2016.

The Economic Impact Study identifies the impact of Dublin Airport on the local economy:

- Eighty nine percent of the direct jobs are generated in Fingal.
- Taking into account the wider overall effect, 26% of total employment, approximately 30,000 jobs, are generated in Fingal from the Airport.
- Taking the 'catalytic' effect into account, such as proximity to the Airport, ability to travel, provision of headquartered companies, and tourism, Fingal benefits to the value of €2.744 billion per annum. More than any other business or economic driver.
- In addition, tourism generation within Fingal results in 20,000 jobs.

8.5.3 Land use

The land use of the study area comprises airport infrastructure (*i.e.*, aircraft stands, terminals) and related transportation land uses including car and coach parking. These land uses are mainly in the east of the study area. Other land uses include grasslands, mainly to the west and south of the study area. EIAR **Chapter 12** identifies the nearest noise sensitive receptors (residential and commercial properties) to the proposed development. **Figure 8.3** (reproduced from EIAR **Chapter 12, Figure 12.1**) shows the location of the nearest sensitive receptors closest to the proposed development. This illustrates the land use and settlement pattern nearest the proposed development.

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[2] InterVISTAS Consultating on behalf of daa, Dublin Airport Economic Impact Study, Final Report, April 2017, https://www.dublinairport.com/docs/default-source/2016-economic-impact-assessment/economic-impact-study---2016.pdf

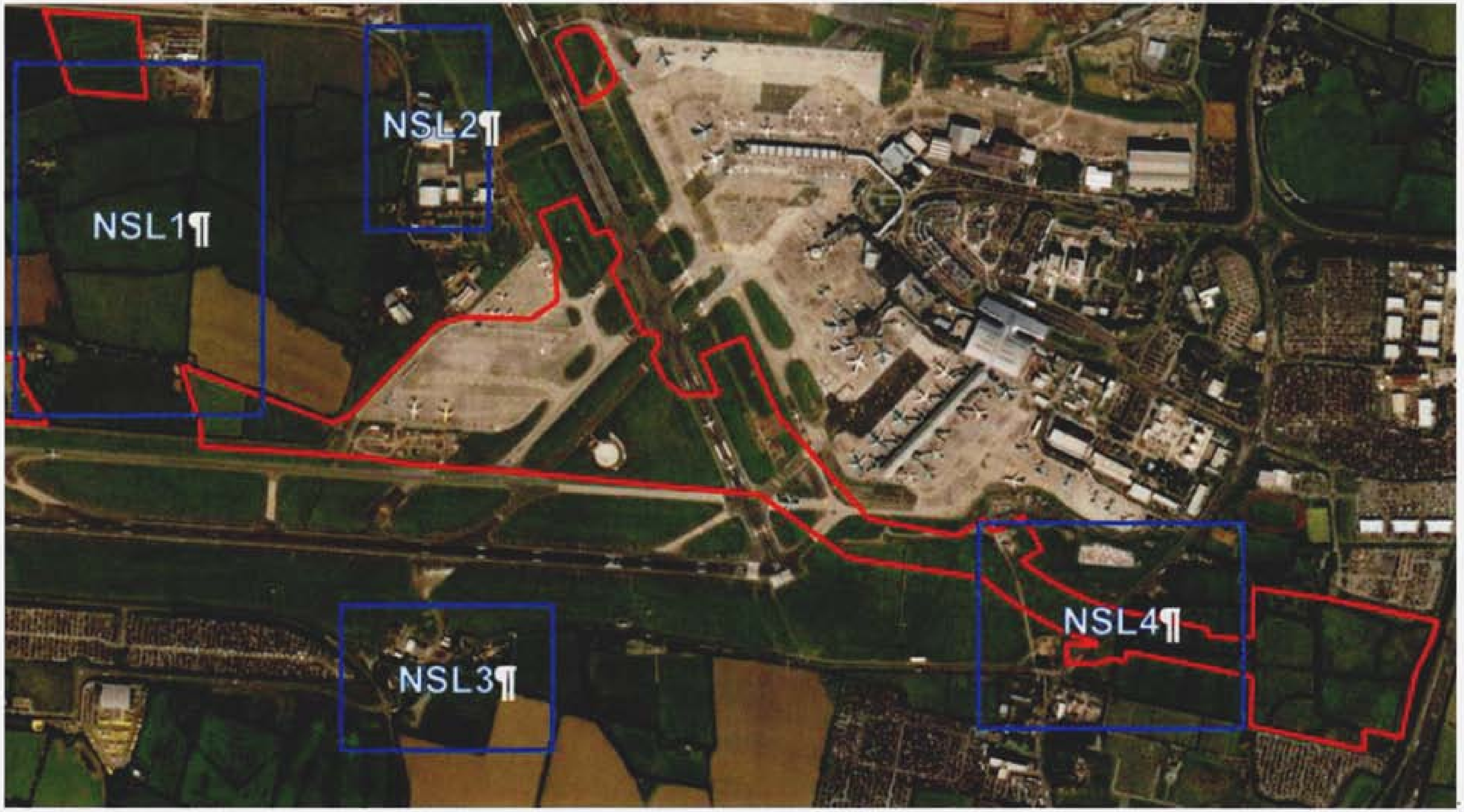

Figure 8.3. Nearest noise sensitive receptors

Further detail on these nearest receptors is provided in EIAR **Chapter 12, Figures 12.2 to 12.5**. A description of each group of noise-sensitive locations is presented below.

NSL1	Residential properties located to the west of Dublin Airport, between the north and south runways. These properties are located approximately 600m from the proposed construction activities.
NSL2	Primarily residential properties located on the western boundary of Dublin Airport, along the R108. Additionally, the Boot Inn is within this location which has been identified as a commercial receptor. These properties are located approximately 100m from the proposed construction activities.
NSL3	Residential properties located on the Old Airport Road to the south of Dublin Airport. These properties are located approximately 500m from the proposed construction activities.
NSL4	One residential property located on the R132 to the east of Dublin Airport. Additional industrial/commercial properties located to the south on the Old Airport Road/Swords Road. These properties are located approximately 150m from the proposed construction activities.

8.5.4 Human health and amenity

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 relate to amenity and are recognised in the EPA Guidance as health determinants, are presented in EIAR **Chapter 12 – Noise & Vibration** and **Chapter 15 – Air Quality & Climate**.

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. The life expectancies for the study area in 2016 are broadly in line with the country averages (79.6 years for males and 83.4 years for females).

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 the 2016 Census returns, 89% of the population aged 15 years and over in Fingal County considered themselves to be in very good or good health, compared to Ireland's average of 88%. In comparison, around 84% of residents in Dubber ED and 77% of residents in the Airport ED consider themselves to be in very good or good health.

8.6 'Do Nothing' scenario

Under the 'Do Nothing' scenario the proposed development will not be constructed. In this scenario, there would be no change in environmental effects on population and human health. However, the site is in an operational airport where a range of developments are underway or planned. It is likely that in the absence of the ADP, development of a similar nature would be progressed on the site which accords with national, regional and local policies to achieve sustainable growth of the airport, the environmental effects of which would be assessed in the planning system.

8.7 Construction phase effects

8.7.1.1 Noise and vibration

The Noise & Vibration chapter of the EIAR (**Chapter 12**) identifies sensitive receptors to the south of the airport including residential properties on the Old Airport Road approximately 500m from the proposed works (represented by NSL 3); and one residential property located on the R132 to the east of the airport, and industrial/commercial properties located to the south of the Old Airport Road/Swords Road which are approximately 150m from the proposed works (represented by NSL 4). From measured sound levels, and noting the duration and phasing of the construction works and the predicted noise from machinery and equipment to be used, the noise impact assessment concluded that during the day and evening, impacts to all noise sensitive locations were not significant to slight, and at night time, when some works such as tunnelling are proposed, the impacts at noise sensitive locations NSL 1, NSL 2 and NSL 3 will be slight to moderate, and at NSL 4 the impacts would be moderate to significant (NSL 4).

In relation to impacts to sensitive receptors by vibration, where the closest NSL is greater than 100m from the works, it is concluded that no vibrations will be perceptible from the works due to the distance between the works and the receptors. The vibration impact will therefore be neutral, imperceptible and short term.

8.7.1.2 Air quality

The Air Quality & Climate chapter of the EIAR (**Chapter 15**) identifies potential impacts on air quality during construction of the proposed development. Impacts are predicted to arise from construction dust emissions from earthworks, construction and trackout with the potential for nuisance and health effects to nearby receptors.

The Institute of Air Quality Management (IAQM) guidelines outline the assessment criteria for determining the sensitivity of the area to human health effects. The criteria taken into consideration include the current annual mean PM_{10} concentration, receptor sensitivity based on type (residential receptors are classified as high sensitivity), and the number of receptors affected within various distance bands from the construction works. A conservative estimate of the current annual mean PM_{10} concentration in the vicinity of the proposed development is 14 $\mu g/m^3$. There are five high sensitivity receptors and one medium sensitivity receptor within 350 m of the proposed ADP boundary. Based on the IAQM criteria (presented in EIAR **Chapter 15, Table 15.11**), in the worst-case scenario, the sensitivity of the area to human health is considered low. Based on the estimate of 450,000 m^3 of material that will need to be excavated, moved, and reused for the construction of the ADP (the source of dust emissions), the dust emission magnitude for the proposed earthwork activities can be classified as Large. In respect of human health effects, in the absence of mitigation, given the estimate of excavations and low sensitivity of the area, there is predicted to be a low risk of dust related human health effects during the construction phase.

There is also the potential for traffic emissions to impact air quality in the short-term over the construction phase, particularly due to the increase in HGVs accessing the site. While traffic will increase for a short period during the excavation works, a detailed air quality assessment of construction phase traffic emissions has been scoped out from any further assessment as the expected traffic generation is below thresholds per TII Guidance (**EIAR Chapter 15, Section 15.6.1.1**). The predicted change in traffic is not sufficient to cause more than a neutral impact on air quality and thus human health. It can therefore be determined that the construction phase traffic will have a not significant, direct, neutral, and short-term effect on air quality.

8.7.1.3 Traffic

Chapter 14 of the EIAR examines the impacts of the proposed development on Material Assets (Traffic & Utilities). During construction of the proposed development there will be additional traffic movements to and from the site from construction personnel, security staff, professional staff (*i.e.*, design team, utility companies), excavation plant, dumper trucks and deliveries/removal of materials (waste/spoil). The frequency of vehicles accessing the site will vary throughout the construction phase.

8.7.2 Operational phase effects

No significant potential impacts on human health and amenity arising from operation of the proposed ADP were identified. The operational stage is not expected to produce noise or vibration perceptible at any receptor. Plant will either be located underground or will be silent in operation and no additional traffic is expected as a result of the proposed development. During the operational phase, there will be no emissions to atmosphere since the pipelines will be buried underground. There is the potential for maintenance vehicles accessing the site to result in particulate emissions, however, due to the infrequent nature of maintenance activities and the low number of vehicles involved, emissions are not predicted to be significant.

8.8 Mitigation measures

8.8.1 Construction Phase Mitigation

8.8.1.1 Noise and Vibration

The construction of any project has potential to give rise to impacts on health and safety of the local community if construction activities are not managed appropriately. Measures to address such health and safety considerations are addressed in the CEMP for the development and will be included in the final contractor's CEMP for implementation during the construction phase, in accordance with best practice.

In respect of noise impacts, along with the mitigation measures recommended in **Chapter 12, Section 12.8** which relate to siting equipment and using screening, consideration will be given to scheduling activities in a manner that reflects the location of the site and the nature of neighbouring properties. Each potentially noisy event/activity should be considered on its individual merits and scheduled according to its noise level, proximity to sensitive locations and possible options for noise control. Depending on the noise emission levels experienced and associated noise impact, the contractor will be flexible and able to conduct certain works at hours which reflect periods when the neighbouring properties have lower sensitivities to noise. Furthermore, every effort will be made to schedule the noisiest works to take place during the less sensitive daytime hours.

No mitigation measures are required in respect of vibration.

8.8.1.2 Air Quality

Mitigation measures for dust include good site and construction management, and dust suppression through watering down roads and tracks. Potential effects are temporary, direct, negative and imperceptible in nature, posing no nuisance at nearby receptors. The dust minimisation measures shall be reviewed at regular intervals during the works to ensure the effectiveness of the procedures in place and to maintain the goal of minimisation of dust through best practice procedures. In the event of dust nuisance occurring outside the site boundary, site activities will be reviewed, and satisfactory procedures implemented to rectify the problem.

8.8.1.3 Traffic

No mitigation is proposed in relation to traffic for the operational phase of the proposed development as there are no predicted significant impacts.

8.8.2 Operational phase mitigation

No mitigation measures are required during operational phase.

8.9 Residual effects

8.9.1 Construction Phase

8.9.1.1 Noise

As detailed in **Chapter 12** of the EIAR, with the implementation of specified mitigation measures related to the use and siting of equipment and the use of screens, the residual impacts from noise at night-time are reduced to not significant to slight at NSL 3, and not significant to moderate at NSL 4.

8.9.1.2 Air Quality

The residual effects of dust emissions and other air pollutants are potentially not envisaged to pose any harm or nuisance to nearby receptors or human health after mitigation measures have been applied.

8.9.1.3 Traffic

Following implementation of the mitigation measures outlined in the Construction Traffic Management Plan (CTMP), the potential impacts on the local road network along sections of the R108, R132 and L2015 and thus local road users are adverse, moderate, and short term for the construction phase.

8.9.2 Operational Phase

The residual effect of the operational phase impacts in respect of noise associated with the ADP are predicted to be neutral, long-term and imperceptible since the pipeline will be buried underground and there will be minimal emissions associated with maintenance vehicles accessing the site. Similarly, the noise levels at the receptors will be insignificant since the plant will either be located underground or will be silent in operation.

8.10 Cumulative effects

Other projects would likely be constructed over a phased basis. Assessment of cumulative effects is presented in **Chapter 18**.

8.11 Monitoring

8.11.1 Construction phase

Residual impacts from the ADP on health and amenity relate to noise during construction, especially at night-time. Ongoing monitoring and audit, and communication with nearby noise sensitive properties will be implemented. Noise monitoring during the construction stage will be conducted in accordance with the International Standard ISO 1996: 2017: Acoustics – Description, measurement and assessment of environmental noise and BS5228.

8.11.2 Operational phase

There is no monitoring recommended for the operational phase of the development as no potential significant impacts were identified on the health or amenity of the local population in respect of noise, air quality and traffic.

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9.1 Introduction

This section of the EIAR was carried out by Altemar Ltd. It assesses the biodiversity value of the proposed project area and the potential impacts of the project on the ecology of the surrounding area and within the potential zone of influence (ZOI).

The programme of work in relation to biodiversity aspects of the EIAR has been designed to identify and describe the existing ecology of the area and detail sites, habitats, or species of conservation interest. It also assesses the significance of the likely effects of the project on the biodiversity elements and designs mitigation measures to alleviate identified impacts. Mitigation measures and the phasing of the project are contained in the accompanying Construction Environmental Management Plan (CEMP), which has been prepared by Nicholas O'Dwyer Ltd.

A significant portion of the proposed development site is built land within the airport environment and consists of maintained roads, aprons, runways, taxiways, buildings and managed grassland. Outside of the airport environment this habitat consists primarily of long grassland. There are no buildings to be demolished for the proposed development.

A separate Natura Impact Statement (NIS), in accordance with the requirements of Article 6(3) of the EU Habitats Directive, has been produced by Altemar Ltd to identify potential impacts of the project on Natura 2000 sites, Annex species or Annex habitats as required at the date of preparation of this application. It concludes that '*Following the implementation of the construction and operational phase mitigation measures outlined, there will be no significant adverse effects on the integrity of the Baldoyle Bay SAC and Baldoyle Bay SPA from the proposed development. No significant impacts will arise on Natura 2000 sites, alone in combination with other plans and projects based on the implementation of mitigation measures.*'

Standard construction and operational phase control measures, in addition to monitoring measures are proposed to minimise potential impacts and to improve the biodiversity potential of the proposed project site. It should be noted that Altemar has worked with the design team from the concept stage to limit the potential impact of the proposed project on biodiversity.

9.1.1 Quality Assurance and Competence

Altemar Ltd. is an established environmental consultancy that is based in Greystones, Co. Wicklow that has been in operation in Ireland since 2001.

Bryan Deegan

Bryan Deegan (MCIEEM) is the primary consultant. Bryan Deegan has 26 years' experience working in Irish terrestrial and aquatic environments, providing ecological consultancy. He has a Certificate in Science, Diploma in Applied Aquatic Science, BSc in Applied Marine Biology, and a MSc in Environmental Science. Bryan has extensive aquatic and terrestrial fieldwork experience including flora and fauna (bird & mammal) surveys. Recent projects carried out and managed by Bryan include the Lidl and Primark Regional Distribution Centres in Newbridge, airside works for daa at Dublin Airport from 2015-2023 and the Ecological Impact Assessment (EcIA) and NIS (within Irish waters and landfall) for a trans-Atlantic fibre optic cable from New York to Mayo.

Prof. Joseph Caffrey

Joe Caffrey has a PhD from University College Dublin (UCD) in aquatic plant biology, ecology, and management. He has worked with Inland Fisheries Ireland (IFI) and its predecessors for 39 years where he carried out and managed extensive freshwater and riparian surveys throughout his career in IFI. Altemar and Prof. Caffrey have a long working relationship and have worked together for many years including the running of the CAISIE LIFE project, electrofishing projects for clients including National Parks and Wildlife Service (NPWS) and are currently working together on the Water Framework Directive (WFD) canal monitoring programme for Waterways Ireland.

Hugh Delaney

Hugh Delaney is an ecologist (ornithologist primarily) having completed work on numerous sites with ecological consultancies over 10+ years. Hugh is local to the Dun Laoghaire-Rathdown area in Dublin and is especially familiar with the bird life and its ecology in the environs going back over 30 years.

9.2 Methodology

This chapter has been prepared having regard to the following guidelines:

- Guidelines for Baseline Ecological Assessment (IEA, 1995);
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (Department of Housing, Planning & Local Government, 2018);
- Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine (Chartered Institute of Ecology and Environmental Management (CIEEM), 2018);
- Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report (European Commission, 2017); and
- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports – Draft (EPA, 2022).

A pre-survey biodiversity data search was carried out in February 2022 and updated in December 2022. This included examining records and data from the NPWS, National Biological Data Centre (NBDC), bassline information held by daa and the Environmental Protection Agency (EPA), in addition to aerial, 6-inch maps and satellite imagery. Habitat surveys of the site were undertaken within the appropriate seasonal timeframe for terrestrial fieldwork. Field surveys were carried out as outlined in **Table 9.1**. All surveys were carried out in the appropriate seasons based on CIEEM (2018) guidance.

Table 9.1. Field surveys

Survey Type	Surveyors	Survey Dates
Habitat & Flora	Bryan Deegan (CIEEM)	20th August 2022, 17th October 2022 (airside), 25th October 2022
Breeding Bird	Hugh Delaney (Ornithologist)	May 14th 2022, May 28th, 2022 & June 16th 2022. (Appendix 9.1)
Aquatic	Prof. Joe Caffrey Bryan Deegan (CIEEM)	17th October 2022 (landside) (Appendix 9.2) 25th October 2022 (airside)
Wintering Bird	Hugh Delaney (Ornithologist)	2 visits/month November -March 2022 (Landside) (November 5th, 2022, November 22nd, 2022, December 3rd, 2022, December 27th, 2022, January 5th, 2023, January 20th, 2023, February 11th, 2023, February 26th, 2023, March 6th, 2023 & March 23rd, 2023)
Bat	Bryan Deegan (CIEEM)	20th August 2022 Appendix 9.3
Mammal	Bryan Deegan (CIEEM)	25th October 2022, 20th January 2023, 15th January 2023, 17th October 2022 (airside).

Desk studies were carried out to obtain relevant existing biodiversity information within the ZOI. The assessment also extends beyond the immediate project area to include those species and habitats that are likely to be impacted upon by the proposed drainage project. In the absence of mitigation there is the potential for silt, dust, and contaminated surface water to enter the Cuckoo Stream and impact on aquatic biodiversity and downstream designated conservation sites located within Baldoyle Bay. In this case, the potential ZOI extends beyond the site, with the potential for downstream impacts to extend beyond the proposed development area *via* the proposed construction works and the surface water/foul water networks. Altemar has been involved with the proposed project since 2021 and has been involved in over 18 daa projects since 2015, including being the ecological clerk of works for the airside diversion of the Cuckoo Stream for the development of the South Apron. Details of the proposed project are seen in **Chapter 4** of this EIAR. The proposed layout and drainage strategy were reviewed to inform this assessment. Further, **Chapter 4 – Project Description**, **Chapter 10 – Water & Hydrology, Chapter 12 – Noise & Vibration** and **Chapter 15 – Air quality & Climate** were reviewed and meetings with the relevant experts were carried out during the process.

9.2.1 Proximity to designated conservation sites and habitats or species of conservation interest

The designated conservation sites within 15km and those with potential hydrological pathways from the proposed project site were examined for potential effects. Sites beyond 15km have no direct or indirect pathways given the scale of the proposed project. This assessment included sites of international importance; Natura 2000 sites (Special Areas of Conservation (SAC) and Special Protection Areas (SPA)) and Ramsar sites and sites of National importance ((Natural Heritage Areas (NHA), and proposed Natural Heritage Areas (pNHA)). Up to date GIS data (NPWS data shapefiles) were acquired and plotted against 1, 5, 10 and 15km buffers from the proposed project site. GIS data of rare and threatened species within proximity of the site was provided by NPWS. Additional information on rare and threatened species was researched through the NBDC, NPWS and previous surveys within the proposed development area.

9.2.2 Terrestrial and Avian Ecology

A pre-survey data search was carried out. This included a literature review to identify and collate relevant published information and ecological studies previously conducted and comprised of information from the following sources: the NPWS, NPWS Rare and Protected Species Database, NBDC, EPA watercourse data, in addition to aerial, 25-inch, satellite imagery and baseline data held by daa.

Following the desktop study, walk-over assessments of the site were carried out on the 20th August 2022. Separate mammal surveys were carried out in the appropriate fieldwork season as outlined in **Table 9.1**. The presence of mammals is indicated principally by their signs, such as resting areas, feeding signs or droppings though direct observations. The assessment of the presence of mammals within the airside area was carried out on the 25th October 2022.

Habitat mapping was carried out according to Fossitt (2000) using ArcMap 5.2 and displayed on Bing satellite imagery or street mapping based on the 20th August 2022 site visit. Any rare or protected species or habitats were noted. As part of the fieldwork an invasive species assessment was also carried out. Separate breeding bird surveys and wintering bird surveys were carried out by Hugh Delaney (ornithologist). Birds noted on site were classed based on the Birds of Conservation Concern in Ireland classification of red, amber, and green, which is based on an assessment of the conservation status of all regularly occurring birds on the island of Ireland. It was considered that sufficient information was available to prepare this report.

9.2.3 Bat Fauna

There are a number of structures located on site. No buildings are to be demolished or upgraded as a result of the proposed works. The site survey was supplemented by a review of Bat Conservation Ireland's (BCIreland) National Bat Records Database. A bat detector and emergent survey that covered the entire application site was carried out on the 20th August 2022.

9.2.4 Aquatic Survey

An aquatic survey of the Cuckoo Stream (landside) was carried out by Prof. Joe Caffrey and this is included as **Technical Appendix 9.2**. The site survey was supplemented by an additional assessment airside by Bryan Deegan (CIEEM) on the 25th October 2022.

9.2.5 Assessment of effects

Assessment of effects was carried out as described in **Chapter 2** of the EIAR. As described, magnitude of change is considered in relation to the sensitivity of the receiving environment/receptor and effects that are described as Imperceptible, Not Significant and Slight, are considered to be not significant. Those effects that are defined as Moderate, Significant, Very Significant of Profound, are significant effects. Refer to **Table 2.2** for description of each criterion.

9.2.6 Difficulties Encountered

No significant difficulties were encountered in relation to the preparation of the Biodiversity chapter. It should be noted, however, that the airside portion of the proposed site includes active runways, apron and managed airside lands and is actively managed to deter biodiversity. This area was not covered by the wintering bird or breeding bird assessments. The management of biodiversity within the airport is covered under the daa specific Wildlife and Habitat Management Plan (WHMP, 2022) and is in line with the European Union Aviation Safety Agency Wildlife Hazard Management Guide.

9.3 Characteristics of the Proposed Project

The ADP proposes significant upgrades to the surface water management infrastructure at Dublin Airport. The ADP comprises a series of drainage system enhancement measures and infrastructure proposals, including the upgrade of existing drainage infrastructure and the construction of additional infrastructure to supplement the performance of the existing surface water management system. **Chapter 4** provides a detailed project description. The proposed project includes the inclusion of decision points within the Airside drainage to optimise catchment water flows, vegetation clearance, the control of invasive species, a diversion of the Cuckoo Stream, the installation of airport drainage infrastructure which includes an overflow to the Cuckoo Stream.

9.4 Receiving Environment

9.4.1 Zone of Influence

As outlined in CIEEM (2018) 'The 'zone of influence' for a project is the area over which ecological features may be affected by biophysical changes as a result of the proposed project and associated activities. This is likely to extend beyond the project site, for example where there are ecological or hydrological links beyond the site boundaries.' In line with best practice guidance an initial zone of influence is set at a radius of 2km for non-linear projects (IEA, 1995).

The potential ZOI of the project in the absence of mitigation was deemed to include; (i) the area within the site outline; (ii) nearby sensitive receptors including the Cuckoo Stream and River Mayne; and (iii) designated conservation sites located downstream of the proposed works. Given the extent of the proposed works, and the fact that in-stream works to the Cuckoo Stream are proposed, in the absence of mitigation there is the potential for dust, silt, and contaminated surface water runoff to enter the Cuckoo Stream during construction and operation. Further, there is the potential for increased flow rates to the existing foul wastewater network, which ultimately discharges to Ringsend Wastewater Treatment Plant (WwTP) which is currently undergoing a significant upgrade[1].

[1] A TEDL (Ref. TE-10365-01) and connection agreement between daa and Uisce Éireann is currently in place. An extensive consultation process has been undertaken between daa and Uisce Éireann regarding the application for a revised TEDL and a new connection agreement to govern the ADP. This consultation has been supplemented by hydraulic modelling of the public sewer network, which confirmed the availability of sufficient hydraulic capacity to receive flows up to and including proposed revised discharge limits. These revised limits have been agreed in principle with Uisce Éireann. A Pre-connection Enquiry form was submitted on the 17/01/23 specifying the limits agreed in previous consultations. A Confirmation of Feasibility letter was issued on 23/02/23

In the case of the proposed drainage project, the potential ZOI extends beyond the site, with the potential for downstream impacts to extend beyond the proposed project area *via* the proposed construction works and the surface water/foul water networks during construction and operation. The application site outline is shown in **Figure 9.1.**

9.4.2 Designated Sites

As can be seen from **Figure 9.2** (SACs within 15km), **Figure 9.3** (SPAs within 15km), and **Figure 9.4** (pNHA within 15km), there is one SPA and SAC within 5km and four pNHAs within 5km of the subject site. **Figure 9.5** demonstrates Ramsar Sites located within 15km of the subject site. The distance and details of the conservation sites within 15km of the proposed development, and conservation sites beyond 15km with the potential for a hydrological connection, are seen in **Table 9.2** and **Table 9.3**. Given the extent of the proposed works and the fact that the Cuckoo Stream traverses through the subject site, it is considered that there is a hydrological pathway to designated sites located within Baldoyle Bay. **Figure 9.6** and **Figure 9.7** demonstrate river waterbodies, local watercourses, sub-catchments, and the Airfield Trunk Culvert located within and proximate to the subject site. Watercourses and proximate designated conservation sites with a hydrological pathway to the subject site are demonstrated in **Figure 9.8 – Figure 9.11**. In addition, contaminated flows within the surface water network will be pumped to the public foul sewer, which in turn discharges to Ringsend Wastewater Treatment Plant (WwTP) for treatment. Foul wastewater (during construction and operation) will be treated within this public network.

(Ref-CDS23000386) in response to this Pre-connection Enquiry form which confirms that these revised limits can be accommodated, subject to delivery of a control system by daa, and the completion of upgrade works by Irish Water on Sutton Pumping Station.

Table 9.2: Natura 2000 sites within 15km / with potential hydrological connection to the subject site

	Name	Distance
SAC		
IE000205	Malahide Estuary SAC	4.6 km
IE000199	Baldoyle Bay SAC	5.2 km
IE000206	North Dublin Bay SAC	6 km
IE000208	Rogerstown Estuary SAC	8.2 km
IE000210	South Dublin Bay SAC	8.7 km
IE000202	Howth Head SAC	9.6 km
IE003000	Rockabill to Dalkey Island SAC	9.8 km
IE002193	Ireland's Eye SAC	10.1 km
IE000204	Lambay Island SAC	14.3 km
SPA		
IE004025	Malahide Estuary SPA	4.6 km
IE004016	Baldoyle Bay SPA	5.2 km
IE004024	South Dublin Bay and River Tolka Estuary SPA	5.9 km
IE004006	North Dublin Bay SPA	6 km
IE0004236	North-West Irish Sea SPA	6.9 km
IE004015	Rogerstown Estuary SPA	8.7 km
IE004117	Ireland's Eye SPA	9.8 km
IE004113	Howth Head Coast SPA	11.5 km
IE004069	Lambay Island SPA	14.3 km

Table 9.3 Designated conservation sites within 15km / with potential hydrological connection to the subject site

	Name	Distance
pNHA		
	Santry Demesne	1.3 km
	Feltrim Hill	2.2 km
	Sluice River Marsh	4.5 km
	Malahide Estuary	4.6 km
	Baldoyle Bay	5.2 km
	Royal Canal	5.9 km
	North Dublin Bay	6 km
	Grand Canal	7.9 km
	Rogerstown Estuary	8.2 km
	Dolphins, Dublin Docks	8.3 km
	South Dublin Bay	8.8 km
	Howth Head	9.1 km
	Portraine Shore	9.3 km
	Liffey Valley	9.3 km
	Ireland's Eye	10 km
	Booterstown Marsh	11.6 km
Ramsar		
	Broadmeadow Estuary	4.7 km
	Baldoyle Bay	5.2 km
	North Bull Island	6.1 km
	Sandymount Strand / Tolka Estuary	8.8 km
	Rogerstown Estuary	9.9 km

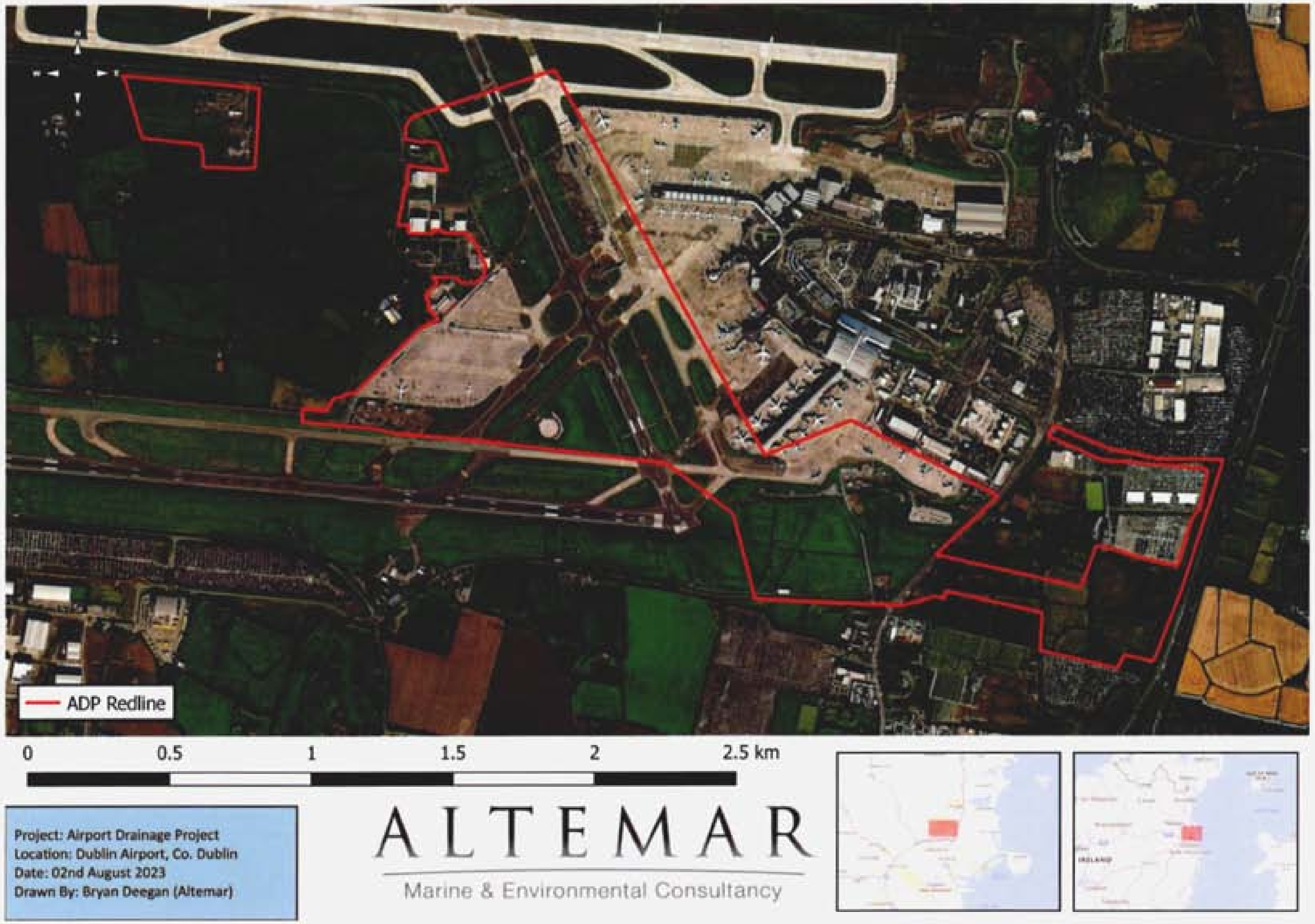

Figure 9.1 Proposed ADP Site Outline (red)

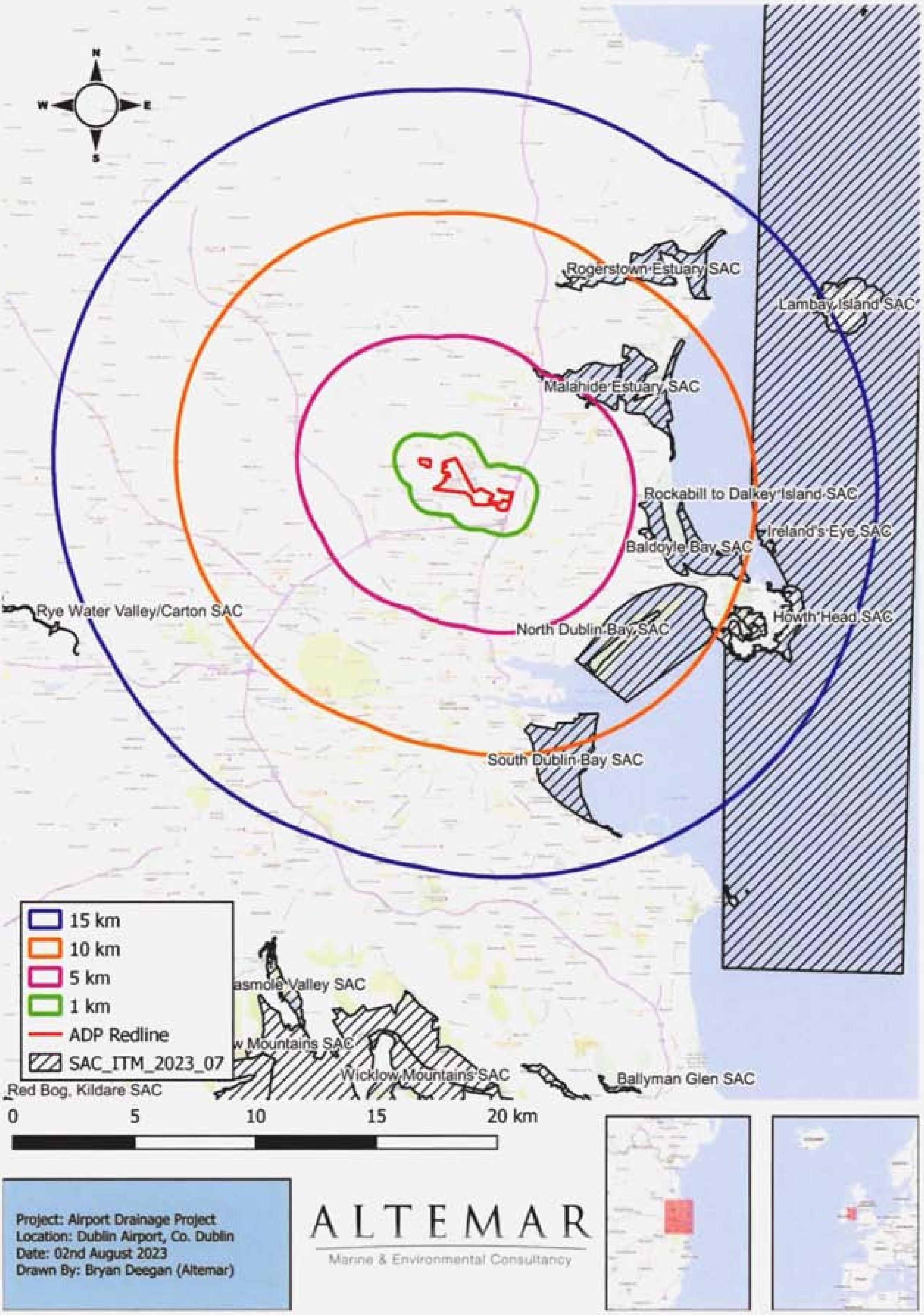

Figure 9.2 Special Areas of Conservation within 15km of the proposed development site

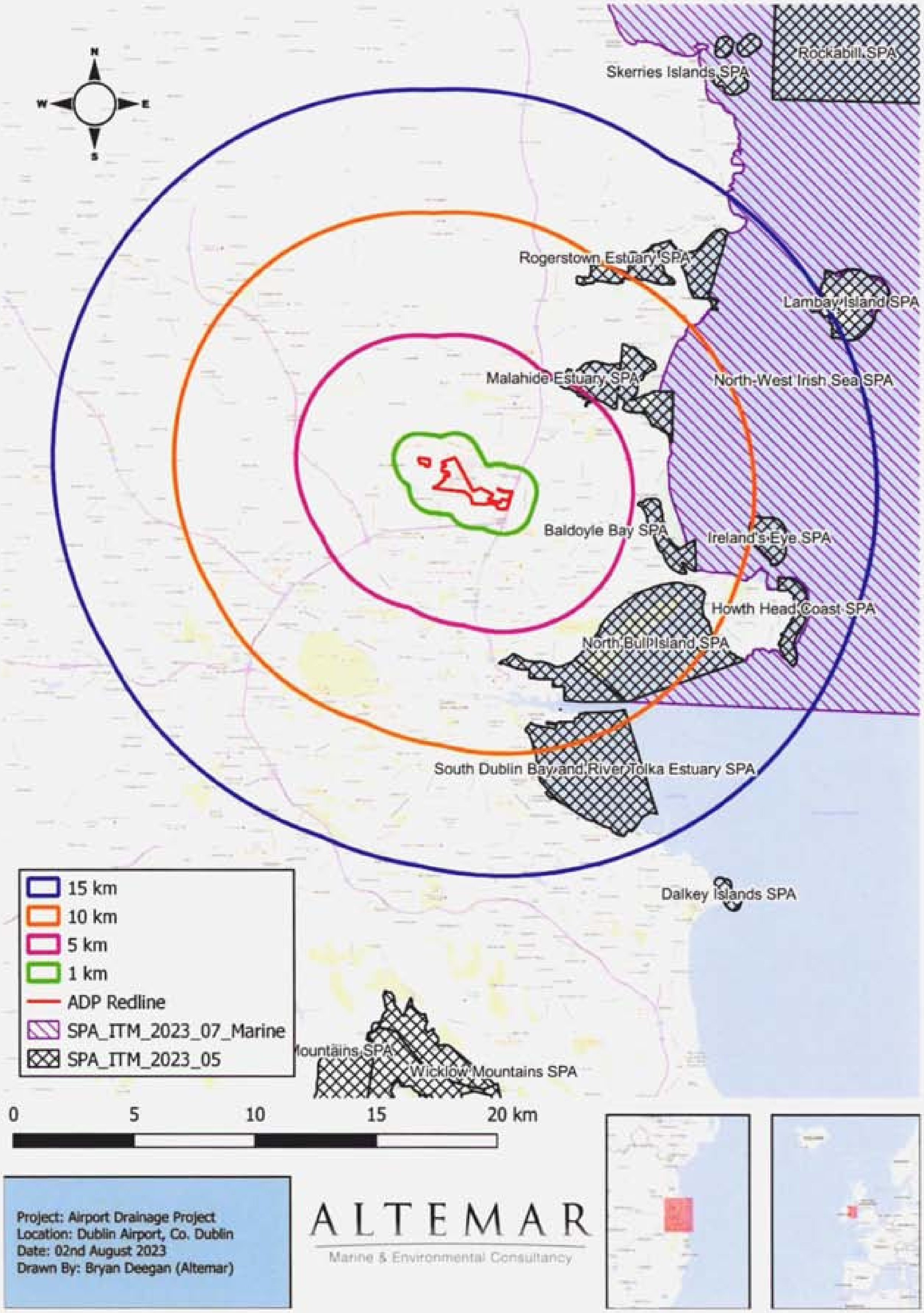

Figure 9.3 Special Protection Areas within 15km of the proposed development site

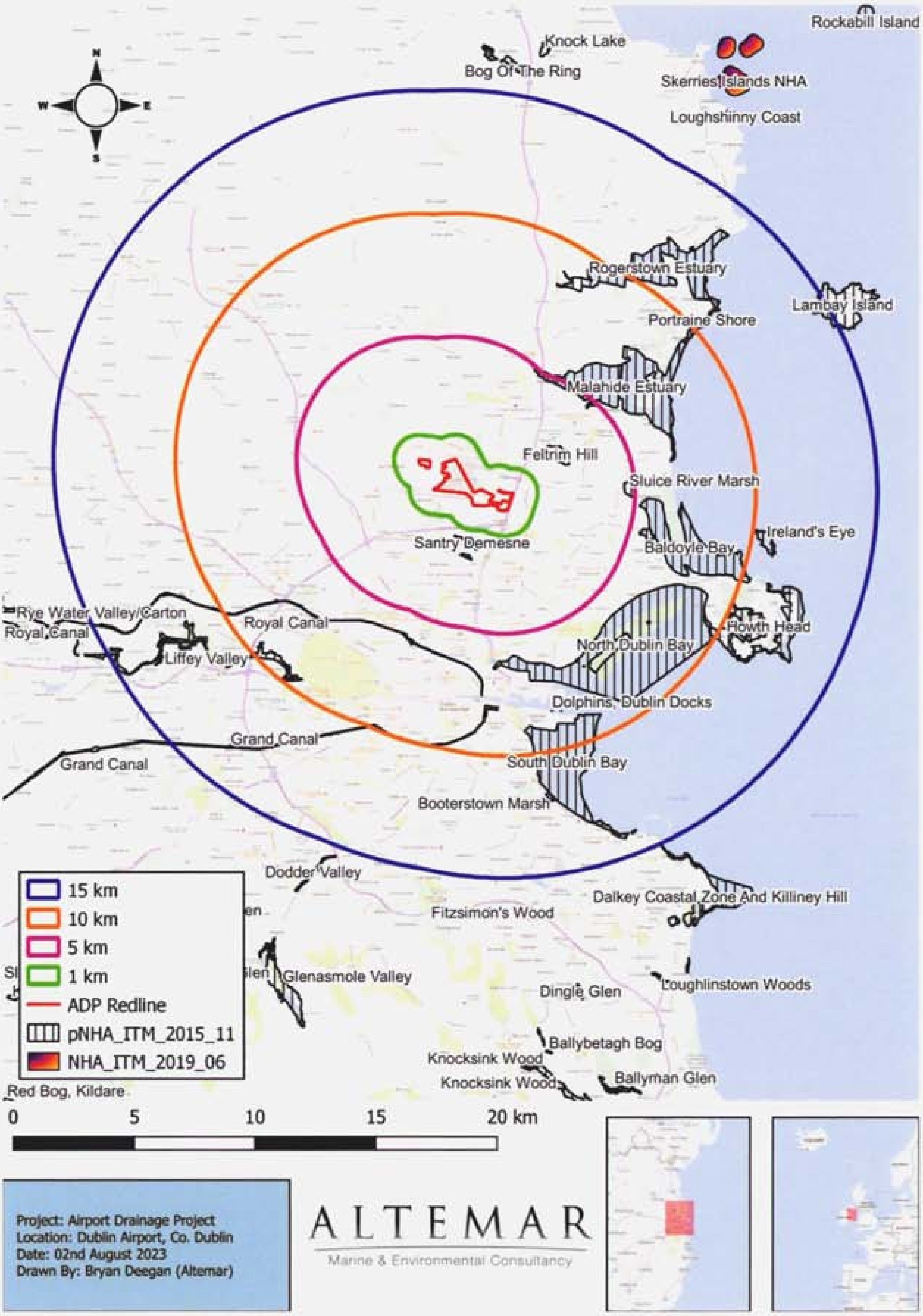

Figure 9.4 pNHAs and NHAs within 15km of the proposed development site

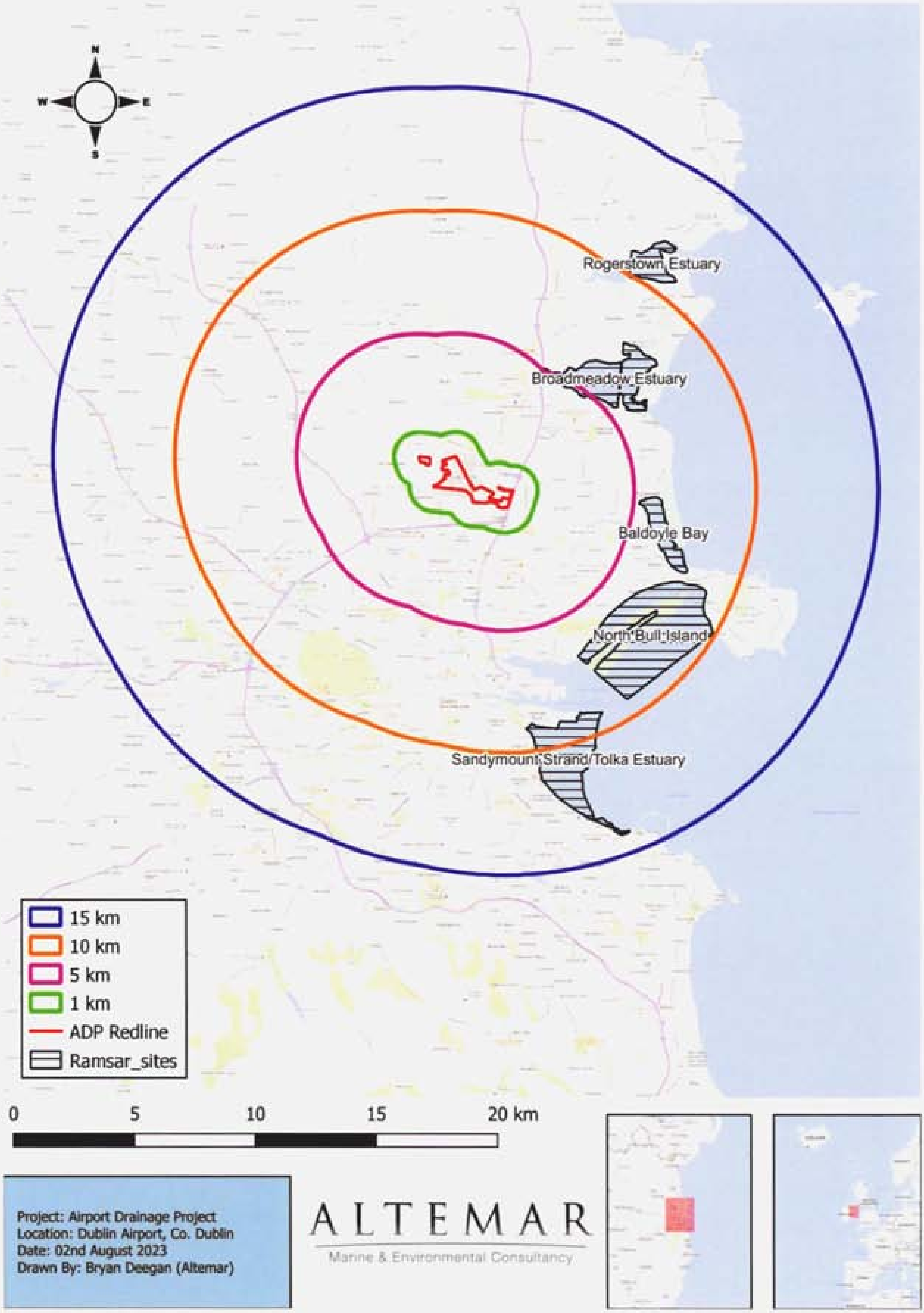

Figure 9.5 Ramsar sites within 15km of the proposed development site

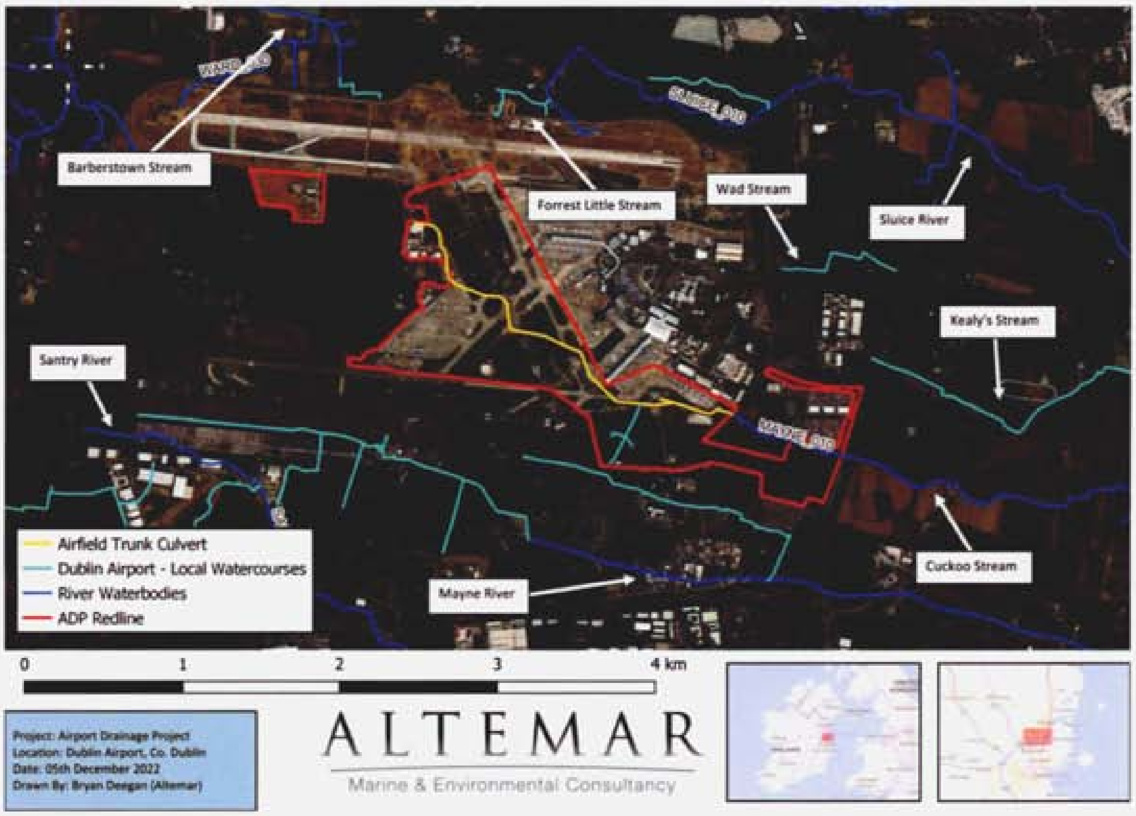

Figure 9.6 River Waterbodies, local watercourses, and Airfield Trunk Culvert (yellow) located within / proximate to ADP site area

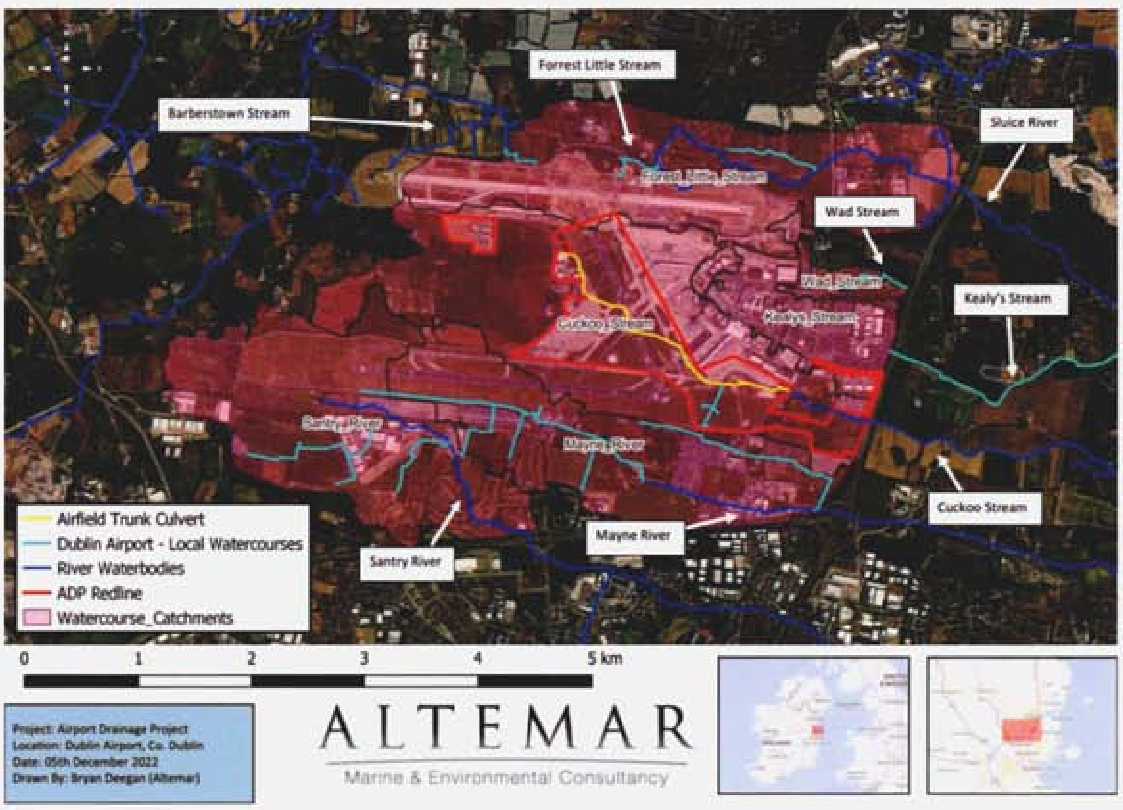

Figure 9.7 River Waterbodies, local watercourses, sub-catchments, and Airfield Trunk Culvert (yellow) located within / proximate to ADP site area

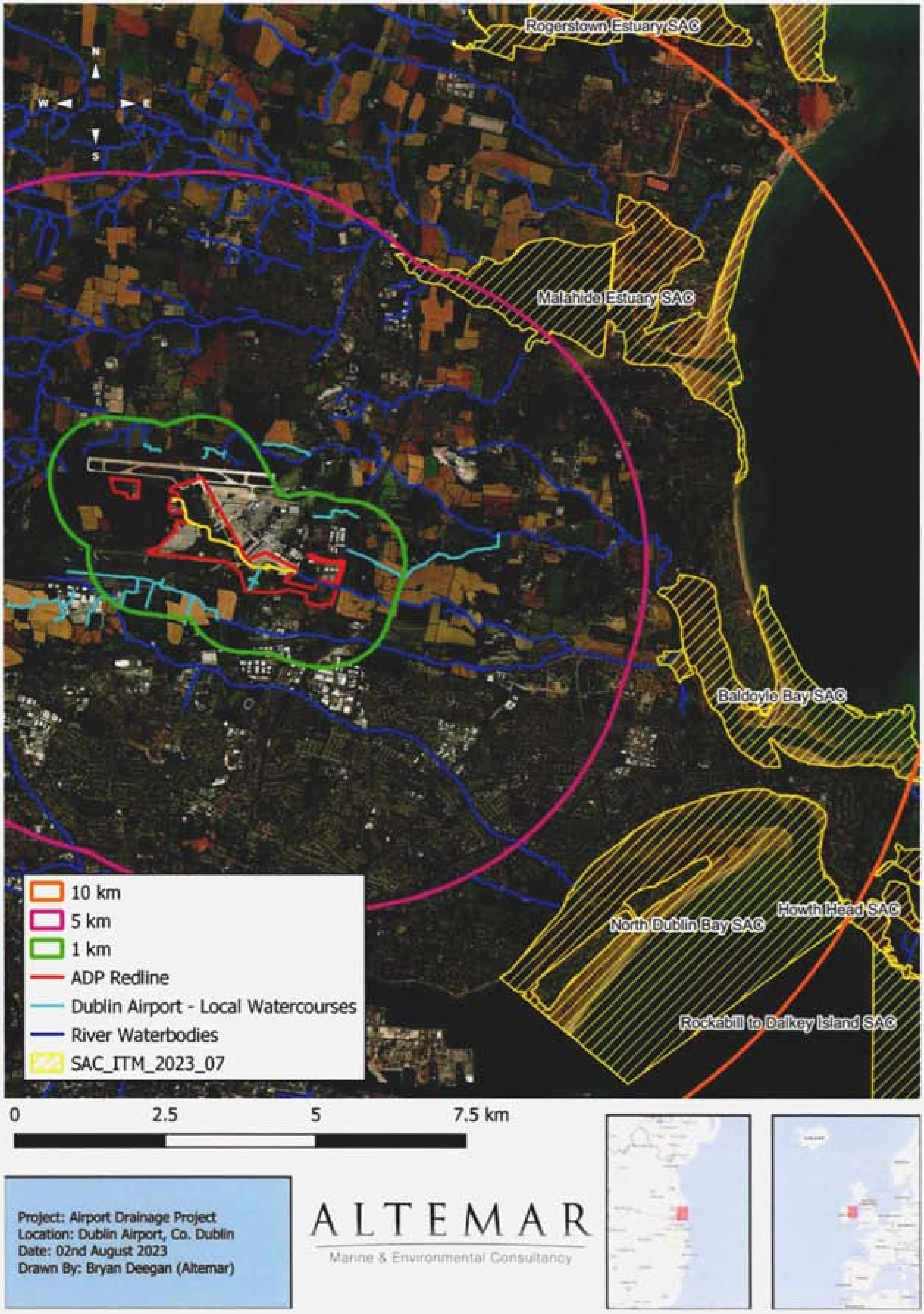

Figure 9.8 Watercourses and SACs proximate to the ADP site area

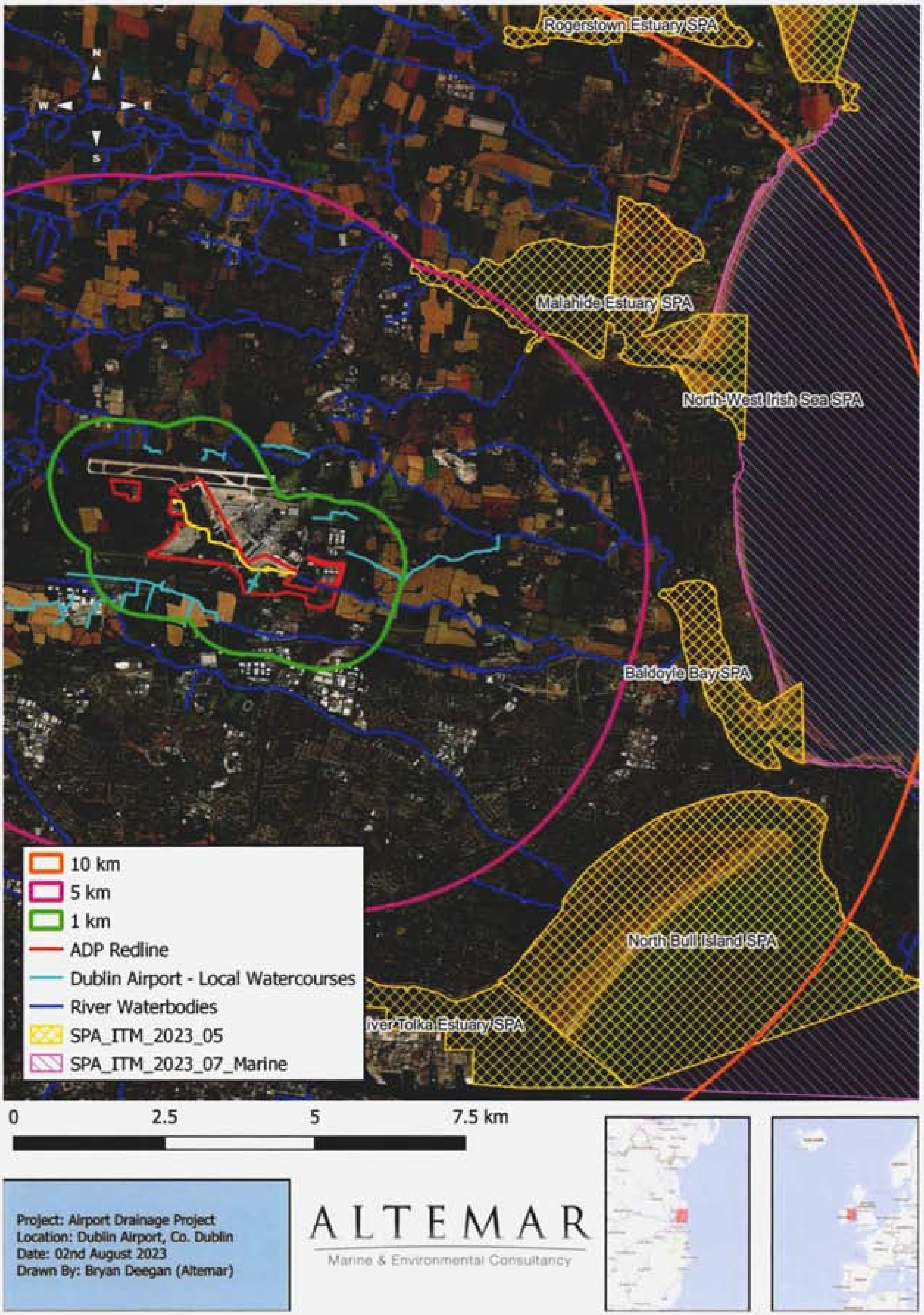

Figure 9.9 Watercourses and SPAs proximate to the ADP site area

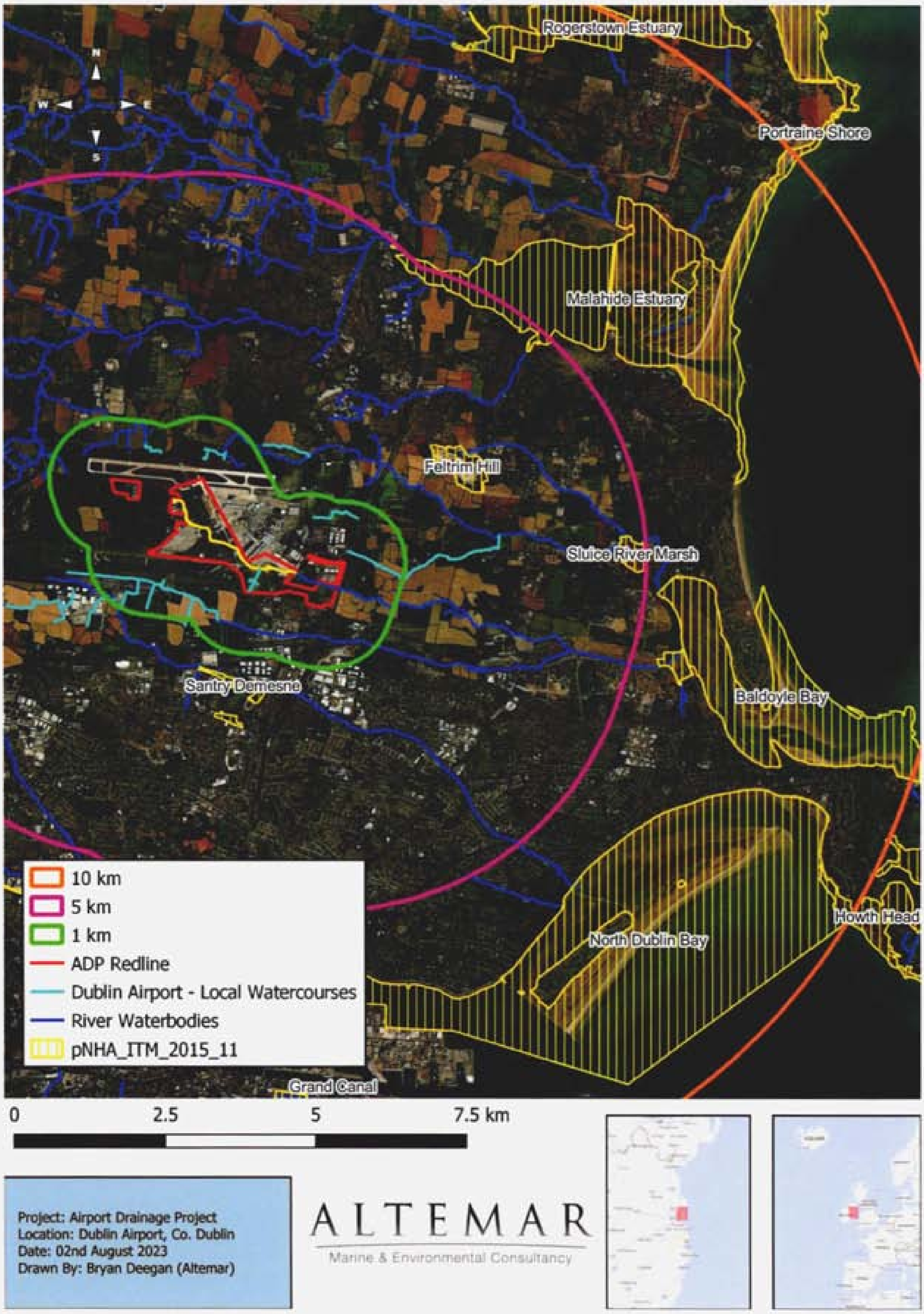

Figure 9.10 Watercourses and pNHAs proximate to the ADP site area

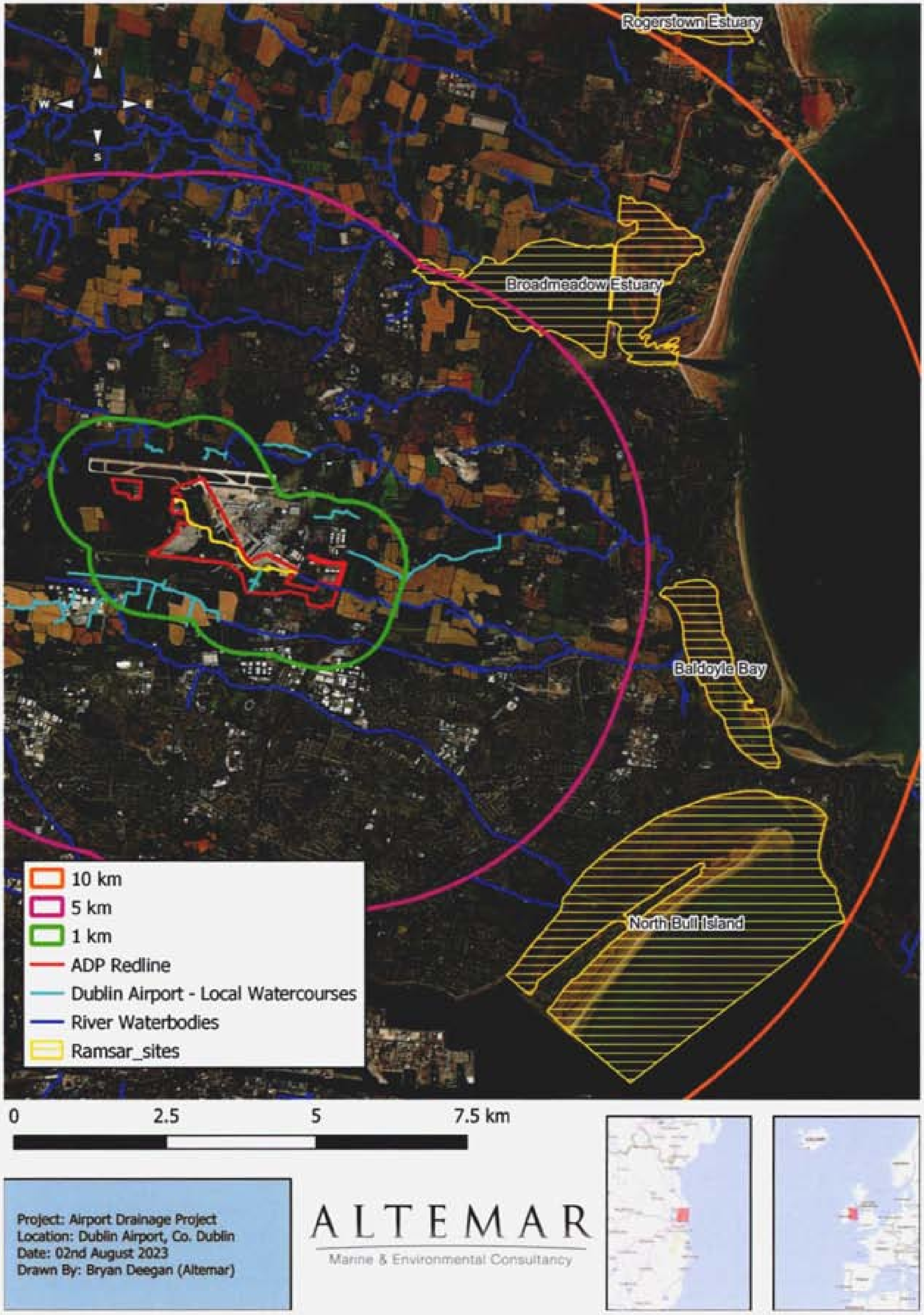

Figure 9.11 Watercourses and Ramsar sites proximate to the ADP site area

9.4.3 Baseline Data – Records

9.4.3.1 Habitat Types

Dublin Airport is located to the north of Dublin City, approximately 5km west of the Irish Sea coastline. The planning boundary *(i.e.,* boundary of Dublin Airport) comprises a substantial complex of approximately 1,100 hectares. There are three main areas within the planning boundary:

- Landside- This primarily consists of built land with roads, buildings and carparks;
- Airside – Within the higher security zone are runways, aprons, and significant areas of managed grasslands, in addition to onsite buildings; and
- Outside these areas there is farmland with grasslands and several arable fields, surrounded by hedgerows within the planning boundary.

Dublin Airport is required to comply with the requirements of the European Union Authority Safety Agency (EASA) and Commission Regulation 139/2014. Laying down requirements and administrative procedures related to aerodromes pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council) which specifically requires wildlife risk assessments to be undertaken.

It should be noted, however, that the airside portion of the proposed site includes active runways, apron and managed airside lands and is actively managed to deter biodiversity. The management of biodiversity within the airport is covered under the daa specific Wildlife and Habitat Management Plan (WHMP, 2022) and is in line with the European Union Aviation Safety Agency Wildlife Hazard Management Guide. The purpose of the WHMP 'is to assess the wildlife strike risk and define and implement appropriate control measures to reduce or mitigate the risk. The plan should also record the results of wildlife strike risk assessments that are conducted and specify the wildlife strike risk mitigation measures that are in place' (WHMP, 2022). This includes bird scaring and habitat management policies including monitoring and a long grass policy. In addition, daa possesses an NPWS "Declaration of Species which may be captured or killed in the interest of aviation safety". As a result of the active deterrence of birds from the airside portion of the site, breeding bird and wintering bird fieldwork do not take place on the airside portion of the lands. Historic, baseline survey identified bird species known to have been struck by aircraft at Dublin Airport from 2007 to 2019 and was investigated to supplement this information. The data is presented in **Technical Appendix 9.1.**

This wildlife risk assessment has been undertaken by daa and an appropriate management plan is in place. These management plans[2] seek to ensure that the habitat around Dublin Airport is managed to reduce the risk from wildlife to aviation. The ongoing habitat management on the airfield controls and deters birds through the implementation of a long grass policy. Therefore, with the implementation of the wildlife management plans many species are deterred from the airfield at the planning boundary.

[2] Dublin Airport Wildlife and Habitat Management Plan 2022

9.4.3.2 Biodiversity within the planning boundary

Flora and Fauna

Bird species regularly observed within the planning boundary include the Common Buzzard (*Buteo buteo*) (Green Listed[3]), Curlew (*Numenius arquata*) (Red listed[4]), Woodpigeon (*Columba palumbus*) (Green listed) and an increasing population of Mountain Hare (*Lepus timidus hibernicus*)[5] on the airfield. The mountain hare has also been recorded as being present in the rare and protected species data that was acquired from NPWS (2022_120_Protected_and_threatened_species_records).

Specifically, the implementation of the long grass policy deters Brent Geese (*Branta bernicla*) (Amber listed[6]). However, these species may be present on adjacent lands where there are no deterrents depending on the land use. As outlined in the most recent Dublin Airport Wildlife and Habitat Management Plan 2022[1], "Since 1995 detailed maps have been prepared illustrating the distribution of birds at Dublin Airport, from which it is possible to identify how the airfield has been used by different species. These maps have shown that the rigorously implemented long grass policy has been highly successful at keeping the grasslands free of most of the potentially hazardous flocking species such as Gulls, Lapwing (*Vanellus vanellus*) (Red listed[7]) and Starling (*Sturnus vulgaris*) (Amber listed[8]). However, despite the long grass policy 32 species of birds (>100g) have been recorded in the vicinity of the airport in 1990-2012 studies"[9].

Other species recorded within the planning boundary include Rabbit (*Oryctolagus cuniculus*), Fox (*Vulpes vulpes*) and Hedgehog (*Erinaceus europaeus*[10]). Common Frog (*Rana temporaria*) has also been noted on site (*pers obs*) and by RPS in (2016a).

A bat survey was carried out by RPS in (2016b) for the ongoing monitoring of the Northern Runway and covered much of the northern section of the airside and landside areas within the planning boundary. The following has been noted by RPS:

*"A moderate level of bat activity recorded across the site during these surveys in comparison to the surveys conducted for the EIS ca. 2005 and more recent surveys on the lands in 2010. Pipistrelles were the most frequently recorded species, with both Common (*Pipistrellus pipistrellus*) and Soprano Pipistrelles (*Pipistrellus pygmaeus*) recorded foraging and commuting along treelines and hedgerows and over open water. Leisler's bat (*Nyctalus leisleri*) was also recorded commuting overhead and* Myotis *sp. were recorded on occasion."*

*"As noted from previous bat surveys carried out for the EIS and 2010 daa project, the Brown Longeared bat (*Plecotus auritus*) roost was reconfirmed at the derelict 2 storey building present within the farm complex (Landside)."*

A Badger (*Meles meles*) survey carried out in 2016 (RPS, 2016c) and the supporting report stated that:

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[3] Green-listed in Ireland. The European population is considered to be Secure.

[4] Red-listed in Ireland due to its small and declining breeding population.

[5] Protected under Wildlife Act 1976 -2021, Habitats Directive (92/43/EEC) Annex V

[6] The Irish population is internationally significant.

[7] Red-listed (National, BoCCI), SPEC 2 vulnerable (Europe)

[8] Amber-listed in Ireland due to moderate recent decline in large parts of its European population.

[9] Dublin Airport Wildlife and Habitat Management Plan 2016

[10] Wildlife Act 1976 - 2021

"There was no discernible evidence of badger activity airside or along the perimeter fence landside. The only confirmatory evidence was isolated badger print in the [redacted]

As outlined in the Dublin Airport Management Plan (2022) "Dublin Airport has 59 grass islands that cover 826 acres (334.2 hectares) of grass within a 18km airfield boundary fence." "The Grasslands at Dublin Airport are maintained in accordance with the 'long grass' policy as detailed in CAP 772 "Bird Strike Risk Management of Aerodromes" which in effect requires the grass length to be maintained at between 150 – 200mm to deter known problem bird species such as the Lapwing and gulls." The grass mix used at Dublin Airport is 75% Tall Fescue and 25% Italian Ryegrass[13].

Based on NPWS rare and protected species records[8] acquired for the project, flora of conservation importance within 5km of airport include Cornflower (*Centaurea cyanus*) found at the Swords Road-Finglas Road junction and Smooth Brome (*Bromus racemosus*) found approximately 1km to the south-west of St Margaret's. Species noted within the subject site, based on NPWS and NBDC records as fine resolution, are seen in **Table 9.4**. Species recorded within two 2km^2 grids that encompass the subject site (O14L & O14R) are seen in **Table 9.5.**

Table 9.4 Species noted within the subject site (NPWS and NBDC records)

Date of Record	Species Name	Designation
07/10/2015	European Rabbit (*Oryctolagus cuniculus*)	Invasive Species: Invasive Species || Invasive Species: Invasive Species >> Medium Impact Invasive Species
22/05/2021	West European Hedgehog (*Erinaceus europaeus*)	Protected Species: Wildlife Acts

Table 9.5 Table of species, NBDC O14L & O14R

Date of Record	Species Name	Designation
O14L		
22/09/2012	Barn Swallow (*Hirundo rustica*)	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern – Amber List
31/12/2011	Black-headed Gull (*Larus ridibundus*)	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern – Red List
31/12/2011	Common Linnet (*Carduelis cannabina*)	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern – Amber List
31/12/2011	Common Pheasant (*Phasianus colchicus*)	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species || Protected Species: EU Birds Directive >> Annex III, Section I Bird Species
31/12/2011	Common Starling (*Sturnus vulgaris*)	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern – Amber List

Date of Record	Species Name	Designation
31/12/2011	Common Wood Pigeon (*Columba palumbus*)	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species || Protected Species: EU Birds Directive >> Annex III, Section I Bird Species
31/12/2011	Eurasian Tree Sparrow (*Passer montanus*)	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern – Amber List
31/12/2011	House Martin (*Delichon urbicum*)	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern – Amber List
31/12/2011	House Sparrow (*Passer domesticus*)	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern – Amber List
31/12/2011	Rock Pigeon (*Columba livia*)	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species
31/12/2011	Yellowhammer (*Emberiza citronella*)	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern – Red List
05/04/2017	European Rabbit (*Oryctolagus cuniculus*)	Invasive Species: Invasive Species || Invasive Species: Invasive Species >> Medium Impact Invasive Species
31/07/2008	Lesser Noctule (*Nyctalus leisleri*)	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts
31/07/2008	Pipistrelle (*Pipistrellus pipistrellus sensu lato*)	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts
O14R		
25/08/2011	Barn Swallow (*Hirundo rustica*)	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern – Amber List
25/08/2011	Common Linnet (*Carduelis cannabina*)	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern – Amber List
18/05/2012	Common Starling (*Sturnus vulgaris*)	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern – Amber List
20/01/2016	Common Wood Pigeon (*Columba palumbus*)	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species || Protected Species: EU Birds Directive >> Annex III, Section I Bird Species
18/01/2011	Herring Gull (*Larus argentatus*)	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern – Red List
31/12/2011	House Martin (*Delichon urbicum*)	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species:

Date of Record	Species Name	Designation
		Birds of Conservation Concern >> Birds of Conservation Concern – Amber List
12/06/2018	House Sparrow (*Passer domesticus*)	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern – Amber List
28/06/2019	Butterfly-bush (*Buddleja davidii*)	Invasive Species: Invasive Species || Invasive Species: Invasive Species >> Medium Impact Invasive Species
06/06/2016	Grayling (*Hipparchia semele*)	Threatened Species: Near threatened
24/06/2018	European Rabbit (*Oryctolagus cuniculus*)	Invasive Species: Invasive Species || Invasive Species: Invasive Species >> Medium Impact Invasive Species
16/07/2008	Lesser Noctule (*Nyctalus leisleri*)	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts
22/05/2021	West European Hedgehog (*Erinaceus europaeus*)	Protected Species: Wildlife Acts

9.4.4 Site Survey

Site assessments were carried out on the 20th August 2022, 17th October 2022 (airside), 25th October 2022. Habitats within the Proposed ADP site were classified according to Fossitt (2000) (**Figure 9.13**) and the species noted within each habitat are described.

9.4.4.1 BL3 Buildings and artificial surfaces

As seen in **Figure 9.13,** a significant portion of the proposed development site is built land within the airport environment and consists of maintained roads, aprons, runways, taxiways, buildings and managed grassland. Outside of the airport environment this habitat consists primarily of long grassland. There are no buildings to be demolished for the proposed development. Opportunistic flora species had begun to grow in cracks and in areas at the edge of the road areas outside of the airport environment. Species included bramble (*Rubus fruticosus agg.*), cat's-ear (*Hypochoeris radicata*), nettle (*Urtica dioica*), dandelion (*Taraxacum spp.*), plantains (*Plantago spp.*), thistles (*Cirsium arvense & C. vulgare*) and docks (*Rumex spp.*).

Figure 9.12 Built land within Dublin Airport (inset airside perimeter road)

9.4.4.2 GA1 Improved Agricultural Grassland

The grassland within the airport is intensively managed and highly modified agricultural grassland that is regularly fertilised but kept at a long sward to reduce biodiversity and limit the potential for ground nesting birds. As a result, floral biodiversity in this area is extremely poor but increased marginally in areas that had been recently reseeded to include opportunistic species including rape (*Brassica napus*). Outside the airport environment this habitat was more diverse with creeping buttercup (*Ranunculus repens*), white clover (*Trifolium repens*), red clover (*Trifolium pratense*), dandelion (*Taraxacum* spp.), plantains (*Plantago* spp.), thistles (*Cirsium vulgare*), docks (*Rumex* spp.) and nettle (*Urtica dioica*). Works are proposed in this area and no species of conservation importance were noted within this habitat. These areas appear to also be used as an amenity area with joggers utilising the perimeter of these fields as an improvised jogging track.

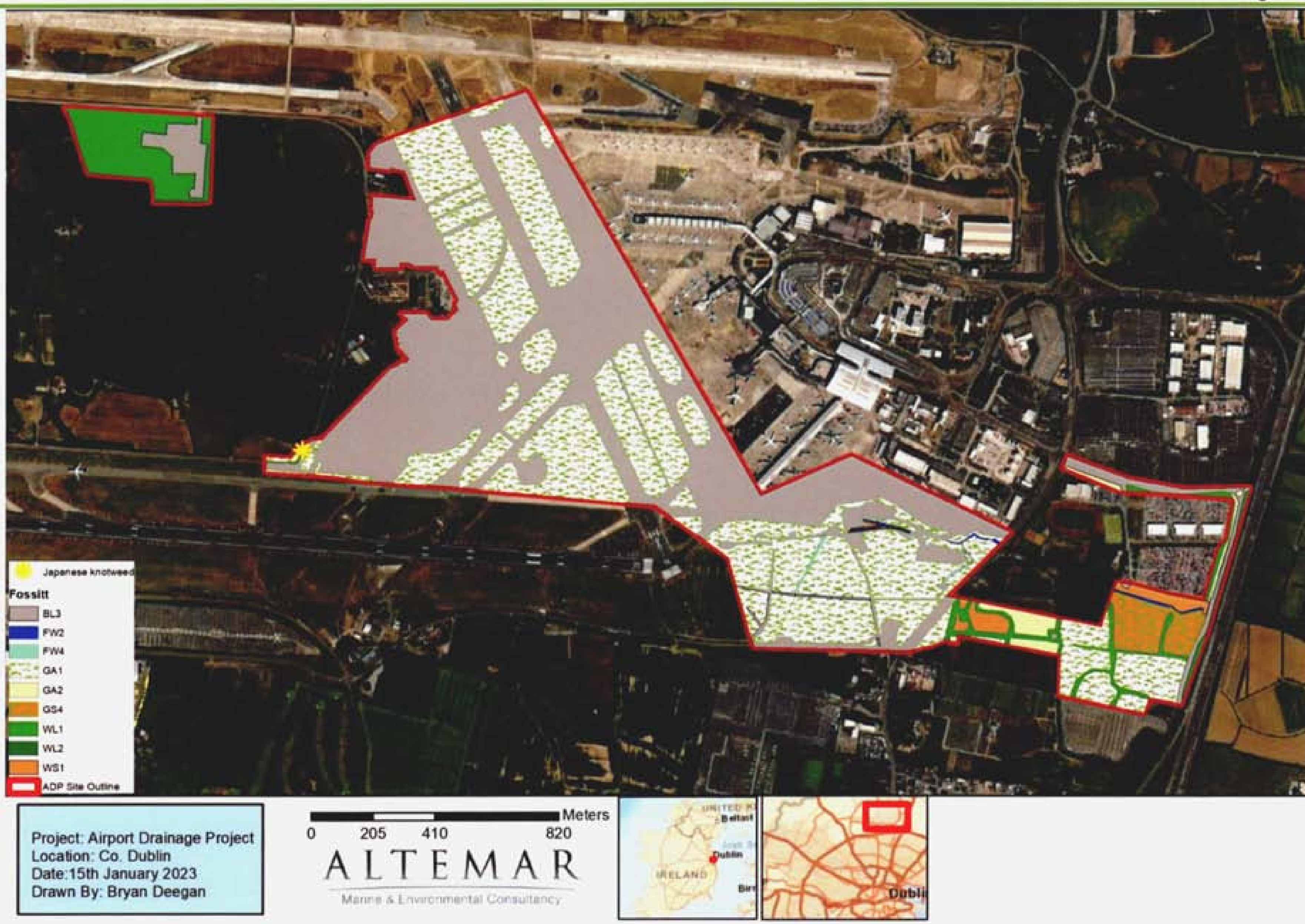

Figure 9.13 Fossitt Habitats on site (see habitat descriptions for the explanation to Fossitt codes) (Entire site)

Figure 9.14 Fossitt Habitats on site (see habitat descriptions for the explanation to Fossitt codes) (Eastern site)

Figure 9.15 Improved Agricultural Grassland (Airside).

A small area of scrub (WS1) (Fossitt, 2000) was noted airside, immediately bordering the Cuckoo Stream. The majority of this habitat was noted outside the airport and east of the R132. These areas were unmanaged and the lands east of the R132 appeared to be abandoned areas of land including an area north of the Cuckoo Stream that has recently undergone site clearance. The species in these areas consisted of gorse (*Ulex europaeus*), bramble (*Rubus fructicosus*), common nettle (*Urtica dioica*) rape (*Brassica napus*), dandelion (*Taraxacum spp.*), oxeye daisy (*Leucanthemum vulgare*), red valerian (*Centranthus ruber*), colt's foot (*Tussilago farfara*), common poppy (*Papaver rhoeas*), scarlet pimpernel (*Anagallis arvensis*), plantains (*Plantago spp.*), thistles (*Cirsium arvense & C. vulgare*), creeping buttercup (*Ranunculus repens*), white clover (*Trifolium repens*), red clover (*Trifolium pratense*), docks (*Rumex spp.*), cat's-ear (*Hypochaeris radicata*), common ragwort (*Senecio jacobaea*), winter heliotrope (*Petasites pyrenaicus*), butterfly-bush (*Buddleja* spp.), self-heal (*Prunella vulgaris*), wild carrot (*Daucus carota*), lesser trefoil (*Trifolium dubium*), wild teasel (*Dipsacus fullonum*) and rosebay willowherb (*Chamaenerion angustifolium*).

Figure 9.16 Scrub

9.4.4.3 GS4 -Wet Grassland

An area of wet grassland was located at the eastern portion of the site. This area appeared to be locally wet during winter months. Biodiversity in these areas was poor and the fields were dominated by thistles (*Cirsium arvense*, *C. vulgare*), clover (*Trifolium repens*), plantains (*Plantago* spp.), creeping buttercup (*Ranunculus repens*), docks (*Rumex* spp.). In the central area of the site the land has remained abandoned for several years and this area of land appeared damper with rush (*Juncus* sp.) and juvenile willow (*Salix* sp.) (scrub) beginning to dominate.

Figure 9.17 Wet Grassland

Figure 9.18 Hedgerows

9.4.4.4 WL1- Hedgerows

The majority of hedgerows within the site outline are located outside the airfield area, with only one short hedgerow located proximate to the Cuckoo Stream within the airfield. The hedgerows to the east of the R132 appear to have been previously maintained although not apparently for several years as they had been allowed to grow to the full height and width. In addition, several hedgerows were double hedgerows with a drainage ditch, which ultimately lead to the Cuckoo Stream. Numerous mature/semi-mature ash (*Fraxinus excelsior*) were noted within the habitat. Other species included elder (*Sambucus nigra*), hawthorn (*Crataegus monogyna*), bramble (*Rubus fruticosus*), blackthorn (*Prunus spinosa*), holly (*Ilex aquifolium*), sycamore (*Acer pseudoplatanus*), dog-rose (*Rosa canina*), ivy (*Hedera helix*), willow (*Salix* sp.), gorse (*Ulex europaeus*), plantains (*Plantago* spp.), rosebay willowherb (*Chamaenerion angustifolium*), hedge bindweed (*Calystegia sepium*), nettle (*Urtica dioica*), cow parsley (*Anthriscus sylvestris*), and cleavers (*Galium aparine*) were noted.

Faunal surveys were carried out. Evidence of fox (*Vulpes vulpes*) and significant rabbit (*Oryctolagus cuniculus*) activity was noted on site. Several small burrows were noted within the hedgerows. The site did not reveal mammal activity of conservation importance. No resting or breeding places of mammals of conservation importance were noted within the hedgerows. However, given the presence of standing water within the drainage ditches within this habitat, it would be expected that the wet drainage ditches on site could form frog breeding areas. No trees of bat roosting potential were noted within the hedgerows.

Figure 9.19 Depositing/lowland rivers. Cuckoo Stream (Airside)

(Top. Downstream of South Apron. Left. riffle area to reintroduce oxygen into stream. Right. bacterial mat on bed of stream upstream of riffle)

9.4.4.5 FW2- Depositing/Lowland rivers

An aquatic survey of the Cuckoo Stream (outside of the airfield) was carried out by Prof. Joe Caffrey and is seen in **Technical Appendix 9.2**. As outlined in **Appendix 9.2,** '*The aquatic flora in the stream was very reduced and it is estimated that the overall percentage ground cover occupied by submerged macrophytes over the section sampled was < 1%. The only species recorded were angiosperm* Callitrich platycarpa *(Various-leaved Water-starwort), the bryophyte* Fontinalis antipyretica *(Greater Water-moss) and the filamentous green alga* Cladophora *sp. (cf.* glomerata*). The former species was represented as a small number of stands that occupied the more slow-flowing water in the glides and pools (see* **Figure 9.12** *(right)). Only very small stands of* F. antipyretica *and* Cladophora *sp., were recorded, clinging to rocks and gravel in the more fast-flowing sections of the stream.*' Within the airfield the assessment was carried out by Bryan Deegan (CIEEM). Within the airfield there was a paucity of instream biodiversity and the gravels within the watercourse were covered by a bacterial mat, the intensity of which reduced further downstream.

Measures had been put in place during the South Apron development (Riffles **Plate 9.5**) to assist in the reoxygenation of the watercourse. No instream biodiversity was noted within the airfield.

9.4.4.6 Evaluation of Habitats

The main habitats within the proposed development are primarily a series of agricultural/wet grassland surrounded by hedgerows. The Cuckoo Stream, drainage ditches and hedgerows on site would be seen as the most important habitats on site, not because of the species noted but, by the linear nature of the elements providing biodiversity corridors and bat foraging routes to the surrounding areas. No habitats of conservation significance were noted within the site boundary.

9.4.4.7 Plant Species

No rare or threatened plant species of conservation value were noted within the proposed development site during the field assessment. The plant species encountered at the various locations on site are detailed above. No rare or plant species of conservation value were noted within the site during the field assessment. Records of rare and threatened species from NBDC and NPWS were examined. A small area of Japanese knotweed was noted in a hedgerow to the west of the airfield within the proposed development site (See **Figure 9.13**). Japanese knotweed (invasive species) is listed on the third Schedule of regulation 49 & 50 in the European Communities (Birds and Natural Habitats) Regulations, 2011. The Japanese knotweed will be isolated and removed in accordance with legislative requirements under supervision of an Invasive Species Specialist.

9.4.4.8 Bats

Bat assessments (**Technical Appendix 9.3**) were carried out, including emergence surveys from trees and hedgerows. There were no seasonal or climatic constraints as surveys were undertaken within the active bat season in good weather conditions with temperatures of greater than 10^{0}C after dark. Winds were very light and there was no rainfall. Foraging activity of soprano pipistrelle, common pipistrelle and Leisler's bats were noted along the hedgerows on site. No trees of moderate or high bat roosting potential were noted within the proposed development site.

9.4.4.9 Terrestrial Mammals

Badgers have been noted [redacted] However, no badgers or badger activity was noted on site. Otters (*Lutra lutra*) activity or holts were not noted on site. No evidence of deer was noted on site. Hedgehogs (*Erinaceus erinaceus*) have been recorded by NPWS within the 10km square. No hedgehogs were seen during the site visits (15th & 20th January 2023) but may be present on site. Irish hares (*Lepus timidus hibernicus*) were noted within the grasslands within the airfield. Evidence of rabbit (*Oryctolagus cuniculus*) and fox (*Vulpes vulpes*) activity was noted on site, particularly to the east of the R132. However, hedgehogs (*Erinaceus erinaceus*), Irish hares (*Lepus timidus hibernicus*), rabbit (*Oryctolagus cuniculus*) and fox (*Vulpes vulpes*) were all recorded by Ball et al. (2023) using camera traps in 2022 within the airport. No protected terrestrial mammals were noted east of the R132.

9.4.4.10 Amphibians/Reptiles

The common frog (*Rana temporaria*) was not observed on site. However, frogspawn was noted beside the drainage ditch. There are features within the site boundary that could be important to frogs including the grassland and drainage ditches. The common lizard (*Zootoca vivipara*) or smooth newt (*Lissotriton vulgaris*) were not recorded on site.

9.4.4.11 Birds

As outlined in the breeding bird assessment in **Technical Appendix 9.1** 'Thirty-two Bird species were recorded at the Dublin Airport site over three breeding bird surveys in May and June 2022. Of these species recorded eleven species were proven to be breeding on-site these being – Blackbird, Robin, Wren, Song Thrush, Blue Tit, Coal Tit, Long-tailed Tit, Goldcrest, Chaffinch, Willow Warbler and Hooded Crow. Breeding species recorded on-site that are Amber-listed on Birdwatch Ireland's Bird of conservation concern in Ireland 2020-2026 were Willow Warbler and Goldcrest.' A wintering bird assessment is ongoing and the data collected have thus far recorded a similar profile of passerines to those recorded in the 2022 breeding bird surveys, exceptions being Redwing and Fieldfare (foraging on-site in small numbers). Of the wintering species recorded on-site (non-passerines) and of conservation concern, Snipe are foraging on-site in small numbers (single figures), attracted to forage at wet locations on-site (some areas in fields at east side and near the stream). Woodcock was recorded once (Single bird). Other species recorded were Oystercatcher and Curlew (one visit only) in the playing fields area, again in single figures. No other species were recorded. As outlined in the wintering bird assessment in **Technical Appendix 9.1** '*In total 42 Bird species were recorded overall at the Dublin Airport site during 10 surveys over the course of the winter bird survey period 2022-2023. Species recorded that are red listed as a wintering species of conservation concern (Birdwatch Ireland's birds of conservation concern in Ireland 2020-2026) that were recorded on-site were Snipe, Oystercatcher and Redwing, each recorded in small numbers, a peak count of Snipe occurring on January 20th (six birds in wet areas near stream at northeast area of site), a maximum Oystercatcher count was eight birds on February 26th and a maximum count of 25 Redwing on January 20th. Amber-listed Gull species were noted to forage in small numbers on the playing fields at the west side of the site. The selection of passerine species recorded was typical of that which might be expected in a semi-urban Dublin setting.*

Results suggest that the site is not significant ex-situ foraging or roosting site for species of qualifying interest from nearby Special Protection Areas (SPA's).'

9.5 Potential Effects of the Proposed Project

The biodiversity chapter has been assessed in line with the EPA's EIAR Guidelines (2022). The assessment process is outlined in **Chapter 2** of the EIAR and the description of effects is seen in **Table 2.2.**

9.5.1 Construction Phase

In the absence of mitigation measures the overall development of the site is likely to have direct negative effects upon the existing habitats, fauna and flora within the site. Direct negative effects will be manifested in terms of the negative effects on the aquatic biodiversity of the Cuckoo Stream during instream works and works proximate to the watercourse that could lead to surface water drainage contaminated with pollutants associated with construction activity entering the watercourse. In addition, there would be direct negative effects on habitats within the construction areas during the construction phase. The removal of these habitats, including grassland and areas of hedgerows, will result in a loss of species of low biodiversity importance. The area is not deemed to be an important foraging area for terrestrial mammals or birds. The likely effects of the proposed construction of the development are outlined below.

9.5.1.1 *Designated Conservation sites within 15km*

The proposed development is not within a designated conservation site. It should be noted that the Cuckoo Stream flows through the subject site and the nearest Natura 2000 sites are Malahide Estuary SAC and SPA, located 4.6km from the subject site. The nearest Natura 2000 sites with a hydrological pathway are Baldoyle Bay SAC & SPA, located 5.2 km from the subject site. The nearest pNHA with a hydrological pathway is Baldoyle Bay pNHA, located 5.2km from the subject site. The nearest Ramsar site with a hydrological pathway is Baldoyle Bay, located 5.2km from the subject site. Given the scale of the proposed development and that in-stream works to the Cuckoo Stream are proposed, it is considered that there is a direct hydrological pathway to downstream designated conservation sites located in Baldoyle Bay. In the absence of mitigation, there is potential for silt and surface water drainage contaminated with pollutants associated with construction activity to enter the Cuckoo Stream and significantly affect downstream designated conservation sites.

<u>Effects: Slight effects / International / adverse effect / not significant / short term.</u> Mitigation is needed to limit the potential negative effect from contaminated surface water during construction.

9.5.1.2 *Terrestrial mammalian species*

Protected species such as the Irish hare and hedgehog have been noted on site. No badgers or otters were observed on site. No resting or breeding places of species of conservation importance have been noted on site. Loss of habitat and habitat fragmentation may affect some mammalian species during construction.

<u>Effects: Slight effects / site / reversible effects / adverse effect / not significant / short term / likely.</u> Mitigation is required in the form of pre-construction inspections for mammals and ensuring that mammals have the ability to exit excavations.

9.5.1.3 *Flora*

No protected flora were noted on site. A small area of Japanese knotweed was noted in a hedgerow to the west of the airfield within the proposed development site (See **Figure 9.13**). Site clearance will remove the floral species within the construction areas on site. This will include the removal of approximately 1km of hedgerow (worst case) in the lands to the east of the airport.

<u>Effects: Slight effects / site / reversible effects / adverse effect / not significant / short term / likely</u>. Mitigation is required to offset the hedgerow loss on site and to comply with legislation in relation to the control/removal of invasive species from site.

9.5.1.4 *Bat Fauna*

No bats were noted roosting on site. No bats were noted emerging from trees on site. Foraging of three bat species was noted on site. During construction several areas of hedgerow will be lost which may result in a minor temporary loss of foraging areas.

<u>Effects: Slight effects / site / adverse effects / not significant / short term / likely.</u> Mitigation is needed in the form of the control of light spill during construction to avoid disturbance to bats.

9.5.1.5 *Aquatic Biodiversity*

In the absence of any mitigation on site, given that the Cuckoo Stream traverses through the subject site, and the potential for contaminated surface water runoff and pollution to enter the watercourse during construction, there is potential for downstream effects on aquatic biodiversity from contaminated runoff, including silt, dust and potential petrochemicals, which would adversely affect aquatic biodiversity. Aquatic biodiversity within the site is poor. However, there was a notable, but gradual, visual improvement in water quality and stream bed over the length of the watercourse within the site outline during the site walkover and therefore works could potentially impact on biodiversity downstream of the proposed works.

<u>Effects: Moderate effects / local / adverse effects / reversible / short term / likely / significant.</u> Mitigation is needed in the form of control of silt, control of dust and control of surface water drainage contaminated with pollutants associated with construction activities.

9.5.1.6 *Bird Fauna*

The airfield is actively managed to deter birds. In addition, the area to the east of the R132 is directly beneath the flight path of planes landing within Dublin Airport. As such it is a highly disturbed environment. Construction activities on site could potentially disturb nesting birds within the site and remove the habitats of Willow Warbler and Goldcrest (amber listed). The felling of trees within bird nesting season could potentially lead to the loss of nesting birds. Works on site could potentially lead to a loss of habitat for snipe and woodcock.

<u>Effects: Slight effects / local / reversible effects / adverse effect / not significant / short term / likely.</u> Mitigation is needed whereby light spill is controlled and the removal of woody vegetation happens outside of bird nesting season. In addition, new areas for willow warbler and goldcrest will be planted on the eastern portion of the site in the vicinity of the Cuckoo Stream. The proposed development is beneath the flight path of the 10/28 runway. Given the location of the site beneath the flight path, mitigation is not proposed to discourage larger bird species from using the proposed development area, due to the potential for collision risk with incoming aircraft.

9.5.2 Operational Phase

Once constructed, the site would be seen as a stable ecological environment. However, appropriate measures should be taken to prevent contaminated surface water run-off into adjacent habitats and, in particular, the River Mayne *via* the Cuckoo Stream.

9.5.2.1 *Designated Conservation sites within 15km*

It is considered that there is a direct hydrological pathway to downstream designated conservation sites located within Baldoyle Bay. In the absence of mitigation, there is potential for slight adverse effects on downstream designated conservation sites as a result of the operational phase of development.

Further, given that any contaminated flows will be directed to Ringsend WwTP for treatment, it is considered that there is an indirect hydrological pathway to designated conservation sites located within Dublin Bay (following treatment). However, given that contaminated flows directed to the foul sewer will be treated along this foul wastewater network, no significant effects on downstream conservation sites are likely.

There is potential for contaminated surface water drainage (pollutants, dust, and silt) to enter the proposed surface water networks and the Cuckoo Stream. In addition, levels of de-icer, below the trigger level of the pollution control will remain in the watercourse. However, it would be expected that given the refined arrangement of pollution control points, the levels of de-icer would be expected to reduce, while the volumes of water within the Cuckoo Stream during de-icing periods would be more consistent, with less interruptions in waterflow. It should also be noted that there will be a monitored overflow pipe connected to the Cuckoo Stream.

Effects: Slight effects / international / adverse / not significant / long term / likely. Mitigation is required in relation to monitoring infrastructure.

9.5.2.2 Terrestrial mammalian species

No protected terrestrial mammals were noted on site.

Effects: Neutral / site / not significant / long term / likely.

9.5.2.3 Flora

No protected flora was noted on site.

Effects: Neutral / site / not significant / long term / likely.

9.5.2.4 Bat Fauna

The proposed development will change the local environment in the short term as some of the existing vegetation will be removed. No potential bat roosts were identified or will be lost due to this development. Foraging is expected to continue on site.

Effects: Slight effects / negative / site / long term / likely. Mitigation will be included within the design to ensure foraging is maintained on site.

9.5.2.5 Aquatic Biodiversity

The proposed development is designed to improve water quality and the hydrodynamics of the Cuckoo stream substantially and it will improve conditions to support instream biodiversity. The system is designed to increase the number of decision points within the airfield (see **Chapter 4**) which will allow cleaner flows to continue downstream, while isolating high COD flows for treatment. This will substantially improve the current situation within the catchment resulting in a more continuous flow in the stream downstream of the airfield during de-icing events and more concentrated flows going to treatment. It has also been designed to respond quicker to contamination events resulting in greater capturing of "first flush" contamination. These events would have high levels of de-icer and the quicker capturing of first flush events would be expected to result in the lowering of high-level peaks in de-icer doing downstream that would be seen in slower response systems. It would be expected that the improvements in water quality would result in the lowering of contamination loading effects *e.g.*, bacterial mats downstream of the airfield.

However, in the absence of any mitigation on site, given that the Cuckoo Stream traverses through the subject site, there is potential for downstream impacts on aquatic biodiversity including aquatic invertebrates, from contaminated runoff, silt, and pollutants. In addition, the overflow from the main tank on site has the potential to discharge concentrated de-icer to the Cuckoo Stream.

Effects: Slight effects / local / reversible / adverse / not significant / long term / likely. Mitigation (as listed in **Section 9.6**) is required to protect downstream aquatic biodiversity. Monitoring of COD and nutrients, reporting and recording of all overflows will be in place.

9.5.2.6 Bird Fauna

Once constructed the proposed development will have a neutral impact airside. The Central Pollution Control Facility (CPCF) will result in a reduction of wet grassland habitat to the east of the R132 which may result in loss in the minor foraging of larger species within the wet grassland area. The loss of this habitat would help reduce the potential risk to aviation due to the presence of some larger bird species in this area beneath the flight path. The management of biodiversity within the airport is covered under the daa specific Wildlife and Habitat Management Plan (WHMP, 2022) and is in line with the European Union Aviation Safety Agency Wildlife Hazard Management Guide. This would include the control of larger bird species that could pose a strike risk. The removal of this habitat will reduce the potential for species to utilise this area thus reducing the level of control required in this area.

Impacts: Slight effects / site / not significant / long term. Given the location of the site beneath the flight path, mitigation measures are not proposed for the larger bird species on site due to the potential for collision risk with incoming aircraft.

9.6 Mitigation Measures

9.6.1 Construction Phase

- A project ecologist will be appointed prior to works commencing on site and consulted in relation to all onsite drainage during works.
- All site clearance works methodologies will have prior approval of a project ecologist. This will include not removing woody vegetation in bird nesting season.
- Staging of project will be carried out to reduce risks of onsite drainage to the Cuckoo Stream and subject to the approval of a project ecologist.
- Local drainage connections, gullies and watercourses will be protected from dust, silt, and surface water throughout the works.
- All onsite drainage network connections will be blanked off and sealed at the first phase of the construction works to prevent runoff or pollutants entering the surface water network.
- There will be no entry of solids or pollutants to the drainage network during the works through the protection of watercourses and drains from works.
- The Site Manager will be responsible for the pollution prevention programme and will ensure that at least daily checks are carried out to ensure compliance. A record of these checks will be maintained.
- Spill containment equipment shall be available for use in the event of an emergency. The spill containment equipment shall be replenished if used and shall be checked on a scheduled basis.

- Silt fencing will be in place in the vicinity of the Cuckoo Stream, and other areas deemed appropriate and as directed by the project ecologist.
- Instream works will be carried out in consultation with Inland Fisheries Ireland. Guidelines on protection of fisheries during construction works in and adjacent to waters (IFI, 2016) will be followed.
- Measures will be in place to allow mammals to exit from excavations. This will be discussed with the project ecologist and will include sloped sides and ramps where relevant.
- Landscaping elements include planting areas for hedgerow loss and specific areas for Willow Warbler and Goldcrest are to be planted on the eastern portion of the site in the vicinity of the Cuckoo Stream in consultation with the project ecologist and landscape architect. The project ecologist will work with the arborist to limit the hedgerow loss on site during construction.
- The project ecologist will oversee the management/treatment or removal of the Japanese knotweed in line with best practice and Irish legislation. Prior to the commencement of works a pre-works inspection and mapping of Japanese knotweed will be carried out. An invasive Species Management Plan will be developed prior to the commencement of works within 7m of Japanese knotweed. No works will take place within 7m of any Japanese knotweed without approval of the project ecologist.

9.6.2 Operational Phase

- Standard operational mitigation measures as outlined in **Chapter 10 – Hydrology** will be in place to protect surface waters from pollution.
- A post construction landscape inspection will be carried out by the project ecologist to ensure that all commitments and mitigation measures have been carried out.
- Lighting during operation will be controlled and bat sensitive lighting will be in place.
- Post construction an inspection of monitoring infrastructure and procedures will be carried out by the project ecologist.

9.7 Monitoring Measures

9.7.1 Construction Phase

A project ecologist will be appointed to oversee construction works on site. The ecologist will be empowered to stop works as necessary to avoid potential significant negative effects.

9.7.2 Operational Phase

Discharges from the drainage network will be monitored for COD and nutrient loading. Monitoring and recording of all overflow discharges will include real-time monitoring of volumes, alarms, and COD concentration. A record of all overflows will be kept for inspection. Fingal County Council and Inland Fisheries Ireland will be informed within 12 hours of any overflows from the Central Pollution Control Facility (CPCF).

9.8 Residual Effects of the Proposed ADP

9.8.1 Construction Phase

Based on the successful implementation of the construction phase controls and mitigation measures and the works to be carried out in accordance with this EIAR and the accompanying NIS, it is likely that there will be no significant residual ecological effect arising from construction works for the project. It is not likely that designated conservation sites will be significantly affected by the proposed development during construction.

A robust series of standard construction phase control measures has been outlined to ensure that the proposed project does not significantly affect species or habitats of conservation importance, conservation areas or watercourses during construction. It is essential that these measures are complied with to ensure that the proposed works do not have downstream environmental impacts. These measures are to protect the Cuckoo Stream and River Mayne, which are potentially the primary vectors of impacts from the site, and to avoid impacts during the construction phase of the proposed project.

No significant environmental effects are likely in relation to the construction of the proposed ADP.

<u>Effects: Slight effects / site / adverse effect / not significant /short term / likely.</u> Standard mitigation will be in place on site, see **Section 9.6.1** for a complete list. These will include control of surface runoff, pre-construction inspections and monitoring of the works by a project ecologist.

9.8.2 Operational Phase

Based on the successful implementation of the operational phase controls and as the operation will be carried out in accordance with this EIAR and the accompanying NIS, it is likely that there will be no significant ecological impact arising from operation of the proposed project. It is considered that designated conservation sites will not be significantly affected by the proposed development.

Standard operational phase control measures have been outlined to ensure that the proposed project does not impact on species or habitats of conservation importance, conservation areas or watercourses. It is essential that these measures are complied with, to ensure that the proposed operations do not result in significant environmental impacts. These measures are to protect the Cuckoo Stream and River Mayne, which are potentially the primary receptors of impacts from the site and ensure that they are not likely to be significantly affected during operational phases of the proposed project. In the long term, the proposed works are designed to improve water quality within the Cuckoo Stream, conserve WWT capacity and save energy.

Significant environmental effects are not considered likely in relation to the operation of the proposed Airport Drainage Project.

<u>Effects: Slight effects / site / Positive effect / Not significant / long term/likely. Standard mitigation will be in place on site.</u>

A summary of the effects in the absence of mitigation, mitigation measures and residual effects following implementation of mitigation measures is presented in **Table 9.6.**

Table 9.6 Potential effects in the absence of mitigation, mitigation measures and residual effects following implementation of mitigation measures.

Phase	Effects	Mitigation	Residual Effects
Construction	**Designated Sites** Slight effects / international / adverse effect / not significant / short term.	Mitigation is needed to limit the potential negative effect from contaminated surface water during construction.	Slight effects / international / adverse effect / short term.
	Terrestrial Mammals Slight effects / site / reversible effects / adverse effect / not significant / short term / likely.	Mitigation is required in the form of pre-construction inspections for mammals and ensuring that mammals have the ability to exit excavations.	Slight effects / site / reversible effects / adverse effect / not significant / short term / likely.
	Flora Slight effects / site / reversible effects / adverse effect / not significant / short term / likely. short term / likely.	Mitigation is required to offset the hedgerow loss on site and to comply with legislation in relation to the control/removal of invasives species from site.	Slight effects / site / reversible effects / adverse effect / not significant / short term / likely.
	Bats Slight effects / site / adverse effects / not significant / short term / likely.	Mitigation is needed in the form of the control of light spill during construction to avoid disturbance to bats.	Slight effects / site / reversible effects/ adverse effect / not significant / short term / likely.
	Aquatic biodiversity Moderate effects / local / adverse effects / reversible / short term / likely / significant.	Mitigation is needed in the form of control of silt, control of dust and control of surface water drainage contaminated with pollutants associated with construction activities.	Slight effect / local / adverse effect / reversible / short term / likely
	Bird Fauna Slight effects / local / reversible effects / adverse effect / not significant / short term / likely.	Mitigation is needed whereby light spill is controlled and the removal of woody vegetation happens outside of bird nesting season. In addition, new areas for willow warbler and goldcrest will be planted on the eastern portion of the site in the vicinity of the Cuckoo Stream. The proposed development is beneath the flight path of the 10/28 runway. Given the location of the site beneath the flight path, mitigation is not proposed to discourage larger bird species from using the proposed development area, due to the potential	Slight adverse / local / reversible effects / negative effect / short term / likely

Phase	Effects	Mitigation	Residual Effects
		for collision risk with incoming aircraft.	
Operation	**Designated Sites** Slight effects / international / adverse effect / not significant / long term / likely.	Mitigation is required in relation to monitoring infrastructure.	Slight effect / international / adverse effect / short term.
	Terrestrial Mammals Neutral / site / not significant / long term / likely.	No mitigation is required	Neutral / site / long term / likely.
	Flora Neutral / site / not significant / long term / likely.	No mitigation is required.	Neutral / site / long term / likely.
	Bats Slight effects / negative / site / long term / likely.	Mitigation will be included within the design to ensure foraging is maintained on site.	Slight negative / site / long term / likely
	Aquatic biodiversity Slight effects / local / reversible effects / adverse effect / not significant / long term / likely.	Mitigation (as listed in **Section 9.6**) is required to protect downstream aquatic biodiversity. Monitoring of COD and nutrients, reporting and recording of all overflows will be in place.	Neutral-slight positive / local / reversible effects / long term /likely.
	Bird Fauna Slight effects / site / not significant / long term.	Given the location of the site beneath the flight path, mitigation measures are not proposed for the larger bird species on site due to the potential for collision risk with incoming aircraft.	Slight effects / adverse effect / site / long term.

Residual effects during construction of the proposed project would be expected to have a slight, short-term impact resulting in a temporary slight adverse significance. Mitigation measures are outlined. During operation the long-term impact of the proposed project would be considered to be neutral to slight positive and not significant.

9.9 Cumulative Effects

A review of developments and proposed developments was completed as part of this assessment. Projects and plans were reviewed and considered for possible cumulative impacts with the Proposed (refer to **Chapter 18**). Potential significant cumulative impacts on biodiversity were not identified from the developments listed therein. No significant cumulative effects were identified with the projects outlined. It should be noted that positive effects would be seen in water quality downstream of the proposed project during operation.

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Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EEC – Clarification of the concepts of: alternative solutions, imperative reasons of overriding public interest, compensatory measures, overall coherence, opinion of the commission; ec.europa.eu/environment/nature/Natura2000/management/docs/art6/guidance_art6_4_en.pdf

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10 HYDROLOGY

10.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) assesses the impact of the Airfield Drainage Project (ADP) on the hydrological environment during the Construction Phase and Operational Phase.

In accordance with the requirements of the EIA Directive, it describes and assesses the likely direct and indirect significant effects of the proposed Project on Hydrology. This chapter also provides a characterisation of the receiving hydrological environment within the site boundary defined for this Project and within the ADP study catchment as well as the hydrological environment/ receiving waterbodies downstream of the proposed Project.

10.2 Statement of Authority

This chapter was prepared by AWN Consulting on behalf of Dublin Airport Authority (daa) for the proposed ADP, which is the subject of a planning application to the local planning authority of Fingal County Council (FCC).

This chapter was prepared by Marcelo Allende (BSc, BEng), and Teri Hayes (BSc MSc PGeol EurGeol) of AWN Consulting. Marcelo is a Water Resources Engineer with over 15 years of experience in environmental consultancy and water resources studies. Marcelo is a Senior Environmental Consultant (Hydrologist) with AWN Consulting, a member of the International Association of Hydrogeologists (Irish Group) and a member of Engineers Ireland (MIEI). Teri is a hydrogeologist and an environmental consultant with over 30 years of experience managing Environmental Impact Assessment, water resource assessment, contaminated land, and licencing projects. Teri has led and contributed to many projects which have successfully achieved planning and licencing. Teri is a member and former President of the International Association of Hydrogeologists (IAH) and is a professional member of the Institute of Geologists of Ireland (IGI) and European Federation of Geologists (EurGeol). Her experience includes expert witness at public hearings, lecturing in EIA and risk assessment and providing expert advice for planning authorities and An Bord Pleanála.

10.3 Methodology

10.3.1 Desktop Study

This assessment was considered in the context of the available baseline information, consultations with statutory bodies, and other available relevant information. In collating this information, the following sources of information and references were consulted:

- Latest EPA Maps & Envision water quality monitoring data for watercourses in the area (these data can be accessed at https://gis.epa.ie/EPAMaps/ and www.catchments.ie);
- National River Basin Management Plan 2018-2021;
- Third Cycle Draft River Basin Management Plan 2022-2027;

- Fingal County Council Development Plan 2023-2029;
- Department of the Environment, Heritage and Local Government (DoEHLG) and the Office of Public Works (OPW) (2009). The Planning System and Flood Risk Management, Guidelines for Planning Authorities;
- Office of Public Works (OPW). Flood mapping data, accessed at www.floodmaps.ie;
- Relevant Eastern Catchment Flood Risk Assessment and Management (CFRAM) Flood Reports;
- Eastern Regional Fisheries Board. Requirements for the Protection of Fisheries Habitat During Construction and Development Works at River Sites;
- Dublin City Council (2005). Greater Dublin Strategic Drainage Study (GDSDS): Technical Documents of Regional Drainage Policies;
- Greater Dublin Regional Code of Practice for Drainage Works: Version Draft 6.0 (Wicklow County Council, South Dublin County Council, Meath County Council, Kildare County Council, Fingal County Council, Dún Laoghaire- Rathdown County Council & Dublin City Council); and
- Construction Industry Research and Information Association (CIRIA) (2001). Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors, (C532).

Other relevant documentation consulted as part of this assessment included the following:

- daa Dublin Airport Drainage Masterplan. Hydrology Report. NOD, September 2019;
- daa Surface Water Management Project. Flood Risk Assessment. NOD, March 2021;
- daa Dublin Airport Drainage Masterplan. Upper Cuckoo Catchment Allowable Discharge NOD, March 2021;
- daa 2020-2022 Monitoring Plan Data Review. NOD, November 2022;
- Dublin Airport Hydraulic Model. Future Scenarios Report. RAA, December 2021;
- Airfield Drainage Project. Planning Design Report. NOD, October 2022;
- Airfield Drainage Project. Surface Water Monitoring Plan. NOD, August 2022;
- Airfield Drainage Project. Construction Environmental Management Plan. NOD, October 2022;
- Biological Monitoring of Surface Water Quality in the Vicinity of Dublin Airport. Quirke & Twomey, September 2022;
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- Water Framework Directive (WFD) Screening Assessment. cbec eco-engineering UK Ltd. October 2022;
- Various design site plans and drawings; and
- Consultation with site engineers/ planners/ architects.

10.3.2 Assessment Methodology

This chapter assesses the potential effects, which the proposed development will have on Hydrology as defined in the Environmental Protection Agency (EPA) 'Guidelines on the Information to be contained in Environmental Impact Assessment Reports' (EPA, 2022a) as well as in line with Article 94 and Schedule 6 of the Planning and Development Regulations 2001 (as amended) and Article 5 and Annex IV of the EIA Directive.

The Draft EPA document entitled 'Advice Notes for Preparing Environmental Impact Statements' (EPA, 2015b), to the extent that they remain relevant and appropriate, is also followed in this hydrological assessment and classification of environmental effects. Finally, the document entitled 'Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes' by the Transport Infrastructure Ireland (TII) formerly National Roads Authority (NRA) (TII, 2009) is referenced where the methodology for assessment of effect is appropriate. Furthermore, in line with this TII Guidelines, an assessment of the attribute importance has been undertaken in order to provide a basis for the assessment of effect provided. The attribute importance considers the potential as well as the existing use of the surface water features as a water resource (*i.e.*, water supply, fisheries and other uses) as well as ecological habitat requirements. The TII criteria for rating the hydrological related attributes are presented in **Table 10.1.**

Table 10.2 provides the rating of potential environmental effects on the hydrological environment. **Table 10.3** presents a matrix of the assessment criteria and is based on the standard EIAR criteria of effects table included in **Chapter 2** which takes account of the quality, significance, duration and type of effect characteristic identified. Based on the defined criteria, where an effect has been classified as Moderate, Significant, Very Significant, or Profound, it can be considered significant as referred to in the EIA Regulations. Effects that are classified as Imperceptible, Not Significant or Slight are not significant.

The duration of each effect is considered to be either momentary, brief, temporary, short-term, medium term, long-term, or permanent. Momentary effects are considered to be those that last from seconds to minutes. Brief effects are those that last less than a day. Temporary effects are considered to be those which are construction related and last less than one year. Short term effects are seen as effects lasting one to seven years; medium-term effects lasting seven to fifteen years; long-term effects lasting fifteen to sixty years; and permanent effects lasting over sixty years.

Table 10.1. Criteria for Rating Site Attributes – Estimation of Importance of Hydrological Attributes (NRA)

Importance	Criteria	Typical Examples
Extremely High	Attribute has a high quality or value on an international scale	River, wetland, or surface water body ecosystem protected by EU legislation *e.g.*, 'European sites' designated under the Habitats Regulations or 'Salmonid waters' designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988.
Very High	Attribute has a high quality or value on a regional or national scale	River, wetland, or surface water body ecosystem protected by national legislation. – NHA status. Regionally important potable water source supplying >2500 homes. Quality Class A (Biotic Index Q4, Q5). Flood plain protecting more than 50 residential or commercial properties from flooding. Nationally important amenity site for wide range of leisure activities.
High	Attribute has a high quality or value on a local scale	Salmon fishery. Locally important potable water source supplying >1000 homes. Quality Class B (Biotic Index Q3-4). Flood plain protecting between 5 and 50 residential or commercial properties from flooding. Locally important amenity site for wide range of leisure activities.
Medium	Attribute has a medium quality or value on a local scale	Coarse fishery. Local potable water source supplying >50 homes. Quality Class C (Biotic Index Q3, Q2- 3). Flood plain protecting between 1 and 5 residential or commercial properties from flooding.
Low	Attribute has a low quality or value on a local scale	Locally important amenity site for small range of leisure activities. Local potable water source supplying <50 homes Quality Class D (Biotic Index Q2, Q1). Flood plain protecting 1 residential or commercial property from flooding. Amenity site used by small numbers of local people.

Table 10.2: Criteria for Rating Impact Significance at EIS Stage – Estimation of Magnitude of Impact on Hydrological Attribute (NRA)

Magnitude of Impact	Criteria	Typical Examples
Large Adverse	Results in loss of attribute	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.
Moderate Adverse	Results in impact on integrity of attribute or loss of part of attribute	Increase in predicted peak flood level >50mm. Partial loss of fishery. Calculated risk of serious pollution incident >1% annually. Partial reduction in amenity value.
Small Adverse	Results in minor impact on integrity of attribute or loss of small part of attribute	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.
Negligible	Results in an impact on attribute but of insufficient magnitude to affect either use or integrity	Negligible change in predicted peak flood level. Calculated risk of serious pollution incident <0.5% annually.
Minor 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.
Moderate 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.
Major Beneficial	Results in major improvement of attribute quality	Reduction in predicted peak flood level >100mm

Table 10.3. Rating of Significant Environmental Impacts at EIS Stage (NRA)

Importance of Attribute	Magnitude of Importance			
	Negligible	Small Adverse	Moderate Adverse	Large Adverse
Extremely High	Imperceptible	Significant	Profound	Profound
Very High	Imperceptible	Significant/moderate	Profound/Significant	Profound
High	Imperceptible	Moderate/Slight	Significant/moderate	Profound/Significant
Medium	Imperceptible	Slight	Moderate	Significant
Low	Imperceptible	Imperceptible	Slight	Slight/Moderate

The principal attributes (and effects) to be assessed include the following:

- River and stream water quality in the vicinity of the site (where available);
- Surface watercourses near the site and potential impact on surface water quality arising from proposed development related works including any discharge of surface water run-off;
- Localised flooding (potential increase or reduction) and floodplains including benefitting lands and drainage districts (if any); and
- Surface water features within the area of the site.

10.4 Receiving Environment

The receiving environment is discussed in terms of surface water and hydrology including potential for existing and historical contamination.

The site is located within, and in the vicinity of, the Dublin Airport campus. Dublin Airport is an international airport serving the island of Ireland. The airport is located 7 km north of Dublin, in Collinstown, and 3 km south of the town of Swords.

10.4.1 Hydrology

The ADP site is located within the former Eastern River Basin District (ERBD), now the Irish River Basin District since 2018, as defined under the European Communities Directive 2000/60/EC, establishing a framework for community action in the field of water policy, commonly known as the 'Water Framework Directive' (WFD).

According to the EPA Maps, the proposed ADP site lies within the Liffey and Dublin Bay Catchment (Hydrometric Area 09) and WFD Sub-Catchment Mayne_SC_010. A small section of the site lies within the WFD Sub-Catchment Broadmeadows_SC_010 (as shown in **Figure 10.1**).

The ADP study catchment is located within the upstream extents of four major river catchments; the Santry River, Mayne River, Ward River and Sluice River. The study area covers a total catchment area of approximately 16.5 km^2.

With regard to the local watercourse catchments, the ADP site is mainly located within the upper Cuckoo Stream local Sub-Catchment. The Upper Cuckoo sub-catchment is the largest sub-catchment at Dublin Airport and includes a large proportion of the operational airfield area at Dublin Airport (refer to **Figure 10.1**).

As mentioned, the surface water at Dublin Airport drains to four primary catchments, subdivided into a further seven sub catchments, as illustrated in **Figure 10.2** (only six sub-catchments shown at this scale) and listed in **Table 10.4**.

Table 10.4: Watercourses within ADP Study Area

Catchment	Sub-Catchment
Sluice	Kealy Stream
	Wad Stream
	Forrest Little Stream
Ward	Ward River
Santry	Santry River
Mayne	Mayne River
	Cuckoo Stream

There is also a large greenfield area outside the airport (approx.170ha), which currently consists of mostly agricultural lands, located in the upper reaches of the catchment, that are part of the local rural sub-catchments presented in **Figure 10.3** below. Stormwater runoff from this area is drained by the existing Airfield Trunk Culvert, which discharges these flows to the open channel section of the Cuckoo Supply Channel adjacent to the South Apron.

The Cuckoo Stream flows eastwards towards the confluence with the River Mayne which ultimately discharges to Baldoyle Estuary. This feature is culverted at the R132 and farther east at the Airport M1 Motorway before flowing as predominantly open channel to the confluence with the River Mayne at Balgriffin Road.

The Sluice River flows eastwards towards the Baldoyle Estuary and enters the Irish Sea at Portmarnock. Tributaries of the Sluice River include the Forrest Little Stream, Wad Stream as well as the smaller Kealy Stream. As mentioned above, all of these streams occur within the grounds of Dublin Airport.

The Mayne River rises near Ballystruan south of Dublin Airport. It flows in an easterly direction immediately south of the long-term car park and Dardistown Cemetery and is culverted below the R132 and the Airport M1 Motorway. This river flows through mainly agricultural and recreational land north of the R132 Northern Cross Route Extension before its confluence with its tributary, the Cuckoo Stream, and ultimately discharges to Baldoyle Estuary and the Irish Sea at Mayne Bridge between Baldoyle and Portmarnock.

The Santry River rises near Harristown to the east of the R122. The river flows in a south-easterly direction through Sillogue Park Public Golf Course before being culverted to the immediate west of the M50 interchange with the Naul Road/Ballymun Road at Ballymun. It continues in a south-easterly direction as predominantly open channel flowing through Santry

Demesne, Clonshaugh, Coolock and Raheny before discharging to Dublin Bay (*via* North Bull Island) near Watermill Road.

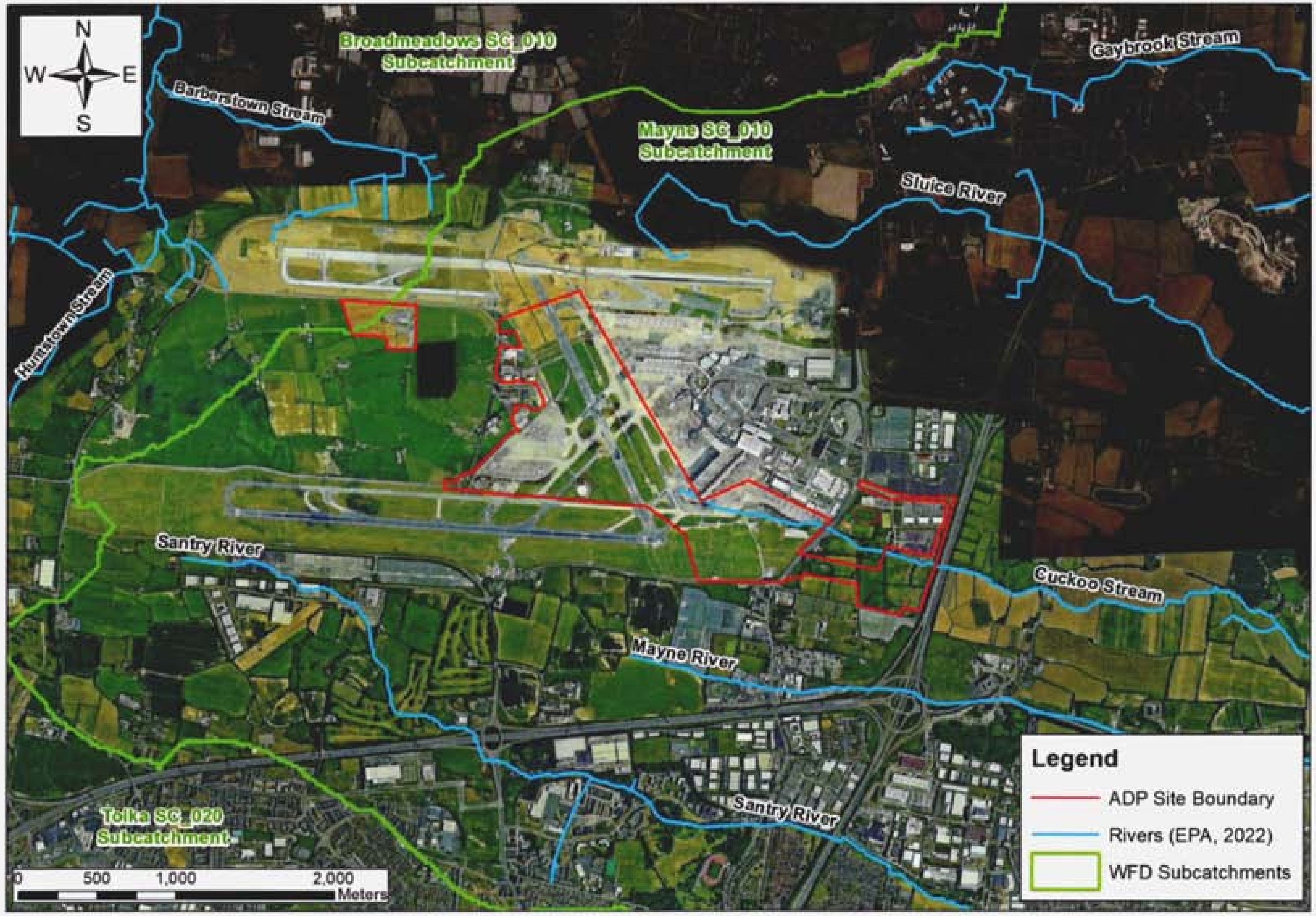

Figure 10.1: ADP location and WFD sub-catchments

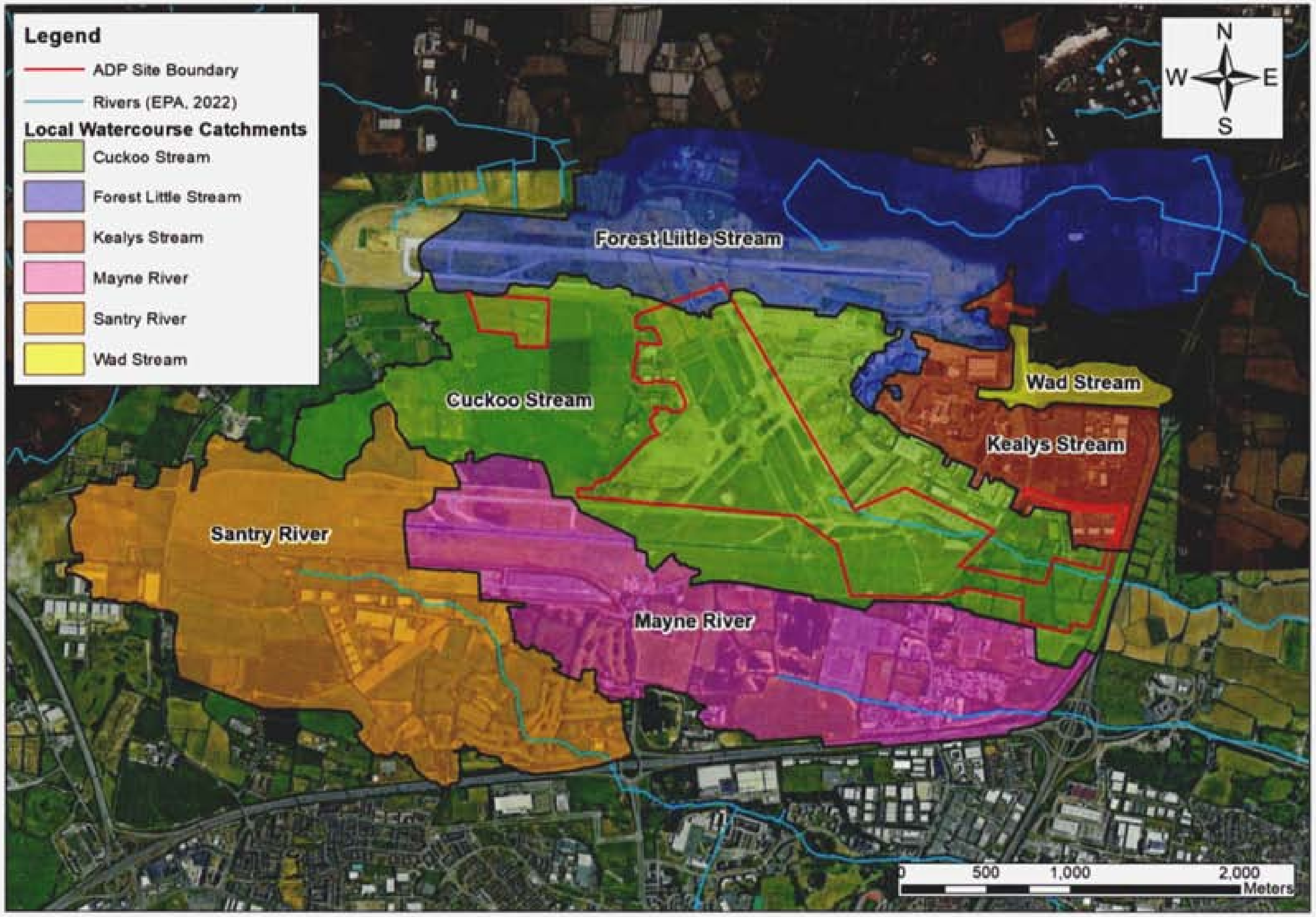

Figure 10.2: Local watercourse catchments

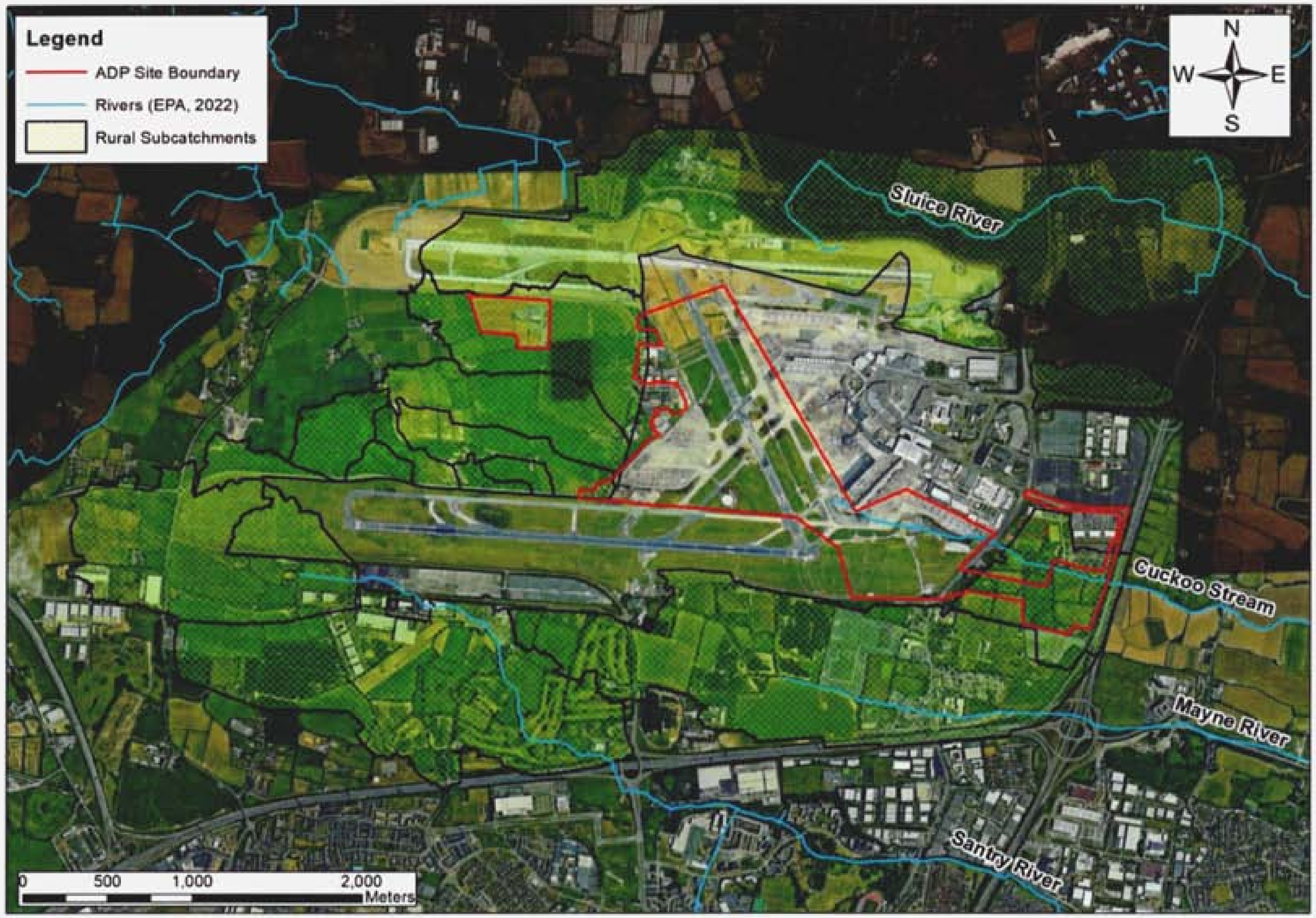

Figure 10.3: Rural sub-catchments

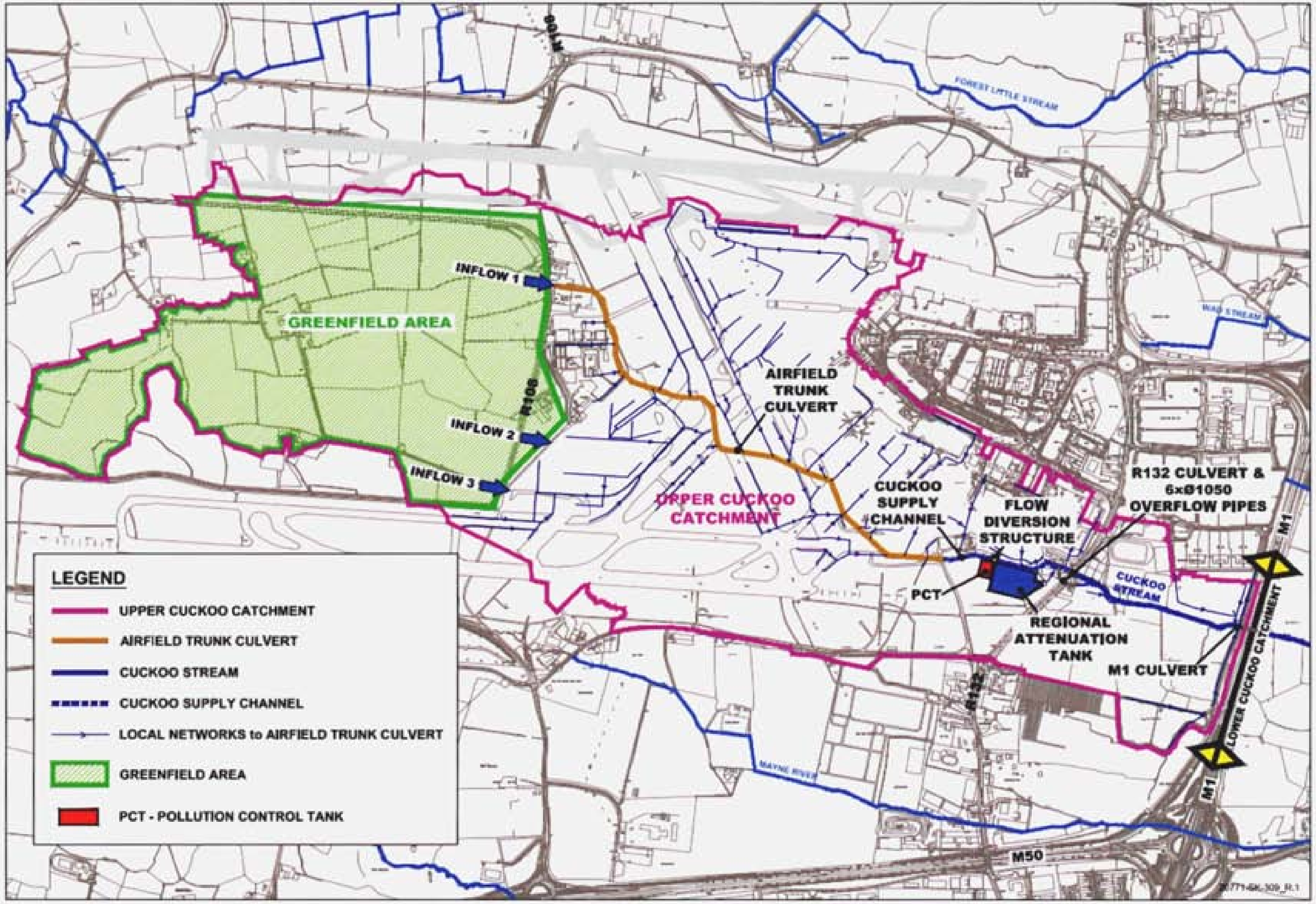

Figure 10.4: Upper Cuckoo Sub-Catchment and indicative existing surface water network

10.4.2 Existing Surface Water Drainage

The existing surface water system in the Upper Cuckoo sub-catchment at Dublin Airport consists of the following components:

- Surface water collection network;
  - Interception of greenfield inflows and conveyance by upstream network pipelines;
  - Local collection pipelines serving roofed and paved areas in the airfield;
  - Airfield Trunk Culvert – the main surface water pipeline in the airfield;
- Flow monitoring point on the Cuckoo Supply Channel, including Total Organic Carbon (TOC) analysers, to monitor whether surface water runoff is clean or contaminated;
- Flow diversion structure (FDS) and pollution control tank (PCT) for capture of contaminated runoff, with a pumped discharge to the public foul sewer;
- Local surface water attenuation systems; and
- Regional surface water attenuation systems.

The existing surface water collection network includes local collection pipework, comprising a series of slot drains and below-ground pipelines, which collect runoff from hardstand areas and convey them to the Airfield Trunk Culvert, which is the main surface water pipeline serving the airfield network (refer to **Figure 10.4** above).

The Airfield Trunk Culvert commences to the east of the R108 and traverses the airport campus in a south-easterly direction towards the existing Cuckoo Supply Channel (open-channel drainage system) adjacent to the South Apron. The Cuckoo Supply Channel runs in an easterly direction and conveys flows across the R132 in a culverted system before continuing to the Cuckoo Stream. The stream conveys the flows across the Eastlands before discharging flows from the daa lands *via* a culvert system under the M1 motorway.

The runoff sources which the Airfield Trunk Culvert (ATC) currently serves, can be considered under the following two categories:

- Greenfield Inflows: The culvert conveys the inflows from grassed areas upstream of the airfield. Surface water runoff from the greenfield areas is currently collected *via* a series of land drains and ditches before being intercepted by the ATC at a number of contribution points. The extent of grassed areas contributing runoff to the ATC, and the inflow points (1, 2 and 3), are shown in **Figure 10.4**.
- Airfield Hardstand Runoff: The ATC also acts as the main trunk surface water pipeline which serves most of the existing hardstand areas within the upper Cuckoo catchment. The existing local network that discharges to the ATC is also detailed on **Figure 10.4.**

The existing ATC and the contributing surface water drainage network do not currently provide sufficient hydraulic capacity to cater for the design flows which are required for new surface water pipelines, in accordance with the Drainage Design Guide (1 in 100-year storm plus 30% uplift for climate change).

The existing flow diversion structure on the Cuckoo Supply Channel diverts clean runoff from the ATC to the Cuckoo Stream and contaminated runoff flows to the pollution control tank. Clean runoff is defined as runoff with a chemical oxygen demand / biological oxygen demand (COD / BOD) concentration below the diversion concentration.

10.4.2.1 Potentially Contaminated Run-Off

All aircraft are de-iced at the aircraft stands in the upper Cuckoo catchment, with the result that aircraft de-icer applied at the airport, which is mobilised following rainfall events, is conveyed to the existing ATC. All pavement de-icing which takes place within the upper Cuckoo Stream catchment also flows to the ATC.

Aircraft de-icing and anti-icing operations can result in contaminants being mobilised from airfield hardstand to the surface water network after rainfall. The compounds used in de-icing and anti-icing are not included on the list of priority hazardous substances in the European Communities Environmental Objectives (Surface Waters) Regulations 2009 (as amended). Nonetheless, when these compounds become mixed with surface water runoff, they can lead to elevated BOD / COD concentrations. This can potentially result in an adverse effect on the water quality of the receiving waters if adequate protection is not provided.

The greenfield inflows, from the greenfield areas upstream of the airfield, provide a significant contribution of clean flows to the airfield's drainage network. As these inflows arise in rural areas upstream of Dublin Airport land, they are not impacted by airport operation activities until they mix.

Under the current arrangement, flows from all contribution sources are conveyed to the ATC where mixing occurs, irrespective of whether they are clean or contaminated (greenfield inflow or from clean run-off sources in the airfield). This means that runoff from a localised de-icing event ultimately ends up mixing with, and contaminating, previously un-contaminated runoff from other areas. This results in higher volumes of contaminated runoff. The proposed development seeks to reduce the volume of contaminated water needing treatment.

10.4.2.2 Ancillary Infrastructure

Flow Diversion Structure (FDS)

The ATC carries the flows to the existing Cuckoo Supply Channel which has a single water quality flow monitoring point, to determine whether the flows from the upstream airfield network are clean or contaminated, using a Total Organic Carbon (TOC) monitor.

The channel also includes a flow diversion structure (FDS) which diverts the flows from the ATC to the pollution control facility, if contaminated, or to the Cuckoo Stream, if clean. Clean flows above the designated hydraulic discharge rate are diverted to the regional surface water attenuation system. This structure has two main functions:

- To divert flows to the pollution control tank (contaminated) or allow flows to continue to the Cuckoo Stream (clean); and

- To attenuate clean flows to the Cuckoo Stream by diverting flows to the regional attenuation facility – if flows are above set point hydraulic discharge rates.

Existing Control Facilities

If the TOC monitor indicates that runoff contamination exceeds the diversion concentration limit, the flows in the existing Cuckoo Supply Channel are diverted by the FDS, in their entirety, to an existing 11,000m^3 pollution control tank. This tank acts as a buffer system for storing the contaminated flows before being discharged *via* a pumped outlet to the North Fringe Sewer (owned and operated by Irish Water).

Surface Water Attenuation Systems

The existing surface water attenuation facilities within the airfield at Dublin Airport consist of a number of local attenuation tanks, to serve specific local developments, and a regional surface water attenuation system, which attenuates clean flows conveyed to the FDS, as described above.

Prior to the early-2000's, only a limited number of developments included the provision of attenuation systems to control the discharge of surface waters from these areas. Since then, all new developments involving the construction of additional hardstanding areas within the airport campus have been required to provide some level of attenuation. The level of attenuation provided has varied across this period, according to the evolution of policy requirements, design standards and guidance relating to surface water attenuation.

The largest of the existing attenuation systems in the upper Cuckoo catchment is the 20,500m^3 Cuckoo Regional Attenuation facility. This facility is designed to serve several post-2007 developments and re-developments in the Cuckoo sub-catchment. The flow diversion structure regulates the flows to the Cuckoo Stream based on a number of set diversion flows.

In addition to the regional attenuation facility there are a number of smaller local attenuation tanks situated in the upper Cuckoo catchment. According to a survey undertaken in August of 2019 (refer to Planning Report, NOD, 2022), there was an additional 18 local attenuation tanks in the upper Cuckoo catchment. The local tanks provided a combined storage volume of 17,600m^3.

It is worth noting that there are additional attenuation facilities, local and regional, within the other stream / river catchments that serve the overall airport campus.

10.4.3 Surface Water Quality

10.4.3.1 WFD Assessment and EPA Monitoring Data

cbec eco-engineering UK carried out a Water Framework Directive (WFD) Screening Assessment for the ADP. The WFD Directive 2000/60/EC was adopted in 2000 as a single piece of legislation covering rivers, lakes, groundwater and transitional (estuarine) and coastal waters. In addition to protecting said waters, its objectives include the attainment of 'Good Status' in water bodies that are of lesser status at present and retaining 'Good Status' or better where such status exists at present.

The WFD requires 'Good Water Status' for all European waters to be achieved through a system of river basin management planning and extensive monitoring by 2015 or, at the least, by 2027.

'Good status' means both 'Good Ecological Status' and 'Good Chemical Status'. In 2009 the EBRD River Basin Management Plan (RBMP) 2009-2015 was published. In the ERBD RBMP, the impacts of a range of pressures were assessed including diffuse and point pollution, water abstraction and morphological pressures (*e.g.,* water regulation structures). The purpose of this exercise was to identify water bodies at risk of failing to meet the objectives of the WFD by 2015 and include a programme of measures to address and alleviate these pressures by 2015. This was the first River Basin Management planning cycle (2010-2015). The second cycle RBMP was carried out between 2018-2021 with the previous management districts now merged into one Ireland River Basin District (Ireland RBD). The third cycle (2022-2027) is currently being undertaken.

The primary aim of the existing RBMP is that water bodies identified as being 'At Risk' of not achieving their environmental objectives need to have targeted measures implemented to achieve objectives under this Plan. 190 Areas for Action were identified across the 5 Local Authority regions. Within these 190 areas, a total of 726 water bodies were selected for initial actions during this RBMP cycle. There are 832 water bodies identified as being 'At Risk' of not achieving their environmental objectives under this Plan that have not been included in the Areas for Action. For most of these water bodies, targeted actions will be undertaken in the third cycle RBMP from 2022-2027. The draft third cycle RBMP has been reviewed in the context of ensuring that mitigation measures comply with current and expected future measures required to be implemented for protection of water body status within the context of the proposed development.

The strategies and objectives of the WFD in Ireland have influenced a range of national legislation and regulations. These include the following:

- European Communities (Water Policy) Regulations, 2003 (S.I. No. 722 of 2003) as amended.
- S.I. No. 99/2023 - European Union (Drinking Water) Regulations 2023.
- European Communities Environmental Objectives (Surface Waters); Regulations, 2009 (S.I. No. 272 of 2009) as amended by S.I. No. 288/2022 - European Communities Environmental Objectives (Surface Waters) (Amendment) Regulations 2022.
- European Communities Environmental Objectives (Groundwater) Regulations, 2010 (S.I. No. 9 of 2010) as amended by S.I. No. 287/2022 - European Communities Environmental Objectives (Groundwater) (Amendment) Regulations 2022.
- S.I. No. 31/2014 - European Union (Good Agricultural Practice for Protection of Waters) Regulations 2014.
- European Communities (Technical Specifications for the Chemical Analysis and Monitoring of Water Status) Regulations, 2011 (S.I. No. 489 of 2011).
- (SI) No. 293 of 1988 European Communities (Quality of Salmonid Waters) Regulations 1988.
- Local Government (Water Pollution) Acts 1977-1990 as amended.

S.I. No. 272/2009 - European Communities Environmental Objectives (Surface Waters) Regulations 2009 amended. As presented below, evidence from the EPA and other sources indicate that the Mayne River (Cuckoo Stream) and other catchments on or near the airport campus are below 'good status' and subject to multiple pressures. This is consistent with small water courses in catchments dominated by intensive agriculture and urban development.

In addition, surface water quality is monitored periodically by the EPA at various regional locations along with principal and other smaller watercourses. The EPA assesses the water quality of rivers and streams across Ireland using a biological assessment method, which is regarded as a representative indicator of the status of such waters and reflects the overall trend in conditions of the watercourse. The biological indicators range from Q5 - Q1. Level Q5 denotes a watercourse with good water quality and high community diversity, whereas Level Q1 denotes very low community diversity and bad water quality. The following subsections present the biological conditions of the watercourses of interest. The EPA water quality monitoring locations are provided in **Figure 10.5** and the legends denoting the Biological Rating System (Q Values) are provided in **Table 10.5**.

Table 10.5: Q Values rating system

Q Value	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	Bad	Seriously polluted	Unsatisfactory

<u>Sluice River</u>

The Sluice River is monitored by the EPA since 2021 for biological quality at 3 no. monitoring stations. Historically, the Eastern Regional Fisheries Board had identified the Sluice River as a salmonid river system (Ove ARUP, 2006). In order to be classified as a salmonid river, the EPA quality class would need to be Class B, Q3-4 (Slightly polluted) to Class A, Q4 (Unpolluted). Biological sampling undertaken by the EPA in 2021 and 2022 assigned Sluice River a Q value of Q2-3 in Forrest Little Bridge, Q3 in Belfast Road bridge and Q3-4 in Kinsealy Bridge.

The most recent published status (www.epa.ie - River Waterbody WFD Status 2016-2021) for the Sluice River waterbody (SLUICE_010; EU Code IE_EA_09S071100) is 'Poor' and its risk score is qualified by the WFD as under 'Review'. This poor status is associated with its biological (invertebrate) conditions. According to the EPA records, the fauna at the station Belfast Road is likely affected by excess fine silt while fine silt and evidence of enrichment were noted at Station Kinsealy Bridge.

Refer to **Figure 10.5** for location of the EPA monitoring stations and **Table 10.6** for the characteristics of them and the respective surface waterbodies.

<u>Mayne River and Cuckoo Stream</u>

The Mayne River and Cuckoo Stream are both associated with the WFD surface waterbody MAYNE_010 (EU Code IE_EA_09M030500). This waterbody is monitored by the EPA for biological and chemical quality in 1 no. monitoring station located downstream of the Mayne confluence with the Cuckoo Stream. Biological sampling undertaken by the EPA in 2022 assigned Mayne River a Q value of Q3 (Poor Status and Moderately polluted). According to the historical EPA records, ecological conditions at this station remain poor (Q3) despite a slight improvement in 2019 (from Q2-3). Pollution-tolerant fauna still dominate the community, with evidence of enrichment.

The most recent published status (www.epa.ie - River Waterbody WFD Status 2016-2021) for the Mayne River waterbody is also 'Poor' and its risk score is qualified by the WFD as 'At Risk' of not achieving good status. This status is associated with its biological (invertebrate) conditions. Chemical conditions at this monitoring station have been recorded as 'Good' and 'High'.

Santry River

The Santry River is monitored by the EPA for biological and chemical quality in the WFD waterbody associated with the study area (SANTRY_010, EU Code IE_EA_09S010300) at 1 no. monitoring station located in Clonshaugh (Clonshaugh Rod Bridge). Biological sampling undertaken by the EPA in 2022 assigned Santry River a Q value of Q3 (Poor Status and Moderately polluted). According to the historical EPA records, in June 2022 the river at this point remained in poor ecological condition, with sewage fungus and instream rubbish recorded.

The most recent published status (www.epa.ie - River Waterbody WFD Status 2016-2021) for the Sluice River waterbody (SLUICE_010; EU Code IE_EA_09S071100) is 'Poor' and its risk score is qualified by the WFD as under 'Review'. This poor status is associated with its biological (invertebrate) conditions. Chemical conditions at this monitoring station have been recorded as 'Good' and 'High'.

Table 10.6: Monitoring Stations and WFD Waterbodies

River	Station Name	Station Code	Q Value/ Year (*)	Surface Waterbody	WFD Status 2016-2021	WFD Risk 3rd Cycle Score
Sluice	Sluice River Forrest Little Bridge	RS09S070300	2-3 / 2021	SLUICE_010	Poor	Under Review
	Sluice River Belfast Rd Bridge	RS09S070400	3 / 2022			
	Kinsealy Bridge	RS09S070840	3-4 / 2022			
Mayne/ Cuckoo Stream	Hole-in-the-Wall Rd Br	RS09M030500	3 / 2022	MAYNE_010	Poor	At Risk
Santry	Clonshaugh Rd Br	RS09S010300	3 / 2022	SANTRY_010	Poor	At Risk

Note (*): Date of last Q Value estimated by the EPA.

According to the WFD Screening Assessment (cbec, 2022), the ADP will contribute to water quality improvements, but appropriate land use management upstream should also be considered by regulators and catchment managers. The WFD assessment has concluded that, provided the system is managed as required, the overall effect of the scheme can be considered beneficial from a WFD perspective because the ADP will increase the flows of water in the Cuckoo stream especially during droughts and therefore have a beneficial effect on the receiving surface waterbody status (chemically, ecologically and in terms of quantity), and the hydrological environment in general.

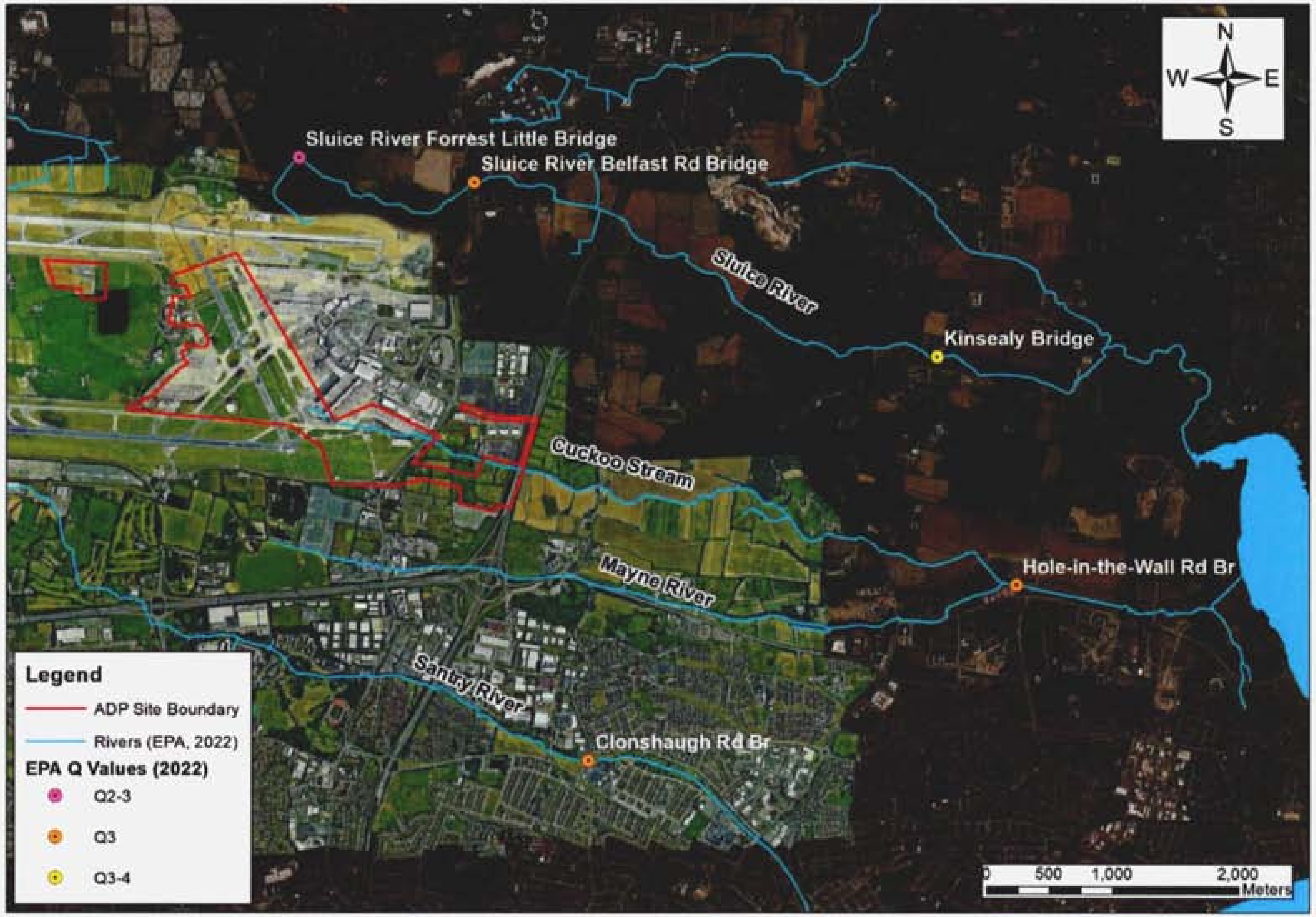

Figure 10.5: EPA water quality stations

10.4.3.2 daa Surface Water Monitoring Programme

A review of the data generated from the daa surface water monitoring programme from 2020 to September 2022 was carried out as part of this section. The main findings of that review are presented below.

Upper Cuckoo sub-catchment

The following features have been identified in this sub-catchment:

- Upstream agricultural inflows characterised by high nitrogen (N) and phosphorus (P), reaching a peak in spring/summer;
- Point source agricultural pollution at C3;
- Due to the de-icer activity, temporary run-off with hydrocarbon and detergent content is expected. As such, occasional slightly elevated concentrations have been detected due to daa activity for total petroleum hydrocarbons (TPH) and detergent;
- At the EPA monitoring point in Belmayne, no evidence was recorded of de-icer pollution impacting BOD concentrations. This station has recorded significantly higher concentrations of BOD, Ammonia N and Ortho P than the values recorded at the M1 which means that water quality at this point is affected by other sources/pressures within the catchment that increase these levels;
- Metals, specific and priority pollutants were generally below the laboratory limit of detection (LOD). No environmental quality standard (EQS) exceedances in Cuckoo Stream;
- BOD concentrations are higher at sampling locations immediately downstream of the airfield than at sites upstream. This is attributable to a combination of point source discharge from an agricultural facility upstream of the airfield, and de-icing runoff events which were not captured by the pollution control system;
- Ammonia N concentrations appear lower at sampling locations immediately downstream of the airfield than at sites upstream due to dilution. This is driven by point source pollution from upstream of the airfield;
- Ortho P concentrations decrease as flows from the upstream catchment are diluted by airfield runoff;
- BOD, Ammonia N and Ortho P concentrations are generally lowest as flows leave daa lands and pass under the M1 motorway probably due to beneficial dilution; and
- In terms of biological water quality, results from the ecological monitoring indicate that the current pollution status for the Cuckoo Stream during 2022 is Q2 (*i.e.,* 'Seriously Polluted'.

Mayne sub-catchment

The following features have been identified in this sub-catchment:

- Upstream inflows characterised by high N and P, peaking in spring/summer;
- Runway runoff subject to spikes of 5-30mg/L BOD during winter attributable to pavement de-icing; and
- In terms of biological water quality, results from the ecological monitoring indicate that the current pollution status for the Mayne sub-catchment during 2022 is Q2-Q3 (*i.e.*, 'Moderately Polluted').

__Santry sub-catchment__

The following features have been identified in this sub-catchment:

- Inflows from Horizon Logistics Park catchment outside the airport area show occasional spikes in BOD and nutrients;
- Runway runoff subject to spikes of 5-30mg/L BOD during winter attributable to pavement de-icing; and
- In terms of biological water quality, results from the ecological monitoring indicate that the current pollution status for the Santry sub-catchment during 2022 is Q3 (*i.e.*, 'Moderately Polluted').

__Kealy Stream and Wad sub-catchments__

The following features have been identified in these sub-catchments:

- BOD/COD concentrations generally low (below limits of detection (LOD)), some spikes detected, particularly in the easternmost sampling sites - potential that the non-daa controlled Airport Business Park could be impacting quality;
- Spikes in ammonia evident throughout catchment - no clear pattern yet observed. Further composite data required at downstream location; and
- In terms of biological water quality, results from the ecological monitoring indicate that the current pollution status for the Kealy Stream sub-catchment during 2022 is Q2 (*i.e.*, 'Seriously Polluted') and Q3 for the Wad sub-catchment (*i.e.*, 'Moderately Polluted').

__Forrest Little sub-catchment__

The following features have been identified in this sub-catchment:

- There is limited data in this catchment, however, the water quality at NRML6 and NRML7 is below 'Good status' thresholds, with high BOD and Ammonia N at both locations, and high Ortho P at NRML 7. The reason is unclear, and no seasonal patterns were observed; and
- In terms of biological water quality, results from the ecological monitoring indicate that the current pollution status for the Forrest Little sub-catchment during 2022 is Q2- Q3 (*i.e.*, 'Moderately Polluted').

10.4.4 Flood Risk Assessment

A Flood Risk Assessment was carried out by NOD for the proposed development at Dublin Airport, associated with the ADP.

In relation to the Planning System & Flood Risk Management (PSFRM) guidelines and the Dublin Airport Local Area Plan Strategic Flood Risk Assessment (LAP SFRA) and sensitivity to flooding, the proposed development contains elements which are considered 'highly vulnerable' (essential infrastructure) as defined in the Guidelines for Planning Authorities, The Planning System and Flood Risk Management (OPW, 2009).

In terms of flood risk assessment, the proposed infrastructure will have a positive impact on flood risk. The drainage infrastructure will provide greater network and hydraulic capacity while also providing greater operational flexibility to control water discharges and resilience, leading to an improved surface water management system.

It is proposed that the clean water allowable discharge rate should not exceed the peak discharge rate of 7.73m^3/s. This is in line with the LAP SFRA and Surface Water Management Plan objective FRM02, which is to protect existing flood risk management infrastructure and safeguard planned future infrastructure.

10.4.4.1 Fluvial Flood Risk

The majority of the proposed ADP infrastructure is to be located below existing ground levels and will therefore not impact on existing surface flow paths.

Based on the Dublin Airport LAP SFRA, it is estimated that the flood extents of the Cuckoo Stream encroach upon an area in the east of the ADP development boundary in the Eastlands (refer to **Figure 10.6**). The proposed CPCF storage tank development in the Eastlands is seen as 'essential infrastructure' to be located in Flood Zone A and so is deemed highly vulnerable in terms of the Justification test. The proposed below ground CPCF storage tank development was assessed and deemed to satisfy the criteria of the Planning System and Flood Risk Assessment's (PSFRM's) Justification Test[1]. Refer to **Section 13 – Flood Risk Assessment** of the Planning Documentation for further details.

[1] The Justification Test is used to assess the appropriateness of developments in flood risk areas. Box 5.1 of the "Planning System and Flood Risk Management Guidelines" (PSFRM Guidelines, 2009) outlines the criteria required to complete the "Justification Test".

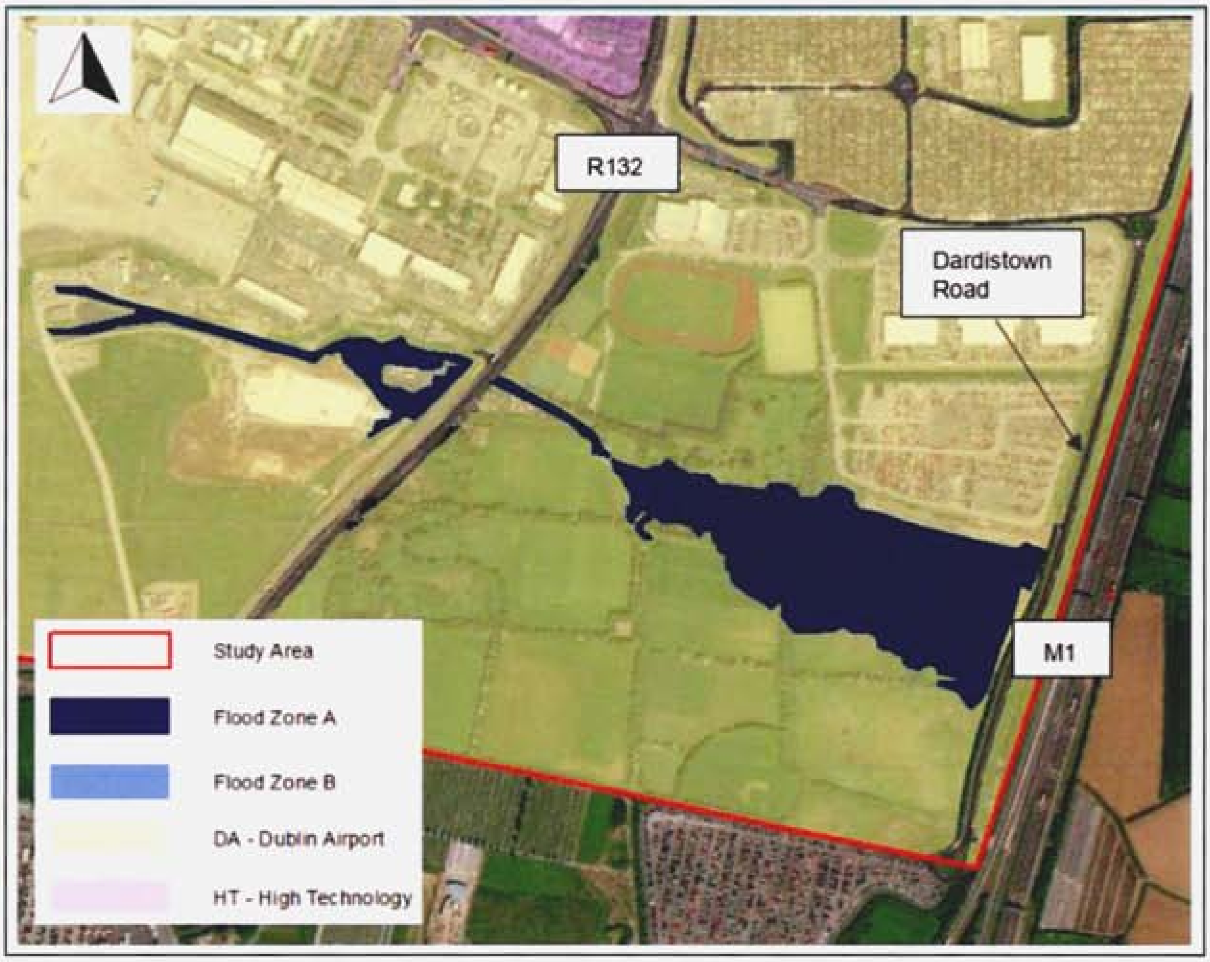

Figure 10.6: Flood extent map for Cuckoo Stream (extract from LAP)

Access chambers to the CPCF storage tank which will be located in the Cuckoo Stream floodplain will be appropriately sealed against flood water ingress.

The proposed above ground control kiosk and electrical substation building associated with the CPCF are located outside Flood Zone A and protected by a proposed flood containment bund. It is proposed to have finished floor levels above the estimated flood levels from the hydraulic modelling associated with the ongoing daa Drainage Masterplan (DMP).

Infrastructure in the South Apron associated with the network re-configuration are outside the Flood Zone A and are essential to the overall ADP.

10.4.4.2 Pluvial Flood Risk

The proposed ADP infrastructure seeks to address pluvial flooding in the West Apron area by the provision of upgraded surface water collection pipework and by the provision of additional local attenuation storage. The proposed measures are predicted to significantly alleviate the predicted flooding in West Apron.

The above ground control kiosk, associated with the decision points DP1, DP4 and DP5A, is proposed to be located in the vicinity of the pluvial flooding area of West Apron. Following implementation of the proposed pluvial flood relief measures it is predicted that the proposed location of the control kiosk will not be susceptible to pluvial flooding. It is proposed that the finished floor level is 200mm above existing ground level. In addition, all critical monitors and controls within the kiosk will be raised above the floor level by a minimum of 100mm.

The controls associated with decision point DP5B are proposed to be located below ground and following the implementation of the aforementioned proposed pluvial flood relief measure it is predicted that the proposed location of the below ground control chamber will not be susceptible to pluvial flooding.

10.4.4.3 Other Sources of Flood Risk

There is no evidence to suggest coastal and groundwater as potential sources of flood risk to the proposed development.

10.4.5 Foul Water Drainage

Discharges to the public foul sewer are managed in accordance with the conditions of the existing Section 16 Trade Effluent Discharge Licence (TEDL) which is regulated by Uisce Éireann. This will continue to be the case although it is anticipated that the volume of water discharged to the wastewater system will be considerably less.

10.4.6 Areas of Conservation

There are two (2) Special Areas of Conservation (SAC) / Special Protection Areas (SPA) (Natura 2000 sites) designated under European directives hydraulically connected to the ADP development area; Baldoyle Bay SPA/SAC. These are discussed in more detail in **Chapter 9 – Biodiversity** in terms of distance to the proposed Project, reasons for designation and zones of influence. These European sites are valued as being of International Importance.

The ADP development area does not overlap directly with any European site. However, as mentioned above, there is a direct pathway through the watercourses to the Baldoyle Bay SPA/SAC, which is located c. 5.5 km to the east of the eastern boundary of the ADP (*i.e.*, M1). This pathway is given by the Cuckoo Stream and Mayne River, as the latter outfalls into the Baldoyle Bay in Clongriffin (refer to **Figure 10.7** below).

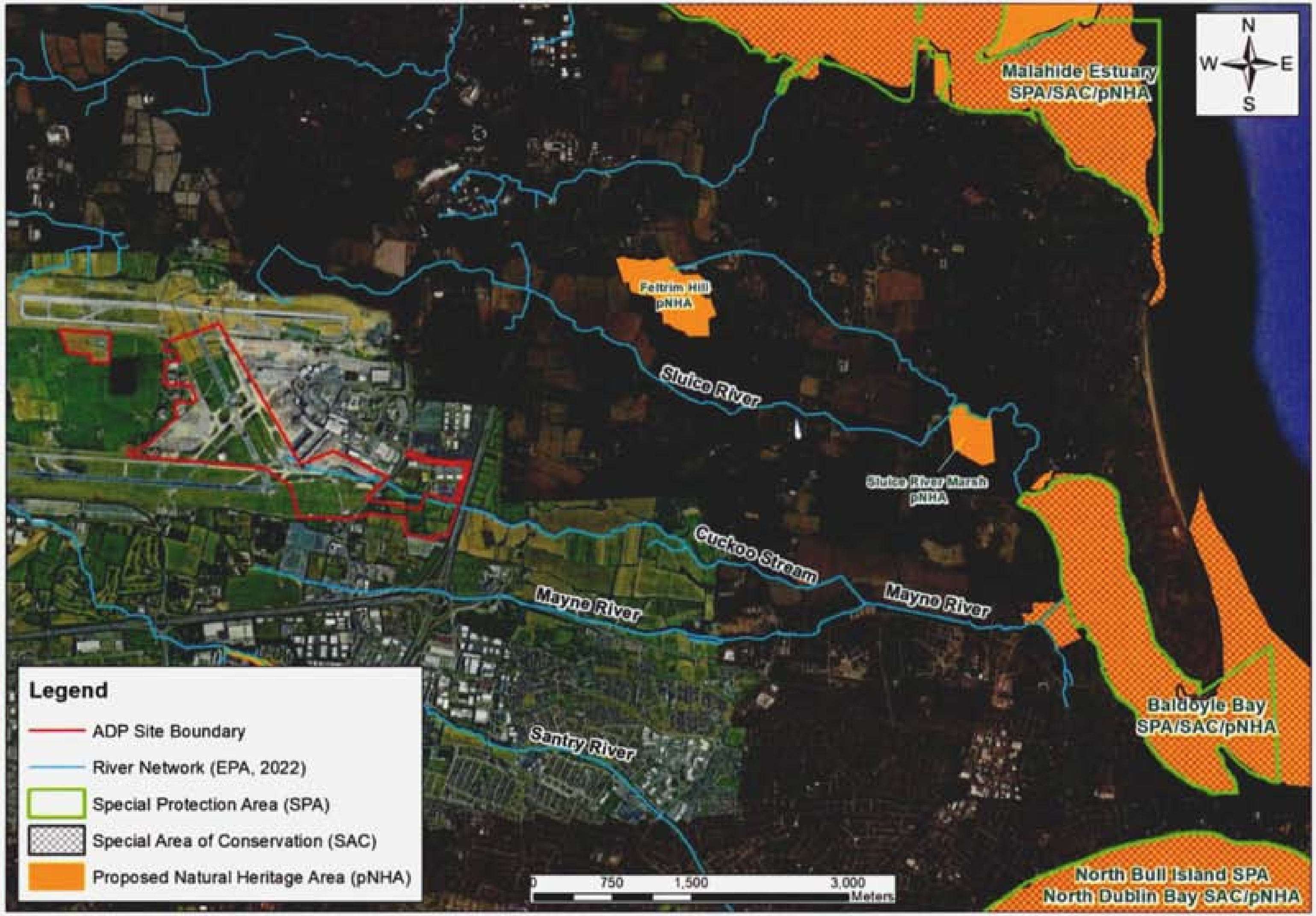

Figure 10.7: Areas of Conservation in context of the ADP location

10.4.7 Rating of Site Importance of Hydrological Features

Based on the TII criteria for rating the importance of hydrological features, the features at the study area are rated as being of 'High Importance' due to the presence of a flood plain which extends into the Eastland area and protects more than 50 residential or commercial properties downstream.

10.5 Characteristics of the Proposed Development

The ADP proposes significant upgrades to the surface water management infrastructure at Dublin Airport. The ADP comprises a series of drainage system enhancement measures and infrastructure proposals, including the upgrade of existing drainage infrastructure and the construction of additional infrastructure to improve the performance of the existing surface water management system.

The proposed new infrastructure includes the implementation of a new Contamination Detection and Response (CD&R) System, the provision of additional pollution control facilities and the construction of additional hydraulic capacity in the network.

The ADP proposals include local network improvements at West Apron as well as reconfiguration works at South Apron (SA) to ensure that they are fully integrated with the proposed airfield-wide surface water management system.

The drainage system enhancements and infrastructure proposals have been informed by the Drainage Masterplan (DMP). The DMP is a long-term masterplan, which indicatively outlines a phased and coherent approach to improvements in drainage infrastructure at Dublin Airport. The DMP considers hydraulic and surface water quality requirements having regard to EU Water Framework Directive 2000/60/EC (transposed into Irish law inter alia in the European Communities Environmental Objectives (Surface Waters) Regulations 2009 as amended.

A full description of the proposed development can be found in **Chapter 4** of this EIAR. The details of the construction and operation of the ADP in terms of Water and Hydrology are presented in sections below.

10.5.1 Construction Phase

The activities required for the construction phase of the proposed development represents the greatest risk of potential impact on the hydrological environment. These activities primarily pertain to the site preparation, excavation, levelling and infilling activities required to facilitate construction of the proposed development, and ancillary services.

10.5.1.1 Site preparation, excavation, levelling, and infilling activities

Significant groundworks are required at the proposed pipelines and storage tanks (CPCF and West Apron). Large scale open excavations will be required along the routes of the proposed pipelines.

Temporary storage of spoil will be managed to prevent accidental release of dust and uncontrolled surface water run-off which may contain sediment and solid matter. Materials will be re-used on site or sent off site as byproducts where possible and, if not suitable for further use, materials will be disposed of to an appropriate permitted/licensed waste disposal facility.

It is envisaged that the majority (approx. 80%) of the excavated material will be removed from the works area for off-site use or disposal as it is excavated. The remainder of the excavated material required for backfilling and construction of a temporary berm will be stockpiled on site. The temporary berm will be constructed in order to protect the excavation for the CPCF from ingress of water, along the southern bank of the Cuckoo Stream in this area. The maximum volume of excavated material to be stockpiled is estimated to be 49,000m^3. Stockpiling of suitable material for backfilling will be commenced near the completion of the excavation for the proposed Central Pollution Control Facility (CPCF), and a stockpile will be maintained until the completion of the tank construction (though with reducing volumes as the tank is backfilled but depending on the contractor's selected sequence of construction and testing for watertightness).

10.5.1.2 Storage of hazardous construction materials

Construction activities will include use of machinery, and temporary storage of fuel required on site for construction machinery. Liquid materials *i.e.*, fuel storage will be located within temporary bunded areas, doubled skinned tanks or bunded containers (all bunds will conform to standard bunding specifications - BS8007-1987) to prevent/contain spillage.

Two areas have been identified as construction compounds, namely the West Compound and the East (Eastlands) Compound (refer to the Preliminary Construction Environmental Management Plan, NOD, 2022), These compounds shall be utilised by the ADP. The EPA Guidance Note 'Storage and Transfer of Materials for Scheduled Activities' shall be taken into account when designing material storage and containment on site.

All materials to be stored in compounds shall be stored in a manner that is safe and that is in line with best industry practice, instances of such are fuels and chemicals, which will be stored in an appropriately bunded area/within double skinned tanks. The bund capacity will be sufficient to accommodate 110% of the largest tank's maximum capacity or 25% of the total maximum capacities of all tanks, whichever is the greater. The exception to this being double walled tanks equipped with leak detection, which do not require additional retention. All potentially harmful substances will be stored in accordance with the manufacturers' guidelines. The contractor will ensure that adequate means to absorb or contain any spillages is available at all times.

10.5.1.3 Water Supply

A water supply will be required for the contractor's welfare facilities as well as other activities on site such as equipment and material wash down, dust suppression, *etc.*. Direct connections will be provided to each of the compounds from the public water supply.

Where possible dust suppression and wash down will use recycled water, however, it may be necessary to supplement this water during dry periods.

10.5.1.4 Foul Drainage During Construction

The compounds will require welfare facilities; this will necessitate a method of collecting the wastewater generated. Wherever possible, compounds will have a direct connection to local sewers; otherwise, they will be serviced by means of a wastewater storage tank, which will be emptied by means of a suction tanker. The wastewater shall be disposed of to a licensed Wastewater Treatment Plant (WwTP).

10.5.1.5 Surface Water Management During Construction

Contractors will be required to comply with the rules and have regard to the recommendations outlined in the daa Construction Contractors Health & Safety and Environmental Rules for working on daa Infrastructure Manual in relation to Surface Water Management.

Specific works areas where surface water management measures will need to be implemented during construction of the drainage element are as follows:

- To the north of the proposed CPCF, the Cuckoo Stream runs in an easterly direction. The proposed CPCF shall require a deep excavation adjacent to the Cuckoo Stream. It should be noted that the flood maps (refer to **Figure 10.6** above) indicate that this area is currently at risk of flooding. This would lead to a risk of the excavation becoming flooded and soil and silt being washed downstream. To mitigate this risk, special measures such as an earth berm shall be required to prevent the watercourse inundating the excavation (refer to Mitigation Measures in **Section 10.7**).
- To the south of the South Apron, the proposed pipelines (CW4 and Airfield Contaminated Pipeline) cross a ditch (part of the ATC), which discharges to the ATC, requiring in-stream works.
- Diversion of the upstream part of the Cuckoo Supply Channel.
- Backfilling of the upstream part of the existing Cuckoo Channel.
- Construction of an overflow weir and overflow channel as part of the existing FDS.
- The emergency overflow from the CPCF storage tank and the CPCF pipeline is proposed to discharge *via* a headwall on the southern bank of the Cuckoo Stream upstream of the M1 motorway culvert (in-stream works).
- To the west of runway 16/34, the proposed pipeline (CW3) crosses underneath the existing ATC.
- On and in the vicinity of the R108 where it is proposed to intercept greenfield flows (in-stream works for headwalls).
- Excavations for the pipeline trenches, manholes, tunnel shafts and decision point chambers could require de-watering depending on level of the ground water table.
- The CPCF storage tank, West Apron Attenuation Tank and West Apron Pollution Tanks are deep below ground structures and could require de-watering depending on level of the ground water table.
- The contractor shall comply with all national laws and regulations on controlling pollution of the environment and shall take all necessary precautions to prevent pollution of streams, lakes, ponds, and reservoirs with fuels, oils, bitumens, chemicals or other harmful materials.

- Ditches and streams shall be clearly identified on site and shown on method statements and site plans.
- The contractor shall identify and risk assess existing drainage systems and put in place measures to prevent possible contamination from surface run-off emanating from the works.
- No discharge to existing infrastructure/watercourses/ground shall be permitted to take place without the appropriate consents or approvals.
- The contractor shall provide suitable de-watering 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. The most likely excavations that may accumulate large quantities of water include the pipeline trenches, CPCF excavation and tunnel shafts. It should be noted that all other excavations regardless of size or depth have the potential to accumulate groundwater and surface water.
- All discharged water from de-watering pumps shall be treated and tested as required to prevent any pollutants entering groundwater or a watercourse. Such water shall be disposed of as construction site runoff having first passed through a settlement tank or filtration system where appropriate.
- Washing of delivery chutes of concrete lorries, shall take place in a designated area. This area shall contain any runoff from the washing process and be treated and tested as required to prevent any pollutants entering groundwater or a watercourse. The personnel washing the concrete chute shall endeavour to funnel the runoff into the concrete barrel, for disposal at the concrete batching plant.
- 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.
- Fuelling of plant and equipment is to be carried out within compound and material storage areas only (unless agreed otherwise with daa – may be necessary in the case of mobile task lighting or generators) by a trained operative using double skinned bowsers within a designated fuelling area and providing bunded fuel storage.
- Drip trays to be used during all fuelling operations and a fully maintained spill kit located within the designated fuelling area.
- All fuels, chemicals or liquids shall be stored in a lockable cabinet that shall be located within a bunded area to 110% of capacity.
- Storage of materials shall be located at least 4m away from water bodies, within designated and bunded areas.
- Where required, silt fencing shall be deployed at the base of stockpiles when storing fine material to prevent runoff outside the designated area.
- A water quality monitoring programme shall be implemented by the contractor and discharges monitored in accordance with consents held. Routine monitoring shall be

undertaken at watercourses upstream and downstream of the works, and at all discharge points to measure turbidity, odour and presence of oil film. The contractor shall ensure that all watercourses are free from litter and debris. All discharges to surface water must be analysed with respect of the requirements of the European Communities Environmental Objectives (Surface Water) Regulations (SI No 272 of 2009) and European Communities Environmental Objectives (Surface Waters) (Amendment) Regulations 2012 (S.I. No. 327 of 2012) taking account of both ecological status and chemical water quality limits.

In-Stream works apply to the following:

- The construction of headwalls to local drains to intercept greenfield flows associated with the Clean Water Pipeline CW1 on the R108 (Location A on Figure 13 2 of CEMP);
- The construction of a headwall for the outfall from the Clean Water Pipeline CW4 at the discharge point to the Cuckoo Channel in South Apron (Location B on Figure 13 2 of CEMP);
- The construction of a headwall for the emergency overflow from the CPCF storage tank and the CPCF Pipeline on the southern bank of the Cuckoo Stream upstream of the M1 motorway culvert (Location C on Figure 13 2 of CEMP);
- The crossing of a ditch to the south of the South Apron for the proposed pipelines (CW4 and ACP2) (Location D on Figure 13 2).
- The connection of the Cuckoo Supply Channel Diversion to the existing Cuckoo Supply Channel.
- The construction of the Flow Continuation Structure at the existing Flow Diversion Structure in South Apron.

10.5.2 Operational Phase

This section provides an overview of the proposed ADP developments, comprising the construction of new surface water drainage infrastructure, as well as upgrades of the existing surface water drainage infrastructure.

The water quality objectives for the waterbodies which drain the airport campus are set out in the WFD and the RBMP 2018. The proposed upgrades to the surface water management system at Dublin Airport are also subject to the legislative Surface Water Quality objectives and the Dublin Airport LAP 2020.

The recently completed daa Drainage Masterplan (DMP) was progressed in response to, and in accordance with, the above-mentioned policy objectives. The drainage proposals included in the ADP Planning Application, effectively represent Stage 1 of the implementation of the DMP.

The proposals associated with the ADP have been developed in consultation with the targets set out in the Dublin Airport Drainage Management Plan (DMaP). This Plan was developed by daa as a result of engagement with Fingal County Council, Inland Fisheries Ireland, Local Authority Waters Programme (LAWPRO) and the Environmental Protection Agency.

As described, the ADP proposes significant upgrades to the surface water management infrastructure at Dublin Airport. The ADP comprises a series of drainage system enhancement measures and infrastructure proposals, including the upgrade of existing drainage infrastructure and the construction of additional infrastructure to supplement the performance of the existing surface water management system.

A core objective of the ADP is to provide a nett improvement in the degree of protection afforded to the receiving waters by the surface water management system, in order to address the water quality objectives.

The proposed ADP developments include significant environmental enhancement works. These proposed environmental enhancement works are designed to contribute to the attainment of the following targets of the Drainage Management Plan:

- Increase clean flows to the Cuckoo Stream;
- Improve water quality and hydrological environment of Maine or Cuckoo stream;
- Improve the ecological condition of the Cuckoo Stream downstream of all pollution control facilities;
- Minimise the occurrence of contamination overflow events;
- Monitor the effect of overflow events; and
- Improve system response to emergency events (*e.g.,* fuel spillage or a leakage of de-icing chemical storage tanks).

The locations of the proposed developments are shown in **Figure 10.8**. Detailed specifications can be found in **Section 11 – Engineering Design Report** included in the Planning Documentation.

Table 10.7 provides a brief description of each proposed drainage development (to be read in conjunction with **Figure 10.8**).

Table 10.7: Overview of Proposed ADP Developments

ADP Proposal	Description of the Proposed Development
CD&R System	A CD&R system has been designed strategically to maximise the segregation of flows from various "zones" within the airfield. This will serve to increase clean flow to receiving waters and protect receiving waters from contaminated surface water runoff. This system consists of detection devices, network "decision points" (DPs) and associated control kiosks.
Clean Water Supply Pipelines	New clean water supply pipelines (CW-1, CW-2, CW-3, and CW-4) are proposed to convey inflows from greenfield areas, and runoff from the airfield which has been identified as clean, to the receiving waters. This will provide a source of clean water to receiving waters. These pipelines will also provide additional hydraulic capacity to the airfield surface water network.
Airfield Contaminated Pipelines (ACP)	The proposed ACP1 and ACP2 are proposed to receive flows identified as contaminated by the CD&R and provide additional hydraulic capacity to the airfield surface water network.
West Apron Network upgrades	It is proposed to upgrade the West Apron surface water collection network. The upgrades include reconfiguration of the existing network, the proposed West Apron Attenuation Tank (WA-AT), implementation of local CD&R devices, network decision points and construction of the West Apron Pollution Tank (WA-PT).
CPCF Trunk Contaminated Pipeline	A new trunk pipeline is proposed to convey contaminated surface water from the airfield to the proposed Central Pollution Control Facility (CPCF), detailed below.
Central Pollution Control Facility (CPCF)	A CPCF is proposed to protect receiving waters from contaminated surface water from the airfield. The CPCF includes pollution control tanks and a pumping station with a discharge to sewer. The CPCF also includes ancillary pipeline and Mechanical, Electrical, Instrumentation, Control and Automation (MEICA) works and an electrical substation.
Supervisory Control and Data Acquisition (SCADA) System	A centralised SCADA system is proposed to control the operation of the surface water network. This will require the construction of Control Kiosks, from which the SCADA system can be monitored and maintained. These kiosks will also require electrical power connections and further connections to communicate signals to the central SCADA system.
Change of Function of Existing Drainage Infrastructure	As a result of the proposed surface water network upgrades, the existing Airfield Trunk Culvert (ATC) will be reconfigured. The central section of the existing ATC (between DP1 and the connection point with ACP2) will be re-purposed as a pipeline for contaminated waters. This section of the culvert will be re-labelled as the Re-purposed Airfield Trunk Culvert (RATC).

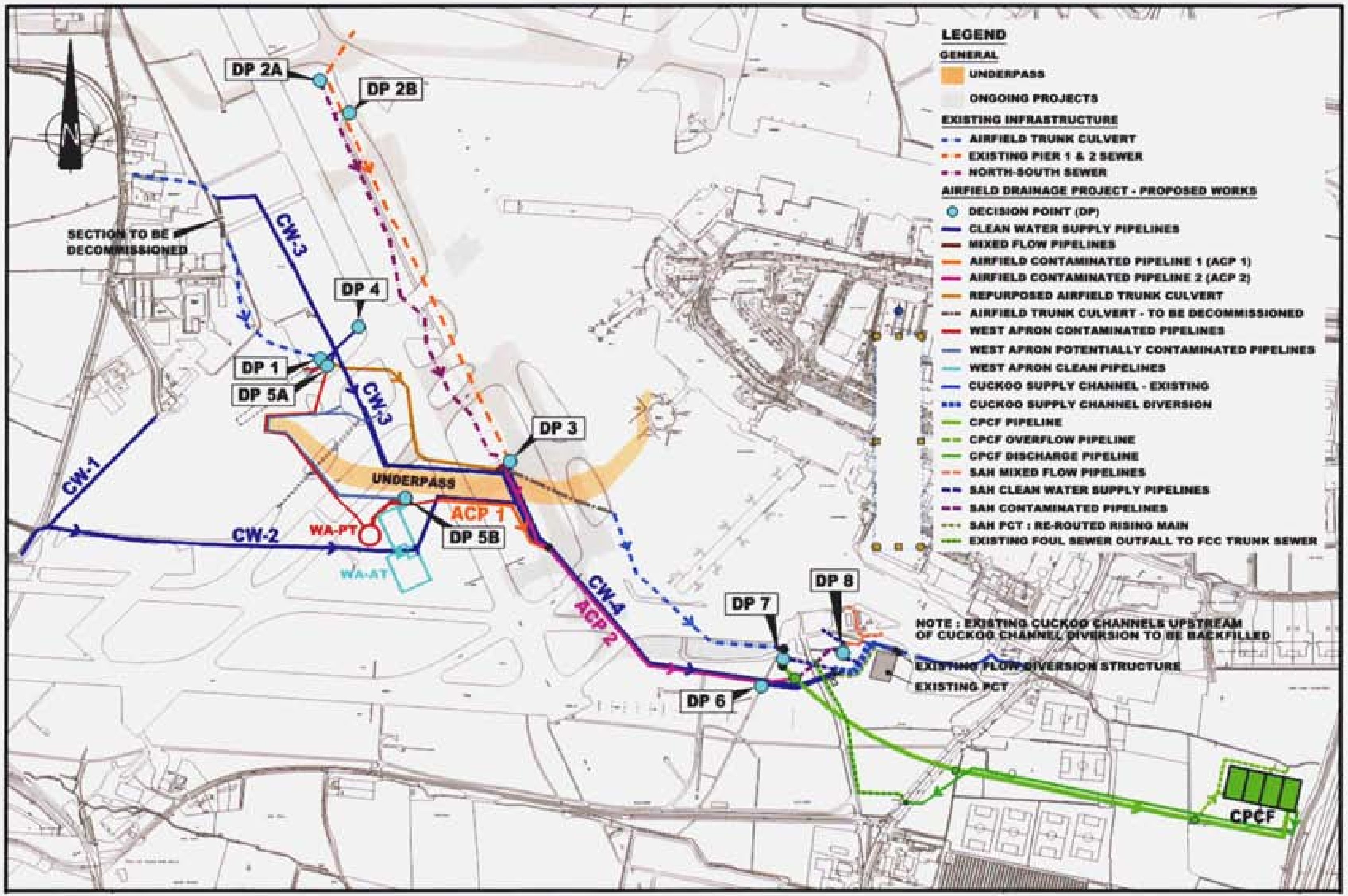

Figure 10.8: Overview of Proposed ADP Developments

In line with Dublin Airport LAP objectives and recommendations, the design of the proposed ADP has incorporated SuDS measures wherever possible and where not restricted on aviation safety grounds. This section provides detail on design considerations for the ADP, when applying the SuDS Management Train approach.

The SuDS approach was informed by the daa's policy document on SuDS, 'Sustainable Urban Drainage Systems (SuDS) Policy for Airside and Landside Works at and in Proximity to Dublin Airport', CIRIA SuDS manual C753 and the FCC LAP.

The development was designed to minimise the introduction of new/redeveloped impermeable area. Across the whole scheme there is approximately 5,031m^2 of new hardstand proposed. This approach prevents the alteration of the current run-off rates from the site. This was particularly relevant for the design proposals associated with the proposed storage tanks.

The proposed West Apron clean water surface water attenuation tank and proposed pollution tank are designed to be fully below ground structures. The area above the tanks would be backfilled with soil and re-planted, with the same grass species which are currently in place. This proposal would ensure that the run-off from the areas developed for the tanks would be the same as the pre-development rates. This design approach ensures that no additional impermeable surfaces are introduced.

Where ADP works are proposed in close proximity to existing developments (*e.g.* West Apron), runoff will be managed through the use of SuDS measures such as filter drains and flow restrictions. In order to protect West Apron from overland flows from the greenfield agricultural lands to the west of the airport, it is proposed to construct a large filter drain along the western edge of West Apron.

The runoff from the West Apron hardstand area is currently partially attenuated through a combination of local storage tanks and the regional Cuckoo attenuation facility. The ADP design for the West Apron will provide attenuation for both the Northern and Southern West Apron Catchments to Q100 greenfield runoff rates for the 1 in 100-year flood event plus an allowance of 30% for climate change.

The provision of additional storage volume of approximately 15,000m^3 in the West Apron will free up the equivalent capacity in the Regional Attenuation facility to serve other areas.

The proposed system has been designed in accordance with the outcomes of the **Water Framework Directive Assessment** included in **Section 15** of the Planning Documentation.

In addition, in order to reduce the risk of septicity in the storage tank during operation of the CPFC, a caustic soda dosing system will need to be installed. This system will include a weatherproof external storage tank with integral bund to protect against potential leakage of the tank. A caustic soda dosing pumping system will be provided and will be housed in the kiosk and the dosing system would contain an internal bund.

10.6 Potential Effects of the Proposed Development

The potential hydrological effects during the construction and operational phases are presented below. Due to the inter-relationship between surface water (hydrology) and soils, geology and hydrogeology, the following effects discussed will be considered applicable to both **Chapter 11 -**

Lands, Soils, Geology and Hydrogeology and this chapter of this EIAR. The potential for significant effects to arise as a result of the interaction between these topics / environmental media has been comprehensively addressed herein.

10.6.1 Construction Phase

During the construction phase of the proposed development the potential effects in relation to hydrology (in the absence of mitigation) are assessed in the following sections.

10.6.1.1 Increased Sediment Loading in Run-off

Surface water run-off during the construction phase may contain increased silt levels or become polluted from construction activities. Run-off containing large amounts of silt can cause damage to surface water systems and receiving watercourses. Silt water can arise from dewatering excavations, exposed ground, stockpiles, and access roads.

During the construction phase at this site there is potential for an increase in run-off due to the compaction of soils. This will reduce the infiltration capacity and increase the rate and volume of direct surface run-off. The potential effect of this is a possible increase in surface water run-off and sediment loading which could potentially impact local drainage and open watercourses.

10.6.1.2 Accidental Spills and Leaks

As with all construction projects, there is potential for water (surface water run-off and /or groundwater) to become contaminated with pollutants associated with construction activity. Contaminated water which arises from construction sites can pose a significant short-term risk to groundwater quality for the duration of the construction if contaminated water is allowed to percolate to the aquifer/ receiving groundwater bodies (refer to **Chapter 11** for further details).

During the construction of the proposed development, there is a risk of accidental pollution incidences from the following sources:

- Suspended solids (muddy water with increased turbidity) – arising from excavation and ground disturbance;
- Cement/concrete (increased turbidity and pH) – arising from construction materials;
- Hydrocarbons (ecotoxic) – accidental spillages from construction plant or onsite storage; and
- Wastewater (nutrient and microbial rich) – arising from accidental discharge from on-site toilets and washrooms.

Machinery activities on site during the construction phase may result in contamination of run-off / surface water. Potential effects could arise from accidental spillage of fuels, oils, paints, *etc.*, which could impact surface water if allowed to infiltrate to surface water systems and / or receiving watercourses. In the absence of mitigation, surface water run-off during the construction phase may contain increased levels of hydrocarbons, and other pollutants. However, implementation of the mitigation measures detailed below will ensure that this risk is minimised.

Concreting operations carried out near surface water drainage points during construction activities could lead to discharges to a watercourse. Concrete (specifically, the cement component) is highly alkaline and any spillage to a local watercourse would be detrimental to water quality and local fauna and flora. However, employment of the mitigation measures highlighted below will help to ensure that the residual impact significance will be minimised.

In the absence of mitigation measures, the impact during the construction phase of the proposed development is presented below.

Table 10.8: Summary of potential effects during construction phase

Impact	Quality	Significance	Duration
Potential Surface Water contamination (due to excavation and infilling or accidental spills and leaks)	Negative	Moderate	Short-term

10.6.2 Operational Phase

The proposed ADP developments include significant environmental enhancement works. These proposed environmental enhancement works are designed to contribute to the attainment of the following targets of the daa Drainage Masterplan (DMP) as follows:

- Increase clean flows to the Cuckoo Stream;
- Improve the ecological condition of the Cuckoo Stream downstream of all pollution control facilities;
- Minimise the occurrence of contamination overflow events;
- Monitor the impact of overflow events; and
- Improve system response to emergency events (*e.g.*, fuel spillage or a leakage of de-icing chemical storage tanks).

The new system will improve the hydraulic conveyance through the airfield and will reduce the level of flooding occurring within the operational areas of the airport and the predicted flooding of the R108. The existing flooding / conveyance issues will be addressed through the introduction of additional hydraulic capacity *via* the CW and ACP pipelines, the interception of overland flows and provision of additional volume of attenuation.

Flows to the downstream Cuckoo Catchment are restricted *via* the twin 900 culverts on the eastern edges of the Eastlands. These culverts will continue to restrict flows under the ADP solution (refer to **Section 11 – Engineering Design Report**, included as part of the planning application) ensuring that there is no uplift in flow rates to the downstream catchment. During periods of high flow, flood waters will be contained within the Eastlands and drained down *via* the twin culverts mentioned above. It is proposed to construct a flood control berm in the Eastlands to manage the predicted flood waters in the area.

It should be noted that the enhanced system will reduce the amount of flow that will be required to be diverted during contamination events. Greenfield inflows will always be available and the presence of multiple zones in the airfield means that not all zones go into divert if there is de-icing taking place in one of them. This will increase the likelihood that ecological flows will be maintained in the receiving waterbody; therefore, this impact is considered to have a positive quality.

It is projected that the ADP will significantly reduce the risk of contaminated flows entering the Cuckoo Stream, thereby improving its ecological condition. It also enables protection against the risk of fuel spillages.

Segregated contaminated flows will be discharged to the Uisce Éireann sewer. The rate at which segregated flows may be discharged is limited by the Trade Effluent Discharge Licence (TEDL).

With regard to the proposed caustic soda dosing system, its design includes an external storage tank with integral bund to protect against potential leakage of the tank. Supervised filling of the storage tank will be via a connection from a chemical delivery vehicle with the appropriate filling mechanisms. As mentioned above, the dosing pumps will be housed in the kiosk and the dosing system will contain an internal bund. Dosing pipework would be contained in protective ducting from the storage tank to the pumps and from the pumps to the CPCF storage tank. Therefore, the potential effects associated with the caustic soda management and possible spills are addressed by the system design measures and no additional mitigation measures are required.

The development was designed to minimise the introduction of new/redeveloped impermeable area. Across the whole scheme there is approximately 5,031m^2 of new hardstand proposed and the design of the proposed ADP has incorporated SuDS measures wherever possible and where not restricted on aviation safety grounds. This will have a minor effect on local recharge to ground; however, the impact on the overall hydrological regime will be insignificant.

Therefore, and considering the expected improvement in the existing hydrological conditions and in the absence of mitigation measures, the potential effects during the operational phase are assessed below.

It should be noted that effects on biodiversity are discussed in **Chapter 9 – Biodiversity**.

Table 10.9: Summary of potential effects during operational phase

Impact	Quality	Significance	Duration
Alteration of surface water flows	Positive	Significant	Long term
Improvement of water quality conditions in Cuckoo Stream	Positive	Significant	Long-term
Change to hydrological regime	Neutral	Imperceptible	Long-term

10.6.3 Do Nothing Scenario

If the proposed development was not to go ahead (*i.e.*, the Do-Nothing scenario) there would be no ADP development and therefore the current surface water management plan and ancillary infrastructure will be in place and opportunities for improving it forgone.

Under the current arrangement, flows from all contribution sources are conveyed to the ATC where mixing occurs, irrespective of whether they are clean or contaminated (greenfield inflow or from potentially contaminated run-off sources in the airfield). This means that runoff from a localised de-icing event ultimately ends up mixing with, and contaminating, previously un-contaminated runoff from other areas. This results in higher volumes of contaminated albeit more diluted contaminated runoff. There would, therefore, be a significant effect on the hydrological environment (Cuckoo sub-catchment) as the diversion of all flows means no ecological flows, lack of flexibility and greater volume. This situation would increase risk of pollution events.

The temporal evolution of the current baseline in terms of water and hydrological environment involves climate change and its effects on the quantity or quality of the surface water. This can potentially affect the surrounding projected flooding.

10.7 Mitigation Measures

As previously stated, the primary objective of the ADP is to provide a nett improvement in the degree of protection afforded to the receiving waters by the surface water management system, in order to address the water quality objectives. In addition, the proposed ADP developments include significant environmental enhancement works that aim to: increase clean flows to the Cuckoo Stream; improve the ecological condition of the Cuckoo Stream downstream of all pollution control facilities; minimise the occurrence of contamination overflow events; monitor the impact of overflow events and improve system response to emergency events (*e.g.*, fuel spillage or a leakage of de-icing chemical storage tanks).

The design of the ADP has considered the potential effects of the development on the hydrological environment where construction will be taking place and a series of design control measures during operation, as explained in **Section 10.4.2**. above.

A number of mitigation measures that will be adopted during the construction and operational phases as detailed below. This section should be read in conjunction with the Construction Environmental Management Plan (CEMP) and planning conditions as applicable.

10.7.1 Construction Phase

10.7.1.1 Construction and Environmental Management Plan (CEMP)

A CEMP has been prepared by NOD in respect of the proposed development (see **Section 12 – CEMP**, submitted as part of the planning application). It contains best practice measures and protocols to be implemented during the construction phase of the proposed development to avoid / minimise environmental effects, including in relation to surface water.

To ensure the CEMP remains fit for purpose, it will be regarded as a live document. The appointed contractor will be responsible for updating the CEMP, as required, *e.g.*, to reflect the publication of relevant new or revised guidelines and/or new statutory requirements. The full schedule of environmental commitments (*i.e.*, all mitigation measures set out in the CEMP, EIAR and Natura Impact Statement (NIS) submitted as part of the planning application, as well as any applicable conditions of development consent) will be included in the CEMP by the appointed contractor.

The CEMP was formulated in accordance with best international practice including but not limited to:

- Best Practice Guidance
    - CIRIA C689 Culvert Design and Operation Guide (2010).
    - CIRIA C532 Control of water pollution from construction sites (2001).
    - CIRIA C762 Environmental Good Practice on site (4th Edition) (2016).
    - CIRIA Report C648 Control of Pollution from Linear Construction Project. Technical Guidance.
    - CIRIA Handbook C650 Environmental good practice on site.
    - CIRIA Handbook C651 Environmental good practice on site checklist.
    - BS5228-1:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites.
    - BS 5837:2012 Trees in relation to design, demolition and construction – Recommendations.
    - Guidelines on protection of fisheries during construction works in and adjacent to waters Inland Fisheries Ireland (2016).
    - Dublin City Council (2005) Greater Dublin Strategic Drainage Study (GDSDS): Technical Documents of Regional Drainage Policies. Dublin: Dublin City Council.
    - National Roads Authority Guidelines for the crossing of watercourses during the construction of national road schemes (TII, 2008).
    - Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes (TII).
    - Guidelines for the Treatment of Bats during to the Construction of National Road Schemes (TII).
    - Guidelines on the Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads (National Roads Authority, December 2010).
    - EPA (2021) Best Practice Guidelines for the Preparation of Waste Management Plans for Construction and Demolition Projects
    - EPA IPC Guidance Note on Storage and Transfer of Materials for Scheduled Activities.
- Dublin Airport Directions for works in and around the Aerodrome:

  - Airport Direction D-O Construction Projects. Specific to Airside construction Projects.
  - Airport Direction D-E Emergency Response. Airside, Fuel spillages, fires and other emergency procedures.
  - Airport Direction D-O Environment and Pollution. Environmental standards for the Dublin Airport Site/Campus.
  - Airport Direction D-O Spillages/FOD.
  - Airport Direction D-O Wildlife and habitat Management.t
- Guidance Documents for construction works at Dublin Airport.
  - Construction Contractor's Health & Safety and Environmental Rules for working on daa Infrastructure Manual.
  - AMD Guidelines Control Dust Fume and Smoke.
  - daa Control of Noise and Vibration.
  - daa Temporary Traffic Management Requirements Specification Covering High Risk Works.
  - daa Standard Traffic Management Plans Covering Low and Medium Risk Works requiring traffic Management.
  - daa Drainage Policy.

10.7.1.2 Surface water run-off and control of sediments

Care will be taken to ensure that exposed soil surfaces are stable to minimise erosion. All exposed soil surfaces will be within the main excavation site which limits the potential for any offsite effects.

Pre-treatment and silt reduction measures on site will include a combination of silt fencing, settlement measures (silt traps, 20 m buffer zone between machinery and watercourses, refuelling of machinery off site, if possible) and hydrocarbon separator. These specific measures will provide protection to the receiving soil and water environments during the construction phase.

Surface water management procedures are outlined in the CEMP (Refer to **Section 12** of the Planning Application Documentation) included with this Application. The CEMP aims to set out the proposed procedures and operations to be utilised on the proposed construction site to protect water quality. The mitigation and control measures as outlined in the CEMP or updated will be employed on site during the construction phase. All mitigation measures outlined within the CEMP will be implemented during the construction phase, as well as any additional measures required pursuant to planning conditions which may be imposed.

The CEMP provides work practices that are industry best practice measures that will be applied during the construction phase, this is in no way included to avoid or reduce potential harmful effects (if any) to European sites (if any), which is a matter that is the subject of separate assessment (discussed further in **Chapter 9 – Biodiversity**).

There shall be localised pumping of surface run-off from the excavations during and after heavy rainfall events to ensure that the excavations are kept relatively dry, however, this is expected to be low due to the low permeability of the subsoils and the relative shallow nature for excavations. Likewise, infiltration to the underlying aquifer is not anticipated (Refer to **Chapter 11 – Land, Soils, Geology & Hydrogeology** for further details).

Run-off containing silt will be contained and treated on site to ensure adequate silt removal. Silt reduction measures on site will include a combination of silt fencing and settlement measures (silt traps, silt sacks and settlement tanks / ponds).

The temporary storage of soil will be carefully managed. Stockpiles will be tightly compacted to reduce run-off and graded to aid in run-off collection. This will prevent any potential negative impact on the stormwater drainage and the material will be stored away from any surface water drains. Movement of material will be minimised to reduce the degradation of soil structure and generation of dust. Excavations will remain open for as little time as possible before the placement of fill and therefore the volume of the stockpiles will be restricted to what is necessary. This will help to minimise the potential for water ingress into excavations. Soil from works will be stored away from existing drainage features to remove any potential impact.

Weather conditions will be considered when planning construction activities to minimise the risk of run-off from the site and the suitable distance of topsoil piles from surface water drains will be maintained.

For construction of any works in-stream a detailed Pollution Control Plan, Emergency Response Plan and Method Statement shall be drafted in agreement with Inland Fisheries Ireland (IFI) and having regard to relevant pollution prevention guidelines in particular the IFI document "Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters" and "Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes (NRA, 2005)". All works in or adjacent to watercourses will comply with the EPA, IFA and OPW requirements.

Direct disposal to the watercourse of arisings from excavations in-stream and from dewatering activities shall not be permitted as these could impact both on water quality of the watercourse and increased flood risk. Any discharge of such water, after proper treating/de-silting with a limit on the turbidity of the discharge to not more than 80 NTU, will be discussed and agreed with the concerned authority (EPA, Fisheries *etc.*) prior to the commencement of works.

During the construction phase as part of the CEMP, monitoring will take place to confirm that pollution control measures are effective. Once construction works commence onsite, monitoring and supervision will be required until all mitigation works are implemented effectively. Dewatering of excavations using proprietary settlement tanks or filtration systems will be monitored at least twice daily with dewatering stopped if any silt is evident within the discharge.

Works in the Cuckoo Stream shall be conducted during low flow conditions.

In-stream works shall only take place during the period March to September or as agreed with the IFI.

10.7.1.3 Fuel and Chemical Handling

To minimise any impact on the underlying subsurface strata from material spillages, all oils, solvents and paints used during construction will be stored within temporary bunded areas. Oil and fuel storage tanks shall be stored in designated areas, and these areas shall be bunded to a volume of 110% of the capacity of the largest tank / container within the bunded area(s) (plus an allowance of 30 mm for rainwater ingress). Drainage from the bunded area(s) shall be diverted for collection and safe disposal.

Refuelling of construction vehicles and the addition of hydraulic oils or lubricants to vehicles will take place in a designated area (or where possible off the site) which will be away from surface water gullies or drains. In the event of a machine requiring refuelling outside of this area, fuel will be transported in a mobile double-skinned tank. An adequate supply of spill kits and hydrocarbon adsorbent packs will be stored in this area. All relevant personnel will be fully trained in the use of this equipment. Guidelines such as "Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors" (CIRIA 532, 2001) will be complied with.

Where feasible, all ready-mixed concrete will be brought to 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 storm water to the underlying subsoil. Wash down and washout of concrete transporting vehicles will take place at an appropriate facility off-site.

In the case of drummed fuel or other chemicals used during construction, containers will be stored in a dedicated internally bunded chemical storage cabinet and labelled clearly to allow appropriate remedial action in the event of a spillage.

Emergency response procedures will be outlined in the detailed CEMP. All personnel working on the site will be suitably trained in the implementation of the procedures.

10.7.1.4 Soil Removal and Compaction

Temporary storage of soil will be carefully managed in such a way as to prevent / reduce the risk of any potential negative impact on the receiving environment. The material will be stored away from any surface water drains. Movement of material will be minimised to reduce degradation of soil structure and generation of dust.

All excavated materials will be visually assessed for signs of possible contamination such as staining or strong odours. Should any unusual staining or odour be noticed, samples of this soil will be analysed for the presence of potential contaminants to ensure that historical pollution of the soil has not occurred. Should it be determined that any of the soil excavated is contaminated, this will be segregated and appropriately disposed of by a suitably permitted / licensed waste disposal contractor.

10.7.2 Operational Phase

As mentioned above, the potential for impact on water quality as a result of the ADP is expected to be positive during operation as the primary objective is to provide a nett improvement in the degree of protection afforded to the receiving waters by the surface water management system, in order to address the water quality objectives.

Additionally, the Central Pollution Control Facility (CPCF) is proposed to provide nett improvements on the protection afforded to the receiving waters and to address the intensification of demand on the existing airport infrastructure.

The surface water collection network in Dublin Airport, that will convey contaminated surface runoff from the airport's impermeable surfaces to the CPCF, is designed to cater for a storm event with a 1% annual exceedance probability (AEP) plus a 30% allowance for climate change.

The basis by which the CPCF storage requirement was determined was the volume required to ensure sufficient capacity is in place to meet the requirements of 95% of de-icing seasons (*i.e.*, the 95%ile of the seasonal maximum storage volume requirements simulated). However, a combination of rainfall events or individual events (greater than the design capacity) could result in the storage volume of the CPCF being fully utilised. There would therefore be the potential for a spill of contaminated flows to the Cuckoo Stream in an extreme event or combination of events. An overflow mechanism for contaminated flows from the CPCF is therefore required.

The following mitigation measures included in the design of the project have been established to avoid and mitigate against the risks of overflows and also detail the emergency response steps if an overflow event occurs.

10.7.2.1 Mitigation/Design Measures to Limit Overflow Events

The following is a summary of the key mitigation/design measures proposed in order to limit overflow of contaminated surface water to the Cuckoo Stream and also to minimise the impact of an overflow should an overflow event occur:

- Segregation of clean flows from potentially contaminated flows is proposed and will improve the resilience of the network;
- Providing additional pollution control storage tank capacity reduces the likelihood of overflows occurring;
- The storage tank is proposed to be compartmentalised, such that first flush of the most heavily contaminated water could be captured in a compartment that would potentially limit highly contaminated water discharging to the watercourse in the event of an overflow;
- The compartmentalised approach means that when the tank is full that short circuiting of contaminated flows to the overflow is prevented by increasing the flow path through each compartment. This can minimise the concentration of the spill volume;
- The provision of a secondary overflow from the CPCF Contaminated Pipeline would allow overflow of surface water with a lower contamination level than the contents of the storage tank under certain conditions;
- The overall airfield-wide SCADA system would include operational flexibility such that pump rates can be increased or decreased at the CPCF, where conditions at other pollution control tanks allow, in order to maximise the storage availability / resilience of the system overall. Pumping from local pollution control tanks to the CPCF storage tank could be turned off if the CPCF storage tank is full and the local tanks have spare storage capacity. This is detailed further in the Operational Control Philosophy document,

included as part of the Engineering Design report (**Section 11** of the planning application).

- The Decision Points - System response configurations have been developed as required to address each potential combination of weather conditions and airport operational activities.

10.7.2.2 Overflow Event – Steps:

The following approach is proposed for the management of overflows during emergency situations and to mitigate the impact of unavoidable overflows of contaminated runoff to the Cuckoo Stream. These steps should be read in conjunction with **Figure 10.11**.

- STEP 1: Flows surcharge along the CPCF Pipeline to Point B. This utilises the online storage volume of the CPCF Pipeline to postpone / avoid an overflow event.
- STEP 2: If the online storage of the CPCF Pipeline is fully utilised and contaminated flows continue to be received, Overflow 1 would be initiated, allowing contaminated flows in the CPCF Storage Tank to overflow towards the Cuckoo Stream.
- STEP 3: Overflow to the Cuckoo Stream *via* Overflow 2. The flow control mechanisms in the CPCF and associated inlet pipelines can be adjusted to allow flows to surcharge back to Point D on **Figure 10.11**, from where they can overflow to the Cuckoo Stream *via* the Overflow 2 pipeline.
- The Overflow 1 and Overflow 2 pipelines converge in a single pipe which gravitates to the Cuckoo Stream.
- STEP 4: If the overflow event has still not been averted and flows continue to surcharge along the CPCF Pipeline, overflow to Cuckoo Supply Channel *via* Overflow 3. Overflow 3 will also be utilised as the primary overflow option in flood conditions *i.e.,* if the water level in the Cuckoo Stream is too high for Overflow 1 or 2 to operate effectively.

It should be noted that the above steps detail the typical overflow procedure. However, the operation of the system will be sufficiently flexible to take these steps in a different sequence, as required to minimise the impact on the receiving waters. For example, consider a scenario where the COD concentration of flows in the CPCF Pipeline is lower than the flows in the CPCF. In this scenario, implementing Step 3 before Step 2 would enable the release of a lower-concentration flow to the Cuckoo Stream.

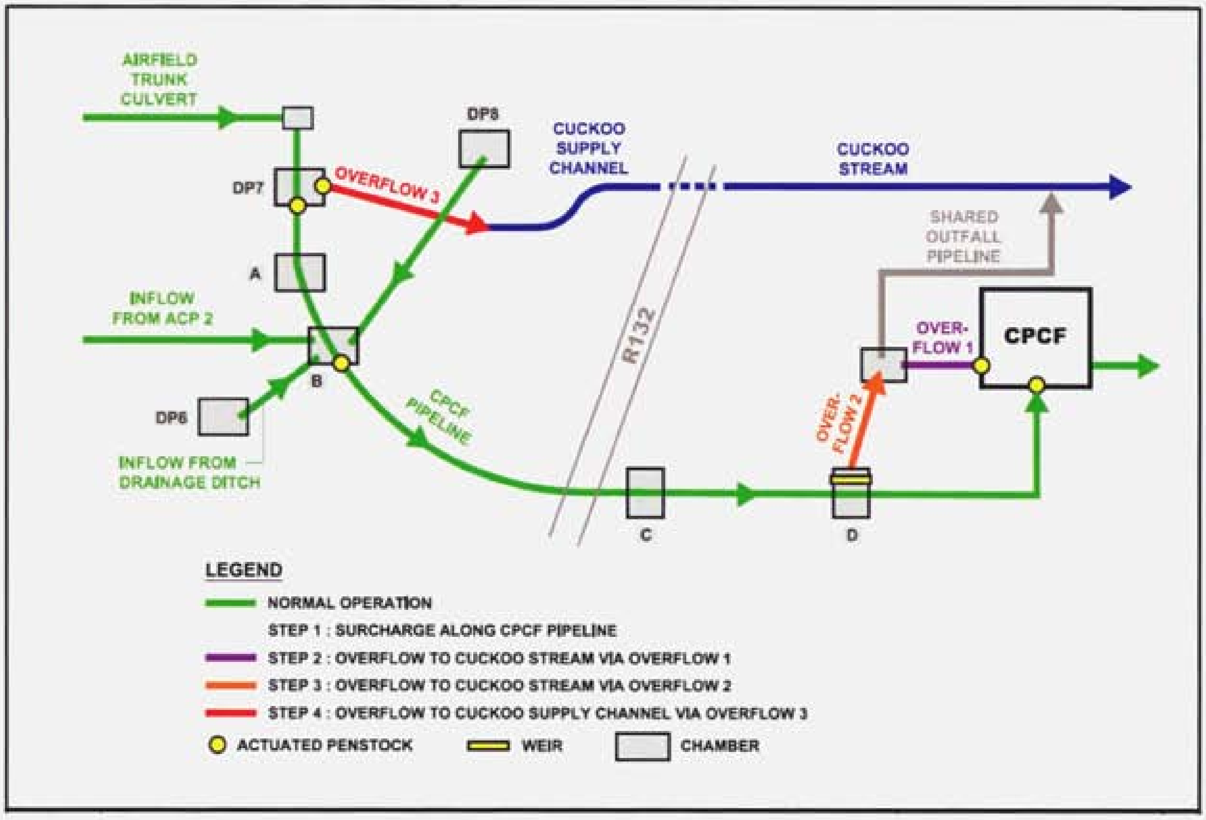

Figure 10-9: Proposed CPCF Overflow Mechanism

10.8 Residual Effects of the Proposed Development

The assessment indicates that the proposed development with mitigation will have no significant effect on the natural surface water regime either qualitatively or quantitatively.

10.8.1 Construction Phase

Following the implementation of mitigation measures detailed in **Section 10.6.1** above, the predicted potential impact from contaminated surface water reaching the surface water environment during the construction phase is presented in **Table 10.10**.

Table 10.10: Summary of residual effects during construction phase

Impact	Quality	Significance	Duration
Potential Surface Water contamination (due to excavation and infilling or accidental spills and leaks)	Neutral	Imperceptible	Short-term

10.8.2 Operational Phase

Following the implementation of the project design, and mitigation measures proposed in **Section 10.6.2**, the residual impact on the surface water environment once the proposed development is constructed and operational is presented in **Table 10.11**.

Table 10.11: Summary of residual effects during operational phase

Impact	Quality	Significance	Duration
Alteration of surface water flows	Positive	Significant	Long term
Improvement of water quality conditions in Cuckoo Stream	Positive	Significant	Long-term
Change to hydrological regime	Neutral	Imperceptible	Long-term

10.8.3 Water Framework Directive Status

As a result of the design of the project and prevention and mitigation measures to be taken, there is not likely to be a significant adverse effect on surface water quantity and quality from the proposed development. There will be no predicted degradation of the current receiving surface waterbody status (chemically, ecologically and quantifiably) or any impact on its potential to meet the requirements and/or objectives in the second RBMP 2018-2021 (River Basin Management Plan) and draft third RBMP 2022-2027.

As such, the project will not cause a deterioration in surface water quality status or compromise the ability of any surface or groundwater to meet the objectives of the Water Framework Directive in the RBMP and the Dublin Airport LAP. In fact, it is likely to improve surface water status, to conserve capacity at the Ringsend WwTP by reducing the volumes discharged to it and will not affect groundwater status at all. It is not likely that there will be any significant discharges of pollutants of priority or other polluting substances to surface water, thus the chemical status of the surface water is not likely to deteriorate as a result of the development of the project.

10.9 Cumulative Effects

As has been identified in the receiving environment section, all developments that are already built and in operation contribute to the characterisation of the baseline environment. **Chapter 18** presents the methodology for scoping in projects to be considered for cumulative effects.

10.9.1 North Runway Project

The recently constructed North Runway project (P. A. Reg. Ref. F04A/1755, A.B.P. Ref. PL06F.217429 as amended by FCC ref. F19A/0023, ABP ref. ABP-305289-19) whose surface water network includes a polluted water holding tank (PWHT) with a pumped discharge to the public sewer. The pipeline which conveys flows from the NR PWHT to the public sewer is called the N-S Sewer.

The ADP proposes to make an adjustment to the operation of the network such that flows from Zone 2A can discharge to either the re-purposed N-S sewer or the existing Pier 1 sewer. The system would monitor the average concentration of contaminated surface water in the North Runway PWHT *via* TOC analysers. The changes will enable flows from the North Runway PCF to be directed to either the Re-purposed N-S Sewer for discharge to the Cuckoo Stream, or to the Pier 1 sewer for discharge to public sewer *via* the CPCF depending on the measured concentration at the PCF and the diversion concentration limits set out in the Drainage Management Plan. The proposed arrangement will provide the physical infrastructure necessary to enable flexibility in the management of clean water at the campus as required by the Drainage Management Plan.

10.9.2 Interface with Planned Developments

It should also be noted that the above-described re-purposing of the N-S Sewer will also affect future flows from Zone 2B. Zone 2B is the location of the Planned Development associated with Apron 5H.

The planned development at Apron 5H will also include a local pollution control facility (PCF) with a pumped discharge to the N-S Sewer. The system would monitor the average concentration of contaminated surface water in the Apron 5H PCF *via* TOC analysers. The above-referenced changes to the N-S Sewer will enable flows from the Apron 5H PCF to be directed to either the Re-purposed N-S Sewer for discharge to the Cuckoo Stream, or to the Pier 1 sewer for discharge to public sewer *via* the CPCF depending on the measured concentration at the PCF and the diversion concentration limits set out in the Drainage Management Plan.

To facilitate the installation of the Underpass, a temporary diversion of the culverted section of the Cuckoo Stream will be required as part of the works. According to the Underpass EIAR, the magnitude of impacts on the Cuckoo Stream is low, resulting in an imperceptible effect as this temporary diversion will be controlled by implementation of CEMP and agreed Drainage Management Plan. Therefore, no cumulative impacts are expected in combination with the ADP project on the hydrological environment during the construction and operational phases of the Dublin Airport Underpass project.

In considering the MetroLink, it is noted that the Cuckoo Stream open water section will not be crossed directly by the proposed route. The proposed Project will be in a tunnel below the course of the Cuckoo Stream at Dublin Airport. There are no planned construction activities located close to this waterbody.Therefore, no cumulative impacts are expected in combination with the ADP on the hydrological environment due to the construction and operational phase of the MetroLink project.

10.9.3 Construction Phase

All future developments will incorporate SuDS measures to protect water quality in compliance with legislative standards for receiving water quality (European Communities Environmental Objectives (Surface Water) Regulations (S.I. 272 of 2009as amended). As a result, there will be minimal cumulative potential for change in the natural hydrological regime. The cumulative impact is considered to be **short-term**, **neutral** and **imperceptible**.

10.9.4 Operational Phase

All the operational cumulative developments are required to manage surface water drainage and discharges in accordance with S.I 272/2009 and its amendments. As such there will be no cumulative impact to surface water quality and therefore there will be no cumulative impact on the Surface Waterbody Status. The cumulative effect on surface water during the operational phase of the proposed development is concluded to have a **long-term**, **imperceptible** significance with a **neutral** quality.

10.10 Monitoring

10.10.1 Pre-Construction Phase

Pre-construction water quality monitoring will be undertaken once a week for a 1-month period, prior to the commencement of the construction works. Samples will be taken for total suspended solids (TSS), turbidity, pH, temperature, dissolved oxygen (DO) and hydrocarbons up and downstream of the proposed working areas and/or crossing points, to establish the baseline water quality conditions prior to construction. Samples for turbidity, pH, DO and temperature will be taken *in situ*; samples for TSS and hydrocarbons will be sent to an accredited laboratory for analysis.

10.10.2 Construction Phase

During construction, the contractor will monitor the levels of TSS, turbidity, pH, temperature, DO and hydrocarbons at the same locations upstream and downstream of the works once a week for the duration of the following works:

- Site clearance works, earthworks movements and stockpiling;
- Excavations; and
- Construction works within and adjacent to watercourses.

The above monitoring will alert the contractor to any detrimental effects that particular construction activities may be having on water quality in order that appropriate remedial action can be taken as quickly as possible; and allow the contractor to demonstrate the success of the mitigation measures employed in maintaining any sediment release within the 'trigger' value established.

10.10.3 Operational Phase – Surface Water Monitoring Plan (SWMP)

Given the significant changes to the configuration and nature of drainage infrastructure in place at the airfield proposed in the SWMP, a revision of the existing SWMP in place is proposed by the ADP.

A bespoke surface water monitoring plan has been developed which considers the ADP proposed redevelopment. A risk-based approach was adopted to identify surface water monitoring locations, frequency of sampling necessary, type of sampling required, and suite of analytes deemed necessary for analysis. The methodology proposes both routine sampling, and event-based responsive sampling and utilises a combination of grab sampling, composite sampling (time-based and flow proportional) and real-time water quality probes. The SWMP is included as **Appendix 10B.**

10.10.3.1 Surface Water Quality Monitoring

Figure 10-10 below presents an overview of the delineated surface water monitoring sub catchments and the locations included in the consolidated surface water quality monitoring plan proposed.

10.10.3.2 Hydrological Monitoring

In order to assess the hydrological effects of PCF operation on receiving waters, it is proposed that the flow of each of the waterbodies downstream of PCFs are monitored. The approximate locations proposed (SW-C-9, SW-K-4, SW-F-2 in addition to the existing SW-C-7) are presented in **Figure 10-10** below.

10.10.3.3 Biological Monitoring

A bi-annual biological monitoring program is in place at the airfield to monitor ecological water quality of waterbodies in the immediate vicinity surrounding the airfield. Minor alterations of sampling locations will be undertaken in order to reflect future revisions in drainage configurations; specifically, to ensure that locations are downstream of all potential discharges. Kick sampling shall continue to be undertaken in spring and autumn each year, with analysis undertaken in line with the EPA Quality Rating System (Q-value).

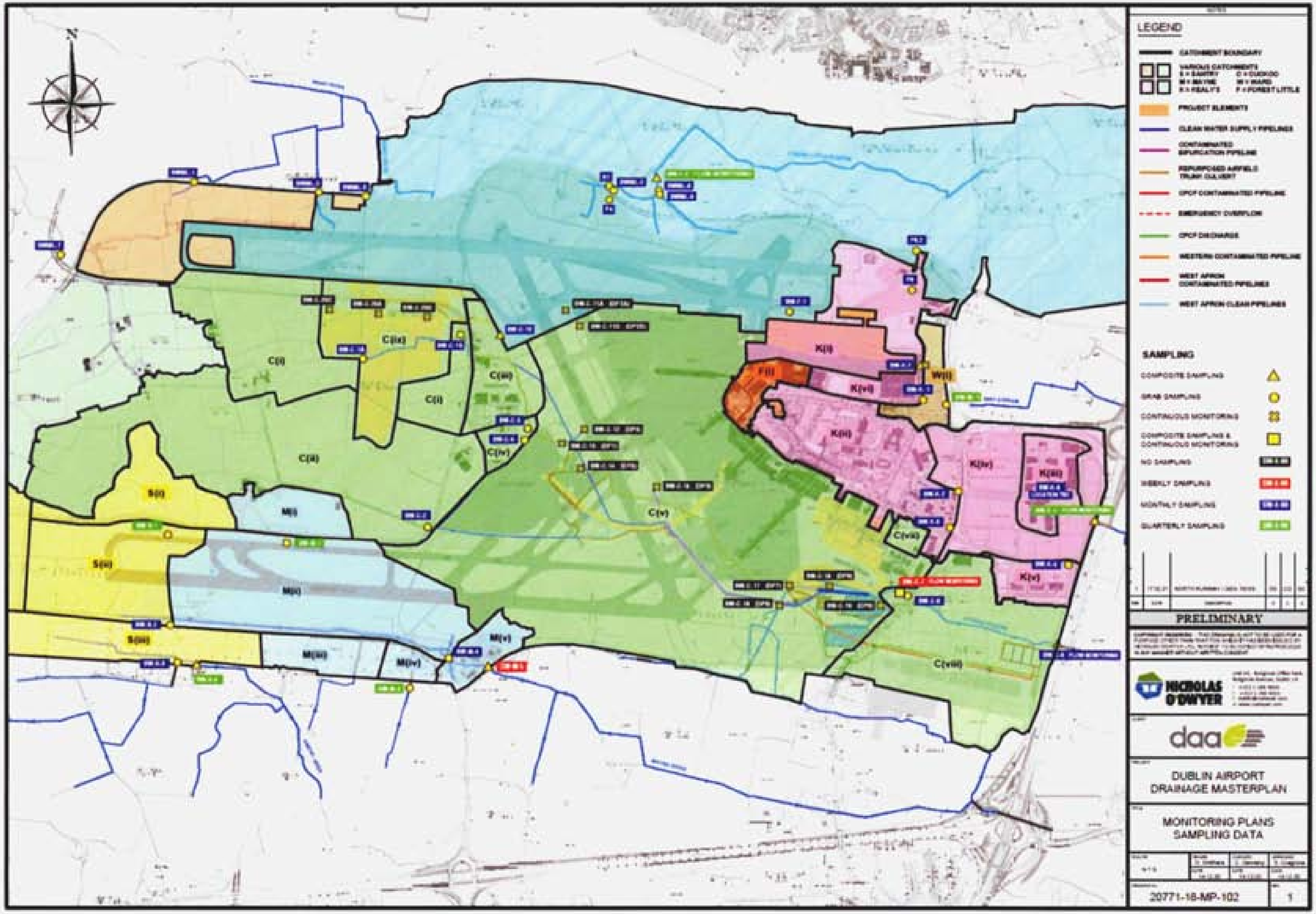

Figure 10-10: Proposed Surface Water Sampling Location

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11 LAND, SOILS, GEOLOGY & HYDROGEOLOGY

11.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) assesses the impact of the Airfield Drainage Project (ADP) on the land, soils, geological and hydrogeological environment during the construction and operational phases. In accordance with the requirements of the EIA Directive, this chapter describes and assesses the likely direct and indirect significant effects of the proposed Project on Land, Soils, Geology and Hydrogeology. This chapter also provides a characterisation of the receiving hydrogeological environment within the site boundary defined for this Project and within a wider study area/ Zone of Influence (given by the groundwater body/ regional aquifer underlying the ADP site) in the vicinity of the proposed Project.

11.2 Statement of Authority

This chapter was prepared by AWN Consulting on behalf of Dublin Airport Authority (daa) for the proposed ADP, which is the subject of a planning application to the local planning authority of Fingal County Council (FCC).

This chapter was prepared by Marcelo Allende (BSc, BEng), and Teri Hayes (BSc, MSc, U, EurGeol) of AWN Consulting. Marcelo is a Water Resources Engineer with over 15 years of experience in environmental consultancy and water resources studies. Marcelo is a Senior Environmental Consultant (Hydrologist) with AWN Consulting, a member of the International Association of Hydrogeologists (Irish Group) and a member of Engineers Ireland (MIEI). Teri is a hydrogeologist and an environmental consultant with over 30 years of experience managing Environmental Impact Assessment, water resource assessment, contaminated land and licencing projects. Teri has led and contributed to many projects which have successfully achieved planning and licencing. Teri is a member and former President of the International Association of Hydrogeologists (IAH) and is a professional member of the Institute of Geologists of Ireland (IGI) and European Federation of Geologists (EurGeol). Her experience includes acting as an expert witness at public hearings, lecturing in EIA and risk assessment and providing expert advice for planning authorities and An Bord Pleanála.

11.3 Methodology

11.3.1 Desktop Study

This assessment was considered in the context of the available baseline information, potential impacts, consultations with statutory bodies as part of the EIA scoping phase and other publicly available relevant information. In collating this information, the following sources of information and references were consulted:

- Geological Survey of Ireland (GSI) - on-line mapping, Geo-hazard Database, Geological Heritage Sites & Sites of Special Scientific Interest, Bedrock Memoirs and 1:100,000 mapping (these data can be accessed at https://www.gsi.ie/en-ie/Pages/default.aspx);

- Teagasc soil and subsoil database;
- Ordnance Survey Ireland (OSI) - aerial photographs and historical mapping;
- Latest EPA Maps & Envision water quality monitoring data for groundwater bodies in the area (these data can be accessed at https://gis.epa.ie/EPAMaps/ and www.catchments.ie);
- National River Basin Management Plan 2018-2021 and the Draft Third Cycle Draft River Basin Management Plan 2022-2027;
- Fingal County Council Development Plan 2023-2029;
- Dublin Airport Local Area Plan (LAP) 2020;
- Department of the Environment, Heritage and Local Government (DEHLG) and the Office of Public Works (OPW) (2009). The Planning System and Flood Risk Management, Guidelines for Planning Authorities; and
- Construction Industry Research and Information Association (CIRIA) (2001). Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors, (C532).

Other relevant documentation consulted as part of this assessment included the following:

- daa Dublin Airport Drainage Masterplan. Hydrology Report. Nicholas O' Dwyer (NOD), September 2019;
- Airfield Drainage Project. Planning Design Report. NOD, October 2022;
- Airfield Drainage Project. Construction Environmental Management Plan. NOD, October 2022;
- daa Phase 2 – Drainage Strategy Works. Volume 5, Ground Investigation Report (Cuckoo catchment), March 2008;
- Ground Investigation Report. Dublin Airport Apron. Rehabilitation 2015-2019. Ground Investigations Ireland, August 2016;
- DAA Surveys – Ground Investigation. Causeway Geotech. October 2018;
- Various design site plans and drawings; and
- Consultation with site engineers/ planners/ architects.

11.3.2 Assessment Methodology

This chapter assesses the potential effects, which the proposed development may have on Land, Soils, Geology and Hydrogeology as defined in the Environmental Protection Agency (EPA) 'Guidelines on the Information to be contained in Environmental Impact Assessment Reports' (EPA, 2022a) as well as in line with Article 94 and Schedule 6 of the Planning and Development Regulations 2001 (as amended) and Article 5 and Annex IV of the EIA Directive.

The Draft EPA document titled 'Advice Notes for Preparing Environmental Impact Statements' (EPA, 2015b), to the extent that they remain relevant and appropriate, is also followed in this geological and hydrogeological assessment and classification of environmental effects. Due consideration is also given to the guidelines provided by the Institute of Geologists of Ireland (IGI) in the document titled 'Guidelines for the Preparation of Soils, Geology and Hydrogeology chapters of Environmental Impact Statements' (IGI, 2013).

Finally, the document titled 'Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes' by Transport Infrastructure Ireland (TII) formerly National Roads Authority (NRA) (TII, 2009) is referenced where the methodology for assessment of impacts is appropriate. Furthermore, in line with the TII Guidelines, an assessment of the attribute importance has been undertaken in order to provide a basis for the assessment of impact provided. The TII criteria for rating the soil and geology, and hydrogeological related attributes are presented in **Table 11-1** and **Table 11-2,** respectively.

Table 11-3 and **Table 11.4** provide the rating of potential environmental effects on the land, soil, geological and hydrogeological environment. **Table 11.5** presents a matrix of the assessment criteria and is based on the standard EIAR impact predictions table included in **Chapter 2 – The EIA Process** of the EIAR which takes account of the quality, significance, duration and type of effect identified.

The duration of each effect is either momentary, brief, temporary, short-term, medium term, long-term, or permanent. Momentary effects are those that last from seconds to minutes. Brief effects are those that last less than a day. Temporary effects are those which are construction related and last less than one year. Short term effects are seen as effects lasting one to seven years; medium-term effects lasting seven to fifteen years; long-term effects lasting fifteen to sixty years; and permanent effects lasting over sixty years.

Table 11-1: Criteria for Rating Site Attributes – Estimation of Importance of Soil and Geology Attributes (NRA)

Importance	Criteria	Typical Examples
Very High	Attribute has a high quality, significance 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 route is significant on a national or regional scale.	Geological feature rare on a regional or national scale (NHA). Large existing quarry or pit. Proven economically extractable mineral resource
High	Attribute has a high quality, significance 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 route is significant on a local scale.	Contaminated soil on site 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 high fertility soils. Moderately sized existing quarry or pit. Marginally economic extractable mineral resource.
Medium	Attribute has a medium quality, significance 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 route is moderate on a local scale.	Contaminated soil on site 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.
Low	Attribute has a low quality, significance 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 route is small on a local scale.	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.

Table 11-2: Criteria for Rating Site Attributes – Estimation of Importance of Hydrogeological Attributes (NRA)

Importance	Criteria	Typical Examples
Extremely High	Attribute has a high quality or value on an international scale	Groundwater supports river, wetland or surface water body ecosystem protected by EU legislation *e.g.*, SAC or SPA status.
Very High	Attribute has a high quality or value on a regional or national scale	Regionally Important Aquifer with multiple well fields. Groundwater supports river, wetland or surface water body ecosystem protected by national legislation – NHA status. Regionally important potable water source supplying >2500 homes. Inner source protection area for regionally important water source.
High	Attribute has a high quality or value on a local scale	Regionally Important Aquifer. Groundwater provides large proportion of baseflow to local rivers. Locally important potable water source supplying >1000 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	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	Poor Bedrock Aquifer Potable water source supplying <50 homes

Table 11-3: Criteria for Rating Impact Significance at EIS Stage – Estimation of Magnitude of Impact on Soil/Geological Attribute (NRA)

Magnitude of Impact	Criteria	Typical Examples
Large Adverse	Results in loss of attribute	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.
Moderate Adverse	Results in impact on integrity of attribute or loss of part of attribute	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.
Small Adverse	Results in minor impact on integrity of attribute or loss of small part of attribute	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.
Negligible	Results in an impact on attribute but of insufficient magnitude to affect either use or integrity	No measurable changes in attributes
Minor Beneficial	Results in minor improvement of attribute quality	Minor enhancement of geological heritage feature
Moderate Beneficial	Results in moderate improvement of attribute quality	Moderate enhancement of geological heritage feature
Major Beneficial	Results in major improvement of attribute quality	Major enhancement of geological heritage feature

Table 11.4: Criteria for Rating Impact Significance at EIS Stage – Estimation of Magnitude of Impact on Hydrogeological Attribute (NRA)

Magnitude of Impact	Criteria	Typical Examples
Large Adverse	Results in loss of attribute/or quality and integrity of attribute	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.
Moderate Adverse	Results in impact on integrity of attribute or loss of part of attribute	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.
Small Adverse	Results in minor impact on integrity of attribute or loss of small part of attribute	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	Calculated risk of serious pollution incident <0.5% annually.

Table 11.5: Rating of Significant Environmental Impacts at EIS Stage (NRA)

Importance of Attribute	Magnitude of Change			
	Negligible	Small Adverse	Moderate Adverse	Large Adverse
Extremely High	Imperceptible	Significant	Profound	Profound
Very High	Imperceptible	Significant/Moderate	Profound/Significant	Profound
High	Imperceptible	Moderate/Slight	Significant/Moderate	Profound/Significant
Medium	Imperceptible	Slight	Moderate	Significant
Low	Imperceptible	Imperceptible	Slight	Slight/Moderate

The principal attributes (and effects) to be assessed include the following:

- Geological heritage sites within the vicinity of/within the perimeter of the proposed development site;
- Landfills, industrial sites in the vicinity of the site and the potential risk of encountering contaminated ground;
- The quality, drainage characteristics and range of agricultural use(s) of subsoil around the site;
- Quarries or mines in the vicinity and the potential implications (if any) for existing activities and extractable reserves;
- The extent of topsoil and subsoil cover and the potential use of this material on site as well as any requirement to remove it off-site as waste for reuse, recovery (R) or disposal (D) options;
- High-yielding water supply wells/springs in the vicinity of/within the site boundary to within a 2km radius and the potential for increased risk presented by the proposed development;
- Classification (regionally important, locally important, *etc.*) and extent of aquifers underlying the site boundary area;
- Increased risks presented to the groundwater bodies by the proposed development associated with aspects such as, for example, the removal of subsoil cover, removal of aquifer (in whole or part thereof), spatial drawdown in water levels, alteration in established flow regimes, and changes in local/ regional groundwater quality;
- Natural hydrogeological/karst features in the area and potential for increased risk presented by the activities at the site; and
- Groundwater-fed ecosystems and the increased risk presented by operations both spatially and temporally.

11.4 Receiving Environment

The receiving environment is discussed in terms of lands, soils, geology and hydrogeology including potential for existing and historical contamination.

11.4.1 General Description of the Site

11.4.1.1 Site Setting

As described in **Chapter 4 – Project Description** of the EIAR, the site is located within, and in the vicinity of, the Dublin Airport campus. Dublin Airport is an international airport serving the island of Ireland. The airport is located 7km north of Dublin and 3km south of the town of Swords.

According to the EPA Maps, the proposed ADP site lies within the Liffey and Dublin Bay Catchment (Hydrometric Area 09) and Water Framework Directive (WFD) Sub-Catchment Mayne_SC_010. A small section of the site lies within the WFD Sub-Catchment Broadmeadows_SC_010 (refer to **Figure 11.1**).

The ADP study catchment is located within the upstream extents of three major river catchments; the Santry River, Mayne River and Sluice River. The study area covers a total catchment area of approximately 16.5km^2(refer to **Chapter 10 – Hydrology**).

The ADP site slopes east towards the Airport M1 Motorway, from *ca.* 70m above Ordnance Datum (mAOD) to 50mAOD.

11.4.1.2 Historical Land Use

The historical OSI Cassini 6-inch maps (first and last editions) show that the first phases of Dublin Airport were constructed during the period 1900-1924 in the townland of Collinstown. The Cassini map for the period 1829-1846 indicates that the ADP site was mainly greenfield prior to the construction of the airport (refer to **Figure 11.2** and **Figure 11.3**).

Figure 11.4 and **Figure 11.5** present the extent of the airport in the context of the ADP boundary in 1995 and 2000, respectively. Additionally, **Figure 11.6** shows the current land use according to the Dublin Airport Local Area Plan (LAP) 2020.

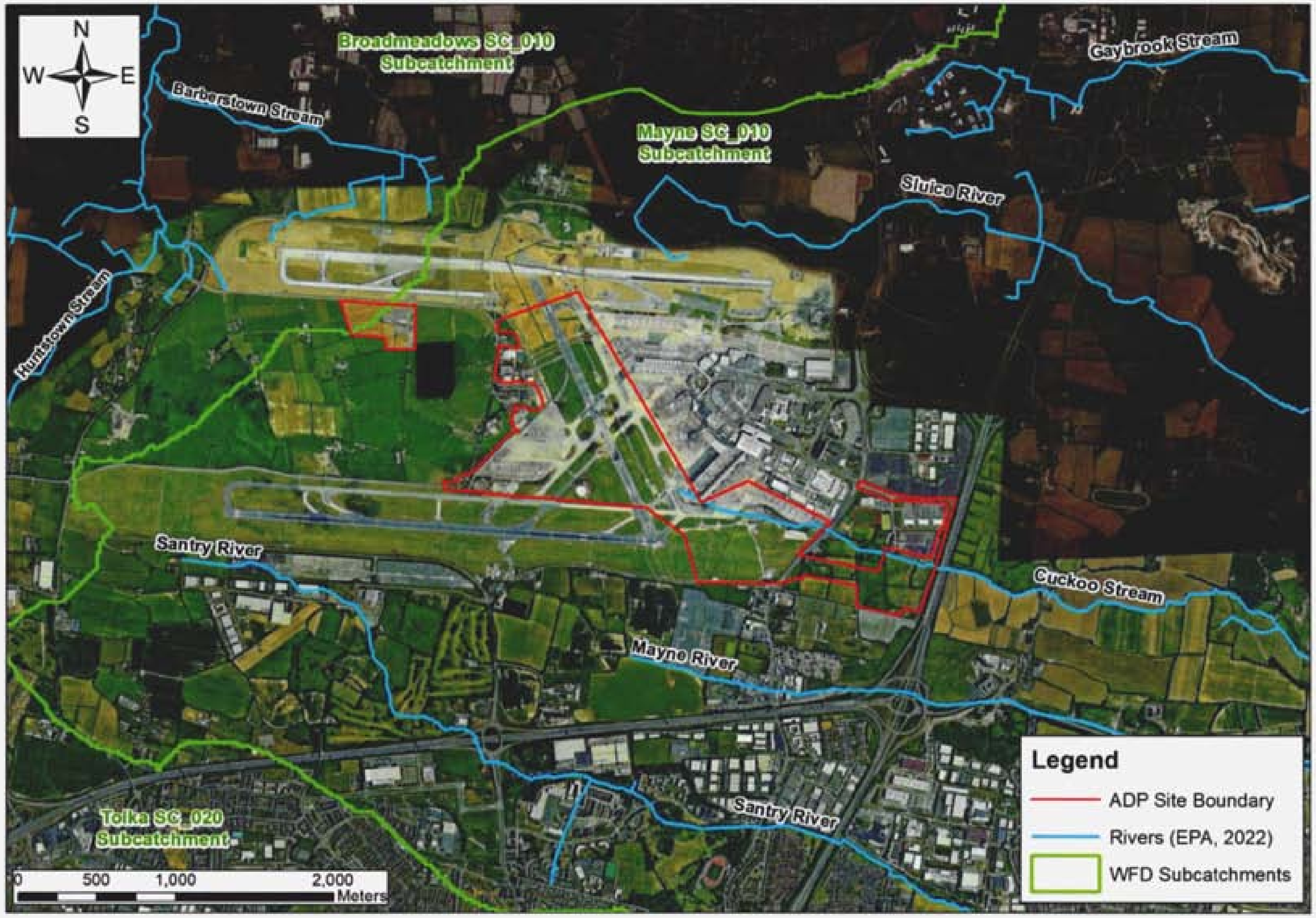


Figure 11.1: ADP location and hydrological catchments

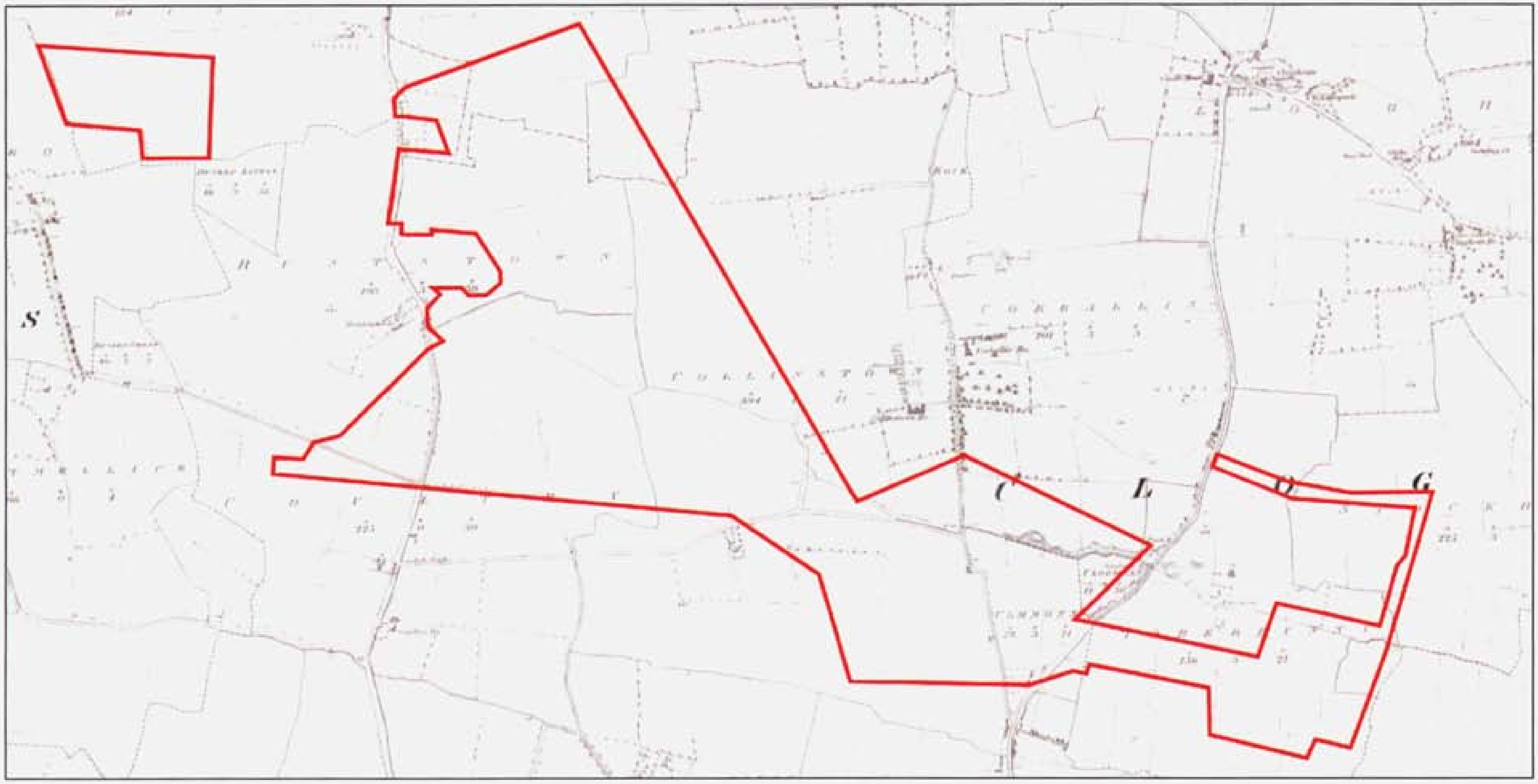


Figure 11.2: Historical aerial map 6-inch first edition (1829-1846)

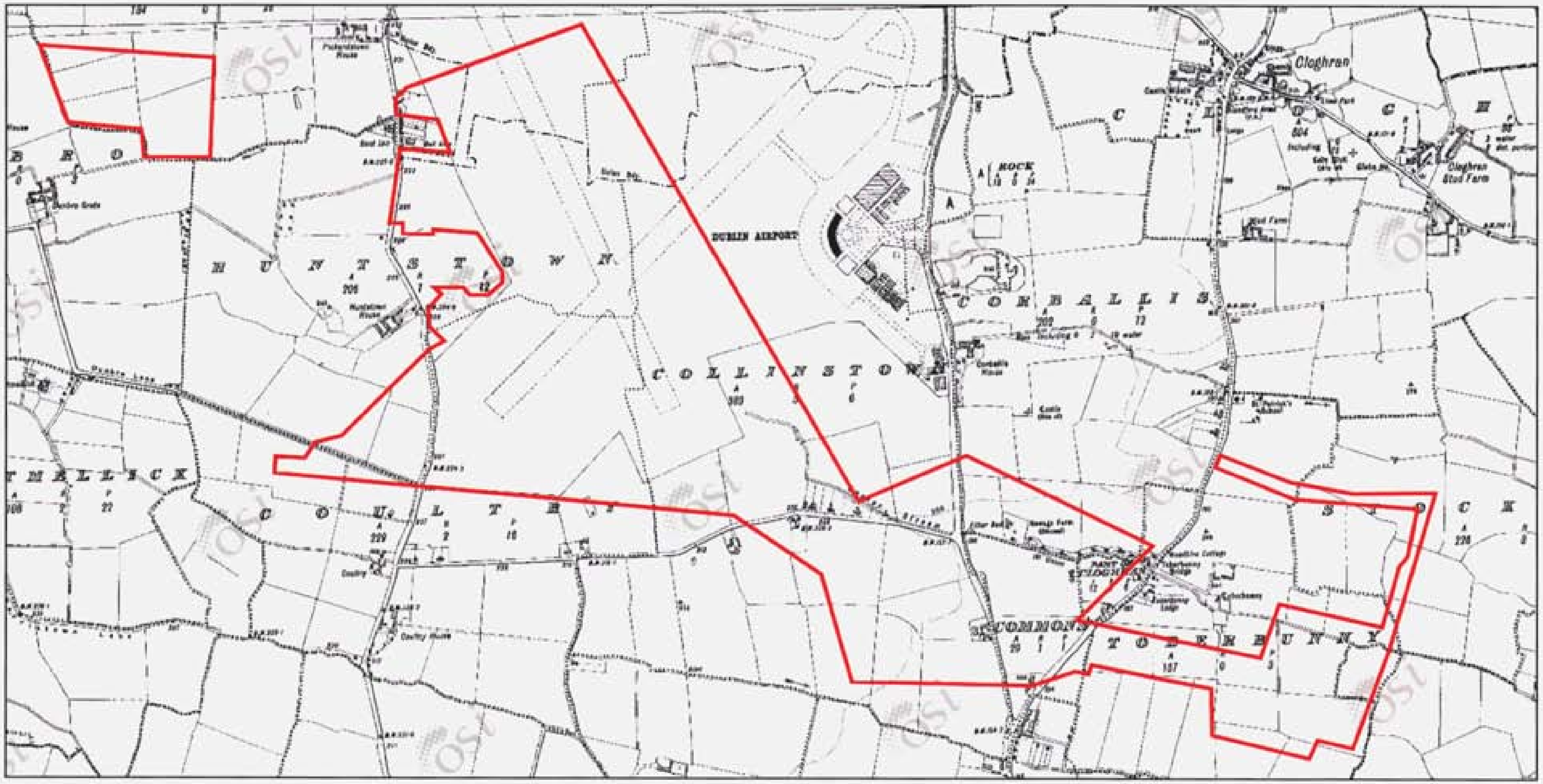


Figure 11.3: Historical aerial map 6-inch last edition (1900-1924)

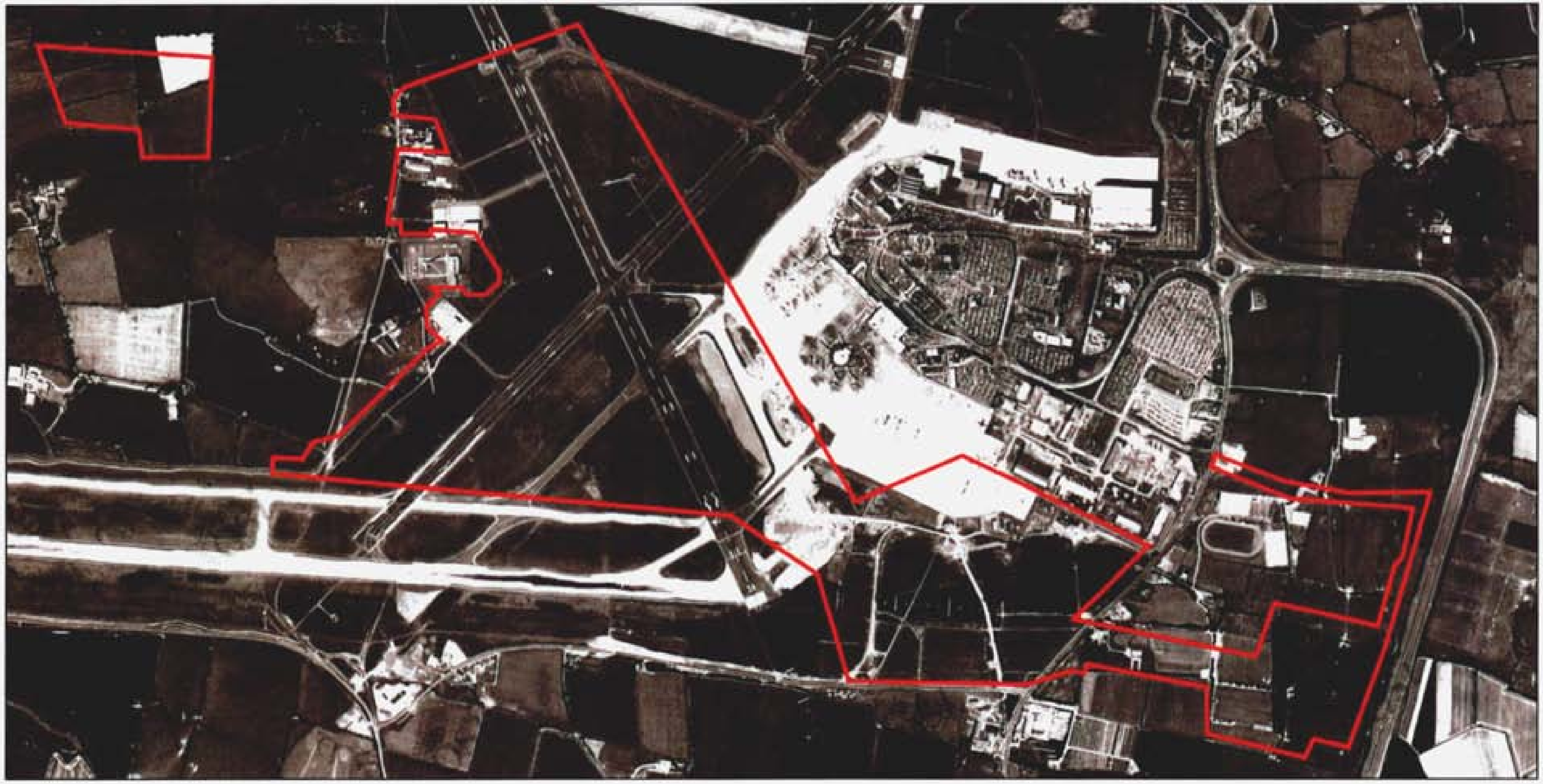


Figure 11.4: 1995 aerial map

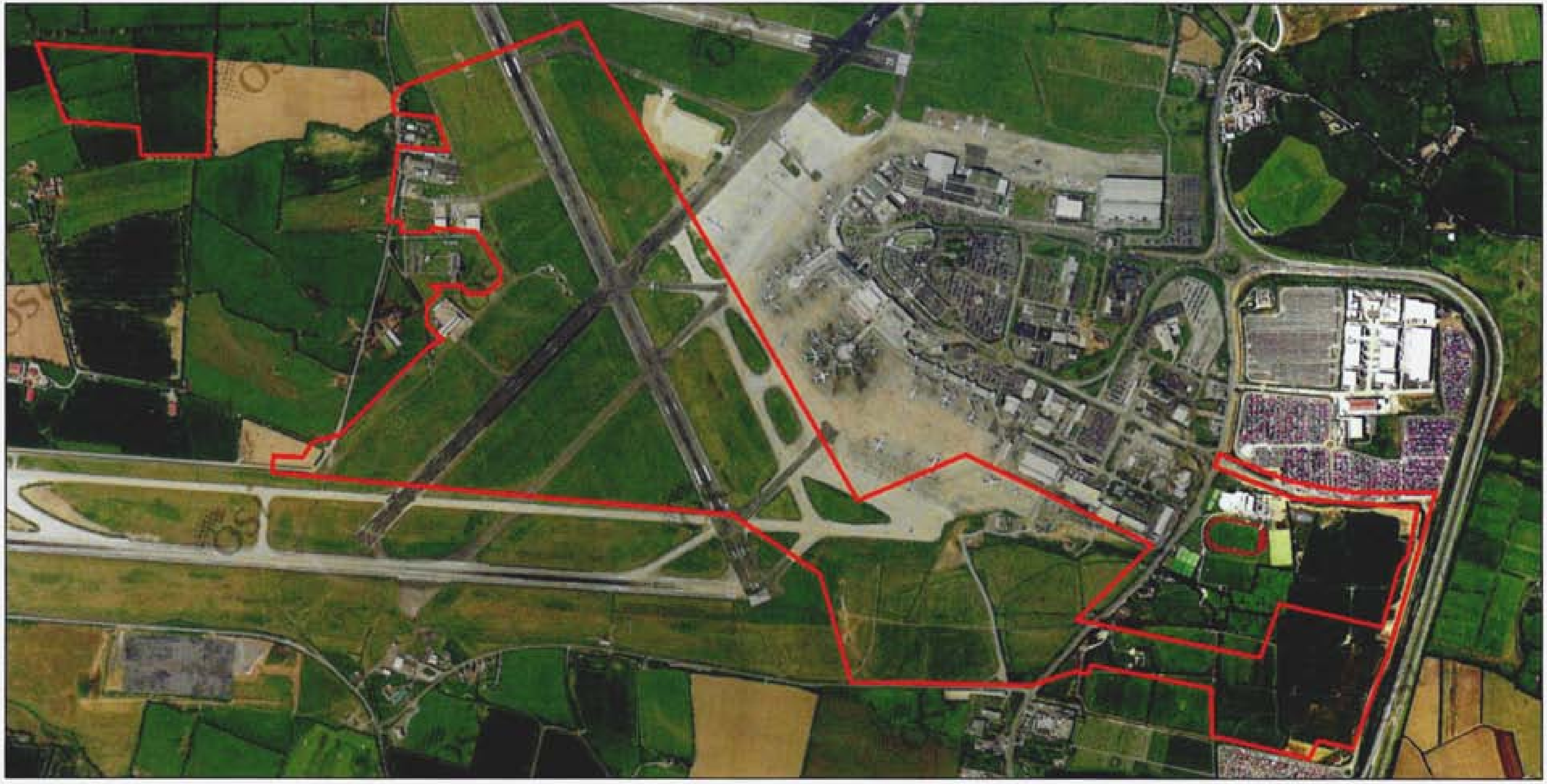


Figure 11.5: 2000 aerial map

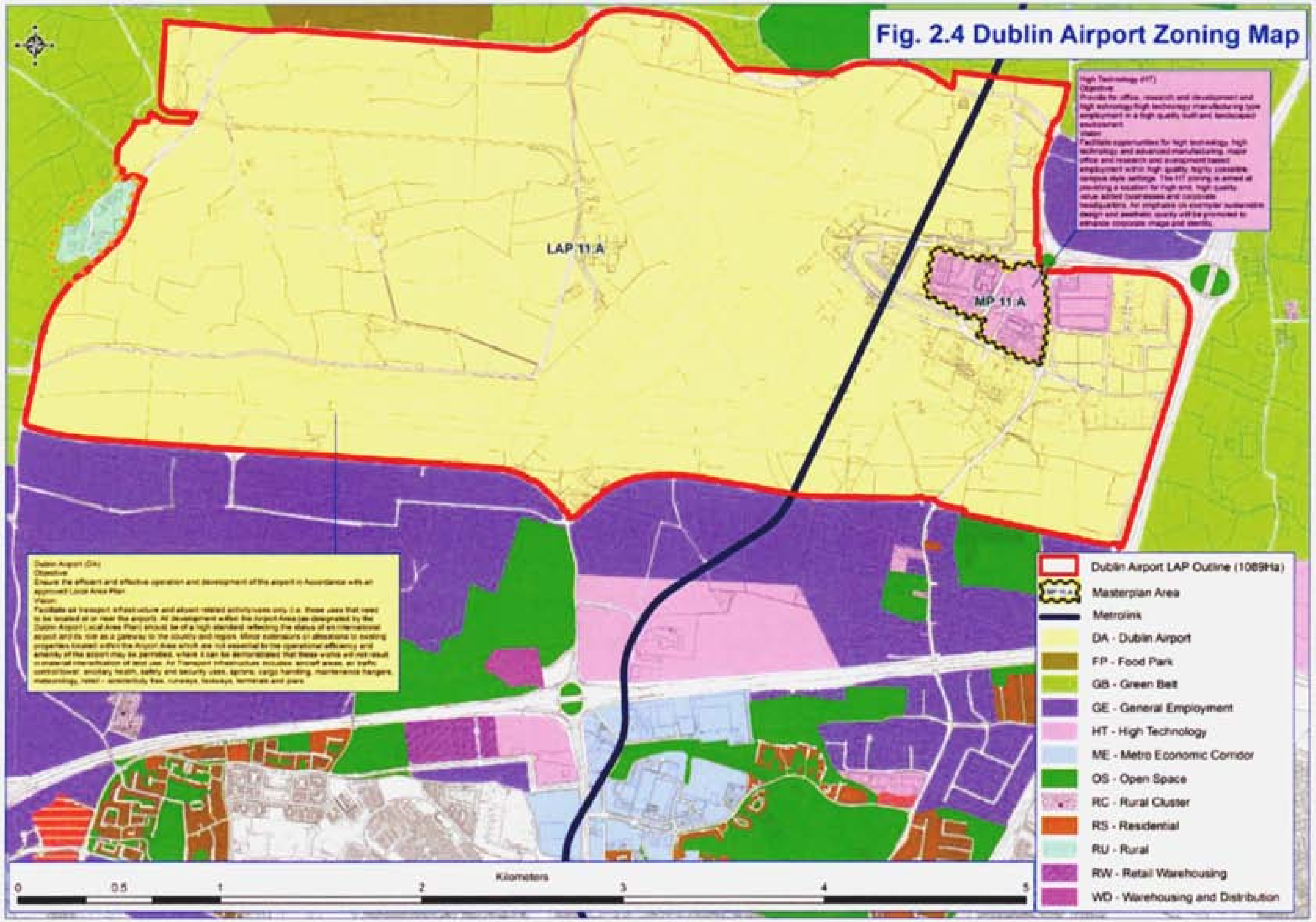


Figure 11.6: Existing Land Use in Dublin Airport (Source: Dublin Airport LAP)

11.4.2 Historical Site Investigation

The following sections present the historical ground investigation carried out for daa within the ADP site since 2008. **Figure 11.7** presents the location of this historical data.

11.4.2.1 GI Report (Cuckoo Catchment) – daa Phase 2 Drainage Strategy Works (RPS, 2008)

This ground investigation was carried out in the area located to the south of South Apron and adjacent to the west of R132. It consists of 8 no. cable percussion boreholes to a maximum depth of 12.0m below ground level (mbgl) and 4 no. trial pits. Refer to **Figure 11.7** for the location of these points.

11.4.2.2 SI Report. Dublin Airport Apron Evaluation (URS, 2014)

The main purpose of the investigation was to assess the overall condition of the existing concrete pavement layers and underlying foundation of the aircraft manoeuvring areas between Pier 2 to Pier 3 and Pier 3 to Pier 4. It included a Rotary Coring survey composed of 24 no. rotary core boreholes which were terminated at depths up to 1.96mbgl. Refer to **Figure 11.7** for the location of these points.

11.4.2.3 SI Report. Dublin Airport Fuel Farm and Hydrant Redevelopment (BHP, 2015)

This is a geotechnical report based on the findings of 19 no. trial pits and 7 no. rotary core boreholes which were terminated within the bedrock at depths up to 25.0 and 25.5mbgl. This report was prepared as part of the design of a new fuel farm and hydrant redevelopment. Refer to **Figure 11.7** for the location of these points.

11.4.2.4 Site Investigation. Dublin Airport South Apron Extension (SI, 2016a)

This report covers the fieldworks and laboratory testing for the South Apron extension project. The fieldworks included a programme of 19 no. cable percussion boreholes, 22 no. trial pits and environmental laboratory testing. Boreholes were terminated at various depths from 0.9mbgl to 13.5mbgl. Refer to **Figure 11.7** for the location of these points.

11.4.2.5 Site Investigation. West Apron and Northern Perimeter Road (SI, 2016b)

This ground investigation was carried out in the West Apron and consists of 1 no. cable percussion borehole to a depth of 3.0mbgl and 8 no. trial pits. Refer to **Figure 11.7** for the location of these points.

11.4.2.6 GI Report. Dublin Airport Apron Rehabilitation 2015-2019 (GII, 2016)

The purpose of this work was to investigate subsurface conditions at the site of the existing Dublin Airport Apron utilising a variety of investigative methods in accordance with the project specification, which includes 2 no. cable percussion boreholes to a maximum depth of 7.2mbgl and 1 no. rotary core borehole to a maximum depth of 15.0mbgl. Refer to **Figure 11.7** for the location of these points.

11.4.2.7 DAA Surveys – Ground Investigation (Causeway, 2018)

This ground investigation was undertaken at 6 no. sites across the daa location. With respect to the ADP site, Site C is associated with the area to the east of the R132 and to the south of the ALSAA sports club and to the west of the M1 motorway. The report provides geotechnical and environmental information based on 1 no. cable percussion borehole (terminated at 17.0mbgl) and 7 no. trial pits. Refer to **Figure 11.7** for the location of these points.

11.4.2.8 GI Report. Additional Airfield Boreholes (GII, 2018)

This ground investigation was carried out on the Airside Section of Dublin Airport. The scope of the work undertaken included (among others) 6 no. cable percussion boreholes to a maximum depth of 7.0mbgl, and 6 no. rotary core boreholes to a maximum depth of 38.0mbgl. Refer to **Figure 11.7** for the location of these points.

Appendix 11.1 – Historical Site Investigation Borehole Logs in **Volume III – Appendices** presents the trial pits and borehole logs associated with these reports.

11.4.3 Soils

The GSI/Teagasc soil mapping indicates that the subject site is mostly underlain by made ground associated with the airport facilities (apron, runways, *etc.*) as presented in **Figure 11.8**. The greenfield area to the west as well as the area of the proposed ADP pipelines comprise predominantly BminPD and BminDW (*i.e.,* poor and well drained mineral soil derived from till, respectively).

Topsoil encountered in these areas during the site investigations described in **Section 11.4.2** are consistent with this classification, as it is mainly described as sandy gravelly clay, except for the Apron areas, which are concrete slabs (*i.e.,* made ground).

11.4.4 Subsoils

The Quaternary geological period extends from about 1.5 million years ago to the present day and can be sub-divided into the Pleistocene Epoch, which covers the Ice Age period that extended up to 10,000 years ago, and the Holocene Epoch, which extends from that time to the present day. The GSI/Teagasc mapping database of the subsoils in the area of the subject site indicates one principal soil type, as shown in **Figure 11.9**. The quaternary subsoil type present across the site is Till derived from Limestones (TLs) which are usually associated with low permeable clays. Bedrock outcrops are detected in the west apron area.

According to the site investigations presented in **Section 11.4.2**, the subsoil profile comprises cohesive deposits (glacial till, sandy gravelly clay) throughout its extent as follows:

- West Apron area: Cohesive deposits (clay) were encountered up to 3.0mbgl. No bedrock encountered.
- Airside Section: Cohesive deposits were encountered underneath the concrete which are composed of sandy gravelly clay to depths between 17.3 and 28.7mbgl where bedrock was encountered.

- Fuel farm and hydrant project area: Cohesive deposits composed of sandy gravelly clay were encountered up to depths between 11.2 and 22.9mbgl where bedrock was met.
- South Apron area: Cohesive deposits composed of sandy gravelly clay were encountered up to depths between 5.2 and 12.0mbgl where bedrock was met.
- Area between R132 and M1: Cohesive deposits (sandy gravelly clay) were encountered up to 17.0mbgl. No bedrock encountered.

11.4.5 Bedrock Geology

Inspection of the available GSI (2023) records (online mapping database) shows that the bedrock geology of the site and the surrounding area is dominated by rocks from the Carboniferous Age. The superficial deposits presented above are underlain by limestones and mudstones of the Tober Colleen Formation, the Lucan Formation and the Malahide Formation (refer to **Figure 11.10**).

The Tober Colleen Formation (rock unit code: CDTOBE) underlies most of the ADP site and is described as a dark-grey, calcareous, commonly bioturbated mudstones and subordinate thin micritic limestone.

The Lucan Formation (rock unit code: CDLUCN) underlies the south-eastern portion of the ADP site (to the east of R132) and is described as a dark grey to black, fine-grained, occasionally cherty, micritic limestone.

The Malahide Formation (rock unit code CDMALH) underlies the western zone of the ADP site and is a limestone composed of calcareous shales, siltstones and sandstones, and occasional thin limestones at its base.

The intrusive site investigations carried out as part of the additional airfield boreholes in the Airside (**Section 11.4.2.8**) were drilled within the bedrock. Logs of these boreholes mainly describe the bedrock unit as "*Medium strong/grained Limestone interbedded with laminated Mudstone*". The site investigations carried out as part of the fuel farm and hydrant project area also drilled boreholes within the bedrock. Their logs mainly describe the bedrock as "*Medium strong/grained Limestone with interbedded Mudstone*". These are consistent with the general description of the Tober Colleen formation.

There is no evidence of karstification at the immediate vicinity of the subject site according to the GSI Karst and well database.

11.4.6 Regional Hydrogeology

The GSI has devised a system for classifying the bedrock aquifers in Ireland. The aquifer classification for bedrock depends on several parameters including the area extent of the aquifer (km^2), well yield (m^3/d), specific capacity ($m^3/d/m$) and groundwater transmissivity ($m^3/d/m$). There are three main classifications: regionally important, locally important and poor aquifers. Where an aquifer has been classified as regionally important, it is further subdivided according to the main groundwater flow regime within it. This sub-division includes regionally important fissured aquifers (Rf) and regionally important karstified aquifers (Rk). Locally important aquifers are sub-divided into those that are generally moderately productive (Lm) and those that are generally moderately productive only in local zones (Ll). Similarly, poor aquifers are classed as either generally unproductive except for local zones (Pl) or generally unproductive (Pu).

The GSI (2022) classifies the principal aquifer types in Ireland as:

Bedrock Aquifer

- Lk - Locally Important Aquifer - Karstified.
- Ll - Locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones.
- Lm - Locally Important Aquifer - Bedrock which is Generally Moderately Productive.
- Pl - Poor Aquifer - Bedrock which is Generally Unproductive except for Local Zones.
- Pu - Poor Aquifer - Bedrock which is Generally Unproductive.
- Rkd - Regionally Important Aquifer (karstified diffuse).

Gravel Aquifer

- Lg - Locally Important Aquifer - Sand & Gravel.
- Rg - Regionally Important Aquifer - Sand & Gravel.

According to the GSI National data, the subject site overlies Poor (Pl) and Locally Important (Ll) aquifers (refer to **Figure 11.11**).

11.4.7 Aquifer Vulnerability

Aquifer 'vulnerability' is a term used to represent the intrinsic geological and hydrogeological characteristics that determine the ease with which groundwater may be contaminated generally by human activities. Due to the nature of the flow of groundwater through bedrock in Ireland, which is almost completely through fissures/fractures, the main feature that protects groundwater from contamination, and therefore the most important feature in the protection of groundwater, is the subsoil (which can consist solely of or mixtures of peat, sand, gravel, glacial till, clays or silts).

The GSI currently classifies the aquifer vulnerability in the region as 'Low' and 'Moderate' which denotes >5m thickness of low permeability clay. The site investigations presented in **Section11.4.2** generally encountered the bedrock at depths greater than 10mbgl which is representative of a 'Low' vulnerability. The aquifer vulnerability class in the region of the site is presented below as **Figure 11.12** and its guidelines is presented in **Table 11-6** below.

Table 11-6: Vulnerability mapping guidelines

Vulnerability Rating	Hydrogeological Condition				
	Subsoil Permeability (type) and Thickness			Unsaturated Zone	Karst Features
	High Permeability (sand/gravel)	Moderate Permeability (e.g. sandy subsoil)	Low Permeability (e.g. clayey subsoil, clay, peat)	(Sand/ gravel aquifers only)	(<30 m radius)
Extreme (E)	0 - 3 m	0 - 3 m	0 - 3 m	0 - 3 m	-
High (H)	> 3 m	3 - 10 m	3 - 5 m	> 3 m	n/a
Moderate (M)	n/a	> 10 m	5 - 10 m	n/a	n/a
Low (L)	n/a	n/a	> 10 m	n/a	n/a

Source: GSI (2022).

Notes: (1) n/a: Not applicable

(2) Precise permeability values cannot be given at present

(3) Release point of contaminants is assumed to be 1-2 below ground surface

11.4.8 Groundwater Bodies

Under the WFD 2000/60/EC (WFD), the GSI (2022) has delineated a number of groundwater bodies in Ireland. According to the GSI (2022), if a groundwater body is capable of serving 10m^3/day of sustainable abstraction, it is designated as a groundwater 'waterbody'.

The ADP site overlies 2 no. groundwater bodies (GWB): Dublin (EU code: IE_EA_G_008) and Swords (EU code: IE_EA_G_011) which are described as 'Poorly productive bedrock' by the EPA. The Swords area underlies the north-western portion of the ADP site. There are also the Industrial Facility GWBs delineated within both the Swords GWB and the Dublin GWB which has been delineated in relation to specific licenced facilities and does not involve the ADP area (except for a small part of the Corballis Road South). Refer to **Figure 11.13**.

11.4.9 Groundwater Quality

The WFD was adopted in 2000 as a single piece of legislation covering rivers, lakes, groundwater and transitional (estuarine) and coastal waters. In addition to protecting said waters, its objectives include the attainment of 'Good Status' in water bodies that are of lesser status at present and retaining 'Good Status' or better where such status exists at present.

The WFD requires 'Good Water Status' for all European waters to be achieved through a system of river basin management planning and extensive monitoring by 2015 or, at the least, by 2027. 'Good status' means both 'Good Ecological Status' and 'Good Chemical Status'. In 2009 the Eastern River Basin District (ERBD) River Basin Management Plan (RBMP) 2009-2015 was published. In the ERBD RBMP, the impacts of a range of pressures were assessed including diffuse and point pollution, water abstraction and morphological pressures (*e.g.*, water regulation structures). The purpose of this exercise was to identify water bodies at risk of failing to meet the objectives of the WFD by 2015 and include a programme of measures to address and alleviate these pressures by 2015. This was the first River Basin Management planning cycle (2010-

2015). The second cycle RBMP was carried out between 2018-2021 with the previous management districts now merged into one Ireland River Basin District (Ireland RBD). The third cycle (2022-2027) is currently being undertaken. It should be noted that the DMaP is proposed within a programme of measures for Areas for Action for the Santry/Mayne waterbodies in the Third Cycle RBMP for the period of 2022-2027, which is currently being prepared by the Department of Housing, Local Government and Heritage.

The most recent published status (www.epa.ie – Groundwater body WFD Status 2016-2021) for both the Dublin and Swords GWB is 'Good' and their risk score is qualified by the WFD as under 'Review' for the Dublin GWB and 'Not at risk' for the Swords GWB based on chemical composition.

11.4.10 Groundwater Wells and Flow Direction

The GSI (2022) Well Card Index is a record of wells drilled in Ireland, water supply sources and site investigation geotechnical boreholes. It is noted that this record is not comprehensive as licensing of wells is not currently a requirement in the Republic of Ireland, and while there has been a requirement to register water abstractions since 2018, it relates solely to abstractions of over 25 cubic meters of water or more per day. It is important to state that the general area in the vicinity of the ADP is serviced by public water supply mains. As such, there is no significant density of boreholes anticipated.

Figure 11.14 shows 2 no. boreholes located nearby to the ADP area, close to the R132. One of these boreholes is associated with a spring beside the Cuckoo Stream identified in the historic Cassini 6-inch map while the other borehole is associated with an industrial well drilled in 1991 in Corballis with good yield class (300m^3/d).

Based on a review of available information and the regional topography dropping away to the east towards Dublin Bay, regional groundwater flow would most likely be in an easterly direction.

Figure 11.7: Site investigation data (Source: NOD, 2020)

Figure 11.8: Soils map (Source: Teagasc, 2022)

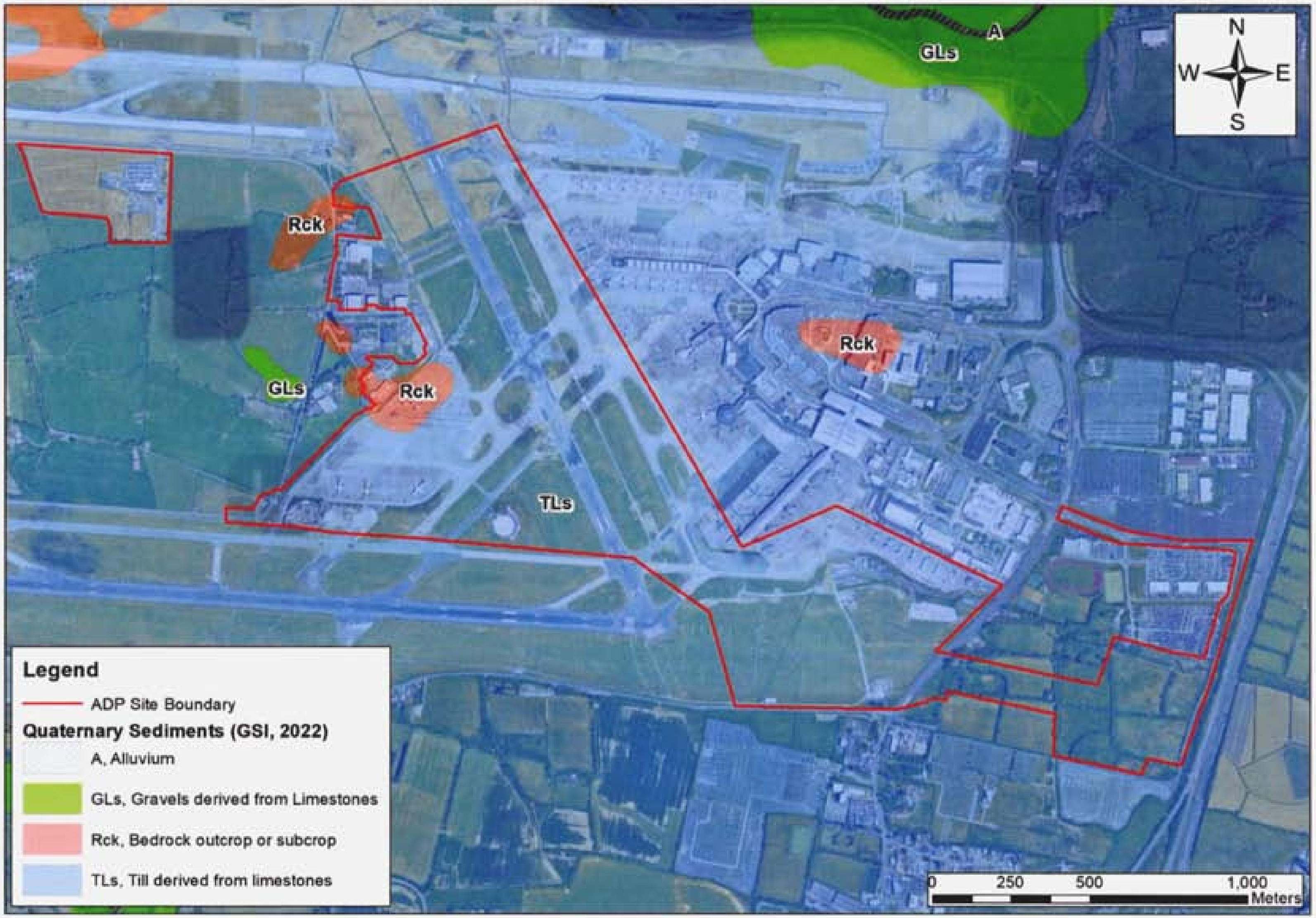


Figure 11.9: Subsoils map (Source: GSI, 2022)

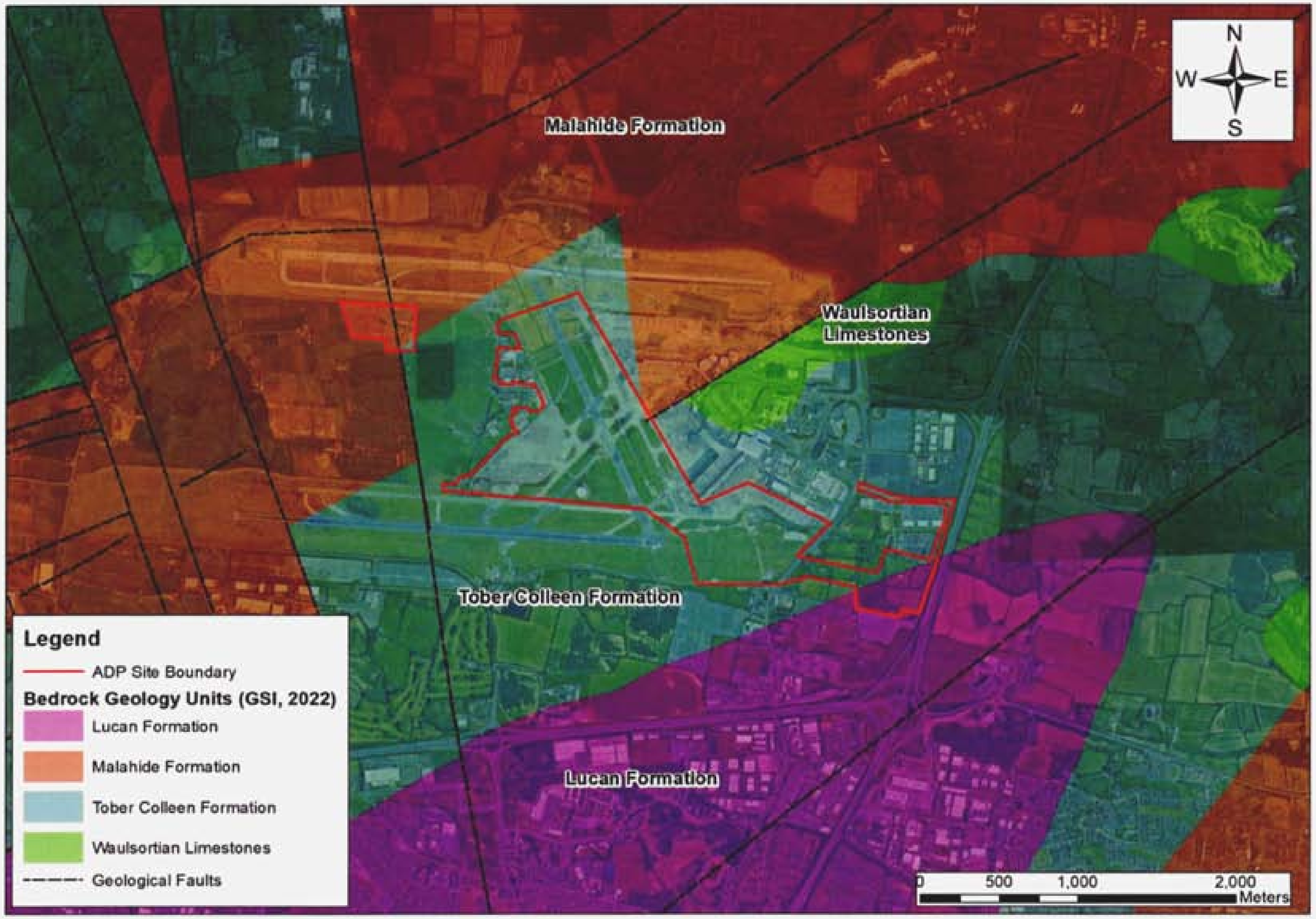


Figure 11.10: Bedrock geology map (Source: GSI, 2022)

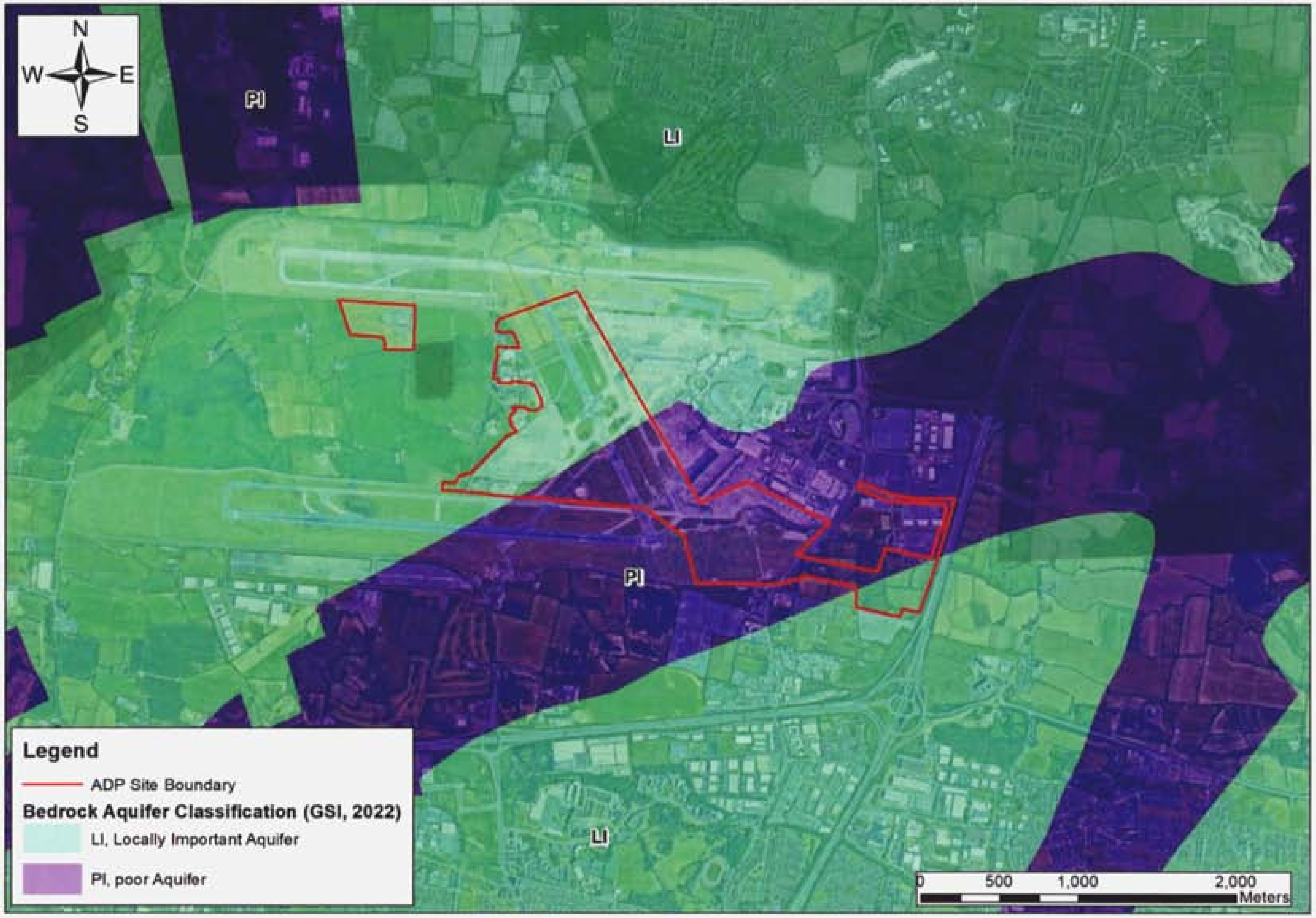


Figure 11.11: Aquifer classification map (Source: GSI, 2022)

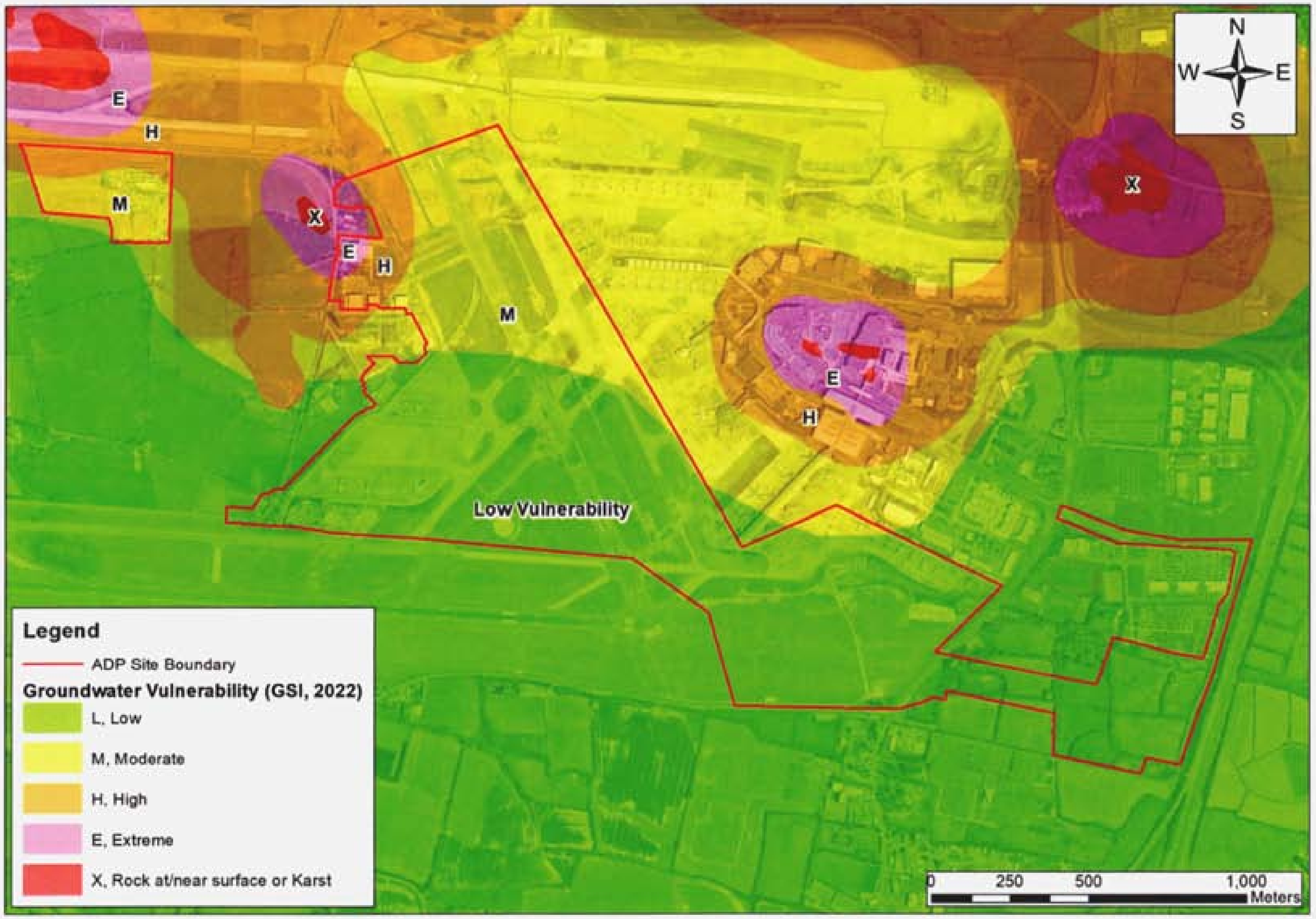


Figure 11.12: Aquifer vulnerability map (Source: GSI, 2022)

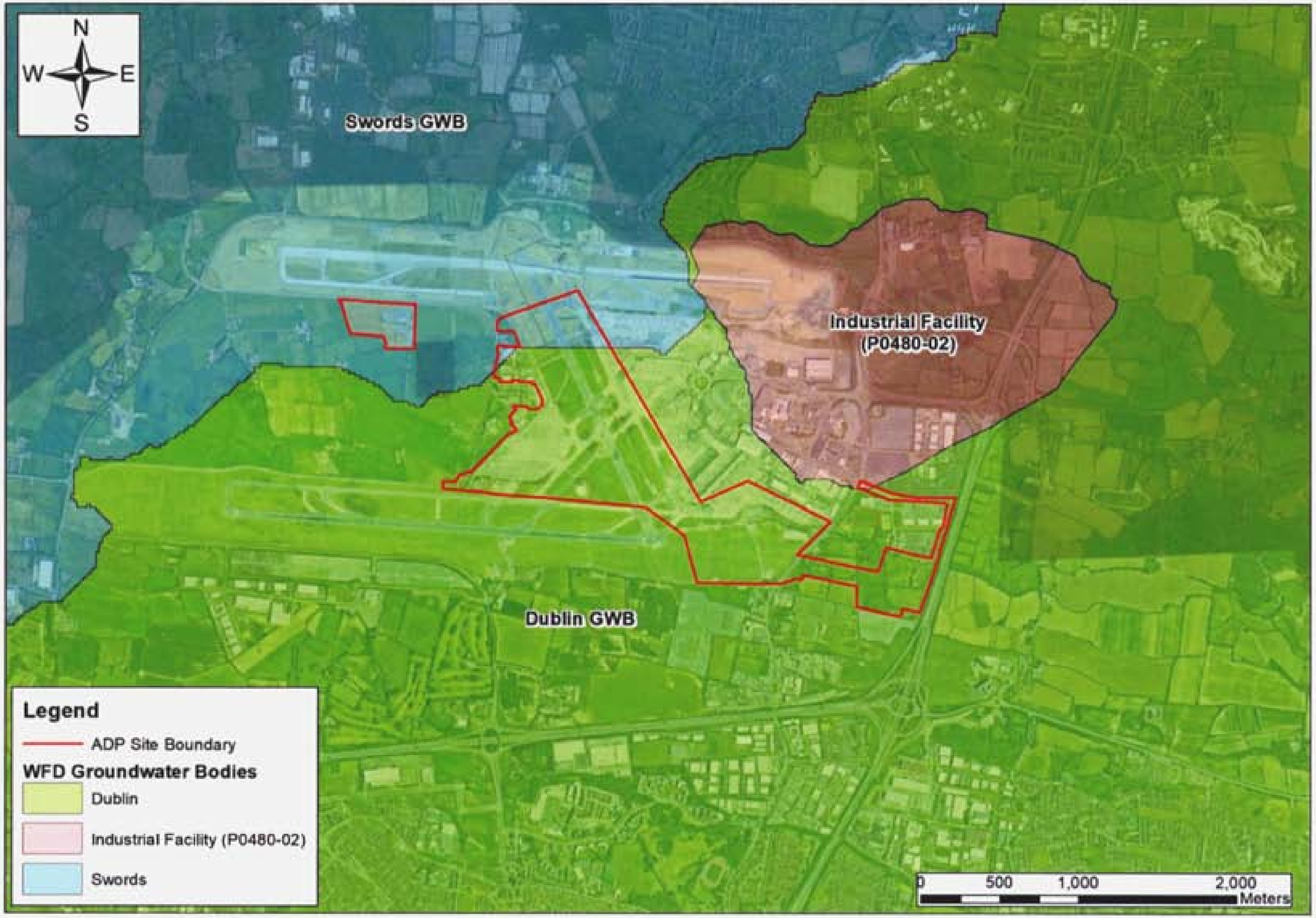


Figure 11.13: Groundwater bodies (Source: EPA, 2022e)

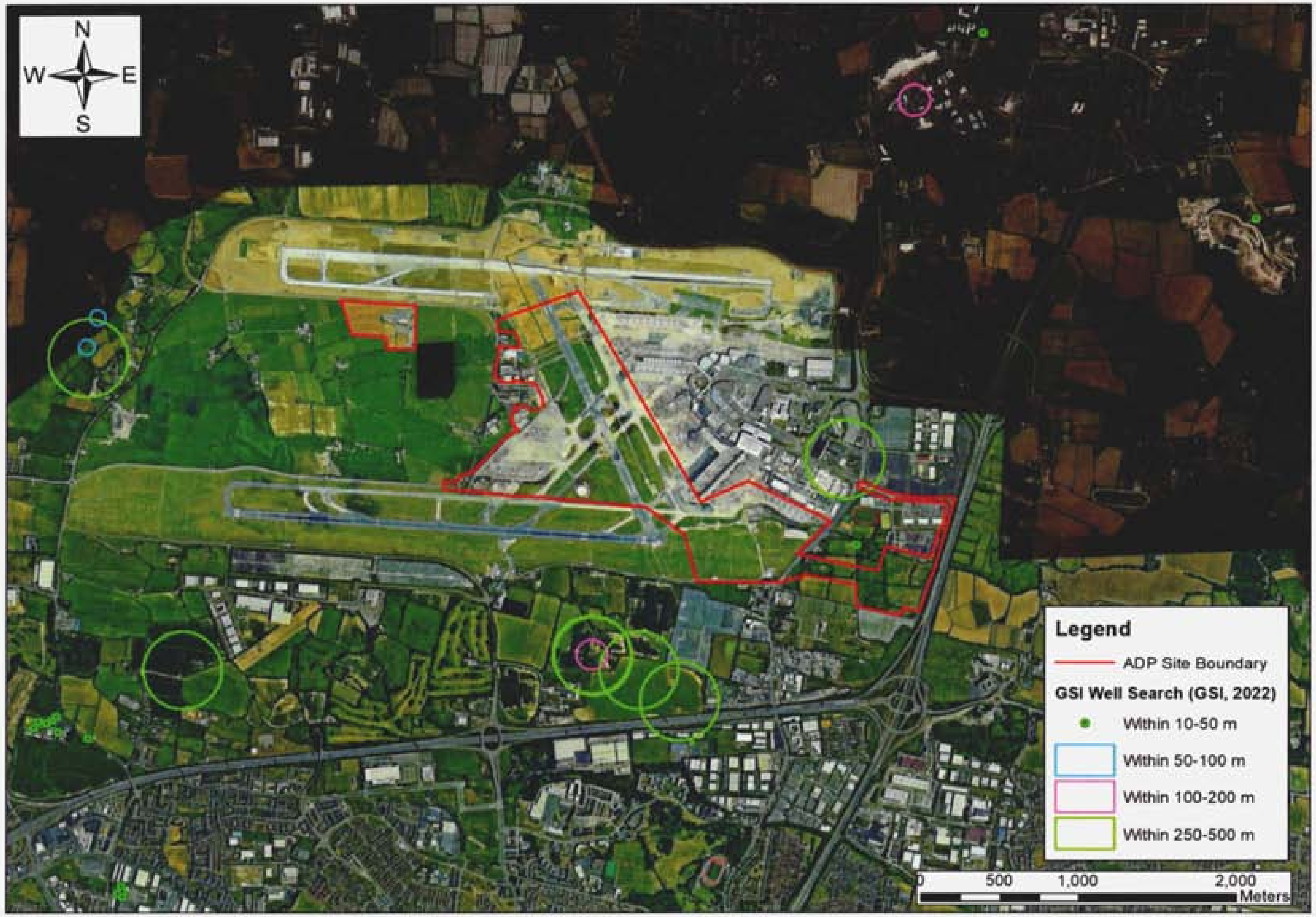


Figure 11.14: GSI well search map (Source: GSI, 2022)

11.4.11 Soil Quality

The site investigations carried out for South Apron Extension (SI, 2016a) and DAA Survey (Causeway, 2018) included environmental testing in their scope of works. The South Apron Extension included five (5) samples and the DAA Survey four (4) samples within the ADP boundary.

The samples were analysed in terms of waste classification, *i.e.*, for those parameters specified in the EU Council Decision Establishing Criteria for the Acceptance of Waste at Landfills (Council Decision 2003/33/EC), referred to as Waste Acceptance Criteria (WAC).

According to the laboratory results, all samples were classified as '*Inert*' as their results are below the '*Inert Waste Landfill*' criteria. The WAC laboratory results have been included as **Appendix 11.2 – Historic Soil Quality Results.**

11.4.12 Groundwater Source Protection Areas

There are no groundwater source protection zones in the immediate vicinity of the site. The zone in closest proximity is approximately 12km to the west (Dunboyne Public Water Supply (PWS)) and the ADP site is outside of the zone of contribution of this supply.

11.4.13 Economic Geology

The Geological Survey of Ireland (GSI) (2022) mineral database was consulted to determine whether there were any mineral sites in the area of the subject site. The designated mineral localities in closest proximity to the subject site are the Feltrim and Huntstown quarries which are both active limestone quarries and are located approximately 2.3km to the east and 4.9km to the west of the ADP site, respectively.

11.4.14 Geological Heritage

The GSI Public Viewer (www.gsi.ie/mapping) was reviewed to identify sites of geological heritage for the site and surrounding area. As mentioned, the Feltrim Quarry (Site Code DF005) approximately 2.3km to the east is the closest audited site. The Huntstown Quarry (Site Code DF022) is located 4.9km to the west.

11.4.15 Geohazards

Much of the Earth's surface is covered by unconsolidated sediments which can be especially prone to instability. Water often plays a key role in lubricating slope failure. Instability is often significantly increased by man's activities in building houses, roads, drainage and agricultural changes. Landslides, mud flows, bog bursts (in Ireland) and debris flows can result. In general, Ireland suffers few landslides. Landslides are more common in unconsolidated material than in bedrock, and where the sea constantly erodes the material at the base of a cliff and leads to recession of the cliffs. Landslides have also occurred in Ireland in recent years in upland peat areas due to disturbance of peat associated with construction activities. The GSI landslide database was consulted and the landslide recorded in closest proximity to the proposed development occurred approximately 11km to the west of the site, referred to as the M3 J4 Clonee 2014, on 3rd February 2014. There have been no recorded landslide events at the site.

Due to the generally flat/level local topography and the underlying strata there is a negligible risk of a landslide event occurring at the site.

In Ireland, seismic activity is recorded by the Irish National Seismic Network. The Geophysics Section of the School of Cosmic Physics at the Dublin Institute for Advanced Studies (DIAS) has been recording seismic events in Ireland since 1978. The station configuration has varied over the years. Currently there are five permanent broadband seismic recording stations in Ireland and operated by DIAS. The seismic data from the stations comes into DIAS in real-time and are studied for local and regional events. Records since 1980 show that the nearest seismic activity to the proposed location was in the Irish Sea (1.0 – 2.0 Ml magnitude) and *ca.* 55 km to the south in the Wicklow Mountains. There is a very low risk of seismic activity to the proposed development site.

There are no active volcanoes in Ireland so there is no risk from volcanic activity.

11.4.16 Areas of Conservation

The ADP development area does not overlap directly with any European site.

There are two (2) Special Areas of Conservation (SAC), or Special Protection Areas (SPA) hydraulically connected to the ADP development area. These are discussed in more detail in **Chapter 9 – Biodiversity** of the EIAR in terms of distance to the proposed Project, reasons for designation and zones of influence. These European sites are valued as being of International Importance.

As mentioned in **Chapter 10 – Hydrology** of the EIAR, there is a direct pathway through the watercourses to the Baldoyle Bay SPA/SAC and is located *ca.* 5.5km to the east of the eastern boundary of the ADP (*i.e.*, M1). This pathway is given by the Cuckoo Stream and Mayne River, as the latter outfalls into the Baldoyle Bay in Clongriffin (refer to **Figure 11.15**).

With regard to the hydrogeological pathway between the ADP site and this area of conservation, it is considered that the hydraulic connection is negligible. The overburden thickness, low permeability, nature of till and a lack of fracture connectivity within the limestone will minimise the rate of off-site migration for any indirect discharges to ground at the site. As such there is no potential for a change in the groundwater body status or significant source -pathway linkage through the Dublin/ Swords aquifers to any European site.

Low risk of migration through poorly connected fracturing within the limestone (Locally Important Aquifer) rock mass (associated to Dublin/Swords WFD groundwater bodies). No likely impact on the status of the aquifer/off site migration due to low potential loading, natural attenuation within overburden and discrete nature of fracturing reducing off site migration.

It should be noted that other European Sites that may be hydrologically connected to the proposed development site but are located further away (including North Dublin Bay SAC (site code: 0206) and the North Bull Island SPA (site code: 4006) were excluded from the assessment due to their distance from the Project site and significant dilution through its groundwater pathway.

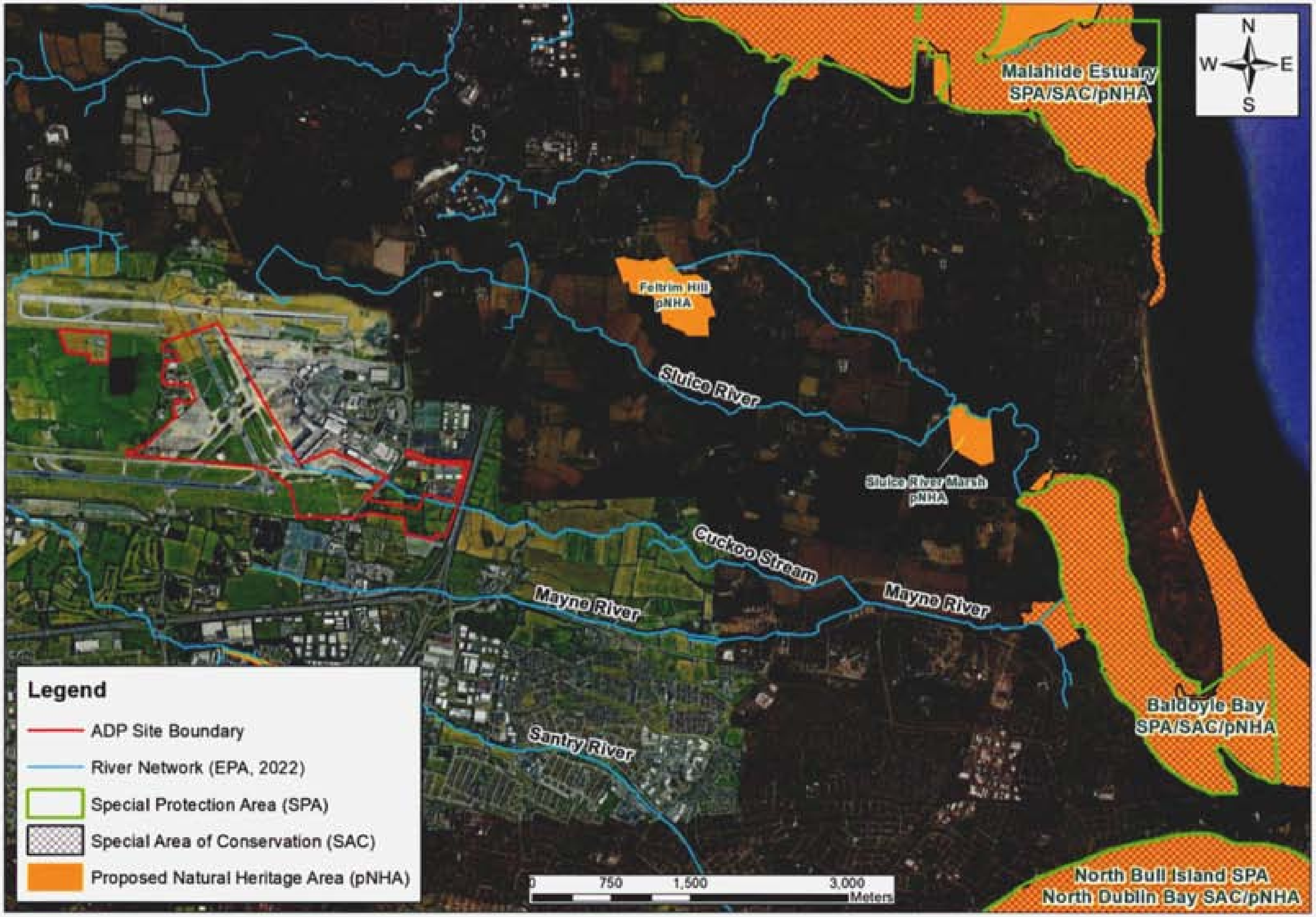


Figure 11.15: European Sites in context of the ADP location

11.4.17 Conceptual Site Model (CSM)

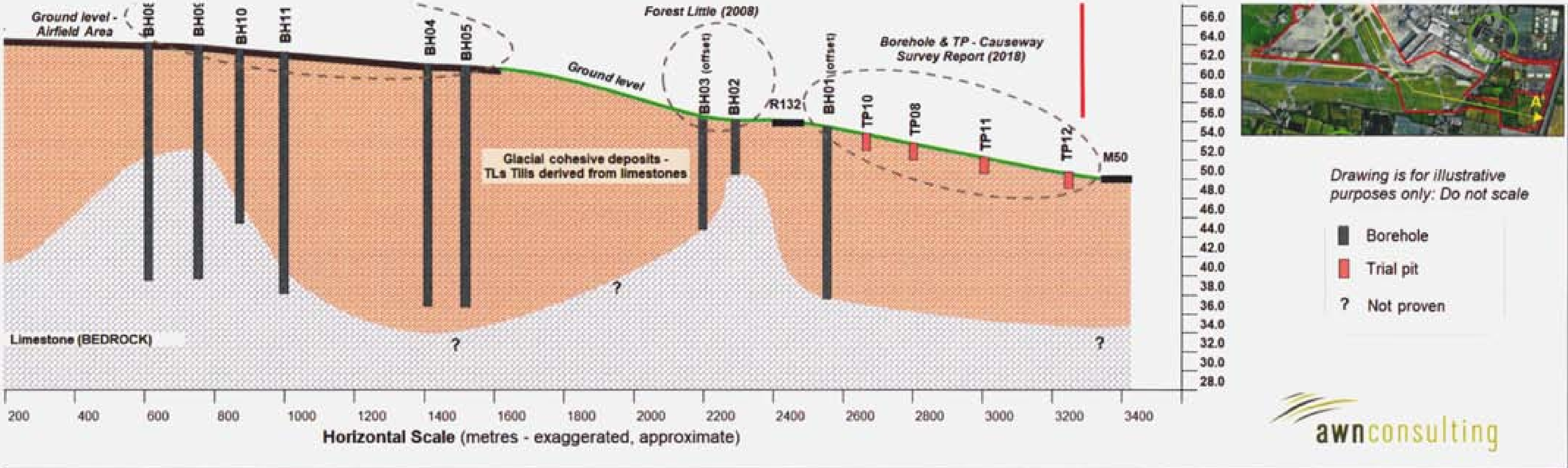
Two geological cross sections of the ADP site are presented in **Figure 11.16** and **Figure 11.17**. These cross sections and the description below present the Conceptual Site Model (CSM) which has been developed based on the information presented in aforementioned sections. The CSM was developed in order to identify any likely Source-Pathway-Receptor linkages relating to the site and the proposed development.

- The ADP site slopes east towards the Airport M1 Motorway, from *ca.* 70 to 50 mAOD. It is expected that the regional groundwater flows to the east towards Dublin Bay.
- Historical site investigations describe the bedrock across the ADP site as '*Medium strong/grained Limestone interbedded with laminated Mudstone'*. Bedrock is associated to limestones and mudstones of the Tober Colleen Formation, the Lucan Formation and the Malahide Formation.
- The bedrock is the main aquifer feeding the surrounding area which is classed as Poor (Pl) and Locally Important (LI) aquifers. The ADP site overlies 2 no. groundwater bodies (GWB): Dublin (EU code: IE_EA_G_008) and Swords (EU code: IE_EA_G_011) which are described as 'Poorly productive bedrock'.
- Presently, the Dublin and Swords GWB are classified as having 'Good' status, and their risk score is qualified by the WFD as under 'Review' for the Dublin GWB and 'Not at risk' for the Swords GWB based on their chemical composition.
- The Source-Pathway-Receptor to the aquifer and to the European Sites in Baldoyle Bay is considered to be negligible due to the overburden thickness, low permeability nature of till, lack of fracture connectivity within the limestone and the distance from the ADP site to these sites (*ca.* 5.5 km).
- There was no evidence of contamination during historical site investigation works.

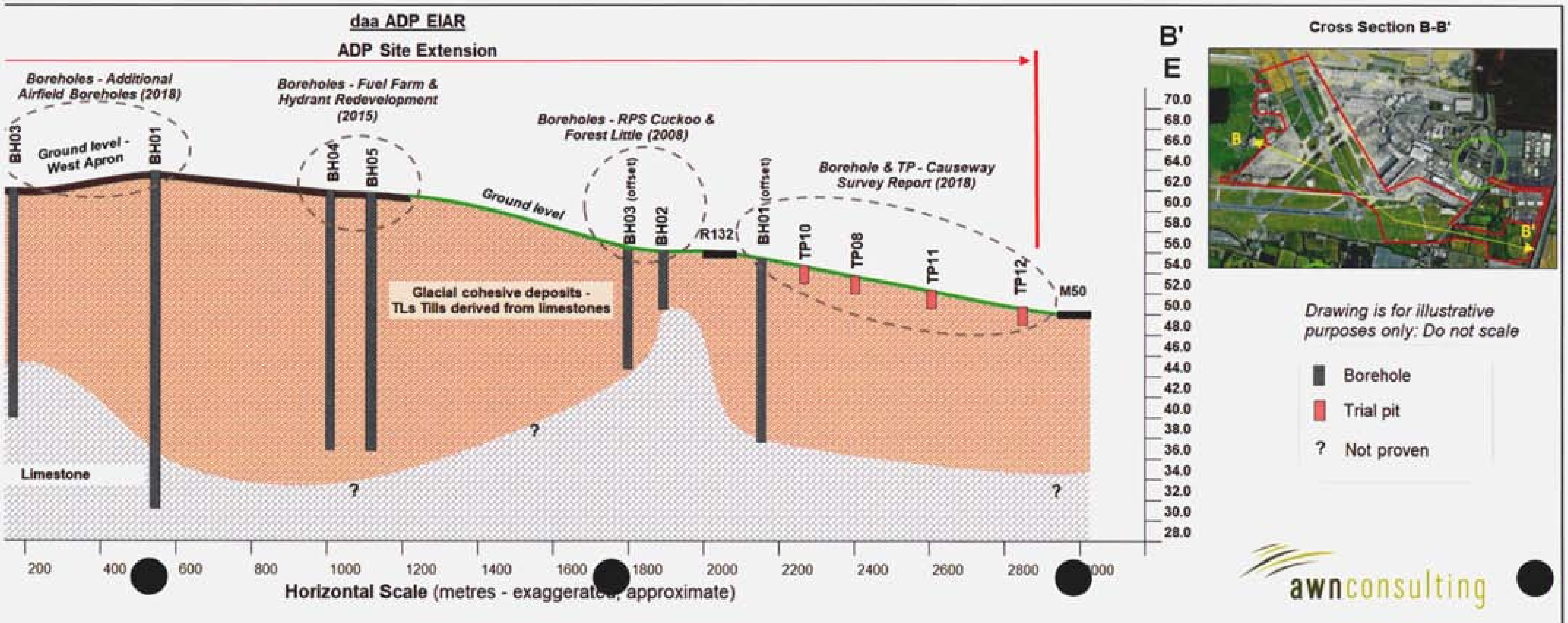
11.4.18 Rating of Site Importance of Geological and Hydrogeological Features

Based on the TII methodology (2009, outlined in **Section 11.3.2**), criteria for rating site importance of geological features, the importance of the bedrock and soil features at this site is rated as 'Low Importance' due to the fact that the local geological attribute has a low quality, significance or value on a local scale.

Based on the TII methodology (2009; refer to **Section 11.3.2**), the importance of the hydrogeological features at this site is rated as 'Medium Importance' due to the fact that the attribute has a medium value on a local scale because part of the ADP site overlies a Locally Important Aquifer.



Conceptual site model, cross section A-A'



11.5 Characteristics of the Proposed Development

The ADP proposes significant upgrades to the surface water management infrastructure at Dublin Airport. The ADP comprises a series of drainage system enhancement measures and infrastructure proposals, including the upgrade of existing drainage infrastructure and the construction of additional infrastructure to improve the performance of the existing surface water management system.

A full description of the proposed development can be found in **Chapter 4 – Project Description** of the EIAR. The details of the construction and operation of the ADP in terms of Land, Soils, Geology and Hydrogeology are presented in sections below.

11.5.1 Construction Phase

The activities required for the construction phase of the proposed development represent the greatest risk of potential impact on the soil, geological and hydrogeological environment. These activities primarily pertain to the site preparation, excavation, levelling, and infilling activities required to facilitate construction of the proposed development, and storage of hazardous materials. Refer to **Section 11.6** below for further details.

11.5.2 Operational Phase

The ADP is designed to minimise the introduction of new/redeveloped impermeable area. Across the whole scheme there is approximately 5,031m^2 of new hardstand proposed. This approach prevents the alteration of the current run-off rates from the site. This was particularly relevant for the design proposals associated with the proposed storage tanks.

In addition, a caustic soda dosing system will need to be installed for the operation of the CPFC. This system will include a weatherproof external storage tank with integral bund to protect against potential leakage of the tank. A caustic soda dosing pumping system will be provided and will be housed in the kiosk and the dosing system would contain an internal bund.

Localised SuDS measures such as filter drains will be used to address the runoff from these areas. Refer to **Chapter 10 – Hydrology** for further details.

11.6 Potential Significant Effects of the Proposed Development

The potential significant effects of the ADP's impacts on land, soils, geology and hydrogeology during the construction and operational phases of the proposed ADP are presented below. Due to the inter-relationship between surface water (hydrology) and soils, geology and hydrogeology, the following impacts and associated effects discussed will be considered applicable to both **Chapter 10 – Hydrology** and this chapter of the EIAR. The potential for significant effects to arise as a result of the interaction between these topics/environmental media has been comprehensively addressed herein.

11.6.1 Construction Phase

During the construction phase of the proposed development the potential impacts in relation to soils, geology and hydrogeology (in the absence of mitigation) are assessed in the following sections.

11.6.1.1 Excavation and Infilling

The excavated material exported from site, if not correctly managed or handled, could impact negatively on human beings (onsite and offsite) as well as water and soil environments. The risk of contaminated soils being present onsite is low and this was confirmed by the historical onsite soil sampling and analysis (refer to **Section 11.4.11**).

The estimated volume of excavation for the CPCF tank will be 190,000m^3. The West Apron Pollution Tank and the West Apron Attenuation Tank will involve a combined estimated excavation volume of 98,000m^3 of which 36,000 m^3 would be sent off-site and the remainder required for backfilling.

In total it is estimated that circa 306,000 m^3 (+25%, -15%) of excavated materials would be sent off-site for the construction of the infrastructure associated with the ADP, including pipelines and the various structures.

It is envisaged that the majority (approx. 75%) of the excavated material will be removed from the works area as it is excavated. The remainder of the excavated material required for backfilling and construction of a temporary berm will be stockpiled on site. The maximum volume of excavated material to be stockpiled is estimated to be approximately 49,000 m^3.

There will be no stockpiling of subsoil along the pipeline corridor other than that required to backfill the trench on a daily basis. Locations designated for temporary spoil storage shall be defined in the CEMP.

Site investigation and laboratory analysis will be carried out in order to identify any potential contamination. If contaminated soil/water is encountered, it will be removed by a licensed waste contractor and disposed of at a suitably licensed facility.

No groundwater is expected to ingress to the excavation area. However, given the characteristics of the subsoil it is expected during the excavation works that localised dewatering of the subsoils will be required to address perched groundwater. Excavation of bedrock will not be required and no bedrock aquifer dewatering is foreseen, as there will be no intervention in the bedrock and its fractures that could potentially carry groundwater belonging to the regional aquifer.

11.6.1.2 Accidental Spills and Leaks

As with all construction projects, there is potential for water (surface water run-off and/or groundwater) to become contaminated with pollutants associated with construction activity. Contaminated water which arises from construction sites can pose a significant short-term risk to groundwater quality for the duration of the construction if it is allowed to percolate to the aquifer.

During construction of the proposed development, there is a risk of accidental pollution incidents from the following sources:

- Suspended solids (muddy water with increased turbidity) – arising from excavation and ground disturbance;
- Cement/concrete (increased turbidity and pH) – arising from construction materials;
- Hydrocarbons (ecotoxic) – accidental spillages from construction plant or onsite storage or when upgrading the existing pipeline network; and
- Wastewater (nutrient and microbial rich) – arising from accidental discharge from on-site toilets and washrooms.

Machinery activities on site during the construction phase may result in contamination of run-off/ surface water. Potential impacts could arise from accidental spillage of fuels, oils, paints, *etc.*, which could impact groundwater if allowed to infiltrate to the subsoil environment. In the absence of mitigation, surface water run-off during the construction phase may contain increased levels of hydrocarbons, and other pollutants. Implementation of the mitigation measures detailed in this chapter will ensure that this risk is minimised.

Concreting operations carried out near surface water drainage points during construction activities could lead to discharges to a watercourse. Concrete (specifically, the cement component) is highly alkaline and any spillage to a local watercourse would be detrimental to water quality and local fauna and flora. Employment of the mitigation measures highlighted in this chapter will help to ensure that this risk will be minimised.

In the absence of mitigation measures, the impact during construction phase is presented in **Table 11-7**. It should be noted that the land as a resource will not be affected by the proposed ADP, as the current land use will be maintained throughout the ADP site. The provision of the Central Pollution Control Facility (CPCF) and ancillary drainage infrastructure is considered to fall under the land use proposal of "Ancillary and Support Facilities".

Table 11-7: Summary of potential impacts during construction phase

Impact	Quality	Significance	Duration
Changes on the soil and geological profile (due to excavation and infilling)	Negative	Moderate	Short-term
Potential groundwater contamination (due to accidental spills and leaks)	Negative	Moderate	Short-term

11.6.2 Operational Phase

The development was designed to minimise the introduction of new/redeveloped impermeable area. Across the whole scheme there is approximately 5,031 m^2 of new hardstand proposed. This will have a minor effect on local recharge to ground; however, the impact on the overall hydrogeological regime will be insignificant. The Dublin GWB has a surface area of c. 825 km^2; the proposed new hardstand would equate to 0.0006% of this surface area and therefore the potential recharge area of this groundwater body.

The aforementioned proposed caustic soda dosing system will include system design measures that address any potential impacts associated with the caustic soda management and eventual spills; no additional mitigation measures are required.

Therefore, and considering the expected improvement in the existing geological and hydrogeological conditions and in the absence of mitigation measures, the potential impacts during the operational phase are assessed in **Table 11.8**.

Table 11.8: Summary of potential impacts during operational phase

Impact	Quality	Significance	Duration
Reduction in groundwater recharge	Neutral	Imperceptible	Long-term
Change to hydrogeological regime	Neutral	Imperceptible	Long-term

11.6.3 Do Nothing Scenario

If the proposed development were not to go ahead (*i.e.*, in the Do-Nothing scenario) there would be no ADP development and therefore the current surface water management plan and ancillary infrastructure will be in place. There will, therefore, be a neutral effect on the hydrogeological environment and regional aquifers in relation to the current situation.

11.7 Mitigation Measures

In order to reduce the potential impacts on the soils, geological and hydrogeological environment explained in **Section 11.6**, a number of mitigation measures that will be adopted during the construction and operational phases are detailed below. This section should be read in conjunction with the Construction Environmental Management Plan (CEMP) and planning conditions as applicable.

11.7.1 Construction Phase

11.7.1.1 Construction and Environmental Management Plan (CEMP)

A CEMP has been prepared by NOD in respect of the proposed development (refer to standalone document submitted under separate cover). It contains best practice measures and protocols to be implemented during the construction phase of the proposed development to avoid/minimise environmental impacts, including in relation to surface water.

To ensure the CEMP remains fit for purpose, it will be regarded as a live document. The appointed contractor will be responsible for updating the CEMP, as required; to reflect the publication of relevant new or revised guidelines and/or new statutory requirements. The full schedule of environmental commitments (*i.e.*, all mitigation measures set out in the CEMP, EIAR and Natura Impact Statement (NIS) submitted as part of the planning application, as well as any applicable conditions of development consent) will be included in the final CEMP prepared by the appointed contractor.

The CEMP was formulated in accordance with best international practice including but not limited to:

- Best Practice Guidance.
- CIRIA C689 Culvert Design and Operation Guide (2010).
- CIRIA C532 Control of water pollution from construction sites (2001).
- CIRIA C762 Environmental Good Practice on site (4th Edition) (2016).
- CIRIA Report C648 Control of Pollution from Linear Construction Project. Technical Guidance.
- CIRIA Handbook C650 Environmental good practice on site.
- CIRIA Handbook C651 Environmental good practice on site checklist.
- BS5228-1:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites.
- BS 5837:2012 Trees in relation to design, demolition and construction – Recommendations.
- Guidelines on protection of fisheries during construction works in and adjacent to waters Inland Fisheries Ireland (2016).
- Dublin City Council (2005) Greater Dublin Strategic Drainage Study (GDSDS): Technical Documents of Regional Drainage Policies. Dublin: Dublin City Council.
- National Roads Authority Guidelines for the crossing of watercourses during the construction of national road schemes (TII, 2008).
- Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes (TII).
- Guidelines for the Treatment of Bats during to the Construction of National Road Schemes (TII).
- Guidelines on the Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads (National Roads Authority, December 2010).
- EPA (2021) Best Practice Guidelines for the Preparation of Waste Management Plans for Construction and Demolition Projects
- EPA IPC Guidance Note on Storage and Transfer of Materials for Scheduled Activities.
- Dublin Airport Directions for works in and around the Aerodrome:
- Airport Direction D-O Construction Projects. Specific to Airside construction Projects.
- Airport Direction D-E Emergency Response. Airside, Fuel spillages, fires and other emergency procedures.
- Airport Direction D-O Environment and Pollution. Environmental standards for the Dublin Airport Site/Campus.

- Airport Direction D-O Spillages/FOD.
- Airport Direction D-O Wildlife and habitat Management.
- Guidance Documents for construction works at Dublin Airport.
- Construction Contractor's Health & Safety and Environmental Rules for working on daa Infrastructure Manual.
- AMD Guidelines Control Dust Fume and Smoke.
- daa Control of Noise and Vibration.
- daa Temporary Traffic Management Requirements Specification Covering High Risk Works.
- daa Standard Traffic Management Plans Covering Low and Medium Risk Works requiring traffic Management.
- daa Drainage Policy.

11.7.1.2 Control of Soil Excavation

Care will be taken to ensure that exposed soil surfaces are stable to minimise erosion. All exposed soil surfaces will be within the main excavation site which limits the potential for any offsite impacts.

Pre-treatment and silt reduction measures on site will include a combination of silt fencing, settlement measures (silt traps, 20m buffer zone between machinery and watercourses, refuelling of machinery off site) and hydrocarbon separator. These specific measures will provide protection to the receiving soil and water environments during the construction phase.

There shall be localised pumping of surface run-off from the excavations during and after heavy rainfall events to ensure that the excavations are kept relatively dry. However, this is expected to be low due to the low permeability of the subsoils and the relative shallow nature for excavations. Likewise, infiltration to the underlying aquifer is not anticipated given the low permeable characteristics of the identified subsoils throughout the ADP site.

The temporary storage of soil will be carefully managed. Stockpiles will be tightly compacted to reduce run-off and graded to aid in run-off collection. This will prevent any potential negative impact on the stormwater drainage and the material will be stored away from any surface water drains. Movement of material will be minimised to reduce the degradation of soil structure and generation of dust. Excavations will remain open for as little time as possible before the placement of fill. This will help to minimise the potential for water ingress into excavations. Soil from works will be stored away from existing drainage features to remove any potential impact.

Significant groundworks are required at the proposed pipelines and storage tanks (CPCF and West Apron). Large scale open excavations will be required along the routes of the proposed pipelines. At the proposed CPCF tank, a large deep excavation will be required. The estimated volume of excavation for this tank will be 190,000m^3. It is envisaged that the majority (*ca.* 75%) of material will be immediately removed from the site for appropriate offsite reuse, recovery, recycling and/or disposal.

The West Apron Pollution Tank and the West Apron Attenuation Tank also involve large deep excavations with a combined estimated excavation volume of 98,000m^3 of which 36,000 m^3 would be sent off-site and the remainder required for backfilling.

Correct classification and segregation of the excavated material being removed off site is required to ensure that any potentially contaminated materials are identified and handled in a way that will not impact negatively on workers as well as on water and soil environments, both on and off-site. Refer to **Chapter 13 – Waste Management** and **Appendix 13.1 – Resource & Waste Management Plan (RWMP)** provided in **Volume III - Appendices: Technical Appendices to the EIAR** for further details.

Soil sampling and laboratory analysis will be carried out in order to identify any potential contamination during excavation works. If contaminated soil is encountered, it will be required to be removed by a licensed waste contractor and disposed of at a licensed facility.

Weather conditions will be considered when planning construction activities to minimise the risk of run-off from the site and the suitable distance of topsoil piles from surface water drains will be maintained.

During the construction phase as part of the CEMP, monitoring will take place to confirm that pollution control measures are effective. Once construction works commence onsite, monitoring and supervision will be required until all mitigation works are implemented effectively. Dewatering of excavations using proprietary settlement tanks or filtration systems will be monitored at least twice daily with dewatering stopped if any silt is evident within the discharge.

11.7.1.3 Fuel and Chemical Handling

To minimise any impact on the underlying subsurface strata from material spillages, all oils, solvents and paints used during construction will be stored within temporary bunded areas. Oil and fuel storage tanks shall be stored in designated areas, and these areas shall be bunded to a volume of 110% of the capacity of the largest tank/container within the bunded area(s) (plus an allowance of 30mm for rainwater ingress)[1]. Drainage from the bunded area(s) shall be diverted for collection and safe disposal.

Refuelling of construction vehicles and the addition of hydraulic oils or lubricants to vehicles will take place in a designated area (or, where possible, off the site) which will be away from surface water gullies or drains. In the event of a machine requiring refuelling outside of this area, fuel will be transported in a mobile double-skinned tank. An adequate supply of spill kits and hydrocarbon adsorbent packs will be stored in this area. All relevant personnel will be fully trained in the use of this equipment. Guidelines such as "Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors" (CIRIA 532, 2001) will be complied with.

Where feasible all ready-mixed concrete will be brought to 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 storm water to the underlying subsoil. Wash down and washout of concrete transporting vehicles will take place at an appropriate facility off-site.

[1] As suggested by HSG71 – Chemical warehousing: The storage of packaged dangerous substances.

In the case of drummed fuel or other chemical used during construction, containers should be stored in a dedicated internally bunded chemical storage cabinet and labelled clearly to allow appropriate remedial action in the event of a spillage.

Emergency response procedures will be outlined in the detailed CEMP. All personnel working on the site will be suitably trained in the implementation of the procedures.

11.7.1.4 Soil Removal and Compaction

Temporary storage of soil will be carefully managed in such a way as to prevent/reduce the risk of any potential negative impact on the receiving environment. The material will be stored away from any surface water drains. Movement of material will be minimised to reduce degradation of soil structure and generation of dust.

All excavated materials will be visually assessed for signs of possible contamination such as staining or strong odours. Should any unusual staining or odour be noticed, samples of this soil will be analysed for the presence of potential contaminants to ensure that historical pollution of the soil has not occurred. Should it be determined that any of the soil excavated is contaminated, this will be segregated and appropriately disposed of by a suitably permitted/licensed waste disposal contractor.

Should any unusual staining or odour be noticed, samples of this soil will be analysed for the presence of potential contaminants to ensure that historical pollution of the soil has not occurred. Should it be determined that any of the soil excavated is contaminated, this will be segregated and appropriately disposed of by a suitably permitted/licensed waste disposal contractor.

11.7.2 Operational Phase

There are no further mitigation measures required during the operational phase in terms of protection of soil, geological and hydrogeological environment.

11.8 Residual Effects of the Proposed Development

The proposed development with mitigation will have no significant impact on the soil, geological and hydrogeological environment either qualitatively or quantitatively.

11.8.1 Construction Phase

Following the implementation of mitigation measures detailed in **Section 11.7.1**, the predicted impact on the soil, geological and hydrogeological environment during the construction phase are presented in **Table 11.9**.

Table 11.9: Summary of residual impacts during construction phase

Impact	Quality	Significance	Duration
Changes on the soil and geological profile (due to excavation and infilling)	Neutral	Not significant	Short-term
Potential groundwater contamination (due to accidental spills and leaks)	Neutral	Imperceptible	Short-term

11.8.2 Operational Phase

Following the implementation of the project design, the predicted residual impact on the soil, geological and hydrogeological environment during the construction phase are presented in **Table 11.10**.

Table 11.10: Summary of potential impacts during operational phase

Impact	Quality	Significance	Duration
Reduction in groundwater recharge	Neutral	Imperceptible	Long-term
Change to hydrogeological regime	Neutral	Imperceptible	Long-term

11.9 Cumulative Effects

As has been identified in the receiving environment section, all developments that are already built and in operation contribute to the characterisation of the baseline environment. **Chapter 18 – Interactions & Cumulative Effects** presents the methodology for scoping in projects to be considered for cumulative effects.

The recently constructed North Runway project will not overlap the construction phase of the ADP project. No cumulative impact on the geological or hydrogeological environment is expected due to the operation of this project.

However, the interaction with the following developments is considered relevant in terms of interaction with the ADP.

11.9.1 MetroLink Project

The proposed MetroLink Project (ABP Ref. 214724) will comprise a metro railway between Estuary Station and the Park and Ride (P&R) facility, north of Swords via Dublin Airport to Charlemont Station which lies south of Dublin City Centre. The alignment is 18.8km long from end to end, while the alignment between the two end stations (Estuary to Charlemont) is 18.1km long. The northern section of the proposed Project, between Estuary and Northwood, will be largely on the surface, in retained cut, cut and cover, or on embankment, with a short section of tunnel under Dublin Airport. This Airport Tunnel will run under and will be approximately 2.3km in length.

Tunnelling and construction of the tunnel will result in the production of large quantities of glacial till. While these excavation volumes are high, the shallow geology does not have heritage value and is not considered to have future economic value, and the magnitude of impact has been assessed as negligible. Localised long-term reduction in groundwater table in vicinity of cut slopes are expected. In terms of hydrogeology, the predicted effect of Construction Phase dewatering (from either drawdown or water quality effects) on identified water features in the wider area is considered Imperceptible.

Therefore, no cumulative impacts are expected in combination with the ADP project on the land, soils, geological and hydrogeolological environment due to the construction and operational phase of the MetroLink project.

11.9.2 Dublin Airport Underpass

The Dublin Airport Underpass (FCC Ref. F22A/0460) consists of four key elements:

- A subterranean Underpass of Runway 16/34.
- Relocation of aircraft stands at Pier 3 to accommodate access roads to serve the Underpass.
- Modifications to Pier 3 to accommodate the proposed Fixed Links and Airbridges.
- Drainage works including temporary diversion of the Cuckoo Culvert and local attenuation.

According to the Environmental Impact Assessment Report, the magnitude of impacts on the land, soils, geology and hydrology is considered to be Low resulting in an Imperceptible effect as this temporary diversion will be controlled by implementation of CEMP and agreed Drainage Strategy.

Therefore, no cumulative impacts are expected in combination with the ADP project on the hydrological environment due to the construction and operational phase of the Dublin Airport Underpass project.

11.9.3 Construction Phase

All future developments will have to incorporate measures to protect soil and water quality in compliance with legislative standards for receiving water quality (European Communities Environmental Objectives (Groundwater) Regulations (S.I. 9 of 2010 as amended). As a result, there will be minimal cumulative potential for change in soil quality or the natural groundwater regime. The cumulative impact is considered to be **short-term**, **neutral** and **imperceptible**.

11.9.4 Operational Phase

All the operational cumulative developments are required to manage groundwater discharges in accordance with S.I. 9 of 2010,S.I. 266 of 2016 and S.I. 287/2022 amendments. As such, there will be no cumulative impact to groundwater quality and, therefore, there will be no cumulative impact on the Groundwater Body Status. The operation of the proposed development is concluded to have a **long-term**, **imperceptible** significance with a **neutral** cumulative impact on groundwater quality.

11.10 Monitoring

11.10.1 Construction Phase

During construction, the contractor will undertake the following monitoring measures:

- Regular inspection of surface water run-off and sediments controls (*e.g.*, silt traps);
- Soil sampling to confirm disposal options for excavated soils in order to avoid contaminated run-off; and
- Regular inspection of construction/mitigation measures (*e.g.*, concrete pouring, refuelling, *etc.*).

11.10.2 Operational Phase – Surface Water Monitoring Plan

Maintenance of the surface water drainage system (SuDS), including interceptors is recommended to minimise any accidental discharges to soil or groundwater.

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12.1 Introduction

This chapter presents an assessment of the effects of the Airfield Drainage Project (ADP) at Dublin Airport in terms of Noise and Vibration on the local environment as defined in the Environmental Protection Agency's (EPA) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, 2022a). A full description of the proposed ADP can be found in **Chapter 4 – Project Description**.

This chapter includes a description of the receiving ambient noise climate in the vicinity of the subject site and an assessment of the potential noise and vibration impact associated with the proposed development, during both the short-term construction phase and the long-term operational phase, on the surrounding environment. The assessment of direct, indirect, and cumulative noise and vibration effects on the surrounding environment has been considered in this chapter.

Mitigation and monitoring measures are included, where relevant, to ensure the proposed development is constructed and operated in a manner that ensures minimal impact on the receiving noise environment and receptors.

12.2 Statement of Authority

This chapter has been prepared by Alistair Maclaurin. Alistair holds a BSc in Creative Music and Sound Technology and a Diploma in Acoustics and Noise Control. He is a member of the Institute of Acoustics (MIOA). Alistair has worked in the field of acoustics since 2012. He has been the lead noise consultant across various sites on major infrastructure projects such as Crossrail and Thames Tideway Tunnel, specialising in construction noise assessment and control. Additionally, he has undertaken various environmental noise assessments for infrastructure developments and planning reports.

12.3 Methodology

The study has been undertaken using the following methodology:

- Baseline noise monitoring has been undertaken in accordance with ISO 1996-2:2017 *Acoustics - Description, Measurement and Assessment of Environmental Noise - Determination of Sound Pressure Levels* in the vicinity of the proposed project and sensitive receptors in order to characterise the existing noise environment;
- A review of the following standards and guidelines has been conducted in order to set a range of acceptable noise and vibration criteria for the construction and operational phases of the proposed project:
    - Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Reports (European Commission, 2017);
    - Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, 2022);

- BS 7385: 1993 Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration (hereafter referred to as BS 7385–2). (BSI 1993);
- BS 6472-1: 2008 Guide to evaluation of human exposure to vibration in buildings, Part 1 Vibration sources other than blasting (hereafter referred to as BS 6472–1) (BSI 2008);
- BS 8233:2014 Guidance on sound insulation and noise reduction for buildings (hereafter referred to as BS 8233) (BSI 2014c);
- BS 4142: 2014 +A1 2019 Methods for Rating and Assessing Industrial and Commercial Sound (hereafter referred to as BS 4142) (BSI 2019);
- UK Highways Agency (UKHA) Design Manual for Roads and Bridges (DMRB) LA 111 Sustainability and Environmental Appraisal LA 111 Noise and Vibration Revision 2 (hereafter referred to as DMRB Noise and Vibration) (UKHA 2020);
- Dublin Local Authorities including Dublin City Council (DCC), Fingal County Council (FCC), South Dublin County Council (SDCC) and Dún Laoghaire Rathdown County Council (DLRCC) Dublin Agglomeration Third Environmental Noise Action Plan December 2018 – July 2023 (hereafter referred to as the Dublin Agglomeration NAP 2018 – 2023) (DCC; FCC; SDCC; DLRCC 2018);
- S.I. No. 549/2018 – European Communities (Environmental Noise) Regulations 2018 (hereafter referred to as the Noise Regulations);
- S.I. No. 241/2006 - European Communities Noise Emission by Equipment for Use Outdoors (Amendment) Regulations 2006;
- International Organization for Standardization (ISO) 9613-2:1996 Acoustics – Attenuation of sound during propagation outdoors - Part 2: General method of calculation (hereafter referred to as ISO 9613 – 2) (ISO 1996);
- ISO 1996-1:2016 Acoustics - Description, measurement and assessment of environmental noise. Part 1: Basic quantities and assessment procedures (hereafter referred to as ISO 1996 – 1) (ISO 2016);
- ISO 1996-2:2017 - Description, measurement and assessment of environmental noise - Part 2: Determination of sound pressure levels (hereafter referred to as ISO 1996 – 2) (ISO 2017);
- The UK Department of Transport Calculation of Road Traffic Noise (hereafter referred to as the CRTN) (UK Department of Transport 1988), and
- Fingal County Development Plan 2023 – 2029.

- Predictive calculations have been performed during the construction phase of the project at the nearest sensitive locations to the proposed construction site;
- Determining significance criteria for impact assessment;

- A schedule of mitigation measures has been proposed to avoid, reduce or offset, where necessary, the identified potential outward effects relating to noise and vibration from the proposed development.

12.3.1 Construction Noise Criteria

12.3.1.1 Residential 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 the absence of specific local guidance, appropriate criteria relating to permissible construction noise levels for a development of this scale may be found in the British Standard BS5228-1:2009+A1:2014 *Code of Practice for Noise and Vibration Control on Construction and Open Sites - Noise*.

The approach adopted here calls for the designation of a noise-sensitive location into a specific category (A, B or C) based on existing ambient noise levels in the absence of construction noise. This sets a threshold noise value that, if exceeded at this location, indicates that a potential significant noise impact is associated with the construction activities, depending on context. It should be noted that this assessment method is only valid for residential properties.

BS 5228-1: 2009+A1:2014 sets out guidance on Construction Noise Thresholds (CNTs) relative to the existing noise environment. **Table 12.1** sets out the threshold values which, when exceeded, signify a potential significant effect at the façades of residential receptors as recommended by this document.

For the appropriate periods (*i.e.*, daytime, evening and night-time) the ambient noise level is determined and rounded to the nearest 5 decibels (dB). If the construction noise level exceeds the appropriate category value, then a significant effect is deemed to occur.

Table 12.1: ABC construction noise thresholds

Assessment category and threshold value period (L_{Aeq})	Construction Noise Threshold (CNT) value in decibels (dB)		
	Category A [A]	Category B [B]	Category C [C]
Daytime (07:00 – 19:00) and Saturdays (07:00 – 13:00)	65	70	75
Evenings and weekends	55	60	65
Night-time (23:00 to 07:00hrs)	45	50	55

[A]Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are less than these values.

[B]Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are the same as category A values.

[C]Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are higher than category A values.

In order to assist with interpretation of significance, **Table 12.2** includes guidance as to the likely magnitude of noise impact associated with construction activities, relative to the CNT. This guidance is derived from Table 3.16 of Design Manual for Roads and Bridges (DMRB), LA111 Noise and Vibration: Highways England, Transport Scotland, The Welsh Government and The Department of Infrastructure, May 2020 (DMRB 2020) and has been adapted for the purposes of this chapter to include the relevant significant effects from the EPA Guidelines (EPA 2022a) using professional expertise and judgment.

In accordance with the DMRB Noise and Vibration construction noise and construction traffic noise impacts shall constitute a significant effect where it is determined that a major or moderate magnitude of impact will occur for a duration exceeding:

- Ten or more days or night in any 15 consecutive day or nights; and
- A total number of days exceeding 40 in any six consecutive months.

The adapted DMRB Noise and Vibration guidance is used to assess the overall significance of construction noise at Noise Sensitive Locations (NSLs) across the proposed Project as shown in **Table 12.2**.

Table 12.2: Likely Impact due to Construction Noise

<table>
<tr><th>Location</th><th>DMRB Magnitude of Impact</th><th>EPA Mapped Impacts</th><th>Determination</th></tr>
<tr><td>Below or equal to baseline noise level</td><td>Negligible</td><td>Not Significant</td><td rowspan="5">Depending on CNT, duration & baseline noise level</td></tr>
<tr><td>Above baseline noise level and below or equal to CNT</td><td>Minor</td><td>Slight to Moderate Note 1</td></tr>
<tr><td>Above CNT and below or equal to CNT +5dB Note 2</td><td>Moderate</td><td>Moderate to Significant</td></tr>
<tr><td>Above CNT +5 and below or equal to CNT +15dB</td><td rowspan="2">Major</td><td>Significant, to Very Significant</td></tr>
<tr><td>Above +15dB</td><td>Very Significant to Profound</td></tr>
</table>

Note 1: CNLs at the upper end of this range will result in higher potential impacts, therefore this range is categorised as slight to moderate, acknowledging that values approaching the CNT are greater than slight. In accordance with DMRB, noise levels below the CNT are deemed 'Not Significant'.

Note 2: The DMRB does not distinguish beyond a 'Major' impact. For the purposes of distinguishing between a Very Significant and Profound Impact, CNLs exceeding the CNT by +20dB are categorised as Profound.

12.3.1.2 Commercial Receptors

BS5228-1:2009+A1 gives several examples of acceptable limits for construction or demolition noise, the most simplistic being based upon the exceedance of fixed noise limits. For example, paragraph E.2 states:

> *"Noise from construction and demolition sites should not exceed the level at which conversation in the nearest building would be difficult with the windows shut."*

Paragraph E.2 goes on to state:

> *"Noise levels, between say 07.00 and 19.00 hours, outside the nearest window of the occupied room closest to the site boundary should not exceed:*
>
> *70 decibels (dBA) in rural, suburban areas away from main road traffic and industrial noise;*
>
> *75 decibels (dBA) in urban areas near main roads in heavy industrial areas".*

For non-residential locations it is considered appropriate to adopt the 75dB(A) criterion during the day.

12.3.1.3 Construction Traffic

Vehicular movement to and from the construction site for the proposed development will make use of the existing road network. In order to assess the potential impact of additional traffic on the human perception of noise, the following two guidelines are referenced: DMRB Noise and Vibration 2020 (UKHA, 2020) and the EPA Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, 2022a). For construction traffic, due to the short-term period over which this impact occurs, the magnitude of impacts is assessed against the 'short term' period in accordance with the DMRB document. **Table 12.3** offers guidance as to the likely impact associated with any particular change in traffic noise level (Source DMRB, 2020).

Table 12.3: Likely impact associated with change in traffic noise level due to additional construction traffic

Change in Sound Level (dB)	Subjective Reaction	DMRB Magnitude of Impact	Initial Significance Rate
Less than 1 dB	Inaudible	Negligible	Not Significant
1 – 2.9	Barely Perceptible	Minor	Not Significant
3 – 4.9	Perceptible	Moderate	Significant
≥ 5	Up to a doubling of loudness	Major	Significant

12.3.2 Construction Vibration Criteria

Vibration standards are generally split into two categories, those dealing with human comfort and those dealing with cosmetic or structural damage to buildings. In both instances, it is appropriate to consider the magnitude of vibration in terms of Peak Particle Velocity (PPV).

Guidance relevant to acceptable vibration within buildings is contained in the following documents:

- British Standard BS 7385-2:1993 Evaluation and Measurement for Vibration in Buildings - Guide to Damage Levels from Ground Borne Vibration; and

- British Standard BS 5228-1:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites - Vibration.

BS7385:1993 states that there should typically be no cosmetic damage if transient vibration does not exceed 15 mm/s at low frequencies rising to 20 mm/s at 15 Hz and 50 mm/s at 40 Hz and above. These guidelines relate to relatively modern buildings and should be reduced to 50% or less for structurally unsound buildings.

BS5228-1:2009+A1:2014 recommends that, for soundly constructed residential property and similar structures that are generally in good repair, a threshold for minor or cosmetic (*i.e.*, non-structural) damage should be taken as a peak component particle velocity (in frequency range of predominant pulse) of 15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz and 50 mm/s at 40 Hz and above. Below these values minor damage is unlikely. Where continuous vibration is such as to give rise to dynamic magnification due to resonance, the guide values may need to be reduced by up to 50 %. BS 5228-2:2009+A1:2014 also comments that important buildings which are difficult to repair might require special consideration on a case-by-case basis.

For utilities and underground services BS5228-1:2009+A1:2014 recommends a maximum of 30 mm/s PPV. If the utilities or underground services are noted to be structurally unsound then the PPV value should be reduced by up to 50% depending on the condition.

12.3.3 Operational Plant Noise Criteria

British Standard 4142:2014+A1:2019 *Methods for Rating and Assessing Industrial and Commercial Sound* describes methods for rating and assessing the impact of sound from an industrial and/or commercial development to a residential receptor. The methods described in this Standard use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident. The results of baseline surveys of the prevailing background sound level (L_{A90}) allow for the noise impact associated with the development to be assessed. With reference to BS 4142:2014, it is noted that, depending on context, adverse effects are likely to occur when the rated specific sound level exceeds the prevailing background sound level by +5 dB, with a significant adverse effect occurring at +10 dB or more. Where the rating level does not exceed the background sound level, BS 4142 comments that this is an indication of the specific sound source having a low impact, again depending on the context.

Where sound emissions are found to be tonal, impulsive, intermittent or to have other sound characteristics that are readily distinctive against the residual acoustic environment, BS 4142:2014+A1:2019 advises that penalties be applied to the specific level to arrive at the rating level.

The subjective method for applying a penalty for tonal sound characteristics outlined in BS 4142:2014+A1:2019 recommends the application of a 2 dB penalty for a tone which is just perceptible at the receptor, 4 dB where it is clearly perceptible, and 6 dB where it is highly perceptible. In relation to intermittency, BS 4142:2014+A1:2019 recommends that if the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied where it is just perceptible at the receptor location to 9 dB where it is highly perceptible.

In terms of this development, in accordance with the guidance provided in BS4142:2014+A1:2019, if the noise from the developed facility alone does not exceed the existing background noise level, then this is an indication of the noise emissions from the facility having a low impact. Adverse effects are predicted to occur when the background noise level is exceeded by more than 5 dB.

In the case of the sensitive receptors located on the R108 the average background noise level has been measured as 53 dB $L_{A90,1hr}$ during the day period and 45 dB $L_{A90,15mins}$ during the night period, and for properties on the R132 and R108 the average background noise level has been measured as 63 dB $L_{A90,1hr}$ during the day period and 58 dB $L_{A90,15mins}$ during the night period therefore the following noise criteria are adopted:

Noise emissions from site operations will be constrained to the following noise levels at residential receptors.

- Daytime: ≤ 55 dB $L_{Aeq,1hr}$
- Night-time: ≤ 45 dB $L_{Aeq,15min}$

Note that notwithstanding the presentation of criteria here, all operational plant is either situated underground or does not produce noise emissions, hence an assessment of operational noise is not required. Nonetheless, it must be ensured at the design stage that any plant installed as part of the project must meet the noise criteria set out above.

12.3.4 Additional Traffic on Public Roads

There will be no additional traffic on public roads as a result of the Project during the operational stage, hence there is no requirement for criteria or assessment.

12.4 Receiving Environment

The prevailing noise environment surrounding the proposed development site is dominated by aircraft take-off and landing at Dublin Airport and road traffic along the surrounding road network. Other sources in the environment include activities within the Dublin Airport campus (aircraft and vehicle ground movements *etc.*).

12.4.1 Receptor Locations

In the first instance, it is important to identify the nearest noise sensitive receptors to the proposed development. **Figure 12.1** provides an overview of the closest areas to the proposed development which have the potential to be impacted, each area is presented in further detail in **Figure 12.2** to **Figure 12.5**. In these figures red denotes residential receptors and blue denotes commercial receptors. A description of each group of noise-sensitive locations is presented below.

NSL1	Residential properties located to the west of Dublin Airport, between the north and south runways. These properties are located approximately 600m from the proposed construction activities.
NSL2	Primarily residential properties located on the western boundary of Dublin Airport, along the R108. Additionally, the Boot Inn is within this location which has been identified as a commercial receptor. These properties are located approximately 100m from the proposed construction activities.

NSL3	Residential properties located on the Old Airport Road to the south of Dublin Airport. These properties are located approximately 500m from the proposed construction activities.
NSL4	One residential property located on the R132 to the east of Dublin Airport. Additional industrial/commercial properties located to the south on the Old Airport Road/Swords Road. These properties are located approximately 150m from the proposed construction activities.

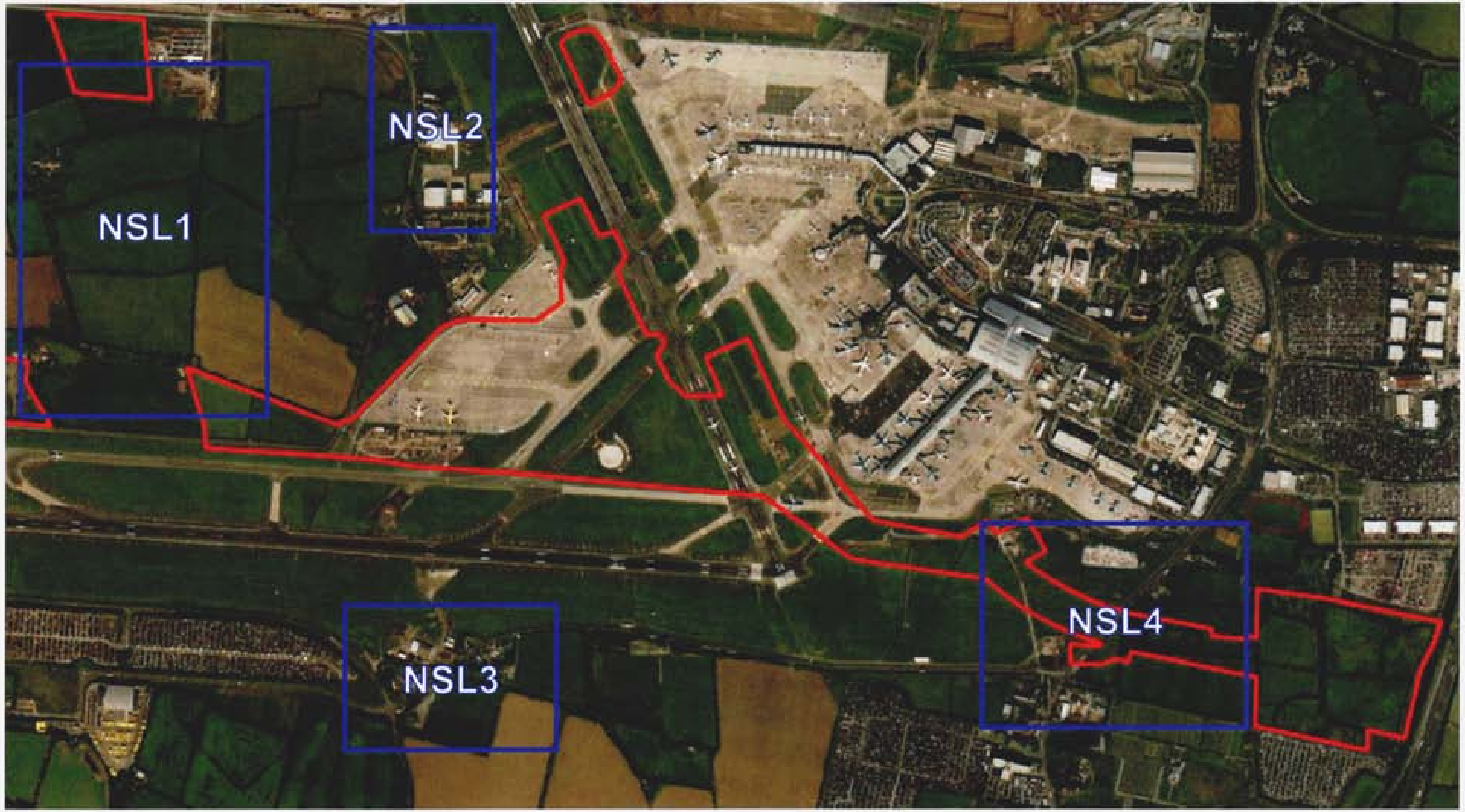


Figure 12.1: Overview of Dublin Airport with reference locations

Figure 12.2: Noise sensitive receptors collectively identified as NSL1

Figure 12.3: Noise sensitive receptors collectively identified as NSL2

Figure 12.4: Noise sensitive receptors collectively identified as NSL3

Figure 12.5: Noise sensitive receptors collectively identified as NSL4

In these figures properties highlighted in red are residential, properties highlighted blue are commercial.

12.5 Characteristics of the Proposed Development

The ADP proposes significant upgrades to the surface water management infrastructure at Dublin Airport. The ADP comprises a series of drainage system enhancement measures and infrastructure proposals, including the upgrade of existing drainage infrastructure and the construction of additional infrastructure to supplement the performance of the existing surface water management system.

12.5.1 Construction Phase

As described in **Chapter 4 – Project Description**, the key civil engineering works that will have a potential to create a noise and vibration impact during construction are summarised below:

- During construction, an amount of soil will be generated as part of the site preparation works and during excavation for the installation of ducting for the pipeline installations;
- Infilling and landscaping will be undertaken;
- Construction traffic accessing the site and moving along local routes.

A suite of mitigation measures will be specified in **Section 12.8** to ensure that impacts from construction works are reduced as much as is reasonably practicable.

12.5.2 Operational Phase

During the operational phase, traffic accessing the site for maintenance purposes has the potential to cause a noise and vibration impact on local receptors, however, on review of the traffic figures it is understood that the number of vehicles will be minimal and this impact will be negligible in terms of noise.

12.6 Noise Survey

An environmental noise survey was conducted to quantify the existing noise environment. The survey was conducted in general accordance with ISO 1996-2:2017 *Acoustics - Description, Measurement and Assessment of Environmental Noise - Determination of Sound Pressure Levels*. Specific details are set out in the following sections.

12.6.1 Measurement Locations

Five survey locations were selected to determine the prevailing noise climate in the vicinity of the proposed development and the identified receptors with potential to be impacted by the proposed development. All survey locations are presented in **Figure 12.6** and **Figure 12.7**, and are discussed in the following sections. Note that NML2 was not accessible during the evening and night period, hence a proxy location (NML2') was identified for those measurements.

Figure 12.6: Noise monitoring locations 1 to 3

Figure 12.7: Noise monitoring locations 4 and 5

12.6.2 Survey Periods

Attended noise measurements were conducted across the locations during the day of 23rd November 2022 and during the day and night of 28th November 2022. During the survey periods the weather was noted to be calm and dry and did not have a negative impact on measured noise levels.

12.6.3 Instrumentation

Measurements were made using Brüel and Kjaer 2250 Light Sound Level Meters. Sample periods were set to 15-minutes.

Before and after the survey the measurement instruments were calibrated using a Brüel & Kjær Type 4231 Sound Level Calibrator.

12.6.4 Measurement Parameters

The noise survey results are presented in terms of the following parameters:

L_{Aeq} is the equivalent continuous sound level. It is a type of average and is used to describe a fluctuating noise in terms of a single noise level over the sample period. It is typically used as a descriptor for ambient noise.

L_{A90} is the sound level that is exceeded for 90% of the sample period. It is typically used as a descriptor for background noise.

LAmax is the maximum sound pressure level recorded during the sample period.

The 'A' suffix denotes the fact that the sound levels have been 'A-weighted' in order to account for the non-linear nature of human hearing. All sound levels in this report are expressed in terms of decibels (dB) relative to 2x10-5 Pa.

12.6.5 Results

12.6.5.1 Location NML1

Table 12.4: Noise measurement results for NML1

Date	Time	L_{Aeq}	L_{Amax}	L_{A90}
23/11/2022	14:29	60	78	51
23/11/2022	15:36	58	79	50
23/11/2022	16:52	57	76	52
28/11/2022	21:36	54	76	41
28/11/2022	22:59	55	75	39
29/11/2022	00:00	43	72	35

At this location the subjective noise character was described as comprising distant road traffic, aircraft movement overhead, bird song and rustling vegetation.

12.6.5.2 Location NML2

Table 12.5: Noise measurement results for NML2

Date	Time	L_{Aeq}	L_{Amax}	L_{A90}
23/11/2022	14:49	62	83	53
23/11/2022	16:01	65	85	54
23/11/2022	17:12	69	91	55
28/11/2022	21:55	63	81	41
28/11/2022	23:19	63	79	45
29/11/2022	00:23	63	80	41

At this location the subjective noise character was described as comprising distant road traffic, aircraft movement overhead, aircraft taxi movements, bird song and rustling vegetation.

12.6.5.3 Location NML3

Table 12.6: Noise measurement results for NML3

Date	Time	L_{Aeq}	L_{Amax}	L_{A90}
23/11/2022	15:10	62	77	54
23/11/2022	16:22	62	81	53
23/11/2022	17:37	64	81	53
28/11/2022	22:13	61	81	47
28/11/2022	23:37	53	74	41
29/11/2022	00:42	54	70	39

At this location the subjective noise character was described as comprising distant road traffic, aircraft movement overhead and occasional local road traffic movements.

12.6.5.4 Location NML4

Table 12.7: Noise measurement results for NML4

Date	Time	L_{Aeq}	L_{Amax}	L_{A90}
23/11/2022	11:12	75	87	52
23/11/2022	12:05	75	87	52
23/11/2022	13:08	76	92	55
28/11/2022	21:33	74	90	55
28/11/2022	23:01	75	93	51
28/11/2022	23:50	74	87	53

At this location the subjective noise character was described as comprising constant local road traffic, aircraft movement overhead and aircraft taxi movements.

12.6.5.5 Location NML5

Table 12.8: Noise measurement results for NML5

Date	Time	L_{Aeq}	L_{Amax}	L_{A90}
23/11/2022	10:38	75	91	65
23/11/2022	11:37	74	90	63
23/11/2022	12:31	74	90	62
28/11/2022	22:00	74	94	59
28/11/2022	23:26	75	94	59
29/11/2022	00:18	74	94	57

At this location the subjective noise character was described as comprising constant local road traffic, aircraft movement overhead and aircraft taxi movements.

12.7 Potential Impacts of the Proposed Development

12.7.1 Construction Noise

12.7.1.1 Adopted Construction Noise Thresholds

Given the measured baseline noise levels presented in **Section 12.6.5** construction noise thresholds have been calculated as per the criteria in **Section 12.3.1** for each NSL and are presented in **Table 12.9**.

Table 12.9: Residential Construction Noise Thresholds

Reference	Construction Noise Threshold		
	Day	Evening	Night
NSL1	65	60	50
NSL2	70	65	55
NSL3	75	65*	55*
NSL4	75	65*	55*

*Note that measured baseline noise levels are far in excess of these designated thresholds, however, given that the nature of the noise environment primarily comprises intermittent aircraft movements it is considered prudent to set limits in line with the experienced noise levels between aircraft movements.

12.7.1.2 Construction Noise Predictions for Construction Phases

A construction program has been produced for the project, the program is presented in the Construction Environmental Management Plan (CEMP) and identifies work areas, periods and proposed plant equipment during the different phases of work. It is possible to predict typical indicative construction noise levels using guidance set out in BS 5228-1: 2009+A1:2014. Given the nature of the project and in order to facilitate the operation of Dublin Airport it will be necessary to undertake some construction works during the night and evening periods in addition to the typical day time period. However, it is noted that night works are most likely to occur at critical operational areas such as at runways and aprons, consequently the night works are likely to be undertaken at locations further within project red line boundary, centrally within the airport and at a further distance to the receptors on the west side of the airport (NSLs 1 and 2). At the east side night works may be required along the extent of the boundary to the CPCF tanks.

Table 12.10 outlines typical plant items that may be used during the construction phase and includes associated noise levels at 10m which are reproduced from BS 5228-1: 2009+A1:2014. **Table 12.11** presents predicted construction noise levels for each NSL during each phase of the construction works, without the application of mitigation. Ground type has been calculated as mixed for NSLs 1 to 3 and soft for NSL 4. Note that the calculations assume all plant to be located on the closest boundary to each NSL.

Table 12.10: Construction noise predictions

Phase	Item of Plant	Data Reference	L_{Aeq} at 10m (dB)	% On Time
1 Topsoil stripping-Open Cut Pipelines, West Apron tanks and CPCF Month 4 to Month 16	Excavator	BS 5228-1:2009 Table C.4:64	75	100
	Backhoe	BS 5228-1:2009 Table C.4:14	67	50
	Bulldozer	BS 5228-1:2009 Table C.2:10	80	100
	Wheel Tractor	BS 5228-1:2009 Table C.4:74	80	100
	Dumper	BS 5228-1:2009 Table C.4:7	78	100
	Loader	BS 5228-1:2009 Table C.4:66	69	100
	Dump Trucks	BS 5228-1:2009 Table C.5:16	81	100
	Tipper Truck	BS 5228-1:2009 Table C.2:30	79	100
Overall			**92 dB L_{Aeq} at 10m**	
2 Pipeline Construction Works (Open Cut)- CW1, CW2, CW3, CW4, West Apron pipes and Contaminated Bifurcation Pipeline Month 4 to Month 21	Excavator	BS 5228-1:2009 Table C.4:64	75	100
	Backhoe	BS 5228-1:2009 Table C.4:14	67	50
	Trencher	BS 5228-1:2009 Table C.4:64	75	50
	Dumper	BS 5228-1:2009 Table C.4:7	78	100

Phase	Item of Plant	Data Reference	L_{Aeq} at 10m (dB)	% On Time
	Loader	BS 5228-1:2009 Table C.4:66	69	100
	Tipper Truck	BS 5228-1:2009 Table C.2:30	79	100
	Cement Mixer Truck with Concrete Pump	BS 5228-1:2009 Table C.4:28	75	10
	Dewatering Pump	BS 5228-1:2009 Table C.4:88	68	25
	Generator	BS 5228-1:2009 Table C.4:78	66	25
	Dump Truck	BS 5228-1:2009 Table C.5:16	81	100
Overall			**89 dB L_{Aeq} at 10m**	
3 Pipeline Construction Works (Tunnelling)- CW2, CW3, CW4, Contaminated Bifurcation Pipeline and CPCF Contamination Line Month 4 to Month 21	Generator	BS 5228-1:2009 Table C.4:84	74	100
	Clay Baller	Reference Data	76	100
	Desander	Reference Data	76	100
	Centrifuge	Reference Data	73	100
	Compressor	BS 5228-1:2009 Table C.3:19	75	100
	Grout Mixer	BS 5228-1:2009 Table C.4:23	61	100
	Pump	BS 5228-1:2009 Table C.4:88	68	100
	Crane	BS 5228-1:2009 Table C.4:52	75	100

Phase	Item of Plant	Data Reference	L_{Aeq} at 10m (dB)	% On Time
	Excavator	BS 5228-1:2009 Table C.4:64	75	100
	Forklift	BS 5228-1:2009 Table C.4:55	71	100
	Vibratory Piling Rig (only at NSL4)	BS 5228-1:2009 Table C.3:8	88	100
Overall			**87 dB L_{Aeq} at 10m (90 dB L_{Aeq} at 10m for NSL4)**	
4 Reinstatement Works	Excavator	BS 5228-1:2009 Table C.4:64	75	100
	Wheeled Backhoe	BS 5228-1:2009 Table C.4:14	67	50
	Grader	BS 5228-1:2009 Table C.6:31	86	100
	Roller	BS 5228-1:2009 Table C.5:26	77	100
	Loader	BS 5228-1:2009 Table C.4:66	69	50
	Tractor	BS 5228-1:2009 Table C.4:74	80	50
Overall			**90 dB L_{Aeq} at 10m**	
5 Tank Construction Works -CPCF and West Apron (including excavation) Month 2 to Month 25	Excavator	BS 5228-1:2009 Table C.4:64	75	100
	Wheeled Backhoe	BS 5228-1:2009 Table C.4:14	67	50
	Roller	BS 5228-1:2009 Table C.5:26	77	50

Phase	Item of Plant	Data Reference	L_{Aeq} at 10m (dB)	% On Time
	Dumper	BS 5228-1:2009 Table C.4:7	78	100
	Loader	BS 5228-1:2009 Table C.4:66	69	100
	Crane	BS 5228-1:2009 Table C.4:52	75	100
	Forklift	BS 5228-1:2009 Table C.4:55	71	10
	Dump Truck	BS 5228-1:2009 Table C.5:16	81	100
	Tipper Truck	BS 5228-1:2009 Table C.2:30	79	100
	Tractor	BS 5228-1:2009 Table C.4:74	80	100
	Cement Mixer Truck with Concrete Pump	BS 5228-1:2009 Table C.4:28	75	100
	Generator	BS 5228-1:2009 Table C.4:78	66	100
Overall			**90 dB L_{Aeq} at 10m**	

Table 12.11: Predicted day and evening construction noise levels

Reference	Predicted Construction Noise Levels (dB $L_{Aeq,T}$)			
	NSL1	NSL2	NSL3	NSL4
Phase 1	51	63	52	57
Phase 2	48	60	50	54
Phase 3	46	58	48	46
Phase 4	49	61	51	56
Phase 5	49	61	51	55

Table 12.12: Predicted night construction noise levels

Reference	Predicted Construction Noise Levels (dB $L_{Aeq,T}$)			
	NSL1	NSL2	NSL3	NSL4
Phase 1	49	52	52	57
Phase 2	46	50	50	54
Phase 3	44	48	48	46
Phase 4	48	51	51	56
Phase 5	48	51	51	55

Taking account of the predicted noise levels presented in **Table 12.11** and **Table 12.12**, **Table 12.13** provides an overview of the impact associated with construction noise during the proposed project at each receptor location and during each period. All impacts are negative, direct and temporary. Given these predicted impacts a suite of mitigation measures are proposed for the construction stage of the project, these are detailed in **Section 12.8.1**. Note that there is potential for construction activities to overlap, however given the range of noise levels predicted and the quantity of items of plant on site it is not likely that the noise levels will increase above the individual phased predictions.

Table 12.13: Predicted Construction Noise Effects

Reference	Predicted Construction Noise Effect During Each Period		
	Day	Evening	Night
NSL1	Not Significant to Slight	Not Significant to Slight	Slight to Moderate
NSL2			Slight to Moderate
NSL3			Slight to Moderate
NSL4			Moderate to Significant

12.7.1.3 Construction Noise Predictions for Demolition

Limited demolition works may be required during the construction phase of the development to remove existing surfaces within the airport. It is noted that these existing pavings are located within the red boundary lines at approximately 600m from the closest noise receptors. BS 5228-1:2009 provides various reference noise levels for breaker units, Table C.1:1 provides the highest applicable noise level of 92dB at 10m from a breaker unit. Taking account of mixed ground conditions and distance attenuation it is predicted that a noise level of 51dB will be experienced at the closest noise receptor which results in a not significant impact during the day and evening periods, and a slight impact during the night periods. Notwithstanding this low noise prediction, **Section 12.8.1.7** provides some recommended mitigation for this activity where practicable due to the intermittent character of the noise emissions.

12.7.1.4 Construction Compounds

The construction compounds will be utilised as delivery and storage spaces for construction vehicles and materials, it is understood that there is no material processing in these areas. They will be designed in such a way that noise and vibration impacts are minimised at nearby receptors at NSL1, mainly by way of installation of barriers between receptors and compound, but also, where practicable, by locating internal routes and working areas as far as possible from the most sensitive receptors. Mitigation measures will be implemented so that the criteria defined in **Section 12.3.1** are achieved. Measures that can be implemented are discussed in **Section 12.8.1**.

12.7.2 Construction Vibration

In terms of vibration, during breaking and excavation there is potential for vibration to propagate through the ground. Empirical data for this activity is not provided in the BS 5228-2:2009+A1:2014 standard, however the likely levels of vibration from this activity is expected to be significantly below the vibration criteria for building damage or utilities damage based on experience from other sites. AWN Consulting has previously conducted vibration measurements under controlled conditions, during trial construction works, on a sample site where concrete slab breaking was carried out. The trial construction works consisted of the use of the following plant and equipment when measured at various distances:

- 3 tonne hydraulic breaker on small CAT tracked excavator; and
- 6 tonne hydraulic breaker on large Liebherr tracked excavator.

Vibration measurements were conducted during various staged activities and at various distances. Peak vibration levels during staged activities using the 3 Tonne Breaker ranged from 0.48 to 0.25 PPV (mm/s) at distances of 10 to 50m respectively from the breaking activities. Using a 6 Tonne Breaker, measured vibration levels ranged between 1.49 to 0.24 PPV (mm/s) at distances of 10 to 50m, respectively.

The range of values recorded provides some context in relation to typical ranges of vibration generated by construction breaking activity likely required on the proposed site.

In terms of utilities and underground services it is expected that vibration emissions as a result of the works will be an order of magnitude below the defined criteria of 30 mm/s PPV.

Given that the closest NSL is greater than 100m from the works, review of the previously measured vibration levels indicates that no vibrations will be perceptible from the works due to the distance between the works and the receptors. The impact will be not significant, imperceptible and short term.

12.7.3 Construction Traffic

The traffic chapter provides an overview of predicted construction traffic flows across the duration of the project in AADT. These figures account for traffic attributed to the project itself as well as cumulative traffic from the Dublin Airport Underpass project. A change in noise level due to construction traffic noise has been calculated for both this development and also cumulatively with the Dublin Airport Underpass project for which sufficient detail was available to allow for a quantitative assessment. **Chapter 18 – Interactions & Cumulative Effects** presents the methodology whereby projects were scoped in or out for assessment of cumulative effects with those predicted for the ADP.

The noise level associated with an event of short duration, such as a passing vehicle movement, may be expressed in terms of its Sound Exposure Level (L_{AX}). The Sound Exposure Level can be used to calculate the contribution of an event or series of events to the overall noise level in a given period.

The appropriate formula is given below:

$$L_{Aeq,T} = L_{AX} + 10\log10(N) - 10\log10(T) \text{ dB}$$

where:

$L_{Aeq,T}$ is the equivalent continuous sound level over the time period T (in seconds)

L_{AX} is the "A-weighted" Sound Exposure Level of the event considered(dB)

N is the number of events over the course of time period T

The assumed mean value of Sound Exposure Level for cars and HGVs is in the order of 73 dB L_{AX} and 88 dB L_{AX} respectively at a distance of 5 metres. These values have been used to calculate the change in noise levels as a result of the construction traffic.

Table 12.14: Construction Traffic

Node	AADT	AADT- HV	Do Something 2026	Underpass Traffic 2026
4	37228	4770	28	19
5	10524	677	129	207
6	24402	2583	101	188
7	37855	4566	101	188
11	50039	9648	82	56
12	117625	2669	82	56
14	34818	2705	28	19
15	27960	4942	28	19

Table 12.15 Change in noise level due to construction traffic

Node	Do Something 2026	Cumulative 2026
4	0.0	0.0
5	+0.5	+1.3
6	+0.1	+0.4
7	+0.1	+0.2
11	+0.1	+0.1
12	+0.1	+0.1
14	+0.1	+0.1
15	0.0	0.0

Figure 12.8 Map indicating node locations

The assessment indicates that all routes bar one will experience a change in noise level of less than 1 dB which can be considered imperceptible. Properties located close to node 5 will experience a change in noise level of 0.5 dB due to this project alone and 1.3 dB when considered cumulatively with the Dublin Airport Underpass construction traffic, this will result in an impact that can be described as not significant. The overall traffic impact during construction works can be considered negative, short-term and not significant.

12.7.4 Operational Noise and Vibration

As discussed previously, the operational stage is not expected to produce noise or vibration perceptible at any receptor. Plant will either be located underground or will be silent in operation and no additional traffic is expected as a result of the proposed development. Consequently, effects during the operational stage are described as neutral, imperceptible and long term.

Table 12.16: Residual noise effects

Reference	Predicted Operational Noise Effect
NSL1	Neutral, imperceptible and long term
NSL2	
NSL3	
NSL4	

12.8 Mitigation

12.8.1 Construction Noise Mitigation

12.8.1.1 Communication with Neighbours

The Contractor will be proactive in engaging with the occupants of neighbouring properties with potential for construction effects and will be obliged to notify them of any works forecast to generate appreciable levels of noise, explaining the nature and duration of the works.

Night-works have the potential to generate the most significant effects from noise. All affected sensitive locations should be notified of planned works in advance of the works progressing. The notification should include a description of the works, the expected duration and details of how to contact the contractor to register any noise complaints.

A designated noise liaison will be appointed by the contractor for the duration of the construction works. This person will log any issues and follow up promptly.

12.8.1.2 Noise Monitoring

The following ongoing noise monitoring programme is recommended for the site in relation to construction activities.

Noise Monitoring Terminals (NMT), number and locations to be agreed between the contractor, daa and local authority, to be installed with the following specifications (or similar approved):

- Logging of two concurrent periods, *e.g.*, 15-minute & hourly;
- E-mail alert on threshold exceedance; and
- Remote access to measured data.

In addition, spot check noise measurements are to be conducted on a monthly basis. These spot checks can be organised to coincide with works that have potential to generate high levels of noise in order to confirm the potential extent of impact.

A monthly noise monitoring report should be prepared by the contractor. Reports should identify any exceedances above nominal limit values and attempts to clarify the causes, *etc.* Where remedial measures are required and identifiable these should also be clearly stated.

12.8.1.3 Noise Control Audits

It is recommended that noise control audits be conducted at regular intervals throughout the construction programme.

The purpose of the audits will be to ensure that all appropriate steps are being taken to control construction noise emissions. To this end, consideration should be given to issues such as the following (note that this list is not intended to be exhaustive):

- Hours of operation being correctly observed;
- Opportunities for noise control "at source";
- Optimum siting of plant items;
- Plant items being stopped when not in use;
- Correct use of proprietary noise control measures;
- Materials handling;
- Poor maintenance; and
- Correct use of screening provided and opportunities for provision of additional screening.

12.8.1.4 Hours of Work

In order that the impact on Dublin Airport services is minimised a portion of construction works will take place at night. Every effort should be made to avoid, reduce, and/or mitigate adverse effects, however, there is likely to be some disturbance experienced for those close to the construction works due to the sensitivity of the night period.

Consideration will be given to scheduling activities in a manner that reflects the location of the site and the nature of neighbouring properties. Each potentially noisy event/activity should be considered on its individual merits and scheduled according to its noise level, proximity to sensitive locations and possible options for noise control.

Depending on the noise emission levels experienced and associated noise impact, the contractor will be flexible and able to conduct certain works at hours which reflect periods when the neighbouring properties have lower sensitivities to noise. Furthermore, every effort will be made to schedule the noisiest works to take place during the less sensitive daytime hours.

12.8.1.5 Selection of Quiet Plant

Careful consideration will be given to the noise emission levels of plant items when they are being considered for use on the site. This practice is recommended in relation to sites with static plant such as compressors and generators. It is recommended that these units be supplied with manufacturers' proprietary acoustic enclosures where possible. The potential for any item of plant to generate noise will be assessed prior to the item being brought onto the site. The least noisy item should be selected wherever possible. Should a particular item of plant already on the site be found to generate high noise levels, the first action should be to identify whether said item can be replaced with a quieter alternative.

12.8.1.6 Control of Noise Sources

If the use of low noise plant or replacing a noisy item of plant are not viable or practicable options, consideration will be given to noise control "at source". This refers to the modification of an item of plant or the application of improved sound reduction methods, often in consultation with the supplier. For example, resonance effects in panel work or cover plates can be reduced through stiffening or application of damping compounds; rattling and grinding noises can often be controlled by fixing resilient materials in between the surfaces in contact.

BS5228 states that "as far as reasonably practicable sources of significant noise should be enclosed". In applying this guidance, constraints such as mobility, ventilation, access and safety must be taken into account. Items suitable for enclosure include pumps and generators. Demountable enclosures that could be moved around site as necessary may also be used to screen operatives using hand tools such as angle grinders.

In practice, a balance may need to be struck between the use of all available techniques and the resulting costs of doing so. It is therefore proposed to adopt the concept of "Best Available Techniques" (BAT).

BAT is defined as follows in Directive 2010/75/EU:

> *"...the most effective and advanced stage in the development of activities and their methods of operation which indicates the practical suitability of particular techniques for providing the basis for emission limit values and other permit conditions designed to prevent and, where that is not practicable, to reduce emissions and the impact on the environment as a whole."*

In this context "best" means "the most effective in achieving a high general level of protection of the environment as a whole".

The expression "available techniques" means "those developed on a scale which allows implementation in the relevant industrial sector, under economically and technically viable conditions, taking into consideration the costs and advantages, whether or not the techniques are used or produced inside the Member State in question, as long as they are reasonably accessible to the operator".

The term "techniques" includes "both the technology used and the way in which the installation is designed, built, maintained, operated and decommissioned". In specifying or otherwise determining BAT, consideration should be given to a specified list of considerations and also to "the likely costs and advantages of measures" as well as "the principles of precaution and prevention".

Thus, the concept of BAT requires a degree of balance between the attainment of environmental benefits and the likely cost implications. In the identification of BAT, regard should be had to a wide range of factors, however, emphasis should be given to "practical suitability" and the need "to reduce an emission and its impact on the environment as a whole".

Proposed techniques should also be evaluated in light of their potential effect on occupational health and safety.

BS5228 makes several recommendations in relation to "use and siting of equipment". These are relevant and hence are reproduced below. These recommendations should be implemented on the site.

> *"Plant should always be used in accordance with manufacturers' instructions. Care should be taken to site equipment away from noise-sensitive areas. Where possible, loading and unloading should also be carried out away from such areas.*
>
> *Circumstances can arise when night-time working is unavoidable. Bearing in mind the special constraints under which such work has to be carried out, steps should be taken to minimise disturbance to occupants of nearby premises.*
>
> *Machines such as cranes that may be in intermittent use should be shut down between work periods or should be throttled down to a minimum. Machines should not be left running unnecessarily, as this can be noisy and waste energy.*
>
> *Plant known to emit noise strongly in one direction should, when possible, be orientated so that the noise is directed away from noise-sensitive areas. Attendant operators of the plant can also benefit from this acoustical phenomenon by sheltering, when possible, in the area with reduced noise levels.*
>
> *Acoustic covers to engines should be kept closed when the engines are in use and idling. The use of compressors that have effective acoustic enclosures and are designed to operate when their access panels are closed is recommended.*
>
> *Materials should be lowered whenever practicable and should not be dropped. The surfaces on to which the materials are being moved could be covered by resilient material."*

The following outline guidance in relation to specific plant will also be applied:

- For mobile plant items such as cranes, dump trucks, excavators and loaders, the installation of an acoustic exhaust and/or maintaining enclosure panels closed during operation can reduce noise levels by up to 10dB. Mobile plant should be switched off when not in use and not left idling.
- For percussive tools such as pneumatic concrete breakers, rock drills and tools a number of noise control measures include fitting muffler or sound reducing equipment to the breaker 'tool' and ensuring any leaks in the air lines are sealed. Erect localised screens around breaker or drill bit when in operation in close proximity to noise sensitive boundaries.
- For all materials' handling ensure that materials are not dropped from excessive heights and drop chutes/dump trucks are lined with resilient materials.
- For compressors, generators and pumps, these can be surrounded by acoustic lagging or enclosed within acoustic enclosures providing air ventilation.
- Demountable enclosures can also be used to screen operatives using hand tools and may be moved around site as necessary.

- All items of plant should be subject to regular maintenance. Such maintenance can prevent unnecessary increases in plant noise and can serve to prolong the effectiveness of noise control measures.
- Where practicable, metal on metal or rock on metal effects should be avoided during night works. This can be achieved by using rubber mallets or impact linings *etc.* on site.
- White noise reverse alarms should be utilised on vehicles where practicable to reduce potential annoyance of tonal noise emissions from site, particularly during the more sensitive evening and night periods.

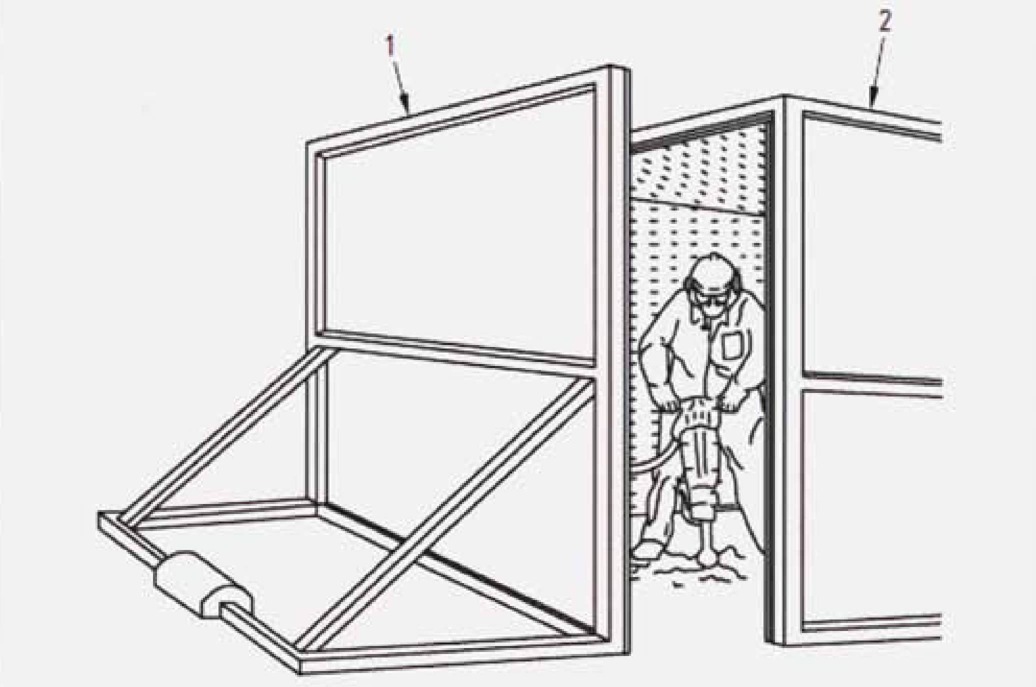
12.8.1.7 Screening

The use of screens can be effective in reducing the noise level at a receiver location and should be employed as a complementary measure to all other forms of noise control. The effectiveness of a noise screen will depend on the height and length of the screen and its position relative to both the source and receiver. The height and length of any screen should, where practicable, be such that there is no direct line of sight between the source and the receiver. In particular, screens should be located around the eastern boundaries where night works may occur.

BS5228 states that on level sites the screen should be placed as close as possible to either the source or the receiver. The construction of the screen should be such that there are no gaps or openings at joints in the screen material. In most practical situations the effectiveness of the screen is limited by the sound transmission over the barrier rather than the transmission through the barrier itself. Screens constructed of materials with a surface mass greater than 10kg/m typically offer adequate sound insulation performance.

Wherever practicable, at static sites, a 2.4m site hoarding is to be installed at the perimeter of the site to screen line of sight from receptor to the source of the noise. Where construction works are more fluid and locations are not fixed, where practicable, an effort will be made to use demountable screens to surround the site works to provide an element of screening to the surrounding receptors.

Annex B of BS5228 (Figures B1, B2 and B3) provides typical details for temporary and mobile acoustic screens, sheds and enclosures that can be constructed on site from standard materials. BS5228 Figure B2 is included here for information purposes.



Key
1 Acoustic screen 2 m wide and 2.7 m high
2 Acoustic shed 2 m square and 2.7 m high

Table B.4 **Measured sound reduction given by types of partial enclosure**

Type of enclosure (see Figure B.3)	Reduction dB(A)		
	Facing the opening(s)	Sideways	Facing rear of shed
Open-sided shed lined with absorbent material; no screen	1	9	14
Open-sided shed lined with absorbent material; with reflecting screen in front	10	6	8
Open-sided shed lined with absorbent material; with absorbent screen in front	10	10	10

Figure 12.9 Typical acoustic screen/shed detail

12.8.2 Construction Vibration Mitigation

On review of the likely vibration levels associated with construction activities and distances to receptors, the construction of the Proposed Scheme is not expected to give rise to vibration that is either significantly intrusive or capable of giving rise to structural or cosmetic damage to buildings or underground services.

Vibration from construction activities will be limited to the values set out in **Section 12.3.2** to avoid any form of potential cosmetic damage to buildings and structures. Monitoring will be undertaken at identified sensitive buildings, where proposed works have the potential to be at or exceed the vibration limit values set out in **Section 12.3.2**. Consequently, the effect can be described as adverse, not significant and temporary.

12.8.3 Operational Stage Mitigation

No mitigation required.

12.9 Residual Effects

12.9.1 Construction Noise

Table 12.17 presents the predicted construction noise levels at the identified receptor locations assuming mitigation measures outlined in **Section 12.8.1** are implemented. A 5dB correction has been assumed to account for localised screening or perimeter screening which should be incorporated where practicable as per **Section 12.8.1**.

Table 12.17: Predicted day and evening residual construction noise levels

Reference	Predicted Construction Noise (dB $L_{Aeq,T}$)			
	NSL1	NSL2	NSL3	NSL4
Phase 1	46	58	47	52
Phase 2	43	55	45	49
Phase 3	41	53	43	41
Phase 4	44	56	46	51
Phase 5	44	56	46	50

Table 12.18: Predicted night residual construction noise levels

Reference	Predicted Construction Noise (dB $L_{Aeq,T}$)			
	NSL1	NSL2	NSL3	NSL4
Phase 1	44	47	47	52
Phase 2	32	36	36	40
Phase 3	39	43	43	41
Phase 4	43	46	46	51
Phase 5	30	34	34	38

Table 12.19 provides an overview of the residual impact associated with construction noise during the proposed project at each receptor location and during each period. Note that all effects are negative and temporary to short-term.

Table 12.19: Residual construction noise effects

Reference	Predicted Construction Noise Effect During Each Period		
	Day	Evening	Night
NSL1	Not Significant	Not Significant	Not Significant to Slight
NSL2			
NSL3			
NSL4			Not Significant to Moderate*

*Note that measured baseline noise levels are far in excess of the calculated construction noise level, however, given that the existing character of the noise environment primarily comprises of intermittent aircraft movements it is considered prudent to consider the impacts experienced during the lulls between aircraft movements.

In accordance with the stated criteria, the calculated construction noise levels and the duration of the effects have determined to be overall Not Significant.

12.9.2 Do Nothing

In the case of a Do Nothing scenario the noise environment will remain unchanged.

12.10 Monitoring

Noise monitoring during the construction stage will be conducted in accordance with the International Standard ISO 1996: 2017: Acoustics – Description, measurement and assessment of environmental noise and BS5228. There is no monitoring recommended for the operational phase of the development as impacts due to noise and vibration are predicted to be not significant.

12.11 Cumulative Effects

Dublin Airport Underpass (FCC Ref. F22A/0460) will utilise some of the same routes for construction traffic. A cumulative assessment has been accounted for in **Section 12.7.3** which has found that the impact will be negative, short-term and not significant. Other projects local to the area are not expected or predicted to produce traffic levels that would create a cumulative impact during this project.

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13.1 Introduction

This chapter evaluates the effects, if any, which the proposed development may have on the environment resulting from the management of waste, as defined in Directive 2011/92/EU as amended by Directive 2014/52/EU, the EPA EIA Report Guidelines, (2022a) and EPA Draft Advice Notes for EIS 2015.

This chapter has also been prepared to address the issues associated with Waste Management and the environment during the construction phase of the proposed development as described in **Chapter 4 – Project Description**.

A site-specific Resource Waste Management Plan (RWMP) has been prepared by AWN Consulting Ltd to deal with waste generation during the excavation and construction phases of the proposed development and has been included as **Appendix 13.1**. The RWMP was prepared in accordance with the Environmental Protection Agency's (EPA) document 'Best Practice Guidelines for the Preparation of Resource and Waste Management Plans for Construction & Demolition Projects' (2021a).

This chapter has been prepared in accordance with European Commission's Guidelines, Guidance on the preparation of the Environmental Impact Assessment Report (2017), the EPA Guidelines on the Information to be contained in EIAR (2022a) and the EU Commission Notice on changes and extensions to projects, 2021.

These documents will ensure the management of wastes arising at the development site in accordance with legislative requirements and best practice standards.

13.2 Statement of Authority

This chapter was prepared by Niamh Kelly and Chonaill Bradley of AWN Consulting. Niamh Kelly has a B.A. (Hons.) in Earth Sciences and an MSc in International Disaster Management and is an Affiliate member of the Chartered institute of Waste Management (CIWM). Niamh has two years of experience in environmental consultancy, and has completed Operational Waste Management Plans, Resource and Waste (formerly Construction & Demolition Waste) Management Plans, Construction Environmental Management Plans, sections of Environmental Impact Assessment Reports and EIA Screening Reports for a variety of developments, including residential, commercial and industrial. Chonaill Bradley is a Principal Environmental Consultant in the Environment Team at AWN. He holds a BSc in Environmental Science. He is an Associate Member of the Institute of Waste Management (CIWM). Chonaill has over seven years' experience in the environmental consultancy sector. Chonaill has completed numerous waste management strategies and construction environmental management plans for residential, commercial and industrial developments in the Dublin area and has experience in developing waste strategies, detailed waste design and conducting waste audits.

13.3 Methodology

The assessment of the impacts of the proposed development, arising from the consumption of resources and the generation of waste materials, was carried out taking into account the methodology specified in relevant guidance documents, along with an extensive document review to assist in identifying current and future requirements for waste management, including national and regional waste policy, waste strategies, management plans, legislative requirements and relevant reports. The assessment of effects carried out in this chapter uses the significance criteria set out in **Table 2.2, Chapter 2**. Effects that are described as Imperceptible, Not significant or Slight are deemed to be not significant; those described as Moderate, Significant, Very Significant or Profound are considered to be significant.

This chapter is based on the proposed development, as described in **Chapter 4 – Project Description** and considers the following aspects:

- Legislative context;
- Construction phase (including site preparation, excavation, and construction); and
- Operational phase.

A desktop study was carried out which included the following:

- Review of applicable policy and legislation which creates the legal framework for resource and waste management in Ireland;
- Description of the typical waste materials that will be generated during the construction and operational phases; and
- Identification of mitigation measures to prevent waste generation and promote management of waste in accordance with the waste hierarchy, to include the potential treatment of any relevant material as a by-product in accordance with the objectives of the Circular Economy.

Estimates of waste generation during the construction phase of the proposed development have been calculated and are included in **Section 13.4** of this chapter. The waste types and estimated quantities are based on published data, collated annually, by the EPA in the National Waste Reports and National Waste Statistics, data recorded from similar previous developments, Irish and US EPA waste generation research as well as other available research sources.

Mitigation measures are proposed to minimise the effect of the proposed development on the environment during the construction and operational phases, to promote efficient waste segregation and to reduce the quantity of waste requiring disposal. This information is presented in **Section 13.7** of this chapter.

A detailed review of the existing ground conditions on a regional, local and site-specific scale are presented in **Chapter 11 – Land, Soils, Geology and Hydrogeology**.

13.3.1 Legislation and Guidance

Waste management in Ireland is subject to EU, national and regional waste legislation and control, which defines how waste materials must be managed, transported and treated. The overarching EU legislation is the Waste Framework Directive (2008/98/EC) which is transposed into national legislation in Ireland. The cornerstone of Irish waste legislation is the Waste Management Act 1996 (as amended). European and national waste management policy is based on the concept of 'waste hierarchy', which sets out an order of preference for managing waste (prevention > preparing for reuse > recycling > recovery > disposal).

Figure 13.1 Waste hierarchy (Source: European Commission)

EU and Irish National waste policy also aims to contribute to the circular economy by extracting high-quality resources from waste as much as possible. Circular Economy (CE) is a sustainable alternative to the traditional linear (take-make-dispose) economic model, reducing waste to a minimum by reusing, repairing, refurbishing, and recycling existing materials and products. (**Figure 13.2**).

Figure 13.2 Circular economy (Source: Repak)

The Irish government issues policy documents which outline measures to improve waste management practices in Ireland and help the country achieve EU targets in respect of recycling and disposal of waste. The most recent policy document, Waste Action Plan for a Circular Economy (WAPCE) – Waste Management Policy in Ireland, was published in 2020 and shifts focus away from waste disposal and moves it back up the production chain. The move away from national waste targets is due to the Irish and international waste context changing in the years since the launch of the previous waste management plan, A Resource Opportunity, in 2015.

One of the first actions to be taken from the WAPCE was the development of the Whole of Government Circular Economy Strategy 2022-2023 'Living More, Using Less' (2021) to set a course for Ireland to transition across all sectors and at all levels of Government toward circularity and was issued in December 2021.

The strategy for the management of waste from the construction phase is in line with the requirements of the EPA's 'Best Practice Guidelines for the Preparation of Resource and Waste Management Plans for Construction & Demolition Projects' (2021a). The guidance documents, Best Practice Guidelines for the Preparation of Waste Management Plans for Construction and Demolition Projects and Construction and Demolition Waste Management: A Handbook for Contractors and Site Managers (FÁS & Construction Industry Federation, 2002), were also consulted in the preparation of this assessment.

There are currently no Irish guidelines on the assessment of operational waste generation, and guidance is taken from industry guidelines, plans and reports including the Eastern Midlands Region (EMR) Waste Management Plan 2015 – 2021, draft National Waste Management Plan for a Circular Economy (NWMPCE) (2023), BS 5906:2005 Waste Management in Buildings – Code of Practice, the Fingal County Council Segregation, Storage and Presentation of Household and Commercial Waste Bye-Laws 2020, the EPA National Waste Database Reports 1998 – 2020 and the EPA National Waste Statistics Web Resource.

13.3.2 Terminology

Note that the terminology used herein is consistent with the definitions set out in Article 3 of the Waste Framework Directive. Key terms are defined as follows:

Waste – Any substance or object which the holder discards or intends to or is required to discard.

Prevention – Measures taken before a substance, material or product has become waste, that reduce:

a) the quantity of waste, including through the re-use of products or the extension of the life span of products;

b) the adverse impacts of the generated waste on the environment and human health; or

c) the content of harmful substances in materials and products.

Reuse – Any operation by which products or components that are not waste are used again for the same purpose for which they were conceived.

Preparing for Reuse – Checking, cleaning or repairing recovery operations, by which products or components of products that have become waste are prepared so that they can be re-used without any other pre-processing.

Treatment – Recovery or disposal operations, including preparation prior to recovery or disposal.

Recovery – Any operation the principal result of which is waste serving a useful purpose by replacing other materials which would otherwise have been used to fulfil a particular function, or waste being prepared to fulfil that function, in the plant or in the wider economy. Annex II of the Waste Framework Directive sets out a non-exhaustive list of recovery operations.

Recycling – Any recovery operation by which waste materials are reprocessed into products, materials or substances whether for the original or other purposes. It includes the reprocessing of organic material but does not include energy recovery and the reprocessing into materials that are to be used as fuels or for backfilling operations.

Disposal – Any operation which is not recovery even where the operation has as a secondary consequence the reclamation of substances or energy. Annex I of the Waste Framework Directive sets out a non-exhaustive list of disposal operations.

13.4 Characteristics of the Proposed Development

The Airfield Drainage Project (ADP) proposes significant upgrades to the surface water management infrastructure at Dublin Airport. The ADP comprises a series of drainage system enhancement measures and infrastructure proposals, including the upgrade of existing drainage infrastructure and the construction of additional infrastructure to supplement the performance of the existing surface water management system.

A full description of the proposed development can be found in **Chapter 4 – Project Description**. The characteristics of the proposed development that are relevant in terms of waste management are summarised below.

13.4.1 Do-Nothing Scenario

Under the Do-Nothing scenario the proposed development will not be constructed. In this scenario, no waste would be generated at the development site.

If the Proposed Development was not to go ahead (*i.e.*, in the Do-Nothing scenario) there would be no excavation or construction or operational waste generated at this Site. There would, therefore, be a neutral effect on the environment in terms of waste.

The site is located within an operational airport and it is likely that in the absence of this subject proposal that a development of a similar nature would be progressed on the site that accords with national and regional policies to promote sustainable growth with enhanced emphasis on self-sustaining economic and employment-based development opportunities.

13.4.2 Construction Phase

There will be no demolition associated with the proposed development.

During the construction phase, waste will be produced from surplus materials such as broken or off-cuts of timber, plasterboard, concrete, tiles, bricks, *etc.* Waste from packaging (cardboard, plastic, timber) and oversupply of materials may also be generated. The appointed Contractor will be required to ensure that oversupply of materials is kept to a minimum and opportunities for reuse of suitable materials is maximised.

Significant groundworks are required at the proposed pipelines and storage tanks (CPCF and West Apron). Large scale open excavations will be required along the routes of the proposed pipelines. At the proposed CPCF tank, a large deep excavation will be required. The estimated volume of excavation for this tank will be 190,000 m^3. It is envisaged that the majority (c. 75%) of material will be immediately removed from the site for appropriate offsite reuse, recovery, recycling and / or disposal. Options for re-use off site could be explored by the appointed Contractor at the time of the construction works. The remainder of the excavated material required for backfilling, topsoiling and construction of a temporary berm and permanent flood embankment will be stockpiled on site. The maximum volume of excavated material to be stockpiled is estimated to be 47,000m^3. Refer to the CEMP for further detail.

Trenchless construction will be used where the impacts of open-cut excavation would result in an unacceptable or an avoidable impact to airport activities (*e.g.*, at crossings of Aircraft Traffic Hotspots) or at crossings of public roads (*e.g.*, R132). The construction methodologies will be determined, at detailed design stage, by the Design-Build Contractor. For this reason, the Permanent Works Planning Corridor has been designed such that either open-cut excavation or trenchless construction is possible at certain crossings of key airport infrastructure. Trenchless construction also reduces the volume of material to be excavated.

The West Apron Pollution Tank (WA-PT) and the West Apron Attenuation Tank (WA-AT) also involve large deep excavations with a combined estimated excavation volume of approximately. 98,000 m^3 (see CEMP). It is envisaged that, of this c. 30,000 m^3 (50% of WA-AT excavated material, that excavated from the WA-PT will be used as refill on site, see CEMP) will be removed from the site for appropriate offsite reuse, recovery, recycling and / or disposal. It is envisaged that the remainder of the excavated material will be reused onsite for backfilling.

If the material that requires removal from the site is deemed to be a waste, removal and reuse / recycling / recovery / disposal of the material will be carried out in accordance with the Waste Management Act 1996 (as amended), the Waste Management (Collection Permit) Regulations 2007 (as amended) and the Waste Management (Facility Permit & Registration) Regulations 2007 (as amended). The volume of waste requiring recovery / disposal will dictate whether a Certificate of Registration (COR), permit or licence is required for the receiving facility. Alternatively, the material may be classed as by-product under Regulation 15 (By-products) (Previously Article 27 of the European Communities (Waste Directive) Regulations 2011) of S.I. No. 323/2020 - European Union (Waste Directive) Regulations 2020. For more information in relation to the envisaged management of by-products and waste, refer to the RWMP (**Appendix 13.1**).

In order to establish the appropriate reuse, recovery and / or disposal route for the excavated material to be removed off-site, it will first need to be classified. Waste material will initially need to be classified as hazardous or non-hazardous in accordance with the EPA publication Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous (2019).

Small volumes of waste will also be generated from construction phase workers *e.g.*, organic / food waste, dry mixed recyclables (wastepaper, newspaper, plastic bottles, packaging, aluminium cans, tins and Tetra Pak cartons), mixed non-recyclables and, potentially, sewage sludge from temporary welfare facilities provided on-site during the construction phase. Waste printer / toner cartridges, waste electrical and electronic equipment (WEEE) and waste batteries may also be generated in small volumes from site offices.

Further detail on the waste materials likely to be generated during the excavation and construction works are presented in the project-specific RWMP (**Appendix 13.1**). The RWMP provides an estimate of the main waste types likely to be generated during the construction phase of the proposed development. These are summarised in **Table 13.1**.

Table 13.1 Predicted on and off-site reuse, recycle and disposal rates for construction waste

Waste Type	Tonnes	Reuse		Recycle/Recovery		Disposal	
		%	Tonnes	%	Tonnes	%	Tonnes
Mixed C&D	480.0	10	48.0	80	384.0	10	48.0
Metals	581.3	5	29.1	90	523.1	5	29.1
Concrete	3324.0	30	997.2	65	2160.6	5	166.2
Plastic	70.0	20	14.0	79	55.3	1	0.7
Bituminous Materials	598.0	43	257.1	57	340.9	0	0.0
Total	5053.3		1345.4		3463.9		244.0

13.4.3 Operational Phase

There will be no waste generated during the operational phase of the proposed development.

13.5 Receiving Environment

In terms of waste management, the receiving environment is in the jurisdiction of Fingal County Council (FCC) as the Local Authority responsible for setting and administering waste management activities in the area.

The FCC Fingal Development Plan 2023 – 2029 sets out policies and objectives for the FCC area which reflect those set out in the EMR Waste Management Plan 2015-2021, draft NWMPCE (2023) and national and EU policy.

In terms of physical waste infrastructure, FCC no longer operates any municipal waste landfill in the area. There are a number of waste permitted and licensed facilities located in the EMR, in the surrounding counties and over Ireland, for management of waste from the construction industry as well as municipal sources. These include soil recovery facilities, inert C&D waste facilities, hazardous waste treatment facilities, municipal waste landfills, material recovery facilities, waste transfer stations and two waste-to-energy facilities.

However, these sites may not be available for use when required or may be limited by the waste contractor selected to service the development in the appropriate phase. In addition, there is potential for more suitably placed waste facilities or recovery facilities to become operational in the future which may be more beneficial from an environmental perspective.

The ultimate selection of waste contractors and waste facilities would be subject to appropriate selection criteria of proximity, competency, capacity and serviceability.

13.6 Potential Effects of the Proposed Development

13.6.1 Construction Phase

The proposed development will generate a range of non-hazardous and hazardous waste materials during site excavation and construction (see **Appendix 13.1** for further detail). General housekeeping and packaging will also generate waste materials, as well as typical municipal wastes generated by construction employees, including food waste. Waste materials will be required to be temporarily stored in the construction site compound or adjacent to it, on-site, pending collection by a waste contractor. If waste material is not managed and stored correctly, it is likely to lead to litter or pollution issues at the development site and in adjacent areas, including the presence of vermin.. Therefore, in the absence of mitigation, the effect on the local and regional environment is likely to be direct, short-term, significant and adverse.

It is essential that all waste materials are dealt with in accordance with regional and national legislation, as outlined previously, and that time and resources are dedicated to ensuring efficient waste management practices. In the absence of mitigation, the effect on the local and regional environment is likely to be indirect, long-term, significant and adverse.

Wastes arising will need to be taken to suitably registered / permitted / licenced waste facilities for processing and segregation, reuse, recycling, recovery, and / or disposal, as appropriate. There are numerous licensed waste facilities in the EMR which can accept hazardous and non-hazardous waste materials, and acceptance of waste from the development site would be in line with daily activities at these facilities. At present, there is sufficient capacity for the acceptance of the likely C&D waste arising at facilities in the region. Most of construction materials are either recyclable or recoverable. However, in the absence of mitigation, the effect on the local and regional environment is likely to be indirect, short-term, significant and adverse.

Significant groundworks are required at the proposed pipelines and storage tanks (CPCF and West Apron). Large scale open excavations will be required along the routes of the proposed pipelines. At the proposed CPCF tank, a large deep excavation will be required. The estimated volume of excavation for this tank will be 190,000m^3. It is envisaged that the majority (c. 75%) of material will be immediately removed from the site for appropriate offsite reuse, recovery, recycling and / or disposal. As mentioned, options for re-use off site could be explored by the appointed Contractor at the time of the construction works. The remainder of the excavated material is required for backfilling, topsoiling and construction of a temporary berm and permanent flood embankment.

The West Apron Pollution Tank and the West Apron Attenuation Tank also involve large deep excavations with a combined estimated excavation volume of 116,000m^3. It is envisaged that c. 51,000m^3 will be removed from the site for appropriate offsite reuse, recovery, recycling and / or disposal, **Appendix 13.1**). It is envisaged that the remainder of the excavated material will be reused onsite for backfilling.

A detailed review of the existing ground conditions on a regional, local site-specific scale are presented in **Chapter 11 – Land, Soils, Geology and Hydrogeology**. Correct classification and segregation of the excavated material to be removed off site is required to ensure that any potentially contaminated materials are identified and handled in a way that will not negatively impact on workers as well as on water and soil environments, both on and off-site. However, in the absence of mitigation, the effect on the local and regional environment is likely to be direct, short-term, significant, and adverse.

13.6.2 Operational Phase

There are no potential effects from the operational phase of the proposed development in respect of Waste Management.

13.7 Remedial and Mitigation Measures

This section outlines the measures that will be employed in order to reduce the amount of waste produced, manage the wastes generated responsibly and handle the waste in such a manner as to minimise the effects on the environment.

The concept of the 'waste hierarchy' is employed when considering all mitigation measures. The waste hierarchy states that the preferred option for waste management is prevention and minimisation of waste, followed by preparing for reuse and recycling / recovery, energy recovery (*i.e.*, incineration) and, least favoured of all, disposal.

13.7.1 Construction Phase

The following mitigation measures will be implemented during the construction phase of the proposed development.

As previously stated, a project specific RWMP has been prepared in line with the requirements of The EPA, Best Practice Guidelines for the Preparation of Resource and Waste Management

Plans for Construction & Demolition Projects' (2021) and is included as **Appendix 13.1**. The mitigation measures outlined in the RWMP will be implemented in full and will form part of a mitigation strategy for the site. The mitigation measures presented in this RWMP will ensure effective waste management and minimisation, reuse, recycling, recovery and disposal of waste material generated during the excavation and construction phases of the proposed development.

- Prior to commencement, the appointed Contractor(s) will be required to refine / update the RWMP (**Appendix 13.1**) in agreement with FCC and in compliance with any planning conditions, or submit an addendum to the RWMP to FCC, detailing specific measures to minimise waste generation and resource consumption, and provide details of the proposed waste contractors and destinations of each waste stream.
- The Contractor will implement the RWMP throughout the duration of the proposed excavation and construction phases.

Significant groundworks are required at the proposed pipelines and storage tanks (CPCF and West Apron). Large scale open excavations will be required along the routes of the proposed pipelines. At the proposed CPCF tank, a large deep excavation will be required. The estimated volume of excavation for this tank will be 190,000m^3. It is envisaged that the majority (c. 75%) of material will be immediately removed from the site for appropriate offsite reuse, recovery, recycling and / or disposal.

The West Apron Pollution Tank and the West Apron Attenuation Tank also involve large deep excavations with a combined estimated excavation volume of 116,000m^3. It is envisaged that c. 51,000m^3 will be removed from the site for appropriate offsite reuse, recovery, recycling and / or disposal. It is envisaged that the remainder of the excavated material will be reused onsite for backfilling.

Correct classification and segregation of the excavated material being removed off site is required to ensure that any potentially contaminated materials are identified and handled in a way that will not have an adverse effect on workers as well as on water and soil environments, both on and off-site. Options for re-use off site could be explored by the appointed Contractor at the time of the construction works. The remainder of the excavated material required for backfilling, topsoiling and construction of a temporary berm and permanent flood embankment will be stockpiled on site.

In addition, the following mitigation measures will be implemented and will be contractual obligations of the construction contractors:

- Building materials will be chosen to 'design out waste';
- On-site segregation of waste materials will be carried out to increase opportunities for off-site reuse, recycling and recovery. The following waste types, at a minimum, will be segregated:
    - Concrete rubble (including ceramics, tiles, and bricks);
    - Metals;
    - Glass;

  - Hazardous material; and
  - Timber.
- Left over materials (*e.g.*, timber off-cuts, broken concrete blocks / bricks) and any suitable construction materials shall be re-used on-site, where possible; (alternatively, the waste will be sorted for recycling, recovery or disposal);
- All waste materials will be stored in skips or other suitable receptacles in designated areas of the site;
- Any hazardous wastes generated (such as chemicals, solvents, glues, fuels, oils) will also be segregated and will be stored in appropriate receptacles (in suitably bunded areas, where required);
- A Resource Manager will be appointed by the main Contractor(s) to ensure effective management of waste during the excavation and construction works;
- All construction staff will be provided with training regarding the waste management procedures;
- All waste leaving site will be reused, recycled or recovered, where possible, to avoid material designated for disposal;
- All waste leaving the site will be transported by suitably permitted contractors and taken to suitably registered, permitted or licenced facilities; and
- All waste leaving the site will be recorded and copies of relevant documentation maintained.

Refer to the Resources and Waste Management Plan (RWMP) for further detail. These mitigation measures will ensure that the waste arising from the construction phase of the proposed development is dealt with in compliance with the provisions of the Waste Management Act 1996, as amended, associated Regulations, the Litter Pollution Act 1997 as amended, the EMR Waste Management Plan 2015 – 2021, and the draft NWMPCE. It will also ensure that optimum levels of waste reduction, reuse, recycling and recovery are achieved and will promote more sustainable consumption of resources.

13.7.2 Operational Phase

There will be no mitigation measures required for the operational phase of this development as no operational waste will be generated.

13.8 Residual Effects of the Proposed Development

The implementation of the mitigation measures outlined in **Section 13.7** and in **Appendix 13.1** will ensure that high rates of reuse, recovery and recycling are achieved at the site of the proposed development during the construction phase. It will also ensure that European, National and Regional legislative waste requirements about waste are met and that associated targets for the management of waste are achieved.

13.8.1 Construction Phase

A carefully planned approach to waste management as set out in **Section 13.6.1** and adherence to the RWMP (which includes mitigation) (**Appendix 13.1**) during the construction phase will ensure that the residual effect on the environment (*i.e.*, the generation, processing and segregation, reuse, recycling, recovery, and / or disposal of waste) will be short-term, imperceptible, and neutral. Having regard to the foregoing, there is no likelihood of significant effects on the environment arising from the proposed development in respect of waste management impacts during the construction phase.

13.8.2 Operational Phase

There will be no residual effects during the operational phase as no operational waste will be generated.

13.9 Monitoring and/or Reinstatement

The management of waste during the construction phase will be monitored by the contractor's appointed Resource Manager to ensure compliance with the above-listed mitigation measures, and relevant waste management legislation and local authority requirements, including maintenance of waste documentation.

13.9.1 Construction Phase

The objective of setting targets for waste management is only achieved if the actual waste generation volumes are calculated and compared. This is particularly important during the excavation and construction works where there is a potential for waste management to become secondary to progress and meeting construction schedule targets. The mitigation measures in the RWMP specify the need for a Resource Manager (RM) to be appointed who will have responsibility to monitor the actual waste volumes being generated and to ensure that contractors and sub-contractors are segregating waste as required. Where targets are not being met, the waste manager will identify the reasons for targets not being achieved and work to resolve any issues. Recording of waste generation during the project will enable better management of waste contractor requirements and identify trends. The data will be reviewed continuously throughout this project to identify opportunities to further reduce waste continually.

13.9.2 Operational Phase

There will be no monitoring required for the operational phase as no operational waste will be produced.

13.10 Cumulative Effects

The potential for cumulative effects (as far as practically possible) of all elements of the Proposed Development, as well as the potential for cumulative effects of the Proposed Development with any/all relevant planned, existing or permitted developments is outlined below for construction and operational phases for those projects that were scoped in for assessment as presented in **Chapter 18**.

13.10.1 Construction Phase

There are existing residential and commercial developments close by (*i.e.*, within 500m of the development site), along with the multiple permissions remaining in place in the area (see **Chapter 7**). In a worst-case scenario, multiple developments in the area could be developed concurrently or overlap in the construction phase.

The Underpass (FCC Ref. F22A/0460) is a development within the vicinity of the site that has the potential for cumulative impacts on waste management during the construction phase.

Due to the high number of waste contractors in the FCC region, as provided from the National Waste Collection Permit Office and the EPA, there would be sufficient contractors available to handle waste generated from a large number of these sites simultaneously, if required. Similar waste materials would be generated by all of the developments. Other developments in the area will be required to manage waste in compliance with national and local legislation, policies and plans which will mitigate against any potential cumulative effects associated with waste generation and waste management. As such the cumulative effect will be indirect, short-term, imperceptible and neutral.

13.10.2 Operational Phase

There will be no waste generated during the operational phase of the proposed development, therefore there is no potential for cumulative impacts in respect of waste management.

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TABLES

14 MATERIAL ASSETS (TRAFFIC AND UTILITIES)

14.1 Introduction

This chapter evaluates the potential effects, from the proposed development on Material Assets as defined in the EPA Guidelines 'Guidelines on the information to be contained in Environmental Impact Assessment Reports' (EPA, 2022a), Advice Notes 'Advice Notes for Preparing Environmental Impact Statements' (EPA, 2015b), and European Commission Guidance on Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report (2017).

14.2 Statement of Authority

This chapter was prepared by Niamh Kelly of AWN Consulting. Niamh has a B.A. (Hons.) in Earth Sciences and an MSc in International Disaster Management and is an Affiliate member of the Chartered institute of Waste Management (CIWM). Niamh has completed Operational Waste Management Plans, Resource and Waste (formerly Construction & Demolition Waste) Management Plans, Construction Environmental Management Plans, sections of Environmental Impact Assessment Reports and EIA Screening Reports for a variety of developments, including residential, commercial and industrial.

Ronan Kearns, BA, BAI, MSc, MBA, CEng MIEI of Pinnacle Consulting Engineers is a Chartered Engineer with 19 years' post graduate experience. Projects worked on include roads, drainage and civil infrastructure design and project management for residential, retail, data centres and commercial developments from feasibility through to construction. Ronan has led numerous planning applications and infrastructure designs for a variety of developments. These developments have ranged from small scale residential projects to multimillion Euro retail and data centre projects. Ronan specialises in transportation planning and site assessment, preliminary design and detailed design of development. Ronan has completed a number of Traffic and Transportation EIAR chapters for Data Centres located in various Local Authorities.

14.3 Methodology

The legislation and guidance listed below have informed this EIAR Chapter and the methodology:

- Fingal County Council (FCC) Fingal Development Plan 2023-2029;
- Guidelines on the Information to be contained in Environmental Impact Assessment Reports. (2022a). Environmental Protection Agency;
- Planning and Development Acts 2000-2022;
- FCC, Dublin Airport Local Area Plan 2020;
- European Union Environmental Impact Assessment (EIA) Directive 2011/92/EU as amended by 2014/52/EU;
- European Union (Planning & Development) (Environmental Impact Assessment) Regulations 2018;

- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment. (August 2018) Department of Housing, Planning and Local Government; and
- European Commission Guidance on Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report (2017).

The Directive 2011/92/EU defines material assets as 'resources that are valued and that are intrinsic to specific places; they may be of either human or natural origin' this included architectural and archaeological heritage. The Directive 2014/52/EU, amending 2011/92/EU, included architectural and archaeological heritage as components of cultural heritage. This EIAR includes architectural and archaeological heritage in the Archaeology & Cultural Heritage Chapter (**Chapter 16**).

The EPA Guidelines (2022a) state that material assets are taken to mean "built services and infrastructure, roads and traffic and waste management". The EPA Advice Notes (2015b) also gives examples of material assets including assimilative capacity of air and water; ownership and access; and tourism and recreational infrastructure. The European Commission Guidance (2022) refers to several examples of material assets including buildings, other structures, mineral resources, and water resources.

In this EIAR, the effects on some of the material assets described in the above guidance have already been considered in the following chapters and therefore these aspects will not be addressed in specific detail within this chapter.

- **Chapter 8**, Population and Human Health
- **Chapter 10**, Hydrology
- **Chapter 11**, Land, Soils, Geology & Hydrogeology
- **Chapter 13**, Material Assets (Waste Management)
- **Chapter 16**, Archaeology & Cultural Heritage

This chapter assesses ownership and access, built services and infrastructure, which have not already been addressed elsewhere in this EIAR. The subsequent sections address built services and infrastructure. The potential effects on built services and infrastructure, if any, have been assessed using the EPA's 'Guidelines on the information to be contained in Environmental Impact Assessment Reports' (2022a). The potential effects on built services and infrastructure, if any, are assessed under the following subheadings:

- Land Use, Property, and Access;
- Power and Electrical Supply;
- Surface water infrastructure;
- Foul drainage infrastructure;
- Water supply;
- Telecommunications; and
- Traffic and Transportation.

The associated built services and infrastructure in the vicinity of the site are summarised in the following sections.

Criteria used to determine significance are in line with those presented in **Table 2.2**, **Chapter 2**.

14.4 Receiving environment

The site is located within, and in the vicinity of, the Dublin Airport campus. Dublin Airport is an international airport serving the island of Ireland. The airport is located 7 km north of Dublin, in Collinstown, and 3 km south of the town of Swords.

14.4.1 Do-Nothing Scenario

Under the Do-Nothing scenario the proposed development will not be constructed. In this scenario, there would be no impact on material assets at the development site.

The site is located within an operational airport and it is likely that in the absence of this subject proposal a development of a similar nature would be progressed on the site that accords with national and regional policies.

14.4.2 Land use, property, and access

The proposed development subject of this planning application consists of an Airfield Drainage Project (ADP) with associated development and ancillary works at Dublin Airport, Co Dublin.

The proposed ADP developments would require works within the "airside" area of the airport campus, in the "landside" area commonly known as the Eastlands and on public carriageways (R108 and R132).

- "Airside" refers to areas in the Dublin Airport campus which are within the Critical Part of the Security Restricted Area (CPSRA) boundary.
- "Landside" refers to areas in the Dublin Airport campus which are outside the CPSRA boundary.

For reference, the area to the east of the R132 carriageway, which is bounded to the east by the M1 motorway, the south by the Dardistown Cemetery and the north by the ALSAA complex and car hire facilities is commonly referred to as "the Eastlands".

The site is in the ownership of the Applicant.

The context of the site is described in further detail in **Chapter 4 – Project Description**. The planning history of the site and surrounds is discussed in further detail in the Planning Report prepared by Nicholas O'Dwyer and included in the planning documentation.

14.4.3 Power and electrical supply

The site will require connections which will be supplied from daa's existing internal grid.

During construction, contractors will require power for onsite accommodation, and construction equipment/plant. A construction compound and temporary power supply will be established in consultation with the utility suppler. The power requirements for the construction phase will be relatively minor.

All connection works will be carried out in accordance with the requirements of the various service providers / authorities.

14.4.4 Surface water infrastructure

The ADP proposes significant upgrades to the surface water management infrastructure at Dublin Airport. The ADP comprises a series of drainage system enhancement measures and infrastructure proposals, including the upgrade of existing drainage infrastructure and the construction of additional infrastructure to supplement the performance of the existing surface water management system.

The implementation of a new Contamination Detection and Response (CD&R) System and the provision of additional pollution control facilities are designed to provide robust protection to receiving waters. The network enhancements also intend to intercept greenfield inflows, at points upstream of the airport campus, and convey them directly to the receiving waters. These proposals will operate as part of an integrated airfield-wide surface water management system designed to improve the ecological quality of receiving waters in accordance with the Surface Water Regulations.

It is also proposed to provide hydraulic upgrades to the existing network. This will provide the network connectivity needed to facilitate the proposed flow segregation system, increase the hydraulic capacity of the network, and alleviate historic capacity issues. Some local upgrades and reconfigurations of existing drainage networks at West Apron and South Apron will be necessary to integrate these networks into the airfield-wide surface water management system.

The proposed ADP includes an airfield-wide Supervisory Control and Data Acquisition (SCADA) system which will provide operational control for all existing and proposed drainage infrastructure.

A new Central Pollution Control Facility (CPCF) is proposed to protect receiving waters from contaminated surface water runoff from the airfield. The proposed CPCF structure would store contaminated surface water runoff prior to discharge to the public foul sewer. The facility would include storage tanks, a pumping station, control kiosk and a new access road as well as other ancillary developments. It is also proposed to construct a new electrical substation to supply power to the proposed CPCF.

It is proposed to construct the CPCF in the Eastlands, to the east of the R132. The proposed CPCF will provide additional storage volume for contaminated surface water runoff from the airfield. The CPCF structure will also include pumping infrastructure, as required to pump contaminated runoff from the CPCF to the public foul sewer for treatment.

The CPCF will significantly increase the resilience of the pollution control system to withstand contamination events and offer improved protection of receiving waters. The proposed storage volume is designed to provide a nett improvement in the protection of receiving water quality. The construction of the CPCF will significantly reduce the likelihood and frequency of contaminated overflows, thereby improving the ecological condition of the Cuckoo Stream.

The CPCF also includes additional safeguarded storage capacity to serve future developments, up to and including the 40mppa development horizon. This approach is reflective of the outcomes of the Drainage Masterplan (DMP) and the Dublin Airport Vision (DAV), which are described in the Drainage Overview document (provided in **Section 9** of this Planning Application). This safeguarding approach is designed to prioritise coordinated and sustainable development, increasing the efficiency of construction and achieving an economy of scale by building larger tanks as one development rather than two separate construction phases.

The CPCF pumping rates will be controlled by the airfield-wide SCADA system which will include operational flexibility in order to optimise system operation.

A TEDL (Ref. TE-10365-01) and connection agreement between daa and Uisce Éireann is currently in place. An extensive consultation process has been undertaken between daa and Uisce Éireann regarding the application for a revised TEDL and a new connection agreement to govern the ADP. This consultation has been supplemented by hydraulic modelling of the public sewer network, which confirmed the availability of sufficient hydraulic capacity to receive flows up to and including proposed revised discharge limits. These revised limits have been agreed in principle with Uisce Éireann. A Pre-connection Enquiry form was submitted on the 17/01/23 specifying the limits agreed in previous consultations. A Confirmation of Feasibility letter was issued on 23/02/23 (Ref-CDS23000386) in response to this Pre-connection Enquiry form which confirms that these revised limits can be accommodated, subject to delivery of a control system by daa, and the completion of upgrade works by Uisce Éireann on Sutton Pumping Station.

The proposed ADP developments include safeguarding measures to facilitate planned future development in accordance with the DMP and the DAV. These safeguarding measures include the provision of additional hydraulic capacity in the network and the futureproofing of infrastructure for future expansion. This holistic, coordinated approach is designed to support the efficiency and sustainability of future developments at Dublin Airport. The inclusion of these safeguarding measures will reduce the need for future repeat construction at a given location, with the result that the combined impact of current and future developments on airport operations is reduced. This means that there would be less operational disruption and fewer temporary closures of airport infrastructure (*e.g.*, taxiways and runways) during future developments, as well as an increased efficiency of construction works and reduced cumulative environmental impact.

14.4.5 Foul drainage infrastructure

During the construction phase of the proposed development welfare facilities will be provided for the contractors *via* portable sanitary facilities within the construction compound site. Foul water will be collected from the welfare facilities on a regular basis by a licensed waste sewerage contractor.

14.4.6 Water supply

During construction, water will be required for tunnelling of pipelines. This requires water for the removal of material from the tunnel boring machine and for the lubrication of pipelines during installation. A storage volume of approximately 1,000m^3 of water will be required at the outset. The water will be used to transport material from the tunnel boring machine to the surface during tunnel boring, and to lubricate the pipeline during installation. This water will be recycled through an on-site separation system and will be reused throughout the process. Water will also be required for pipeline testing and tank testing purposes.

Water from the public mains would be considered for use following liaison with Uisce Éireann. In the West Compound, there is an existing well that has been used for the previous construction works in this area.

In addition to the above, water will be required for various other uses, including the following:

- Wheel washing (estimated daily usage of 450m^3 of water based on wheel washing at two compounds and three construction access gates to the works zones and peak daily construction traffic movements of 450 from the works zones). Water can be conserved by the potential use of water reuse wheelwash systems;
- Welfare facilities (estimated daily usage of 6m^3 of potable water at peak construction);
- Canteen facilities (estimated daily usage of 15m^3 of potable water at peak construction);
- Dust suppression; and
- The CPCF.

Direct connections will be provided to each construction compound from the public water supply. Applications will be made to Uisce Éireann Connections and Developer Services Team.

New clean water supply pipelines are proposed to convey flows from greenfield inflows, and runoff from the airfield which has been identified as clean, to the receiving waters. This will help to address the water quality of the receiving waters by improving the supply of clean flow. As well as conveying surface water flows from within the airfield which are identified as clean, these pipelines will also serve to convey greenfield inflows from grassed areas upstream of the airfield which are not impacted by airport activities.

14.4.7 Telecommunications

Telecommunications for the East and West Compounds will be supplied from existing daa sources.

14.4.8 Traffic and Transportation

As mentioned, the ADP is located at Dublin Airport, Collinstown, Co. Dublin. Public roads in the general area of the site include the M1 motorway to the east, the M50 motorway to the south, the L2015 (Old Airport Road) to the south, the regional road R108 to the north, south and west and the local road (L72746 Naul Road) to the north.

The relevant public roads adjacent and within the area of proposed works are as follows:

- R132 (Swords Road): Immediately to the southeast of the existing South Apron. The proposed Central Pollution Control Facility (CPCF) is proposed to be located to the east of this road. The proposed CPCF Contaminated Pipeline route is proposed to cross this road via trenchless construction methods. The discharge pipework from the CPCF tank is proposed to discharge to the North Fringe Sewer which is located on the R132 and will require an open cut crossing of the eastern lanes of the R132;
- R108 to the west of the airport campus: The proposed Clean Water Pipeline CW1 is proposed to be constructed in part along the R108;
- R108 (Naul Road): To the north of the airport campus. There are no proposed works anticipated which would directly impact this road; and
- L2015 (Old Airport Road): To the south of the airport campus. There are no proposed works anticipated which would directly impact this road.

14.5 Potential effects of the proposed development

14.5.1 Land use, property and access

During the construction phase there are potential short-term nuisances such as dust and noise, as well as the potential for pollution of groundwater or the existing drainage ditches associated with excavations and construction works.

The Construction Environmental Management Plan (CEMP) (see **Appendix 4**) will be implemented and adhered to by the construction contractor and will be overseen and updated as required if site conditions change by the Project Manager, Environmental Manager and Ecological Clerk of Works where relevant. All personnel working on the site will be trained in the implementation of the procedures outlined in the CEMP. The specific mitigation measures to address potential environmental effects are presented in each individual EIAR chapter.

The lands for the proposed development are entirely within the existing Dublin Airport site and are zoned 'DA - Dublin Airport' under the Fingal Development Plan 2023-2029. The objective of this zoning is to *'Ensure the efficient and effective operation and development of the airport in accordance with an approved Local Area Plan'*. Due to the zoning of these lands, and the setting of the proposed development within the existing Dublin Airport site, the overall potential impact associated with land use and property for the operational phase will be neutral, not significant, and long term, with a localised extent.

14.5.2 Power and electrical supply

The power requirements for the construction phase of the proposed development will be relatively minor. The potential effect associated with power and electrical supply for the construction phase will be direct, neutral, imperceptible, and short-term, as power will be provided from daa's existing internal supply.

During the operational phase, maintenance of utilities infrastructure on the site will be carried out using power provided from daa's existing internal supply. As such, no significant effects on services or utilities themselves are predicted to occur as a result of the operational phase.

14.5.3 Surface water infrastructure

The contractor will be required to manage surface water as outlined in the CEMP. The design and control measures will ensure that run-off water containing silt or potential construction contaminants (oil and alkaline water from cement) will be contained on site and treated. Run off will be managed to greenfield run-off rates and as such there is no potential for off-site flooding.

As detailed in **Chapter 10 – Hydrology** of this EIA Report, surface water run-off during the construction phase may contain increased silt levels or become polluted from construction activities. Run-off containing large amounts of silt can cause damage to surface water systems and receiving watercourses. Silt water can arise from dewatering excavations, exposed ground, stockpiles, and access roads.

During the construction phase at this site there is potential for an increase in run-off due to the compaction of soils. This will reduce the infiltration capacity and increase the rate and volume of direct surface run-off. The potential impact of this is a possible increase in surface water run-off and sediment loading which could potentially impact local drainage and open watercourses.

There is potential for water (surface water run-off and /or groundwater) to become contaminated with pollutants associated with construction activity. Contaminated water which arises from construction sites can pose a significant short-term risk to groundwater quality for the duration of the construction if contaminated water is allowed to percolate to the aquifer/ receiving groundwater bodies (refer to **Chapter 11 – Land, Soils, Geology & Hydrogeology** for further details).

During the construction of the proposed development, there is a risk of accidental pollution incidences from the following sources:

- Suspended solids (muddy water with increased turbidity) – arising from excavation and ground disturbance;
- Cement/concrete (increased turbidity and pH) – arising from construction materials;
- Hydrocarbons (ecotoxic) – accidental spillages from construction plant or onsite storage; and
- Wastewater (nutrient and microbial-rich) – arising from accidental discharge from on-site toilets and washrooms.

Machinery activities on site during the construction phase may result in contamination of run-off / surface water. Potential effects could arise from accidental spillage of fuels, oils, paints, *etc.*, which could impact surface water if allowed to infiltrate to surface water systems and / or receiving watercourses. In the absence of mitigation, surface water run-off during the construction phase may contain increased levels of hydrocarbons, and other pollutants. However, implementation of the mitigation measures detailed below will ensure that this risk is minimised.

Concreting operations carried out near surface water drainage points during construction activities could lead to discharges to a watercourse. Concrete (specifically, the cement component) is highly alkaline and any spillage to a local watercourse would be detrimental to water quality and local fauna and flora. As such, the potential effects associated with surface water run-off from the proposed development during the construction phase without mitigation measures is adverse, short term, and moderate.

The development was designed to minimise the introduction of new/redeveloped impermeable area. Across the whole scheme there is approximately 5,031 m^2 of new hardstand proposed. This will have a minor effect on local recharge to ground; however, the impact on the overall hydrological regime will be insignificant, refer also to **Chapter 11**.

14.5.4 Foul drainage infrastructure

Welfare facilities will be provided for the construction workers on site during the construction works and wastewater will be of domestic origin only. The works contractor will be required to apply to Uisce Éireann for connection to discharge any contaminated surface water which collects in excavations if it is required. The works contractor will be obliged to comply with any conditions of the discharge license to control discharge quality and rate of flow. The potential effect on foul drainage for the construction phase is direct, adverse, imperceptible, and short-term.

During the operational phase, the proposed CPCF pumping station will pump flows from the CPCF to the public foul sewer. The proposed physical sewer discharge infrastructure involves a phased approach, with an interim foul sewer connection to be constructed initially, followed by a permanent foul sewer connection. This phased approach is described below:

- The initial sewer discharge will involve a pumped discharge to the existing North Fringe Sewer. This will remain in place until such time as Uisce Éireann's Greater Dublin Drainage (GDD) project constructs and commissions the proposed orbital sewer. It is noted that the pumped discharge is proposed to be the permanent solution if the GDD Project is not delivered. This option is completely independent of the GDD project.
- The permanent sewer discharge pipelines from the CPCF will discharge to the GDD orbital foul sewer. The proposed permanent sewer discharge solution involves a combination of both gravity and pumped discharge pipelines. The combined gravity and pumped discharge solution means that, when contaminated water builds up to a sufficient height within the CPCF storage tank, flows can discharge *via* gravity to the public foul sewer, thereby minimising pumping costs and energy consumption.

The potential effect on foul drainage for the operational phase is direct, neutral, imperceptible, and long-term.

14.5.5 Water supply

During the construction phase water will be required for tunnelling of pipelines, wheel washing, welfare facilities, canteen facilities and dust suppression. Water from the public mains would be considered for use following liaison with Uisce Éireann. In the West Compound, there is an existing well that has been used for the previous construction works in this area. The demand during the construction phase is not expected to be significant enough to have any potential impact on the existing water supply network. The potential effect on potable water infrastructure for the construction phase is therefore direct, neutral, imperceptible, and short-term.

New clean water supply pipelines are proposed to convey inflows from greenfield areas and runoff from the airfield which has been identified as clean. This will provide a source of clean water to receiving waters. The potential effect on potable water infrastructure for the operational phase is direct, neutral, imperceptible, and long-term.

14.5.6 Telecommunications

The locations of existing services (underground and overhead, where applicable) will be confirmed prior to the commencement of on-site works. The potential effect on telecommunications infrastructure for the construction phase is direct, neutral, imperceptible and short-term, as telecommunications will be supplied from existing daa sources.

It is assumed that there is sufficient capacity available in the network to accommodate the development, so there are no potential effects associated with telecommunications for the Project for the operation phase.

14.5.7 Traffic and Transportation

14.5.7.1 Methodology

Pedestrian Amenity

IEMA Guidelines define pedestrian amenity as the relative pleasantness of a journey maybe influenced by fear and intimidation if they are relevant. As with pedestrian delay, pedestrian amenity is considered to be affected by speed of traffic, traffic volumes and volumes of HGV relative to standard traffic and long with the width of the footpath and pedestrian volumes.

The impact of the proposed development on pedestrians is outlined in **Table 14.1**.

Table 14.1 Degree of hazard to pedestrians (IEMA, 1993)

Degree of Hazard	Average Traffic Flow over 18hr day (vehicles per hour)	Total 18 Hour HGV Flows	Average Speed (mph)
Extreme	1,800+	3,000+	20+
Great	1,200-1,800	2,000-3,000	12-20

Degree of Hazard	Average Traffic Flow over 18hr day (vehicles per hour)	Total 18 Hour HGV Flows	Average Speed (mph)
Moderate	600-1,200	1,000-3,000	10-15

Driver Delay

IEMA Guidelines note that driver delay can occur at several points on the network, although the effects are only likely to be significant when the traffic on the highway network is predicted to be at or close to capacity of the system.

TII's Traffic and Transport Assessment Guidelines (PE-PDV-02045) sets out advisory thresholds, with respect to traffic movements, for when a Traffic and Transport Assessment is required as follows:

- 100 trips in / out combined in the peak hours for the proposed development.
- Development traffic exceeds 10% of turning movements at junctions with and on National Roads.
- Development traffic exceeds 5% of turning movements at junctions with National Roads if location has potential to become congested or sensitive.

Accidents and Safety

There is no formal published guidance for the assessment of accidents and safety, rather it is left to professional judgement to assess the implications on the local infrastructure as a result of the development.

In this instance, the physical highways infrastructure that will connect the Project to the local road network is in place. This will allow for the identification of road safety trend using sources of verified data such as the Road Safety Authority's Road traffic collision data.

Where there is an existing trend in traffic collision, the additional traffic generated by the Overall Project is likely to exacerbate this trend.

If no trend exists, the addition of traffic generated by the Project is unlikely to lead to a significant decrease in road safety/increase in accidents as the relevant infrastructure has been designed in accordance with the relevant design standards.

Assessment

The following nodes were assessed as part of this EIAR chapter as these were identified as the nodes that would be likely to be the most impacted as a result of the Project (**Table 14.2**).

Table 14.2 Location of nodes

NODE	Location
4	Old Airport Road/Swords Road
5	Old Airport Road
6	Old Airport Road/R122
7	R122/R108 Roundabout
11	R132/Naul Road
12	R132/Junction 2 M1 Slip Road
14	Swords Road/Green Car Park Road
15	Swords Road/Corballs Road

14.5.7.2 Potential Effects during Construction Phase

The likely effects of the construction works will be short-term in nature. The number of staff on site will fluctuate over the implementation of the subject scheme.

During the construction phase, the general workforce is likely to be approximately 160 in number.

Based on the site working hours, on-site employees will generally arrive before 07:00, thus avoiding the morning peak hour traffic and depart after 19:00 avoiding the evening peak traffic.

A number of the construction traffic movements will be undertaken by heavy goods vehicles.

Construction traffic movements to and from the two works zones will take place for various construction related activities including but not limited to:

- Disposal of surplus excavated materials from pipeline trenches, manholes, chambers, tunnel shafts, tunnelled pipelines, the West Apron tanks and the CPCF storage tank; and
- Delivery of construction materials such as pipes, backfill material, concrete, steel, precast materials, mechanical equipment, *etc.*, either direct to the works zone or from the compounds.

The estimated construction traffic volumes are variable depending on phasing of the works and the work type. The peak construction traffic volume will be associated with the excavation for the

CPCF, the concrete pours for the CPCF, the excavation for the West Apron tanks (polluted and clean tanks) and the concrete pours for the West Apron Pollution Tank.

Based on Table 10-1 of the CEMP (see **Appendix 4**), the peak single one-way movement is estimated to be 274 HGVs/day for the excavation from the CPCF. The split of the total estimated traffic movements is 45% associated with the west works zone and 55% associated with the east works zone.

Table 14.3. Traffic increases associated with the peak construction phase

NODE	AADT	AADT - HV	Construction Traffic	% HGV	% Impact
4	37,228.38	4,770.61	27.94	12.89%	0.08%
5	10,524.37	677.06	128.76	7.66%	1.22%
6	24,402.89	2,583.31	100.82	11.00%	0.41%
7	37,855.87	4,566.43	100.82	12.33%	0.27%
11	50,039.32	9,648.44	82.49	19.45%	0.16%
12	117,625.75	2,669.07	82.49	2.34%	0.07%
14	34,818.09	2,705.55	27.94	7.85%	0.08%
15	27,960.76	4,942.19	27.94	17.78%	0.10%

The traffic associated with the construction phase will increase traffic through local nodes by up to 1.22% ranging from 0.7% to 1.22% during peak construction in 2026 (**Table 14.3**).

This is less than the threshold set out by TII for the need for a traffic and transport impact assessment.

During the construction phase of the proposed development, there will be additional traffic movements to and from the site from construction personnel, security staff, professional staff (*i.e.*, design team, utility companies), excavation plant, dumper trucks and deliveries/removal of materials (waste/spoil). The frequency of vehicles accessing the site will vary throughout the construction phase.

The effects of the construction phase would be temporary and are summarised as follows:

- Adverse, significant and temporary in EIAR terms for pedestrian amenity;
- Adverse, significant and temporary permeant in EIAR terms for driver delay; and

- Adverse, significant and temporary in EIAR terms for accidents and safety.

A site-specific Construction Traffic Management Plan (CTMP) is included with the CEMP. The CTMP outlines the proposed construction traffic access measures for the proposed development, and mitigation measures to minimise the impact of construction traffic on the surrounding road network.

The construction traffic effects of the proposed development are dependent on the capacity of the local road network to facilitate access to the development by HGVs and heavy construction machinery associated with the construction phase. The ability to accommodate temporary parking for contractors and storage of materials on site is another key consideration.

The road marshal, appointed by the Main Contractor, will be responsible to ensure that there is no disruption to traffic or pedestrians and that roadways and paths are kept clean and free of debris.

The CTMP remains a live document that will be reviewed by the contractor and expanded upon, where necessary, throughout the construction phase of the project. However, this version is considered to be wholly relevant for the expected works.

Following the implementation of the mitigation measures outlined in the CTMP the potential effects on traffic and transportation are negative, moderate, and short term for the construction phase.

The effects of the construction phase, post implementation of mitigation measures, would be temporary and are summarised as follows.

- Slight negative, not significant and temporary in EIAR terms for pedestrian amenity;
- Slight negative, not significant and temporary in EIAR terms for driver delay; and
- Slight negative, not significant and temporary in EIAR terms for accidents and safety.

Haul Routes

Materials such as steel and concrete required in the construction of the proposed development are likely to be sourced from manufacturers that are not situated within the immediate vicinity of the proposed development.

The total number of vehicular traffic movements between site location will be determined by the contractor based on the phasing of the proposed development. The use of local roads will be minimised as much as possible, particularly to avoid / minimise the encountering of narrow road widths, poor visibility and unsuitable bearing capacities.

Construction traffic movements to and from the works zones will be *via* the routes shown in Figure 10, Figure 11 and Figure 12 of the CTMP and will be subject to site access control and security as described in Section 5.1 of the CTMP.

Construction traffic movements associated with the removal of surplus excavated materials from the works zones to suitable disposal sites may not be able to avoid impacting the known congestion points, the M1 spur route and the R132 roundabout, but this will depend on the location of the disposal site(s) to be determined by the appointed contractor(s).

Construction traffic, associated with the disposal of surplus material, from the west works zone can access the main routes as follows:

- The M50 can be accessed via the Naul exit;
- The N2 to the west can be accessed via the R108; and
- The M1 can be accessed via the Naul exit onto the M50.

Traffic associated with deliveries to the west compound would be via the R108 from the M50, N2 and M1.

Construction traffic, associated with the disposal of surplus material, from the east works zone can access the main routes as follows:

- The M50 can be accessed via the R132 and the Naul exit outside peak traffic times from Gate 1B;
- The M50 can be accessed via the R132 and the Naul exit from the Eastlands;
- The M50 can be accessed via the Naul Road in a westerly direction from Gate 1B in peak and outside peak traffic times;
- The N2 to the west can be accessed via the R132 outside peak traffic times and via the Naul Road during peak traffic times from Gate 1B;
- The N2 to the west can be accessed via the R132 from the Eastlands;
- The M1 can be accessed from the Eastlands via the R132 and Naul exit onto the M50 at peak traffic times on the M1 spur route and R132 roundabout;
- The M1 can be accessed from Gate 1B via the Naul Road in a westerly direction onto the M50 at peak traffic times on the M1 spur route and R132 roundabout; and
- The M1 can be accessed from Gate 1B and the Eastlands via the R132 and the M1 spur road / R132 roundabout outside peak traffic times.

14.5.7.3 Potential Effects during Operational Phase

During the operational phase, the proposed development will not generate any traffic due to the nature of the permanent works. Therefore, once complete, the ADP will not have any effect on the local road network during normal operation.

14.5.7.4 Cumulative Effects

Chapter 18 presents the approach taken to scope in or out other projects for potential cumulative effects. The cumulative effect of the ADP and the Underpass Project is illustrated below in **Table 14.4**, assuming some overlap of the construction phase of the two projects.

Table 14.4 Cumulative traffic increases of Airfield Drainage Project and the Underpass Project

NODE	AADT	AADT - HV	Construction Traffic	Underpass Traffic	% HGV	% Impact
4	37,228.38	4,770.61	136.12	19.05	13.23%	0.42%
5	10,524.37	677.06	627.31	207.29	14.36%	7.93%
6	24,402.89	2,583.31	491.18	188.25	13.37%	2.78%
7	37,855.87	4,566.43	491.18	188.25	13.86%	1.79%
11	50,039.32	9,648.44	401.88	56.23	20.20%	0.92%
12	117,625.75	2,669.07	401.88	56.23	2.66%	0.39%
14	34,818.09	2,705.55	136.12	19.05	8.22%	0.45%
15	27,960.76	4,942.19	136.12	19.05	18.23%	0.55%

The traffic associated with the construction phase will increase traffic through local nodes by up to 8% ranging from 0.39% to 7.93% during peak construction in 2026.

This is less than the threshold set out by TII for the need for a traffic and transport impact assessment.

Given insufficient information about the timing of the construction phase and associated traffic to be generated on the network, an assessment to a similar level of detail could not be carried out for the MetroLink. With mitigation in place for the duration of the construction phases, if they overlap, significant cumulative effects are not considered likely.

14.6 Remedial and mitigation measures

14.6.1 Construction phase

Ongoing consultation with Uisce Éireann, Bord Gáis EirGrid, ESB Networks and other relevant service providers within the locality, and compliance with any requirements or guidelines they may have, will ensure a smooth construction schedule without disruption to the local residential and business community. The works contractor will be obliged to put best practice mitigation measures in place (including consultation with utility providers; assessment of utilities at detailed design stage to determine risk of damage due to vibrations) to ensure that there are no interruptions to these utilities, unless this has been agreed in advance. Coordination and consultation will be carried out between the project team and ESB and Uisce Éireann, and other relevant service providers within the locality, as the design of the proposed development progresses.

The CEMP will be implemented and adhered to by the construction contractor and will be overseen and updated as required if site conditions change by the Project Manager, Environmental Manager and Ecological Clerk of Works where relevant. All personnel working on the Site will be trained in the implementation of the procedures.

The construction contractor will update the CEMP to include any subsequent planning conditions relevant to the proposed development and set out further detail of the overarching vision of how the construction contractor of the proposed development manage the site in a safe and organised manner. The construction contracter will detail the site-specific surface water protection measures including silt control features and measures for the management of spills. During construction any liquid materials, paints, fuels *etc.*, will be stored within temporary bunded areas, double-skinned tanks or bunded containers. Mitigation measures for surface water protection are outlined within the CEMP, and **Chapter 10 – Hydrology** of this EIAR.

The CTMP outlines the proposed construction traffic access measures for the proposed development, and mitigation measures to minimise the impact of construction traffic on the surrounding road network.

The relevant mitigation measures set out in the CTMP include the following:

- Access to the site will be managed by the deployment of Security Officers at key access points situated around the perimeter of the site with the assistance of an access control system utilising turnstiles and barriers/bollards. The construction site fencing will be kept secure at all times; the perimeter will be secured using fencing circa 2.4m to 3m high for the duration of the construction works. The contractor will be responsible for installing the temporary boundary fencing required;
- All construction traffic requiring access to airside work zones will have to be pre-screened prior to accessing the site, the pre-screening will take place at each Compound (East and West) prior to continuation onto the site access. The pre-screening will ensure construction traffic does not queue on the public road network adjacent to the site entrances;
- All construction traffic requiring access to the landside construction zones will need to be processed through the East compound. The intention will be to consolidate construction materials which will reduce traffic frequency to the construction site and control construction traffic to avoid queuing on the public road network adjacent to site entry gates;
- Due to the congested location of the project *i.e.*, the airport, services to the immediate area will need to be prioritised, therefore, the workforce will travel to site by public road network and park adjacent to the site compounds within designated areas near the offices. Transport services will be provided from the car park within the compound to the work zones;

- Rules regarding cars parked in the car park will state that all cars are to be positioned by "reverse parking". By requiring reverse parking, the risk of backing out blindly into oncoming traffic is removed. Contractors reserve the right to place a warning sticker on cars not compliant with site parking rules. Re-offending cars will be removed from site and access badge revoked;
- Site work vans and mobile workshop vans will have temporary parking facilities on site at the works face. (To limit and police the number of vehicles entering the work zones the Contractor will issue a limited number of permits to the workforce);
- Advanced notice for delivery vehicles arriving at the compounds is required to avoid an ad-hoc system of delivery. The preferred system will sequence and schedule delivery and construction vehicle arrivals / departures to avoid traffic congestion and safety risk to the neighbours and local businesses;
- Delivery bookings need to be submitted at least 48 hours in advance to allow sufficient time to co- ordinate delivery vehicle movements and the associated use of on-site materials handling equipment. Regular delivery meetings will be held between all parties and the Logistics Manager to make any adjustments and ensure that the delivery schedules are pre-agreed with all;
- The existing services and operations will be ongoing at Dublin Airport and are to be uninterrupted by the proposed works. The proposed delivery routes shall be restricted to ensure that strategic roads to Dublin Airport are not compromised by significant increases in construction traffic volumes; and
- The contractor will be responsible for the provision of Temporary Traffic Management (TTM) by competent and trained personnel. Where works require TTM, the PSCS must ensure that the hazards associated with working on the road are addressed. They must ensure that a Temporary Traffic Management Plan (TTMP) is in place and that it is implemented correctly. Only appropriately trained and competent operatives, supervisors, managers or other competent persons should be engaged in the assessment, design, installation, maintenance and removal of TTM.

14.6.2 Operational phase

It is expected that consultation with Uisce Éireann, EirGrid, ESB Networks, and other relevant service providers within the locality and compliance with any requirements or guidelines they may have will ensure that there will be no ongoing effects on material assets.

Given the enhancement measures and infrastructure proposals, including the upgrade of existing drainage infrastructure and the construction of additional infrastructure to supplement the performance of the existing surface water management system, a bespoke surface water monitoring plan has been developed. A detailed overview of the proposed monitoring plan is presented in the Planning Design Report prepared by Nicholas O'Dwyer and included in the planning documentation (**Section 10B**).

There will be no traffic generated as a result of the operation of the proposed development, therefore no mitigation measures are required in this regard.

14.7 Residual effects of the proposed development

14.7.1 Construction phase

The works contractor will be obliged to put best practice measures in place and work in accordance with the CEMP measures to ensure that there are no interruptions to service from the existing telecommunications network, watermain, sewer and electrical grid. Any planned interruptions will be agreed in advance with the utilities suppliers. The implementation of mitigation measures and adherence to the CEMP will ensure that the residual effects on the material assets during the construction phase will be neutral, imperceptible, and short-term.

Following the implementation of the mitigation measures outlined in the CTMP the potential effects on traffic and transportation are negative, slight, and short term for the construction phase.

14.7.2 Operational phase

As power will be provided from the internal daa supply, there are no predicted effects associated with power and electricity supply. There are no predicted effects associated with telecommunications or traffic for the proposed development for the operational phase.

The implementation of the mitigation measures within each chapter, and detailed above, will ensure that the residual effects on material assets during the operational phase will be neutral, imperceptible and long-term.

14.8 Monitoring and/or reinstatement

Monitoring arrangements will be reached with utility suppliers. No additional monitoring or reinstatement is required.

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15 AIR QUALITY AND CLIMATE

15.1 Introduction

This chapter assesses the likely air quality and climate effects associated with the proposed Airfield Drainage Project (ADP) at Dublin Airport, Swords, Co. Dublin. This assessment is undertaken according to the Environmental Protection Agency (EPA) documents Guidelines on the Information to be contained in Environmental Impact Statements (EPA, 2022a) and Advice Notes for Preparing Environmental Impact Statements (EPA, 2015b). A full description of the proposed ADP can be found in **Chapter 4 – Project Description.**

15.2 Statement of Authority

This chapter was completed by Aisling Cashell and Niamh Nolan. Aisling Cashell is an Environmental Consultant in the air quality section of AWN Consulting Ltd. She has less than one years' experience working in environmental consultancy focusing on air quality. She holds a BA and an MAI in Civil, Structural and Environmental Engineering from Trinity College Dublin. She is a member of Engineers Ireland. She has experience in mapping software and specialises in air quality, climate and sustainability. She has prepared air quality and climate impact assessments for numerous EIARs for a range of projects including commercial, residential, and industrial developments. Niamh Nolan is an Environmental Consultant in the air quality section of AWN Consulting Ltd. She has two years' experience working in environmental consultancy focusing on air quality. She holds a BSocSci (Hons) in Social Policy and Geography from University College Dublin. She is an Associate Member of both the Institute of Air Quality Management and the Institution of Environmental Science.

This chapter was reviewed by Dr. Avril Challoner. Avril is a Principal Environmental Consultant in the Air Quality and Climate section of AWN Consulting with 10 years' experience in Air Quality Consulting. She holds a BEng (Hons) in Environmental Engineering from the National University of Ireland Galway, HDip in Statistics from Trinity College Dublin and has completed a PhD in Environmental Engineering (Air Quality) in Trinity College Dublin. She is a Chartered Environmentalist (CEnv), Chartered Scientist (CSci), Member of the Institute of Environmental Management and Assessment, Member of the Institute of Air Quality Management and specialises in the fields of air quality, climate assessment, EIA and air dispersion modelling.

15.3 Methodology

This chapter has been prepared having regard to the following guidelines:

- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (Department of Housing, Planning & Local Government, 2018);
- Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report (European Commission, 2017);

- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, 2022);
- Advice Note on Preparing Environmental Impact Statements – Draft (EPA, 2015);
- Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment (European Commission, 2013);
- Guidance on the Assessment of Dust from Demolition and Construction Version 1.1 (Institute of Air Quality Management (IAQM), 2014);
- UK Design Manual for Roads and Bridges (DMRB), Volume 11, Environmental Assessment, Section 3 Environmental Assessment Techniques, Part 1 LA 105 Air quality (UK Highways Agency, 2019a); and
- UK Design Manual for Roads and Bridges (DMRB) Volume 11 Environmental Assessment, Section 3 Environmental Assessment Techniques, Part 14 LA 114 Climate (UK Highways Agency, 2019b.

15.3.1 Air Quality Criteria for Rating Effects

15.3.1.1 Ambient Air Quality Standards

In order to reduce the risk to health from poor air quality, National and European statutory bodies (*i.e.*, the Department of the Environment, Heritage and Local Government in Ireland and the European Parliament and Council of the European Union), have set limit values in ambient air for a range of air pollutants. These limit values or "Air Quality Standards" are health or environmental-based levels for which additional factors may be considered. For example, natural background levels, environmental conditions and socio-economic factors may all play a part in the limit value which is set.

Air quality significance criteria are assessed based on compliance with the appropriate standards or limit values. The applicable standards in Ireland include the Air Quality Standards Regulations 2011, which incorporate European Commission Directive 2008/50/EC, which has set limit values for numerous pollutants. The limit values for NO_2, PM_{10}, and $PM_{2.5}$ are relevant to this assessment. Council Directive 2008/50/EC combines the previous Air Quality Framework Directive (96/62/EC) and its subsequent daughter directives (including 1999/30/EC and 2000/69/EC) and includes ambient limit values relating to $PM_{2.5}$. The applicable limit values for NO_2, PM_{10}, and $PM_{2.5}$ are set out in **Table 15.1**.

Table 15.1 Ambient Air Quality Standards

Pollutant	Regulation Note 1	Limit Type	Value
Dust Deposition	TA Luft (German VDI 2002)	Annual average limit for nuisance dust	350 mg/m^2/day
Nitrogen Dioxide	2008/50/EC	Hourly limit for protection of human health – not to be exceeded more than 18 times/year	200 µg/m^3
		Annual limit for protection of human health	40 µg/m^3
Particulate Matter (as PM_{10})	2008/50/EC	24-hour limit for protection of human health – not to be exceeded more than 35 times/year	50 µg/m^3 PM_{10}
		Annual limit for protection of human health	40 µg/m^3 PM_{10}
Particulate Matter (as $PM_{2.5}$)	2008/50/EC	Annual limit for protection of human health	25 µg/m^3 $PM_{2.5}$

Note 1 EU 2008/50/EC – Clean Air For Europe (CAFÉ) Directive replaces the previous Air Framework Directive (1996/30/EC) and daughter directives 1999/30/EC and 2000/69/EC

In April 2023, the Government of Ireland published the Clean Air Strategy for Ireland (Government of Ireland 2023), which provides a high-level strategic policy framework needed to reduce air pollution. The strategy commits Ireland to achieving the 2021 World Health Organisation (WHO) Air Quality Guidelines Interim Target 3 (IT3) by 2026 (shown in **Table 15.2**), the IT4 targets by 2030 and the final targets by 2040 (shown in **Table 15.2**). The strategy notes that a significant number of EPA monitoring stations observed air pollution levels in 2021 above the WHO targets; 80% of these stations would fail to meet the final $PM_{2.5}$ target of 5 µg/m^3. The strategy also acknowledges that "*meeting the WHO targets will be challenging and will require legislative and societal change, especially with regard to both $PM_{2.5}$ and NO_2*". Ireland will revise its air quality legislation in line with the proposed EU revisions to the Cleaner Air for Europe (CAFE) Directive, which will set interim 2030 air quality standards and align the EU more closely with the WHO targets.

Table 15.2 WHO Air Quality Guidelines 2021

Pollutant	Regulation	Limit Type	IT3 (2026)	IT4 (2030)	Final Target (2040)
NO2	WHO Air Quality Guidelines	24-hour limit for protection of human health	50µg/m³ NO_2	50µg/m³ NO_2	25µg/m³ NO_2
		Annual limit for protection of human health	30µg/ m³ NO_2	20µg/ m³ NO_2	10µg/m³ NO_2
PM (as PM10)		24-hour limit for protection of human health	75µg/ m³ PM_{10}	50µg/m³ PM_{10}	45µg/m³ PM_{10}
		Annual limit for protection of human health	30µg/ m³ PM_{10}	20µg/m³ PM_{10}	15µg/m³ PM_{10}
PM (as PM2.5)		24-hour limit for protection of human health	37.5µg/m³ $PM_{2.5}$	25µg/m³ $PM_{2.5}$	15µg/m³ $PM_{2.5}$
		Annual limit for protection of human health	15µg/m³ $PM_{2.5}$5	10µg/m³ $PM_{2.5}$	5µg/m³ $PM_{2.5}$

15.3.1.2 Dust Deposition Guidelines

The concern from a health perspective is focused on particles of dust, which are less than 10 microns, and the EU ambient air quality standards outlined in **Section 15.3.1.1** have set ambient air quality limit values for PM_{10} and $PM_{2.5}$.

Regarding larger dust particles that can give rise to nuisance dust, there are no statutory guidelines regarding the maximum dust deposition levels that may be generated during the construction phase of a development in Ireland. However, the German TA-Luft standard for dust deposition (non-hazardous dust) (German VDI, 2002) sets a maximum permissible emission level for dust deposition of 350 mg/m²/day averaged over a one-year period at any receptors outside the site boundary. The TA-Luft standard has been applied for the purpose of this assessment based on recommendations from the EPA in Ireland in the document titled 'Environmental Management Guidelines – Environmental Management in the Extractive Industry (Non-Scheduled Minerals) (EPA, 2006). The document recommends that the TA-Luft limit of 350 mg/m²/day be applied to the site boundary of quarries. This limit value is considered good practice and can be implemented with regard to dust effects from construction of the proposed development which includes excavation for the installation of pipelines and tanks underground.

15.3.2 Air Quality Significance Criteria

The TII guidance document Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes (TII 2011) details the methodology for determining air quality impact significance criteria for road schemes in Ireland. While this is not a road scheme the significance criteria are based on the protection of human health and therefore are applicable on any project. The significance criteria have been adopted for the Project and are detailed in **Table 15.3** to **Table 15.5**. The significance criteria are based on PM_{10} and NO_2 as these pollutants are most likely to exceed the annual mean limit values (40µg/m^3). However, the criteria have also been applied to the predicted annual $PM_{2.5}$ concentrations for the purpose of this assessment.

Table 15.3 Definition of Impact Magnitude for Changes in Ambient Pollutant Concentrations

Magnitude of Change	Annual Mean NO_2 / PM_{10}	No. Days with PM_{10} Concentration > 50 µg/m^3	Annual Mean $PM_{2.5}$
Large	Increase / decrease ≥4µg/m^3	Increase / decrease >4 days	Increase / decrease ≥2.5µg/m^3
Medium	Increase / decrease 2µg/m3 <4µg/m^3	Increase / decrease 3 or 4 days	Increase / decrease 1.25µg/m3 <2.5µg/m^3
Small	Increase / decrease 0.4µg/m3 <2µg/m^3	Increase / decrease 1 or 2 days	Increase / decrease 0.25µg/m3 <1.25µg/m^3
Imperceptible	Increase / decrease <0.4µg/m^3	Increase / decrease <1 day	Increase / decrease <0.25µg/m^3

Source: Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes - Transport Infrastructure Ireland (TII 2011)

Table 15.4 Definition of Impact Magnitude for Changes in Ambient Pollutant Concentrations

Absolute Concentration in Relation to Objective / Limit Value	Change in Concentration		
	Small	Moderate	Large
Increase with Proposed Scheme			
Above Objective/Limit Value With Project (≥40µg/m³ of NO_2 or PM_{10}) (≥25µg/m³ of $PM_{2.5}$)	Slight adverse	Moderate adverse	Substantial adverse
Just Below Objective/Limit Value With Project (36 - <40µg/m³ of NO_2 or PM_{10}) (22.5µg/m3 <25µg/m³ of $PM_{2.5}$)	Slight adverse	Moderate adverse	Moderate adverse
Below Objective/Limit Value With Project (30 - <36µg/m³ of NO_2 or PM_{10}) (18.75µg/m³ <22.5µg/m³ of $PM_{2.5}$)	Negligible	Slight adverse	Slight adverse
Well Below Objective/Limit Value With Project (<30µg/m³ of NO_2 or PM_{10}) (<18.75µg/m³ of $PM_{2.5}$)	Negligible	Negligible	Slight adverse
Decrease with Proposed Scheme			
Above Objective/Limit Value With Project (≥40µg/m³ of NO_2 or PM_{10}) (≥25µg/m³ of $PM_{2.5}$)	Slight beneficial	Moderate beneficial	Substantial beneficial
Just Below Objective/Limit Value With Project (36µg/m3 <40µg/m³ of NO_2 or PM_{10}) (22.5µg/m³ <25µg/m³ of $PM_{2.5}$)	Slight beneficial	Moderate beneficial	Moderate beneficial
Below Objective/Limit Value With Project (30µg/m³ <36µg/m³ of NO_2 or PM_{10}) (18.75µg/m³ <22.5µg/m³ of $PM_{2.5}$)	Negligible	Slight beneficial	Slight beneficial
Well Below Objective/Limit Value With Project (<30µg/m³ of NO_2 or PM_{10}) (<18.75µg/m³ of $PM_{2.5}$)	Negligible	Negligible	Slight beneficial

* Where the Impact Magnitude is Imperceptible, then the Impact Description is Negligible

Source: Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes - Transport Infrastructure Ireland (TII 2011)

Table 15.5 Air Quality Impact Significance Criteria

Absolute Concentration in Relation to Objective / Limit Value	Change in Concentration		
	Small	Medium	Large
Increase with Proposed Scheme			
Above Objective/Limit Value With Project (≥35 days)	Slight Adverse	Moderate Adverse	Substantial Adverse
Just Below Objective/Limit Value With Project (32 days <35 days)	Slight Adverse	Moderate Adverse	Moderate Adverse
Below Objective/Limit Value With Project (26 days <32 days)	Negligible	Slight Adverse	Slight Adverse
Well Below Objective/Limit Value With Project (<26 days)	Negligible	Negligible	Slight Adverse
Decrease with Scheme			
Above Objective/Limit Value With Project (≥35 days)	Slight Beneficial	Moderate Beneficial	Substantial Beneficial
Just Below Objective/Limit Value With Project (32 days <35 days)	Slight Beneficial	Moderate Beneficial	Moderate Beneficial
Below Objective/Limit Value With Project (26 - <32 days)	Negligible	Slight Beneficial	Slight Beneficial
Well Below Objective/Limit Value With Project (<26 days)	Negligible	Negligible	Slight Beneficial

* Where the Impact Magnitude is Imperceptible, then the Impact Description is Negligible

Source: Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes - Transport Infrastructure Ireland (TII 2011)

15.3.3 Climate Criteria for Rating Effects

'LA 114 – Climate' (UKHA 2019) outlines a recommended approach for determining the significance of both the Construction and Operational Phases. The approach is based on comparing the '*Do Something*' scenario and the net project greenhouse gas (GHG) emissions (*i.e., Do Something – Do Minimum*) to the relevant carbon budgets (Department of the Taoiseach 2022). With the publication of the Climate Action Act in 2021, sectoral carbon budgets have been published for comparison with the Net CO_2 project GHG emissions from the proposed Project. The transport sector emitted approximately 12 $MtCO_{2eq}$[1] in 2018 and has a ceiling of 6,000ktCO_{2eq} in 2030 which is a 50% reduction over this period. The comparison of impacts with the relevant budget has been completed in **Section 15.6** and **Section 15.9**.

When assessing significance, LA 114 Climate recommends that the assessment of projects as significant should only occur 'where increases in GHG emissions will have a material impact on the ability of Government to meet its carbon reduction targets'.

There are three overarching principles that are particularly relevant in considering the aspect of significance in the 2010 IEMA Principles Series on Climate Change Mitigation & EIA (IEMA 2010):

- The GHG emissions from all projects will contribute to climate change, the largest interrelated cumulative environmental effect;
- The consequences of a changing climate have the potential to lead to significant environmental effects on all topics in the EIA Directive (*e.g.*, human health, biodiversity, water, land use, air quality); and
- GHG emissions have a combined environmental effect that is approaching a scientifically defined environmental limit; as such any GHG emissions or reductions from a project might be considered to be significant. The environmental limit is the national global GHG emission budget that defines a level of dangerous climate change, and any GHG emission that contributes to exceedance of that budget or threatens efforts to stay within it can be considered as significant.

The 2020 Guidance (IEMA 2020) document builds on those principles with three points:

- When evaluating significance, all new GHG emissions contribute to a negative environmental impact; however, some projects will replace existing development or baseline activity that has a higher GHG profile. The significance of a project's emissions should therefore be based on its net impact over its lifetime, which may be positive, negative or negligible;
- Where GHG emissions cannot be avoided, the goal of the EIA process should be to reduce the project's residual emissions at all stages; and
- Where GHG emissions remain significant, but cannot be further reduced, approaches to compensate the project's remaining emissions should be considered.

[1] $MtCO_2eq$ – million tonnes carbon dioxide equivalent

The criteria for determining the significance of effects are a two-stage process that involves defining the magnitude of the impacts and the sensitivity of the receptors. This section describes the criteria applied in this chapter to assign values to the magnitude of potential impacts and the sensitivity of the receptors. The terms used to define magnitude and sensitivity are based on those which are described in further detail in **Chapter 2 – The EIA Process**. In relation to climate, there is no project specific assessment criteria, but the proposed Project will be assessed against the recommended IEMA (IEMA 2020) significance determination. This takes account of any embedded or committed mitigation measures that form part of the design and which should be considered.

- **Major or moderate adverse impact (significant):** A project that follows a 'business-as-usual' or 'Do Minimum' approach and is not compatible with the net zero[2] trajectory by 2050 or sectoral based transition to next zero targets, results in a significant adverse effect. It is down to the consultant completing the assessment to differentiate between the 'level' of significant adverse effects *e.g.*, 'moderate' or 'major' adverse effects. A project's impact can shift from significant adverse to nonsignificant effects by incorporating mitigation measures that substantially improve on business-as-usual and meet or exceed the science-based emissions trajectory of ongoing but declining emissions towards net zero. Meeting the minimum standards set through existing policy or regulation cannot necessarily be taken as evidence of avoiding a significant adverse effect. This is particularly true where policy lags behind the necessary levels of GHG emission reductions for a science based 1.5°C compatible trajectory towards net zero.

- **Minor adverse impact (not significant):** A project that is compatible with the budgeted, science based 1.5°C trajectory (in terms of rate of emissions reduction) and which complies with up-to-date policy and 'good practice' reduction measures to achieve that has a minor adverse effect that is not significant. The project may have residual impacts but is doing enough to align with and contribute to the relevant transition scenario. A 'minor adverse' or 'negligible' non-significant effect conclusion does not necessarily refer to the magnitude of GHG emissions being carbon neutral[3] (*i.e.,* zero on balance) but refers to the likelihood of avoiding severe climate change and achieving net zero by 2050. A 'minor adverse' effect or better is a high bar and indicates exemplary performance where a project meets or exceeds measures to achieve net zero earlier than 2050.

- **Negligible Impact (not significant):** A project that achieves emissions mitigation that goes substantially beyond the reduction trajectory, or substantially beyond existing and emerging policy compatible with that trajectory, and has minimal residual emissions, is assessed as having a negligible effect that is not significant.

- **Beneficial Impact (significant):** A project that causes GHG emissions to be avoided or removed from the atmosphere has a beneficial effect that is significant. Only projects that

[2] Net Zero: "*When anthropogenic emissions of greenhouse gases to the atmosphere are balanced by anthropogenic removals over a specified period.*" Net zero is achieved where emissions are first educed in line with a 'science-based' trajectory with any residual emissions neutralised through offsets.

[3] Carbon Neutral: "*When anthropogenic emissions of greenhouse gases to the atmosphere are balanced by anthropogenic removals over a specified period irrespective of the time period or magnitude of offsets required.*"

actively reverse (rather than only reduce) the risk of severe climate change can be judged as having a beneficial effect.

Where the fundamental reason for a proposed project is to combat climate change and this beneficial effect drives the project need, then it is likely to be significant.

IEMA states (IEMA 2020) that GHG emissions are not geographically limited due to the global nature of impacts rather than directly affecting any specific local receptor.

However, as Ireland declared a climate and biodiversity emergency in May 2019 and it is currently failing to meet its EU binding targets under Regulation (European Union 2018/842) the sensitivity of the environment can be considered high. The declaration of the biodiversity emergency results in changes in GHG emissions whether beneficial or adverse are of more significance than previously considered prior to these declarations. This ties in with the IEMA Guidance (IEMA 2020) which states that the sensitive receptor for GHG emissions is the global atmosphere. The receptor has a high sensitivity, given the severe consequences of global climate change and the cumulative contributions of all GHG emission sources.

As further context to this approach to significance, it is recognised that there are many activities and sectors which are contributing to net GHG emissions in Ireland. Large industrial and power GHG emissions are captured in the context of the EU-wide Emission Trading Scheme (ETS) which has set defined targets which are being met due to the structure of the Cap-and-Trade mechanism which allows the price of carbon to rise to ensure that GHG emissions are reduced at least cost. Most other activities such as agriculture, transport, built environment, waste and smaller industry, however, are subject to the GHG Regulations which has set a specific target for Ireland of a 30% reduction in GHG emissions by 2030.

15.3.3.1 Climate Agreements

Ireland is party to both the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol. The Paris Agreement, which entered into force in 2016, is an important milestone in terms of international climate change agreements and includes an aim of limiting global temperature increases to no more than 2°C above pre-industrial levels with efforts to limit this rise to 1.5°C. The aim is to limit GHG emissions to 40 gigatonnes as soon as possible whilst acknowledging that peaking of GHG emissions will take longer for developing countries. Contributions to GHG emissions will be based on Intended Nationally Determined Contributions (INDCs) which will form the foundation for climate action post 2020. Significant progress was also made in the Paris Agreement on elevating adaptation onto the same level as action to cut and curb emissions.

To meet the commitments under the Paris Agreement, the EU enacted Regulation (EU) 2018/842 on binding annual GHG emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No. 525/2013 (the Regulation). The Regulation aims to deliver, collectively by the EU in the most cost-effective manner possible, reductions in GHG emissions from the ETS and non-ETS sectors amounting to 43% and 30%, respectively, by 2030 compared to 2005. Ireland's obligation under the Regulation is a 30% reduction in non-ETS GHG emissions by 2030 relative to its 2005 levels.

In 2015, the Climate Action and Low Carbon Development Act 2015 (No. 46 of 2015) (Government of Ireland, 2015) was enacted (the Act). The purpose of the Act was to enable Ireland 'to pursue, and achieve, the transition to a low carbon, climate resilient and environmentally sustainable economy by the end of the year 2050' (3.(1) of No. 46 of 2015). This is referred to in the Act as the 'national transition objective'. The Act made provision for, inter alia, a national adaptation framework. In addition, the Act provided for the establishment of the Climate Change Advisory Council with the function to advise and make recommendations on the preparation of the national mitigation and adaptation plans and compliance with existing climate obligations.

The first Climate Action Plan (CAP) was published by the Irish Government in June 2019 (Government of Ireland, 2019a). It outlined the current status across key sectors including Electricity, Transport, Built Environment, Industry and Agriculture and presented the various broadscale measures required for each sector to achieve ambitious decarbonisation targets. The 2019 CAP also detailed the required governance arrangements for implementation including carbon-proofing of policies, establishment of carbon budgets, a strengthened Climate Change Advisory Council and greater accountability to the Oireachtas. The Government published the second CAP in November 2021 (Government of Ireland, 2021a). The plan contains similar elements as the 2019 CAP and aims to set out how Ireland can reduce GHG emissions by 51% by 2030 (compared to 2018 levels) which is in line with the EU ambitions, and a longer-term goal to achieving net-zero emissions no later than 2050. The 2021 CAP outlines that emissions from the Built Environment sector must be reduced to 4 – 5 Mt CO_2e[4] by 2030 in order to meet climate targets. This will require further measures in addition to those committed to in the 2019 CAP, including phasing out the use of fossil fuels for the space and water heating of buildings, improving the fabric and energy of buildings, and promoting the use of lower carbon alternatives in construction.

Following on from Ireland declaring a climate and biodiversity emergency in May 2019 and the European Parliament approving a resolution declaring a climate and environment emergency in Europe in November 2019, the Government approved the publication of the General Scheme for the Climate Action (Amendment) Bill 2019 in December 2019 (Government of Ireland, 2019b) followed by the publication of the Climate Action and Low Carbon Development (Amendment) Act 2021 (No. 32 of 2021) (hereafter referred to as the 2021 Climate Act) in July 2021 (Government of Ireland, 2021b). The 2021 Climate Act was prepared for the purposes of giving statutory effect on the core objectives stated within the CAP.

The purpose of the 2021 Climate Act is to provide for the approval of plans 'for the purpose of pursuing the transition to a climate resilient, biodiversity rich and climate neutral economy by no later than the end of the year 2050. The 2021 Climate Act will also 'provide for carbon budgets and a decarbonisation target range for certain sectors of the economy'. The 2021 Climate Act defines the carbon budget as 'the total amount of GHG emissions that are permitted during the budget period'. The 2021 Climate Act removes any reference to a national mitigation plan and instead refers to both the CAP, as published in 2019, and a series of National Long Term Climate Action Strategies. In addition, the Environment Minister shall request each local authority to make a 'local authority climate action plan' lasting five years and to specify the mitigation measures and the adaptation measures to be adopted by the local authority.

[4] Mt CO_2eq – million tonnes carbon dioxide equivalent

The Climate Action Plan 2023 (CAP23) is the second annual update to Ireland's Climate Action 2019. This is the first CAP since the publication of the carbon budgets and sectoral emissions ceilings, and it aims to implement the required changes to achieve a 51% reduction in carbon emissions by 2030. The CAP has six vital high impact sectors where the biggest savings can be made: renewable energy, energy efficiency of buildings, transport, sustainable farming, sustainable business and change of land-use.

CAP23 states that the decarbonisation of Ireland's manufacturing industry is key for its economy and future competitiveness. There is a target to reduce the embodied carbon in construction materials by 10% for materials produced and used in Ireland by 2025 and by at least 30% for materials produced and used in Ireland by 2030. CAP23 states that these reductions can be brought about by product substitution for construction materials and reduction of clinker content in cement. Cement and other high embodied carbon construction elements can be reduced by the adoption of the methods set out in the Construction Industry Federation 2021 report, Modern Methods of Construction. In order to ensure that economic growth can continue alongside a reduction in emissions, the Investment Development Agency (IDA) Ireland will also seek to attract businesses to invest in decarbonisation technologies.

In relation to carbon budgets, the Climate Action and Low Carbon Development (Amendment) Act states 'A carbon budget, consistent with furthering the achievement of the national climate objective, shall be proposed by the Climate Change Advisory Council, finalised by the Minister and approved by the Government for the period of 5 years commencing on the 1 January 2021 and ending on 31 December 2025 and for each subsequent period of 5 years (in this Act referred to as a 'budget period')'. The carbon budget is to be produced for 3 sequential budget periods, as shown in **Table 15.6**. The carbon budget can be revised where new obligations are imposed under the law of the European Union or international agreements or where there are significant developments in scientific knowledge in relation to climate change. In relation to the sectoral emissions ceiling, the Minister for the Environment, Climate and Communications (the Minister for the Environment) shall prepare and submit to government the maximum amount of GHG emissions that are permitted in different sectors of the economy during a budget period and different ceilings may apply to different sectors. The sectorial emission ceilings for 2030 were published July in 2022 and are shown in **Table 15.7.** Industry has a 35% reduction required and emissions ceiling of 4,000kt CO_2e.

Table 15.6 5-Year Carbon Budgets 2021-2025, 2026-2030 and 2031-2025

Budget Period	Reduction Required	2018 Emissions (Mt CO_2e)
2021-2025	295 Mt CO_2e	Reduction in emissions of 4.8% per annum for the first budget period.
2026-2030	200 Mt CO_2e	Reduction in emissions of 8.3% per annum for the second budget period.
2031-2035	151 Mt CO_2e	Reduction in emissions of 3.5% per annum for the third provisional budget.

Source: Department of the Taoiseach, 2022

Table 15.7 Sectoral Emission Ceiling 2030

Sector	Baseline ($MtCO_2eq$)	Carbon Budgets ($MtCO_2eq$)		2030 Emissions ($MtCO_2eq$)	Indicative Emissions % Reduction in Final Year of 2025- 2030 Period (Compared to 2018)
	2018	2021-2025	2026-2030		
Transport	12	54	37	6	50
Electricity	10	40	20	3	75
Built Environment - Residential	7	29	23	4	40
Built Environment - Commercial	2	7	5	1	45
Agriculture	23	106	96	17.25	25
LULUCF	5	xxx	xxx	xxx	xxx
Industry	7	30	24	4	35
Other (F-gases, waste, petroleum refining)	2	9	8	1	50
Unallocated Savings	-	7	5	-5.25	-
Total	**68**	**xxx**	**xxx**	-	-
Legally Binding Carbon Budgets and 2030 Emission Reduction Targets	-	**295**	**200**	-	**51**

* Finalising the sectoral emissions ceiling for LULUCF sector has been deferred for up to 18 months from July 2022 to allow for the completion of the Land-Use review.
Source: Department of the Taoiseach, 2022

The daa Carbon Reduction Strategy (CRS) (daa, 2022) outlines the approach to decarbonise Dublin Airport and outlines an emissions reduction pathway to 2030 as part of an interim step in its transition to Net Zero Carbon emissions by 2050. Dublin Airport is undertaking a programme of incremental infrastructure replacement and upgrades that will be delivered in a sustainable manner. The CRS details the commitment to ensure that all infrastructure expansion and development is designed and delivered with carbon reduction as a key driver.

15.3.4 Construction Phase

15.3.4.1 Air Quality

The Institute of Air Quality Management in the UK (IAQM) guidance document 'Guidance on the Assessment of Dust from Demolition and Construction' (2014) outlines an assessment method for predicting the effect of dust emissions from construction activities based on the scale and nature of the works and the sensitivity of the area to dust effects. The IAQM methodology has been applied to the construction phase of this development to predict the likely risk of dust effects in the absence of mitigation measures and to determine the level of site-specific mitigation required. The use of UK guidance is considered best practice in the absence of applicable Irish guidance.

The major dust generating activities are divided into four types within the IAQM guidance (2014) to reflect their different potential effects. These are:

- Demolition;
- Earthworks;
- Construction; and
- Trackout (transport of dust and dirt from the construction site onto the public road network).

The magnitude of each of the four categories is divided into Large, Medium or Small scale depending on the nature of the activities involved. The magnitude of each activity is combined with the overall sensitivity of the area to determine the risk of dust effects from site activities. This assessment has been scoped in and allows the level of site-specific mitigation to be determined.

Construction phase traffic also has the potential to affect air quality and climate. The impact to air quality as a result of changes in traffic is assessed at sensitive receptors in the vicinity of affected roads. The Transport Infrastructure Ireland (TII) guidance (2011) states that a proportionate number of representative receptors, which are located in areas that will experience the highest concentrations or greatest improvements as a result of the proposed development, are to be included in the modelling. The TII criteria state that receptors within 200 m of impacted road links should be assessed; roads which are more than 200 m from a receptor will not impact pollutant concentrations at that receptor. The TII guidance (2011) defines sensitive receptor locations 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.

The UK DMRB guidance (UK Highways Agency, 2019a) states that road links meeting one or more of the following criteria can be defined as being 'affected' by a proposed development and should be included in the local air quality assessment. The use of the UK guidance is recommended by TII (2011). In the absence of specific Irish guidance, this approach is considered best practice and can be applied to any development that causes a change in traffic as follows:

- Annual average daily traffic (AADT) changes by 1,000 or more;
- Heavy duty vehicle (HDV) AADT changes by 200 or more;

- A change in speed band;
- A change in carriageway alignment by 5m or greater.

The impact to air quality as a result of changes in traffic is assessed at sensitive receptors in the vicinity of affected roads (See **Section 15.3**). For the proposed ADP, the construction stage traffic will not increase by more than 1,000 AADT but for a limited time during the excavation process HDV movements will exceed 200 AADT. However, as this is only predicted for a short period of the construction phase, it does not meet the above scoping criteria when traffic is considered over an annual average. In addition, there are no proposed changes to the traffic speeds or road alignment. On application of best practice guidance, a detailed assessment has been scoped out as the relevant thresholds for a change in traffic that would give rise to a potential significant effect have not been met, and as such there is no potential for a likely significant effect on air quality. As a result, a detailed air assessment of construction stage traffic emissions has been scoped out from any further assessment as there is no potential for significant effects on air quality.

15.3.4.2 Climate

As mentioned, Ireland has annual GHG targets which are set at an EU level and need to be complied with to reduce the effect of climate change. Impacts to climate as a result of GHG emissions are assessed against the targets set out by the EU under Regulation (EU) 2018/842 on binding annual GHG emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No. 525/2013, which has set a target of 30% reduction in non-ETS sector GHG emissions by 2030 relative to 2005 levels.

As per the EU guidance document *Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment* (European Commission, 2013) the climate baseline is first established with reference to EPA data on annual GHG emissions (see **Section 15.4.4**). The effects of the proposed development on climate is determined in relation to this baseline. The UK Highways Agency has published an updated DMRB guidance document in relation to climate impact assessments, LA 114 Climate (UK Highways Agency, 2019b). The scoping criteria therein are used to determine whether a detailed climate assessment is required for a proposed project during the construction stage based on a potential greater than 1% change in emissions from the baseline scenario. If emissions will not increase by over 1% then no further assessment is required as there is no potential for significant effects on climate. The construction stage activities and potential for GHG emissions have been reviewed as part of the construction stage climate assessment for the ADP and a qualitative assessment was carried out.

15.3.5 Operational Phase

15.3.5.1 Air Quality

In general, operational phase traffic has the potential to affect local air quality because of increased vehicle movements associated with the proposed development. The UK Highways Agency DMRB scoping criteria detailed in **Section 15.3.4.1** was used to determine if any road links are affected by the proposed development and require inclusion in a detailed air dispersion modelling assessment.

Due to the nature of the proposed development, there will be minimal vehicles accessing the site during the operational phase. The proposed development will not increase traffic by more than 1,000 AADT or 200 HDV AADT. In addition, there are no proposed changes to the traffic speeds or road alignment. On application of best practice guidance, a detailed assessment has been scoped out as the relevant thresholds for a change in traffic that would give rise to a potential significant effect have not been met, and as such there is no potential for a likely significant effect on air quality. Therefore, no road links affected by the proposed development satisfy the screening criteria (see **Section 15.3.4.1**) and a quantitative assessment of the effect of traffic emissions on ambient air quality is not necessary as there is no identified potential for significant effects on local air quality.

15.3.5.2 Climate

Emissions from road traffic associated with the operational phase of the proposed development have the potential to emit carbon dioxide (CO_2) which will impact climate. The UK Highways Agency has published an updated DMRB guidance document in relation to climate impact assessments LA 114 Climate (UK Highways Agency, 2019b). The following scoping criteria are used to determine whether a detailed climate assessment is required for a proposed project during the operational stage. If any of the road links impacted by the proposed development meet or exceed the below criteria, then further assessment is required.

- A change of more than 10% in AADT;
- A change of more than 10% to the number of heavy-duty vehicles; and
- A change in daily average speed of more than 20 km/hr.

None of the road links impacted by the proposed development meet the scoping criteria above and therefore a detailed assessment has been scoped out as there is no potential for significant impacts to climate.

15.4 Receiving Environment

15.4.1 Meteorological Data

A key factor in assessing temporal and spatial variations in air quality is the prevailing meteorological conditions. Depending on wind speed and direction, individual receptors may experience very significant variations in pollutant levels under the same source strength (*i.e.*, traffic levels) (WHO, 2006). Wind is of key importance in dispersing air pollutants and for ground level sources such as traffic emissions where pollutant concentrations are generally inversely related to wind speed. Thus, concentrations of pollutants derived from traffic sources will generally be greatest under very calm conditions and low wind speeds when the movement of air is restricted. In relation to PM_{10}, the situation is more complex due to the range of sources of this pollutant. Smaller particles (less than $PM_{2.5}$) from traffic sources will be dispersed more rapidly at higher wind speeds. However, fugitive emissions of coarse particles ($PM_{2.5}$ - PM_{10}) will increase at higher wind speeds. Thus, measured levels of PM_{10} will be a non-linear function of wind speed.

The nearest representative weather station collating detailed weather records is the Dublin Airport meteorological station. Dublin Airport met data has been examined to identify the prevailing wind direction and average wind speeds over a five-year period (see **Figure 15.1**). For data collated during five representative years (2018 - 2022), the predominant wind direction is westerly to south-westerly with a mean wind speed of 5.4 m/s over the period 1991 - 2020 (Met Éireann, 2023).

Figure 15.1 Dublin Airport Windrose 2018 – 2022 (Met Éireann, 2023)

15.4.2 Baseline Air Quality

The EPA and Local Authorities have undertaken air quality monitoring programs in recent years. The most recent EPA published annual report on air quality "Air Quality in Ireland 2021" (EPA, 2022b) details the range and scope of monitoring undertaken throughout Ireland.

As part of the implementation of the Framework Directive on Air Quality (1996/62/EC) (repealed by Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe), four air quality zones have been defined in Ireland for air quality management and assessment purposes as outlined within the EPA document titled 'Air Quality In Ireland 2021' (EPA, 2022b). Dublin is defined as Zone A and Cork as Zone B. Zone C is composed of 23 towns with a population of greater than 15,000. The remainder of the country, which represents rural Ireland but also includes all towns with a population of less than 15,000, is defined as Zone D. In terms of air monitoring, Dublin Airport is categorised as Zone A.

In 2020 the EPA reported (EPA, 2022b) that Ireland was compliant with EU legal air quality limits at all locations, however, this was largely due to the reduction in traffic due to Covid-19 restrictions. The EPA Air Quality in Ireland 2020 report details the effect that the Covid-19 restrictions had on air monitoring stations, which included reductions of up to 50% at some monitoring stations which have traffic as a dominant source. The report also notes that Central Statistics Office (CSO) figures show that while traffic volumes are still slightly below 2019 levels, they have significantly increased since 2020 levels. The 2020 concentrations are therefore predicted to be an exceptional year and not consistent with long-term trends. For this reason, data from 2020 has been included for representative purposes only and has not been used to determine baseline levels of pollutants in the vicinity of the proposed development.

15.4.2.1 NO_2

With regard to NO_2, continuous monitoring data from the EPA (EPA, 2022b), at suburban Zone A background locations in Rathmines, Dun Laoghaire, Swords and Ballyfermot show that current levels of NO_2 are below both the annual and 1-hour limit values, with annual average levels ranging from 11 – 22µg/m^3 over the period 2017 – 2021 (see **Table 15.8**). Swords is the closest representative monitoring station to the proposed development. Based on these results, an estimate of the current background NO_2 concentration in the region of the proposed development is 16 µg/m^3.

Table 15.8 Trends in Zone A Air Quality – Nitrogen Dioxide (µg/m^3)

Station	Averaging Period	Year				
		2017	2018	2019	2020	2021
Rathmines	Annual Mean NO_2 (µg/m^3)	17	20	22	13	14
	99.8th%ile 1-hr NO_2 (µg/m^3)	86	87	102	81	69
Ballyfermot	Annual Mean NO_2 (µg/m^3)	17	17	20	12	13
	99.8th%ile 1-hr NO_2 (µg/m^3)	112	101	101	83	73
Dun Laoghaire	Annual Mean NO_2 (µg/m^3)	17	19	15	14	16
	99.8th%ile 1-hr NO_2 (µg/m^3)	101	91	91	78	73
Swords	Annual Mean NO_2 (µg/m^3)	14	16	15	11	11
	99.8th%ile 1-hr NO_2 (µg/m^3)	79	85	80	65	63

Note 1: Data for 2020 shown for representative purposes only, not used in determining background concentrations

15.4.2.2 PM_{10}

Long-term PM_{10} monitoring was carried out at the suburban Zone A locations of Rathmines, Dún Laoghaire, Tallaght, Phoenix Park, and Ballyfermot. Concentrations over the 2017 – 2022 period are below both the annual and daily limit values (EPA, 2022b). The average annual mean concentrations range from 9– 16 µg/m^3 over the period 2017– 2022 (see **Table 15.9**). Of the suburban background stations considered, Rathmines had the highest number of exceedances. There were 9 exceedances (in 2019) of the daily limit value of 50 µg/m^3, noting that 35 exceedances are permitted per year. Based on the above information a conservative estimated background concentration of 14 µg/m^3 has been used in this assessment.

Table 15.9 Trends in Zone A Air Quality – PM_{10} (µg/m^3)

Station	Averaging Period	Year				
		2017	2018	2019	2020	2021
Ballyfermot	Annual Mean PM_{10} (µg/m^3)	12	16	14	12	12
	24-hr Mean > 50 µg/m^3 (days)	1	0	7	2	0
Dún Laoghaire	Annual Mean PM_{10} (µg/m^3)	12	13	12	12	11
	24-hr Mean > 50 µg/m^3 (days)	2	0	2	0	0
Tallaght	Annual Mean PM_{10} (µg/m^3)	12	15	12	10	10
	24-hr Mean > 50 µg/m^3 (days)	2	1	3	0	0
Rathmines	Annual Mean PM_{10} (µg/m^3)	13	15	15	11	12
	24-hr Mean > 50 µg/m^3 (days)	5	2	9	2	0
Phoenix Park	Annual Mean PM_{10} (µg/m^3)	9	11	11	10	10
	24-hr Mean > 50 µg/m^3 (days)	1	0	2	0	0

Note 1: Data for 2020 shown for representative purposes only, not used in determining background concentrations

15.4.2.3 $PM_{2.5}$

Annual mean concentrations of $PM_{2.5}$ monitoring at the Zone A location of Rathmines over the period 2017 – 2021 (EPA, 2022b) ranged from 8 - 10 µg/m^3 and indicated an average $PM_{2.5}$/PM_{10} ratio ranging from 0.60 – 0.75. Based on this information, a conservative ratio of 0.8 was used to generate a background $PM_{2.5}$ concentration of 11.2 µg/m^3.

Based on the above information the air quality in the Dublin area is generally good, with concentrations of the key pollutants generally well below the relevant limit values. However, the EPA has indicated that road transport emissions are contributing to increased levels of NO_2, with the potential for breaches in the annual NO_2 limit value in future years at locations within urban centres and roadside locations. In addition, burning of solid fuels for home heating is contributing to increased levels of particulate matter (PM_{10} and $PM_{2.5}$). The EPA predicts that exceedances in the particulate matter limit values are likely in future years if burning of solid fuels for residential heating continues (EPA, 2022b).

15.4.3 Sensitivity of the Receiving Environment

In line with the UK Institute of Air Quality Management (IAQM) guidance document '*Guidance on the Assessment of Dust from Demolition and Construction*' (2014) prior to assessing the effect of dust from a proposed development the sensitivity of the area must first be assessed as outlined below. Both receptor sensitivity and proximity to proposed works areas are taken into consideration. For the purposes of this assessment, high sensitivity receptors are regarded as residential properties (where people are likely to spend most of their time), schools and hospitals.

In terms of receptor sensitivity to dust soiling, there are 5 no. high sensitivity residential properties within 350m of the site boundary. Dublin Airport is a medium sensitivity receptor and is within 350m of the site boundary. Therefore, the overall sensitivity of the area to dust soiling effects is considered low based on the IAQM criteria outlined in **Table 15.10.**

Table 15.10 Sensitivity of the Area to Dust Soiling Effects on People and Property

Receptor Sensitivity	Number of Receptors	Distance from Source (m)			
		<20	<50	<100	<350
High	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	**Low**
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

Source: Guidance on the Assessment of Dust from Demolition and Construction (IAQM, 2014)

In addition to sensitivity to dust soiling, the IAQM guidelines also outline the assessment criteria for determining the sensitivity of the area to human health effects. The criteria taken into consideration include the current annual mean PM_{10} concentration, receptor sensitivity based on type (residential receptors are classified as high sensitivity), and the number of receptors affected within various distance bands from the construction works. A conservative estimate of the current annual mean PM_{10} concentration in the vicinity of the proposed development is $14\mu g/m^3$. There are 5 no. high sensitivity receptors and one medium sensitivity receptor within 350m of the proposed development boundary. Based on the IAQM criteria outlined in **Table 15.11,** the worst-case sensitivity of the area to human health is considered low.

Table 15.11 Sensitivity of the Area to Dust Related Human Health Effects

Receptor Sensitivity	Annual Mean PM_{10} Concentration	Number of Receptors	Distance from Source (m)				
			<20	<50	<100	<200	<350
High	< 24 µg/m³	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	**Low**
Medium	< 24 µg/m³	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Low	< 24 µg/m³	>1	Low	Low	Low	Low	Low

Source: Guidance on the Assessment of Dust from Demolition and Construction (IAQM, 2014)

The IAQM guidelines also outline the assessment criteria for determining the sensitivity of the area to dust-related ecological effects. Dust emissions can coat vegetation leading to a reduction in the photosynthesising ability of the plant as well as other effects. The guidance states that dust effects on vegetation can occur up to 50m from the site and 50m from site access roads, up to 500m from the site entrance. The sensitivity of the area is determined based on the distance to the source, the designation of the site, (European, National, or local designation) and the potential dust sensitivity of the ecologically important species present. The proposed development is not within 500m of any designated ecological site (NPWS, 2023) and as such potential significant effects are not anticipated.

15.4.4 Climate Baseline

Anthropogenic emissions of GHGs in Ireland included in the European Union's Effort Sharing Regulation (ESR) (EU 2018/842) are outlined in the most recent review by the EPA which details provisional emissions up to 2021 (EPA, 2022c). The GHG emission inventory for 2021 is the first of ten years over which compliance with targets set in the ESR will be assessed. This Regulation sets 2030 targets for emissions outside of the ETS (known as ESR emissions) and annual binding national limits for the period 2021-2030. Ireland's target is to reduce ESR emissions by 30% by 2030 compared with 2005 levels, with a number of flexibilities available to assist in achieving this. Ireland's ESR emissions annual limit for 2021 is 43.48 $MtCO_2eq$. Ireland's provisional 2021 GHG ESR emissions are 46.19 $MtCO_2eq$, this is 2.71 $MtCO_2eq$ more than the annual limit for 2021 (EPA, 2022c). Agriculture continues to be the largest contributor to overall GHG emissions at 37.5% of the total. Transport, energy industries and the residential sector are the next largest contributors, at 17.7%, 16.7% and 11.4%, respectively. GHG emissions for 2021 are estimated to be 4.7% higher than emissions in 2020. This is due to a gradual lifting of covid restrictions and an increase in the use of coal and less renewables within electricity generation. Ireland's GHG emissions have increased by 11.4% from 1990 – 2021.

Provisional National total emissions (including Land Use, Land-use Change and Forestry (LULUCF)) for 2021 are 69.29 $MtCO_2eq$. These have used 23.5% of the 295 Mt CO_2eq Carbon Budget for the five-year period 2021-2025. This leaves 76.5% of the budget available for the succeeding four years, requiring an 8.4% average annual emissions reduction from 2022-2025 to stay within budget.

The EPA 2022 GHG Emissions Projections Report for 2021 – 2040 (EPA, 2022d) provides an assessment of Ireland's total projected GHG emissions from 2021 to 2040, using the latest Inventory data for 2020 and provides an assessment of Ireland's progress towards achieving its National ambitions under the Climate Action and Low Carbon Development (Amendment) Act 2021 (Government of Ireland, 2021b) and EU emission reduction targets for 2030 as set out under the EU Effort Sharing Regulation (ESR) 2018/842. Two scenarios are assessed – a "With Existing Measures" (WEM) scenario, which is a projection of future emissions based on the measures currently implemented and actions committed to by Government, and a "With Additional Measures" (WAM) scenario, which is the projection of future emissions based on the measures outlined in the latest Government plans at the time projections are compiled. This includes all policies and measures included in the WEM scenario, plus those included in government plans but not yet implemented.

The EPA report states under the "With Existing Measures" scenario that the projections indicate that Ireland will cumulatively exceed its ESR emissions allocation by 52.3 $MtCO_2eq$ over the 2021-2030 period even with full use of the flexibilities available. Under the "With Additional Measures scenario", the projections indicate that Ireland can achieve compliance under the ESR over the 2021-2030 period using both flexibilities but only with full implementation of the 2021 Climate Action Plan. Both projected scenarios indicate that implementation of all climate plans and policies, plus further new measures, are needed for Ireland to meet the 51% emissions reduction target for 2030 and put the country on track for climate neutrality by 2050 (EPA, 2022d).

15.5 Characteristics of the Proposed Development

The ADP proposes significant upgrades to the surface water management infrastructure at Dublin Airport. The ADP comprises a series of drainage system enhancement measures and infrastructure proposals, including the upgrade of existing drainage infrastructure and the construction of additional infrastructure to supplement the performance of the existing surface water management system.

15.5.1 Do-Nothing

Under the Do-Nothing scenario the proposed development will not be constructed. In this scenario, ambient air quality at the site will remain as per the baseline provided there are no changes in air emissions in the wider area.

In future there is the potential to cause increased climate vulnerability as adaptation has not taken place to account for future climate change. Therefore, the absence of the proposed development may result in increased flood risk creating disruptions or safety issues.

15.5.2 Construction Phase

The key civil engineering works that will have a potential effect on air quality and climate during construction are summarised below:

- During construction, an amount of soil will be generated as part of the site preparation works and during excavation for the installation of ducting for the pipeline installations.

- Infilling and landscaping will be undertaken.
- Temporary storage of construction materials.
- Construction traffic accessing the site will emit air pollutants and greenhouse gases during transport.

As outlined in **Section 15.7**, a dust minimisation plan will be formulated for the construction phase of the proposed development to ensure no dust nuisance occurs at nearby sensitive receptors.

15.5.3 Operational Phase

During the operational phase, traffic accessing the site for maintenance purposes has the potential to affect air quality and climate. This traffic has been reviewed and a detailed air quality assessment has been scoped out as none of the roads affected by the proposed development satisfy the DMRB assessment criteria (**Section 15.3.4.1**), and will therefore not cause a significant effect.

15.6 Potential Effects of the Proposed Development

15.6.1 Construction Phase

15.6.1.1 Air Quality

The greatest potential effect on air quality during the construction phase of the proposed development is from construction dust emissions and the potential for nuisance dust. With respect to dust, nuisance dust may result to the loss of amenity due to dust deposition or visible dust plumes, often related to people making complaints, but not necessarily sufficient to be a legal nuisance. While construction dust tends to be deposited within 350 m of a construction site, most of the deposition occurs within the first 50 m (IAQM, 2014). The extent of any dust generation depends on the nature of the dust (soils, peat, sands, gravels, silts *etc*.,) and the nature of the construction activity. In addition, the potential for dust dispersion and deposition depends on local meteorological factors such as rainfall, wind speed and wind direction.

A review of Dublin Airport meteorological data indicates that the prevailing wind direction is westerly to south-westerly and wind speeds are generally moderate in nature (see **Figure 15.1**). In addition, dust generation is considered negligible on days where rainfall is greater than 0.2mm (UK Office of Deputy Prime Minister (2002), BRE (2003). A review of historical 30-year average data for Dublin Airport indicates that on average 200 days per year have rainfall over 0.2mm (Met Eireann, 2023) and therefore it can be determined that dust generation will be reduced significantly.

In order to determine the level of dust mitigation required during the proposed works, the potential dust emission magnitude for each dust generating activity needs to be taken into account, in conjunction with the previously established sensitivity of the area (see **Section 15.4.3**). As per **Section 15.3.4.1** the major dust generating activities are divided into four types within the IAQM guidance to reflect their different potential effects. These are:

- Demolition;
- Earthworks;
- Construction; and
- Trackout (transport of dust and dirt from the construction site onto the public road network).

Demolition

There are no demolition activities associated with the proposed development. Therefore, there is no demolition effect predicted as a result of the works.

Earthworks

Earthworks primarily involve excavating material, loading, and unloading of materials, tipping and stockpiling activities. Activities such as levelling the site and landscaping works are also considered under this category. The dust emission magnitude from earthworks can be classified as Small, Medium, or Large based on the definitions from the IAQM guidance as transcribed below:

- **Large:** Total site area > 10,000 m^2, potentially dusty soil type (*e.g.,* clay which will be prone to suspension when dry due to small particle size), >10 heavy earth moving vehicles active at any one time, formation of bunds > 8 m in height, total material moved >100,000 tonnes;
- **Medium:** Total site area 2,500 m^2 – 10,000 m^2, moderately dusty soil type (*e.g.,* silt), 5 - 10 heavy earth moving vehicles active at any one time, formation of bunds 4 – 8m in height, total material moved 20,000 – 100,000 tonnes; and
- **Small:** Total site area < 2,500 m^2, soil type with large grain size (*e.g.,* sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <4 m in height, total material moved < 20,000 tonnes, earthworks during wetter months.

In total it is estimated that circa 450,000m^3 of material will need to be excavated, moved, and reused for the construction of the ADP. The dust emission magnitude for the proposed earthwork activities can be classified as Large as a result.

The sensitivity of the area, as determined in **Section 15.4.3**, is combined with the dust emission magnitude for each dust generating activity to define the risk of dust effects in the absence of mitigation. As outlined in **Table 15.12**, this results in an overall medium risk of dust soiling effects and a low risk of dust related human health effects as a result of the proposed earthworks activities.

Table 15.12 Risk of Dust Effect - Earthworks

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	**Medium Risk**	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible Risk

Construction

Dust emission magnitude from construction can be classified as Small, Medium, or Large based on the definitions from the IAQM guidance as transcribed below:

- **Large:** Total building volume > 100,000 m^3, on-site concrete batching, sandblasting;
- **Medium:** Total building volume 25,000 m^3 – 100,000 m^3, potentially dusty construction material (*e.g.*, concrete), on-site concrete batching; and
- **Small:** Total building volume < 25,000 m^3, construction material with low potential for dust release (*e.g.*, metal cladding or timber).

The dust emission magnitude for the proposed construction activities can be classified as medium as a worst-case. As outlined in **Table 15.13**, this results in an overall medium risk of dust soiling effects and a low risk of human health effects as a result of the proposed construction activities.

Table 15.13 Risk of Dust Effects - Construction

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	**Medium Risk**	Low Risk
Low	Low Risk	Low Risk	Negligible Risk

Trackout

Factors which determine the dust emission magnitude are vehicle size, vehicle speed, number of vehicles, road surface material and duration of movement. Dust emission magnitude from trackout can be classified as small, medium, or large based on the definitions from the IAQM guidance as transcribed below:

- **Large:** > 50 HDV (> 3.5 t) outward movements in any one day, potentially dusty surface material (*e.g.*, high clay content), unpaved road length > 100 m;
- **Medium:** 10 - 50 HDV (> 3.5 t) outward movements in any one day, moderately dusty surface material (*e.g.*, high clay content), unpaved road length 50 - 100 m; and
- **Small:** < 10 HDV (> 3.5 t) outward movements in any one day, surface material with low potential for dust release, unpaved road length < 50 m.

The dust emission magnitude for the proposed trackout can be classified as large, as at worst-case peak periods there will be more than 50 outward HDV movements per day. As outlined in **Table 15.14**, this results in an overall medium risk of dust soiling effects and a low risk of human health effects as a result of the proposed trackout activities.

Table 15.14 Risk of Dust Effects – Trackout

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	**Medium Risk**	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible Risk

Summary of Dust Emission

The risk of dust effects as a result of the Project are summarised in **Table 15.15** for each activity. The magnitude of risk determined is used to prescribe the level of site-specific mitigation required for each activity in order to prevent significant effects occurring.

There is at most a low risk of dust soiling and human health effects associated with the proposed works. There is a negligible risk of dust related ecological effects. Best practice dust mitigation measures will be implemented to ensure that there are no significant effects at nearby sensitive receptors. In addition, due to the linear nature of the pipeline, not all receptors will be affected at any one time. It is proposed to install approximately 100m of trench at any time thereby reducing the potential dust emission magnitude from excavation and infilling activities. In the absence of mitigation, dust effects are predicted to be short-term, adverse, and slight, see **Section 15.3.1**. This is a non-significant risk, however, dust mitigation will be put in place to minimise this risk.

Table 15.15 Summary of Dust Effect Risk used to Define Site-Specific Mitigation

Potential Effect	Dust Emission Risk			
	Demolition	Earthworks	Construction	Trackout
Dust Emission Magnitude	-	Large	Medium	Large
Dust Soiling Risk	-	Medium Risk	Medium Risk	Medium Risk
Human Health Risk	-	Low Risk	Low Risk	Low Risk

There is also the potential for traffic emissions to affect air quality in the short-term over the construction phase, particularly due to the increase in HDV accessing the site. The construction stage traffic has been reviewed and while for a short period during the excavation works HDV AADT will exceed 200, as this is only for a short period of the construction phase a detailed air quality assessment has been scoped out. None of the road links affected by the Project satisfy the assessment criteria in **Section 15.3.4.1,** as the change in traffic is not sufficient to cause more than a neutral impact as per TII Guidance (see **Section 15.3.2**). It can therefore be determined that the construction stage traffic will have a not-significant, imperceptible, direct, neutral, and short-term effect on air quality in accordance with **Section 15.3.2**.

15.6.1.2 Climate

There is the potential for greenhouse gas emissions to atmosphere during the construction of the development. Construction vehicles, generators *etc.*, may give rise to CO_2 and N_2O emissions. The Institute of Air Quality Management document, *Guidance on the Assessment of Dust from Demolition and Construction* (IAQM, 2014), states that site traffic and plant is unlikely to make a significant effect on climate. As per **Section 15.4.4**, Ireland had total GHG emissions of 46.19 $MtCO_2eq$ in 2021, emissions from the construction phase of the Project will be a small fraction of this. Therefore, the potential effect on climate is considered to be imperceptible, direct, neutral, and temporary.

15.6.2 Operational Phase

15.6.2.1 Air Quality and Climate

During operation, the pipeline will be buried underground and therefore there will be no emissions to atmosphere. There is the potential for maintenance vehicles accessing the site to result in emissions of NO_2, $PM_{10}/PM_{2.5}$ and CO_2. However, due to the infrequent nature of maintenance activities and the low number of vehicles involved emissions are not predicted to be significant. A detailed air quality and climate assessment was scoped out for the operational stage of the development as per the UK DMRB screening criteria (See **Section 15.3.5.1**). Operational phase effects on air quality and climate are predicted to be imperceptible, direct, neutral, and long-term in accordance with **Section 15.3.2**.

15.7 Remedial and Mitigation Measures

15.7.1 Air Quality Construction Phase

The objective of dust control at the site is to ensure that no significant nuisance occurs at nearby sensitive receptors. In order to develop a workable and transparent dust control strategy, the following management plan has been formulated by drawing on best practice guidance from Ireland, the UK and the USA based on the following publications:

- 'Guidance on the Assessment of Dust from Demolition and Construction' (IAQM, 2014);
- 'Planning Advice Note PAN50 Annex B: Controlling The Environmental Effects Of Surface Mineral Workings Annex B: The Control of Dust at Surface Mineral Workings' (The Scottish Office, 1996);
- 'Controlling the Environmental Effects of Recycled and Secondary Aggregates Production Good Practice Guidance' (UK Office of Deputy Prime Minister, 2002);
- 'Controlling Particles, Vapours & Noise Pollution from Construction Sites' (BRE, 2003);
- 'Fugitive Dust Technical Information Document for the Best Available Control Measures' and the USA (USEPA, 1997); and
- 'Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition' (periodically updated) (USEPA, 1986).

The construction Contractor will provide a further detailed CEMP that will include any subsequent planning conditions relevant to the Project and set out further detail of the overarching vision of how the construction Contractor of the Project manage the Site in a safe and organised manner.

Site Management

The aim is to ensure good site management by avoiding dust becoming airborne at source. This will be done through good design and effective control strategies.

At the construction planning stage, the siting of activities and storage piles will take note of the location of sensitive receptors and prevailing wind directions in order to minimise the potential for significant dust nuisance (see **Figure 15.1** for the wind rose for Dublin Airport). As the prevailing wind is predominantly westerly to south-westerly, locating construction compounds and storage piles downwind (to the east or northeast) of sensitive receptors will minimise the potential for dust nuisance to occur at sensitive receptors.

Good site management will include the ability to respond to adverse weather conditions by either restricting operations on-site or quickly implementing effective control measures before the potential for nuisance occurs. When rainfall is greater than 0.2mm/day, dust generation is generally suppressed (UK Office of Deputy Prime Minister (2002), BRE (2003)). The potential for significant dust generation is also reliant on threshold wind speeds of greater than 10m/s (19.4 knots) (at 7m above ground) to release loose material from storage piles and other exposed materials (USEPA, 1986). Particular care should be taken during periods of high winds (gales) as these are periods where the potential for significant dust emissions are highest (IAQM 2014). The prevailing meteorological conditions near the site are favourable in general for the suppression of dust for a significant period of the year. Nevertheless, there will be infrequent periods where care will be needed to ensure that dust nuisance does not occur. The following measures shall be taken to avoid dust nuisance occurring under unfavourable meteorological conditions:

- The Principal Contractor or equivalent must monitor the contractors' performance to ensure that the proposed mitigation measures are implemented and that dust effects and nuisance are minimised;
- During working hours, dust control methods will be monitored as appropriate, depending on the prevailing meteorological conditions;
- The name and contact details of a person to contact regarding air quality and dust issues shall be displayed on the site boundary, this notice board should also include head/regional office contact details;
- It is recommended that community engagement be undertaken before works commence on site explaining the nature and duration of the works to local residents and businesses;
- A complaints register will be kept on site detailing all telephone calls and letters of complaints received in connection with dust nuisance or air quality concerns, together with details of any remedial actions carried out;
- It is the responsibility of the contractor at all times to demonstrate full compliance with the dust control conditions herein; and

- At all times, the procedures put in place will be strictly monitored and assessed.

The dust minimisation measures shall be reviewed at regular intervals during the works to ensure the effectiveness of the procedures in place and to maintain the goal of minimisation of dust through the use of best practice and procedures. In the event of dust nuisance occurring outside the site boundary, site activities will be reviewed, and satisfactory procedures implemented to rectify the problem. Specific dust control measures to be employed are described below.

Site Roads / Haulage Routes

Movement of construction trucks along site roads (particularly unpaved roads) can be a significant source of fugitive dust if control measures are not in place. The most effective means of suppressing dust emissions from unpaved roads is to apply speed restrictions. Studies show that these measures can have a control efficiency ranging from 25 to 80% (UK Office of Deputy Prime Minister, 2002).

- A speed restriction of 20 km/hr will be applied as an effective control measure for dust for on-site vehicles using unpaved site roads;
- Access gates to the site will be located at least 10m from sensitive receptors where possible;
- Bowsers or suitable watering equipment will be available during periods of dry weather throughout the construction period. Research has found that watering can reduce dust emissions by 50% (USEPA, 1997). Watering will be conducted during sustained dry periods to ensure that unpaved areas are kept moist. The required application frequency will vary according to soil type, weather conditions and vehicular use; and
- Any hard surface roads will be swept to remove mud and aggregate materials from their surface while any unsurfaced roads shall be restricted to essential site traffic only.

Land Clearing / Earth Moving

Land clearing / earth-moving works during periods of high winds and dry weather conditions can be a significant source of dust.

- During dry and windy periods, and when there is a likelihood of dust nuisance, watering will be conducted to ensure moisture content of materials being moved is high enough to increase the stability of the soil and thus suppress dust.
- During periods of very high winds (gales), activities likely to generate significant dust emissions will be postponed until the gale has subsided.

Storage Piles

The location and moisture content of storage piles are important factors which determine their potential for dust emissions.

- Overburden material will be protected from exposure to wind by storing the material in sheltered regions of the site. Where possible storage piles will be located downwind of sensitive receptors.

- Regular watering will take place to ensure the moisture content is high enough to increase the stability of the soil and thus suppress dust. The regular watering of stockpiles has been found to have an 80% control efficiency (UK Office of Deputy Prime Minister, 2002).
- Where feasible, hoarding will be erected around site boundaries to reduce visual effect. This will also have an added benefit of preventing larger particles from affecting nearby sensitive receptors.

Site Traffic on Public Roads

Spillage and blow-off of debris, aggregates and fine material onto public roads will be reduced to a minimum by employing the following measures:

- Vehicles delivering or collecting material with potential for dust emissions shall be enclosed or covered with tarpaulin at all times to restrict the escape of dust; and
- At the main site traffic exits, a wheel wash facility will be installed. All trucks leaving the site must pass through the wheel wash. In addition, public roads outside the site shall be regularly inspected for cleanliness, as a minimum, daily, and cleaned as necessary.

Summary of Dust Mitigation Measures

The pro-active control of fugitive dust will ensure that the prevention of significant emissions, rather than an inefficient attempt to control them once they have been released, will contribute towards the satisfactory performance of the Contractor. Notwithstanding the fact that no significant effect is anticipated, these measures are nonetheless being employed as a matter of good practice. The key features with respect to control of dust, alongside those outlined in the Construction Environmental Management Plan, will be:

- The specification of a site policy on dust and the identification of the site management responsibilities for dust issues;
- The development of a documented system for managing site practices with regard to dust control;
- The development of a means by which the performance of the dust minimisation plan can be regularly monitored and assessed; and
- The specification of effective measures to deal with any complaints received.

15.7.2 Air Quality Operational Phase

No mitigation is proposed for the operational phase of the Project as effects on air quality will be imperceptible.

15.7.3 Climate Construction Phase

Embodied carbon of materials and construction activities will be the primary source of climate impacts during the construction phase. Measures to reduce the embodied carbon of the construction works include:

- Creating a construction program which allows for sufficient time to determine reuse and recycling opportunities for demolition wastes;
- Appointing a suitably competent contractor who will undertake waste audits detailing resource recovery best practice and identify materials that can be reused/recycled;
- Materials will be reused on site within the new build areas where possible;
- Ensure compliance with local and regional climate actions plans, including CAP23;
- Prevention of on-site or delivery vehicles from leaving engines idling, even over short periods;
- Ensure all plant and machinery are well maintained and inspected regularly;
- Minimising waste of materials due to poor timing or over ordering on site will aid to minimise the embodied carbon footprint of the site; and
- Sourcing materials locally where possible to reduce transport related CO_2 emissions.

15.7.4 Climate Operational Phase

No mitigation is proposed for the operational phase of the Project as effects for climate during operation are not significant. When maintenance is required during the operational phase, mitigation from the construction phase will be utilised to ensure impacts are minimised.

15.8 Monitoring / Reinstatement

15.8.1 Construction Phase

During working hours, dust control methods will be monitored as appropriate, depending on the prevailing meteorological conditions.

Monitoring of construction dust deposition along the site boundary to nearby sensitive receptors during the construction phase of the proposed scheme is recommended to ensure mitigation measures are working satisfactorily. This can be carried out using the Bergerhoff method in accordance with the requirements of the German Standard VDI 2119. The Bergerhoff Gauge consists of a collecting vessel and a stand with a protecting gauge. The collecting vessel is secured to the stand with the opening of the collecting vessel located approximately 2m above ground level. The TA Luft limit value is 350mg/m^2/day during the monitoring period of 30 days (+/- 2 days). Once the dust mitigation measures outlined in the mitigation section are implemented construction dust emissions will be imperceptible.

15.8.2 Operational Phase

There is no monitoring recommended for the operational phase of the development with respect to air quality as effects on air quality are predicted to be imperceptible.

Long term observations of climate vulnerability of the proposed development should be made with further climate adaptation put in place if required.

15.9 Residual Effects of the Proposed Development

15.9.1 Construction Phase

15.9.1.1 Air Quality

When the dust mitigation measures detailed in the mitigation section of this report (**Section 15.7**) are implemented, the residual effect of fugitive emissions of dust and particulate matter from the site will be temporary, direct, adverse and imperceptible in nature, posing no nuisance at nearby receptors.

15.9.1.2 Climate

Based on the scale and temporary nature of the construction works and the intermittent use of equipment, the residual effect on climate change and transboundary pollution from the Project is deemed to be minor adverse, temporary and not significant (see **Section 15.3.3**) in relation to Ireland's obligations under the EU 2030 target, provided mitigation measures to minimise embodied carbon are implemented (IEMA 2020). These mitigation measures should include recommendations under CAP23.

15.9.1.3 Human Health

Best practice mitigation measures are proposed for the construction phase of the Project, which will focus on the pro-active control of dust and other air pollutants to minimise generation of emissions at source. The mitigation measures that will be put in place during construction of the Project will ensure that the effect of the development complies with all EU ambient air quality legislative limit values which are based on the protection of human health (**Table 15.1**). Therefore, the residual effect of construction of the Project will be temporary, direct, adverse, and imperceptible with respect to human health.

15.9.2 Operational Phase

15.9.2.1 Air Quality and Climate

The residual effect of the operational phase associated with the Project are predicted to be neutral, long-term and imperceptible as the pipeline will be buried underground once constructed and there will be minimal emissions associated with maintenance vehicles accessing the site.

15.10 Cumulative Assessment

15.10.1 Air Quality

According to the IAQM Guidance (2014) should the construction phase of the proposed development coincide with the construction phase of any other developments, such as the proposed underpass and apron 5H, then there is the potential for cumulative construction dust related effects on nearby sensitive receptors. However, provided the mitigation measures outlined in **Section 15.7.1** are implemented throughout the construction phase of the proposed development, significant cumulative dust effects are not predicted.

With mitigation measures (as per **Section 15.7**) in place, there are no significant effects on air quality predicted for theconstruction phase. Potential cumulative effects on air quality and climate are addressed in **Chapter 18**.

15.10.2 Climate

As mentioned, Ireland declared a climate and biodiversity emergency in May 2019 and it is currently failing to meet its EU binding targets under Regulation (European Union 2018/842) the sensitivity of the environment to GHG emissions can be considered high. This ties in with the IEMA Guidance (IEMA 2020) which states that the sensitive receptor for GHG emissions is the global atmosphere. The receptor has a high sensitivity, given the severe consequences of global climate change and the cumulative contributions of all GHG emission sources.

IEMA states (IEMA 2020) that GHG emissions, unlike local air pollutants, are not geographically limited due to the global nature of impacts rather than directly affecting any specific local receptor. The GHG emissions from all projects within Ireland, and globally, will contribute to climate change therefore all Irish and global emissions contribute to the cumulative environmental effect. As the proposed project is compared to Ireland's 2030 emission targets it is inherently cumulative in nature and no further cumulative assessment is required.

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16 ARCHAEOLOGY & CULTURAL HERITAGE

16.1 Introduction

The objective of the report is to assess the likely significant effects of the proposed development on the receiving cultural, architectural, and archaeological heritage environments and to propose ameliorative measures to safeguard any monuments, features, finds of antiquity or features of architectural or cultural heritage merit.

This chapter should be read in conjunction with the site layout plans and project description chapter of this EIAR.

16.2 Statement of Authority

This chapter was prepared by Dr Clare Crowley, Senior Archaeologist and Heritage Consultant at Courtney Deery Heritage Consultancy Ltd. Clare has more than 20 years' experience in cultural heritage management and assessment and holds a PhD in Archaeology (Dublin Institute of Technology, 2009), a BA (Hons) in Ancient History, Archaeology & French (Trinity College Dublin, 1996), a Certificate in Repair and Conservation of Historic Buildings (Dublin Civic Trust, 2004) and a Certificate in Condition Surveys of Historic Buildings (University of Oxford, 2017).

Clare has extensive experience in completing cultural heritage impact assessments for major infrastructural projects, with recent examples including N2 Slane Bypass Road Scheme (2017-2023), Dublin Bus Connects Project (2020-2023), multiple Solar PV Farms in counties Cork, Meath, Offaly, Carlow (*e.g.,* Kilrue, Ballyroe in Cork, Ardenhue in Carlow, Bishopswood in Offaly) (2018-2023), windfarms (on-and off-shore), *e.g*., Teevurcher Co. Meath, Moanvane, Co. Offaly, and the extensive Greenwire Project (2013-2022).

16.3 Methodology

This assessment was based on the combination of a desk study and field walkover survey (undertaken 1st December 2022) (see **Section 16.4.6.3**) and was informed by a geophysical survey carried out in November 2019 in part of the development lands (see **Section 16.4.6.2**). The following sources were availed of:

- The National Monuments, Preservation Orders and Register of Historic Monuments lists were sourced directly from the Department of Housing, Local Government and Heritage (DHLGH);
- Record of Monuments and Places (RMP) and Sites and Monuments Record (SMR). The SMR, as revised in the light of fieldwork, formed the basis for the establishment of the statutory RMP in 1994 (RMP; pursuant to Section 12 of the National Monuments (Amendment) Act, 1994, as amended). The RMP records known upstanding archaeological monuments, their original location (in cases of destroyed monuments) and the position of possible sites identified as cropmarks on vertical aerial photographs. The information held in the RMP files is read in conjunction with published constraint maps. Archaeological sites identified since 1994 have been added to the non-statutory SMR database of the Archaeological Survey of Ireland (National Monuments Service,

DHLGH), which is available online at www.archaeology.ie and includes both RMP and SMR sites. Those sites designated as SMR sites have not yet been added to the statutory record, but are scheduled for inclusion in the next revision of the RMP;

- Record of Protected Structures (RPS) and Architectural Conservation Areas (ACAs), Fingal County Development Plan 2023-2029;
- The National Inventory of Architectural Heritage (NIAH) Building Survey and Garden Survey (DHLGH) highlight a representative sample of architectural heritage in the county and raise awareness of the wealth of same. The NIAH surveys can be reviewed online at www.buildingsofireland.ie;
- The topographical files of the National Museum of Ireland;
- National Folklore Collection (Duchas.ie);
- Cartographical sources, OSi Historic Mapping Archive, including early editions of the Ordnance Survey (OS) maps and other historical mapping (such as Down Survey 1656 Map and Taylor's Map of the County of Kildare 1783);
- Excavations Bulletins and Excavations Database (1970-2021);
- Aerial imagery (Google Earth 2001–2020, Bing 2013; OSi 1995, 2000, 2006; and
- Other documentary sources (as listed in the references at the end of this chapter).

16.3.1 Relevant Guidelines, Policy, and Legislation

This assessment has been prepared in accordance with the following legislation, standards and guidelines:

- Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act, 1999 as amended;
- Built and Archaeological Heritage: Climate Change Sectoral Adaptation Plan, Department of Cultural, Heritage and the Gaeltacht, September 2019.
- Code of Practice for Archaeology agreed between the Minister for Arts, Heritage, Regional, Rural and Gaeltacht Affairs and Transport Infrastructure Ireland, 2017;
- Council of Europe (1985). Convention for the Protection of the Architectural Heritage of Europe (ratified by Ireland 1997), 'Granada Convention';
- Council of Europe (1992). European Convention on the Protection of the Archaeological Heritage (ratified by Ireland 1992), 'Valletta Convention';
- Council of Europe (2005). Framework Convention on the Value of Cultural Heritage for Society, 'Faro Convention';
- Department of Arts, Heritage, Gaeltacht and the Islands (DAHG) (1999). Framework and Principles for the Protection of the Archaeological Heritage;
- Department of Housing, Planning and Local Government (2018) Guidelines for Planning Authorities and An Bord Pleanala on carrying out Environmental Impact Assessment;

- Environmental Protection Agency (EPA) (2022). Guidelines on the information to be contained in Environmental Effect Assessment Reports;
- EPA (2015). Advice Notes for preparing Environmental Effect Statements, Draft September 2015;
- EPA (2002). Guidelines on the information to be contained in Environmental Effect Statements;
- EPA (2003). Advice Notes on Current Practice (in preparation of Environmental Effect Statements);
- European Commission (2017). Environmental Effect Assessment of Projects – Guidance on the Preparation of the Environmental Effect Assessment Report;
- Heritage Act, 1995 (as amended);
- Historic England (2017). The Setting of Heritage Assets, Historic Environment Good Practice Advice in Planning Note 3 (Second Edition);
- ICOMOS (2011). Guidance on Heritage Effect Assessments for Cultural World Heritage Properties;
- ICOMOS Xi'an Declaration on the Conservation of the Setting of Heritage Structures, Sites and Areas, 2005;
- Monitoring Effects of Climate Change on Built Heritage, Report of the ICOMOS Ireland Climate Change Sub-Committee, January 2010;
- National Monuments Act, 1930 as amended;
- National Roads Authority (NRA) (2005). Guidelines for the Assessment of Archaeological Heritage Effect of National Road Schemes;
- NRA (2006) Guidelines for the Assessment of Architectural Heritage Impacts of National Road Schemes;
- Planning and Development Act 2000 (as amended);
- The Heritage Council (2013). Historic Landscape Characterisation in Ireland: Best Practice Guidance; and
- The UNESCO World Heritage Convention, 1972.

Excerpts from the relevant legislation are contained in **Appendix 16.1**.

16.3.2 Appraisal Method for the Assessment of Effects

Cultural heritage sites are considered to be a non-renewable resource and cultural heritage material assets are generally considered to be location sensitive. In this context, any change to their environment, such as construction activity and ground disturbance works, could adversely affect these sites. The likely significance of all effects is determined in consideration of the magnitude of the effect and the baseline rating upon which the effect has an effect (*i.e.*, the sensitivity or value of the cultural heritage asset). Having assessed the potential magnitude of effect with respect to the sensitivity / value of the asset, the overall significance of the effect is then classified as not significant, imperceptible, slight, moderate, significant, very significant, or profound.

A glossary of effect assessment terms, including the criteria for the assessment of effect significance, is contained in **Appendix 16.2** and is informed by information contained in the guidelines provided by EPA (2022), Historic England (2017), and NRA (2005, 2006), as listed in **Section 16.3.1**.

16.4 Receiving Environment

16.4.1 Study Area

The proposed Airfield Drainage Project (ADP) works are located at Dublin Airport. The surrounding area is a mix of highly developed suburban densities and a belt of agricultural land that survives around the Dublin Airport lands within which the works will take place.

The study area forms part of the northern urban fringe of the city and comprises the proposed ADP works redline boundary (**Figure 16.1**). A 500m radius from this boundary was included in the assessment of designated or known cultural heritage sites. Recorded archaeological monuments within 500m can serve as a good indicator of previously unidentified sites of archaeological potential in the area. A 500m radius also allows for the assessment of indirect effects on cultural heritage features, *e.g.*, effects on settings of archaeological monuments or architectural sites. Recorded archaeological sites in the wider area are discussed in **Section 16.4.2** to provide an archaeological and historical context for the landscape in which the proposed development is sited.

This is a landscape that is, in places, still somewhat rural in character (as, for example, the fields surrounding the airport runways, some of which form part of the proposed works area in Tubberbunny townland). Land use varies extensively from arable cultivation, residential, industrial, and existing airport development. These processes have created a modern agricultural, residential, and industrial landscape.

Fingal has a rich and well-documented archaeological record and the area is known to have been extensively settled since the prehistoric period. The historical setting of the lands consists of an area predominantly dominated by agricultural usage.

Development of the new northern runway at Dublin Airport involved a considerable amount of archaeological investigation in 2016-17, which has greatly increased knowledge of this landscape in the past and points to occupation from the prehistoric period onwards.

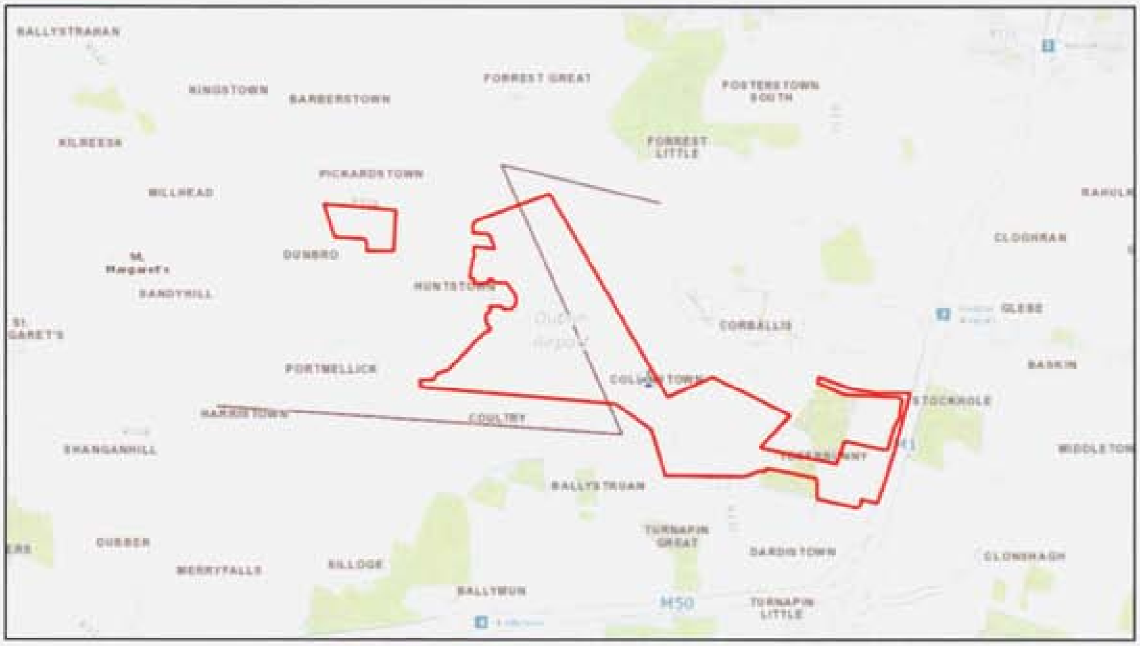

Figure 16.1 Study area

The study area extends into nine townlands, as detailed in **Table 16.1**.

Table 16.1: Townlands within the study area

Townland	Civil Parish	Barony
Collinstown	Santry	Coolock
Commons	Santry	Coolock
Coultry	Santry	Coolock
Forrest Great	Swords	Nethercross
Forrest Little	Swords	Nethercross
Huntstown	Santry	Coolock
Pickardstown	St Margaret	Coolock
Portmellick	St Margaret	Coolock
Toberbunny	Cloghran	Coolock

16.4.2 Archaeological and Historical Background

16.4.2.1 Prehistoric period

There is evidence for prehistoric activity in the wider environs of the proposed development. A possible tumulus (or barrow) site is recorded in Cloghran townland, c. 1.3km south-west. It is classified as a mound site (RMP DU015-001) and was identified on an aerial photograph (Fairey Survey of Ireland 453/2) taken in 1971, where it appears as a circular earthen mound c. 15m in diameter. There is no longer any visible trace of the site. There are also seven ring-ditches recorded in the surrounding area (c. 1-2km radius from the proposed development; DU011-047, -114, -119, -126, -169 & DU014-098) in the townlands of Nevinstown West, Fostertown South, Forrest Great, Kingstown, Ballystrahan, and Shanganhill. All these sites have been identified as cropmarks on aerial imagery and have no visible surface trace on the ground. Barrows and ring-ditches are both burial monuments of the Bronze Age, although such sites may also date from the succeeding Iron Age (c. 500 BC to AD 500).

Further evidence was brought to light during advance archaeological investigations for the Metro North project in the late 2000s. This included the identification of a cluster of cremation pits (DU014-120, c. 620m south-west) in Ballystruan and a burnt mound to the west in Ballymun townland (DU014-119, c. 835m south). Another burnt mound was identified in Fostertown South (DU011-151), in the vicinity of the recorded ring-ditch there (DU011-047), over 2km to the north-east. Further to the north-east, archaeological investigations in advance of a housing development in Drinan found a cremation pit, kiln, and a nearby cluster of pits (DU012-089 to -091). Pottery from the kiln was dated to the Late Bronze Age and a radiocarbon date of 1114-907 BC was returned for charcoal from the cremation pit (Moriarty 2005), indicating possible contemporaneous activity.

In the lands to the north of the proposed ADP works, in the area developed for the Dublin Airport North Runway project, multiple archaeological sites were identified by archaeological investigations. While the majority of these represented settlement activity in the early medieval and medieval periods, there was also evidence for prehistoric activity. Two potential fulachtaí fia were identifed by geophysical survey in Site H, which lies within the proposed ADP works boundary in Pickardstown townland (see in **Section 16.4.6.1**). The remainder of the newly identified sites lie outside the proposed works boundary and include the remains of another fulacht fia in Site I in Pickardstown townland and one in Barberstown townland (Site 3), which comprised a trough and three pits.

Although fulachtaí fia are typically dated to the Bronze Age exceptions do occur and this included the trough at Site 3 in Barberstown, which was dated to the Neolithic period (Cal 3330-3230 BC/Cal 3180-3160 BC/ Cal 3120-2900 BC). It was initially assumed that the three pits were associated with the trough. However, a radiocarbon date obtained from the fill of one of the pits proved it was significantly later in date and dated to the Late Neolithic period (Cal 2840-2810 BC/Cal 2680-2480 BC). This may suggest that this site was continually reused and revisited over an extended period but utilised for the same purpose.

16.4.2.2 Early medieval and medieval periods

The early medieval period would have been heavily influenced by the proposed development site's proximity to the early ecclesiastical site at Swords; this influence was further solidified with the arrival of the Anglo-Normans in 1169, to whom is attributed the origin of the church site and graveyard in Cloghran (RMP DU014-009) c. 1.5km north of the proposed development (Sutton, 2003).

Among ecclesiastical sites there are several monument types that are not, strictly speaking, 'official' church sites. These include holy wells, which are a Christian adaptation of a pre-Christian tradition of sacred springs which, like their pagan predecessors, were often visited at certain times of the year, such as saints' or other holy days and often had the reputation for effecting cures. The holy well site (RMP DU014-010) in Cloghran, c. 1.3km north of the proposed development, is marked on the 1843 edition of the Ordnance Survey six-inch map as 'Lady Well'; it is shown on the Ordnance Survey revision map of 1936 as 'Lady Well (site of)'. No trace of the well, which is no longer venerated, remains. A second Holy Well occurs in Toberbunny (RMP DU014-023), c. 195m northwest of the proposed works. Toberbunny is the Irish for '*tobar bainne*' meaning 'well of milk'.

There was an increase in settlement across north County Dublin during the early medieval period (c. AD 500 to AD 1200), and the ringfort, otherwise known as the rath or fairy fort, is the best-known native monument of this period. A recorded ringfort site in Forrest Great (RMP DU011-043) is situated c. 740m to the north-west of the proposed development. A further ringfort site located in Cloghran, c. 1.4km east/north-east (RMP DU011-046) now lies within the grounds of Dublin airport, immediately south of the Forrest Little Road. The monument was partly destroyed in 1822, and further cleared away in 1873 (Adams, 1881; Healy, 1975). Adams (1881), in his antiquarian notes of the parishes of Santry and Cloghran describes a site, 150 feet in diameter, at which in 1822, 'some ancient silver and copper coins, pikes, pipes and musket balls were found' (Lewis, 1837). In 1873 'four slap-shillings, an Irish halfpenny of William and Mary, and a defaced 17th century token were found' in addition to a paved road that led to steps in the side of the ringfort's embankment (Adams, 1881). Tradition also records that a castle once stood near the site. Castle Moat House in Cloghran was the seat of J. Mac Owen, Esq. in the second quarter of the 19th century and is now offices for the Dublin Airport Authority. According to Lewis (1837) it 'takes its name from an extensive moat, or rath, within the demesne'; this reference may relate to the ringfort site (RMP DU011-046), or, alternatively, to the ringfort site in Forrest Great (RMP DU011-043) (Sutton, 2003).

A substantial amount of early medieval settlement activity was uncovered in the lands to the north of the proposed ADP works, during the archaeological investigations for the Dublin Airport North Runway project. This included a large sub-oval shaped enclosure (Site A) in Pickardstown townland, which was occupied during this period. In close proximity to this was Site B, a second sub-oval shaped enclosure in Barberstown townland, with an occupation phase contemporary to Site A (7th-10th century AD), but continuing into the medieval period with phases of activity in the 10th-12th century AD and 12th-15th century AD. At Site D in Barberstown townland, an early medieval kiln was found alongside a ditch that was originally dug in the early medieval period but was recut and reutilised at a later stage in the medieval period. Features found at Site I in Pickardstown townland represent the remains of agricultural activities associated with the large enclosure sites identified at Sites A and B and were located in the same area as the fulacht fia, which points to a continuity of human activity in this area from the prehistoric period onwards.

A third large enclosure, this one bivallate and roughly oval in shape, was identified at Site J in Forrest Little townland. Although the archaeological nature of the features picked up by geophysical survey were confirmed by testing, the site has not been fully excavated, though it may also represent early medieval settlement.

The Anglo- Normans, like the Norse before them, were especially drawn to the rich, fertile plains of Fingal, ideal for the intensive agriculture that they were to introduce, abundant with natural resources and easy access to local harbours. The manorial system introduced by the Anglo-Normans generated an expansion in the production and export of grain. The manor was the basic Anglo-Norman territorial unit and consisted of the lord's abode, a church, the mill and a clustering of the lord's tenants. This was surrounded by several hundred acres of fields and woodland scattered with tenant farmers.

At the time of the Anglo-Normans, the study area was included in the grant of the kingdom of Meath, by Henry II, to Hugh De Lacy, who re-granted the land to Adam de Feipo or Phepoe, in whose family it continued until about 1375. In the latter part of the sixteenth century, it passed to the Nugent family (Adams, 1881, 482).

A recorded castle site (RMP DU014-011) is located in Corballis c. 295m north of the proposed development. Early historical maps depict the location of a ruinous castle (tower house) in the corner of a field. A variety of historical and cartographic evidence combine to suggest that the building may have been razed in 1641/42 by the forces of the Earl of Ormond. The castle's occupant at that time was involved in the provisioning of Confederate troops besieging Drogheda late in 1641, and Ormond repaid such participation, in Fingal and parts of Counties Louth and Meath particularly, with targeted violence. The demise of the structure in the early 1640s is also implied by the discovery of reused dressed medieval stones in the original, mid-17th century vernacular cottage at Corballis House (Frazer, 2007).

In medieval times Dunbro was one of three manors in the parish of St Margaret, the other two being Dunsoghly and Barberstown, beyond the study area. Towards the close of the 12th century the lands of Dunbro, containing approximately one carucate, were granted by King John, to Robert de St Michael. However, during the 13th century the connection of the St Michael family with Dunbro came to an end. From this period Dunbro appears as the property Stephen de Fulebourne, a great ecclesiastic, and the then chief governor of Ireland. Historical sources indicate that a substantial 13th century dwelling existed at Dunbro that was supposed to rival Dublin Castle. De Fulebourne was an extravagant man, his ecclesiastical office was not subordinate to his civil one, he had lavish possessions and was called to court during the summer of 1284, when he was resident at Dunbro. His enemies reported that, for the purpose of building a town there, he had taken timber, stone, and other things in the town and castle of Dublin; and it was alleged that he had removed marble fittings from the hall of the castle at Dublin to beautify his own at Dunbro. Two ogive-shaped stones, which were found at Dunbro some 160 years ago, were probably relics of a chapel erected there by him; and a field at Dunbro, which bears the name of "the priest's paddock", was possibly given by him for the endowment of the chapel (Ball, 1920).

16.4.2.3 Post-medieval / early modern period

There were numerous small estates in this part of north County Dublin, one of which, Corballis House, was located at the heart of what is now Dublin Airport. At the time of its demolition in 2007, Corballis House was a detached seven-bay two-story house that had been dated by the National Inventory of Architectural Heritage Building Survey to c. 1835. Archaeological investigations prior to and during the monitored demolition of the house, however, revealed the building's true history, with the earliest phase of the house likely to have been built shortly after 1641/2. It incorporated re-used medieval stone ope surrounds into its shallow foundations and wall fabric, which probably came from the nearby castle. At that time the building consisted of a single-storey, west-facing, three-bay stone cottage, with a thatched, gabled roof and a single chimney. Later in the 17th century, a south extension that included a second fireplace was added to one end of the cottage, doubling its length. The building was still thatched with longstraw at this time, and the few small windows were probably glazed.

The next phase of renovation was probably initiated by Thomas Wilkinson after he acquired Corballis in 1706. It saw the raising of the walls of the existing building and the lowering of interior floors to accommodate the addition of an upper storey. Windows were enlarged as part of the refurbishment, and a new roof of red tile and slate was added. Green-glazed ridge tiles from North Devon were used to decorate the roof peak, and fashionable blue and white glazed tin-glazed 'Delft' tiles (depicting various rural scenes) were added to either side of the enlarged downstairs fireplaces, just below the mantelpieces. Cobblestone paths threaded through a well-drained front garden to the central west entrance of Corballis House, flanked by decorative garden parterres —probably of box wood — that were considered especially pleasing when viewed from upper storey windows.

In the 1720s, the now two-storey residence was again lengthened at its other end, and a small cellar was built beneath this new north extension, nearest to the farmyard. The cellar may first have been used as a dairy pantry; it subsequently came to serve as a wine cellar and, later still, was used also for coal storage.

A huge eastern addition that enlarged the house beyond its previous single-pile width, and nearly doubled its size, was begun around 1760 under the guidance of James Wilkinson. The opportunity was used to raise the height of the new slate roof in order to lift both ground floor and first floor ceilings inside the older part of the house. The front of the building was moved from the old west side entrance to the new Georgian-proportioned east façade, and a terraced cobblestone patio was laid before it. The south façade was also significantly renovated to provide a fitting prospect from the newly landscaped avenue approach. It resembled the new east front of the building, with large sash windows arranged symmetrically around a central arched doorway and fanlight.

Towards the end of the 18th century, under the direction of Sir Henry and Lady Elizabeth Wilkinson, half-octagon bows were added to each side of the south façade. Windows were systematically repositioned and enlarged, in proportion to the revised building dimensions. The central arched doorway in the southern façade was also replaced with a large window. In addition, the roof and first storey ceilings were raised over the eastern and southern parts of the building. Shortly thereafter, the interior plasterwork of Corballis House was renewed and new decorative plaster niches were built inside one of the upper storey bay rooms. The musical theme of these niches is a clue that this room may once have been the venue for fashionable recitals and parties that Susannah Liddiard Wilkinson hosted around the turn of the 19th century.

Although many individual architectural features of the building were added over the remaining two centuries of its life, the basic floor plan of Corballis at the time of its removal in 2007 was that which was already in existence in the early 19th century.

The adjacent townland of Collinstown in 1659 had three English and six Irish residences and in the late 17th century was owned by Patrick Birmingham of Corballis. In 1669 James the Duke of York was granted the lands of Collinstown by King Charles II. Collinstown includes an area which in the 17th century was known as Dowanstown or Donas. In the 18th century Thomas Molyneux purchased the lands of Collinstown and Dowanstown for £1,184. The lands purchased included 236 acres. A number of quarries were excavated in the area in the 18th century, subsequently forming a substantial lake before being infilled in 1970s.

16.4.2.4 20th century development

Construction of an airport at Collinstown started in 1917. It was one of eight sites in Ireland chosen by The Royal Flying Corps to be the site of a military-run airport. The construction of the Collinstown Aerodrome concentrated around Collinstown House and it was completed in 1919. The aerodrome included paved runways, six hangers, a repair shed, salvage shed and a number of ancillary buildings such as sheds for repair and salvage and stores. As the aerodrome was built as a military base, a number of regimental buildings which housed over seven hundred people were constructed.

However, with the end of World War I, the flying units withdrew from Collinstown Aerodrome. In 1919, Collinstown House stood as a three-storey brick building with a slate roof; it was incorporated into the aerodrome and functioned as the headquarters of the 3rd training wing. In the period between 1919 and 1922 Collinstown continued to be used by the defence forces acting as a barracks for the British army. The outbreak of the Civil War saw an increased usage of the site by civilians.

In 1935 it was requested of the Minister of Industry and Commerce that provision be made for the development of an aerodrome for the City of Dublin. The works suggested included the 'demolition of the existing buildings at Collinstown aerodrome and the levelling of the ground for the establishment of an aerodrome on this site' (Dáil Éireann, Volume 57, 25 June 1935). This was followed by the passing of the Air Navigation and Transport Bill of 1936, facilitating the establishment of the national air-line Aer Lingus and the start of construction of a new airport at Collinstown. Within the airport grounds, large-scale earthmoving was undertaken with a network of tracks and carriages used to redistribute earth across the site. In total, 717 acres were developed, with a new terminal, workshops and hangers being constructed (O'Donovan & Clancy, 2006).

The area once occupied by the 18th century Collinstown House is now part of the existing runway facility for Dublin Airport, with the original terminal building constructed further north in the townland. The detached multiple-bay four-storey airport terminal building was built in 1937, in the International Modern style. It has a curved plan with repeated bands of horizontal glazing, cantilevered terraces and promenades on the western façade overlooking the airfield. The terminal building was designed by a team of architects that included Desmond Fitzgerald, an elder brother of the former Taoiseach, Dr Garret FitzGerald. The curved building with its tiered floors was designed to echo the lines of a great ocean liner. It was one of the first buildings in Ireland in an International Modernist style and won many architectural awards for its design.

By 1947, flights departing from Dublin had ventured as far as Continental Europe and new concrete runways were completed in 1948. By the late 1950s, the original terminal was incapable of handling growing passenger numbers, so the new North Terminal was opened in June 1959. Originally it had been planned that this building would handle all US and European flights, but instead it became the arrivals area for all passengers. By the 1960s, new departure gate piers were added adjacent to the old terminal to cope with larger aircraft. It was during this period that a free-standing airport chapel was constructed, the Church of Our Lady Queen of Heaven, which was one of the first modernist churches in Dublin. It is a detached multiple-bay Roman Catholic church, built in 1964, with a concrete bell tower and landscaped entrance courtyard to the west.

It soon became apparent that the original terminal building could no longer cope with passenger demand and in 1972 a new terminal building was opened. The airport has greatly expanded since then with the addition of a new terminal, new departure gate piers, an extension to the 1971 terminal building, a new runway and taxiways.

The original terminal building was designed to cater for just 100,000 passengers a year, in contrast to the 30 million a year that can be handled since Terminal 2 opened in 2010. The old terminal building is still partially used for daily passenger operations and many of the internal design features of the building have been retained as a reminder of those early days of aviation (www.dublinairport.com/about-us/did-you-know/history).

16.4.3 Cartographic sources

16.4.3.1 Down Survey maps

No detail is shown on the map for the barony of Nethercross (**Figure 16.2**) with regard to townland names, though the shape of the townlands is remarkably similar to those that are depicted on the 19th century Ordnance Survey (OS) maps. The townlands of Forrest Great and Forrest Little appear as a single townland at the south end of the barony, annotated '*(11)*' on the map. The principal highway from Dublin is shown on the map as a dotted line extending northwards into the barony to Swords.

Figure 16.2: Down Survey map of the Barony of Nethercross, c. 1656

Some of the townlands within the study area are named on the map for the barony of Coolock (**Figure 16.2**), including *Collinstonne*, *Coulweltree*, *Huntstonne*, *Portnelogg*. Pickardstown and Toberbunny lies within areas of unforfeited land, within which no detail is shown. A structure shown within Corballis townland is likely to represent the earliest phase of Corballis House, while structures depicted in Dunbro represent the manor there. The parish map for Cloghran (**Figure 16.4**) contains little of interest, though it does include the place name '*Tobber bonny*' to the south of the parish boundary, referencing either the holy well or perhaps the nearby bridge (which is so-named on Rocque's more detailed map a century later). The accompanying parish terrier notes that *Tobberbonny* is part of the parish of Cloghran.

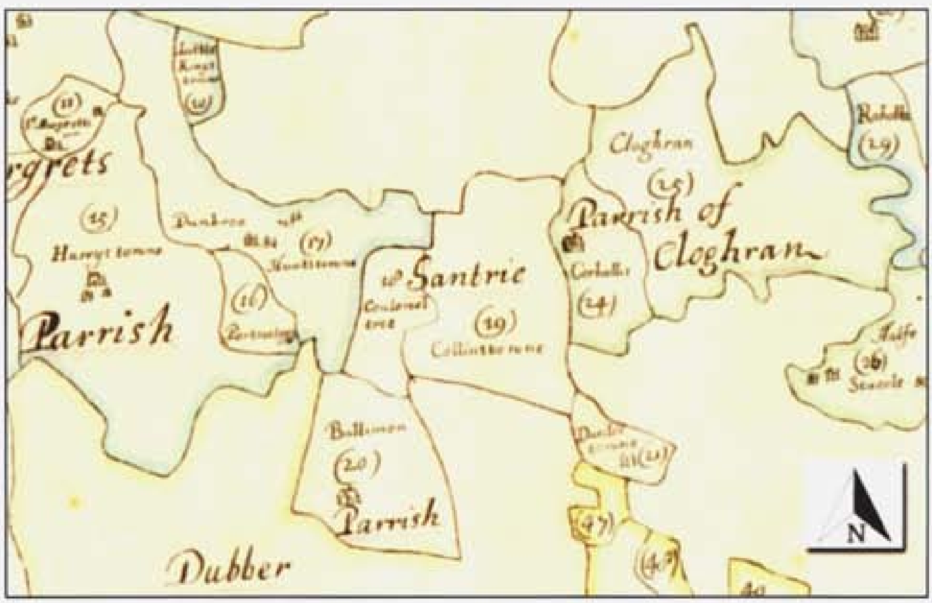

Figure 16.3: Down Survey map of the Barony of Coolock, c. 1656

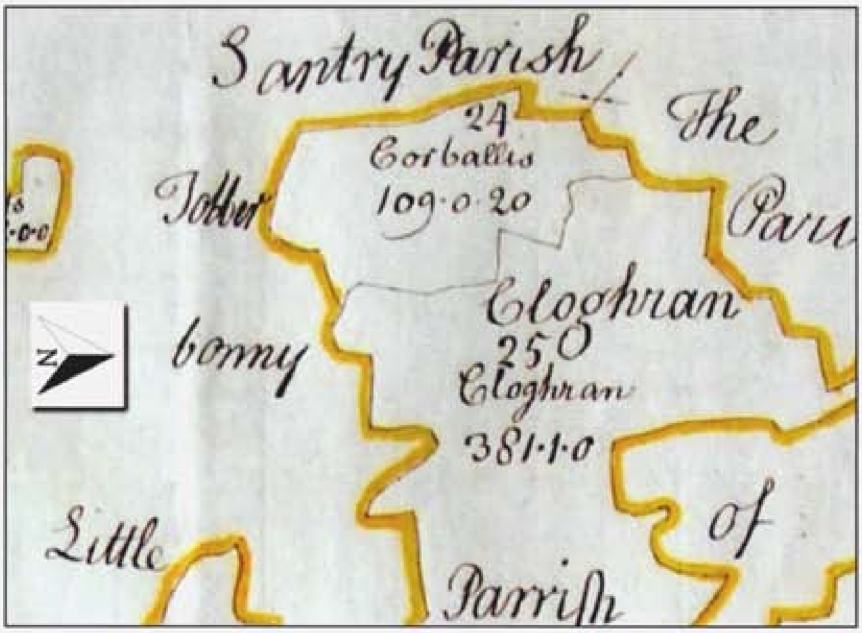

Figure 16.4: Down Survey map of the Barony of Coolock, c. 1656

16.4.3.2 Rocque's map of County Dublin, 1760

Rocque's map of Dublin county provides considerably more detail than the Down Survey maps of the preceeding century **(Figure 16.5**). Ballystruan ('*Ballstrowan*') townland is shown with a house and associated structures on its lands. The designed landscapes associated with several of the country houses in the general study area can be seen on this 18th century map, including Corballis House ('*Corbally*'), Cloghran House, and Forrest House. The placename Little Forrest appears on the map, though possibly in relation to a house shown there. In Toberbunny townland, '*Tubber Bunny Bridge*' and '*Tubber Bunny*' names appear on the map, the latter of which possibly refers to a house with walled gardens to the rear. The small villages of Cloghran and Huntstown are depicted, as is another named '*Forrest Town*', and the road network is much as it later appears on the 19th century first edition OS map. Agricultural fields, shown as predominantly pasture, occupy the land surrounding the houses and villages.

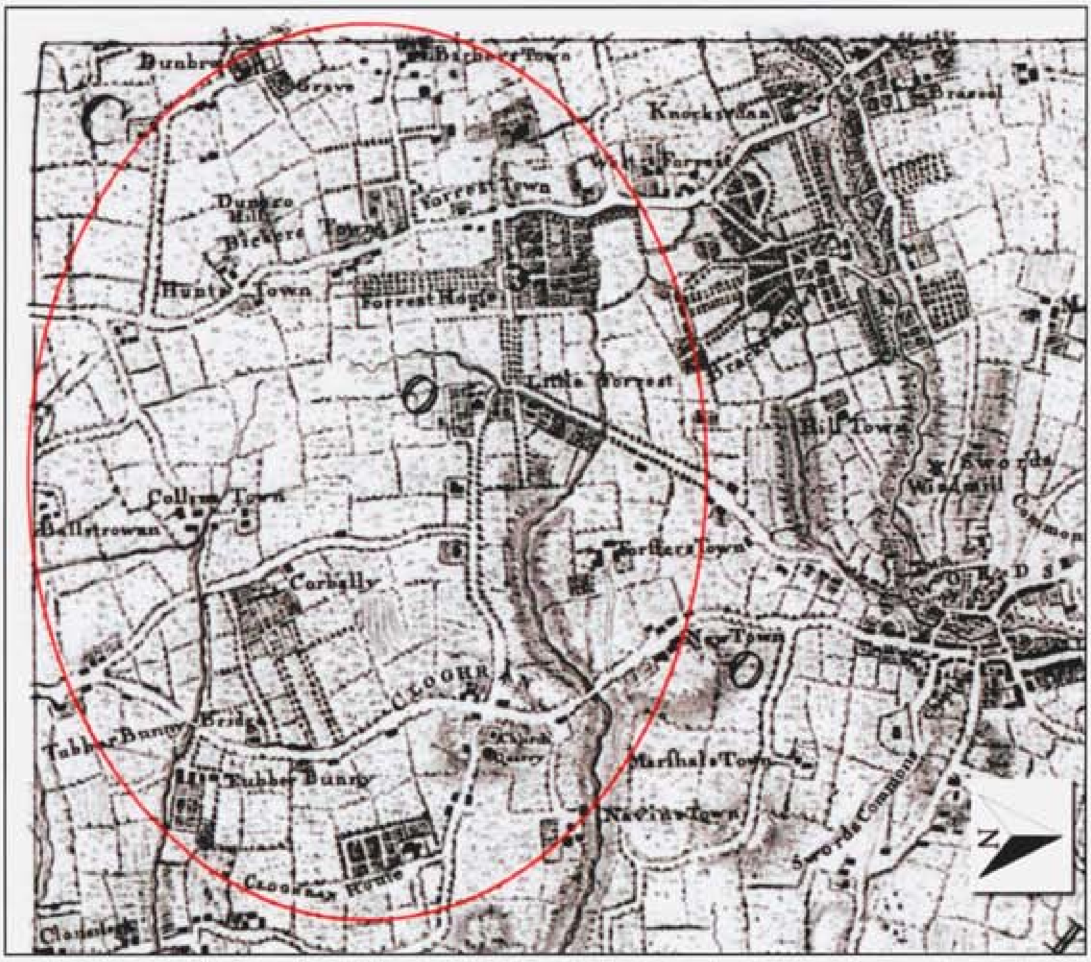

Figure 16.5: Rocque's Map of County Dublin, 1760, showing study area in red

16.4.3.3 Taylor's map of Dublin, 1816

On Taylor's map of 1816 (**Figure 16.6**) there is considerably less detail and little change evident since the map of the preceding century. Most of the townlands are named and the country houses in the study area are depicted, notably Collinstown and Corballis, both of which are shown with surrounding woodland representing their associated demesnes. 'Tubberabonny' is named but no well is indicated.

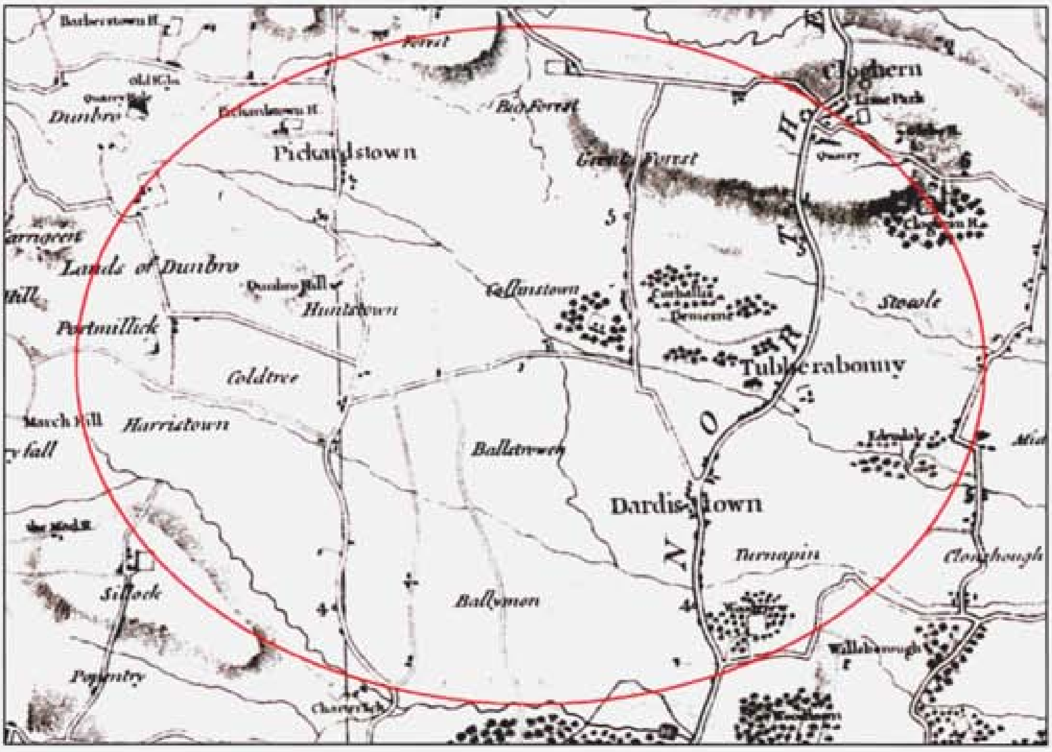

Figure 16.6: Taylor's map of County Dublin, 1816, showing study area in red

16.4.3.4 Ordnance Survey mapping, 1843 to 1949

The first edition six-inch Ordnance Survey (OS) map of 1843 is the earliest accurate and detailed cartographic source for the study area (**Figure 16.7**).

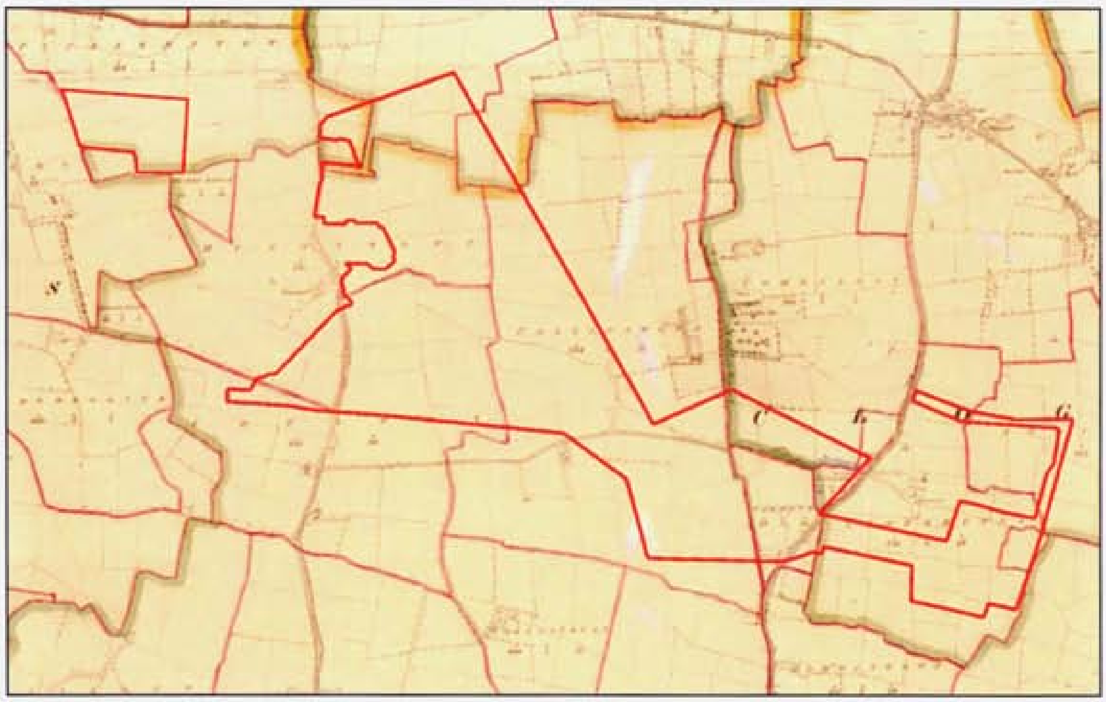

Figure 16.7: Ordnance Survey first edition six-inch map, 1843, showing approximate site location in red

The proposed development area extends across lands that are depicted on the 1843 map as agricultural, a network of mostly small fields. In the surrounding area, with the exception of Cloghran village and some linear settlement along the roadside at Toberbunny, settlement is restricted to small farmsteads and small country estates (*e.g.*, Corballis and Collinstown) and country villas (*e.g.*, Coultry House).

The recorded well at Toberbunny is depicted and named on the map (**Figure 16.8**). It is located in the corner of a yard to the rear of two buildings, possibly outbuildings associated with the large house to the north, with the Cuckoo Stream immediately south of it. The group of buildings was accessed from a laneway off the main road. The lane continued to the south-east, terminating at two small ponds. Toberbunny Bridge is marked at the road, where it crossed the Cuckoo Stream. No other features of interest are located within the proposed development boundary.

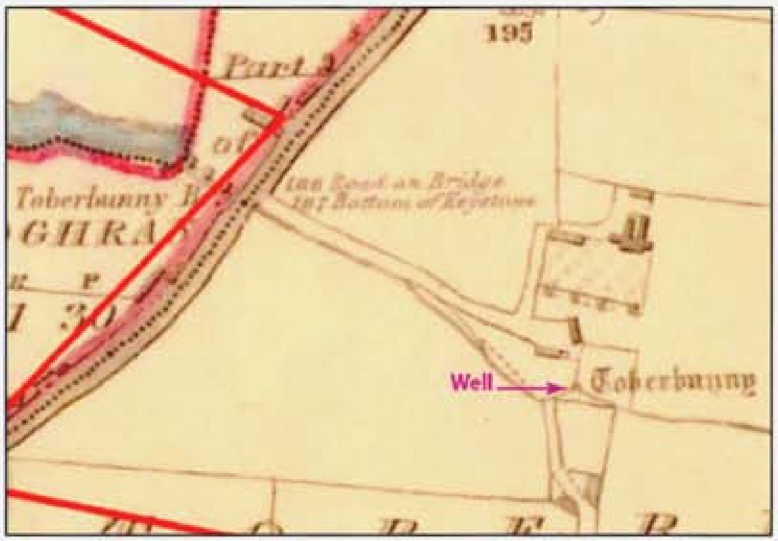

Figure 16.8: Detail of Ordnance Survey first edition six-inch map (1843) showing Toberbunny well (RMP DU014-023), with approximate site boundary in red

Figure 16.9 Detail of Ordnance Survey revised edition six-inch map (1868) showing Toberbunny well (RMP DU014-023)

The large house to the north had been demolished by 1868 (**Figure 16.9**), as had the two outbuildings. In their place, the laneway had been extended eastwards and a small outbuilding had been constructed where it met the yard wall. Only one of the ponds was still in place. By the time of the 25-inch OS map of 1909 (**Figure 16.10**) there had been little change in the wider study area. At Toberbunny, the well was still indicated (**Figure 16.11**) but it is marked in a different location (c. 20m to the north) to that shown on the 1843 map. A short distance north-east of the well, the small outbuilding had been replaced by a larger square building. The remaining pond to the south-east had been filled in.

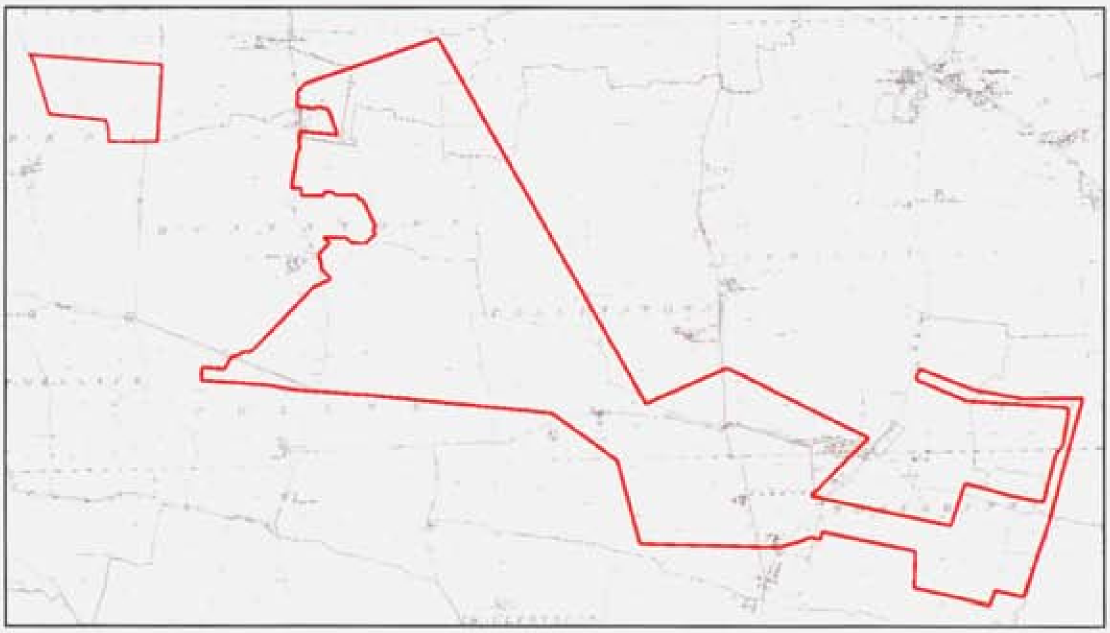

Figure 16.10: Ordnance Survey 25-inch map, 1909, showing approximate site location in red

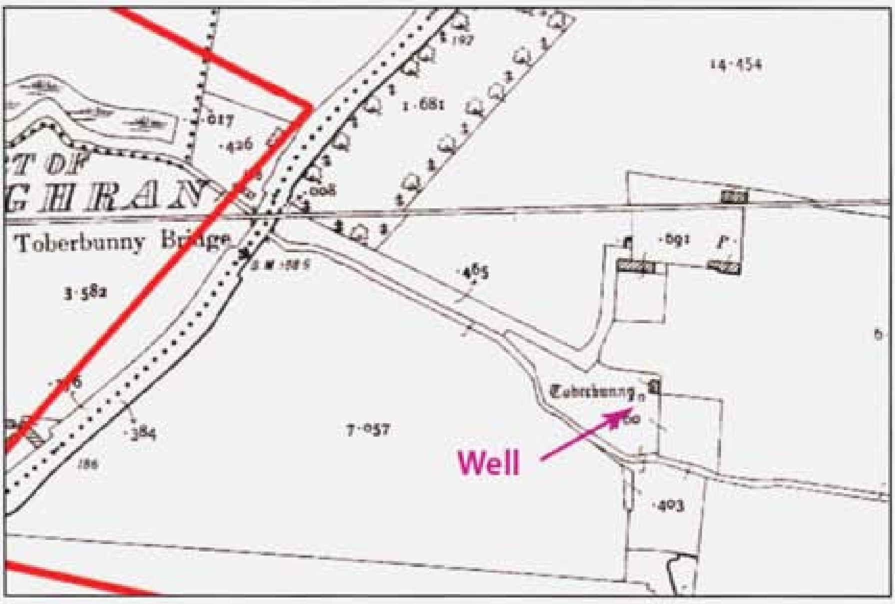

Figure 16.11: Detail of Ordnance Survey 25-inch map (1909) showing Toberbunny well (RMP DU014-023), with approximate site boundary in red

The two map editions from the mid to later 1930s capture two different phases in the developing aeronautical landscape at Collinstown, with the 25-inch map (**Figure 16.12**) showing the early 20th century aerodrome still in place (north of the proposed development boundary) and the six-inch map (**Figure 16.13**) reflecting the introduction of the new airport for Dublin City. The time of the map surveys marks the cusp of the changeover, between the demolition of the old aerodrome buildings and the construction of the new airport.

The revised six-inch OS map edition shows the new airport as it is being constructed. The curving Modernist style terminal building had been completed and forms the centre point of a symmetrical arrangement of buildings to the north-east and south-east. The road layout providing access to the airport is similarly geometrical in pattern. The dotted lines demarcating the runways and airfield, within the proposed development boundary, indicate that these elements had yet to be completed.

At Toberbunny, the well and adjacent building are still depicted. On the south side of the laneway, two new houses had been built, the larger of which is named Toberbunny Lodge.

Figure 16.12 Detail of Ordnance Survey 25-inch map (1936) showing early 20th century aerodrome, with approximate site boundary in red

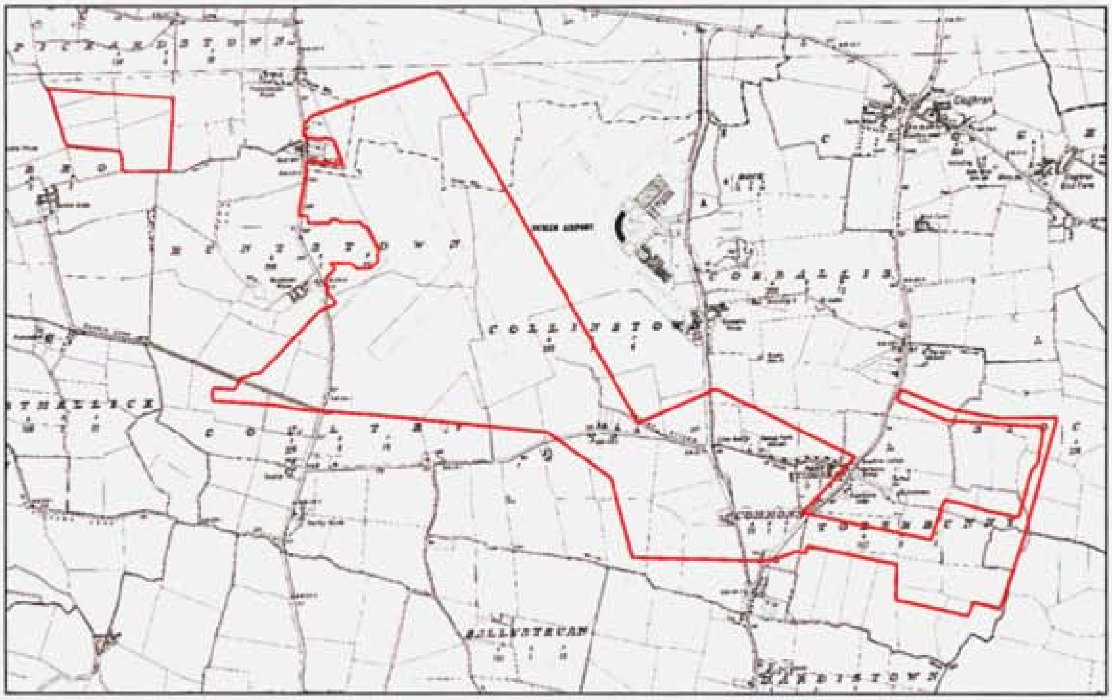

Figure 16.13: Ordnance Survey six-inch map, 1939, showing approximate site location in red

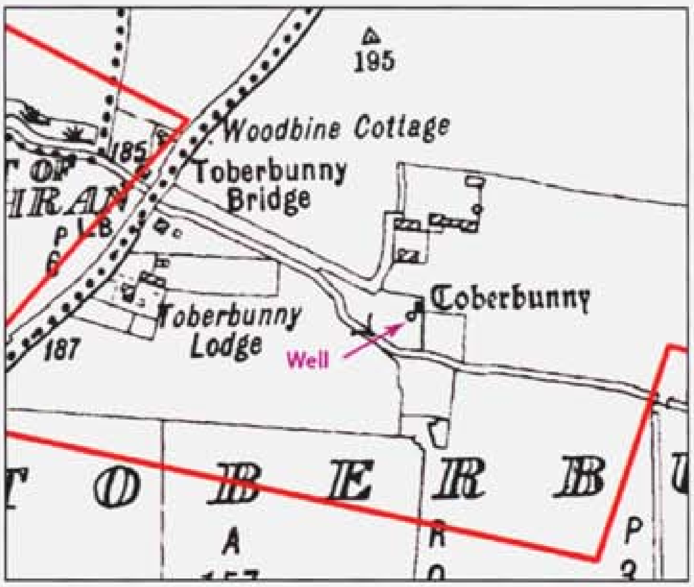

Figure 16.14: Ordnance Survey six-inch map (1939) showing Toberbunny well (RMP DU014-023), with approximate site boundary in red

16.4.4 Aerial imagery

There has been substantial change in the landscape since the mid-20th century OS six-inch mapping, primarily with the development of Dublin Airport, its associated road network and the nearby M1 Motorway, and the absorption of Santry and Swords into the Greater Dublin suburban area. The most recent development, the construction of the North Runway, represented a significant change to the agricultural landscape north and north-west of the airport (**Figure 16.15**). It also, as is noted in **Section 16.2.6** below, revealed multiple previously unknown archaeological sites, indicating that this area was occupied from the Neolithic period onwards (**Figure 16.16**).

Figure 16.15: Aerial imagery (Google Earth Pro 2022) showing proposed development boundary

Figure 16.16: Aerial imagery (Google Earth Pro 2017) showing North Runway development lands during archaeological investigations

16.4.5 Stray finds

No stray finds are recorded in the National Museum of Ireland (NMI) topographical files for the townlands located within the study area.

16.4.6 Archaeological investigations

The results of archaeological investigations relating to the development of the airport, surrounding road network, and advance archaeological work for the Metro North scheme indicate that there is substantial evidence for prehistoric and early medieval activity in this landscape.

16.4.6.1 North Runway Project

The most recent are the archaeological investigations that were carried out in advance of the Dublin Airport North Runway development, in an extensive area of former agricultural land to the north and north-west of the existing Dublin Airport terminal building. The investigations, which identified multiple archaeological sites (**Figure 16.17**), involved geophysical survey, archaeological testing and subsequent excavation in 2016 and 2017, with a further phase of investigations in 2019.

Figure 16.17: Location of archaeological sites and potential sites identified during archaeological investigations for the North Runway Project (Google Earth Pro 2022)

Two possible fulachtaí fia sites were identified by geophysical survey in Site H (anomalies 38 & 39 on **Figure 16.18**), which lies within the proposed ADP works boundary in Pickardstown townland (**Figure 16.19**). The anomalies at Site H present as distinct areas of magnetic disturbance identified along the southern boundary of the field, interpreted as fulachtaí fia. Nothing of archaeological significance was found by testing at geophysical sites G, E, and F, however, notable findings were identified at Sites A, B, D, I, and J:

- Site A in Pickardstown townland (Licence No. 17E0053, Excavations Bulletin Ref. 2017:777) comprised a large sub-oval shaped enclosure 62m by 49m (external dimensions). It represented the remains of an early medieval enclosure which was located within a landscape dominated by early medieval / medieval settlement and associated agricultural activities. Evidence of occupation and habitation were identified at Site A via pits, kilns, a metalled surface, gullys / linear features and the remnants of a possible internal structure. This was one of two enclosures were identified within the North Runway lands – Site A and Site B – and both enclosures were located close to each other and represented successive phases of enclosure activity. Two features at Site A were radiocarbon dated from the 6th-7th century AD, though dateable artefacts from the site were few. A bone pin was recovered from the possible structure located within the enclosure and was tentatively dated from 10th-mid 11th century AD.
- The enclosure at Site B in Barberstown townland (Licence No. 17E0092, Excavations Bulletin Ref. 2017:772) was located in close proximity to and north-east of the enclosure at Site A. Site B was a large sub-oval shaped enclosure defined by two ditches (max. internal dimensions c. 40m E-W by 54m N-S). Various phases of activity were identified, the earliest of which was radiocarbon dated from 7th-10th century AD and the next from the 10th-12th century AD, however, both ditches contained a significant amount of pottery dating from the 12th-15th century AD which would suggest they were being utilised over an extended period. The majority of the remaining features exposed within this site were typical of features you would find on any early medieval settlement, including a possible internal structure and possible kiln, and indicative of agricultural activities and practices.
- At Site D in Barberstown townland (Licence No. 17E0090, Excavations Bulletin Ref. 2017:775), excavation identified a c. 70m long ditch and a kiln. The ditch had a small gap approximately mid-way along its length and charcoal from a lower fill was radiocarbon dated to 7th-9th century AD. Finds from the fill of the ditch included three iron knife fragments and eight sherds of 12th/13th-century Dublin-type fabrics, giving a significantly later date; this pottery came from the main fill of the ditch which sealed the fill from which the radiocarbon date came. This would suggest that the ditch feature, originally dug in the early medieval period, was recut and reutilized at a later stage in the medieval period. The kiln was identified and excavated near the northern extent of the site, where it had been cut by the ditch and therefore predated it. It is also typical of simple earth-cut early medieval kilns.
- Site I, in Pickardstown townland (Licence No. 17E0054, Excavations Bulletin Ref. 2017:738) comprised pits, drains, and a metalled surface, as well as two burnt spreads with an associated trough. The latter most likely represent the ploughed-out remains of a fulacht fia, which are typically Bronze Age in date, though insufficient charcoal was recovered for dating. Three of the pits at Site I, all of which contained fragments of animal bone, were radiocarbon dated to the 7th/8th century AD. Although their function is unknown, they likely represented the remains of agricultural activities associated with the large enclosure sites identified at Sites A and B. The remaining features at Site I – drains, gullys and a metalled surface – were dated to the post-medieval period and were probably associated with and contemporary to activities carried out at the nearby Pickardstown House.

- At Site J in Forrest Little townland (Licence No. 19E0006, Excavations Bulletin Ref. 2019:542), geophysical survey revealed a bivallate enclosure measuring c. 80m x 50m. It was defined by a broad ditch, roughly oval in shape, encompassing a smaller circular ditch measuring c. 33m in diameter. Multiple linear responses and potential pit locations were noted in proximity to the enclosure. Test-trenching confirmed the presence of the oval enclosures, while also showing that the larger outer enclosure had been partially removed during historic road building and service laying in the area. The presence of pits, structural slot trenches and other archaeological features associated with the enclosures was also confirmed. The site was not excavated as it is not located under an area that was to be used for runway construction.

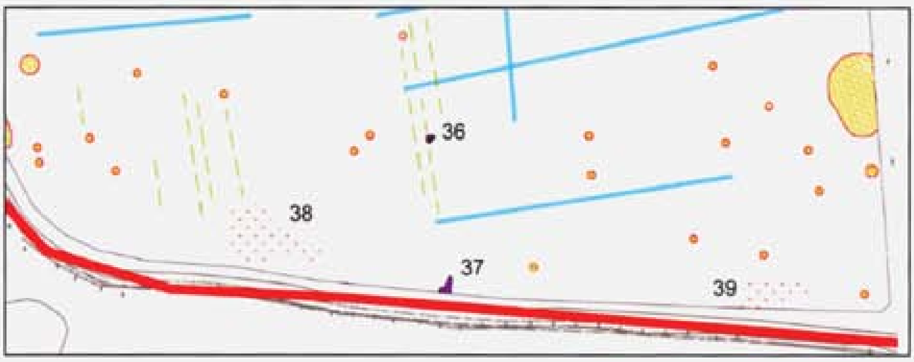

Figure 16.18: Geophysical survey results (interpretative drawing) for Site H (after Nicholls, 2016), within the proposed development boundary

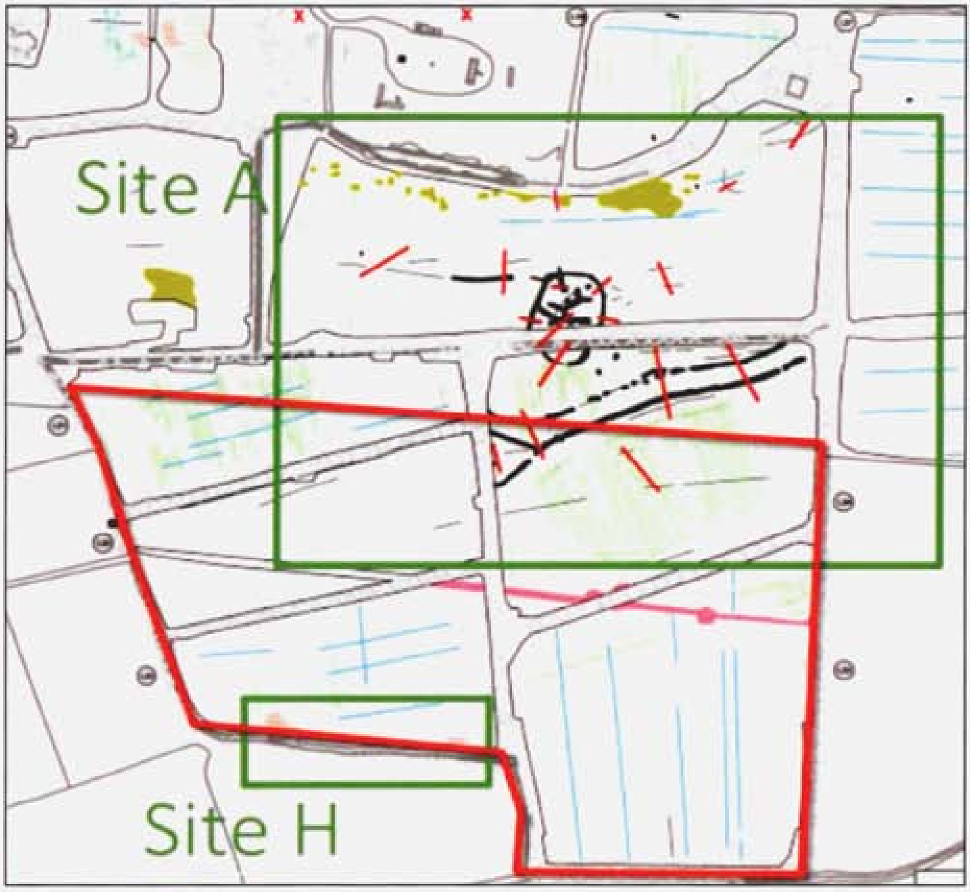

Figure 16.19: Geophysical survey results at Sites A & H and archaeological test trench locations at Site A (after Cotter 2017), showing unexcavated potential archaeological features within the proposed development boundary (in red) in Site H

Ten trial-pits, five boreholes and five infiltration test-pits were monitored at the location of the Metro North depot in Dardistown. Nothing of archaeological significance was located in any of the pits or boreholes, however, subsequent geophysical survey and archaeological testing across the proposed Dardistown Depot site identified a burnt mound (Licence Nos 11R0017 & 11E0039). The proposed depot site straddled Ballystruan and Ballymun townlands, with the low level burnt mound located in the latter (SMR DU014-119, c. 820m south).

16.4.6.2 Geophysical survey within the proposed development site

A geophysical survey (Licence No. 19R0232) was carried out in 2019 in Toberbunny townland for the proposed Eastlands Logistic Park. The survey area included three small fields and part of a fourth that lie within the proposed development boundary (**Figure 16.20**). Detailed magnetometer and electromagnetic surveys were carried out within the survey area: Magnetometer (M) (**Figure 16.21**); Electromagnetic Apparent Magnetic Susceptibility (S) (**Figure 16.22**); and Electromagnetic Apparent Electrical Resistivity (R) (**Figure 16.23**). The relevant results are provided in

Table 16.2.

None of the anomalies detected were interpreted as definitive archaeology, however, there were a number of possible archaeological sites / features, including five possible ring-ditches (M16, M18, S12, S13, R10), a possible trackway (R8), and several possible pits (R7). Two of the possible ring-ditches may be encircled by larger enclosures (M18 and R10). Other arcing or linear anomalies could not be ruled out as archaeological but the geophysical survey report indicates that they could also be geological or agricultural in origin.

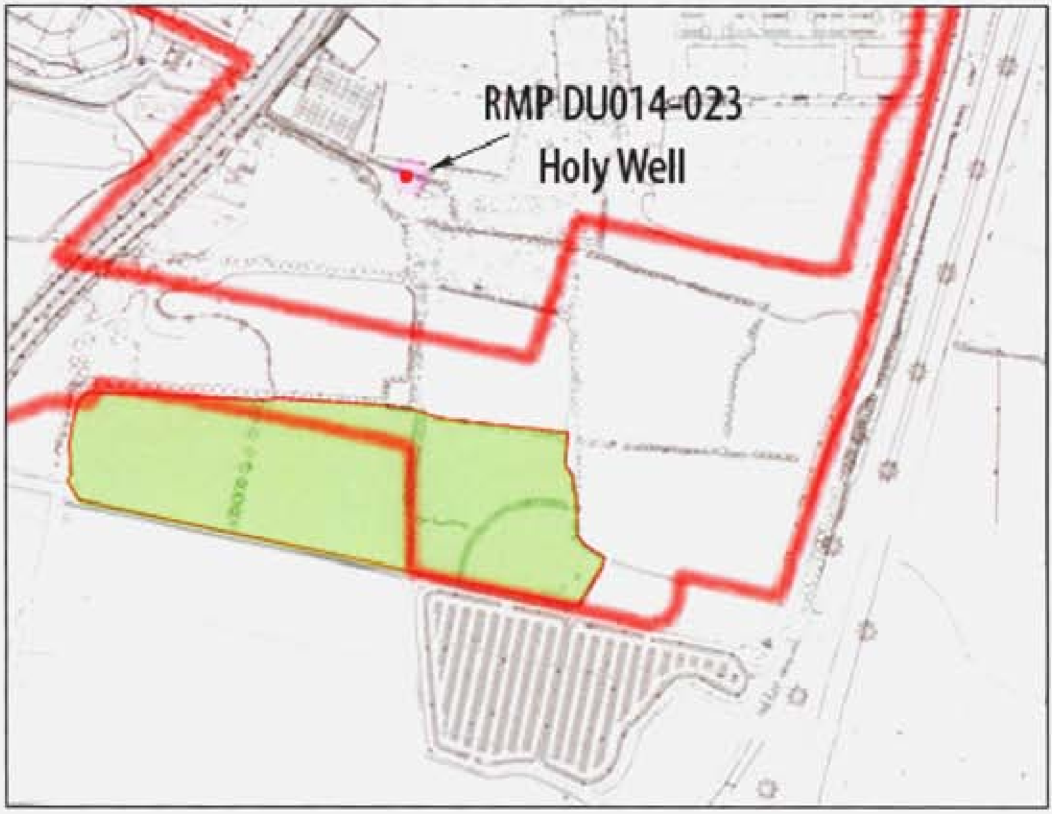

Figure 16.20: Previous geophysical survey area in Toberbunny townland in 2019, in green, with proposed development boundary in red

Table 16.2: Results of geophysical survey

Anomaly	Interpretation
M9	Linear anomaly. Possible ditch, 34m in length. Runs on same orientation as adjacent probable boundary ditches and so could be related. However, it has a stronger geophysical signature and therefore could be archaeological in origin. N half lies within proposed development boundary.
M15	Two linear anomalies. Possible ditches within the NE field, 40m & 29m in length. They do not match the orientation of anything surrounding them and therefore could be archaeological or agricultural in origin.
M16	Arcing anomaly. Possible ditch or cut feature, 29m in length. May represent an archaeological ring ditch, with a diameter of 11.6m.
M17	Arcing anomaly. Possible ditch, 39m in length, which may represent archaeological remains.
M18	Two arcing ditches which appear to surround a small possible ring ditch. The outer ditches may enclose an area 30m in diameter, while the central ring ditch measures 6.3m in diameter and may contain a northern entrance. The outer enclosure appears to have been cut by a later field boundary, depicted on 1st edition OS map.
M19	Two linear anomalies, slightly arcing. Possible ditches. These run between a relict field boundary and a zone of modern disturbance making them difficult to quantify. They may be archaeological or geological in origin.
M20	Right-angled possible ditch 25m in length, which may once have bounded the corner of the field.
M21	Linear anomaly. Possible ditch, 26m in length, which may be agricultural or archaeological in nature.
S7	Arcing anomaly. Possible ditch, 100m in length. Could be archaeological or geological in origin
S10	Arcing anomaly. Possible ditch, 98m in length. Could be archaeological, agricultural, or geological in nature.
S11	Arcing anomaly. Possible ditch, 40m in length.
S12	Possible ring ditch, 16m diameter.
S13	Possible ring ditch, 13m in diameter.
R7	Possible pits. Four isolated points of high resistivity, which might correspond to near surface stones, stone lined pits, or stone deposits.
R8	'T-shaped' boundary comprising two parallel ditches (low resistivity) and central bank or stone feature (high resistivity). This could represent an agricultural boundary, though it does not correspond to a boundary shown on any historic mapping. Alternative interpretation is a trackway with ditches either side.
R9	Arcing anomaly. A high resistivity feature, 23m in length. Associated with compact earth or stone this feature could be archaeological in origin.
R10	Two arcing low resistivity ditches. The larger measures 56m in length and may be an archaeological enclosure ditch which may surround the smaller ditch. This smaller semi-circular ditch, 40m in length, may represent a ring-ditch 18.6m in diameter. A possible entranceway can be seen on the northern edge of the ring-ditch.

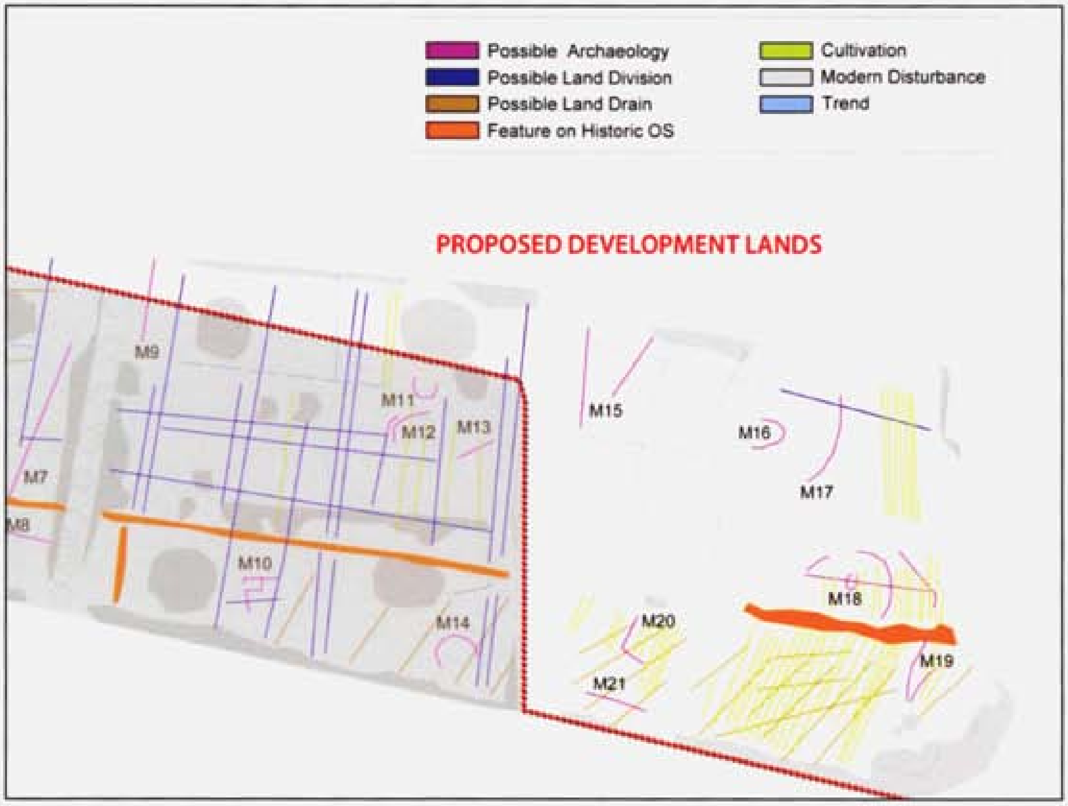

Figure 16.21: Results of geophysical survey, Magnetometer Interpretation

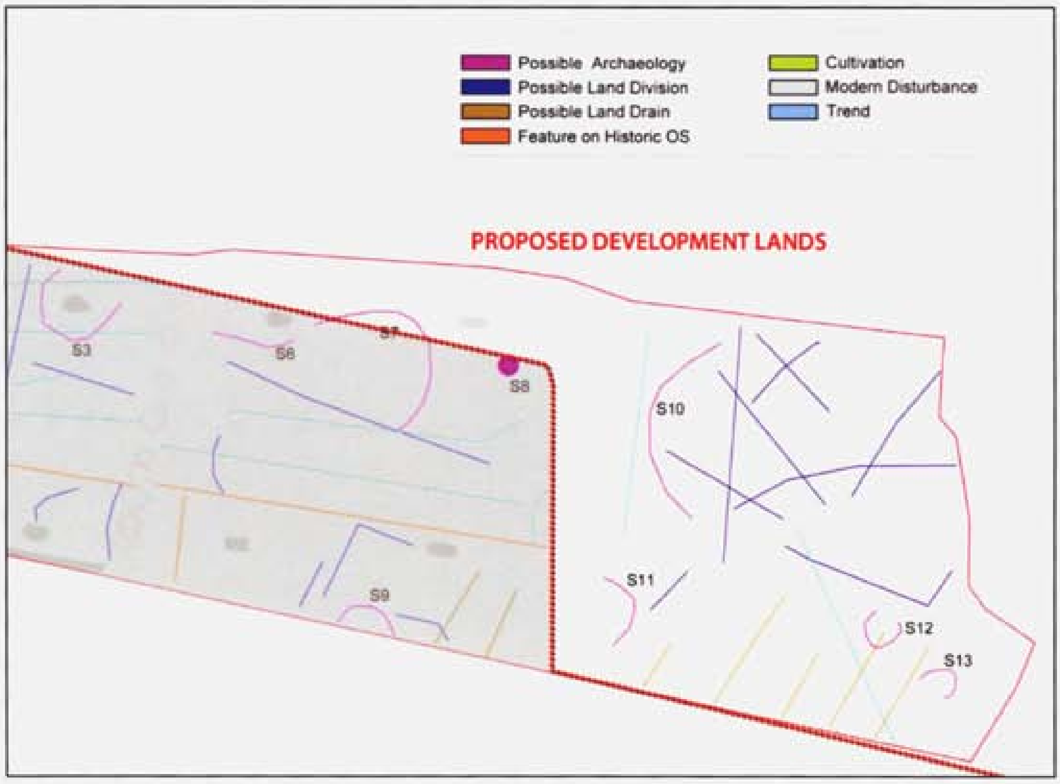

Figure 16.22: Results of geophysical survey, Electromagnetic Apparent Magnetic Susceptibility Interpretation

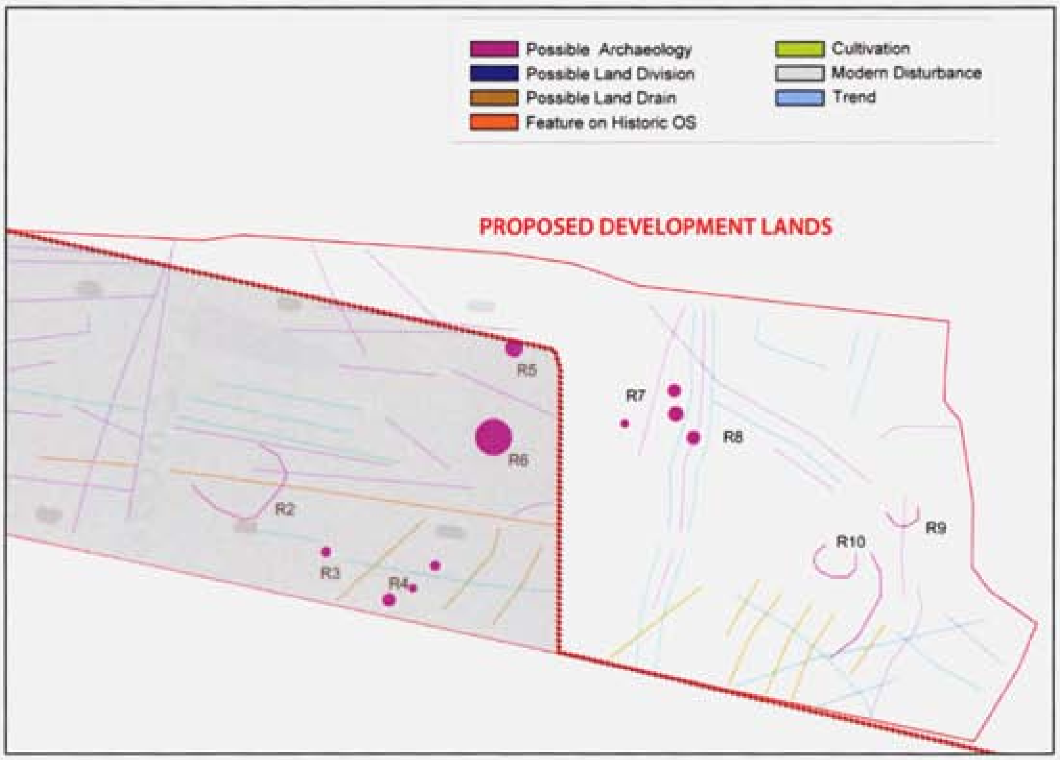

Figure 16.23: Results of geophysical survey, Electromagnetic Apparent Electrical Resistivity Interpretation

16.4.6.3 Field survey within the proposed development site

An inspection was carried out of the Eastlands area (**Figure 16.24**) of the proposed development on 1st December 2022, on a dry, bright day. The remainder of the lands within the proposed development lie within Dublin Airport and have been previously developed or disturbed, with a small field in Pickardstown townland having been previously subjected to field survey and geophysical survey.

Access to the site was via a laneway off the R312 road that follows the same course as that shown on the historic OS mapping.

East of the R132 road in the Eastlands area, the Cuckoo Stream (**Figure 16.25**) still flows along the course shown on the historic OS maps, with naturalised banks, but is crossed by several modern concrete bridges. The stream channel is narrow and the watercourse itself is shallow, with dense vegetation along its banks. The stream is culverted beneath the widened Swords Road (R312), at the site of the former Toberbunny Bridge. It continues on the west side of the road in a man-made open channel in Dublin Airport lands, along the southern perimeter of the South Apron (**Figure 16.26**), beyond which it is culverted.

The field boundaries throughout the Eastlands area are predominantly mature hedgerow and the majority are overgrown. Deep ditches, many water-filled, are also common. In general, the topography is level. Slight undulations were noted in the eastern fields (F6 to F8), however, the long grass and vegetation overgrowth in this area obscured the ground surface (**Figure 16.27** and **Figure 16.28**).

Field 5 is completely overgrown and is almost entirely taken up by a large mound of spoil. F9, a small field at the south-east end of the site, was also very overgrown, as was F18 at the south-western end. Construction compounds were noted in F10 and F9. Fields F1, F19, F16, F14 and F15 are all in use as playing pitches, with well-maintained lawn and a level ground surface (**Figure 16.29**). F10 to F13 and F17 were also under relatively short grass, with good ground surface visibility (**Figure 16.31**).

The fields at the northern end of Eastlands once formed part of a golf course and evidence of landscaping for the course can still be seen in areas of slightly higher ground, low platforms and banks, and tree and shrub clusters in fields F2 to F4 (**Figure 16.24**). Much of this area is very overgrown, including the site of the holy well (RMP DU014-023) in F2 (**Figure 16.32**). The RMP location of the well was entirely obscured by dense brambles and its condition or the presence of any built elements or superstructure could not be confirmed (**Figure 16.33** and **Figure 16.34**). The well is described in the RMP file as an '*unenclosed pool close to Cuckoo Stream*' that had been incorporated into the golf course (see **Section 16.4.9.2**). There was no visible trace of a pool or former pool in the vicinity of the stream. The banks of the Cuckoo Stream were densely covered with vegetation (**Figure 16.25**); nothing could be seen of the original location of the well, as depicted on the first edition OS map, which was located c. 20m south of the well as mapped on the 1909 25-inch edition (on which the RMP location is based).

Figure 16.24 Field survey numbers

To the rear (north-east) of the well site are the remains of a stone building first depicted on the 1909 OS 25-inch map (**Figure 16.11** and **Figure 16.35** to **Figure 16.39**). The building is set in a yard, which is at a lower level to the surrounding ground. The yard is partly demarcated by a modern concrete wall to the west. A stone boundary wall extends from the north-east corner of the building or approximately 10m, representing the remains of the yard depicted on the historic OS mapping. The wall is random-rubble construction, with large stone coping surviving at its western end, indicating an original height of c. 2m. The building is a small two-storey stone-built house, with a roughcast render on the exterior. The entire south wall is missing. New timbers for a roof provide stability for the structure but it is unslated and open to the elements. A decorative edging has been added to the timbers. A picnic table in the interior suggests it may have been used as a local amenity. The remaining internal features are the two fireplaces, one on each floor, in the west gable. Traces of a blocked up doorway are evident in the surviving north wall, indicated by the line of the brick-reveal on either side. Remnants of plaster on the interior walls could be seen on the ground floor.

Toberbunny Lodge, which appears on the revised six-inch OS map of 1939, is extant but no longer in use. It sits in an overgrown plot within the proposed development boundary at the west end of F19, at the side of the R132 road (**Figure 16.40** and **Figure 16.41** to **Figure 16.43**). It is a single-storey house with hipped roof and pebbledash render to the exterior. All of the window and door opes have been blocked up. The roof is slated, with red-clay ridge tiles, and roughcast rendered chimney stacks. The original L-shape of the building depicted on the 1939 map is now obscured by several extensions built to the south-west and south-east. The most recent of these are probably those at the rear of the house: the small flat-roof extension on the north-east corner and the adjacent extension to the west, which has a hipped roof line at its east end where it meets the original house and an A-frame roof line at the gable (east) end.

Figure 16.25 Cuckoo Stream south of Field 2

Figure 16.26 View of the Cuckoo Stream west of the R132 road (Images, Nicholas O'Dwyer Ltd)

Figure 16.27 View of Field 7 facing south, demonstrating vegetation overgrowth

Figure 16.28 Field 8 facing south, demonstrating uneven ground surface

Figure 16.29 View of Field 14, an example of the playing pitches in the west side of Eastlands

Figure 16.30 Field 12 facing south-west

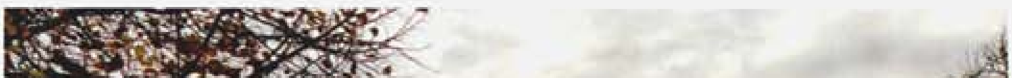

Figure 16.31 Example of vegetation overgrowth and uneven ground in former golf course area (Field 4)

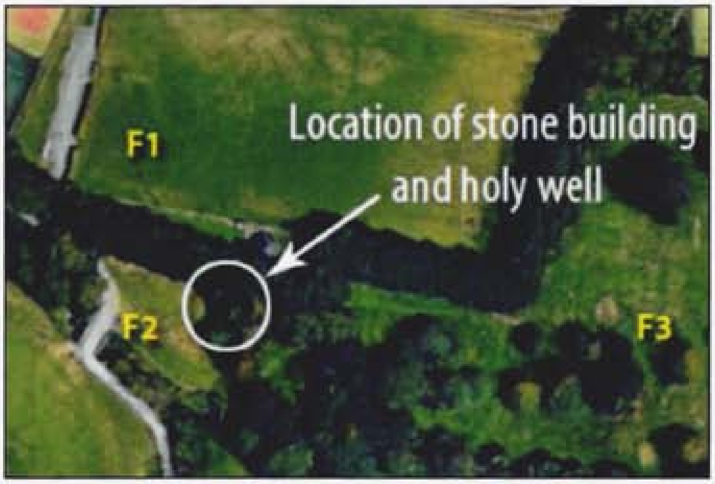

Figure 16.32 Location of holy well (RMP DU014-023) and late 19th century building in Field 2

Figure 16.33 View north-east towards holy well site in F2 (former golf course)

Figure 16.34 Holy well site and location of late 19th century house, facing north-east

Figure 16.35 West gable of late 19th century house

Figure 16.36 Interior of late 19th century house, showing new roof timbers, fireplaces in west gable and blocked-up doorway in north wall

Figure 16.37 Decorative trim on new roof timbers on late 19th century house

Figure 16.38 Concrete boundary wall and north-façade of late 19th century house

Figure 16.39 Stone boundary wall of former yard extending to east of late 19th century house

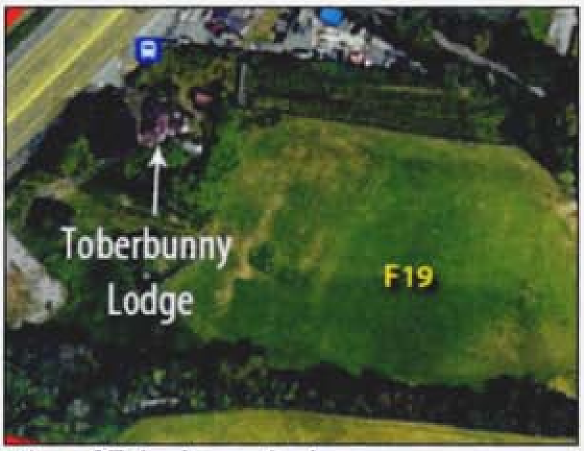

Figure 16.40 Location of Toberbunny Lodge

Figure 16.41: Toberbunny Lodge, north-west façade

Figure 16.42 Toberbunny Lodge, north-east façade

Figure 16.43 Toberbunny Lodge, rear extensions

16.4.6.4 Other archaeological investigations in the vicinity

Construction work in the vicinity of the former castle site at Corballis was monitored by an archaeologist in December 2007 and early 2008 (RMP DU014-011; Licence No. 06E0440); the site lay beneath tarmac, and modern concrete block and corrugated steel buildings. The very bottom of a former late post-medieval boundary ditch was identified, but the ground across the area had been heavily truncated by airport works over the past 60-odd years—not least by the countless trenches for services feeding the terminal, the control tower and various neighbouring buildings. No archaeology was identified in the environs of the RMP site (Frazer, 2007).

Archaeological monitoring was also undertaken of groundworks associated with the proposed extension of the airport terminal building in 2006/2007, c. 470m to the northwest of the proposed development site (Licence No. 06E0545, Excavations Bulletin Ref. 2006:584). No archaeological sites, features or deposits were identified. Fragments of early 20th century clay drainage pipes associated with the previous use of the area by the Royal Air Force (pre-1920) and one piece of oyster shell were recovered.

In the area proposed for Metro Construction Compound 8, five archaeological sites were identified (Licence No. 09E478) including: a pit containing burnt mound material of probable Bronze Age date; a cluster of probable cremation burial pits, again of possible Bronze Age date (SMR DU014-120, c. 595m south-west of the proposed development); a sub-rectangular enclosure (56m x 45m) of probable early medieval date (SMR DU014-121, c. 345m south-west); a curvilinear ditch and associated pit features of uncertain date that may represent activity associated with the enclosure; and an isolated fire-pit of uncertain date. Features of archaeological potential noted in an earlier geophysical survey of these lands were identified either as variations in the natural subsoil or as the remains of late post-medieval and modern agricultural activity – namely plough furrows, field boundaries, land drains and stone sockets – and were therefore of no archaeological significance.

16.4.7 Placename evidence

Townland names are an invaluable source of information, not only on the topography, land ownership and land use within the landscape, but also on its history, the archaeological monuments, and the folklore. Where a monument has been forgotten or destroyed; a placename may still refer to it and may indicate the possibility that the remains of certain sites may still survive below the ground surface. Townland names were written down by the Ordnance Survey surveyors, a collage of mapmakers, soldiers and antiquarians, in the 1830s and 1840s, when the entire country was mapped for the first time. While most place names were anglicised or translated by the surveyors relatively accurately, some were corrupted virtually beyond recognition. Nonetheless, a variety of place names, whether of Irish, Viking, Anglo-Norman, English or, in very rare cases, Anglo-Saxon origin, appear throughout Ireland, and the appearance of the different languages is often a good indicator of the cultural heritage and, therefore, of the archaeological record of the area.

The townland names in this part of north Dublin provide reference to the historical heritage of the area. They are an invaluable source of information on the topography, on landownership and land use, the history and cultural heritage, archaeological monuments, and folklore. Like most of the townlands in North County Dublin, the names in the area are a mix of both English and Irish names. Toberbunny is derived from the Irish *tobar bainne* meaning 'well of milk', referring to the Holy Well (DU014-023).

Place names are often a good indicator of the cultural heritage and archaeological record of an area. In this instance, the English place names in the study area, and the many more beyond it, reflect the fact that this was good agricultural land in relative proximity to Dublin, with numerous derivations from English landowners, comprising family names and the suffix 'town' (*e.g.*, Pickardstown, Huntstown, Collinstown, all within the study area). Commons is first recorded in 1654-56 in the Civil Survey as '*ye Commons of Santrey*', a reference to common or shared land associated with a medieval manor. The name Santry is itself derived from the Irish *Sean Triabh* or Old Tribe.

Other place names in the study area are anglicised or translated Irish townland names also survive, including Coultry, which derives from the Irish *colltraige* meaning hazel-land.

The earliest documented place name associated with the townland of Forrest Great is 'Werhewel (in the manor of Swords)', which appears in the Calendar of Archbishop Alen's Register c. 1256-71 (www.logainm.ie). Variations of the same place name appear in the records until the early 16th century, with one instance of 'Little Farow' in the Register for 1489 (www.logainm.ie). In c. 1530, the Register records 'the moch and litle farowe' and an entry c. 1534 indicates that both refer to the same place: 'English Wherue and th'irisch (I have read evidences both of E. W..... which is supposed to be 'the moch and litle farowe'. From 1655 onwards, the place name is almost exclusively recorded as 'forest' (varying spellings) and almost always attached to a descriptor (Little / Great Forest, Forest Town / House, West Forest). The origins of the 13th century English 'Wehewel' or the later 'moch', 'farowe', and 'forest' are unknown. The 'Forrest' element may refer to woodland or a family name. The Civil Survey (1654-56) records a fair stone house, outbuildings and tenant's cottages *etc.* at 'the Great Forrest' held by Lord Ranelagh, but does not mention any woodland (Simington, 1945).

16.4.8 Assessment of Waterways

Waterways and riverine environments are considered to have an inherent archaeological potential, as they have always attracted human activity. The Cuckoo Stream flows partly through the proposed development area. West of the R132 road in Dublin Airport at the South Apron, the stream channel has been previously disturbed and comprises a man-made, wide, shallow, open channel, with significant infrastructure; part of the internal DAA surface water sewer (**Figure 16.44**; see also **Figure 16.26** in **Section 16.4.6.3**). East of the R132 road, in the Eastlands area, the stream flows along the same source as that depicted on the historic maps. The stream course is unchanged from the first edition OS six-inch map of 1843 (**Figure 16.45**) through to the last edition six-inch map of 1939. The banks are overgrown and the stream shallow (see **Figure 16.25** in **Section 16.4.6.3**).

Figure 16.44: Map showing Cuckoo Stream east of R132 road and DAA surface drainage network west of R132 road, with proposed development boundary in red

Figure 16.45: Ordnance Survey first edition six-inch map (1843) showing Cuckoo Stream, with approximate site location in red

There are no industrial heritage sites located within the proposed development site. Toberbunny bridge, which is marked on the historic maps (see **Section 16.4.3**), is now a modern culvert beneath the widened R312 road and is located outside the proposed development boundary.

Modern culverts were also observed at crossing points both inside and outside the proposed development boundary in Eastlands. The partial remains of an earlier bridge footing were visible in the shallow stream just inside the proposed development boundary, with a modern bridge crossing the stream immediately east of it **(Figure 16.46**). This earlier stream crossing is first depicted on the 1909 25-inch OS map edition (**Figure 16.47**). A gate pier which is out of alignment with the modern bridge stands to the south-west of the concrete parapet wall (**Figures 16.48** to **16.50**). It does not appear to be aligned with the earlier bridge footings, though its construction would suggest a similar later 19th century date. No works will take place at or near this location as part of the proposed development.

Figure 16.46: Location of earlier bridge remains

A recorded holy well (DU014-023) is located c. 195m outside the proposed development boundary in Eastlands, close to the Cuckoo Stream (see **Figure 16.51** in **Section 16.4.9**). It is described in the RMP file as '*an unenclosed pool close to Cuckoo Stream, behind Toberbunny Lodge, east of Dublin Airport. It has been incorporated into a golf course. It is said to have been a station well in former times. No longer venerated*'. Vegetation overgrowth currently obscures the site and its present condition is unknown. The well is depicted on all editions of the historic OS maps (see **Section 16.4.3**). No works are proposed in the vicinity of the well and it will not be affected by the proposed development.

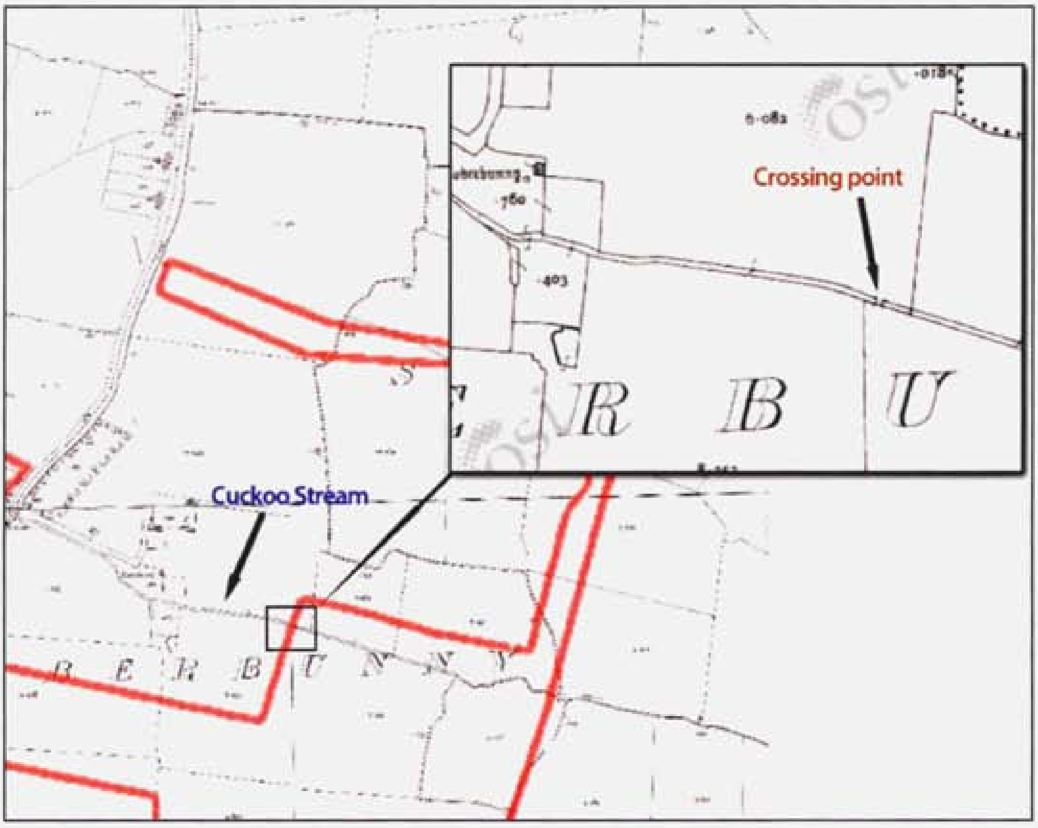

Figure 16.47: Ordnance Survey 25-inch map (1909) showing crossing point, with approximate site location in red

Figure 16.48: Remains of earlier bridge on west side of modern crossing

Figure 16.49: Modern bridge crossing, facing north-east

Figure 16.50: Modern bridge crossing facing south-west, showing gate pier to south

16.4.9 Designated sites

16.4.9.1 National Monuments

There are no national monuments in the vicinity of the proposed development.

16.4.9.2 Recorded Monuments

Only six recorded archaeological sites are located within c. 500m of the proposed drainage works (**Figure 16.51**), none of which are located within the proposed ADP redline boundary.

A Holy Well (DU014-023) site is located c. 195m north-west of the proposed development at its closest point. It is described in the RMP file as '*an unenclosed pool close to Cuckoo Stream, behind Toberbunny Lodge, east of Dublin Airport. It has been incorporated into a golf course. It is said to have been a station well in former times. No longer venerated*'.

An inn is recorded in Pickardstown (DU014-090), a post-1700 building named Boot Inn, which lies c. 20m outside the proposed ADP redline boundary, on the north-west side of the existing airport.

The other sites are located further afield and include an enclosure site in Ballystruan, c. 350m south-west (DU014-121); another enclosure site and a 16th/17th century house site in Harristown (DU014-008 & -040), c. 215m and c. 390m south-west respectively; and a castle site in Corballis (DU014-011), c. 295m north. None of these sites are upstanding. Three of the sites (DU014-011, -008, - 040) are located within Dublin Airport in areas already developed (beneath airport buildings and the south runway, respectively). Little is known of the three sites and there is no record of archaeological investigations at these locations.

The remaining site, an enclosure (DU014-121), was identified during archaeological investigations undertaken for the Metro North project. Geophysical survey revealed a sub-rectangular enclosure (56m E-W x 45m N-S) with a hollow way c. 30m east of it. The monument may date from the early medieval era, based on the absence of (later) medieval pottery and on the recovery of a fragment of concave 'furnace bottom' iron slag from a lower fill of the enclosure ditch (Frazer 2009).

A further 58 recorded archaeological sites are located in wider landscape surrounding the proposed works, representing activity from at least the Bronze Age onwards. These are shown on **Figure 16.52** and are discussed in the context of the archaeological and historical background in **Section 16.4.2**.

Figure 16.51: RMP / SMR sites within c. 500m of the proposed development

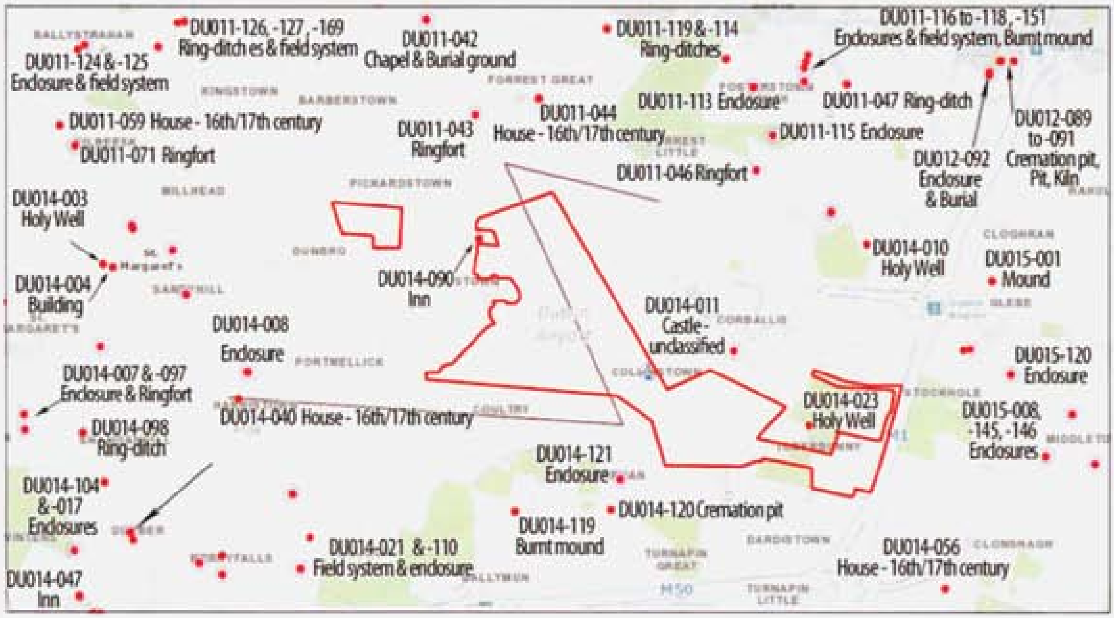

Figure 16.52: RMP / SMR sites in the wider landscape

16.4.9.3 Protected Structures and National Inventory of Architectural Heritage sites

There are no protected structures or structures listed in the National Inventory of Architectural Heritage (NIAH) within the proposed development site.

The nearest are two single-storey thatched cottages, built c. 1800, located either side of Collinstown Cross, c. 120m south of the proposed development boundary (**Figure 16.53**). The cottage on the west side of the road is a protected structure (RPS 0604; NIAH Ref. 11349003). The second thatched cottage stands on the opposite side of the Swords Road to the protected structure and is included in the NIAH (Ref. 11349003). The setting of both dwellings is immediate and constrained to their respective plots by the adjacent modern development.

Two protected structures are recorded within the grounds of Dublin Airport, the Old Central Terminal Building (RPS 0612) and the Church of Our Lady Queen of Heaven (RPS 0864), c. 320m north-east and c. 530m north-east of the proposed development boundary, respectively.

The setting of both sites has significantly altered since the mid-20th century, with the increased size and scale of the airport. However, the terminal building and church in modernist style were designed to function at the heart of a busy airport. As such, the introduction of new architecture and infrastructure (such as the eye-catching Terminal 2 building), in their immediate vicinity is in keeping with the original design ethos and intent.

16.4.9.4 Architectural Conservation Areas

There are no Architectural Conservation Areas located within the study area.

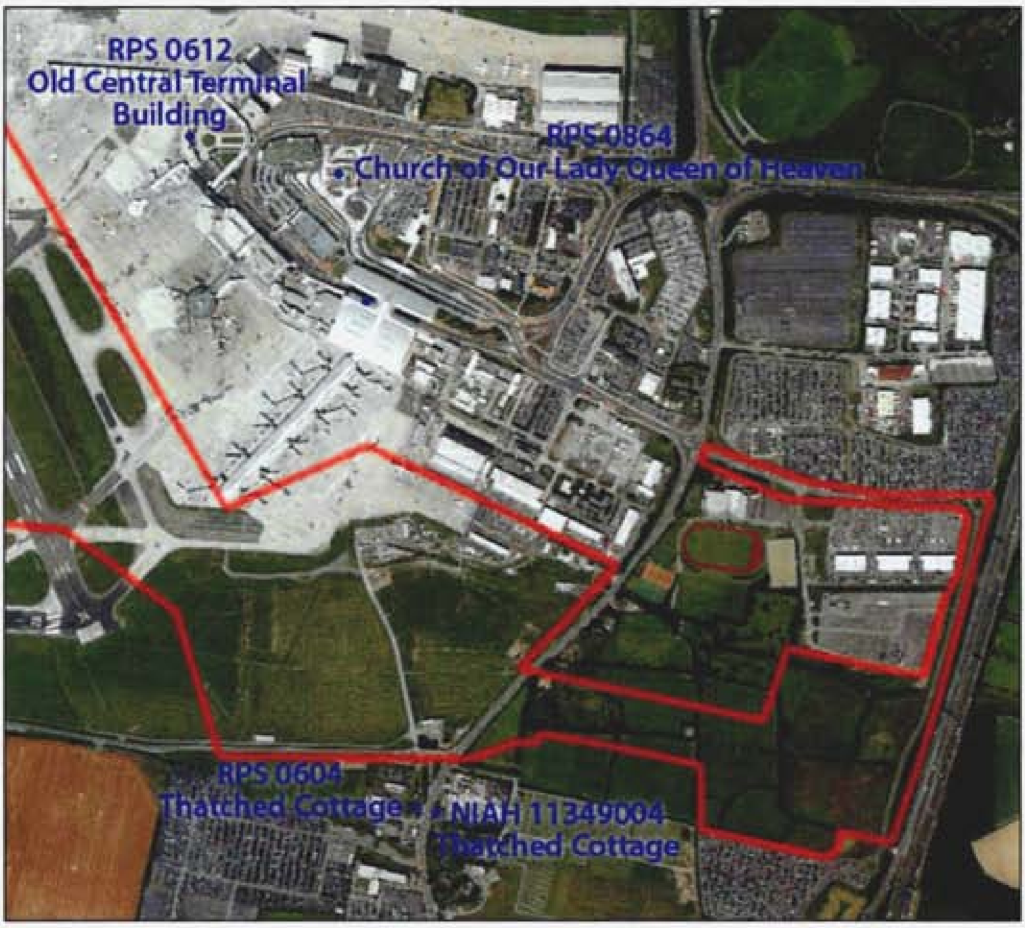

Figure 16.53: RPS and NIAH sites within c. 500m of the proposed development site

16.5 Effects of the proposed development

16.5.1 Do-nothing scenario

In the 'do-nothing' scenario the proposed development site would not be redeveloped and, therefore, there would be no adverse effects to any, as of yet, undiscovered subsurface archaeological deposits, features or finds, nor to any features of architectural heritage, cultural heritage or historic interest.

16.5.2 Construction phase

16.5.2.1 Designated Sites

No designated sites (RMP, SMR, RPS, NIAH) will be affected by the proposed development, as a result of their nature (*e.g.*, previously excavated sites), modern settings, or distance from the proposed development (as detailed in **Section 16.4.9**).

A recorded holy well (DU014-023) is located c. 195m outside the proposed development boundary in Eastlands, close to the Cuckoo Stream, which flows in part through the proposed development (see also **Section 16.5.2.3** below). Vegetation overgrowth currently obscures the site of the well and its present condition is unknown. No works are proposed in the vicinity of the well (the nearest being c. 200m south) and it will not be affected by the proposed development.

16.5.2.2 Undesignated Sites

Most of the lands within the proposed development boundary have been previously disturbed and developed, the most recent of which – the North Runway area – revealed multiple archaeological sites through geophysical survey, archaeological testing and subsequent excavation. The archaeological potential of this landscape is thus well established. Two possible fulachtaí fia sites were identified by the geophysical survey for the North Runway Project, but not subjected to further investigation at the time. They are located within the proposed ADP works boundary in Pickardstown townland, at the site of the proposed West Compound.

In addition, the geophysical survey that was undertaken at the southern end of the Eastlands area in 2019 revealed a number of possible archaeological sites / features, including five possible ring-ditches (M16, M18, S12, S13, R10), two of which may be encircled by larger enclosures, a possible trackway (R8), and several possible pits (R7). There is a potential that additional features may be identified elsewhere in the Eastlands within the proposed development boundary.

There would be a direct negative effect on these features as a result of the ground-breaking works, should they prove to be archaeological in nature, of high magnitude. As the sensitivity of the receptors is unknown, the significance of effect is undetermined.

16.5.2.3 Area of archaeological potential

Waterways are generally accepted to have an inherent archaeological potential, as noted in **Section 16.4.8**. The majority of the proposed works in relation to the Cuckoo Stream will take place west of the R132 road in Dublin Airport at the South Apron, where the stream channel has been previously disturbed and comprises a man-made, wide, shallow, open channel (part of the internal DAA surface water sewer), thus negating its archaeological potential. The only other disturbance involves an emergency overflow pipeline to the stream at the eastern end of the CPCF Trunk Pipeline in the Eastlands (c. 425m south-east of the holy well site) (**Figure 16.54**). At this location, there is the potential to disturb any archaeological features or finds which may be present. Given the localised nature of the proposed works at this location, the potential that ground-breaking works would uncover previously unknown archaeological features / deposits is slight. The magnitude of effect is considered to be low and the sensitivity of any features that may be present is unknown, thus the significance of effect is undetermined.

In the ADP, no other works are proposed along the stream course in the Eastlands. The change to the hydrological regime has been assessed as imperceptible (see **Chapter 10 – Hydrology**) and no potential changes in hydrology would result in areas of scouring within the Cuckoo Stream. Thus, no archaeological deposits that may be present within the stream bed would be affected.

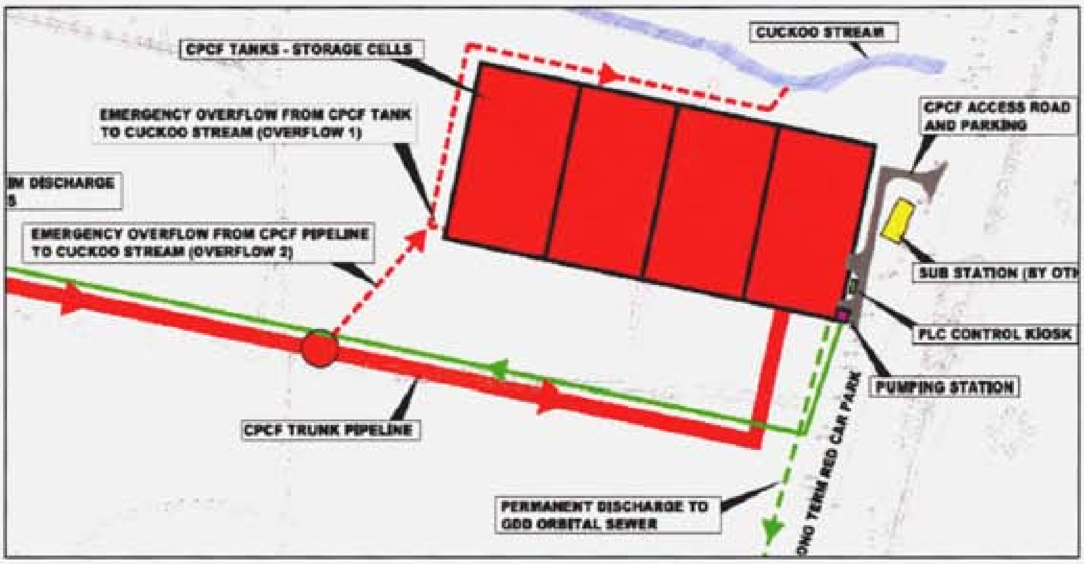

Figure 16.54 Location of emergency overflow pipeline (red dashed line) to Cuckoo Stream in Eastlands area

16.5.3 Operational phase

No operational phase effects were identified for the proposed development. It is anticipated that any effect on archaeological, architectural, and cultural heritage features would be encountered at the site preparation stage and resolved prior to the operational phase.

16.6 Mitigation Measures

16.6.1 Construction phase

Archaeological monitoring of the proposed works will take place at the Cuckoo Stream in the Eastlands area, to identify whether any archaeological features or deposits are present (as outlined in **Section 16.5.2.3**).

Archaeological monitoring will be carried out under licence to the Department of Housing, Local Government and Heritage (DHLGH) and the NMI, and will ensure the full recognition of, and the proper excavation and recording of, all archaeological soils, features, finds and deposits which may be disturbed below the ground surface. All archaeological issues will be resolved to the satisfaction of the DHLGH and the NMI. The archaeologist will have provision to inspect all excavation to the formation level for the proposed works and to temporarily halt the excavation work, if and as necessary. They will be given provision to ensure the temporary protection of any features of archaeological interest identified. The archaeologist will be afforded sufficient time and resources to record and remove any such features identified. Archaeological excavation ensures that the removal of any archaeological soils, features, finds and deposits is systematically and accurately recorded, drawn and photographed, providing a paper and digital archive and adding to the archaeological knowledge of a specified area (*i.e.,* preservation by record).

Geophysical survey will be undertaken as a mitigation measure within the Eastlands area, where not already undertaken, well in advance of construction. This will seek to identify any other archaeological sites or features that may be present subsurface.

Further archaeological investigation will include archaeological testing of the potential archaeological sites / features already identified in Toberbunny and Pickardstown townlands (as detailed in **Section 16.5.2.2**), and any additional features identified by geophysical survey. Any confirmed archaeological features will be resolved through one or more of the following, in consultation with the National Monuments Service (DHLGH):

- Preservation by record (archaeological excavation);
- Preservation *in situ*;
- Preservation by design; and
- Archaeological monitoring.

16.6.2 Operational phase

The operational phase of the development will have no effect on the cultural heritage environment of the area. As such, no mitigation measures are required for the operational phase.

16.7 Residual effects

Following the implementation of the above-stated construction mitigation, no significant residual effects are predicted to occur in relation to cultural heritage, archaeological or architectural heritage.

16.8 Monitoring

Archaeological issues will be resolved at the pre-construction and construction stages of the development. This will include any necessary archaeological monitoring and inspection work required.

16.9 Interaction of effects

No interaction of effects were identified during the assessment process. Integrated assessment with **Chapter 10 – Hydrology** was carried out with regard to the Cuckoo Stream and found no interaction of effects. Climate change vulnerability and the archaeological, architectural, or cultural heritage resource were considered in relation to this project (which entails ancillary works), having regard for the Built and Archaeological Heritage: Climate Change Sectoral Adaptation Plan, (Department of Cultural, Heritage and the Gaeltacht, 2019). No issues were identified.

16.10 Cumulative effects

The proposed development was considered in relation to existing and approved projects (see **Chapter 18**) and no cumulative effects were identified in the course of this assessment.

16.11 Difficulties encountered

No difficulties were encountered in the course of this assessment.

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17 LANDSCAPE AND VISUAL

17.1 INTRODUCTION

17.1.1 Background

Stephenson Halliday was commissioned in September 2022 to produce a landscape and visual appraisal (LVA) of the proposed new drainage and storage system for the Dublin Airport, including above ground and below ground infrastructure. An LVA as opposed to a Landscape and Visual Impact Assessment (LVIA) has been prepared to inform mitigation and design as likely significant effects would be limited to the construction phase of the proposed development and occur in a limited geographical area that is not sensitive to development.

The LVA is informed by the methodology described in **Technical Appendix 17.1**.

The appraisal defines the extent of the study area, assesses the existing landscape and visual environment, describes the nature of the anticipated changes and assesses the effects during construction and once completed.

17.1.2 The Site and Proposals

The entire application site is on land owned by Dublin Airport and either used as an existing airfield or allocated for future airfield uses. The focus of this LVA is on the land to the east of the R132 which, although allocated for future airport use, is currently greenfield land. The reason for focussing on this area is because the impacts of the proposed development to the west of the R132 in the existing airfield will be mainly during the construction stage and therefore of short duration and temporary. There will be minimal new above ground structures and these would be in keeping with the existing land use and would not affect any sensitive receptors.

The LVA site is to the east of the existing airfield in greenfield land which is currently used as playing fields and pasture. The site is bordered by airport parking access and the M1 to the east, the R132 (Swords Rd) to the west, ALSAA Sport Centre and airport parking to the north and the Dardistown Cemetery and further airport parking to the south.

The proposed development is for an upgraded drainage network to the existing runway, including underground drainage delivery and water storage system from the existing runway, beneath the R132 and into a Central Pollution Control Facility (CPCF) facility beneath greenfield land described above. Groundworks to the greenfield land are required for the construction of the proposed development, which will mainly be below ground, with above ground infrastructure consisting of temporary works compounds and permanent structures such as a substation and monitoring station at the eastern edge of the site where a new site entrance will be formed off the airport parking access road. A planning corridor is proposed which will encompass works undertaken for the proposed development as shown on **Figure 17.1**.

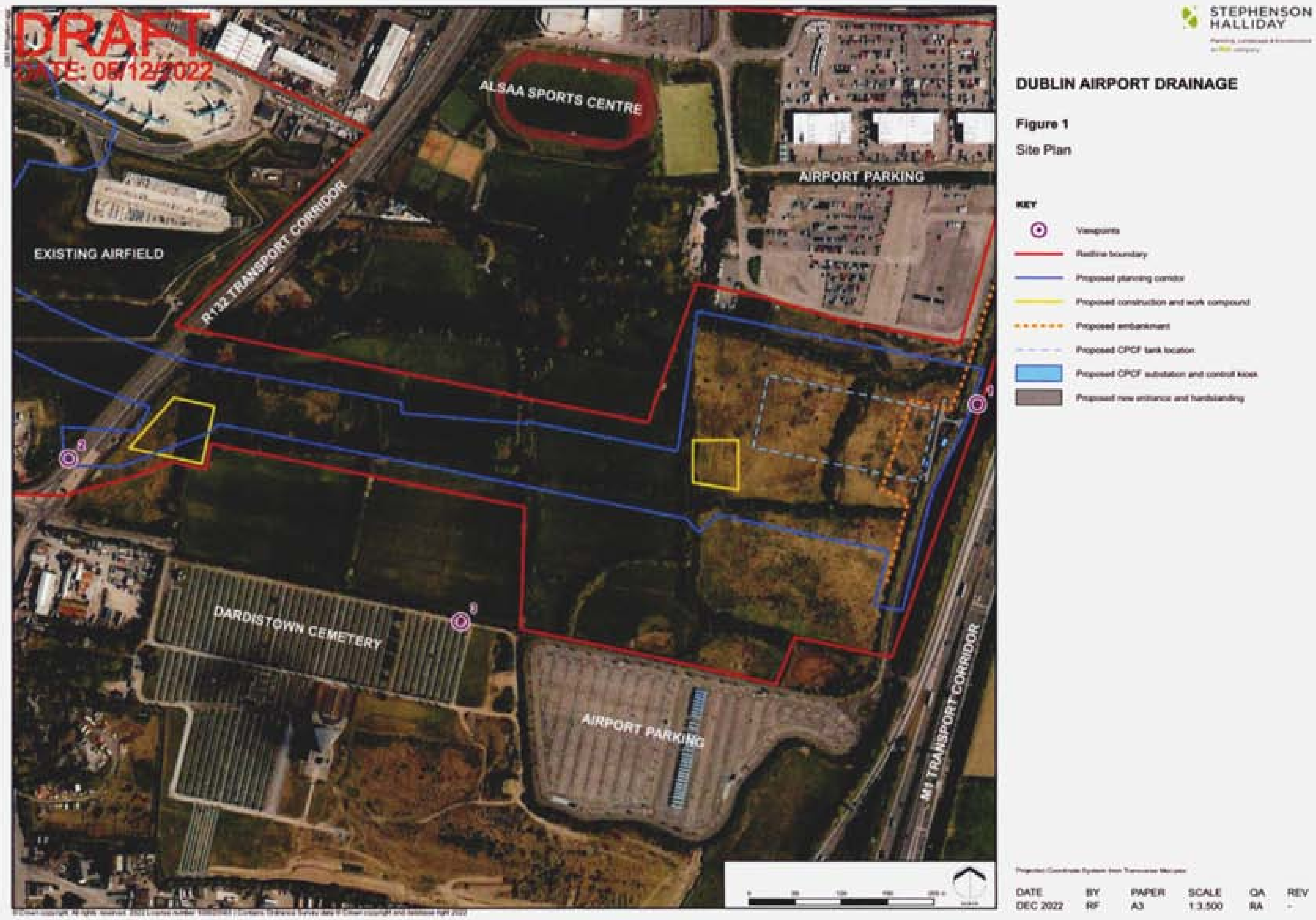


Figure 17.1 Site Plan

17.1.3 Competence

This report has been prepared by Chartered Landscape Architects at Stephenson Halliday. The Practice has over 25 years of experience providing LVIA for a wide range of development types within the UK and Ireland. The practice is registered with both the Landscape Institute and IEMA and all work is prepared and reviewed internally by senior highly experienced landscape planners with Public Inquiry or Hearing experience.

The primary author of this Statement is Ross Allan, assisted by Daniel Leaver, both of whom are Chartered Members of the Landscape Institute (CMLI). Both have over 20 years' post-qualification experience in landscape planning and have worked on renewables and utilities projects across the UK and Ireland.

17.1.4 Study Area

To inform the assessment a site visit was made to the site and surrounding area during October 2022.

Site investigation work confirmed that the application site and surrounding area are heavily modified and visibility of the proposed development would occur in a limited area where low sensitivity receptors are present. The location, size and extent of the proposed development is such that, from areas beyond the existing airfield, it would be seen in the context of the existing airport infrastructure and would not be uncharacteristic of the baseline. As such, any potential landscape and visual effects in areas outside of the application site are likely to be small or negligible. This appraisal considers potential effects of the proposed development on site fabric and character of the area in which it is located along with those people who work at and visit the airport, those who commute past the site and visitors to the Dardistown Cemetery to the south.

17.2 METHODOLOGY

The detailed methodology and a summary of the primary judgements informing this appraisal is provided below.

17.2.1 Introduction

For the purposes of this report, the methodology used takes account of and is based upon recommendations given in '*Guidelines for Landscape and Visual Impact Assessment*' (Third Edition 2013) (GLVIA3), produced jointly by the Landscape Institute and the Institute of Environmental Management and Assessment. This assessment methodology has been used and tested at numerous Public Inquiries and Hearings and found to be fit for purpose.

At paragraph 1.1, GLVIA3 states that, "*Landscape and Visual Impact Assessment is a tool used to identify and assess the significance of and the effects of change resulting from development on both the landscape as an environmental resource in its own right and people's views and visual amenity.*" Wherever possible, identified effects are quantified, but the nature of landscape and visual assessment requires interpretation using professional judgement. In order to provide a level of consistency to the assessment, the prediction of magnitude and assessment of significance of the residual landscape and visual effects have been based on pre-defined criteria.

GLVIA3 further states that "*professional judgement is a very important part of the LVIA*" (paragraph 2.23) and that "*in all cases there is a need for the judgements that are made to be reasonable and based on clear and transparent methods so that the reasoning applied at different stages can be traced and examined by others.*" (paragraph 2.24). It goes on at paragraph 3.32 to state that "*there are no hard and fast rules about what effects should be deemed 'significant" but LVIAs should always distinguish clearly between what are considered to be the significant and non-significant effects.*" The aim of the LVIA is therefore to identify, predict and evaluate potential key significant effects arising from the proposed development.

Landscape and visual assessments are separate, though linked processes which GLVIA3 notes are "*related but very different considerations*". The assessment of the potential effect on the landscape is carried out as an effect on the environmental resource (*i.e.*, the landscape). Visual effects are assessed as an inter-related effect on people.

Landscape effects derive from changes in the physical landscape elements which may give rise to changes in its distinctive character and how this is experienced, including consideration of aesthetic and perceptual aspects.

Visual effects relate to changes that arise in the composition of available views as a result of changes to the landscape, to people's responses to the changes and to the overall effects with respect to visual amenity.

17.2.2 Establishing the Baseline

The baseline for consideration of landscape and visual effects, evaluated through desk study and site work, is the current situation at the time of the assessment. Operational developments and those under construction are considered as part of the baseline and included as part of the assessment of landscape and visual effects.

The future baseline is considered to be changes to the landscape which are considered certain or likely to happen – including consented proposals which are not yet present in the landscape but are expected to be constructed. Their inclusion is based on individual project circumstances and the approach and reasoning is set out within the assessment.

17.2.3 Landscape Effects

The starting point for assessment of landscape effects is a desk-based assessment of published landscape character assessment with relevant extracts included as judged appropriate. The landscape effects of the proposed development are considered against the key characteristics of the receiving landscape. The degree to which the proposed development changes "*distinct and recognisable pattern of elements, or characteristics, in the landscape that make one landscape different from another, rather than better or worse*" ('*An Approach to Landscape Character Assessment', Natural England, 2014*), enables a judgement to be made as to the significance of the effect in landscape character terms.

Direct and indirect landscape effects are defined in GLVIA3. Direct effects may be defined as resulting "*directly from the development itself*" (paragraph 3.22). An indirect (or secondary) effect is one that results "*from consequential change resulting from the development*" (paragraph 3.22) and is often produced away from the site of the proposed development or as a result of a complex pathway or secondary association. The direct or physical landscape effects of the proposed development would generally be limited to within the planning application boundary. The indirect landscape effects are concerned with the visual effects and relate to effects associated with the introduction of the development seen in the context of the existing landscape and visual character of the view.

In order to reach an understanding of the effects of development upon the landscape resource it is necessary to consider different aspects of the landscape baseline including:

- Landscape Fabric/Elements: The individual features of the landscape, such as hills, valleys, woods, hedges, tree cover, vegetation, buildings and roads for example which can usually be described and quantified.
- Landscape key characteristics: The particularly notable elements or combinations of elements which make a particular contribution to defining or describing the character of an area, which may include experiential characteristics such as wildness and tranquillity.

The sensitivity (high, medium, low) of the landscape to a particular development is considered on a case-by-case basis and considers the susceptibility of the landscape, which varies depending on the type of development proposed and the particular site location, and the landscape value (identified as national, regional, or community). As stated in GLVIA3, '*LVIA sensitivity is similar to the concept of landscape sensitivity used in the wider arena of landscape planning, but is not the same*'.

Landscape value: The importance attached to a landscape, often used as a basis for designation or recognition which expresses national or local authority consensus, because of its special qualities/attributes. The factors which are considered in landscape include aesthetic or perceptual aspects such as scenic beauty, tranquillity or wildness or cultural associations as well as recreational/community value, conservation interests, landscape character and condition and representativeness/rarity.

Landscape susceptibility according to GLVIA3 means "*the ability of the landscape to accommodate the proposed Development without undue consequences for maintenance of the baseline situation and/or the achievement of landscape planning policies and strategies*". Judgements on landscape susceptibility (high, medium, low) include references to both the physical and aesthetic characteristics and the potential scope for mitigation.

Susceptibility of landscape character areas are influenced by their characteristics and are often considered (though often recorded as 'sensitivity' rather than susceptibility) within landscape character assessments and capacity studies.

Sensitivity is judged taking into account the component judgments about the value and susceptibility of the receptor as illustrated by the table below. Where sensitivity is judged to lie between levels, an intermediate assessment will be adopted.

Table 17.1 Landscape Sensitivity

Landscape receptors		Susceptibility		
		High	Medium	Low
Value	National	High	High/Medium	Medium
	Regional	High/Medium	Medium	Medium/Low
	Community	Medium	Medium/Low	Low

The magnitude of landscape change arising from the proposed development at any particular location is assessed in terms of its size or scale, geographic extent of the area or receptor that is influenced and its duration and reversibility.

The scale of the change takes account of:

- degree of loss or alteration to key landscape features/elements; characteristics; and for designated areas – special qualities and/or purposes of designation;
- distance from the development; and
- landscape context to the development.

The approach to assessing effects on landscape character is to consider the key characteristics for the Landscape Character Type (LCT) within which the proposed development is located (host) and identify which of these the proposed development would affect. For the host LCTs, a large-scale change in landscape character is likely to occur where key characteristics would be lost or substantially changed. Where particular views are a key characteristic of a landscape type, large or medium scale landscape character effects may occur where the proposed development becomes a key feature of those views.

Having established the size/scale of change (large, medium, small, negligible) to the landscape baseline, the geographic extent of the change can be identified (wide, intermediate, localised or limited) and a judgement made as to the degree of change for each landscape receptor.

Duration and reversibility can be linked depending on the nature of the development. Reversibility is a judgement about the ability and practicality of the proposed development to be reversible, partially reversible to something similar or a permanent change in the landscape. Duration reflects how long the change will last. The duration of the change would be considered short term when lasting less than 2 years; medium term when lasting between 2 and 10 years; or long term when lasting between 10 and 25 years, and permanent for more than 25 years. Construction effects are therefore usually considered short term, whilst operational effects can change over time as a result the proposed landscape mitigation works. For this project, effects are judged on completion during winter to account for a worst-case scenario and at year 15 during summer when the mitigating effects of planting can be said to have matured.

Magnitude is considered taking into account the three contributory factors as illustrated by the diagrams included below.

17.2.4 Visual Effects

In order to identify the significance of a visual effect it is necessary to establish the relative sensitivity of the viewers and the magnitude of the change they experience. In this case sensitivity is a combination of both susceptibility of the viewer to the proposed change and the value of the views.

Those living within view of the scheme are usually regarded as the highest susceptibility group as well as those engaged in outdoor pursuits for whom landscape experience is the primary objective. The susceptibility of potential visual receptors will also vary depending on the activity of the receptor. For visual receptors susceptibility and value are closely linked - the most valued views are also likely to be those where viewer's expectations will be highest.

The value of public views, which is the focus of GLVIA3, is identified as national, regional or community and will vary depending on the nature, location and context of the view and the recognised importance of the view. Considerations include cultural associations; designation or policy protection; views of or from landmarks; and/or the scenic quality of the view. The value attributed relates to the value of the view, e.g. a National Trail is nationally valued for access, but not always for the available views from every section.

Visual receptor susceptibility is defined as in accordance with the criteria below.

- High - Local residents; users of outdoor recreation focussed on the appreciation of views including footpaths, beauty spots and picnic areas; people experiencing views to or from important features of physical, visual, cultural or historic interest.
- Medium - Local road users and travellers on trains. People engaged in outdoor recreation with some appreciation of the landscape e.g. road cycling, nature conservation, golf and water based recreation.
- Low - Workers, users of facilities and commercial buildings (indoors) experiencing views from buildings. Road and rail users on fast moving commuting or trunk routes. Visual receptors where views are incidental to the activity and/or location.

Sensitivity is judged taking into account the component judgments about the value and susceptibility of the receptor as illustrated by the table below. Where sensitivity is judged to lie between levels, an intermediate assessment will be adopted.

Table 17.2 Visual sensitivity

Visual receptors		Susceptibility		
		High	Medium	Low
Value	National	High	High/Medium	Medium
	Regional	High/Medium	High/Medium	Medium/Low
	Community	High/Medium	Medium	Low

The magnitude of visual change arising from the proposed development at any particular location is assessed in terms of its size or scale (large, medium, small, negligible), geographic extent of the area or receptor that is influenced (wide, localised, limited) and its duration (short, medium, long, permanent).

The representative viewpoints are used as 'samples' on which to base judgements of the scale of effects on visual receptors. The wider extent of the effect and its duration are not captured in the viewpoint analysis (as a viewpoint cannot capture these factors for an entire route or area). As duration and extent are necessary considerations in determining magnitude of change; magnitude and significance judgements are provided for visual receptors and not for all representative viewpoints. The exceptions to this are specific viewpoints – where people visiting that location to look at the view are assessed as a visual receptor group.

With the exception of specific viewpoints, each route and receptor group will encompass a range of possible views, which might vary from no view of the development to very clear, close views. Therefore, effects are described in such a way as to identify where views towards the development are likely to arise and what the scale and duration and extent (wide, intermediate, localised, limited) of those views are likely to be. In some cases this will be further informed by a nearby viewpoint and in others it will be informed with reference to ZTV studies, aerial photography and site visits. Each of these individual effects are then considered together in order to reach a judgement of the effects on the visual receptors along that route, or in that place.

The scale of effect arising from the proposed development at any particular viewpoint reflects the degree to which the nature of the views from that location would be changed and is taking into account:

- The distance of the viewpoint from the development;
- the degree to which the development is visible or screened;
- the angle of view in relation to main receptor activity or main focus of the view;
- the horizontal and vertical field of view occupied by the development; and
- the extent and nature of other built development visible.

The approach to assessing effects on views is to consider the full 360 degree view from any given receptor – not just those towards the development and/or shown in visualisations. It is assumed that the change would be seen in clear visibility and the assessment is carried out on that basis. Where there are operational (and consented) developments considered as part of the baseline, the visual effects consider the effects of adding the proposed development to that baseline. Where appropriate, comment may be made on lighting and weather conditions.

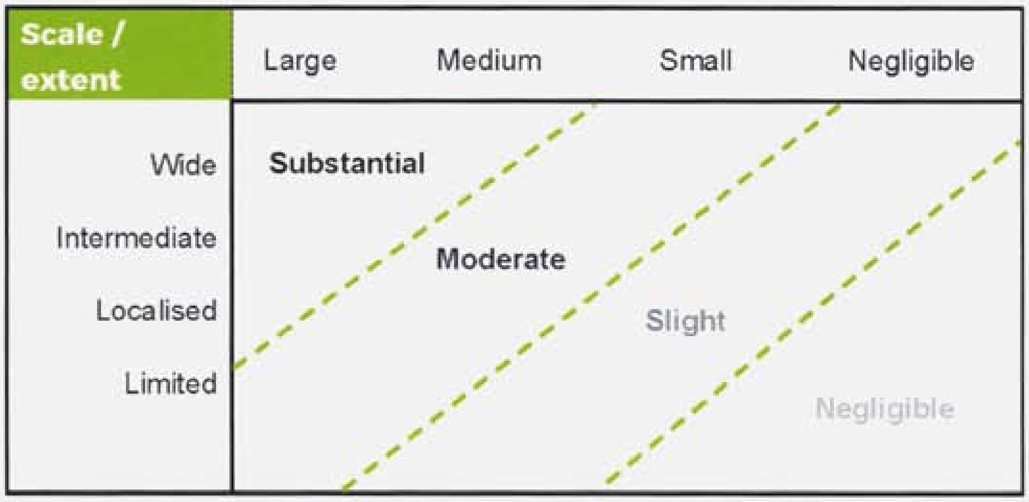
Duration reflects how long the change will last and are rated in the same way as described above for landscape effects. The effects as a result of the proposed development would be considered short term when lasting less than 2 years; medium term when lasting between 2 and 10 years; or long term when lasting between 10 and 25 years, and permanent for more than 25 years. For visual receptors moving through the landscape (e.g. road and rail users), the length of their journey during which they would see the development is reflected in the judgement of the geographic extent of effects. As with landscape effects, construction effects are considered short term, whilst operational effects are judged on completion during winter to account for a worst case scenario and at year 15 during summer when the mitigating effects of planting can be said to have matured.

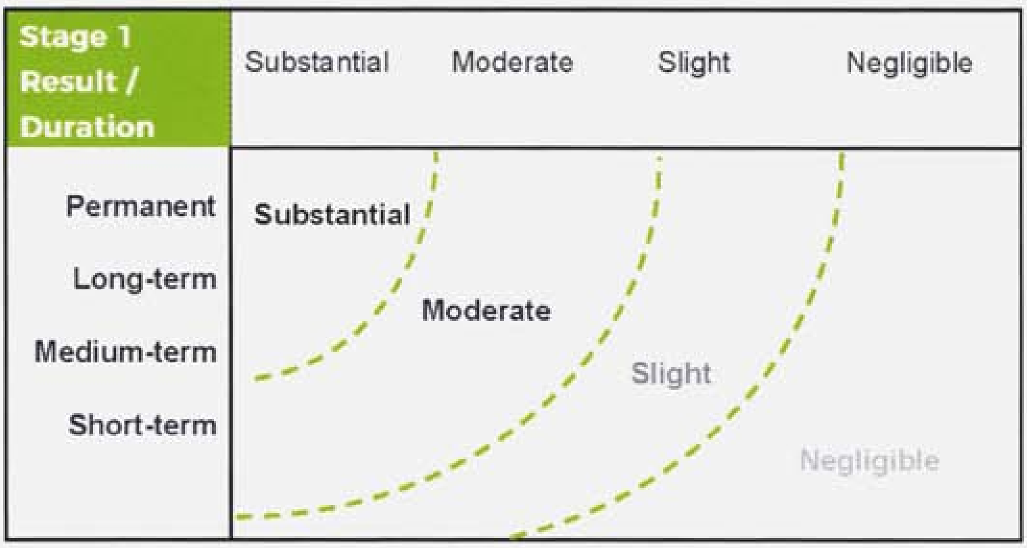
Magnitude is considered taking into account the three contributory factors as illustrated by the diagrams included below.

17.2.5 Magnitude of Landscape and Visual Change

Scale of effect is the first factor in determining magnitude; which may be higher if the effect is particularly widespread and/or long lasting, or lower if it is constrained in geographic extent and/or timescale. The tables below illustrate how this judgement is considered as a two-step process. Firstly, scale and extent are considered, for which the outcomes are illustrated by the first part of the table; the second part of the table illustrates the influence of duration on this initial judgement. Where magnitude is judged to lie between levels, an intermediate assessment will be adopted.

Table 17.3 Magnitude





17.2.6 Significance of Landscape and Visual Effects

The significance of any identified landscape or visual effect is assessed as major, moderate, minor or negligible. These categories are based on the consideration of sensitivity with the predicted magnitude of change. The table below is not used as a prescriptive tool and illustrates the typical outcomes, allowing for the exercise of professional judgement. In some instances, a particular parameter may be considered as having a determining effect on the analysis.

Where the effect has been classified as Major or Major/Moderate this is considered to be equivalent to likely significant effects referred to in the EIA Regulations. Where 'Moderate' effects are predicted, professional judgement will be applied to ensure that the potential for significant effects arising has been thoroughly considered.

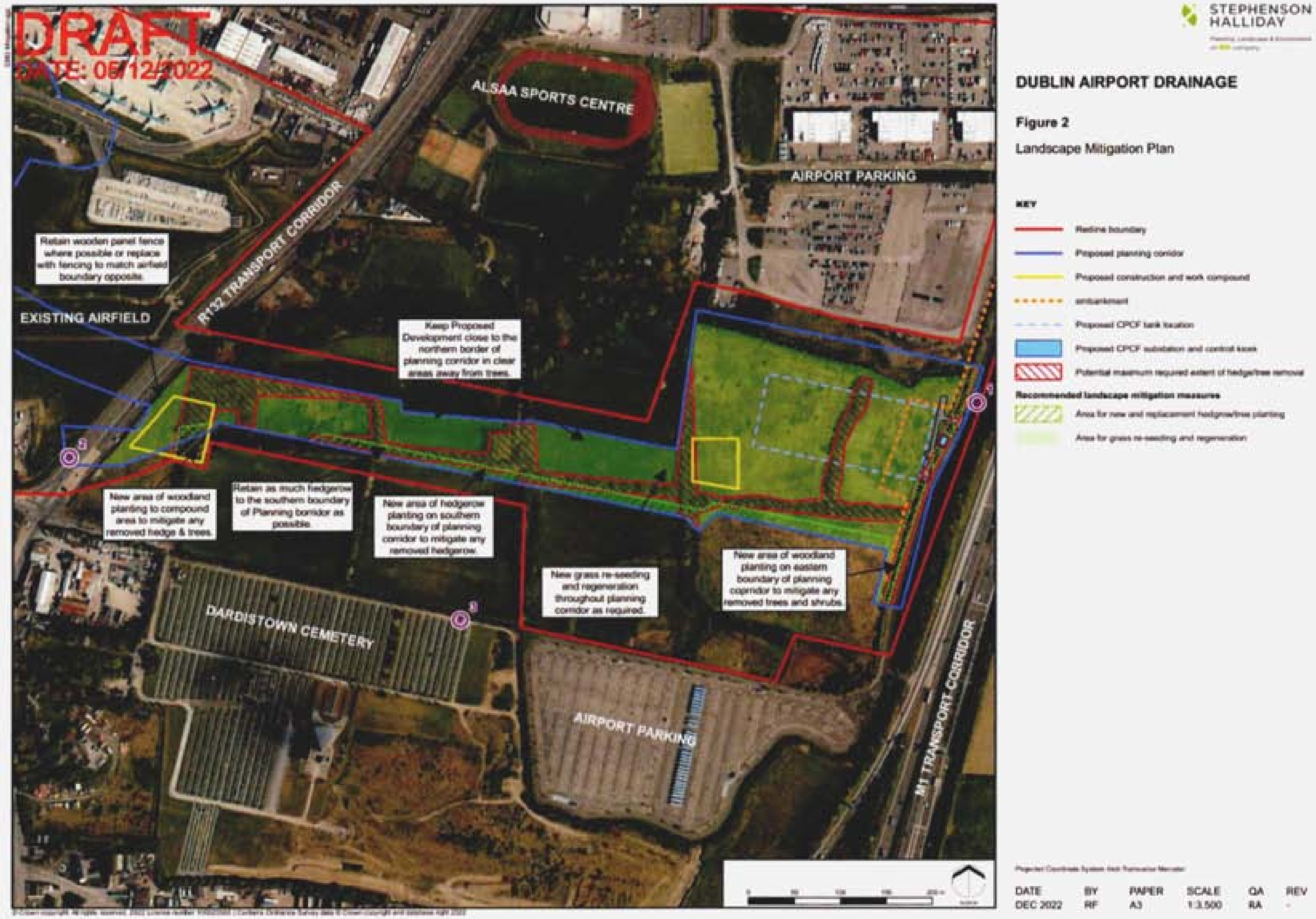


Figure 17.2 Landscape Mitigation Plan

Table 17.4 Significance

Visual receptors		Magnitude of change			
		Substantial	Moderate	Slight	Negligible
Receptor sensitivity	High	Major	Major/ moderate	Moderate	Minor
	Medium	Major/ moderate	Moderate	Moderate/ minor	Minor/ negligible
	Low	Moderate	Moderate/ minor	Minor	Negligible

Judgement of the significance of effects on landscape character and visual amenity imposed by the proposed development takes into account recommended mitigation as seen on **Figure 17.2** above, which is to be implemented post construction. Suitable vegetation protection measures and construction hoarding will be used to mitigate the potential effects of the short duration construction phase as necessary.

17.2.7 Beneficial/Adverse

Landscape and visual effects can be beneficial or adverse and in some instances may be considered neutral. Neutral effects are those which overall are neither adverse nor positive but may incorporate a combination of both. Whether an effect is beneficial, neutral or adverse is identified based on professional judgement. GLVIA3 indicates at paragraph 2.15 that this is a "*particularly challenging*" aspect of assessment, especially in the context of a changing landscape.

17.2.8 Distances

Where distances are given in the assessment, these are approximate distances between the nearest part of the site and the nearest part of the receptor in question, unless explicitly stated otherwise.

17.3 PLANNING POLICY

Current local planning policy is described in the adopted Fingal County Council Development Plan 2023-2029 (adopted April 2023)

17.3.1 Fingal Development Plan (2023-2029)

Policies of relevance to this appraisal include:

Section 9 Green Infrastructure and Natural Heritage states that "*The challenge is to develop the County in a way which maintains and enhances biodiversity for future generations.*" Relevant policies are as follows:

- Policy GINHP4 – Green Infrastructure Themes: "*Ensure the green infrastructure strategy for Fingal protects and enhances existing green infrastructure resources and plans for future green infrastructure provision which addresses the five main themes identified in this Plan, namely: Biodiversity, Parks, Open Space and Recreation,* *Sustainable Water Management, Archaeological and Heritage landscapes, Landscape."*

- Policy GINHP5 – Green Infrastructure Network: "*Develop the green infrastructure network to ensure the conservation and enhancement of biodiversity, including the protection of European Sites, the provision of accessible parks, open spaces and recreational facilities (including allotments and community gardens), the sustainable management of water, the maintenance of landscape character including historic landscape character and the protection and enhancement of archaeological and heritage landscapes.*"
- Policy GINHP21 – Protection of Trees and Hedgerows: "*Protect existing woodlands, trees and hedgerows which are of amenity or biodiversity value and/or contribute to landscape character and ensure that proper provision is made for their protection and management in line with the adopted Forest of Fingal-A Tree Strategy for Fingal.*"

Section 9.6.13 Landscape notes that "*Landscapes are living elements that have responded to, and continue to respond to history, culture, natural cycles, weather events, water, climatic change and economic factors with influences spanning land uses such as agriculture, transport, tourism, industry and energy and settlement patterns. Landscapes give us a strong sense of place.*" The Planning and Development Act, 2000 (as amended) has incorporated the *European Landscape Convention* 2002 definition of landscape as "*…an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors*" and this definition has been incorporated into. The National Landscape Strategy for Ireland 2015–2025 recognises the importance of landscape protection and for national and regional landscape character assessments to be undertaken to promote better landscape management and planning. The relevant landscape policy is as follows:

- Policy GINHP24 – National Landscape Strategy: "*Support the aims and objectives of the European Landscape Convention by implementing the relevant objectives and actions of the National Landscape Strategy 2015–2025.*"
- Policy GINHP25 – Preservation of Landscape Types: "Ensure the preservation of the uniqueness of a landscape character type by having regard to the character, value and sensitivity of a landscape when determining a planning application."
- Objective GINHO57 – Development and Landscape: "Ensure development reflects and, where possible, reinforces the distinctiveness and sense of place of the landscape character types, including the retention of important features or characteristics, taking into account the various elements which contribute to their distinctiveness such as geology and landform, habitats, scenic quality, settlement pattern, historic heritage, local vernacular heritage, land-use and tranquillity."

Other policies which are relevant to the development though not directly concerned with the content guidance of landscape and visual appraisals are dealt with elsewhere in this report as relevant..

17.4 Baseline

17.4.1 Site Fabric

The site comprises of a series of fields enclosed by sequential hedgerows running in both north-south and east-west directions. Fields in the west of the site are managed for use as playing fields by the ALSAA Sport Centre. Fields in the east of the site are used for pasture, with some low shrubs scattered throughout. Access onto the site is *via* a small entrance gate on the R132, with a track leading across the north of the site and south to the centre.

The western boundary of the site beside the R132 is a wooden panel fence, with mature trees and small areas of woodland on the east side and field boundaries of hedgerows and mature trees, forming a grid-like pattern across the site, with some smaller scale fields in the southeast and the north of the site. The eastern and southern boundaries are delineated by a line of semi-mature trees along a palisade fence with shrubs running parallel to it to the east and a chain link fence with occasional trimmed hedge to the south. The northern boundary is a little less formal and is predominantly defined by the Mayne River, which flows into the site through a culvert beneath the R132 in the west, running along the existing access and continuing east before flowing under the airport parking access route and the M1 at the eastern boundary.

17.4.2 Landscape Character

The site, along with Dublin Airport, lies at the southern edge of the Fingal Low Lying Agricultural Landscape Character Type (LCT) as identified in the 2017 Fingal Landscape Character Assessment, which is characterised by a mix of pasture and arable farming on low lying land with few protected views or prospects. The Low-Lying LCT has an open character combined with large field patterns, few tree belts and low roadside hedges. The site is located at the southern edge of the LCT on the suburban fringe of Dublin and is not considered to be an area of sensitivity to development. The surrounding context of the site is varied between industrial, airfield, transportation corridors and small-scale memorial typologies and as such is separated from the typical landscapes and valued views or prospects of the LCT.

The 2017 Fingal Landscape Character Assessment indicates that Low Lying LCT is of overall "*modest value*" and is of "*low sensitivity*". It is stated that the area "*can absorb a certain amount of development once the scale and forms are kept simple and surrounded by adequate screen boundaries and appropriate landscaping to reduce impact on the rural character of the surrounding roads. The protection of views and riparian corridors from inappropriate development is of paramount importance in these areas.*" The 2017 Assessment includes the following relevant principle for development:

- "The skyline should be protected.
- *Existing tree belts should be retained and managed, and older stands of trees restocked. Roadside hedging should be retained and managed. Proposals necessitating the removal of extensive field and roadside hedgerows, or trees should not be permitted. Strong planting schemes using native species, to integrate development into these open landscapes, will be required.*
- *Sites with natural boundaries should be chosen, rather than open parts of larger fields.*"

The site is in an area typical of the landscape character type although its surrounding context of the airfield, cemetery, industrial land and M1 & R132 transport corridors forms a degree of separation from the wider agricultural landscape. Field pattern is irregular and size is small compared to the wider landscape beyond the M1 to the east and the R132 and M1 are well defined boundaries to the area.

The proposed development would be positioned between mature hedgerows, with above ground impacts predominantly limited to the construction phase with the exception of small-scale kiosk monitoring stations in the existing airfield and a proposed substation, pump station, kiosk and access road at the CPCF in the LVA site; the low level nature of the development will avoid impacts upon the skyline. In addition, as a site with generally strong natural boundaries it is not considered to influence the surrounding landscape other than within the immediate context of the site. This is considered below in terms of the direct effect on site fabric and the effect on surrounding landscape character.

Image 1: Long, open views across the large scale expansive landscapes in existing airfield and runway area through mesh fencing opposite the site on the R132.

17.4.3 Visual Environment of the Existing Site

The site is well contained on all sides by existing vegetation, with intermittent views into the site from the south from inside the cemetery mainly in winter after leaf fall. There would be intermittent views through the palisade fence along the airport parking access road on the eastern boundary to the site. Views towards the site from the R132 to the west are interrupted by a wooden panel fence and mature trees. Views from the north are available from airport parking to the north of the creek through sparse vegetation, with a dense belt of trees screening visibility to the site in other areas on the northern boundary.

Image 2: Tall trees and wooden panel fencing at the western site boundary on the R132

Image 3: Hedgerow and trees along the southern boundary at the Dardistown Cemetery

Visibility to the site is well screened out with direct boundary areas by dense mature hedge, buildings, and acute angles of view. Visibility from the M1 is entirely screened by roadside vegetation, with industrial complexes along the R132 screening visibility from areas to the south and west. Visibility from further north is screened by roadside vegetation, buildings, and small roadside embankment.

Image 4: Palisade fencing with trees and shrubs on the eastern boundary beside airport parking access

17.4.4 Visual Receptors

The main group of visual receptors that may be affected by the proposed development are those who work at, and visitors to Dublin Airport, including those using airport parking adjacent to the site.

Other visual receptors who may experience effects of the Proposed development include visitors to the Dardistown Cemetery to the south, road users, cyclists and pedestrians on the R132 to the west.

17.5 Landscape and visual effects

The assessment of effects during construction and operation takes into account the mitigation proposals at each stage, hence all effects are considered as residual.

17.5.1 Effects on site fabric

The planning corridor is approximately 60m wide extending from the R132 in the west to the east of the site where it becomes wider to allow construction access and excavation of material to accommodate the CPCF tanks. Construction will involve the removal of site boundary trees, internal hedge field boundaries and a section of the internal access as shown on **Figure 17.1**. The most notable effects on site fabric will occur during this construction phase during the site clearing and groundworks.

We are in agreement with the published LCA that the sensitivity of the local landscape is low. The scale of construction works would be large in relation to the site but would be of localised extent and short duration. The magnitude of change during construction would therefore be Moderate and the significance of direct effects upon the landscape of the site would be Moderate/Minor (not significant) and adverse in nature.

Sustained effects beyond the construction phase will be lessened as the grassland is regenerated and removed hedges and trees in the planning corridor are replaced as outlined on **Figure 17.2**. Permanent change will occur across the site as an area inside the planning corridor is kept clear of trees and shrubs along the pipeline route and at the CPCF tanks. There will be no replacement trees above below ground infrastructure, leaving a long, open grassland strip across the centre of the site. Mitigation planting and restoration is proposed, which will limit the effects of the proposed development, and in turn will partially restore or replace existing landscape elements.

On completion the scale of change would be medium over a localised extent and a medium to long term duration. The magnitude of change on completion would be Slight and the significance of direct effects on the landscape of the site would be Minor (not significant) and adverse in nature. In the long term, once the landscape proposals have matured, it is considered that the significance of direct effects would remain Minor (not significant), however the nature of effects would be neutral, as the landscape would take on a character in keeping with its local context.

17.5.2 Effects on landscape character

The landscape character of the site is typical of the Fingal Low Lying Agricultural LCT, however it is disconnected from its context by the M1, enclosure by existing development and distance from landscape typical to the character area. The predominantly impermeable nature of these borders will largely contain effects on landscape character to the site, with some minor effects experienced from areas along the site boundary. The LCA is judged to be of low sensitivity to development, with large scale airport elements noted as an occasional feature.

The removal of internal hedge field boundaries will open internal areas of the site, altering the pattern of small fields to form a larger scale open space more typical of fields seen in surrounding areas. This will result in a noticeable change in the scale of landscape elements from within the site, and from the boundary at either end of the construction corridor, though mitigation planting will reduce effects from the airport parking access route to the east and from the cemetery to the south.

The most noticeable effects on landscape character will occur during the construction phase, where the landcover within the site will be altered or removed within the planning corridor. The scale of effect would be medium of localised extent and short term duration. Temporary construction effects would result in a Slight magnitude of change. Direct effects on the LCT during construction would therefore be Minor (not significant) and adverse in nature.

On completion the scale of change would be small over a localised extent and a medium to long term duration. The magnitude of change on completion would be Slight and the significance of direct effects on the landscape would be Minor (not significant) and adverse. Once the landscape proposals have matured, it is considered that the scale of change would be perceived as negligible over a localised extent and permanent operational effects would result in a Negligible magnitude of change. Direct effects on the LCT would therefore be Negligible (not significant) and the nature of effects would be neutral.

17.5.3 Visual effects

17.5.3.1 Workers and visitors at Dublin Airport

This group encompasses those visiting and working at the airport, those using long term parking facilities to the north and south of the site, and the parking access road which borders the site to the east. Visibility into the site from these areas is limited at present, with filtered views available from the parking areas through fencing, hedgerow and shrubs. Linear semi-mature tree planting further screens views from the parking access road. This receptor group is judged to have a Low sensitivity to the proposed development.

The addition of the proposed development would result in the removal of approximately 120m of screening vegetation and fencing along the eastern boundary, opening views into the site from the road. There would be approximately a 200-300m stretch along the airport parking access road where the CPCF substation and monitoring station, along with the new site entrance would be visible, though mitigation planting would provide some screening post construction as it matures.

The proposed development would introduce new components into views slightly extending the influence of airport infrastructure into the site and would be visually contiguous with space surrounding the airfield. The most notable effects on airport workers and visitors would be during groundworks and construction which assumes that trees along the fence and associated shrubbery is removed during the construction phase. During this short period the site will appear considerably different than both the existing visual environment and the finished proposed development.

Image 5: View along the eastern extent of the Planning corridor at the existing airport parking access route.

There would be a large-scale change over a limited area which would be of short-term duration. Temporary construction effects would result in a Moderate magnitude of change and Moderate/Minor (not significant) overall effect that would be adverse in nature.

On completion the scale of change would be medium over a limited extent and a medium to long term duration. The magnitude of change on completion would be Slight and the significance of effects would be Minor (not significant) and adverse in nature. In the long term, once the landscape proposals have matured, it is considered that the scale of change would be perceived as small/negligible over a limited extent and permanent operational effects would result in a Negligible magnitude of change. Permanent visual effects would therefore be Negligible (not significant) and neutral in nature.

17.5.3.2 Road users, cyclists and pedestrians along the R132

This group is made up of people travelling north and south on the R132 to the west of the site. Views experienced while travelling along this route are directed to the west into the airfield, where views are open. Visibility into the site is largely screened by a wooden panel fence, with further screening from large trees on the site boundary. The R132 is an arterial route and those travelling along it are predominantly commuters and are not using the route recreationally.

The addition of the proposed development would involve the removal of boundary fencing as well as trees within the planning corridor, opening views to the east from the road. Clear visibility directly into the planning corridor would be available when travelling past it, for a 70m stretch. Views would be of short duration for those travelling by car or bus and would be slightly longer for cyclists and pedestrians. The introduction of the proposed development would open up views along the CPCF pipeline route as this would remain free of trees and shrubs although fencing may be replaced which would partly interrupt views. More notable effects would be experienced during construction, where the site would be considerably different from both the existing environment and finished proposed development due vegetation clearance and the presence of construction plant and earthworks.

Image 6: View from the R132 to the site and the planning corridor.

Construction activities would be visible at close range and there would be a medium-scale change over an intermediate extent of the site, which would be of Moderate magnitude over a short period of time during construction. Temporary construction effects would be of Moderate/Minor (not significant) overall effect and adverse in nature.

On completion the scale of change would be medium over an intermediate extent and a medium to long term duration. The magnitude of change on completion would be Moderate and the significance of effects would be Moderate/Minor (not significant) and adverse. In the long term, once the landscape proposals have matured, it is considered that the scale of change would reduce to small. Permanent operational effects would therefore result in a Moderate/Slight magnitude of change and Minor (not significant) overall effect which would be neutral in nature.

17.5.3.3 Visitors to Dardistown Cemetery

This receptor group is comprised of people visiting the cemetery to visit resting places and attend memorial services. Visitors arrive by either by car or on foot from the R132, travelling east along a short section of access road that runs parallel to the site approximately 100m to the south of the planning corridor. Views into the site from the access road are screened by a belt of trees. Intermittent views are available through a hedgerow with semi-mature trees on the northern boundary of the cemetery and are mainly experienced when walking along the internal boundary path and to a lesser extent, when looking north from central areas. This group is judged to have a low-medium sensitivity to the proposed development.

The addition of the proposed development would result in the removal of mature hedges approximately 100-200m from the cemetery boundary. Construction activity including hedgerow and tree removal and groundworks would be visible mainly from the internal boundary path, with glimpsed views from in central areas of the cemetery.

Image 7: Intermittent views to the site from inside the cemetery grounds through gaps in hedgerow and trees (planning corridor lies at the opposite side of the field at the tree line).

The proposed development would be seen in filtered views in the medium-distance and would be partially visible mainly during construction. There would be a small-scale change over a limited extent of the visible area, which would be Slight in magnitude over a short period of time during construction. Temporary construction effects would be of Minor (not significant) overall effect and adverse in nature.

On completion the scale of change would be small/negligible over limited extent and a medium to long term duration. The magnitude of change on completion would be Slight/Negligible and the significance of effects would be Minor (not significant) and adverse. In the long term, once the landscape proposals have matured, it is considered that the scale of change would reduce to negligible. Permanent operational effects would therefore result in a Negligible magnitude of change and Negligible (not significant) overall effect which would be neutral in nature.

17.6 Cumulative Effects

The proposed development was considered in relation to existing and approved projects (see **Chapter 18**) and no cumulative effects were identified in the course of this assessment.

17.7 Summary

The proposed development is for a new drainage and attenuation system for the Dublin airport, which includes a Central Pollution Control Facility (CPCF), which is set within a planning corridor approximately 60m wide and 900m long in greenfield land adjacent to the existing airfield. The construction of the CPCF and associated pipeline would involve earthworks and the removal of vegetation within the planning corridor to install the CPCF pipeline and tanks underground. There would also be vegetation removal to construct an access road on the east side of the CPCF facility where the electricity substation, control building and pump station would be located.

Mitigation planting will be introduced to areas of the site that have been disturbed during the construction period. This will involve the following:

- The replacement of any removed hedgerow field boundaries and trees beyond the pipeline wayleave and the replacement of any hedges and trees that may be damaged during construction.
- The introduction of new tree/woodland planting along the southern edge of the planning corridor to restore any vegetation lost during construction and to retain the character of views from the cemetery where practicable.
- Planting in the eastern part of the planning corridor to compensate for removal of hedgerow and trees along the side of the Dublin Airport parking access road.
- The reseeding of grasses to areas disturbed by construction activity.

The proposed development would give rise to Moderate/Minor (not significant) adverse direct effects on the landscape of the site during the construction phase which would reduce to Minor (not significant) adverse on completion. The majority of components would be buried and the introduction and gradual maturation of mitigation planting would provide a degree of screening to the substation and other structures in the east of the proposed development during operation. Once mature, permanent landscape effects would remain Minor (not significant) but would be neutral in nature.

Effects on the wider LCT are assessed as at most Minor (not be significant) adverse during construction and on completion, reducing to Negligible (not significant) neutral in the long term.

The only notable effects on views would occur for workers and visitors to the airport and users of the R132 on the western boundary during the construction phase; short term effects on views would be Moderate/Minor (not significant) adverse. Effects on completion would remain Moderate/Minor (not significant) adverse for users of the R132 but would reduce to Minor (not significant) neutral in the long term after the establishment of mitigation planting.

There would be no significant effects experienced by any landscape or visual receptor and no notable effects from areas outside of that identified in this appraisal.

18

CONTENTS

TABLES

18 INTERACTIONS & CUMULATIVE EFFECTS

18.1 Introduction

The EU *Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions* (1999) acknowledge that the assessment of cumulative impacts and impact interactions should not be considered as a separate stage in the EIA process. Instead, these are an integral part of all stages of the process. This chapter summarises the potential for interactions between impacts on different environmental factors arising from the Project on the receiving environment as identified in the EIAR. It also includes a summary of the assessment of potential cumulative effects in combination with other projects that was carried out for each environmental factor in the respective chapters in Volume II, Part 2 of this EIAR.

18.1.1 Interactions of Effects

Interactions of effects are reactions between effects, whether it is between the effects from just one project or between the impacts of multiple projects. For each environmental factor there could be interactions or interdependencies with other environmental factors, whereby impacts may interact to create a greater effect or different type of effect.

Article 3 of the EIA Directive requires that:

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;*

b) *Biodiversity, with particular attention to species and habitats under Directive 92/42/EEC and Directive 2009/147/EC;*

c) *Land, soil, water, air and climate;*

d) *Material assets, cultural heritage and the landscape;*

e) *The interaction between the factors referred to in points (a) to (d).*

Where relevant, environmental factor chapters in this EIAR already address potential environmental interactions. These are considered in this chapter and addressed collectively here.

18.1.2 Cumulative Effects

The EIA Directive makes specific reference to the consideration of cumulation of effects. Annex IV of the EIA Directive (2011/92/EU as amended by 2014/52/EU) requires that an EIAR provides *"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."*

Noting that the Directive requires consideration of cumulative effects with existing and/or approved projects, this chapter also considers (i) projects that are subject of planning applications currently under consideration; and (ii) projects that may be envisaged through a plan/programme although there has not been any application submitted yet (*i.e.*, consideration of future development). It should be noted that the level of detail available per project will reflect the stage within which it sits in the planning application process. Crucially, therefore, it follows that the level of detail of cumulative assessment is reflective of the level of detail of information available at the time of assessment.

Also, as per the Landscape Institute's guidance, an assessment of cumulative effects should focus on whether there are any potential cumulative impacts which are reasonably foreseeable and which are likely to influence the decision making of the proposed development, rather than an assessment of every potential cumulative effect1.

18.2 Statement of Authority

This chapter was prepared by Krista Farrugia, Principal Environmental Consultant with Nicholas O'Dwyer. with 20 years of experience in the field of Environmental Impact Assessment (EIA). Krista holds a Master of Science in Integrated Environmental Management from the University of Bath, a Post Graduate Diploma in Wildlife Biology and Conservation from Edinburgh Napier University, and a Bachelor of Science (Hons) in Chemistry and Biology from the University of Malta. She is a Practitioner with the Institute of Environmental Management and Assessment (IEMA) with extensive experience in EIA coordination, environmental auditing, Strategic Environmental Assessment (SEA), ecological studies and Appropriate Assessment (AA), and landscape and visual assessment. Krista has worked on assessments of a wide range of developments including residential and commercial, waste management facilities, roads, port development, coastal infrastructure, and aquaculture. Krista has worked extensively in Malta and more recently in Ireland.

18.3 Methodology

18.3.1 Guidance

The following guidance documents were referred to when selecting the appropriate approach for assessment of interactions effects and cumulative effects.

- Environmental Protection Agency. 2022. *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*.
- European Commission. 1999. *Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions*. Office for Official Publications of the European Communities.
- Government of Ireland. 2018. Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment.
- Landscape Institute & Institute for Environmental Management and Assessment (IEMA).2013. 3rd edition. *Guidelines for Landscape and Visual Impact Assessment*.

18.3.2 Interactive Effects

The consideration of interactive effects was an integrated part of the assessment process. The EIA coordinator and environmental factor specialists consulted each other as needed during the design process. The impact interactions are assessed as relevant within the specific environmental factor chapters in **Volume II, Part 2** of this EIAR. Therefore, no additional assessment is included in this chapter. Instead, in accordance with EPA Guidance (2022), the assessment of impact interactions is summarised in this chapter in the form of a matrix.

18.3.3 Cumulative Effects

The assessment of cumulative effects was carried out using the following approach:

1. Identification of a long list of other projects that could result in significant cumulative effects with effects arising from the Project;
2. Identification of a shortlist of projects where cumulative effects are considered likely;
3. Desk study for the shortlisted projects; and
4. Assessment.

The potential for the ADP to result in cumulative effects with other projects 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.

When scoping for cumulative assessment, projects which were considered have either (i) received planning permission but have not yet been completed, or (ii) for which a planning application has been submitted and is pending a decision. Projects consented and being implemented (Bucket 1, see **Section 7.5** in EIAR **Chapter 7 – Future Developments**) are generally considered as part of the baseline. Reference was made to daa's project tracker, which is a live document that includes a list of all projects with pending or approved planning applications happening at the airport that is issued monthly (see **Table 18.1** for the list of projects considered as at August 2023. N.B. Projects that are in the pipeline and are at the feasibility assessment or pre-planning phase are addressed in EIAR **Chapter 7**. **Table 18.2** presents other projects/applications within the vicinity of the airport that were also considered for cumulative assessment. Together, **Table 18.1** and **Table 18.2** summarise the scoping exercise that was carried out for cumulative assessment for the ADP EIAR.

Table 18.1 daa Projects

Ref. No.	Proposal	Status	Scoped in / out for cumulative assessment
Bucket 1: Projects consented and being implemented			
F20A/0550	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 on a site of 19.2ha.	Planning permission granted on 13 July 2022. Construction underway.	Construction works will be completed ahead of the proposed ADP and therefore there is no potential for cumulative effects during the construction phase. The ADP will affect future flows at this development, and therefore this aspect was scoped in and assessed for cumulative effects in relation to effects on surface water, see **Chapter 10**.
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.	Section 5 application declared exempt development on 31 July 2019. Construction underway.	Construction works will be completed ahead of the proposed ADP. There is no potential for interaction of effects with the ADP. Design details for this project were considered in developing the ADP design. This project was scoped out of cumulative assessment.
F19A/0168	An extension of the existing Terminal 1 baggage hall in two locations to facilitate the mandatory upgrade of the airport security screening system for passenger baggage.	Planning permission granted on 16 July 2019. Construction underway.	Landside airport development will have no direct interface with the ADP project. This project was scoped out of cumulative assessment.
F18A/0638	The development will consist of enabling works to facilitate the mandatory upgrade of the airport security screening system for passenger baggage. This will include the demolition and clearance of the Carousel No. 4 Building, totaling 996 sqm, making good the remaining Terminal 1 facade; and all associated fencing and site works.	Planning permission granted on 19 February 2019. Construction underway.	Landside development will have no direct interface with the ADP project. This development was scoped out of cumulative assessment.
F21A/0232	The development will consist of a temporary (5 year lifespan) construction contractor 'West Compound' on a 5.9 ha site adjoining the R108 public road. The proposed development will include the continuation of use of the existing North Runway contractor compound (including existing office cabins, vehicle workshop, security gatehouse, soil mounding and foul sewer tank) along with a number of amendments and additions to the existing facility to provide a consolidated 'West Compound' for airside development contractors. The amendments and additions to the existing facility include: reduced car parking (150 no. spaces), new truck parking (25 no. spaces) and trailer set down area, new bus stop, cycle parking provision, a new hardstanding area for	Planning permission granted on 14th June 2021. Project constructed.	Project constructed and therefore part of the baseline. This development was scoped out of cumulative assessment.

Ref. No.	Proposal	Status	Scoped in / out for cumulative assessment
	skip set down, new streetlighting and electrical switchroom. The proposal includes all associated ancillary development, site works and services including underground attenuation system.		
F20A/0638	The proposed development shall consist of a new standalone 8-12 -storey (over partial basement) hotel consisting of the following :- a) Kitchen, plant and back of house services at basement level ; b) Double height reception, restautant/bar/lounge area at ground floor; c) Kitchen, staff facilities, storage rooms, bin stores and toilets at ground floor; d) Outdoor seating areas at ground floor level; e) 300 no. hotel bedrooms at 1st to 11th floors; f) Plant at roof level; g) New landscaped entrance courtyard between the existing and proposed hotels; h) Coach set down and car drop -off area at entrance to new hotel ; i) Reconfiguration of car park to rear of existing hotel; j) Provision of 15 no. car parking spaces in service yard to rear of existing hotel; k0 Security hut, bicycle parking and all assoicated landscaping, signage site works and services.	Permission granted 22nd November 2021.	Landside development will have no direct interface with the ADP project. This development was scoped out of cumulative assessment.
F20A/0636	The proposed development shall consist of the construction of a 1-6 storey extension (over lower ground) to the existing hotel consisting of the following: (a) Demolition of part of existing staff room at lower ground level, glazed entrance at ground floor and balconies on the side (south) elevation; (b) Construction of a new leisure facility including swimming pool and gym at ground floor; (c) 55 no. additional hotel bedrooms at 1st to 5th floor levels bringing the total to 284 bedrooms; (d) Plant at lower ground and roof level; (e) New landscaped entrance courtyard; (f) Works to elevation of existing hotel facade including new entrance and canopy; (g) Security hut, bicycle parking, underground attenuation and all associated landscaping, signage, site works and services.	Permission granted 22nd November 2021.	Landside development will have no direct interface with the ADP project. This development was scoped out of cumulative assessment.

Ref. No.	Proposal	Status	Scoped in / out for cumulative assessment
F20A/0331	Green Car Park/ Red Express North	Planning permission granted 29th October 2020.	This project has been constructed and was considered as part of the baseline. It is thus scoped out of cumulative assessment.
F20A/262	Amendment to Planning Permission reference F19A/0049 as granted which is for: a) a single-storey extension of Pier 1 and Pier 2 Immigration Hall by 673 sq m to the North East (currently 1607 sq m., proposed 2,280 sq.m.) to provide additional internal passenger queuing space; b) partial recladding with timber feature cladding; c) rooftop plant with screening louvers; d) demolition and relocation of an existing fire escape stairs; e) re-organisation of the adjoining surface car park resulting in a net loss of 22 spaces (currently 74 no. spaces, proposed 52 no. spaces) and new coach turning route; f) new glazed single-storey entrance porch to the rear of the VIP lounge (16 sq.m); g) two emergency escape doors; and h) a gas skid (7sq.m), landscaping and all associated site development works. The amendment relates to the provision of a solid roof canopy structure, clad with black PPC metal fascia and soffit with incorporated signage and supported by black painted steel columns (34.5 sq.m) in place of previously approved "new glazed single-storey entrance porch to the rear of the VIP Lounge (16sqm)". The application is also to include the addition of a freestanding entrance signage totem 2.0m high by 0.9m wide (1.8 sqm) and all associated site development work, all on a site of 0.696ha.	Planning permission granted 29th July 2020.	This project has been constructed and was considered as part of the baseline. It is thus scoped out of cumulative assessment.
FW20A/0160	Permission for temporary (12 months up to the end of 2021) change of use of 9.22 ha of existing Holiday Blue Car park for the development of a facility to provide for parking of Heavy Good Vehicles (HGV). The development comprises the reconfiguration of the existing car-parking area to provide 250 no. HGV parking spaces, as well as resurfacing of parking areas and internal roads. The development includes 10 no. prefabricated buildings comprising 2 no. 2.7m x 8.0m office units, 2 no. 2.7m x 8.0m canteen units, 4 no. 2.7 m x 5.0m bathroom units, 2 no. 2.7m x 6.0m shower units, proprietary waste-water treatment unit with percolation area, water connection to existing Irish Water service and ancillary works.	Planning permission granted 18th November 2020.	Temporary permission granted, now expired. This is thus scoped out of cumulative assessment.

Ref. No.	Proposal	Status	Scoped in / out for cumulative assessment
F19A/0023	Amend the North Parallel Runway (North Runway)(permitted under FCC Reg. Ref. F04A/1755; An Bord Pleanála Ref: PL06F.217429), on this site of c.265.7 hectares at Dublin Airport, Co. Dublin, in the townlands of Millhead, Kingstown, Dunbro, Barberstown, Pickardstown, Forrest Great, Forrest Little, Cloghran, Collinstown, Corballis, Rock and Huntstown. The permitted runway is located to the north and north-west of terminal 1 and Terminal 2, Dublin Airport.	Planning permission granted on 9th August 2019 by Fingal County Council. Subsequently, an appeal was lodged on 29th August 2019 and a decision to grant permission was made by An Bord Pleanala on 18th March 2020.	This project has been constructed and was considered as part of the baseline. It is thus scoped out of cumulative assessment.
FW19A/0097	Erection of warehouses / logistics unit; development of an extension to the previous warehouses; and Amendments to the warehouse/logistics building.	Planning permission granted 7th August 2019.	This project is located 1.5km to the southwest of the Project boundary and is thus scoped out of the cumulative assessment.
Bucket 2: Projects consented but not yet implemented			
F23A/0121	The development is a modification to a previous permission for Airside Operation Facilities (Reg. Ref. F19A/0426) which approved the development of an animal welfare facility, airside operation facilities and the provision of a substation.	Application pending determination with Fingal County Council.	Indeterminate. Unknown if there would be any construction stage overlaps at this stage. During operation there will be no interface between the planned development and the ADP. This project was scoped out of cumulative assessment.
F23A/0132	Extension of North Apron, to include the construction of new apron pavement and the rehabilitation of existing apron pavement, along with associated ancillary development.	Application pending determination with Fingal County Council.	Indeterminate. Unknown if there would be any construction stage overlaps at this stage. North Apron design details were considered in the ADP design development. Therefore, adverse operational impacts are not anticipated. This project was scoped out of cumulative assessment.
F21A/0008	Development of an airside single-storey free-standing General Aviation dispatch hut and Tug Shelter and storage shelter (approx. 10.7m x 9.9m). The application includes all associated site works and services.	Planning permission granted on 15 June 2021. Works have not yet commenced.	Indeterminate. Unknown if there would be any construction stage overlaps at this stage. During operation there will be no interface between the planned development and the ADP. This project was scoped out of cumulative assessment.
F20A/0058	The removal of all existing portacabins and the construction of a vehicle maintenance building comprising of 2 no. units with mezzanine levels, 2 no. storage areas, a new boundary wall and all associated site development works. The proposed storage areas will each consist of 3 no. oil tanks, 2 no. bunded storage units and a refuse store.	Planning permission granted on 2 July 2020. Project not intended for commencement.	Indeterminate. Unknown if there would be any construction stage overlaps at this stage. During operation there will be no interface between the planned development and the ADP. This project was scoped out of cumulative assessment.
F19A/0426	The development will consist of: i. Animal Welfare Facility ii. Airside Operations Facilities iii. 'Substation 19' site, a greenfield ca. 0.05 hectare site southwest of the South Apron	Planning permission granted on 12 December 2019. Works have not yet commenced.	Indeterminate. Unknown if there would be any construction stage overlaps at this stage. During operation there will be no interface between the

Ref. No.	Proposal	Status	Scoped in / out for cumulative assessment
	incorporating a single storey electrical substation (c. 168 sqm) with a maximum height of c. 3.4m. and overall dimensions of c. 11m. in width and c. 15.5m. in length. Ancillary site development works and services including lighting and drainage and all ancillary site development works.		planned development and the ADP. This project was scoped out of cumulative assessment.
FW22A/0022	Development shall consist of the construction of a single storey unit (Unit 26) for industrial and/or Warehouse use with ancillary two storey office with a gross floor area 5,480 square meters. The development will also include an ESB substation, service yard, associated car parking, signage to the proposed unit, the extension of the existing road Cedar Drive to the new proposed unit, service access roads, and all associated landscaping and ancillary site works for underground duct work, drainage and utility services.	Planning permission granted on 14th July 2022. Works have not yet commenced.	Indeterminate. Unknown if there would be any construction stage overlaps at this stage. During operation there will be no interface between the planned development and the ADP. This project was scoped out of cumulative assessment.
F22A/0029	Rehabilitation works to existing 'Purple Zone' staff car park to include resurfacing, lighting, road markings and signage, ducting for EV charging points, and all associated site works and ancillary development. No increase in parking capacity is proposed. It is proposed that staff parking will be facilitated within the northern section of the 'Express Red' long term car park (also known as the 'Express Green' car park), located to the east of the 'Purple Zone' staff car park in the townland of Cloghran, Co. Dublin, for the duration of the works.	Planning permission granted on 10th March 2022 by Fingal County Council. Subsequently, an appeal was lodged on 5th April 2022 and a decision to Remove Condition(s) & Amend Condition(s) was made by An Bord Pleanala on 10th March 2023 (ABP-313225-22). Works have not yet commenced.	Indeterminate. Unknown if there would be any construction stage overlaps at this stage. During operation there will be no interface between the planned development and the ADP. This project was scoped out of cumulative assessment.
F21A/0518	Planning permission for development which will consist of 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 in the townlands of Corballis and Collinstown, Dublin Airport, Co. Dublin. The proposed development will include the reconfiguration of the 2no. existing exit lanes from both the Terminal 1 and Terminal 2 forecourts to provide 4no. new exit lanes, and all associated works including pay cabinets, staff control reader, control barrier, flexi bollards, automatic number plate recognition cameras, CCTV cameras, and 2no. cantilever columns with lane guidance signage, new fencing, new kerbs, new/realigned footpaths and cycleways, relocated lighting columns, and traffic islands. The proposed	Planning permission granted on 3rd March 2022 by Fingal County Council. Subsequently, an appeal was lodged on 30th March 2022 and a decision to grant permission was made by An Bord Pleanala on 16th March 2023. Works have not yet commenced.	Indeterminate. Unknown if there would be any construction stage overlaps at this stage. During operation there will be no interface between the planned development and the ADP. This project was scoped out of cumulative assessment.

Ref. No.	Proposal	Status	Scoped in / out for cumulative assessment
	reconfigured exit lanes from the Terminal 1 and 2 forecourts will also have 1no. lane for buses and taxis. The proposed reconfigured exit lanes from the Terminal 1 forecourt will have 1no. lane including control barriers for emergency vehicles only. The proposed reconfigured exit lanes from the Terminal 2 forecourt will also involve the closure of the existing access/egress into the existing Terminal 2 short-term surface car park and the provision of a new access and new egress, barrier, a CCTV camera and pay cabinet; a proposed concrete median to tie into the existing median; the internal rearrangement and change of use of the existing Terminal 2 surface car park (291no. spaces) to provide 245 no. long-term car parking spaces, 17no. van parking spaces, and 20 no. short-term car parking spaces; and the removal of an existing pedestrian crossing and provision of a new pedestrian crossing. The proposed development will also involve the erection of advance traffic direction, fee information signage and road markings, and all associated site development, drainage and landscaping works. the proposed development will also involve the reconfiguration of the existing car parking layout on part of the central section of the Express Red Long-Term Car Park in the townland of Toberbunny, Dublin Airport, co. Dublin including the removal of 206no. long-term car parking spaces; the provision of a proposed entry lane, pay cabinet, bollards, entry barrier, automatic number plate recognition camera, staff control reader, and CCTV camera; relocated security hut; provision of new egress with a proposed exit barrier, CCTV camera and pay cabinet; and all associated site development, landscaping and fencing works, to facilitate a time-limited free waiting zone incorporating 100no. short-term car parking spaces (including 4no. PRM waiting spaces).		
F21A/0255	For development at these site addresses: 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	Planning permission granted on 4th January 2022. Works have not yet commenced.	Indeterminate. Unknown if there would be any construction stage overlaps at this stage. During operation there will be no interface between the planned development and the ADP. This project was scoped out of cumulative assessment.

Ref. No.	Proposal	Status	Scoped in / out for cumulative assessment
	Compound 2 is located to the east of Swords Rugby Club in the townland of Stockhole. 410 bedroom hotel with pedestrian link.		
FW22A/0021	Planning permission for a new solar photovoltaic solar farm at site bounded by Harristown Lane (L3151), St Margaret's Road (R122), and South Parallel Road (R108) in the townland of Sanganhill Td, Finglas ED, Co. Dublin. The development will consist of the installation of a ground mounted solar photovoltaic (PV) array with associated development and ancillary works including inverters, modules and transformers; site cabling; 2 no. substation building; a storage container on a concrete base; an internal access road and attendant surface water drainage; the formation of a new site entrance onto South Parallel Road (R108); security boundary fencing and landscaping; and a security controlled entry gate and lighting.	Permission granted 3rd November 2022. Works have not yet commenced.	Indeterminate. Unknown if there would be any construction stage overlaps at this stage. During operation there will be no interface between the planned development and the ADP. This project was scoped out of cumulative assessment.
Bucket 3: Lodged and pending applications which have not yet been determined			
F22A/0460	The proposed development will consist of the construction of a subterranean Underpass of Runway 16/34, a critical airfield operational safety project.	Planning Permission granted on 27 February 2023. An appeal has subsequently been lodged (on 24th March 2023) and is now under consideration by An Bord Pleanála (ABP. Reg. Ref. ABP-316138-23).	Due to the nature and scale of this development in terms of the extent of works and the potential overlap of construction phases between this project and the ADP, this project was scoped in for cumulative assessment.
F20A/0668	A proposed development comprising the taking of a 'relevant action' only within the meaning of Section 34C of the Planning and Development Act 2000, as amended, at Dublin Airport, Co. Dublin, in the townlands of Collinstown, Toberbunny, Commons, Cloghran, Corballis, Coultry, Portmellick, Harristown, Shanganhill, Sandyhill, Huntstown, Pickardstown, Dunbro, Millhead, Kingstown, Barberstown, Forrest Great, Forrest Little and Rock on a site of c. 580 ha. The proposed relevant action relates to the night-time use of the runway system at Dublin Airport.	Planning permission granted on 8th August 2022 by Fingal County Council. An appeal was lodged on 24th August 2022 and is under consideration by An Bord Pleanala (ABP-314495-22).	This application relates to night time noise and changing current planning conditions in relation to night-time restrictions on flights. This will not have a bearing on the ADP. This project was scoped out of cumulative assessment.

Table 18.2 Other Projects

Ref. No.	Proposal	Status	Scoped in / out for cumulative assessment
Bucket 3: Lodged and pending applications which have not yet been determined (Major development)			
ABP: 314724	An application by TII under section 37(1) of the Transport (Railway Infrastructure) Act 2001 (for the Railway (Metrolink– Estuary to Charlemont via Dublin Airport) Order. The works will generally comprise but are not limited to the construction of a Railway approximately 18.8km in length which is mostly underground. It includes a 9.4km section of single bore tunnel running beneath Dublin City Centre running from Charlemont to Northwood Station and a 2.3km section of single bore tunnel running beneath Dublin Airport. There will be a total of 16 stations and a multi-storey 3000 space park and ride close to the M1 Motorway will be provided at Estuary Station; a maintenance depot is located near Dardistown Station which will house all the facilities required for the maintenance and operation of the Metrolink and its rolling stock and the Operational Control Centre.	Case is due to be decided by 21/12/2023	A major development, it was identified that this proposal should be considered in the light of the ADP and therefore the proposal was scoped in for cumulative assessment insofar as there is sufficient information available to allow for a robust assessment.
ABP 317121	Bus Connects Sword to City Centre Bus Corridor Scheme to facilitate public transport and includes the construction of bus, cycle and pedestrian infrastructure.	Case is due to be decided by 20/11/2023	At the Airport the Scheme stays on the R132 past the airport. There will be some changes/upgrades at the airside junction and the roundabout. The proposed scheme will cross the Mayne_010 at two locations including at R132 Swords Road, north of the M1 Road, south of Dublin Airport Terminal 2. No significant residual effects were predicted on the tributary during construction. Similarly, in the case of the ADP, no residual significant effects were identifed on surface water during construction. Therefore, no further assessment was carried out.

18.4 Summary of Interactive Effects

This section summarises interaction and interdependencies between one factor and another. The matrix provided in **Table 18.3** provides a snapshot summary of the findings from the assessment of interacting effects, where relevant, as addressed within each of the environmental factor chapters of the EIAR.

Table 18.3 Interactive Effects Summary Matrix

Interaction With	Biodiversity	Water	Population & Human Health	Material Assets	Waste	Air Quality & Climate	Noise & Vibration	Archaeology, Architecture & Cultural Heritage	Land, Soils & Geology	Landscape & Visual
Biodiversity		✓								
Water	✓		✓	✓	✓				✓	
Population & Human Health				✓	✓	✓	✓			✓
Material Assets	✓		✓		✓	✓				
Waste				✓		✓			✓	
Air Quality & Climate	✓		✓	✓	✓					
Noise & Vibration			✓							
Archaeology & Cultural Heritage					✓				✓	✓
Land, Soils, Geology & Hydrogeology	✓	✓	✓	✓	✓			✓		
Landscape & Visual			✓	✓				✓		

As described and assessed in the environmental factor chapters in **Part 2** of the EIAR, during the construction phase, the proposed Project is likely to impact on the local environment (*i.e.,* noise, traffic disruption, dust). However, implementation of mitigation measures specified in the relevant EIAR factor chapters, and summarised in **Chapter 19**, including good site management and best construction practices as identified in the CEMP and CTMP (**Section 12** of the planning documentation) will mitigate and reduce identified impacts so as not to be significant.

The interactions between Traffic & Transport and other aspects such as Population & Human Health and Biodiversity are expected to be greatest during construction stage (refer to EIAR **Chapter 8 – Population and Human Health** and **Chapter 9 - Biodiversity**, respectively). Interactions between Hydrology and Land, Soils, Geology & Hydrogeology, and Traffic & Transport are also key during construction. The mitigation measures specified in EIAR **Chapter 10 - Hydrology**, **Chapter 11 – Land, Soils, Geology & Hydrology**, and **Chapter 14 – Material Assets (Traffic & Utilities)**, and identified in the CEMP and CTMP (**Section 12** of the planning documentation) will ensure effects are not significant.

EIAR **Chapter 9 – Biodiversity** and **Chapter 10 – Hydrology** of the EIAR identified significant positive effects on surface water flows and water quality conditions in the Cuckoo Stream. Potential improvements to the water environment provide the opportunity for improvements to the aquatic-dependent ecology of the stream including further downstream.

The noise assessment (**Chapter 12 – Noise & Vibration**) identified potential impacts from night-time works on sensitive receptors (residential and commercial properties) at representative Noise Sensitive Locations (NSLs) to the south of the airfield complex.

18.5 Projects Scoped in for Assessment of Cumulative Effects

As identified in **Table 18.1** and **Table 18.2**, three projects were assessed further in relation to potential cumulative effects with the ADP, as summarised hereunder.

18.5.1.1 Underpass (daa Project)

The subterranean Underpass of Runway 16/34 will provide vehicular access between the Eastern Campus and the West Apron. It consists of four key elements:

- A subterranean Underpass of Runway 16/34.
- Relocation of aircraft stands at Pier 3 to accommodate access roads to serve the Underpass.
- Modifications to Pier 3 to accommodate the proposed Fixed Links and Airbridges.
- Drainage works including temporary diversion of the Cuckoo Culvert and local attenuation.

18.5.1.2 Apron 5H (daa Project)

With respect to Apron 5H, the main consideration is related to surface water management in the context of the operational phase of the ADP and the assessment of potential cumulative effects was therefore scoped into the hydrology assessment. The construction phases of the two projects will not overlap.

18.5.1.3 MetroLink (TII project)

The proposed MetroLink Project (ABP Ref. 214724) will comprise a metro railway between Estuary Station and the Park and Ride (P&R) facility, north of Swords via Dublin Airport to Charlemont Station which lies south of Dublin City Centre. The alignment is 18.8km long from end to end, while the alignment between the two end stations (Estuary to Charlemont) is 18.1km long. The northern section of the proposed Project, between Estuary and Northwood, will be largely on the surface, in retained cut, cut and cover, or on embankment, with a short section of tunnel under Dublin Airport. This Airport Tunnel will run under and will be approximately 2.3km in length.

18.5.2 Summary of Cumulative Effects

Following the scoping exercise summarised in **Table 18.1** and **Table 18.2**, **Table 18.4** presents the findings from the assessment of residual cumulative effects. The potential for cumulative effects to occur between the ADP and the Underpass and Metrolink relates only to the construction phase of the ADP. If there is no overlap between the construction phases of either the Underpass or the Metrolink projects with that of the ADP, then there is no potential for cumulative effects.

Table 18.4 Summary of cumulative effects

Environmental Factor	Cumulative effects with Underpass (construction)	Cumulative effects with Metrolink (construction)	Cumulative effects with Apron 5H (operational)
Population and Human Health	No significant cumulative effects identified	No significant cumulative effects identified.	N/A
Biodiversity	If they were to be constructed at the same time, it is unlikely that significant cumulative effects on habitats or protected species will arise from the ADP and the Underpass. During construction of the ADP, implementation of mitigation measures set out in the CEMP will result in imperceptible effects to surface water, a potential pathway to sensitive biodiversity sites downstream. Similar mitigation measures are listed in the EIAR for the Underpass including measures directly outlined in the CEMP. Given the extent of mitigation planned for these projects, it is considered improbable that best practice measures would fail at the same time on enough schemes to result in a significant pollution event that would affect the aquatic ecology of Cuckoo Stream.	No significant cumulative effects identified.	N/A
Hydrology	To facilitate the installation of the Underpass, a temporary diversion of the culverted section of the Cuckoo Stream will be required as part of the works. According to the Underpass EIAR, the magnitude of impacts on the Cuckoo Stream is low, resulting in an imperceptible effect as this temporary diversion will be controlled by implementation of CEMP and agreed Drainage Management Plan. Therefore, no cumulative impacts are expected in combination with the ADP project on the hydrological environment during the construction and operational phases of the Dublin Airport Underpass project.	The Cuckoo Stream open water section will not be crossed directly by the proposed route. The proposed Project will be in a tunnel below the course of the Cuckoo Stream at Dublin Airport. There are no planned construction activities located close to this waterbody. Therefore, no cumulative impacts are expected in combination with the ADP on the hydrological environment due to the construction and operational phase of the MetroLink project.	As described in **Chapter 10**, the repurposing of the N-S Sewer as part of the ADP will affect future flows from Zone 2B, where the planned development associated with Apron 5H is located. The planned development at Apron 5H will also include a local pollution control facility (PCF) with a pumped discharge to the N-S Sewer. The system will monitor the average concentration of contaminated surface water in the Apron 5H PCF via TOC analysers. The proposed re-purposing of the N-S Sewer will enable flows from the Apron 5H PCF to be directed to either the re-purposed N-S Sewer for discharge to the Cuckoo Stream, or to the Pier 1 sewer for discharge to public sewer via the CPCF depending on the measured concentration at the PCF and the diversion concentration limits set out in the Dublin Airport

Environmental Factor	Cumulative effects with Underpass (construction)	Cumulative effects with Metrolink (construction)	Cumulative effects with Apron 5H (operational)
			Drainage Management Plan.
Land, Soils, Geology & Hydrogeology	According to the Underpass EIAR, the magnitude of impacts on the land, soils, geology and hydrogeology is considered to be Low resulting in an Imperceptible effect as the temporary diversion of the Cuckoo Stream during construction of the Underpass will be controlled by implementation of CEMP. Therefore, no significant residual cumulative effects are expected in combination with the ADP project.	Tunnelling works and construction of the tunnel will result in the production of large quantities of glacial till. While these excavation volumes are high, shallow geology does not have heritage value and is not considered to have future economic value, and the magnitude of impact has been assessed as negligible. Localised long-term reduction in the groundwater table in the vicinity of cut slopes are expected. In terms of hydrogeology, the predicted effect of Construction Phase dewatering (from either drawdown or water quality effects) on identified water features (*i.e.*, Cuckoo Stream) in the wider area is considered Imperceptible. Therefore, no cumulative impacts are expected in combination with the ADP project.	N/A
Noise & Vibration	The Underpass will utilise some of the same routes for construction traffic. A cumulative assessment has been accounted for in **Section 12.7.3** of this EIAR which has found that the impact will be negative, short-term and not significant.	Insufficient information about timing of construction phase and associated traffic to be generated on the network results in an indeterminate cumulative effect.	N/A
Material Assets (Waste)	In terms of waste, the Resources and Waste Management Plan for the ADP (See **Appendix 13.1**) demonstrated that there is sufficient capacity to manage waste generated from the ADP as well as other ongoing projects. Due to the high number of waste contractors in the FCC region, as provided from the National Waste Collection Permit Office and the EPA, there would be sufficient contractors available to handle waste generated from a large number of construction sites simultaneously (including the Underpass and ADP), if required. Waste generated from any development underway would need to be managed in compliance with national and local legislation, policies and plans	In terms of waste, the Resources and Waste Management Plan for the ADP (See **Appendix 13.1**) demonstrated that there is sufficient capacity to manage waste generated from the ADP as well as other ongoing projects. Due to the high number of waste contractors in the FCC region, as provided from the National Waste Collection Permit Office and the EPA, there would be sufficient contractors available to handle waste generated from a large number of construction sites simultaneously, if required. Waste generated from any development underway would need to be managed in compliance with national and local legislation, policies and plans which will mitigate	N/A

Environmental Factor	Cumulative effects with Underpass (construction)	Cumulative effects with Metrolink (construction)	Cumulative effects with Apron 5H (operational)
	which will mitigate against any potential cumulative effects associated with waste generation and waste management. As such the cumulative effect during the construction phase will be short-term, imperceptible and neutral.	against any potential cumulative effects associated with waste generation and waste management. As such the cumulative effect during the construction phase will be short-term, imperceptible and neutral.	
Material Assets (Traffic & Utilities)	**Figure 5.1** in the CEMP for the ADP (see **Section 12** of the planning documentation) illustrates an indicative programme for the drainage pipelines, West Apron drainage works, and the CPCF Tank of up to 27 months. Peak construction is expected to occur in month 20. Assuming a minimum 12-18 month period in order to achieve planning consent/site mobilisation for the ADP, it is anticipated that peak construction would occur in Q4 2025/Q1 2026. The proposed Underpass has an outline construction phase of 2023 - 2025. An assessment year of 2024 is applied as this is planned to be the peak period for construction activity. The proposed ADP and Underpass will have limited construction overlap. It is therefore assumed that the cumulative impact between the ADP and Dublin Airport Underpass will be limited. Construction activity at Dublin Airport Underpass will begin to reduce as ADP construction activities begins to increase.	Insufficient information about timing of construction phase and associated traffic to be generated on the network results in an indeterminate cumulative effect.	N/A
Air Quality & Climate	The proposed Dublin Airport Underpass has the potential for cumulative construction dust impacts to air quality with the ADP given its proximity. There is a small overlap in the construction phases of the Underpass and the ADP. As a result, there is potential for cumulative construction dust impacts to nearby receptors. However, provided the mitigation measures outlined in EIAR **Chapter 15**, **Section 15.7** are in place for the duration of the construction phase, cumulative dust related impacts to nearby sensitive receptors	With mitigation in place for the duration of the construction phases, if they overlap, significant cumulative effects are not considered likely.	N/A

Environmental Factor	Cumulative effects with Underpass (construction)	Cumulative effects with Metrolink (construction)	Cumulative effects with Apron 5H (operational)
	are not predicted to be significant. Cumulative impacts to air quality will be direct, short-term, localised, negative and imperceptible.		
Archaeology & Cultural Heritage	No significant cumulative effects identified.	No significant cumulative effects identified	N/A
Landscape & Visual	The main effects of the ADP on site fabric, landscape character and visual amenity occur during the construction stage, to the east of the R132 outside the airfield complex. If the ADP and Underpass project are constructed at the same time, there is no potential for significant cumulative landscape and visual effects based on their location. These projects are within the airfield itself, or south of the airfield at Terminal 2.	Indeterminate without confirmed project timing, application is pending.	N/A

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CONTENTS

TABLES

19 SUMMARY OF MITIGATION MEASURES

19.1 Introduction

This chapter of the EIAR contains a summary of the mitigation which will be implemented during construction and operation of the proposed development.

19.2 Summary Table

Table 19.1 lists the mitigation proposed as part of the proposed development.

Table 19.1 Summary of Mitigation Measures

Chapter	Mitigation
Chapter 9: Biodiversity - terrestrial & aquatic & ornithology	**Construction Phase** • A project ecologist will be appointed prior to works commencing on site and consulted in relation to all onsite drainage during works. • All site clearance works methodologies will have prior approval of a project ecologist. This will include not removing woody vegetation within bird nesting season. • Staging of project will be carried out to reduce risks of onsite drainage to the Cuckoo Stream and subject to the approval of a project ecologist. • Local drainage connections, gullies and watercourses will be protected from dust, silt and surface water throughout the works. • All onsite drainage network connections will be blanked off and sealed at the first phase of the construction works. • There will be no entry of solids or petrochemicals to the drainage network during the works. • The Site Manager will be responsible for the pollution prevention programme and will ensure that at least daily checks are carried out to ensure compliance. A record of these checks will be maintained. • Spill containment equipment shall be available for use in the event of an emergency. The spill containment equipment shall be replenished if used and shall be checked on a scheduled basis. • Silt fencing will be in place in the vicinity of the Cuckoo Stream, and other areas deemed appropriate and as directed by the project ecologist. • Instream works will be carried out in consultation with Inland Fisheries Ireland.

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	• Measures will be in place to allow mammals to exit from excavations. This will be discussed with the project ecologist and will include sloped sides and ramps where relevant. • Landscaping elements include compensatory areas for hedgerow loss and specific areas for Willow Warbler and Goldcrest to be planted on the eastern portion of the site in the vicinity of the Cuckoo Stream in consultation with the project ecologist and landscape architect. The project ecologist will work with the arborist to limit the hedgerow loss on site during construction. • The project ecologist will oversee the management/treatment or removal of the Japanese knotweed on site in line with Irish legislation. • Landscaping elements include planting areas for hedgerow loss and specific areas for Willow Warbler and Goldcrest are to be planted on the eastern portion of the site in the vicinity of the Cuckoo Stream in consultation with the project ecologist and landscape architect. The project ecologist will work with the arborist to limit the hedgerow loss on site during construction. • The project ecologist will oversee the management/treatment or removal of the Japanese knotweed in line with best practice and Irish legislation. Prior to the commencement of works a pre-works inspection and mapping of Japanese knotweed will be carried out. An invasive Species Management Plan will be developed prior to the commencement of works within 7m of Japanese knotweed. No works will take place within 7m of any Japanese knotweed without approval of the project ecologist. **Operational Phase** • Standard operational mitigation measures as outlined in **Chapter 10: Hydrology** will be in place to protect surface water networks from pollution. • A post construction landscape inspection will be carried out by the project ecologist. • Lighting during operation will be controlled and bat sensitive lighting will be in place. • Post construction an inspection of monitoring infrastructure and procedures will be carried out by the project ecologist.

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Chapter 10: Hydrology	**Construction Phase** *Construction and Environmental Management Plan (CEMP)* A Construction Environmental Management Plan (CEMP) has been prepared by NOD in respect of the proposed development (refer to standalone document submitted under separate cover). It contains best practice measures and protocols to be implemented during the construction phase of the proposed development to avoid / minimise environmental impacts, including in relation to surface water. To ensure the CEMP remains fit for purpose, it will be regarded as a live document. The appointed contractor will be responsible for updating the CEMP, as required; *e.g.*, to reflect the publication of relevant new or revised guidelines and / or new statutory requirements. The full schedule of environmental commitments (*i.e.*, all mitigation measures set out in the CEMP, EIAR and Natura Impact Statement (NIS) submitted as part of the planning application, as well as any applicable conditions of development consent) will be included in the CEMP by the appointed contractor. The CEMP was formulated in accordance with best international practice including but not limited to: • Best Practice Guidance o CIRIA C689 Culvert Design and Operation Guide (2010). o CIRIA C532 Control of water pollution from construction sites (2001). o CIRIA C762 Environmental Good Practice on site (4th Edition) (2016). o CIRIA Report C648 Control of Pollution from Linear Construction Project. Technical Guidance. o CIRIA Handbook C650 Environmental good practice on site. o CIRIA Handbook C651 Environmental good practice on site checklist.

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	○ BS5228-1:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites. ○ BS 5837:2012 Trees in relation to design, demolition and construction – Recommendations. ○ Guidelines on protection of fisheries during construction works in and adjacent to waters Inland Fisheries Ireland (2016). ○ Dublin City Council (2005) Greater Dublin Strategic Drainage Study (GDSDS): Technical Documents of Regional Drainage Policies. Dublin: Dublin City Council. ○ National Roads Authority Guidelines for the crossing of watercourses during the construction of national road schemes (TII, 2008). ○ Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes (TII). ○ Guidelines for the Treatment of Bats during to the Construction of National Road Schemes (TII). ○ Guidelines on the Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads (National Roads Authority, December 2010). ○ EPA (2021) Best Practice Guidelines for the Preparation of Waste Management Plans for Construction and Demolition Projects ○ EPA IPC Guidance Note on Storage and Transfer of Materials for Scheduled Activities. • Dublin Airport Directions for works in and around the Aerodrome: ○ Airport Direction D-O Construction Projects. Specific to Airside construction Projects.

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	◦ Airport Direction D-E Emergency Response. Airside, Fuel spillages, fires and other emergency procedures. ◦ Airport Direction D-O Environment and Pollution. Environmental standards for the Dublin Airport Site/Campus. ◦ Airport Direction D-O Spillages/FOD. ◦ Airport Direction D-O Wildlife and habitat Management.t • Guidance Documents for construction works at Dublin Airport. ◦ Construction Contractor's Health & Safety and Environmental Rules for working on daa Infrastructure Manual. ◦ AMD Guidelines Control Dust Fume and Smoke. ◦ daa Control of Noise and Vibration. ◦ daa Temporary Traffic Management Requirements Specification Covering High Risk Works. ◦ daa Standard Traffic Management Plans Covering Low and Medium Risk Works requiring traffic Management. ◦ daa Drainage Policy. *Surface water run-off and control of sediments* Care will be taken to ensure that exposed soil surfaces are stable to minimise erosion. All exposed soil surfaces will be within the main excavation site which limits the potential for any offsite effects. Pre-treatment and silt reduction measures on site will include a combination of silt fencing, settlement measures (silt traps, 20 m buffer zone between machinery and watercourses, refuelling of machinery off site, if

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	possible) and hydrocarbon separator. These specific measures will provide protection to the receiving soil and water environments during the construction phase. Surface water management procedures are outlined in the CEMP (**Section 12**) included with this Application. The CEMP aims to set out the proposed procedures and operations to be utilised on the proposed construction site to protect water quality. The mitigation and control measures as outlined in the CEMP or updated will be employed on site during the construction phase. All mitigation measures outlined within the CEMP will be implemented during the construction phase, as well as any additional measures required pursuant to planning conditions which may be imposed. The CEMP provides work practices that are industry best practice measures that will be applied during the construction phase, this is in no way included to avoid or reduce potential harmful effects (if any) to European sites (if any), which is a matter that is the subject of separate assessment (discussed further in **Chapter 9 – Biodiversity**). There shall be localised pumping of surface run-off from the excavations during and after heavy rainfall events to ensure that the excavations are kept relatively dry, however, this is expected to be low due to the low permeability of the subsoils and the relative shallow nature for excavations. Likewise, infiltration to the underlying aquifer is not anticipated (Refer to **Chapter 11 – Land, Soils, Geology & Hydrogeology** for further details). Run-off containing silt will be contained and treated on site to ensure adequate silt removal. Silt reduction measures on site will include a combination of silt fencing and settlement measures (silt traps, silt sacks and settlement tanks / ponds). The temporary storage of soil will be carefully managed. Stockpiles will be tightly compacted to reduce run-off and graded to aid in run-off collection. This will prevent any potential negative impact on the stormwater drainage and the material will be stored away from any surface water drains. Movement of material will be minimised to reduce the degradation of soil structure and generation of dust. Excavations will remain open for as little time as possible before the placement of fill and therefore the volume of the stockpiles will be restricted to what is necessary. This will help to minimise the potential for water ingress into excavations. Soil from works will be stored away from existing drainage features to remove any potential impact.

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	Weather conditions will be considered when planning construction activities to minimise the risk of run-off from the site and the suitable distance of topsoil piles from surface water drains will be maintained. For construction of any works in-stream a detailed Pollution Control Plan, Emergency Response Plan and Method Statement shall be drafted in agreement with Inland Fisheries Ireland (IFI) and having regard to relevant pollution prevention guidelines in particular the IFI document "Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters" and "Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes (NRA, 2005)". All works in or adjacent to watercourses will comply with the EPA, IFA and OPW requirements. Direct disposal to the watercourse of arisings from excavations in-stream and from dewatering activities shall not be permitted as these could impact both on water quality of the watercourse and increased flood risk. Any discharge of such water, after proper treating/de-silting with a limit on the turbidity of the discharge to not more than 80 NTU, will be discussed and agreed with the concerned authority (EPA, Fisheries *etc.*) prior to the commencement of works. During the construction phase as part of the CEMP, monitoring will take place to confirm that pollution control measures are effective. Once construction works commence onsite, monitoring and supervision will be required until all mitigation works are implemented effectively. Dewatering of excavations using proprietary settlement tanks or filtration systems will be monitored at least twice daily with dewatering stopped if any silt is evident within the discharge. Works in the Cuckoo Stream shall be conducted during low flow conditions. In-stream works shall only take place during the period March to September or as agreed with the IFI. *Fuel and Chemical Handling* To minimise any impact on the underlying subsurface strata from material spillages, all oils, solvents and paints used during construction will be stored within temporary bunded areas. Oil and fuel storage tanks shall be stored in designated areas, and these areas shall be bunded to a volume of 110% of the capacity of the

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	largest tank / container within the bunded area(s) (plus an allowance of 30 mm for rainwater ingress). Drainage from the bunded area(s) shall be diverted for collection and safe disposal. Refuelling of construction vehicles and the addition of hydraulic oils or lubricants to vehicles will take place in a designated area (or where possible off the site) which will be away from surface water gullies or drains. In the event of a machine requiring refuelling outside of this area, fuel will be transported in a mobile double skinned tank. An adequate supply of spill kits and hydrocarbon adsorbent packs will be stored in this area. All relevant personnel will be fully trained in the use of this equipment. Guidelines such as "Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors" (CIRIA 532, 2001) will be complied with. Where feasible all ready-mixed concrete will be brought to 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 storm water to the underlying subsoil. Wash down and washout of concrete transporting vehicles will take place at an appropriate facility off-site. In the case of drummed fuel or other chemicals used during construction, containers will be stored in a dedicated internally bunded chemical storage cabinet and labelled clearly to allow appropriate remedial action in the event of a spillage. Emergency response procedures will be outlined in the detailed CEMP. All personnel working on the site will be suitably trained in the implementation of the procedures. *Soil Removal and Compaction* Temporary storage of soil will be carefully managed in such a way as to prevent / reduce the risk of any potential negative impact on the receiving environment. The material will be stored away from any surface water drains. Movement of material will be minimised to reduce degradation of soil structure and generation of dust. All excavated materials will be visually assessed for signs of possible contamination such as staining or strong odours. Should any unusual staining or odour be noticed, samples of this soil will be analysed for the presence of potential contaminants to ensure that historical pollution of the soil has not occurred. Should it be

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	determined that any of the soil excavated is contaminated, this will be segregated and appropriately disposed of by a suitably permitted / licensed waste disposal contractor. **Operational Phase** As mentioned, the potential for impact on water quality as a result of the ADP is expected to be positive during operation as the primary objective is to provide a nett improvement in the degree of protection afforded to the receiving waters by the surface water management system, in order to address the water quality objectives. Additionally, the Central Pollution Control Facility (CPCF) is proposed to provide nett improvements on the protection afforded to the receiving waters and to address the intensification of demand on the existing airport infrastructure. The surface water collection network in Dublin Airport, that will convey contaminated surface runoff from the airport's impermeable surfaces to the CPCF, is designed to cater for a storm event with a 1% annual exceedance probability (AEP) plus a 30% allowance for climate change. The basis by which the CPCF storage requirement was determined was the volume required to ensure sufficient capacity is in place to meet the requirements of 95% of de-icing seasons (*i.e.*, the 95%ile of the seasonal maximum storage volume requirements simulated). However, a combination of rainfall events or individual events (greater than the design capacity) could result in the storage volume of the CPCF being fully utilised. There would therefore be the potential for a spill of contaminated flows to the Cuckoo Stream in an extreme event or combination of events. An overflow mechanism for contaminated flows from the CPCF is therefore required. The following mitigation measures included in the design of the project have been established to avoid and mitigate against the risks of overflows and also details the emergency response steps if an overflow event occurs.

	Mitigation/Design Measures to Limit Overflow Events The following is a summary of the key mitigation/design measures proposed in order to limit overflow of contaminated surface water to the Cuckoo Stream and also to minimise the impact of an overflow should an overflow event occur: • Segregation of clean flows from potentially contaminated flows is proposed and will improve the resilience of the network; • Providing additional pollution control storage tank capacity reduces the likelihood of overflows occurring; • The storage tank is proposed to be compartmentalised, such that first flush of the most heavily contaminated water could be captured in a compartment that would potentially limit highly contaminated water discharging to the watercourse in the event of an overflow; • The compartmentalised approach means that when the tank is full that short circuiting of contaminated flows to the overflow is prevented by increasing the flow path through each compartment. This can minimise the concentration of the spill volume; • The provision of a secondary overflow from the CPCF Contaminated Pipeline would allow overflow of surface water with a lower contamination level than the contents of the storage tank under certain conditions; • The overall airfield-wide SCADA system would include operational flexibility such that pump rates can be increased or decreased at the CPCF, where conditions at other pollution control tanks allow, in order to maximise the storage availability / resilience of the system overall. Pumping from local pollution control tanks to the CPCF storage tank could be turned off if the CPCF storage tank is full and the local tanks have spare storage capacity. This is detailed further in the Operational Control Philosophy document. • The Decision Points - System response configurations have been developed as required to address each potential combination of weather conditions and airport operational activities.

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	Overflow Event – Steps: The following approach is proposed for the management of overflows during emergency situations and mitigate the impact of unavoidable overflows of contaminated runoff to the Cuckoo stream. These steps should be read in conjunction with **Chapter 10 – Figure 10.11**. • STEP 1: Flows surcharge along the CPCF Pipeline to Point B. This utilises the online storage volume of the CPCF Pipeline to postpone / avoid an overflow event. • STEP 2: If the online storage of the CPCF Pipeline is fully utilised and contaminated flows continue to be received, Overflow 1 would be initiated, allowing contaminated flows in the CPCF Storage Tank to overflow towards the Cuckoo Stream. • STEP 3: Overflow to the Cuckoo Stream *via* Overflow 2. The flow control mechanisms in the CPCF and associated inlet pipelines can be adjusted to allow flows to surcharge back to Point D on **Chapter 10 – Figure 10.11**, from where they can overflow to the Cuckoo Stream *via* the Overflow 2 pipeline. • The Overflow 1 and Overflow 2 pipelines converge in a single pipe which gravitates to the Cuckoo Stream. • STEP 4: If the overflow event has still not been averted and flows continue to surcharge along the CPCF Pipeline, overflow to Cuckoo Supply Channel *via* Overflow 3. Overflow 3 will also be utilised as the primary overflow option in flood conditions *i.e.*, if the water level in the Cuckoo Stream is too high for Overflow 1 or 2 to operate effectively. It should be noted that the above steps detail the typical overflow procedure. However, the operation of the system will be sufficiently flexible to take these steps in a different sequence, as required to minimise the impact on the receiving waters. For example, consider a scenario where the COD concentration of flows in the CPCF Pipeline is lower than the flows in the CPCF. In this scenario, implementing Step 3 before Step 2 would enable the release of a lower-concentration flow to the Cuckoo Stream.
Chapter 11: Land, Soils, Geology & Hydrogeology	**Construction Phase**

	Construction and Environmental Management Plan (CEMP) Mitigation measures as outlined in **Chapter 10 – Hydrology** also apply in the protection of protect lands, soils, geology and hydrogeology. *Control of Soil Excavation* Mitigation measures as outlined in **Chapter 10 – Hydrology** also apply in the protection of protect lands, soils, geology and hydrogeology. Significant groundworks are required at the proposed pipelines and storage tanks (CPCF and West Apron). Large scale open excavations will be required along the routes of the proposed pipelines. At the proposed CPCF tank, a large deep excavation will be required. The estimated volume of excavation for this tank will be 190,000m^3. It is envisaged that the majority (*ca.* 80%) of material will be immediately removed from the site for appropriate offsite reuse, recovery, recycling and/or disposal. The West Apron Pollution Tank and the West Apron Attenuation Tank also involve large deep excavations with a combined estimated excavation volume of 98,000m^3 of which 36,000 m^3 would be sent off-site and the remainder required for backfilling. Correct classification and segregation of the excavated material being removed off site is required to ensure that any potentially contaminated materials are identified and handled in a way that will not impact negatively on workers as well as on water and soil environments, both on and off-site. Refer to **Chapter 13 – Waste Management** and **Resource & Waste Management Plan (RWMP)** provided as **Appendix 13.1** for further details. Soil sampling and laboratory analysis will be carried out in order to identify any potential contamination during excavation works. If contaminated soil is encountered, it will be required to be removed by a licensed waste contractor and disposed of at a licensed facility. *Fuel and Chemical Handling* Mitigation measures as outlined in **Chapter 10 – Hydrology** also apply in the protection of protect lands, soils, geology and hydrogeology.

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	Soil Removal and Compaction Mitigation measures as outlined in **Chapter 10 – Hydrology** also apply in the protection of protect lands, soils, geology and hydrogeology. **Operational Phase** There are no further mitigation measures required during the operational phase in terms of protection of soil, geological and hydrogeological environment.
Chapter 12: Noise & Vibration, including baseline acoustic survey	**Construction Noise Mitigation** *Communication with Neighbours* The Contractor will be proactive in engaging with the occupants of neighbouring properties with potential for construction impacts and will be obliged to notify them of any works forecast to generate appreciable levels of noise, explaining the nature and duration of the works. Night-works in particular have the potential to generate the most significant noise impacts. All affected sensitive locations should be notified of planned works in advance of the works progressing. The notification should include a description of the works, the expected duration and details of how to contact the contractor to register any noise complaints. A designated noise liaison will be appointed by the contractor for the duration of the construction works. This person should log any issues and follow up promptly. *Noise Monitoring* The following ongoing noise monitoring programme is recommended for the site in relation to construction activities.

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	Noise Monitoring Terminals (NMT), number and locations to be agreed between the contractor, daa and local authority, to be installed with the following specifications (or similar approved): • Logging of two concurrent periods, *e.g.* 15-minute & hourly; • E-mail alert on threshold exceedance; and • Remote access to measured data. In addition, it is recommended that spot check noise measurements are conducted on a monthly basis. These spot checks can be organised to coincide with works that have potential to generate high levels of noise in order to confirm the potential extent of impact. A monthly noise monitoring report should be prepared by the contractor. Reports should identify any exceedances above nominal limit values and attempts to clarify the causes, *etc*. Where remedial measures are required and identifiable these should also be clearly stated. *Noise Control Audits* It is recommended that noise control audits be conducted at regular intervals throughout the construction programme. The purpose of the audits will be to ensure that all appropriate steps are being taken to control construction noise emissions. To this end, consideration should be given to issues such as the following (note that this list is not intended to be exhaustive): • Hours of operation being correctly observed; • Opportunities for noise control "at source"; • Optimum siting of plant items; • Plant items being stopped when not in use;

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	• Correct use of proprietary noise control measures; • Materials handling; • Poor maintenance, and; • Correct use of screening provided and opportunities for provision of additional screening. *Hours of Work* In order that the impact on Dublin Airport services is minimised a portion of construction works will take place at night. Every effort should be made to avoid, reduce, and/or mitigate negative impacts, however, there is likely to be some disturbance experienced for those in close proximity to the construction works due to the sensitivity of the night period. Consideration will be given to scheduling activities in a manner that reflects the location of the site and the nature of neighbouring properties. Each potentially noisy event/activity should be considered on its individual merits and scheduled according to its noise level, proximity to sensitive locations and possible options for noise control. Depending on the noise emission levels experienced and associated noise impact, the contractor will be flexible and able to conduct certain works at hours which reflect periods when the neighbouring properties have lower sensitivities to noise. Furthermore, every effort will be made to schedule the noisiest works to take place during the less sensitive daytime hours. *Selection of Quiet Plant* Careful consideration will be given to the noise emission levels of plant items when they are being considered for use on the site. This practice is recommended in relation to sites with static plant such as compressors and generators. It is recommended that these units be supplied with manufacturers' proprietary acoustic enclosures where possible. The potential for any item of plant to generate noise will be assessed prior to the item being brought onto the site. The least noisy item should be selected wherever possible. Should a

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	particular item of plant already on the site be found to generate high noise levels, the first action should be to identify whether or not said item can be replaced with a quieter alternative. *Control of Noise Sources* If the use of low noise plant or replacing a noisy item of plant are not viable or practicable options, consideration will be given to noise control "at source". This refers to the modification of an item of plant or the application of improved sound reduction methods, often in consultation with the supplier. For example, resonance effects in panel work or cover plates can be reduced through stiffening or application of damping compounds; rattling and grinding noises can often be controlled by fixing resilient materials in between the surfaces in contact. BS5228 states that "as far as reasonably practicable sources of significant noise should be enclosed". In applying this guidance, constraints such as mobility, ventilation, access and safety must be taken into account. Items suitable for enclosure include pumps and generators. Demountable enclosures that could be moved around site as necessary may also be used to screen operatives using hand tools such as angle grinders. In practice, a balance may need to be struck between the use of all available techniques and the resulting costs of doing so. It is therefore proposed to adopt the concept of "Best Available Techniques" (BAT). BAT is defined as follows in Directive 2010/75/EU: *"...the most effective and advanced stage in the development of activities and their methods of operation which indicates the practical suitability of particular techniques for providing the basis for emission limit values and other permit conditions designed to prevent and, where that is not practicable, to reduce emissions and the impact on the environment as a whole."* In this context "best" means "the most effective in achieving a high general level of protection of the environment as a whole". The expression "available techniques" means "those developed on a scale which allows implementation in the relevant industrial sector, under economically and technically viable conditions, taking into consideration the

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	costs and advantages, whether or not the techniques are used or produced inside the Member State in question, as long as they are reasonably accessible to the operator". The term "techniques" includes "both the technology used and the way in which the installation is designed, built, maintained, operated and decommissioned". In specifying or otherwise determining BAT, consideration should be given to a specified list of considerations and also to "the likely costs and advantages of measures" as well as "the principles of precaution and prevention". Thus, the concept of BAT requires a degree of balance between the attainment of environmental benefits and the likely cost implications. In the identification of BAT, regard should be had to a wide range of factors, however, emphasis should be given to "practical suitability" and the need "to reduce an emission and its impact on the environment as a whole". Proposed techniques should also be evaluated in light of their potential effect on occupational health and safety. BS5228 makes a number of recommendations in relation to "use and siting of equipment". These are relevant and hence are reproduced below. These recommendations should be implemented on the site. *"Plant should always be used in accordance with manufacturers' instructions. Care should be taken to site equipment away from noise-sensitive areas. Where possible, loading and unloading should also be carried out away from such areas.* *Circumstances can arise when night-time working is unavoidable. Bearing in mind the special constraints under which such work has to be carried out, steps should be taken to minimise disturbance to occupants of nearby premises.* *Machines such as cranes that may be in intermittent use should be shut down between work periods or should be throttled down to a minimum. Machines should not be left running unnecessarily, as this can be noisy and waste energy.*

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	Plant known to emit noise strongly in one direction should, when possible, be orientated so that the noise is directed away from noise-sensitive areas. Attendant operators of the plant can also benefit from this acoustical phenomenon by sheltering, when possible, in the area with reduced noise levels. *Acoustic covers to engines should be kept closed when the engines are in use and idling. The use of compressors that have effective acoustic enclosures and are designed to operate when their access panels are closed is recommended.* *Materials should be lowered whenever practicable and should not be dropped. The surfaces on to which the materials are being moved could be covered by resilient material."* The following outline guidance in relation to specific plant will also be applied: • For mobile plant items such as cranes, dump trucks, excavators and loaders, the installation of an acoustic exhaust and/or maintaining enclosure panels closed during operation can reduce noise levels by up to 10dB. Mobile plant should be switched off when not in use and not left idling. • For percussive tools such as pneumatic concrete breakers, rock drills and tools a number of noise control measures include fitting muffler or sound reducing equipment to the breaker 'tool' and ensuring any leaks in the air lines are sealed. Erect localised screens around breaker or drill bit when in operation in close proximity to noise sensitive boundaries. • For all materials handling ensure that materials are not dropped from excessive heights and drop chutes/dump trucks are lined with resilient materials. • For compressors, generators and pumps, these can be surrounded by acoustic lagging or enclosed within acoustic enclosures providing air ventilation. • Demountable enclosures can also be used to screen operatives using hand tools and may be moved around site as necessary.

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	• All items of plant should be subject to regular maintenance. Such maintenance can prevent unnecessary increases in plant noise and can serve to prolong the effectiveness of noise control measures. • Where practicable, metal on metal or rock on metal impacts should be avoided during night works. This can be achieved through the use of rubber mallets or impact linings etc. on site. • White noise reverse alarms should be utilised on vehicles where practicable to reduce potential annoyance of tonal noise emissions from site, particularly during the more sensitive evening and night periods. *Screening* The use of screens can be effective in reducing the noise level at a receiver location and should be employed as a complementary measure to all other forms of noise control. The effectiveness of a noise screen will depend on the height and length of the screen and its position relative to both the source and receiver. The height and length of any screen should, where practicable, be such that there is no direct line of sight between the source and the receiver. In particular, screens should be located around the eastern boundaries where night works may occur. BS5228 states that on level sites the screen should be placed as close as possible to either the source or the receiver. The construction of the screen should be such that there are no gaps or openings at joints in the screen material. In most practical situations the effectiveness of the screen is limited by the sound transmission over the barrier rather than the transmission through the barrier itself. Screens constructed of materials with a surface mass greater than 10kg/m typically offer adequate sound insulation performance. Wherever practicable, at static sites, a 2.4m site hoarding may be installed at the perimeter of the site to screen line of sight from receptor to the source of the noise. Where construction works are more fluid and locations are not fixed, an effort should be made where practicable to use demountable screens to surround the site works to provide an element of screening to the surrounding receptors.

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	Annex B of BS5228 (Figures B1, B2 and B3) provides typical details for temporary and mobile acoustic screens, sheds and enclosures that can be constructed on site from standard materials. BS5228 Figure B2 is included here for information purposes. **Construction Vibration Mitigation** On review of the likely vibration levels associated with construction activities and distances to receptors, the construction of the Proposed Scheme is not expected to give rise to vibration that is either significantly intrusive or capable of giving rise to structural or cosmetic damage to buildings or underground services. Vibration from construction activities will be limited to the values set out in **Section 12.3.2.** to avoid any form of potential cosmetic damage to buildings and structures. Monitoring will be undertaken at identified sensitive buildings, where proposed works have the potential to be at or exceed the vibration limit values **Section 12.3.2.** Consequently, the effect can be described as adverse, not significant and temporary. **Operational Stage Mitigation** No mitigation required.
Chapter 13: Material Assets (waste management)	**Construction Phase** The following mitigation measures will be implemented during the construction phase of the proposed development. As previously stated, a project specific RWMP has been prepared in line with the requirements of The EPA, Best Practice Guidelines for the Preparation of Resource and Waste Management Plans for Construction & Demolition Projects' (2021) and is included as **Appendix 13.1**. The mitigation measures outlined in the RWMP will be implemented in full and will form part of a mitigation strategy for the site. The mitigation measures presented in this RWMP will ensure effective waste management and minimisation, reuse, recycling, recovery and disposal of waste material generated during the excavation and construction phases of the proposed development.

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	• Prior to commencement, the appointed Contractor(s) will be required to refine / update the RWMP (**Appendix 13.1**) in agreement with FCC and in compliance with any planning conditions, or submit an addendum to the RWMP to FCC, detailing specific measures to minimise waste generation and resource consumption, and provide details of the proposed waste contractors and destinations of each waste stream. • The Contractor will implement the RWMP throughout the duration of the proposed excavation and construction phases. Significant groundworks are required at the proposed pipelines and storage tanks (CPCF and West Apron). Large scale open excavations will be required along the routes of the proposed pipelines. At the proposed CPCF tank, a large deep excavation will be required. The estimated volume of excavation for this tank will be 220,000m^3. It is envisaged that the majority (c. 75%) of material will be immediately removed from the site for appropriate offsite reuse, recovery, recycling and / or disposal. The West Apron Pollution Tank and the West Apron Attenuation Tank also involve large deep excavations with a combined estimated excavation volume of 116,000m^3. It is envisaged that c. 51,000m^3 will be removed from the site for appropriate offsite reuse, recovery, recycling and / or disposal. It is envisaged that the remainder of the excavated material will be reused onsite for backfilling. Correct classification and segregation of the excavated material being removed off site is required to ensure that any potentially contaminated materials are identified and handled in a way that will not have an adverse effect on workers as well as on water and soil environments, both on and off-site. Options for re-use off site could be explored by the appointed Contractor at the time of the construction works. The remainder of the excavated material required for backfilling, topsoiling and construction of a temporary berm and permanent flood embankment will be stockpiled on site. In addition, the following mitigation measures will be implemented and will be contractual obligations of the construction contractors: • Building materials will be chosen to 'design out waste';

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	• On-site segregation of waste materials will be carried out to increase opportunities for off-site reuse, recycling and recovery. The following waste types, at a minimum, will be segregated: o Concrete rubble (including ceramics, tiles, and bricks); o Metals; o Glass; o Hazardous material; and o Timber. • Left over materials (*e.g.*, timber off-cuts, broken concrete blocks / bricks) and any suitable construction materials shall be re-used on-site, where possible; (alternatively, the waste will be sorted for recycling, recovery or disposal); • All waste materials will be stored in skips or other suitable receptacles in designated areas of the site; • Any hazardous wastes generated (such as chemicals, solvents, glues, fuels, oils) will also be segregated and will be stored in appropriate receptacles (in suitably bunded areas, where required); • A Resource Manager will be appointed by the main Contractor(s) to ensure effective management of waste during the excavation and construction works; • All construction staff will be provided with training regarding the waste management procedures; • All waste leaving site will be reused, recycled or recovered, where possible, to avoid material designated for disposal; • All waste leaving the site will be transported by suitably permitted contractors and taken to suitably registered, permitted or licenced facilities; and • All waste leaving the site will be recorded and copies of relevant documentation maintained.

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	Refer to the Resources and Waste Management Plan (RWMP) for further detail. These mitigation measures will ensure that the waste arising from the construction phase of the proposed development is dealt with in compliance with the provisions of the Waste Management Act 1996, as amended, associated Regulations, the Litter Pollution Act 1997 as amended, the EMR Waste Management Plan 2015 – 2021, and the draft NWMPCE. It will also ensure optimum levels of waste reduction, reuse, recycling and recovery are achieved and will promote more sustainable consumption of resources. **Operational Phase** There will be no mitigation measures required for the operational phase of this development as no operational waste will be generated.
Chapter 14: Material Assets (Traffic & Utilities)	**Construction phase** Ongoing consultation with Uisce Ėireann, Bord Gáis, EirGrid, ESB Networks and other relevant service providers within the locality, and compliance with any requirements or guidelines they may have, will ensure a smooth construction schedule without disruption to the local residential and business community. The works contractor will be obliged to put best practice mitigation measures (including consultation with utility providers; assessment of utilities at detailed design stage to determine risk of damage due to vibrations) in place to ensure there are no interruptions to these utilities, unless this has been agreed in advance. Coordination and consultation will be had between the project team and ESB and Uisce Éireann, and other relevant service providers within the locality, as the design of the proposed development progresses. The CEMP will be implemented and adhered to by the construction contractor and will be overseen and updated as required if site conditions change by the Project Manager, Environmental Manager and Ecological Clerk of Works where relevant. All personnel working on the Site will be trained in the implementation of the procedures. The construction contractor will update the CEMP to include any subsequent planning conditions relevant to the proposed development and set out further detail of the overarching vision of how the construction contractor of the proposed development manage the site in a safe and organised manner. The construction contracter will detail the site-specific surface water protection measures including silt control features and

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	measure for the management of spills. During construction any liquid materials, paints, fuels *etc.* will be stored within temporary bunded areas, doubled skinned tanks or bunded containers. Mitigation measures for surface water protection are outlined within the CEMP, and **Chapter 10 – Hydrology** of this EIAR. The CTMP outlines the proposed construction traffic access measures for the proposed development, and mitigation measures to minimise the impact of construction traffic on the surrounding road network. The relevant mitigation measures set out in the CTMP include the following: • Access to the site will be managed by the deployment of Security Officers at key access points situated around the perimeter of the site with the assistance of an access control system utilising turnstiles and barriers/bollards. The construction site fencing will be kept secure at all times; the perimeter will be secured using fencing circa 2.4m to 3m high for the duration of the construction works. The contractor will be responsible for installing the temporary boundary fencing required. • All construction traffic requiring access to airside work zones will have to be pre-screened prior to accessing site, the pre-screening will take place at each Compound (East and West) prior to continuation onto the site access. The pre-screening will ensure construction traffic does not queue on the public road network adjacent to the site entrances. • All construction traffic requiring access to the landside construction zones will need to be processed through the East compound. The intention will be to consolidate construction materials which will reduce traffic frequency to the construction site and control construction traffic to avoid queuing on the public road network adjacent to site entry gates. • Due to the congested location of the project *i.e.,* the airport, services to the immediate area will need to be prioritised, therefore, the workforce will travel to site by public road network and park adjacent to the site compounds within designated areas near the offices. Transport services will be provided from the car park within the compound to the work zones. • Rules regarding cars parked in the car park will state that all cars are to be positioned by "reverse parking". By requiring reverse parking, the risk of backing out blindly into oncoming traffic is removed.

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	Contractors reserve the right to place a warning sticker on cars not compliant with site parking rules. Re-offending cars will be removed from site and access badge revoked. • Site work vans and mobile workshops vans will have temporary parking facilities on site at the works face. (To limit and police the number of vehicles entering the work zones the Contractor will issue a limited number of permits to the workforce). • Advanced notice for delivery vehicles arriving at the compounds is required to avoid an ad-hoc system of delivery. The preferred system will sequence and schedule delivery and construction vehicle arrivals / departures to avoid traffic congestion and safety risk to the neighbours and local businesses. • Delivery bookings need to be submitted at least 48 hours in advance to allow sufficient time to co-ordinate delivery vehicle movements and the associated use of on-site materials handling equipment. Regular delivery meetings will be held between all parties and the Logistics Manager to make any adjustments and ensure that the delivery schedules are pre-agreed with all. • The existing services and operations will be ongoing at Dublin Airport and are to be uninterrupted by the proposed works. The proposed delivery routes shall be restricted to ensure that strategic roads to Dublin Airport are not compromised by significant increases in construction traffic volumes. • The contractor will be responsible for the provision of Temporary Traffic Management (TTM) by competent and trained personnel. Where works require TTM, the PSCS must ensure that the hazards associated with working on the road are addressed. They must ensure that a TTMP is in place and that it is implemented correctly. Only appropriately trained and competent operatives, supervisors, managers or other competent persons should be engaged in the assessment, design, installation, maintenance and removal of TTM. **Operational phase** It is expected that consultation with the Uisce Éireann, EirGrid, ESB Networks, and other relevant service providers within the locality and compliance with any requirements or guidelines they may have will ensure that there will be no ongoing effects on material assets.

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	Given the enhancement measures and infrastructure proposals, including the upgrade of existing drainage infrastructure and the construction of additional infrastructure to supplement the performance of the existing surface water management system, a bespoke surface water monitoring plan has been developed. A detailed overview of the proposed monitoring plan is presented in the Planning Design Report prepared by Nicholas O'Dwyer and included in the planning documentation. There will be no traffic generated as a result of the operation of the proposed development, therefore no mitigation measures are required in this regard.
Chapter 15: Air Quality & Climate (including GHG Assessment)	**Construction Phase** The objective of dust control at the site is to ensure that no significant nuisance occurs at nearby sensitive receptors. In order to develop a workable and transparent dust control strategy, the following management plan has been formulated by drawing on best practice guidance from Ireland, the UK and the USA based on the following publications: • 'Guidance on the Assessment of Dust from Demolition and Construction' (IAQM, 2014); • 'Planning Advice Note PAN50 Annex B: Controlling The Environmental Effects Of Surface Mineral Workings Annex B: The Control of Dust at Surface Mineral Workings' (The Scottish Office, 1996); • 'Controlling the Environmental Effects of Recycled and Secondary Aggregates Production Good Practice Guidance' (UK Office of Deputy Prime Minister, 2002); • 'Controlling Particles, Vapours & Noise Pollution From Construction Sites' (BRE, 2003); • 'Fugitive Dust Technical Information Document for the Best Available Control Measures' and the USA (USEPA, 1997); and • 'Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition' (periodically updated) (USEPA, 1986).

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	The construction Contractor will provide a further detailed CEMP that will include any subsequent planning conditions relevant to the Proposed Development and set out further detail of the overarching vision of how the construction Contractor of the Proposed Development manage the Site in a safe and organised manner. *Site Management* The aim is to ensure good site management by avoiding dust becoming airborne at source. This will be done through good design and effective control strategies. At the construction planning stage, the siting of activities and storage piles will take note of the location of sensitive receptors and prevailing wind directions in order to minimise the potential for significant dust nuisance (see **Chapter 15 - Figure 15.1** for the wind rose for Dublin Airport). As the prevailing wind is predominantly, westerly to south-westerly, locating construction compounds and storage piles downwind (to the east or northeast) of sensitive receptors will minimise the potential for dust nuisance to occur at sensitive receptors. Good site management will include the ability to respond to adverse weather conditions by either restricting operations on-site or quickly implementing effective control measures before the potential for nuisance occurs. When rainfall is greater than 0.2mm/day, dust generation is generally suppressed (UK Office of Deputy Prime Minister (2002), BRE (2003)). The potential for significant dust generation is also reliant on threshold wind speeds of greater than 10 m/s (19.4 knots) (at 7 m above ground) to release loose material from storage piles and other exposed materials (USEPA, 1986). Particular care should be taken during periods of high winds (gales) as these are periods where the potential for significant dust emissions are highest (IAQM 2014). The prevailing meteorological conditions near the site are favourable in general for the suppression of dust for a significant period of the year. Nevertheless, there will be infrequent periods where care will be needed to ensure that dust nuisance does not occur. The following measures shall be taken to avoid dust nuisance occurring under unfavourable meteorological conditions: • The Principal Contractor or equivalent must monitor the contractors' performance to ensure that the proposed mitigation measures are implemented and that dust effects and nuisance are minimised;

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	• During working hours, dust control methods will be monitored as appropriate, depending on the prevailing meteorological conditions; • The name and contact details of a person to contact regarding air quality and dust issues shall be displayed on the site boundary, this notice board should also include head/regional office contact details; • It is recommended that community engagement be undertaken before works commence on site explaining the nature and duration of the works to local residents and businesses; • A complaints register will be kept on site detailing all telephone calls and letters of complaint received in connection with dust nuisance or air quality concerns, together with details of any remedial actions carried out; • It is the responsibility of the contractor at all times to demonstrate full compliance with the dust control conditions herein; and • At all times, the procedures put in place will be strictly monitored and assessed. The dust minimisation measures shall be reviewed at regular intervals during the works to ensure the effectiveness of the procedures in place and to maintain the goal of minimisation of dust through the use of best practice and procedures. In the event of dust nuisance occurring outside the site boundary, site activities will be reviewed, and satisfactory procedures implemented to rectify the problem. Specific dust control measures to be employed are described below. *Site Roads / Haulage Routes* Movement of construction trucks along site roads (particularly unpaved roads) can be a significant source of fugitive dust if control measures are not in place. The most effective means of suppressing dust emissions from unpaved roads is to apply speed restrictions. Studies show that these measures can have a control efficiency ranging from 25 to 80% (UK Office of Deputy Prime Minister, 2002).

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	• A speed restriction of 20 km/hr will be applied as an effective control measure for dust for on-site vehicles using unpaved site roads; • Access gates to the site will be located at least 10m from sensitive receptors where possible; • Bowsers or suitable watering equipment will be available during periods of dry weather throughout the construction period. Research has found that watering can reduce dust emissions by 50% (USEPA, 1997). Watering will be conducted during sustained dry periods to ensure that unpaved areas are kept moist. The required application frequency will vary according to soil type, weather conditions and vehicular use; • Any hard surface roads will be swept to remove mud and aggregate materials from their surface while any unsurfaced roads shall be restricted to essential site traffic only. *Land Clearing / Earth Moving* Land clearing / earth-moving works during periods of high winds and dry weather conditions can be a significant source of dust. • During dry and windy periods, and when there is a likelihood of dust nuisance, watering will be conducted to ensure moisture content of materials being moved is high enough to increase the stability of the soil and thus suppress dust. • During periods of very high winds (gales), activities likely to generate significant dust emissions will be postponed until the gale has subsided. *Storage Piles* The location and moisture content of storage piles are important factors which determine their potential for dust emissions. • Overburden material will be protected from exposure to wind by storing the material in sheltered regions of the site. Where possible storage piles will be located downwind of sensitive receptors;

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	• Regular watering will take place to ensure the moisture content is high enough to increase the stability of the soil and thus suppress dust. The regular watering of stockpiles has been found to have an 80% control efficiency (UK Office of Deputy Prime Minister, 2002); and • Where feasible, hoarding will be erected around site boundaries to reduce visual effect. This will also have an added benefit of preventing larger particles from affecting nearby sensitive receptors. *Site Traffic on Public Roads* Spillage and blow-off of debris, aggregates and fine material onto public roads will be reduced to a minimum by employing the following measures: • Vehicles delivering or collecting material with potential for dust emissions shall be enclosed or covered with tarpaulin at all times to restrict the escape of dust; • At the main site traffic exits, a wheel wash facility will be installed. All trucks leaving the site must pass through the wheel wash. In addition, public roads outside the site shall be regularly inspected for cleanliness, as a minimum on a daily basis, and cleaned as necessary. *Summary of Dust Mitigation Measures* The pro-active control of fugitive dust will ensure that the prevention of significant emissions, rather than an inefficient attempt to control them once they have been released, will contribute towards the satisfactory performance of the contractor. Notwithstanding the fact that no significant effect is anticipated, these mitigation measures are nonetheless being employed as a matter of good practice The key features with respect to control of dust, alongside those outlined in the Construction Environmental Management Plan, will be: • The specification of a site policy on dust and the identification of the site management responsibilities for dust issues; • The development of a documented system for managing site practices with regard to dust control;

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	• The development of a means by which the performance of the dust minimisation plan can be regularly monitored and assessed; and • The specification of effective measures to deal with any complaints received. **Operational Phase** No mitigation is proposed for the operational phase of the Proposed Development as effects on air quality will be imperceptible. **Climate Construction Phase** Embodied carbon of materials and construction activities will be the primary source of climate impacts during the construction phase. Measures to reduce the embodied carbon of the construction works include: • Creating a construction program which allows for sufficient time to determine reuse and recycling opportunities for demolition wastes; • Appointing a suitably competent contractor who will undertake waste audits detailing resource recovery best practice and identify materials can be reused/recycled; • Materials will be reused on site within the new build areas where possible; • Ensure compliance with local and regional climate actions plans, including CAP23; • Prevention of on-site or delivery vehicles from leaving engines idling, even over short periods; • Ensure all plant and machinery are well maintained and inspected regularly; • Minimising waste of materials due to poor timing or over ordering on site will aid to minimise the embodied carbon footprint of the site; and • Sourcing materials locally where possible to reduce transport related CO_2 emissions.

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	Climate Operational Phase No mitigation is proposed for the operational phase of the Proposed Development as effects for climate during operation are not significant. When maintenance is required during the operational phase, mitigation from the construction phase will be utilised to ensure impacts are minimised.
Chapter 16: Cultural Heritage	**Construction phase** Archaeological monitoring of the proposed works will take place at the Cuckoo Stream in the Eastlands area, to identify whether any archaeological features or deposits are present (as outlined in **Section 16.5.2.3**). Archaeological monitoring will be carried out under licence to the Department of Housing, Local Government and Heritage (DHLGH) and the NMI, and will ensure the full recognition of, and the proper excavation and recording of, all archaeological soils, features, finds and deposits which may be disturbed below the ground surface. All archaeological issues will be resolved to the satisfaction of the DHLGH and the NMI. The archaeologist will have provision to inspect all excavation to the formation level for the proposed works and to temporarily halt the excavation work, if and as necessary. They will be given provision to ensure the temporary protection of any features of archaeological interest identified. The archaeologist will be afforded sufficient time and resources to record and remove any such features identified. Archaeological excavation ensures that the removal of any archaeological soils, features, finds and deposits is systematically and accurately recorded, drawn and photographed, providing a paper and digital archive and adding to the archaeological knowledge of a specified area (*i.e.*, preservation by record). Geophysical survey will be undertaken as a mitigation measure within the Eastlands area, where not already undertaken, well in advance of construction. This will seek to identify any other archaeological sites or features that may be present subsurface. Further archaeological investigation will include archaeological testing of the potential archaeological sites / features already identified in Toberbunny and Pickardstown townlands (as detailed in **Section 16.5.2.2**), and any additional features identified by geophysical survey. Any confirmed archaeological features will be resolved through one or more of the following, in consultation with the National Monuments Service (DHLGH):

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	• Preservation by record (archaeological excavation); • Preservation *in situ*; • Preservation by design; and • Archaeological monitoring. **Operational phase** The operational phase of the development will have no effect on the cultural heritage environment of the area. As such, no mitigation measures are required for the operational phase.
Chapter 17: Landscape & Visual Impact	Mitigation planting will be introduced to areas of the site that have been disturbed during the construction period. This will involve the following: • The replacement of any removed hedgerow field boundaries and trees outwith the pipeline wayleave and the replacement of any hedges and trees that may be damaged during construction. • The introduction of new tree/woodland planting along the southern edge of the planning corridor to restore any vegetation lost during construction and to retain the character of views from the cemetery where practicable. • Planting in the eastern part of the planning corridor to compensate for removal of hedgerow and trees along the side of the Dublin Airport parking access road. • The reseeding of grasses to areas disturbed by construction activity.