EAST ROAD STRATEGIC HOUSING DEVELOPMENT: 1-4 EAST ROAD, DUBLIN 3

Environmental Impact Assessment Report (EIAR) - Volume 2

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Est. 1968
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Environmental Assessment
Built Environment

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GLOSSARY

Term	Definition
AA	Appropriate Assessment
AADT	annual average daily traffic
ACAs	Architectural Conservation Areas
ACM	Asbestos Containing Materials
ADS	Archaeological Development Services Ltd.
ANC	Association of Noise Consultants
AOD	Above Ordnance Datum
APSH	annual probable sunlight hours
AQS	Air Quality Standards
ATC	automatic traffic counter
BMS	Building Management System
BRT	Bus Rapid Transit
BTEX	benzene, toluene, ethylbenzene and xylene) aliphatic and aromatic hydrocarbons,
C&D	Construction and Demolition
C&DMP	Construction and Demolition Management Plan
c.	Circa
CARD	Calendar of Ancient Records of Dublin
CFD	computational fluid dynamics
CFRAM	Catchment Flood Risk Assessment and Management
CIÉ	Córas Iompar Éireann
CIE	Commission Internationale de l'Eclairage (in relation to lighting)
CIEEM	Chartered Institute of Ecology and Environmental Management
CIEH	Chartered Institute of Environmental Health
CIRIA	Construction Industry Research and Information Association
COP24	Conference of the Parties to the Convention
COR	Certificate of Registration
CSO	Central Statistics Office
DCC	Dublin City Council
DCCAE	Department of Communications, Climate Action and Environment
DCHG	Department of Culture, Heritage and the Gaeltacht
DCIHR	Dublin City Industrial Heritage Record
DDDA	Dublin Docklands Development Authority
DEHLG	Department of Environment, Heritage and Local Government
DIAS	Dublin Institute for Advanced Studies
DOC	dissolved organic carbon

Term	Definition
DoS	Degree of Saturation
DTTAS	Department of Transport, Tourism and Sport
EC	European Commission
EcIA	Ecological Impact Assessment
ED	Electoral Districts
EEV	Enhanced Environmentally-friendly Vehicle
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EIS	Environmental Impact Statement
ELC	European Landscape Convention
EMR	Eastern-Midlands Region
EMS	Environmental Management System
EPA	Environmental Protection Agency
ERFB	Eastern Regional Fisheries Board
ESB	Electricity Supply Board
ESBN	ESB Networks
ETS	Emissions Trading System
FFL	finished floor levels
FRA	Flood Risk Assessment
GACs	Generic Assessment Criteria
GDA	Greater Dublin Area
GDSDS	Greater Dublin Strategic Design System
GEM	gust equivalent mean
GHGs	greenhouse gases
GII	Ground Investigation Ireland
GSWR	Great Southern and Western Railway
GWB	Groundwater Body
H&S	Health & Safety
ha	hectares
IGI	Institute of Geologists of Ireland
IHT	Institution of Highways and Transportation
L	Litre
LAP	Local Area Plans
LEA	Local Electoral Area
LI	locally important
LNWR	London and North Western Railway
LQM	Land Quality Management Ltd.

Term	Definition
LV	Low Voltage
m	metre
MASP	Metropolitan Area Strategic Plan
MGWR	Midland Great Western Railway
MMP	Mobility Management
MV	Medium Voltage
NCDWC	National Construction and Demolition Waste Council
NDBC	National Biodiversity Data Centre
NDP	National Development Plan
NECD	National Emissions Ceiling Directive
NH3	Ammonia
NIS	Natura Impact Statement
NLS	National Landscape Strategy
NLS	noise sensitive locations
NMI	National Museum Of Ireland
NOX	Nitrogen Oxides
NPF	National Planning Framework
NPWS	National Parks and Wildlife Service
NRA	National Roads Authority
NTA	National Transport Authority
NTS	Non-Technical Summary
OHSMS	Occupational Health and Safety Management System
OMP	O'Mahony Pike
OS	Ordnance Survey
OWMP	Operational Waste Management Plan
pC&DMP	preliminary Construction and Demolition Management Plan Management Plan
PCB	Polychlorinated Biphenyls
PE	Population Equivalent
pNHA	proposed Natural Heritage Area
PPG	Pollution Prevention Guidelines
PPV	Peak Particle Velocity
ProPG	Professional Guidance on Planning & Noise
RCC	Royal Canal Company
RMP	Record of Monuments and Places
ROI	Republic of Ireland
RPGs	Regional Planning Guidelines
RPS	Record of Protected Structures

Term	Definition
RSA	Road Safety Authority
RSES	Regional Spatial & Economic Strategy
S.I.	Statutory Instrument
SAC	Special Area of Conservation
SAP	Small Area Population
SCI	Special Conservation Interest
SDRA	Strategic Development and Regeneration Area
SDZ	Strategic Development Zone
SEA	Strategic Environmental Assessment
SFRA	Strategic Flood Risk Assessment
SHD	Strategic Housing Development
SMR	Sites and Monuments Record
SO2	Sulphur Dioxide
SPA	Special Protection Areas
SSFRA	Site Specific Flood Risk Assessment
SuDS	Sustainable Drainage Systems
TDS	total dissolved solids
TII	Transport Infrastructure Ireland
TMP	Traffic Management Plan
TOC	Total Organic Carbon
TRL	Transport Research Laboratory
UNFCCC	United Nations Framework Convention on Climate Change
VOCs	Volatile Organic Compounds
VSC	Vertical Sky Component
WAC	Waste Acceptance Criteria
WEEE	waste electrical and electronic equipment
WHO	World Health Organisation
WSA	waste storage area
WSC	Wide Streets Commissioners
WwTP	Wastewater Treatment Plant
ZAP	Zone of Archaeological Potential

1 Introduction

1.1 Background

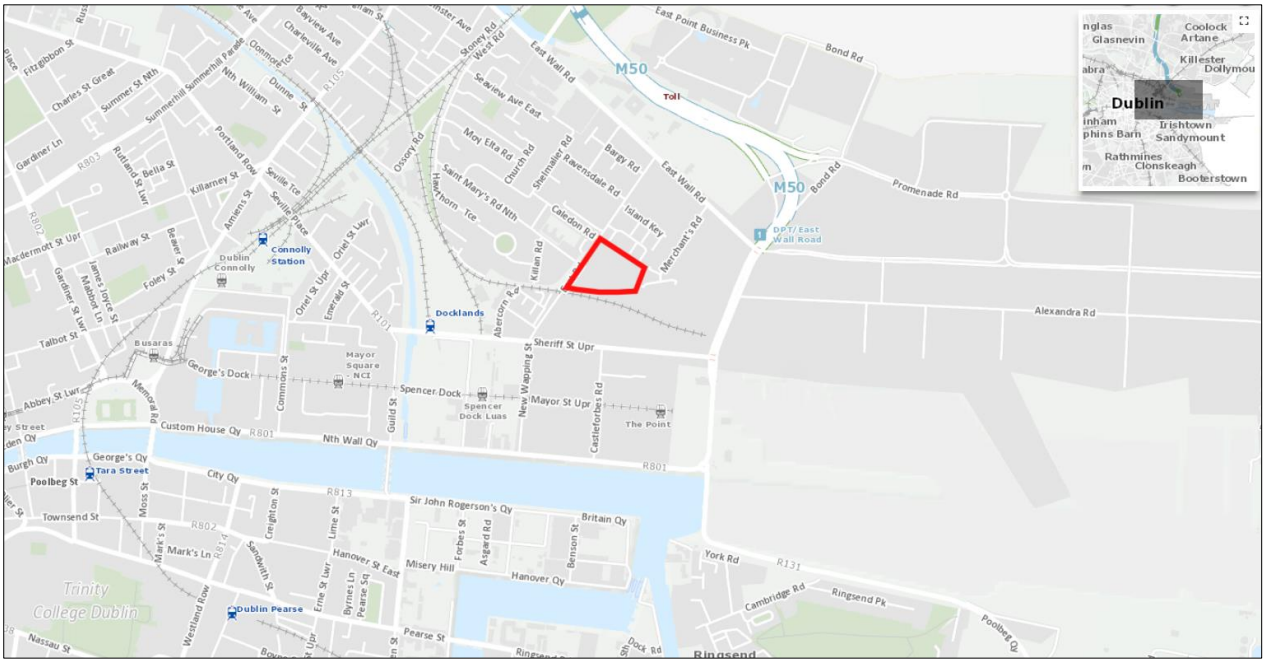
This Environmental Impact Assessment Report (EIAR) presents the assessment of environmental impacts and applicable mitigation measures associated with the proposed Strategic Housing Development (SHD) at 1-4 East Road, East Wall, Dublin 3 (hereafter referred to as "the proposed Project"). This EIAR has been prepared in accordance with the requirements of the Planning and Development Act 2000 (as amended) the Planning and Development Regulations 2001 (as amended), and relevant guidance documents, and it conforms to the requirements as specified therein.

1.2 The Proposed Project

1-3 East Road, Dublin 3 is currently in use as a warehousing / logistics / light industrial space and has a number of existing industrial sheds. No.4 East Road is an existing redbrick building, which is currently occupied by the East Wall Men's shed. The proposed Project incorporates all of the landholdings at 1-4 East Road (hereafter referred to as "the Site").

The Site has an area of c.2.11 hectares (ha) and is bound by East Road to the west, railway sidings to the south, Merchant's Square to the east and Island Key Apartments to the north, see Figure 1.1 below.

Figure 1.1: Location of the Site for the Proposed Project[1] (Site location in red)



The Site is located north of the Docklands Strategic Development Zone (SDZ) area, and is located within the administrative area of Dublin City Council (DCC). Within the area there are numerous developments either completed, permitted or in construction nearby. More details on the background and site history can be found in Chapter 4 (Description of the Proposed Project).

The proposed Project will provide a mixed-use development set out in 9 No. blocks, ranging in height from 3 to 15 storeys to accommodate 554 No. apartments, an enterprise space, retail units, foodhub / café / exhibition space, residential amenity, crèche and a Men's shed. The proposed Project will also include car parking spaces, bicycle parking, storage, services and plant areas. More details on the proposed Project are set out in Chapter 4 (Description of the Proposed Project).

[1] Department of Housing, Planning and Local Government (My Plan): http://www.myplan.ie/webapp/

1.3 Client

The Client for this proposed Project is Glenveagh Living Ltd., owners of the lands at 1-4 East Road, East Wall, Dublin 3.

1.4 Environmental Impact Assessment (EIA)

Environmental Impact Assessment (EIA) is the process by which the anticipated effects on the environment of a proposed development or project are measured.

The environmental assessment has evaluated the Construction Phase (including demolition works and Site clearance works) and Operational Phase (the day-to-day functioning of the Site) of the proposed Project. If the anticipated effects are unacceptable, design measures or other relevant mitigation measures have been identified to reduce or avoid those effects.

This EIAR focuses on describing the existing environment (baseline), identifying the potential impacts and describing any mitigation measures required to reduce or eliminate potential impacts. The EIAR is the document produced as a result of this process and to record this assessment.

Table 1.1 below provides a high level overview of the EIA process and the steps involved. Further information on the approach to EIA can be found in Chapter 2 (The EIA Process).

Table 1.1: Overview of the EIA Process

Stage	Description	Status
1. Screening	Is an EIA required?	Completed
2. Scoping	The outline of the likely significant effects of the proposed Project and the aspects to be considered in the impact assessment.	Completed
3. Environmental Impact Assessment	This stage includes: ▪ Collection of the baseline information. ▪ The Impact Assessment. ▪ Mitigation & Monitoring.	**Current Stage**
4. Review & Decision	The EIAR and Appropriate Assessment (AA) Screening Statement will be submitted as part of the Planning Application to An Bord Pleanála.	
5. Monitoring	Implementation and monitoring of the proposed Mitigation Measures.	Future

1.5 Format & Structure of the EIAR

Table 1.2 below sets out the format and structure of this EIAR along with a brief summary of what is included in each Chapter.

Table 1.2: Structure of the EIAR

Chapter No.	Description
Volume 1: NTS	
NTS	Summary of the EIAR in non-technical language
Volume 2: Main Report	
Chapter 1 - 4	Provide a background to the project and information on the proposed Project assessed in the EIA. This includes including the need for the proposed Project
Chapter 5	Presents the alternatives considered for the Site
Chapter 6	Consultation
Chapter 7	Population & Human Health
Chapter 8	Cultural Heritage
Chapter 9	Biodiversity (Flora & Fauna)
Chapter 10	Landscape (Townscape) & Visual
Chapter 11	Traffic & Transport
Chapter 12	Land, Soils, Geology & Hydrogeology
Chapter 13	Surface Water (Hydrology)
Chapter 14	Air Quality & Climate
Chapter 15	Noise & Vibration
Chapter 16	Microclimate (Daylight / Sunlight)
Chapter 17	Microclimate (Wind)
Chapter 18	Material Assets - Services
Chapter 19	Material Assets - Waste
Chapter 20	Presents an overview of all the major interactions between the different environmental aspects as outlined above and the interactions between the various attributes.
Chapter 21	Presents the cumulative impacts of this EIAR with committed development
Chapter 22	Presents the schedule of environmental commitments / mitigation measures included in the EIAR Document for ease of reference.
Volume 3: Appendices	
A81 - A16.1	Technical reference information supporting the EIAR Chapters.

1.6 Objectives of the Proposed Project

The objective of the proposed Project is to transform an underutilised (brownfield) site which will provide the local community in East Road and environs with a sustainable long-term mix-use development. The proposed Project will combine employment, living and public realm to provide a diversified form of housing supply, new adaptable employment and community use opportunities.

The key objectives of the proposed Project are:

- to be both a working and living community with a long-term mix of uses, providing a catalyst for future social and economic growth and redevelopment in the area;
- to create a series of buildings drawing on the wider character of East Wall with variation in scale responding to the Site context;

- to draw inspiration from the industrial / warehouse buildings architecture; and
- to provide a new gateway building and public space defining the Site as a destination within the Docklands.

1.6.1 EIAR Project Team & Contributors

The table below outlines the EIAR project team and environmental specialists that contributed to this EIAR.

Table 1.3: EIAR Project Team and Environmental Specialist

Name	Role	Company	Qualification / Experience
Thomas Burns	EIAR Co-ordinator	Brady Shipman Martin	**B.Agr.Sc. (Land.) Dip. EIA Mgmt., Adv. Dip. Plan. & Env. Law** ▪ Environmental Planner and Landscape Architect ▪ Member of Irish Landscape Institute & Irish Environmental Law Association ▪ Over 25 years' experience in EIA
Sorcha Turnbull	EIAR / Planner Co-ordinator	Brady Shipman Martin	**BSc (Spatial Planning), Dip. EIA Mgmt** ▪ Senior Planner ▪ Corporate Member of the Irish Planning Institute (IPI) & Associate Member of the Royal Town Planning Institute (RTPI) ▪ Over 10 years' experience in Planning and EIA
Rebecca Dunlea	EIA Report Population & Human Health Assessment Material Assets – Services Assessment	Brady Shipman Martin	**BA MA MSc** ▪ Member of the Chartered Institute of Water and Environmental Management - MCIWEM ▪ Over 5 years' experience
Matt Hague	Senior Ecologist	Brady Shipman Martin	**BSc MSc Adv. Dip. Plan. & Env. Law** ▪ Chartered Environmentalist - CEnv ▪ Full member of the Chartered Institute of Ecology and Environmental Management - MCIEEM ▪ Over 17 years' experience
John Kelly	Landscape & Visual Assessment	Brady Shipman Martin	**BArch (Hons)** ▪ Member of the Royal Institute of the Architects Ireland - MRIAI ▪ Over 25 years' experience
Dr. Clare Crowley	Cultural Heritage Assessment	Courtney Deery	**BA (Hons) in Archaeology & Geography & PhD Archaeology** ▪ Over 20 years' experience
Mark McKenna	Traffic & Transport Assessment	DBFL Consulting Engineers	**BEng (Hons) MSc** ▪ MIEI ▪ Over 7 years' experience
Paul Conaghan	Soil / Lands & Water Assessment	AWN Consulting	**BSc MSc** ▪ Member of the International Association of Hydrogeologists ▪ Over 8 years' experience
Dr. Avril Challoner	Air Quality & Climate Assessment	AWN Consulting	**BSc MSc** ▪ Chartered AMIEnvSc ▪ Member of the Institute of Air Quality Management - IAQM ▪ Over 9 years' experience

Name	Role	Company	Qualification / Experience
Leo Williams	Noise & Vibration Assessment	AWN Consulting	BAI MAI PgDip ▪ Member of Institute of Acoustics ▪ Over 3 years' experience
Amy Hastings	Microclimate - Daylight & Sunlight Assessment	ARC Architectural Consultants Ltd.	MSc Spatial Planning, Barrister-at-Law ▪ Director of ARC Architectural Consultants Ltd. ▪ Corporate Member of the Irish Planning Institute (IPI) ▪ Over 16 years' experience
Réamonn Mac Réamoinn	Microclimate - Wind Assessment	ARUP	BA BAI & MSE (Civil) ▪ Chartered Engineer - CEng ▪ Member of Engineers Ireland - MIEI ▪ Over 13 years' experience
Chonaill Bradley	Material Assets - Waste Assessment	▪ AWN Consulting	BSc (Environmental Science) ▪ Graduate Member of the Institute of Waste Management (GradCIWM) ▪ Over 4 years' experience

2 The Environmental Impact Assessment (EIA) Process

2.1 EIA Legislation

The initial EIA Directive has been in place since 1985 (85/337/EEC) and this Directive along with three amendments was codified in Directive 2011/92/EU in December 2011. Proposed changes to the EIA Directive were adopted by the Council of the European Union and amending Directive 2014/52/EU came into force in May 2014. EU Member States had three years to transpose this Directive. The European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018) transpose the requirements of the 2014 Directive into existing planning consent procedures.

The EIA Directive aims to provide a high level of protection to the environment and ensures environmental considerations are taken into account in the preparation of a proposed Project, with the view to reducing environmental impacts. EIA also public participation in decision-making and thereby strengthens the quality of decisions.

The 2014 Directive requires that certain developments be assessed for the *likely environmental effects* before planning approval can be granted. When submitting a planning application for such a development, the applicant must submit an EIAR.

The 2014 Directive uses the term Environmental Impact Assessment Report rather than the previous Environmental Impact Statement (EIS).

2.2 EIA Process

EIA is the process for anticipating the effects on the environment caused by a proposed development or project. Where effects are unacceptable, design or other measures can be taken to avoid or reduce these effects to acceptable levels.

The EIAR is the document produced as a result of the Environmental Impact Assessment (EIA) process, that:

- provides a description of the baseline environment;
- identifies the potential effects as a result of the proposed development or project; and
- provides a description of any mitigation measures required to reduce or eliminate such potential effects.

The EIA process is summarised as follows:

- screening - is EIA required?;
- scoping - what issues should be considered within the EIAR?;
- baseline Data Collection - establishing a robust baseline of the existing environment on / around the proposed site. This includes a review of existing available information and undertaking any surveys identified during Scoping;
- impact Assessment - assessment of the environmental impacts and establishing their significance;
- mitigation - a description of the mitigation measures and / or factors that reduce or eliminate any significant environmental impacts identified, which cannot be avoided practically through design;
- consultation - with Statutory Stakeholders, the public and other bodies;
- decision - the competent authority, in this case An Bord Pleanála, decides, taking into consideration the results of consultations, if the proposed Project can be authorised; and
- monitoring - implementation and monitoring of mitigation measures.

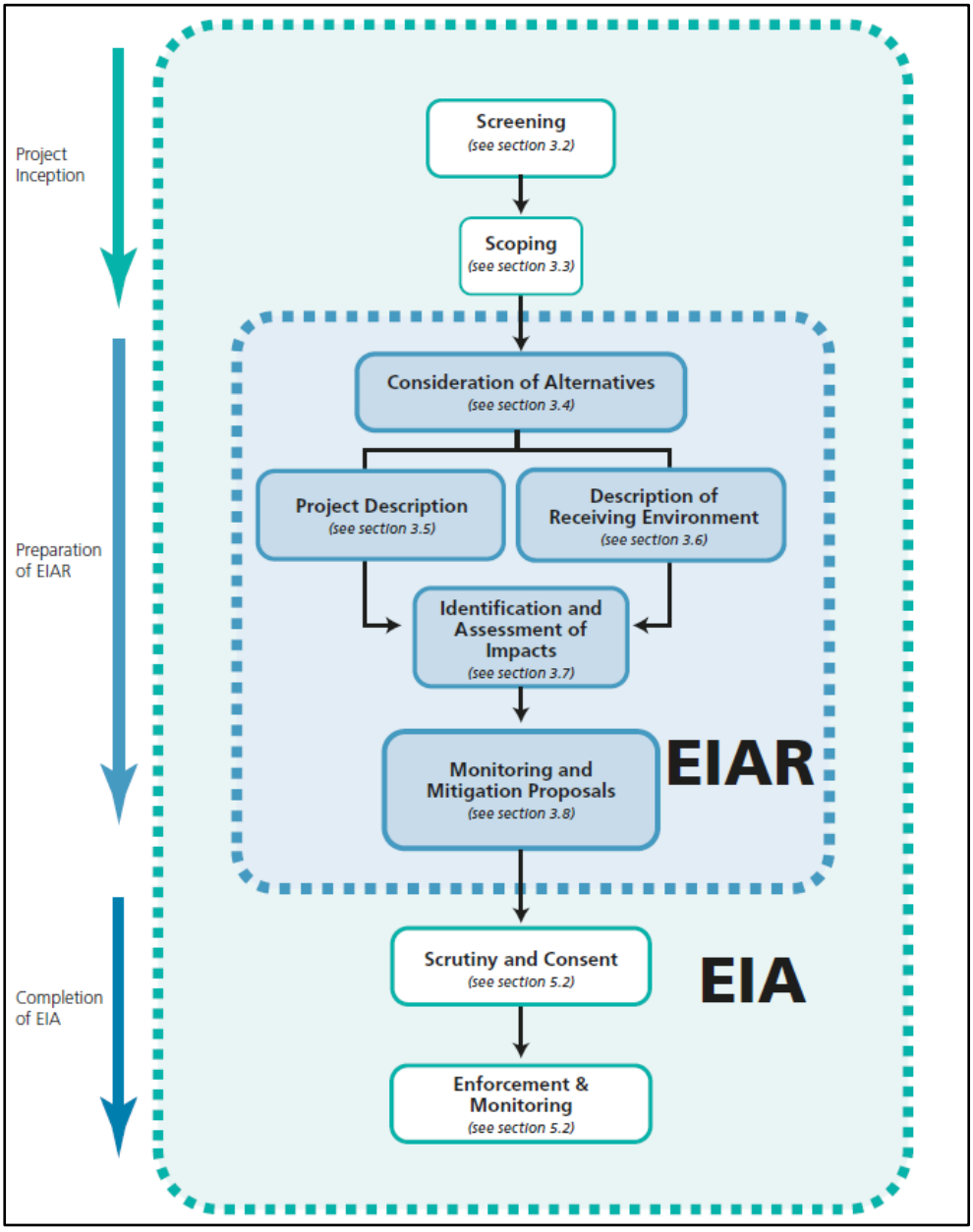
In accordance with the draft EPA EIAR guidance documents the following attributes of the receiving environment and their interactions are described within the EIAR:

- Population & Human Health;
- Biodiversity (Flora & Fauna);

- Land & Soils;
- Water;
- Air;
- Climate;
- Material Assets;
- Cultural Heritage
- Landscape; and
- Interactions of the foregoing.

The EIA process is summarised in Figure 2.1 below.

Figure 2.1: The Position of an EIAR within the EIA Process[2] (EPA 2017)



[2]Draft Guidelines on the Information to be Contained in EIARs: http://www.epa.ie/pubs/advice/ea/EPA%20EIAR%20Guidelines.pdf

2.3 EIA Methodology

2.3.1 EIA Guidance

This assessment of environmental impacts has been completed in accordance with, but not limited to, the following legislation and current guidance:

- Directive 2014/52/EC amending Directive 2011/92/EU on the *Assessment of the Effects of Certain Public and Private Projects on the Environmen*t;
- *Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions* (European Commission (EC) 1999);
- Guidance on Scoping (EC 2017);
- Guidance on the EIA Report (EC 2017);
- *Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment* (EC 2013);
- Planning and Development Act 2000, as amended;
- Planning and Development Regulations 2001, as amended ;
- Circular letter PL 1/2017 - Advice on Administrative Provisions in Advance of Transposition (2017);
- *EPA Guidelines on the Information to be Contained in Environmental Impact* Statements (EPA, 2002) (and revised and draft guidelines 2015/2017);
- EPA *Advice Notes on Current Practice (in Preparation of Environmental Impact Statements)* (EPA, 2003) (and revised advice notes 2015); and
- *Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports* (EPA 2017).

In addition to these guidance document, all EU Directives and national legislation relating to the specialist areas (e.g. Biodiversity) have been considered as part of the process for each environmental aspect. Specific guidance are addressed in the relevant assessment Chapters 7-19 of this Report.

2.3.2 EIA Screening

Screening is Stage 1 in the process, whereby a decision is made on whether or not an EIA is required. In order to determine whether an EIA is required for the proposed Project, it is necessary to determine whether it is a project listed in one of the Annexes to the Directive 2011/92/EU (as amended by Directive 2014/52/EU).

The 2014 Directive specifies the classes of project for which an EIA is required and the information which must be contained within the EIAR. In accordance with *Article 4(1)* of the 2014 Directive, all projects listed in Annex I are considered as having significant effects on the environment and shall be subject to EIA. For projects listed in Annex II of the Directive, the national authorities may determine whether an EIA is needed, either on the basis of thresholds / criteria or on a case by case examination.

These Annexes have been transposed into Irish law by the provisions of the Planning and Development Act 2000, as amended, and the Planning and Development Regulations 2001-2018.

Projects requiring EIA are listed in Parts 1 and 2 of Schedule 5 of the Planning and Development Regulations 2001 (as amended).

Schedule 5 (Part 1) of the Planning & Development Regulations 2001 (as amended) lists major project classes for the purposes of mandatory EIA, which typically include industrial, chemical, energy, waste, infrastructure and intensive agricultural developments. The proposed Project does not correspond to a development set out under Part 1 of Schedule 5 and therefore, EIA is not a requirement under this provision.

Schedule 5 (Part 2) of the Planning & Development Regulations 2001 (as amended) set mandatory thresholds for each project class above which EIA is required. Sub-sections 10(b)(i) and 10(b)(iv) addresses '*infrastructure projects*'

referring to housing and urban developments, and require that the following classes of project, relevant to this project, be subject to EIA:

> "*Class 10(b) (i).* ***Construction of more than 500 dwelling units****."*
> *"Class 10(b) (iv). Urban development which would involve an* ***area greater than 2ha*** *in the case of a* ***business district****, 10ha in the case of other parts of a built-up area and 20ha elsewhere."*

Therefore, EIA is required and an EIAR (this report) has been prepared and will be submitted to An Bord Pleanála with the SHD Planning Application.

2.3.2.1 Appropriate Assessment (AA)

The Birds Directive (79/409/EEC) and the Habitats Directive (92/43/EEC) set out the procedures in relation to nature conservation management, and in particular the conservation of European sites. The term "*European site*" replaced "*Natura 2000 site*" under the EU EIA and Habitats Regulations 2011 (S.I. No. 473 of 2011).

European sites comprise Special Area of Conservation (SAC) and Special Protection Areas (SPAs). It is a requirement to consider the possible nature conservation implications of any plan or project on European sites. Appropriate Assessment (AA) is the process which considers the possible effects of a plan or project on European sites.

In accordance with these requirements the proposed Project has been assessed to consider whether there are *any likely significant effects* from the proposed Project on European sites.

2.3.3 EIA Scoping

Scoping is Stage 2 in the process of determining the content and extent of what should be covered in the environmental information. Scoping requires the consideration of the nature and likely scale of the potential environmental impacts likely to arise from a proposed development or project. This was carried out on an informal basis through the pre-planning process with both Dublin City Council and An Bord Pleanala where key issues to be considered were identified and discussed.

The Scoping process is an iterative process and is an ongoing phase throughout the development of the EIAR.

2.3.4 Consultation

The EIAR document enables the competent / consent authorities to reach a decision on the acceptability of the proposed Project in the full knowledge of the project's *likely significant impacts* on the environment, if any.

Decisions are taken by the competent / consent authorities through the statutory planning process which allows for public participation and consultation while receiving advice from other key stakeholders and statutory authorities with specific environmental responsibilities. Public participation and consultation is an integral part of the SHD process as outlined in the Planning & Development (Strategic Housing Development) Regulations 2017 An Bord Pleanála SHD Pre-Consultation[3]. Further information on the Consultation Process can be found in Chapter 6 (Consultation).

[3] An Bord Pleanála: http://www.pleanala.ie/shd/general/SHD%20PreApp%20Guidance%20for%20Applicants.pdf

3 Planning & Development Context

3.1 Introduction

This Chapter sets out the strategic and statutory context governing the planning and development of the proposed Project. This includes a review of the planning policy context at a national, regional and local level and other relevant statutory and non-statutory planning documents.

National and regional plans and policies inform the policies and objectives of local authority Development Plans, as also of Local Area Plans (LAP) and SDZ planning schemes, which set the local statutory planning context.

The proposed Project falls under the definition of SHD as set out under Section 3 of the Planning and Development (Housing) and Residential Tenancies Act 2016 as it is a development '*of 100 or more houses on land zoned for residential use or for a mixture of residential and other uses*'.

3.2 National Planning Context

3.2.1 The National Development Plan 2018-2027

This National Development Plan (NDP) 2018-2027 sets out the significant level of investment, which underpins the National Planning Framework (NPF) and drive its implementation over the next ten years.

Under the National Strategic Outcome 1 states:

> *'the aim is to secure the sustainable growth of more compact urban and rural settlements supported by jobs, houses, services and amenities, rather than continued sprawl and unplanned, uneconomic growth.'*

3.2.2 The National Planning Framework - Project Ireland 2040

The National Planning Framework (NPF) - Project Ireland 2040 requires delivery of a baseline of 25,000 homes annually to 2020, followed by a likely level of 30-35,000 annually up to 2027. As a result 112,000 households are expected to have their housing needs met in a social housing home over the next decade. To achieve the objective of compact growth, 40% of future housing delivery is to be delivered within and close to the existing footprint of built-up areas.

The NPF - Project Ireland 2040 identifies the urgent requirement for a major uplift of the delivery of housing within the existing built-up areas of cities and other urban areas. The NPF has a particular focus on brownfield development, targeting derelict and vacant sites that may have been developed before but have fallen into disuse.

With regards to Dublin the NPF identifies that the city needs to '*accommodate a greater proportion of the growth it generates within its metropolitan boundaries and to offer improved housing choice.'*

National Policy Objective 4 in this regards states:

> *'Ensure the creation of attractive, liveable, well designed, high quality urban places that are home to diverse and integrated communities that enjoy a high quality of life and well-being.'*

National Policy Objective 11 in this regards states:

> *'In meeting urban development requirements, there will be a presumption in favour of development that can encourage more people and generate more jobs and activity within existing cities, towns and villages, subject to development meeting appropriate planning standards and achieving targeted growth.'*

National Policy Objective 13 in this regards states:

> *'In urban areas, planning and related standards, including in particular building height and car parking will be based on performance criteria that seek to achieve well-designed high quality outcomes in order to achieve targeted growth. These standards will be subject to a range of tolerance that enables*

alternative solutions to be proposed to achieve stated outcomes, provided public safety is not compromised and the environment is suitably protected.'

3.3 Regional Planning Guidelines

3.3.1 Eastern and Midland Regional Assembly - Draft Regional Spatial & Economic Strategy (RSES)

The Draft Regional Spatial and Economic Strategy is a strategic plan and investment framework to shape the future development of the Eastern & Midland Region to 2031 and beyond. The region is the smallest in terms of land area but the largest in population size and is identified as the primary economic engine of the state.

The Draft Strategy identifies that the region '*is home to over 800,000 households, with 4 out of 5 living in conventional housing while apartments account for around 18% or our housing stock. One of the challenges facing the region is the continued growth rates of household formation coupled with a severe slowdown in the development of new housing stock during the economic recession, resulting in housing supply and affordability pressures in both sale and rental markets, particularly in Dublin and urban areas but affecting all of the region'*.

The Draft Strategy is underpinned by key principles that reflect the three pillars of sustainability; Social, Environmental and Economic, and expressed in a manner which best reflects the challenges and opportunities of the Region. The plan identifies that the central need is for the RSES to be people focussed, as '*quality of life*' encapsulates strong economic output and stability, good environmental performance and a good standard of living for all.

The Site is located with the Dublin Metropolitan Area, as designated by the Draft Strategy. The Metropolitan Area Strategic Plan (MASP) which is part of the draft RSES seeks to focus on a number of large scale strategic sites, based on key corridors that will deliver significant development in an integrated and sustainable fashion.

The Strategy identifies that Docklands Strategy will build out of North Lotts and Grand Canal Docks SDZ with further physical and social regeneration of Poolbeg and northeast inner-city lands, this would include the Site for the proposed Project.

Policy Objective relating to Housing Delivery include:

RPO 5.4: *Future development of strategic residential development areas within the Dublin Metropolitan area shall provide for higher densities and qualitative standards as set out in the 'Sustainable Residential Development in Urban Areas', 'Sustainable Urban Housing; Design Standards for New Apartments' Guidelines, and Draft 'Urban Development and Building Heights Guidelines for Planning Authorities'.*

While the Site is predominantly considered as a residential scheme, in line with the zoning objectives for the site, a significant quantum of employment floorspace is provided for, which is also in line with the objectives of the draft RSES.

In regards to the Docklands the employment potential is identified as '*High tech, financial services and people intensive employment and regeneration of underutilised lands*'. The proposed Project can complement the permitted and existing adjoining larger commercial floorplates in the North Lotts and allow a range of start-up and workspace types for new and emerging business to grow and develop.

3.3.2 The Regional Planning Guidelines for the Greater Dublin Area 2010-2022 (RPGs)

The Regional Planning Guidelines (RPGs) for the Greater Dublin Area[4] (GDA) 2010-2022 '*is a policy document which aims to direct the future growth of the GDA over the medium to long-term.'* The RPGs seek to and seeks to implement the strategic planning framework set out in the National Spatial Strategy[5].

Furthermore the RPGs for the GDA '*supports the delivery of the hierarchy, focusing new housing within the existing footprint of the metropolitan areas and planning expansion of the footprint in conjunction with new high quality public transport investment; designation of multi-modal transport corridors providing enhanced public transport linkages serving key towns and linked investment in developing these designated towns in the hinterland area'*.

Core principles from this strategic vision for these RPGs:

- '….
- *Development within the existing urban footprint of the Metropolitan Area will be consolidated to achieve a more compact urban form, allowing for the accommodation of a greater population than at present, with much-enhanced public transport system, with the expansion of the built up areas providing for well-designed urban environments linked to high quality public transport networks, enhancing the quality of life for residents and workers alike.*
- *….'*

The Settlement Strategy key principles are:

- Achieving the potential of the GDA as an international Gateway.
- Consolidated and sustainable cities and towns.
- Supporting high quality public transport, and increase opportunities for walking and cycling.

The Settlement Strategy will be:

> *'Focusing on new housing within the existing built up footprint of Dublin City and suburbs within the metropolitan area of Dublin; and that large scale expansion of this footprint only occurring as part of an integrated plan where there are strong linkages between the lands in question and existing or planned high quality public transport creating opportunity and suitability to expand the built up area.'*

With regard to the Settlement Strategy, strategic policy SP1 states:

> *'The delivery of new housing in the GDA shall support the NSS, Smarter Travel and the DEHLG[6] Guidelines on Sustainable Residential Development. The RPG Settlement Strategy encourages the focusing of new housing development on (i) consolidation within existing built footprint with particular focus on the metropolitan area; (ii) supporting the achievement of sustainable towns; (iii) supporting national investment in public transport services by focusing new development areas to key locations to achieve the integration of land use and high quality public transport provision, and (iv) build up economics of scale for services in identified growth towns.'*

Furthermore, in regard to Social Infrastructure, strategic policy SIP1 states:

> *'That Local Authorities work with the relevant state agencies in ensuring that an integrated approach is taken to both planning for the communities who live within the GDA either in planning for growth, for change or regeneration in communities…'*

[4] The GDA includes the geographical area of Dublin City, Dun Laoghaire- Rathdown, Fingal, South Dublin, Kildare, Meath, and Wicklow and incorporates the regions of both the Dublin Regional Authority and the Mid-East Regional Authority.
[5] RPG for the GDA: https://emra.ie/dubh/wp-content/uploads/2015/02/Greater-Dublin-Area-Regional-Planning-Guidelines-2010-2022-Volume-I.pdf
[6] Department of Environment, Heritage and Local Government now the Department of Communications, Climate Action and Environment (DCCAE)

3.4 Dublin City Development Plan 2016-2022 - Local Level

The Site is located within the administrative area of DCC. The Dublin City Development Plan 2016-2022 sets the statutory planning policy for development within the City Boundary, having regard to national and regional plans and policies.

The Development Plan sets out a new approach to meet the needs and aspirations of citizens of Dublin and the country, not only for the 6-year life of the plan, but for the long term. This approach is based on the principles of sustainability and resilience on the social, economic and environmental fronts.

The Development Plan has been informed by the RPGs and the environmental sensitivities of the county. The Site is located within the Docklands Area.

3.4.1 Core Strategy

The Core Strategy of the Development Plan promotes the intensification and consolidation of Dublin City, and the Docklands is identified as one of the Strategic Development Regeneration Area (SDRA) capable of realising this objective.

The Plan notes that these SDRA areas:

> '*represent significant areas of the inner and outer city with substantial development capacity and the potential to deliver the residential, employment and recreational needs of the city*.'

The majority of SDRAs relate to a zoning objective which seeks the social, economic, physical development or rejuvenation of an area with residential, employment and mixed-uses (Z14). The Development Plan notes that '*these SDRAs have substantial development capacity, not only for residential uses*….'

The Docklands is identified as SDRA 6. In respect of SDRA 6, the City Development Plan identifies that:

> *'the designation of the Docklands, including the Docklands SDZ, as a strategic development and regeneration area (SDRA) provides for the continued physical and social regeneration of this part of the city, consolidating the area as a vibrant economic, cultural and amenity quarter of the city, whilst also nurturing sustainable neighbourhoods and communities.'*

The zoning and standard provisions in the Development Plan have been devised to support the delivery of the core strategy. In particular, the Plan notes that:

> '*the zoning provisions ensure adequate land to meet the population targets and economic role of the city as the national gateway; intensification along public transport corridors and a mixed-use approach to zonings (Z4, Z5, Z6, Z10,* ***Z14****) to underpin a compact and sustainable city.'*

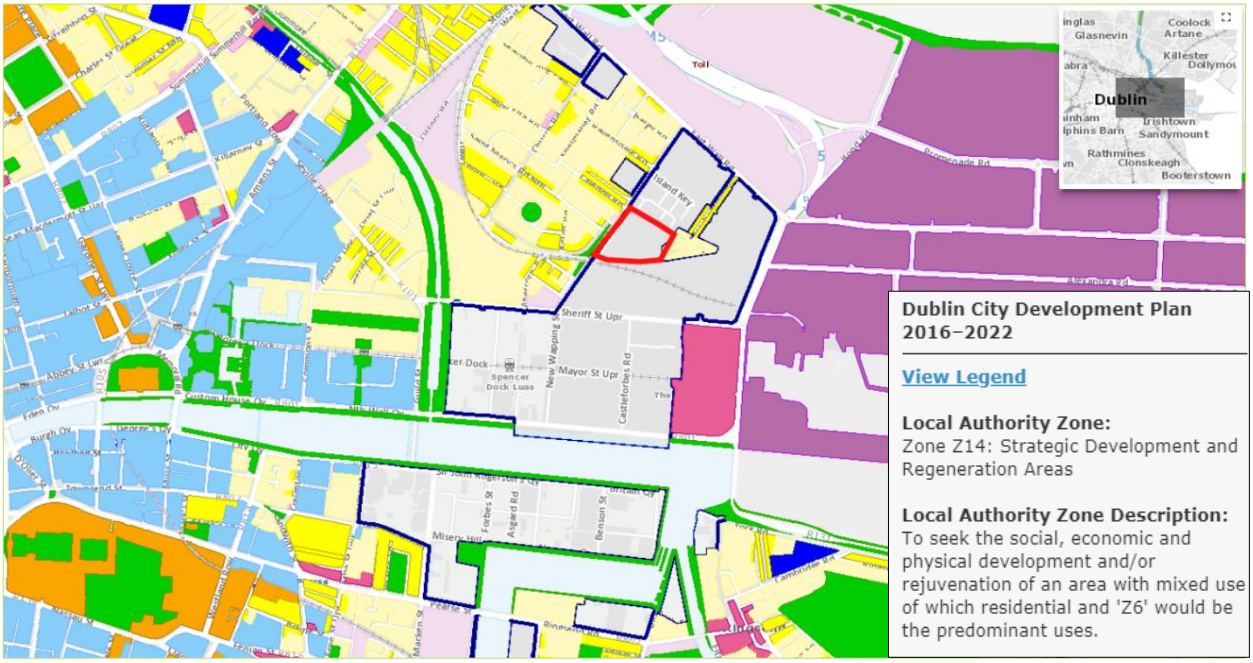
3.4.2 Zoning Objective

The Site is zoned Z14 within the Development Plan, see Figure 3.1 below. The stated objective of this zoning is to:

> *'to seek the social, economic and physical development and / or rejuvenation of an area with mixed use, of which residential and 'Z6' would be the predominant uses.'*

The Z6 zoning aims to provide for enterprise and facilitate opportunities for employment creation. As such, both employment and residential uses are considered permissible with Z14 zoning making the principle of the proposed Project acceptable.

Figure 3.1: Land Use Zoning under the Current Dublin City Development Plan 2016-2022[7] (Site location in red)



3.4.3 Residential Development

The Development Plan identifies that the provision of quality homes which provide for the needs of the city's population and which contribute to the making of good, connected neighbourhoods is a key priority.

In this regard it is the policy of DCC:

QH7: *To promote residential development at sustainable urban densities throughout the city in accordance with the core strategy, having regard to the need for high standards of urban design and architecture and to successfully integrate with the character of the surrounding area.*

QH8: *To promote the sustainable development of vacant or under-utilised infill sites and to favourably consider higher density proposals which respect the design of the surrounding development and the character of the area.*

The Plan further notes that, in Dublin City, it is envisaged that the majority of new housing in the City area will be apartments or another typology that facilitates living at sustainable urban densities.

With regards apartments, the DCC policies are as follows:

QH18: *To promote the provision of high quality apartments within sustainable neighbourhoods by achieving suitable levels of amenity within individual apartments, and within each apartment development, and ensuring that suitable social infrastructure and other support facilities are available in the neighbourhood, in accordance with the standards for residential accommodation.*

QH19: *To promote the optimum quality and supply of apartments for a range of needs and aspirations, including households with children, in attractive, sustainable, mixed-income, mixed-use neighbourhoods supported by appropriate social and other infrastructure.*

QH20: *To ensure apartment developments on City Council sites are models of international best practice and deliver the highest quality energy efficient apartments with all the necessary infrastructure where a need is identified, to include community hubs, sports and recreational green open spaces and public parks and suitable shops contributing to the creation of attractive, sustainable, mixed-use and mixed-income neighbourhoods.*

[7] Department of Housing, Planning and Local Government (My Plan): http://www.myplan.ie/webapp/

3.5 Planning History of the Site

The Site has been subject to a number of planning applications in recent years as set in Table 3.1 below:

Table 3.1: Previous Planning Applications for the Site

Plan Reg. Reference	Description of Application	Determination
2690/01 and PL29N.128741	Change of use of storage area at the East Road Industrial Complex, Dublin 3 for cardboard recycling.	**Granted** by An Bord Pleanála 25th January 2002
0107/02 and PL29N.129420	Storage of empty waste skips on zoned industrial land.	**Refused** by DCC 19th March 2002
4794/03 and PL29N.205481	The development will consist of the demolition of 2 No. houses currently in use as offices, a portable office building, a storage shed and part of a storage shed together with the erection of 4 blocks of buildings containing a crèche, retail units, office space and 81 No. apartments with associated underground parking & storage under block 2 and underground parking under block 3 together with surface parking spaces, internal roads, drainage including temporary on-site sewage treatment plant and landscape works. The building comprising *block 1* will front East Road and will be 5 stories with retail on ground floor and 4 stories of office space above with exterior balconies. The building comprising *block 2* will be 5 stories with a crèche and 2 no. of one bedroom apartments at ground floor and 4 stories above containing 20 No. one bedroom apartments with deck access and private exterior balconies. The building comprising *block 3* will be generally 5 stories providing 2 no one bedroom apartments and 41 No. two bedroom apartments with deck access and private exterior balconies. The building comprising *block 4* will be generally 5 stories with 4 No. work / live units at ground floor and 4 stories above containing 2 No. three bedroom apartments and 14 No. two bedroom apartments.	**Refused** by An Bord Pleanála 25th June 2004
4803/08 (and PL29N.232517-Withdrawn)	The development will involve the demolition of all existing structures on the site which consists of 5 No. light industrial buildings and 2 No. semi-detached houses (currently vacant) the combined area of which is 6,170m^2; and the construction of a mixed-use development. The proposed mixed-use development incorporates a total of 95,360m^2 gross floor area comprising a hotel (7,575m^2), office accommodation (82,564m^2), retail floor space (503m^2), gym and pool (2,769m^2), healthcare centre (920m^2) and café / restaurant accommodation (969m^2) in 4 No. blocks ranging in height from 4 to 17 storeys.	**Refused** by DCC 15th December 2004

4 Description of the Proposed Project

This Chapter sets out the Site history, the site layout, the need for the project, details the area around the proposed Project, together with the proposed design parameters. In accordance with Article 5(1)(a) of the 2011 Directive as amended by Directive 2014/52/EU the description of the proposal should comprise

'…information on the site, design, size and other relevant features of the project'.

This description sets the basis against which the specialist assessments presented in this EIAR have been undertaken.

4.1 Background

4.1.1 The Site History

The East Wall area established during the late 18th century. The dominance of the railway system over the canal, saw the area develop with a mix of warehouses, stores and yards, and rows of small terraced houses. As such, the area was predominately a working class area, with many taking up employment in Dublin Port. The houses are typically single and two storey, were located in proximity to the larger scale industrial facilities in the North Docks and along North Wall Quay. A network of railway lines, many elevated, brought both passenger and freight trains into the North Docks.

Looking at the historic relationship between the residential area of East Wall and the larger scale industrial and port related buildings at North Docks, East Road presented an abrupt change from the residential area into the North Docks, and that transition is also apparent to the south at Mayor Street. Railway infrastructure weaves through the area and was a defining feature of the locality.

See Chapter 8 (Cultural Heritage, Archaeology & Architectural) and Chapter 10 (Landscape (Townscape) & Visual) for more detail on the Site history.

4.1.2 Current Site Use

The Site has a development area of c.2.11 ha (total application site is 2.3ha including) and is currently occupied by Hireco Park as a container / trailer park. The Site comprises mostly hardstanding area together with: (see Figure 4.1 below)

- warehouses;
- industrial sheds; and
- redbrick buildings – (containing the East Wall Men's shed)

4.1.3 Site Location & Surrounding Area

The Site is located in the core of the East Wall area of Dublin City and Docklands. This is an important transition point in the Docklands, from East Wall Road to the North Lotts, adjacent to the Dublin Port railyards, and less than 200m from Sherriff Street junction with New Wapping Street. East Road represents a key entry point to the Docklands and as a connector back to East Wall Road principal artery. It affords a more attractive pedestrian and cycle route into the City than East Wall Road currently provides.

The landscape of the East Wall area is typically flat and low lying, as the existing topography levels range from 0.88m above Ordnance Datum (AOD) in the northern extent of the Site to c.0.11mAOD in the southern extents of the Site.

The land uses surrounding the Site are a mix of commercial and residential (comprising both individual dwellings and larger residential apartment blocks). The Site is bound by East Road to the west, Island Key Apartments to the north, Merchant's Square to the east and the railway sidings to the south see Figure 4.1 below.

The Site in a highly accessible location, just 600m walking distance from both the Spencer Dock Luas Stop and the Docklands Rail Station. The Spencer Dock Luas Stop is also the future proposed location of the Docklands DART

Underground Station. In addition there is an existing bus stop directly in front of the Site which is to have its frequency increased under the proposed Bus Connects. This public transport infrastructure connects to the City centre and to the wider Dublin area employment and education locations. The Site is within walking and cycling distance of the North and South Docklands employment hubs, the IFSC and the City Centre.

In addition, as outlined by the Guidelines, a greater approach to mixed-use developments should be adopted and the proposed employment capacity of c.250 people onsite (during the Operational Phase) will provide significant opportunities to residents (and locals) to work on Site.

There are no watercourses in the immediate vicinity of the Site, and the Site is not hydraulically linked (other than through man made sewers) to the estuarine waters to the north and south. The Site is located c.950m southwest of the Irish Sea at East Point.

Figure 4.1: Current Site Land Use (Site location in red)

4.1.4 Flood Risk Assessment (FRA)

A Strategic Site Flood Risk Assessment (SSFRA) was prepared by DBFL Consulting Engineers for the proposed Project to comply with current planning legislation and forms part of this planning application. The Flood Risk Management (FRM) Guidelines require a SSFRA to '*gather relevant information sufficient to identify and assess all sources of flood risk and the impact of drainage from the proposal*'.

The objectives of the SSFRA is to inform the planning authority regarding flood risk for the Site of the proposed Project. The SSFRA relates only to the Site in the vicinity of East Road and its immediate surroundings. The SSRA report follows the requirements of *'The Planning System & Flood Risk Management - Guidelines for Planning Authorities'*[8]. FRM Guidelines propose that a *Justification Test* be applied to assess the appropriateness, or otherwise, of particular developments that are being considered in areas of moderate or high flood risk.

The Site is located within the Flood Zone A, *i.e.* high probability of flooding. Although, the Site is also located in an area protected by flood defences. (See Figure 3.4 and Figure 3.5 of the SSFRA for East Road). Therefore a *Justification Test* was completed to justify development in this flood risk area.

[8] OPW: https://www.opw.ie/en/media/Planning%20Guidelines%20-%20FRM%20-%20Nov%202009.pdf

The proposed Project passed the *Justification Test* in accordance with the FRM Guidelines and the proposed Project is deemed appropriate to be located within Flood Zone A on the basis that the mitigation measures stipulated within the justification are met, see the Site Specific Flood Risk Assessment, Proposed Mixed-Use Development, as part of this Planning Application pack.

The proposed Project passed the *Justification Test* in accordance with the FRM Guidelines and the proposed Project is deemed appropriate to be located within Flood Zone A on the basis that the mitigation measures stipulated within the justification are met. The proposed Project is within Flood Zone A for tidal flooding, however the Site is located in an area that benefits from flood defence measures, therefore the SSFRA has assessed a *residual* risks associated with breach of these defences.

The conclusion of the SSFRA show that the finished floor levels (FFL) are located above the 0.1% AEP flood level, in addition to a climate change allowance and a conservative freeboard, giving a minimum FFL for this type of development of 4.08m

4.2 The Need for the Proposed Project

The development of the proposed Project is supported by both national and regional policy and guidance documents which are outlined in Chapter 3 (Planning and Development Context) and in the Planning Report included in the planning application pack, and including the following:

- Rebuilding Ireland - Action Plan for Housing and Homelessness;
- Project Ireland 2040 - National Planning Framework;
- Eastern and Midland Regional Assembly - Regional Spatial & Economic Strategy (RSES): Draft Strategy;
- Regional Planning Guidelines for the Greater Dublin Area (2010 – 2022);
- Guidelines for Planning Authorities on Sustainable Residential Development in Urban Areas (2009), and the accompanying Urban Design Manual;
- Delivering Homes, Sustaining Communities (2008) and the accompanying Best Practice Guidelines - Quality Housing for Sustainable Communities;
- Sustainable Urban Housing: Design Standards for New Apartments (2018);
- Design Manual for Urban Roads and Streets (2013);
- Urban Development and Building Heights Guidelines for Planning Authorities (December 2018)
- Guidelines for Planning Authorities on Childcare Facilities (2001);
- Smarter Travel - A New Transport Policy for Ireland (2009-2020);
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (2018);
- The Planning System and Flood Risk Management (2009); and
- Birds and Habitats Directive - Appropriate Assessment.

4.3 Main Features of the Proposed Project

The proposed Project will consist of the demolition of all structure on the Site and the construction of a mixed-use development.

The description of the proposed Project, as set out in the public notices is as follows:

'Demolition of all existing structures on site and the construction of a mixed-use development with a gross floor area (GFA) of c. 52,796 sq.m (excluding below podium parking and plant areas) set out in 9 No. blocks, over two separate podium, ranging in height from 3 to 15 storeys to accommodate: 554 No. apartments, commercial / enterprise space, 3 No. retail units, foodhub / café / exhibition space, residential amenity services, crèche and a Men's shed. The site will accommodate 241 No. car parking spaces, 810 No. bicycle parking spaces, storage, services and plant areas. Landscaping will include a new central public plaza and residential podium courtyards. The residential component of the development consists of 554 No. apartments, to be provided as follows:

- *9 No. residential buildings range in height from 3 storeys to 15 storeys, (including podium and ground floor uses) a with a total GRA of c.47,077m^2 (excluding ground floor uses and below podium parking).*
- *554 No. apartments comprising*
    - *72 studios, 202 No. 1 bed units;*
    - *232 No. 2 bed units; and*
    - *48 No. 3 bed units.*

The residential buildings are arranged around a central public plaza (at ground level) and raised residential courtyards at podium level over ground level car-parking and other uses. Balconies and terraces to be provided on all elevations at all levels for each block. The breakdown of residential accommodation is as follows:

- ***Block A1:** 3 to 7 storey building (including podium and ground floor Level 0), including setbacks and balconies, accommodating 70 No. units comprising 15 No. studios, 37 No. 1 bed units, 8 No. 2 bed units, 10 No. 3 bed units. (GFA c.5,398.2m^2).*
- ***Block A2**: 4 to 7 storey building including setbacks and balconies, accommodating 69 No. units comprising 15 No. studios, 15 No. 1 bed units, 37 No. 2 bed units, 2 No. 3 bed units (GFA of c.5,775.5m^2).*
- ***Block A3:** 4 to 7 storey building (including podium and ground floor Level 0), including setbacks and balconies, accommodating 56 No. units comprising 21 No. 1 bed units, and 35 No. 2 bed units (GFA of c.4,881.5m^2).*
- ***Block B1:** 3 to 4 storey building (including podium and ground floor Level 0), including setbacks and balconies, accommodating 16 No. units comprising 5 No. 1 bed units, 5 No. 2 bed units, 6 No. 3 bed units (GFA of c.1,676.8m^2).*
- ***Block B2:** 5 to 6 storey building (including podium and ground floor Level 0), including setbacks and balconies, accommodating 34 No. units comprising 10 No. 1 bed units, 16 No. 2 bed units, 8 No. 3 bed units (GFA of c.3,266.2m^2).*
- ***Block C1**: 6 to 8 storey building (including podium and ground floor Level 0), including setbacks and balconies, accommodating 58 No. units comprising 24 No. studios, 4 No. 1 bed units, 8 No. 2 bed units, 22 No. 3 bed units (GFA of c.5,010.3m^2).*
- ***Block C2:** 5 to 10 storey building (including podium and ground floor Level 0), including setbacks and balconies, accommodating 85 No. units comprising 11 No. studios, 25 No. 1 bed units and 49 No. 2 bed units (GFA of c.7,230.5m^2).*
- ***Block D1:** 8 storey building (including podium and ground floor Level 0), including setbacks and balconies, accommodating 78 No. units comprising 7 No. studios, 26 No. 1 bed units and 45 No. 2 bed units (GFA of c.6,232.6m^2).*
- ***Block D2:** 8 to 15 storey building (including podium and ground floor Level 0), including setbacks and balconies, accommodating 88 No. units comprising 59 No. 1 bed units and 29 No. 2 bed units (GFA of c.6,779m^2).*
- ***Residential tenant amenity space** is provided at ground level of block C2 with a total floor area of 361.6 m^2. External residential courtyards are provided between blocks A1-A2-A3-B1, D1:D2-C2 and C1-B2.*

*The **residential buildings** sit at podium level (Level 1) above ground level which contains residential **car-parking**, **cycle parking**, **plant areas** and ground floor uses. These ground floor uses include a **crèche** of c. 539.9 sq.m and 3 no. **retail units** with a total floor area of 344.6 sq.m, a **foodhub / café / exhibition** space of 680.8 sq.m, **enterprise space** of 2,444.6 sq.m, **tenant amenity space** of 361.6 sq.m and **a men's shed** of 91.8 sq.m. Total gross floor area of proposed other uses is 4463.3 sq.m.*

*The Site is accessed from a relocated entrance off East Rd, and the below podium car parking, split into two areas, accommodates **bicycle parking**, **car parking spaces**, **plant**, **ESB sub-stations, storage areas, waste storage areas and other associated facilities**. The application includes for alterations to the existing road layout and junction on East Road.*

The development also includes for a new centrally landscaped public plaza, which also incorporates surface car-parking and cycle parking. The proposed application includes all site landscaping works, green roofs, boundary treatments, lighting, servicing, signage, and associated and ancillary works, including site development works above and below ground.'

The Planning Application pack is accompanied by the Architects Design Statement and drawings prepared by O'Mahony Pike Architects, which provide a rationale for the design and layout of the proposed Project and the dwelling types, crèche and retail units proposed therein.

4.3.1 Landscape Strategy and Design

The proposed Project will adopt a primary axis parallel to East Road that facilitates an appropriate interface with the adjoining apartment blocks to the north, and also allows maximum sunlight and daylight penetration to the developments.

The nine blocks will be arranged such that the tallest will establish the landmark and gateway feature, and subsequent blocks will step down so is provide appropriate interfaces at site boundaries and to optimise sunlight and daylight access.

East Yard Lane will lead from East Road, to a multi-functional East Square and East Yard Court. The lane, square and court will form a new neighbourhood environment, as an extension of East Road. A strong mix of uses will ensure active uses, while adding significant new open space and public realm areas to the area.

Landscaping will include a tree-lined East Yard Lane with a series of seating areas, and East Square and East Yard Court with feature tree planting, high quality, robust paving, feature lighting and seating areas. A series of podium level landscaped courtyards will branch of the central spine providing high quality communal open spaces incorporating formal and informal play areas.

Full details of the proposed Project are provided in the Architects Design Statement, and the Landscape Proposal document.

4.4 Construction Phase & Construction Works

4.4.1 Construction Phase

A 5 year planning permission is being sought from An Bord Pleanála. This will lead to a construction period of not greater than 30 months, including demolition works. A determination on the application is expected from An Bord Pleanála in Q3 2019.

Allowing a reasonable period for mobilisation and Site set up, it is expected that demolition works will commence in Q4 2019 subject to permission and the discharge of any pre-commencement planning conditions.

The Construction Phase will commence in Q4 2019 with the projected completion of the buildings by Q2 2021.

The preliminary Construction Management Plan (pCMP) (see Planning Application pack) and Construction & Demolition Waste Management Plan (C&DWMP) (see Planning Application pack) which are included with this planning application, should be referred to for more detail on the Construction Phasing. The appointed Contractor will prepare a detailed final CMP, including detailed construction phasing and a Traffic Management Plan (TMP).

4.4.2 Proposed Construction Works and Methods

There are a number of construction works involved in a development of this nature. These activities (which are independent of phasing) can be divided into the general categories as set out in Table 4.1 below.

Table 4.1: Proposed Project General Construction Activities

Activity	Description of Activity
Site Setup	Immediately after access to the Site is made and it is secure, the Site Compound will be established. Existing Site services will be isolated including the decommissioning of existing substations in conjunction with the ESB and the provision of a temporary builder's power supply. The Site will be secured with hoarding on all open sides and accessible approaches.
Demolition	The main demolitions will be carried out by a competent Demolition Subcontractor in accordance with the current code for demolition and the consultant engineer's specification.
Earthworks	Limited earthworks will be associated with the development. The FFL has been set to minimize excavations, although some local earth movement may be required to create consistent levels over the Site.
Structure	Structure includes the foundations and the physical frame of the blocks.
Enclosures	The enclosures for the building will be formed from brick, block work, timber, and glass, with all the required levels of insulation and water proof membrane.
Services	The requisite services will be provided including drainage and lighting.
Landscaping	The landscaping works include some hard landscaping, roads, footpaths, cycle-paths, bed and tree planting, and significant open spaces.

The appointed Contractor will be required to prepare a final CMP for the duration of the works which will include the following aspects:

- construction working hours;
- site access;
- air quality;
- noise & vibration;
- traffic management;
- health & safety; and
- construction waste.

4.4.2.1 Construction Working Hours

The CMP will outline the construction hours for the proposed Project. The expected construction hours will be 07:00-19:00 Monday to Friday and 08:00-17:00 on Saturdays. There will be no works on Sundays or bank / public holidays in accordance with the Environmental Noise Regulations (S.I. No. 140 of 2006 Environmental Noise Regulations) and subject to final agreement with DCC. From time to time, in exceptional instances, works may be required outside of these hours. However, this will be agreed with DCC prior to any works taking place.

The appointed Contractor will be required to prepare and adhere to a Construction Phase Health & Safety (H&S) Plan and any employed subcontractors will also be required adhere to this Plan.

4.4.2.2 Site Access

The Site is currently accessed from East Road. During the Construction Phase (including demolition and excavation works), construction traffic will access the Site via the existing access off East Road. The routing will be strictly managed and controlled, and details will be incorporated into the TMP.

Pedestrian access will be strictly controlled. Only SafePass accredited personnel will be permitted on to the Site and a daily record (access / egress) of site personnel will be maintained. No pedestrian access points will be provided during the Construction Phase.

Site security will be provided by way of a monitored infrastructure systems such as site lighting and CCTV cameras, when deemed necessary.

4.4.2.3 Air Quality - Dust & Dirt

The appointed Contractor shall put in place a regime for monitoring dust levels in the vicinity of the Site during the Construction Phase. The level of monitoring and adoptions of mitigation measures will vary throughout the Construction Phase depending on the type of activities being undertaken and the prevailing weather conditions at the time

The potential impacts associated with air quality during the Construction Phase are addressed in Chapter 14 (Air Quality & Climate).

4.4.2.4 Noise & Vibration

It is not envisaged that any significant prolonged noise and vibration producing activities will be carried out onsite. The most likely generator will be the internal demolition of the existing buildings and the pavement cutting at junction of East Road and Church Road.

The appointed Contractor shall ensure that the level of noise and vibration resulting from the Construction Phase, does not constitute a nuisance, and that noise and vibration emissions conform to the requirements of *BS 5228: 2009 Code of Practice for Noise and Vibration Control on Construction Sites, Part 1 and Part 2.*

The potential impacts associated with noise and vibration during the Construction Phase, are addressed in Chapter 15 (Noise & Vibration).

4.4.2.5 Traffic Management Plan (TMP)

A TMP will be prepared prior to any works commencing on Site and will be discussed with DCC. The Site will be accessed from the existing Site entrance on East Road. Traffic volumes are *not anticipated to be significant*. All vehicular access will be controlled at the gate where all access and egress will be recorded. All site personnel and delivery drivers will have to undergo Site induction. Unscheduled deliveries will not be allowed access.

Deliveries of material to the Site will be planned to avoid high volume periods, however there may be times where it is necessary to have deliveries within these times.

Construction traffic will not be permitted to park on the public roads or within the general area outside the Site.

Warning signage will be provided for pedestrians and other road users on all approaches in accordance with the *Traffic Signs Manual and the Contractor's Traffic Management Plan*[9].

Travel by car to the Site by site personal will not encouraged and minimised where possible as the Site is easily accessible by public transport. Site personnel will generally arrive before 07:00, thus avoiding the morning peak hour traffic and generally depart after 17:00. It should be noted that a large proportion of site personnel may arrive in shared transport.

There will be a need to facilitate vehicle parking / travel and to avoid any potential overspill parking into the local area. A limited number of car parking spaces will be provided for visitors.

4.4.2.6 Health & Safety

A detailed Construction Phase H&S Plan will be prepared by the appointed Contractor in advance of any works commencing on the Site. This Plan will operate in line with ISO 18001 & ISO 14001[10].

The H&S Plan will apply to any persons working on the Site and in respect of passing pedestrians, motorists or other transport carriers.

[9] Traffic Signs Manual: http://www.dttas.ie/sites/default/files/publications/roads/english/traffic-signs-manual-2010/traffic-signs-manual-2010-chapter-8-temporary-traffic-measures-and-signs-roadworks.pdf

[10] (ISO 18001) Occupational Health and Safety Management System (OHSMS) and (ISO 14001) Environmental Management System (EMS)

A suitably qualified and competent Project Supervisor Design Process has been appointed and a suitably qualified and competent Project Supervisor (Construction Phase) will be appointed in line with those requirements laid down in the Safety, Health and Welfare at Work Construction Regulations 2013 (S.I. No. 291 of 2013 Safety, Health and Welfare at Work (Construction)).

4.4.2.7 Construction Waste

Waste is defined as any substances or object belonging to a category of waste specified in the First Schedule (of the Waste Management Act 1996) or included in the European Waste Catalogue and Hazardous Waste List[11], which the holder discards or intends or is required to discard and anything which is discarded or otherwise dealt with as if it were waste shall be presumed to be waste until the contrary is proved.

Construction and Demolition (C&D) waste is the largest '*municipal*' waste stream contributing to the current pressure on landfills in Ireland. Unsustainable management and inappropriate disposal of such waste can result in a waste of natural resources and lead to environmental pollution.

The main source of waste material at the Site will be construction waste. A C&DWMP has been prepared and accompanies this planning application (see Planning Application pack) and includes information on the legal and policy framework for C&D waste management in Ireland, estimates of the type and quantity of C&D waste to be generated by the proposed Project and makes recommendations for management of different types of waste.

During the Construction Phase (including demolition and excavation works) it is anticipated that the excavated material will require removal from the Site for offsite reuse, recovery, recycling and / or disposal. The appointed Contractor will endeavour to ensure that material is reused or recovered offsite insofar as is reasonably practicable or disposed of at authorised facility. Any unsuitable or unusable C&D waste generated onsite will be appropriately segregated and stored prior to collection for off-site recycling, recovery or disposal as appropriate at a suitably licensed facility.

There are two main types of C&D waste, hazardous and non-hazardous, see Table 4.2 below. Hazardous waste is defined as waste which can have a harmful effect on the environment and on human health and as such they can be ignitable, reactive, corrosive and / or toxic and / or are listed as hazardous by the European Waste Catalogue. See Chapter 19 (Material Assets - Waste) for further information regarding Waste Management.

Table 4.2: Main Type of Construction Waste

Hazardous Waste	Non-Hazardous Waste
Timber	Adhesives and Sealants
Scrap Metal	Asbestos
Paper / Cardboard	Aerosols
Canteen Waste	Batteries
Litter	Chemicals
	Cleaning
	Products
	Oil (Contaminated absorbent Material or debris)
	Paints and Thinner
	Fuels (hydrocarbons such as diesel)

[11] European Waste Catalogue and Hazardous Waste List, Jan 2002: http://www.nwcpo.ie/forms/EWC_code_book.pdf

4.4.3 Description of the Operational Phase of the Proposed Project

The proposed Project is a mixed-use development consisting of residential apartments ranging in height from 3 to 15 storeys and amenity facilities.

The primary direct significant environmental effects will arise during the Construction Phase. As a result, the Operational Phase of the proposed Project is therefore relatively benign and not likely to give rise to any significant additional impacts in terms of activities, materials or natural resources used or effects, residues or emissions which are likely to have a significant impact on human beings, flora and fauna, soils, water, air and climate.

The primary *likely significant environmental impacts* of the Operational Phase as a result of the proposed Project are fully addressed in the relevant specialist chapters of this EIAR. These impacts relate to Population & Human Health, Landscape & Visual, Noise and Air Quality & Climate associated with the traffic generated.

The proposed Project also has the potential for *cumulative, secondary and indirect impacts* (*i.e.* traffic) and can be difficult to quantify due to complex inter-relationships.

However, all interactions and cumulative impacts are *unlikely to be significant*, have been addressed in Chapter 20 (Interactions) and Chapter 21 (Cumulative Impacts) of this EIAR.

5 Consideration of Alternatives

5.1 Introduction

Consideration of alternatives is an important aspect of the EIA process and is necessary to evaluate the *likely environmental consequences* of a range of development strategies for the Site within the constraints imposed by environmental and planning conditions.

This Chapter provides an overview of alternative designs that have been considered for the Site at 1-4 East Road, Dublin 3.

5.2 Legislative Context

Article 5 (1) of the 2014 Directive requires the consideration of reasonable alternatives which are relevant to the project and taking into account the effects of the project on the environment. It states under Article 5 (1) that;

> *'Where an environmental impact assessment is required, the developer shall prepare and submit an environmental impact assessment report. The information to be provided by the developer shall include at least':*

And Article 5 (1) (d):

> *'a description of the reasonable alternatives studied by the developer, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the project on the environment.'*

Schedule 6 of the Planning and Development Regulations, 2001 (as amended) sets out the information which is to be contained in an EIS and Part 1 (d) of Schedule 6 states that the following shall be included:

> *'A description of the* ***reasonable alternatives*** *studied by the person or persons who prepared the EIAR, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the proposed development on the environment.'*

In accordance with EPA Guidelines (Draft), different types of alternatives may be considered at several key stages during the process. As environmental issues emerge during the preparation of the EIAR, alternative designs may need to be considered early on in the process or alternative mitigation options may need to be considered towards the end of the process.

The EPA Guidelines (Draft) states;

> *'The objective is for the developer to present a representative range of the practicable alternatives considered. The alternatives should be described with 'an indication of the main reasons for selecting the chosen option'. It is generally sufficient to provide a broad description of each main alternative and the key issues associated with each, showing how environmental considerations were taken into account is deciding on the selected option. A detailed assessment (or 'mini-EIA') of each alternative is not required.'*

Thus, the consideration and presentation of the reasonable alternatives studied by the project design team is an important requirement of the EIA process.

5.3 Alternatives Examined

This Chapter provides an outline of the main alternatives examined during the design phase and sets out the main reasons for choosing the proposed Project. The alternatives may be described at five levels:

1. 'Do-Nothing' Alternative
2. Alternative Locations

3. Alternative Layouts
4. Alternative Designs
5. Alternative Processes

5.3.1 'Do-Nothing' Alternative

A '*do-nothing'* scenario was considered to represent an unsustainable and inefficient use of these strategically located Strategic Development and Regeneration Areas (SDRA) (Z14) zoned lands.

The suitability of the lands for development as proposed *('Z14 areas are capable of accommodating significant mixed-use development'*) within an area which has capacity for SHD and a highly accessible location to public transport (Spencer Dock Luas Stop and the Docklands Rail Station) and road network were also key considerations.

5.3.2 Alternative Locations

Glenveagh Living Ltd. (the Applicant) acquired the subject site on the basis that it is zoned Z14 as part of a wider Strategic Development and Regeneration Area (SDRA 6) within the Development Plan 2016-2022, which was itself subject to the Strategic Environmental Assessment (SEA) process.

The SDRA designation envisages that these areas have substantial development capacity and the potential to deliver the residential, employment and recreational needs of the city and the Z14 land-use zoning objective for SDRA 6 is:

> *"To seek the social, economic and physical development and/or rejuvenation of an area with mixed use, of which residential and 'Z6' would be the predominant uses."*

As such it is considered that the Site is entirely suitable for the nature of development as proposed in this SHD application.

5.3.3 Alternative Layouts & Designs

During the design process for the proposed Project a range of iterations of the proposed Site layout were considered. The planning application and this EIAR demonstrates that the Site and the surrounding area have the environmental capacity to accommodate the proposed Project without significant risk of impact upon environmental sensitivities due to the site location.

The proposed layout is designed to function as a mixed-use development on a currently underutilised site, and is intended to provide a landmark and gateway building and public space at East Wall that defines the Site as a destination within the Docklands.

During the design process for the proposed Project a number of iterations of alternative designs were considered. The proposed Project at East Road has been prepared in accordance with the requirements of the Development Plan 2016-2022. A detailed analysis of the architectural design strategy is provided in the Architects Design Statement, prepared by O'Mahony Pike, and should be read in conjunction with this chapter of the EIAR.

The proposed Project has been the subject of a number of pre-application meetings with the Dublin City Council prior to lodgement (see Section 6.2 of this EIAR and the Planning Report which accompanies this planning application). The proposed Project was also subject of a pre-application SHD consultation with An Bord Pleanála, with design alterations arising out of this process also.

The key considerations which influenced the design of the proposed Project were as follows:

- To provide and promote a residential development in the City, with regard to the need for high standards of urban design / architecture and to successfully integrate the development with the character of the surrounding area.
- The need to promote sustainable development of vacant or under-utilised sites and to consider higher density proposals.
- The need to provide sustainable neighbourhoods by achieving suitable levels of amenity.

- The need to provide suitable social infrastructure and other support facilities are available in the neighbourhood.
- The need to include community hubs, sports and recreational green open spaces and suitable shops contributing to the creation of sustainable and mixed-income neighbourhoods.
- The quality of the urban environment to be delivered and the associated impact on human health.

5.3.3.1 Alternative Design 1

Initial Massing & Site Layout

Following a Section 247 meeting with DCC, a number of matters were raised regarding the conceptual design. These issues included the grouping and height of the development blocks which resulted in the following:

- The need to provide sufficient **sunlight** access to the public.
- The need to provide sufficient and good quality communal **open space**.
- The need to have regard to the existing elevation on East Road and **appropriate design** in context with the area.

The issues raised relate the following environmental aspects:

- Population & Human Health
- Landscape & Visual
- Microclimate - Daylight / Sunlight.

Figure 5.1 below illustrates the initial conceptual design.

Figure 5.1: Alternative Design Layout 1

5.3.3.2 Alternative Design 2

Emerging Massing & Layout

The proposed Project evolved from the initial conceptual design and the consideration of an alternative design resulted in significant environmental improvements in terms of Population & Human Health, Microclimate (Daylight / Sunlight) and Landscape & Visual. The alternative design No. 2 resulted in:

- increased south light penetration; and
- stepping introduced to the massing / development blocks.

Figure 5.2 below illustrates the alternative design:

Figure 5.2: Alternative Design Layout 2

5.3.3.3 The Proposed Project – the Alternative

The final preferred proposed Project has been progressed via an iterative process, with changes having been made during the pre-application process with An Bord Pleanála based on their comments and environmental considerations pertaining to the development. The proposed Project design alternative has particular consideration for the following:

- complies with BRE Guidelines (sunlight / daylight);
- increased south light penetration;
- increased height at south west corner (gateway); and
- roofscaping introduced.

Figure 5.3 below illustrates the the proposed Project design alternative.

Figure 5.3: The Proposed Project Alternative

5.3.4 Alternative Process

This is not considered relevant to this EIAR having regard to the nature of the proposed Project - a Strategic Housing Development, where the planning application will be submitted to An Bord Pleanála.

6 Consultation

6.1 Introduction

This Chapter describes the consultation process of the proposed Project. The 2014 Directive places strong emphasis on effective public participation in the decision-making procedures for EIA cases. Early involvement of the public and other stakeholders ensured that the views of groups and individuals were taken into consideration throughout the preparation of the EIAR.

It was recognised at an early stage of the project that public and stakeholder engagement is a critical component to the process. The structure, presentation and the Non-Technical Summary (NTS) of the EIAR, as well as public access, all facilitate the dissemination of the information contained in the EIAR. The core objective is to ensure that the public and local community are aware of the *likely environmental effects* of projects prior to the granting of consent.

Informal scoping of potential environmental impacts was undertaken with the Planning Authority through pre-application meetings. Direct and formal public participation in the EIA process will be through the statutory planning application process under the new SHD procedures.

Consultation was undertaken which identified the environmental and community issues that needed to be taken into consideration in designing the proposed Project for the Site.

Section 4(1) of the Planning and Development Act of 2016 provides that an application for permission for a SHD shall be made directly to An Bord Pleanála and not to a Planning Authority, as was the case previously.

The SHD process comprises three mandatory stages, which are outlined in Table 6.1 below.

Table 6.1: SHD Consultation Stages[12]

Stage	Description
Stage 1	**Consultation** with the Planning Authority (under *Section 247 of the Planning & Development Act, 2000, as amended*).
Stage 2	**Pre-Application Consultation** with An Bord Pleanála (under *Section 6 of the Planning & Development (Housing) and Residential Tenancies Act, 2016*).
Stage 3	**Planning Application** to be submitted directly to An Bord Pleanála.

6.2 Consultation - Stage 1

Pre-application Consultation is a new and mandatory step required prior to making an application for a SHD to An Bord Pleanála.

Both the context and approach to the development and the emerging design rationale for the proposed Project, have been subject to considerable consultation with the Planning Department under *Section 247*.

A series of meetings have been held with both the Development Agency and DCC's Planning Department as formal pre-application discussions on the substance of the proposed Project. The pre-application attendees and dates of these meetings are listed in Table 6.2 below. In addition meetings and consultation took place with officials from the Roads & Traffic Section, Drainage and Housing Departments.

[12] DHPLG SHD Pre-Application Consultation: http://www.pleanala.ie/shd/general/SHD%20PreApp%20Guidance%20for%20Applicants.pdf

Table 6.2: List of Consultation Meetings

Date	Attendees
21st May 2018	Mary Conway (Deputy City Planner) Claire Sheehan (Senior Executive Planner)
18th June 2018	Mary Conway (Deputy City Planner)
26th July 2018	Mary Conway (Deputy City Planner) Claire Sheehan (Senior Executive Planner) Stephanie Farrington (A/ Senior Executive Planner- Roads and Traffic Planning Division) Peter Glynn (Executive Engineer)
6th September 2018	Mary Conway (Deputy City Planner) Claire Sheehan (Senior Executive Planner)
8th October 2018	Mary Conway (Deputy City Planner)
8th November 2018	Mary Conway (Deputy City Planner) Claire Sheehan (Senior Executive Planner)

6.3 Pre-Application Consultation - Stage 2

The new SHD Pre-Application process requires a number of key steps to be completed which are:

- **Request for a Pre-Application Consultation** meeting by the prospective applicant to An Bord Pleanála.
- **Planning Authority submits their opinion and *Section 247* records** to An Bord Pleanála, following request for a Pre-Application Consultation.
- **Pre-Application Consultation Meeting** will be held with An Bord Pleanála, the Planning Authority and the prospective applicant.
- **Record** of the Pre-Application Consultation.
- **Forming and Issuing of Opinion** by An Bord Pleanála.

A Pre-Application Consultation Meeting was held with An Bord Pleanála, DCC and Glenveagh Living Ltd. (the applicant) on the 6th February 2019.

6.3.1 Other Consultation

Before lodging this planning application, some information was issued to the DHPLG EIA Portal[13]. The EIA Portal is an online map-based website that provides users with access to applications for development consent with an EIAR.

An Opinion was received from An Bord Pleanála following the pre-application consultation meetings. This provided details of the prescribed bodies to be notified about this SHD planning application, which are as follows:

- Irish Water
- Transport Infrastructure Ireland (TII)
- National Transport Authority (NTA)
- Dublin City Childcare Committee
- Córas Iompair Éireann
- Commission for Railway Regulation
- Iarnród Éireann.

This proposed Project has a dedicated website: www.eastroadshd1.ie

[13] DHLPG EIA Portal: https://www.housing.gov.ie/planning/environmental-assessment/environmental-impact-assessment-eia/eia-portal

6.4 Planning Application - Stage 3

The planning application is submitted directly to An Bord Pleanála, and this stage allows for further consultation. The application and all accompanying documents will be available on public display for a period of 5 weeks for review by the public and interested parties. Submissions on any aspect of the proposed development may be made to An Bord Pleanála and such submissions will be taken into account in the determination of the application by the Board.

7 Population & Human Health

7.1 Introduction

The 2014 Directive updated the list of topics to be addressed in an EIAR and has replaced '*Human Beings*' with '*Population & Human Health'*. The term '*human health'* is not defined in the 2014 Directive, however the European Commission (EC) Guidance relating to the implementation of the 2014 Directive, states:

> *'Human health is a very broad factor that would be highly Project dependent. The notion of human health should be considered in the context of 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 pollutants) are obvious aspects to study. In addition, these would concern the commissioning, operation, and decommissioning of a Project in relation to workers on the Project and surrounding population[14]'.*

The EPA Guidelines (Draft 2017) state that:

> *'in an EIAR, the assessment of impacts on population and human health should refer to the assessments of those factors under which human health effects might occur, as addressed elsewhere in this EIAR e.g. under the environmental factors of air, water, soil etc.[15]'*

This Chapter also meets the requirement for assessment of '*Human Beings'* as per Schedule 6 of the Planning and Development Regulations 2001-2018.

This Chapter considers and assesses the potential effects of the proposed Project on the people in the surrounding community, during the Construction and Operational Phases. Potential impacts of the proposed Project on Population & Human Health can arise from traffic & transport, air quality and climate, noise & vibration, landscape & visual, material assets: utilities and the risk of unplanned events. These aspects are dealt within the specialist chapters of this EIAR.

7.2 Methodology

The assessment considers attributes and characteristics associated with population, community and residential settlement, economic activities and employment, community infrastructure and tourism and recreation.

The assessment was carried out in accordance with the following guidance and tailored accordingly based on professional judgement:

- EPA *Guidelines on the Information to be Contained in Environmental Impact Statements* (EPA, 2002) (and revised and draft guidelines 2017);
- EPA Advice Notes on *Current Practice in the Preparation of Environmental Impact Statements* (EPA,
- 2003) (and revised advice notes 2015); and
- Fáilte Ireland Guidelines on the treatment of *Tourism in an Environmental Impact Statement* (2011).

A Site visit was undertaken to appraise the location and *likely and significant potential impact* upon human receptors. A desk-based study was carried out to characterise the environment in relation to human beings including the receiving population, to identify neighbouring industry and dwellings and to assist in the characterisation of land use.

The following sources were used for this assessment:

[14] Environmental Impact Assessment of Projects: Guidance on the preparation of the EIAR, EC (2017): http://ec.europa.eu/environment/eia/eia-support.htm
[15] EPA Guidelines: https://www.epa.ie/pubs/advice/ea/EPA%20EIAR%20Guidelines.pdf

- Central Statistics Office (CSO), Census data from 2011 and 2016;
- CSO Labour Force Survey 2018;
- CSO Small Area Population (SAP) Statistics: http://census.cso.ie/sapmap/;
- Regional Planning Guidelines for the Greater Dublin Area 2010-2022;
- Dublin City Development Plan 2016-2022;
- Department of Housing, Planning & Local Government: http://www.myplan.ie/webapp/; and
- World Health Organisation (WHO): https://www.who.int/.

This assessment is a study of the potential indirect and direct socio-economic impacts of the development of the Site as well as the operations of the proposed Project.

Receptors were assessed for sensitivity, magnitude and significance to provide an appropriate and adequate assessment of how they could be impacted by the Construction and Operations of the proposed Project. The characteristics of this impact assessment are defined below in Table 7.1 to Table 7.3, as per the EPA Guidelines (Draft 2017). Table 7.1 below defines the quality of effects from *positive to negative* on the environment.

Table 7.1: Quality of Effects

Quality of Effect	Description of Effect
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 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 a nuisance.

Table 7.2 below outlines the definitions of significance of effects which range from imperceptible to profound effects.

Table 7.2: Definitions of Significance of Effect

Significance of Effects	Description of Significance of Effects
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 noticeable 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 the majority of a sensitive aspect of the environment.
Profound Effects	An effect which obliterates sensitive characteristics.

Table 7.3 below describes the duration of effects. Momentary effects lasting from seconds to minutes will often be less concerning than long term and permanent effects, depending on their severity.

Table 7.3: Describing Duration of Effects

Duration of Effects	Description of Duration of Effects
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.

7.3 Baseline Environment

This Section provides a description of the relevant aspects of the baseline (current state) environment in relation to Population & Human Health.

The baseline environment is considered in this Section under the following headings:

- Population, Gender & Age;
- Land Use;
- Employment;
- Community & Local Amenities; and
- Human Health.

7.3.1 Population, Gender & Age

The CSO provides data on population and socio-economic aspects of the population at different levels from the entire state, county level and individual Electoral Districts (ED) within each County. The most recent census by the CSO was undertaken in 2016.

The Site is located in the Local Electoral Area (LEA) of North Inner City and the ED of North Dock B. The CSO population statistics relevant to this EIAR are set out in Table 7.4 below.

Table 7.4: Population Change in the State, LEA and ED Level 2011 - 2016[16]

Area	Number of Persons		
	2011	2016	% change between 2011 - 2016
Ireland - State	4,588,252	4,757,976	3.7
North Inner City (LEA)	67,309	72,982	7.8
North Dock B (ED)	6,895	7,695	11.6

CSO data illustrates that the population of the Irish State increased between 2011 and 2016 by 3.7% to 4,757,976. Growth within the County was higher than the national average with a growth rate of 5.3%.

Growth within North Dock B (ED) was significantly higher with an increase by c.11.6% between 2011 and 2016. This growth is likely to be associated with a significant level of residential development that has progressed in this area in recent years, supported by physical and social infrastructure, including the Luas line.

The total population for the North Dock B (ED) consists of 4,174 males and 3,521 females. The average age in North Dock B is 34.3 years in 2016 compared with 33.3 years in 2011, which was a percentage change of 3.0%.

[16] CSO 2016: http://census.cso.ie/sapmap/ and CSO 2011: http://census.cso.ie/sapmap_2011/

7.3.2 Land Use

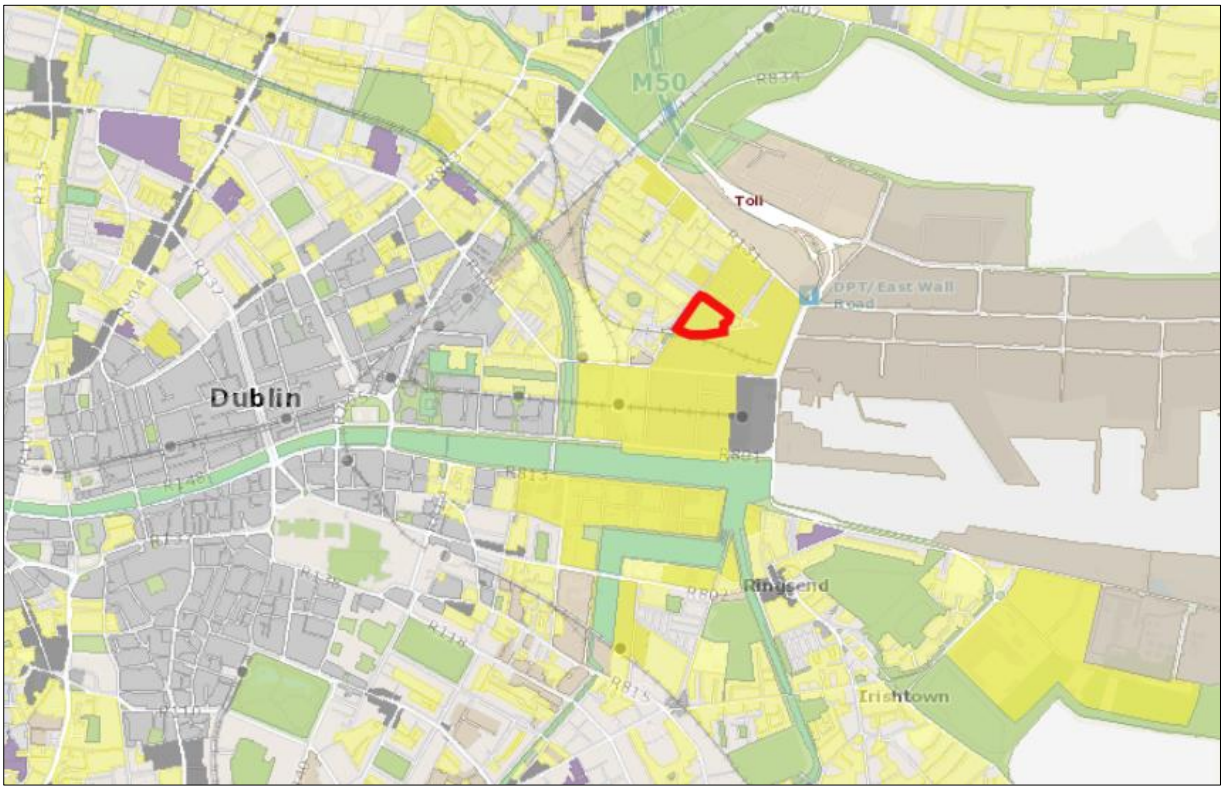
The Site measures c.2.11ha, located along East Road, Dublin 3. The Site lies within DCC administrative area, north of the North Lotts and Grand Canal Dock SDZ and within the '*Docklands Area',* where it is identified as SDRA 6 in the Development Plan. Therefore the Site is subject to the land use policies and objectives of the Development Plan 2016-2022, see Figure 7.1 below. Under this Plan the Site and surrounding environs is zoned as a Strategic Residential Reserve. Under the Plan the following policies include:

> *'QH7: To promote residential development at sustainable urban densities throughout the city in accordance with the core strategy, having regard to the need for high standards of urban design and architecture and to successfully integrate with the character of the surrounding area.*

and

> *'QH26: To promote the transformation of the key regeneration areas into successful socially integrated neighbourhoods….'*

Figure 7.1: Land use zoning as part of the Dublin City Development Plan 2016-2022[17] (Site location in red)



At present, the Site for the proposed Project consists of warehousing / logistics / light industrial space and has a number of existing industrial sheds, with an existing redbrick building along East Road.

The land use surrounding the Site and environs consists of a mix of residential, commercial, warehousing, recreational facilities and industry. The Site is immediately bound by East Road to the west, Island Key apartments to the north, Merchant's Square to the east and the railway sidings to the south see Section 4.1.3 above.

The local residential development consists of two storey housing along Church Road, St. Mary's Road, and Caledon Road to the east, and Merchant's Square to the West. North of the Site residential development consists of high density 4 / 5 storey apartments at Teeling Way and Island Key Apartments. There nearest designated site is the South Dublin Bay and River Tolka Estuary SPA (c.750m to the north and c.2.2km to the southeast), South Dublin Bay SAC (c.2.2km to the southeast), North Bull Island SPA (c.3.4km to the east) and North Dublin Bay SAC (c3.4km to the northeast).

[17] Department of Housing, Planning and Local Government (My Plan): http://www.myplan.ie/webapp/

7.3.3 Employment

The CSO's Labour Force Survey for Q4 of 2018[18] identified an annual increase in employment of 2.3% (50,500) in the year to the fourth quarter of 2018, with total employment at 2,281,300. Unemployment decreased by -10.5% (15,200) in Q4 of 2018, bringing the total number of persons unemployed to 128,800. This is the 26th quarter in succession where unemployment has declined on an annual basis.

The long-term unemployment rate decreased from 2.5% to 2.1% over the year to Q4 of 2018. Long-term unemployment accounted for 38.9% of total unemployment in Q4 of 2018.

Approximately 350,000 people work in the DCC administration, with more than 750,000 in the GDA[19]. Currently c.800ha are zoned for employment purposes (Z6 and Z7) across the City. The key employment location is the City centre (Z5) as this area is well served by public transport, with employment hubs in Dublin 2 and Docklands and emerging locations such as Smithfield / Grangegorman, Heuston and the Digital Hub.

Table 7.5 below outlines the employment by industry in North Dock B (ED), from the 2016 Census. The largest percentage of the population worked in '*Commerce and Trade*' (28%), while just 2% worked in '*Building and Construction*'.

Table 7.5: Employment by Industry in North Dock B (2016)[20]

Industry in North Dock B	Male	Female	Total
Agriculture, Forestry & Fishing	1	1	**2**
Building & Construction	91	8	**99**
Manufacturing Industries	139	59	**198**
Commerce & Trade	708	665	**1,373**
Transport & Communications	558	299	**857**
Public Administration	134	88	**222**
Professional Services	262	507	**769**
Other	899	446	**1,345**
Total	**2,792**	**2,073**	**4,865**

7.3.4 Community & Local Amenities

The Site is located c.1.8km east of Dublin City Centre, which is a highly developed and concentrated area of residential, commercial, industrial, community and leisure receptors. Dublin City has a range of community facilities including parks / open spaces, sports / recreational, playgrounds, youth centres and libraries.

East Wall's community groups and recreational facilities include a recreational centre, community centre, youth club and a Men's shed. Leisure activities (e.g. walking, running, cycling) in the area located in close proximity (c.2km) to the Site include, parks (Fairview Park and Ringsend Park) and waterbody amenities (Royal Canal, River Liffey and North and South Dublin Bay) and cycle routes.

South Dublin Bay and River Tolka Estuary SPA (c.750m to the north and c.2.2km to the southeast), considered as a cultural asset, provides the local community with an amenity site suitable for walking, running and cycling.

[18] CSO Labour Force Survey 2018: https://www.cso.ie/en/releasesandpublications/er/lfs/labourforcesurveyquarter42018/
[19] Dublin City Development Plan: http://www.dublincity.ie/sites/default/files/content/Planning/DublinCityDevelopmentPlan/Written%20Statement%20Volume%201.pdf
[20] CSO 2016 Electoral Division North Dock B: http://census.cso.ie/sapmap2016/Results.aspx?Geog_Type=ED3409&Geog_Code=2AE196291DB413A3E055000000000001#SAPMAP_T13_1301

7.3.5 Human Health

The surrounding environs consists of a mix of residential, commercial, warehousing, some recreational facilities and industry. However, due to the close proximity of the Site to Dublin Port, there are a number of industrial processes (including SEVESO II Directive sites (96/82/EC & 2003/105/EC) within 1km, which would be likely to result in a risk to human health and safety.

There are two thresholds, a lower one of 50 tonnes (lower tier) and a higher one of 200 tonnes (top tier). Lower tier sites are required to have a Major Accidents Prevention Policy and a Safe Work Systems Plan. Top tier sites are required to carry out, in conjunction with the local competent authority (which includes the Health Service Executive, the Local Authority, An Garda Síochána and in the case of New Ross, New Ross Port Company) a Major Accidents External Emergency Plan. There are 2 No. SEVESO sites (lower tier) which are <1.km from the Site, see Table 7.6 below.

Table 7.6: Seveso Sites within 1km from the Site

Distance from Site	Name and Address
<1km	Topaz Energy Group, T1, Alexandra Road, Dublin Port, Dublin 1
<1km	Topaz Energy Group, Yard 3 Alexandra Road, Dublin Port, Dublin 1

In addition the baseline conditions associated with Traffic & Transport are outlined in Section 11.3, the baseline conditions associated with Land, Soils, Geology & Hydrogeology are outlined in Section 12.3, the baseline conditions associated with Air Quality & Climate are outlined in Section 14.3 and the baseline conditions associated with Noise & Vibration are outlined in Section 15.3 of this EIAR.

7.4 Potential Impact of the Proposed Project

This Section describes the effects that are likely to arise in the absence of mitigation, as a result of the proposed Project, during both the Construction and Operational phases.

Potential Impacts are considered under the following headings: population, gender & age, land use, employment, community & local amenity and human health.

7.4.1 Construction Phase

7.4.1.1 Population, Gender & Age

The Construction Phase of the proposed Project is unlikely to have any significant increase or decrease on the local population. It is expected that construction workers will travel from their existing residence rather than taking temporary accommodation in the local area. However, there will be a short-term increase in the local working population during the Construction Phase.

Impacts to the local population are considered to *be neutral, imperceptible, temporary* in nature and therefore not considered *significant.*

Construction related activities, including construction noise, dust and traffic *etc*. have the potential to impact the local population. Such activities will result in *negative*, *short-term* impacts. These impacts are addressed in the relevant specialist chapters of this EIAR.

A pCMP detailing construction methods and construction hours has been prepared and is submitted with this planning application. The pCMP will be designed to minimise potential impacts to local population, see the Planning Application pack.

7.4.1.2 Land Use

The Construction Phase of the proposed Project will consist of site clearance, demolition, excavation and construction works. The proposed Project will comply with the statutory land use zoning policies and objectives of the Dublin City Development Plan and the NPF. Development of the Site will align with the NPF objective to achieve compact growth and in doing so will realise the efficient use of currently underutilised brownfield land with higher housing density.

Construction works are likely to take place over a 30 month period. During this time, there will be no severance of land, loss of rights of way or amenities as a result of the proposed Project. However the Construction Phase has the potential to impact *negatively* and result of the *temporary* degradation of the local visual environment for a *short-term*. See Chapter 10 (Landscape & Visual) for more detail on the visual impact.

It is considered that the overall potential impacts are *negative,* of *slight significance* and are anticipated to be of *short-term* duration. The potential effect overall is considered to be *not significant*.

7.4.1.3 Employment

The Construction Phase will provide a boost for the local construction sector in terms of new employment, materials and construction costs.

During the peak Construction Phase, approximately a significant number of people will be **directly** employed on the Site. Where practicable, a local labour will be employed.

Indirectly, employment and economic activity associated with the provision of construction materials and associated professional services (architectural, engineering and legal services) and local retail will benefit from the proposed Project. These *positive* impacts on economic activity will be *temporary*, however overall they contribute to the future viability of the construction sector. Therefore, such impacts will be *positive*, *very significant* and of *short-term* duration.

7.4.1.4 Community & Local Amenities

Construction related activity has the potential to increase baseline noise, which could cause disturbance to the local residents and the users of the community and recreational facilities (Sean O'Casey Community Centre and the East Wall Recreational Centre). The East Wall Men's shed will be demolished for a short-term, but a new facility will be included as part of the proposed Project.

Construction traffic could cause disturbance from possible odour releases / air and dust emissions from the movement of materials to and from / around the Site. Such activities will result in *negative, short-term* impacts, however these impacts are addressed further in the relevant specialist chapters of this EIAR.

Construction of new residential structures will impact the existing views of surrounding residential properties, public roads and industries.

At the closer Docklands scale, there will be views of the construction activity and emerging structures along street corridors and from more open vantage points. Visual effects will range from *slight / not significant* and *negative*, to *significant* / *moderate* and *negative*.

At the local scale, construction activity and the emerging development, particularly following construction of the podium level and lower floors, will be more visible from the adjoining established residential streets and developments at East Wall and at Merchant's Square. Visibility from these closer and generally more sensitive locations will typically give rise to *significant* / *moderate negative* visual effects as the new and larger scale buildings emerge in views where no existing structures are currently visible.

Effects on views during the Construction Phase will be *temporary* to *short term*, and will also vary considerably from the wider city scale to the more local context of the Site.

There is not anticipated to be any direct socio-economic impacts on the parks (Fairview Park and Ringsend Park) and waterbody amenities (Royal Canal, River Liffey and South Dublin Bay) during the Construction Phase, due to their distance from the Site.

As a result, the potential effects are *adverse*, of *slight significance* and of *short-term* duration.

7.4.1.5 Human Health

The Construction Phase may result in short-term impacts to human health in the local area, as a result of construction traffic, dust, noise and contaminated land.

Potential effects from traffic include concerns relating to accidents and safety, pedestrian safety and intimidation. Indirect impact may result from an increase in local traffic volumes, transporting materials to and from the Site, and are likely to affect the local population and human health. The potential impacts from traffic and transport are addressed further in Chapter 11 (Traffic & Transport) of this EIAR.

Air quality (dust), noise and vibration are the main concerns in respect to potential impacts on human health, as a result of the proposed Project. Excessive levels of noise and vibration can cause deficiencies in hearing and sleeping patterns and contribute to hypertension, heart disease and provoke annoyance[21]. All of which can result in the deterioration of a person's health. The potential impacts to air quality, noise and vibration are addressed in Chapter 14 and Chapter 15 respectively of this EIAR.

The proposed Project is located on an existing brownfield site. As such there is a potential impact to human health associated with potential contaminated land at the Site. The potential impacts from contaminated land are addressed in Chapter 12 (Land, Soils, Geology & Hydrogeology) of this EIAR.

Construction impacts to human health are likely be *negative, significant* and *short-term* in duration and addressed further in the relevant specialist chapters of this EIAR. Construction impacts to human health will be monitored through the implementation of the pCMP. The pCMP will outline the Site operational hours, during the Construction Phase, and is designed to minimise potential impacts to the local population.

7.4.2 Operational Phase

7.4.2.1 Population, Gender & Age

The Operational Phase of the proposed Project will result in the provision a mixed-use development of 554 No. apartments, an enterprise space, retail units, foodhub / café / exhibition space, residential amenity, crèche and a Men's shed. This will provide accommodation for approximately 1000 persons in the East Wall area. The proposed Project will contribute to the settlement growth of the Dublin City, and accommodate a portion of the planned population growth of the City. Therefore, the proposed Project will have *a positive, significant* and *permanent* impact on the population of East Wall.

The local population increase will generate additional local spending to a range of businesses and services and will likely have a *positive, moderate* and *long-term* impact on economic activity of the area.

7.4.2.2 Land Use

The proposed Project (complies with the statutory land use zoning[22]) will result in a mixed-use development (including residential, commercial, retail and amenity and community facilities). The proposed Project will provide much needed housing and facilities to the growing population of the area and Dublin City. As there is a housing crisis in the City, it is expected that a high-density mixed-use development will result in a *positive*, *significant,* and *permanent* in duration impact. Recreational amenity space is also provided in addition to other land uses such as a crèche and retail space. The potential effect overall is determined to be *significant.*

[21] WHO: http://www.euro.who.int/en/health-topics/environment-and-health/noise
[22] R4 – Strategic Residential Reserve

7.4.2.3 Employment

The Operational Phase will have a positive impact on employment, as the proposed Project includes the provision of an enterprise space, retail units, foodhub / café / exhibition space, residential amenity and crèche. Furthermore, the proposed Project may attract additional employment / economic activity to the area, given the fact that residential is the predominant land use proposed.

The impact of the proposed Project are assessed as *positive,* of *slight significance* and anticipated to have a *medium* to *long-term* duration.

7.4.2.4 Community & Local Amenities

The proposed Project has provisions for an enterprise space, retail units, foodhub / café / exhibition space, residential amenity, crèche and a Men's shed. These facilities will benefit future residents and existing residents in the local environs.

The development of the Site from a brownfield site to a mixed-use development will improve the vitality and vibrancy of East Wall and will help support existing community and social infrastructure. The new residents of the will be able to avail of the existing range of community facilities and local amenities.

The impact of the proposed Project are assessed as *positive,* of *slight significance* and of *long-term duration.*

7.4.2.5 Human Health

A lack of physical activity[23], (identified by the WHO), is the 4th leading risk factor for global mortality[24]. Urban air pollution and traffic injuries are also responsible for a further 2.6 million deaths annually. The central location of the proposed Project promotes, walking, cycling and use of public transport thus promotes active movements for future residents. Health benefits of physical activity (walking and cycling combined with public transport) can prevent many of these deaths from physical inactivity. The central location of the proposed Project in the City has the potential to positively impact on human health.

The Operational Phase will result in an *adverse, slight* and *permanent* impact on local air quality, as a result of heating requirements for buildings and with the increase in traffic movements.

Adequate and appropriate exposure to daylight is critical for human health and well-being. Light impacts human health and performance by enabling performance of visual tasks, sleeping patterns and affecting mood. See Chapter 16 (Microclimate (Daylight / Sunlight)) and Chapter 17 (Microclimate (Wind)) for the potential daylight / sunlight and wind impacts to human health as a result of the proposed Project.

A Strategic Site Flood Risk Assessment (SSFRA) was prepared for the proposed Project to comply with current planning legislation and forms part of this planning application. The Flood Risk Management (FRM) Guidelines require a SSFRA to '*gather relevant information sufficient to identify and assess all sources of flood risk and the impact of drainage from the proposal*'.

The objectives of the SSFRA is to inform the planning authority regarding flood risk for the Site of the proposed Project. The SSFRA relates only to the Site in the vicinity of East Road and its immediate surroundings. The SSRA report follows the requirements of *'The Planning System & Flood Risk Management - Guidelines for Planning Authorities'*[25]. FRM Guidelines propose that a *Justification Test* be applied to assess the appropriateness, or otherwise, of particular developments that are being considered in areas of moderate or high flood risk.

[23] Physical activity includes exercise as well as other activities which involve bodily movement and are done as part of playing, working, active transportation, house chores and recreational activities.
[24] WHO: https://www.who.int/dietphysicalactivity/pa/en/
[25] OPW: https://www.opw.ie/en/media/Planning%20Guidelines%20-%20FRM%20-%20Nov%202009.pdf

The Site is located within the Flood Zone A, *i.e.* high probability of flooding. Although, the Site is also located in an area protected by flood defences. (See Figure 3.4 and Figure 3.5 of the SSFRA for East Road). Therefore a *Justification Test* was completed to justify development in this flood risk area.

The proposed Project passed the *Justification Test* in accordance with the FRM Guidelines and the proposed Project is deemed appropriate to be located within Flood Zone A on the basis that the mitigation measures stipulated within the justification are met, see the SSFRA, Proposed Mixed-Use Development, as part of this planning application.

The proposed Project is within Flood Zone A for tidal flooding, however the Site is located in an area that benefits from flood defence measures, therefore the SSFRA has assessed a *residual* risks associated with breach of these defences.

The proposed Project therefore is unlikely to result in *negative* impacts in relation to Population and Human Health in this regard.

7.5 Mitigation Measures

7.5.1 Construction Phase

A final CMP will be prepared by the appointed Contractor prior to work commencing on the Site. The final CMP shall contain the mitigation measures identified in this EIAR and ensure that they are fully implemented during the Construction Phase, to prevent or reduce the impacts identified in the impact assessment.

All site personnel will be required to understand and implement the requirements of the final CMP and will be required to comply with all legal requirements and best practice guidance for construction sites.

The proposed Project will look to procure material and services from local providers, where reasonably practicable, and within the requirements of the procurement process. In doing so, this would encourage additional economic activity in the local economy which may subsequently result in indirect employment opportunities being created.

The mitigation measures, proposed throughout this EIAR, are likely to result in any *significant and likely adverse* environmental impacts on Population & Human Health during the Construction Phase being avoided.

A preliminary H&S Plan will be developed during the detailed design. This Plan will address health and safety issues from the design stages. The appointed Contractor will be required to prepare a final Construction Phase H&S Plan and any employed subcontractors will also be required adhere to this Plan. This Plan will operate in line with ISO 18001 & ISO 14001.

Adherence to the Construction Phase mitigation measures outlined in this EIAR will ensure that the construction works will an *imperceptible* and *neutral impact* in terms of health and safety.

7.5.2 Operational Phase

The Operational Phase is the development of a mixed-use development which will change the Site from a warehousing / industrial space to a residential development with amenity facilities. The proposed Project has been designed to *avoid negative impacts* on Population & Human Health through the provision of a development which includes:

- inclusion of an retail and development - enterprise centre, retail units and exhibition space;
- inclusion of childcare facilities - crèche;
- inclusion of amenity facilities - foodhub, café, residential amenity & a Men's shed;
- landscaping to mitigate against issues arising from microclimate conditions - plant areas; and
- high quality finishes and materials.

No significant risks to Population & Human Health, as a result of the proposed Project, have been identified during the Operational Phase. The proposed Project is considered to have a *positive* and *significant* impact. No further mitigation measures are required.

7.6 Residual Impacts

Residual impacts are the final or intended impacts which occur after the proposed mitigation measures have been implemented. They refer to the degree of change that will occur after the proposed mitigation measures have taken effect.

The proposed Project is anticipate to provide a *significant positive* impact to the overall economy and social benefits for the local area and Dublin City. Adherence to the mitigation measures outlined above in this Chapter will ensure that there will be no *negative residual impacts or effects* on Population & Human Health, during the Construction and Operational Phase of the proposed Project. The provision of residential accommodation will result in a *likely significant positive effect* for the local area.

7.7 Monitoring

In relation to Population & Human Health, measures to avoid negative impacts are largely integrated into the design and layout of the proposed Project. Compliance with the design and layout will be a condition of any permitted development.

The Building Regulations certification process will address the necessary monitoring requirements of specific conditions of planning permission. Site specific Health & Safety requirements will be undertaken by the Site Project Manager for the Construction Process.

In relation to impacts from Air Quality & Climate, Traffic & Transport and Noise & Vibration *etc*. these monitoring measures will be addressed in the relevant specialist Chapters of this EIAR.

7.8 Reinstatement

There are no reinstatement plans proposed specifically with respect to Population & Human Health.

7.9 Interactions

It is considered that there is the potential for *slight, temporary negative impacts* on the existing population due to dust, noise and construction traffic associated with the Construction Phase of the proposed Project. In addition, general construction activities will also have a *temporary* impact on the landscape of the area, in terms of both general visual disturbance and visual intrusion. These impacts are addressed in more detail in Chapters 8-19. These impacts are not considered to be *significant.*

There is a potential for the Operational Phase of the proposed Project to impact human health via air, noise, traffic and daylight / sunlight. These issues are discussed fully under the relevant Chapters:

- Chapter 11: Traffic & Transport;
- Chapter 12: Land, Soils, Geology & Hydrogeology;
- Chapter 14: Air Quality & Climate;
- Chapter 15: Noise and Vibration;
- Chapter 16: Microclimate (Daylight / Sunlight);
- Chapter 17: Microclimate (Wind); and
- Chapter 19: Material Assets (Waste).

7.10 Difficulties Encountered in Compiling the Chapter

No difficulties were experienced in compiling this Chapter of this EIAR.

7.11 Cumulative Impacts

In addition to the proposed Project there are a number of additional developments proposed in the vicinity of the Site that are considered in terms of a cumulative impact on the surrounding communities. These projects are discussed in Chapter 21 (Cumulative impacts).

The proposed Project on its own will have a *positive, significant* and *permanent* impact on the population of East Wall in the provision of a mixed-use development and amenity and enterprise facilities. The proposed Project, in-combination with the wider Dublin City Development Plan has the potential to have a *profoundly positive impact* on the local and regional population in terms of employment opportunities and wellbeing.

7.12 'Do-Nothing' Impact

A '*do-nothing*' scenario is not considered valid as the lands are currently zoned for redevelopment under the Development Plan. In the event that the proposed Project does not proceed, it is likely that the Site will remain in its current use until an alternative redevelopment proposal is granted planning permission.

7.13 References

- National Planning Framework, Ireland 2040 – Our Plan (Government of Ireland, 2018): http://npf.ie/
- Regional Planning Guidelines for the Greater Dublin Area 2010-2022: https://emra.ie/dubh/wp-content/uploads/2015/02/Greater-Dublin-Area-Regional-Planning-Guidelines-2010-2022-Volume-I.pdf
- Draft Eastern and Midlands Regional Spatial and Economic Strategy: https://emra.ie/regional-strategies/rses/
- Dublin City Development Plan 2016-2022: http://www.dublincity.ie/sites/default/files/content/Planning/DublinCityDevelopmentPlan/Written%20Statement%20Volume%201.pdf
- Environmental Impact Assessment of Projects: Guidance on the preparation of the EIAR, EC (2017): http://ec.europa.eu/environment/eia/eia-support.htm
- EPA Guidelines on the Information to be Contained in Environmental Impact Statements Assessment Reports (Draft) (EPA, 2017): https://www.epa.ie/pubs/advice/ea/EPA%20EIAR%20Guidelines.pdf
- EPA Advice Notes on Current Practice in the Preparation of Environmental Impact Statements (EPA, 2003) (and revised advice notes 2015): http://www.epa.ie/pubs/consultation/reviewofdrafteisguidelinesadvicenotes/Draft%20Guidelines%20on%20the%20Information%20to%20be%20contained%20in%20an%20EIS.pdf
- Department of Housing, Planning & Local Government: http://www.myplan.ie/webapp/
- Fáilte Ireland Guidelines on the treatment of Tourism in an Environmental Impact Statement (2011): http://www.yellowriverwindfarm.com/files/EisAppendices/Appendix%20F%20-%20Statutory%20&%20Non-statutory%20Consultees/02.%20F%C3%A1ilte%20Ireland%20EIS%20and%20Tourism%20Guidelines%202011.pdf
- Central Statistics Office (CSO) website www.cso.ie
- CSO Map: http://census.cso.ie/sapmap/
- CSO Labour Force Survey 2018: https://www.cso.ie/en/releasesandpublications/er/lfs/labourforcesurveyquarter42018/
- World Health Organisation (WHO): https://www.who.int/

8 Cultural Heritage, Archaeology & Architectural

8.1 Introduction

This Chapter of the EIAR considers and assesses the cultural and heritage, archaeological and architectural environment of the proposed Project at East Road, Dublin 3. The purpose of the study is to assess the possible significance of the receiving cultural and heritage, archaeological and architectural environment and to identify and evaluate the significance of the impact of the proposed Project on this environment and to suggest any ameliorative measures that might be appropriate.

8.2 Methodology

8.2.1 Desk Study

The assessment is based on a desk study. The Site is a brownfield site, with no archaeological or architectural heritage sites in its vicinity, and its current state was confirmed using aerial imagery. The desk study availed of the following sources:

- The National Monuments, Preservation Orders and Register of Historic Monuments lists were sourced directly from the Department of Culture, Heritage and the Gaeltacht (DCHG);
- 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 Record of Monuments and Places in 1994 (RMP; pursuant to Section 12 of the National Monuments (Amendment) Act, 1994). 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, DCHG), 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), Dublin City Development Plan (2016-2022);
- The topographical files of the National Museum of Ireland;
- Cartographical sources included, deGomme (1673), Bolton, (1717), Brooking (1728), Rocque (1756), Taylor (1816), Clarke's map of a conjectural medieval city superimposed on the 1943 edition of the Ordnance Survey (OS) map (not shown) and various editions of the OS Maps;
- Excavations Bulletins and Excavations Database (1970-2018);
- Other documentary sources (as listed in the references, Section 8.13); and
- Aerial imagery (Google Earth 2001–2013, Bing 2013; OSi 1995, 2000, 2006).

8.2.2 Standards and Guidelines

The following legislation, standards and guidelines were consulted to inform the assessment:

- National Monuments (Amendments) Acts, 1930-2014;
- The Planning and Development Act 2000, as amended;
- Heritage Act, 1995;
- The UNESCO World Heritage Convention, 1972;
- ICOMOS Xi'an Declaration on the Conservation of the Setting of Heritage Structures, Sites and Areas, 2005;
- Council of Europe Convention for the Protection of the Architectural Heritage of Europe (Granada) 1985, ratified by Ireland in 1991;
- Council of Europe European Convention on the Protection of the Archaeological Heritage (Valletta) 1992, ratified by Ireland in 1997;

- The Burra Charter, the Australia ICOMOS Charter for Places of Cultural Significance 2013;
- The European Landscape Convention (ELC), ratified by Ireland 2002 European Landscapes Convention 2010. (The Department of the Environment, Heritage and Local Government 'Landscape and Landscape Assessment Guidelines' have been in draft form since 2000, however the Draft National Landscape Strategy (NLS) was launched in July 2014);
- Guidance on Heritage Impact Assessments for Cultural World Heritage Properties – A publication of the International Council on Monuments and Sites, January 2011;
- Guidelines on the information to be contained in Environmental Impact Statements, 2002, EPA;
- Advice Notes on Current Practice (in preparation of Environmental Impact Statements), 2003, EPA;
- EPA: Draft Revised Guidelines on The Information to be Contained in Environmental Impact Statements, September 2015;
- EPA: Advice Notes for Preparing Environmental Impact Statements, Draft, September 2015;
- Frameworks and Principles for the Protection of the Archaeological Heritage, 1999, (formerly) Department of Arts, Heritage, Gaeltacht and Islands;
- Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act, 2000 and the Planning and Development Act 2000;
- Code of Practice between the National Roads Authority (NRA) and the Minister for Arts, Heritage and the Gaeltacht, June 2000;
- Guidelines for the Assessment of Architectural Heritage Impact of National Road Schemes, 2006, NRA;
- Guidelines for the Assessment of Archaeological Heritage Impact of National Road Schemes, 2006, NRA;
- Guidelines for the Testing and Mitigation of the Wetland Archaeological Heritage for National Road Schemes, 2006, NRA;
- National Landscape Strategy for Ireland 2015-2025, Department of Arts, Heritage and the Gaeltacht;
- Historic England (July 2015), Historic Environment Good Practice Advice in Planning, Note 3: The Setting of Heritage Assets;
- Historic Scotland (October 2010), Managing Change in the Historic Environment; and
- The Heritage Council (2010), Proposals for Irelands Landscapes; and International Council on Monuments and Sites (2011), Guidance on Heritage Impact Assessments for Cultural World Heritage Properties.

Excerpts from the relevant legislation are contained in Appendix A8.1.

8.3 Baseline Environment

8.3.1 Archaeological and Historical Background

8.3.1.1 Introduction

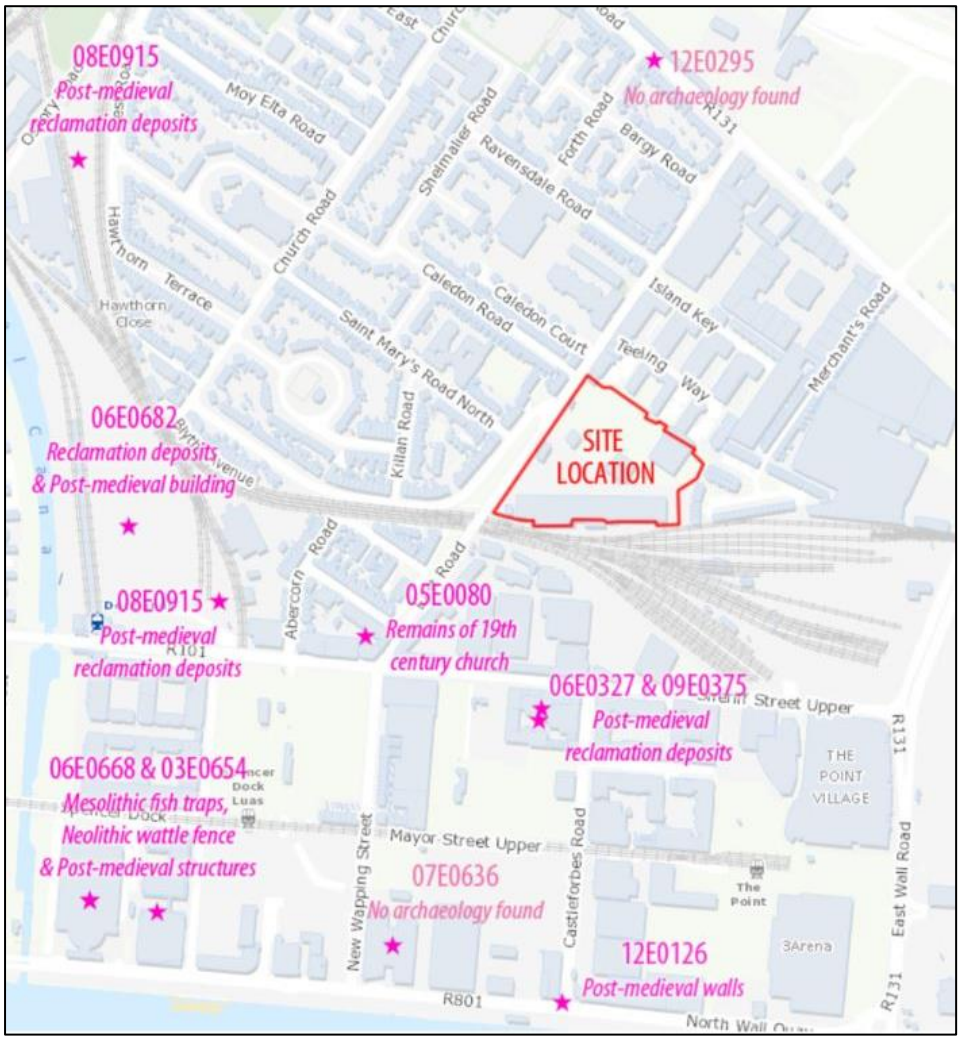
The proposed Project site lies within an area of the City that, until the large-scale reclamation projects of the late 17th and 18th centuries, formed part of the sloblands of the broad River Liffey estuary. It is located well outside of the zone of archaeological potential (ZAP) for Historic Dublin (c.475m north and over 1km east of the ZAP boundary).

8.3.1.2 Prehistoric Riverine Activity in the Study Area

The earliest human activity in Ireland dates from the Mesolithic period (c. 8000-4000BC), with the evidence indicating a strong preference for riverine and coastal areas. In the GDA, for example, large numbers of Mesolithic tools have been recovered from the Malahide and Rogerstown estuaries. Middens are also recorded at Sutton to the north of Dublin Bay and at Dalkey Island to the south. Evidence for activity in the vicinity of rivers, the sea and indeed lakes probably reflects the importance of fish in the diet of Mesolithic people, a trend observed in other

European countries. Furthermore, given the absence of the large mammals hunted in mainland Europe, it is even more likely that fish and fowl were important sources of meat in Mesolithic Ireland[26].

There is very little evidence for prehistoric activity in the Dublin City area, although a number of artefacts recovered from excavations indicate a prehistoric presence on and around the banks of the Liffey. The most significant evidence for prehistoric activity along the River Liffey, however, it was revealed in 2004 and 2006-07 during archaeological investigations at the Spencer Dock development site on North Wall Quay, c.550m southwest of the Site (this large block of land now houses the National Convention Centre and adjacent residential buildings; see



below). The material uncovered had been sealed beneath 18th century reclamation deposits and post-medieval structural remains and was located at the southern end of the Site, in an area formerly occupied by the Liffey estuary (McQuade, Excavations 2003:0576, Licence No. 03E0654; Myles & McQuade, Excavations 2006:634 & 2007:494, Licence no. 06E0668).

The excavations revealed evidence relating to prehistoric riverine activity in the silts which had accumulated to the south of the former shoreline of the River Liffey, c.13m-16m north of the North Wall Quay. This included the discovery in 2006/07 of Late Mesolithic fish trap remains (radiocarbon dated to 6000-5840 BC) and a mid-Neolithic wattle fence (which was probably also part of a fish trap structure) and dated to 5980-5760BC (located at depths of -5mOD and c.-4.66mOD respectively[27]). The Late Mesolithic fish traps excavated in 2006/07 are similar to the very well-preserved archaeological remains of up to five finely woven wooden fish traps of late Mesolithic date (6100-5720 cal. BC) identified in 2003/4 on the adjacent site to the east. The wooden remains were preserved in

[26] McQuade, M. (2007)
[27] McQuade, M. (2007)

the silt deposit, with the activity concentrated c.1.2–1.3m to the south of the early shoreline of the River Liffey and in the estuarine waters to the south at an average depth of -5mAOD[28].

The discovery of the first fish traps in 2003/04 was of international significance as they were the earliest dated examples recorded in either Ireland or the UK. They provided the first definitive evidence for the use of fish traps in Ireland during the Mesolithic period. The subsequent discovery of another Late Mesolithic fish trap nearby illustrates that the Late Mesolithic population of the Dublin area were, over a period of up to 200 years, fishing along a 70m a stretch of the River Liffey intertidal zone in the area currently known as Spencer Dock. The remains of the large wooden Middle Neolithic fish trap further indicates that several millennia later, the occupants of the surrounding area were once again fishing along this part of the River Liffey estuary[29]. Although no evidence for prehistoric settlement was uncovered at the site, the people who constructed and used the fish traps must have been living nearby.

There is tantalising evidence of further waterlogged wooden remains of possible prehistoric date on a neighbouring site (c.320m southwest of the Site), though unfortunately no radiocarbon dates are currently available. They were uncovered during archaeological monitoring of bulk excavations by Archaeological Development Services (ADS) Ltd. in 2011/2012 in advance of the planned North Lotts pumping station. The remains comprised two clusters of horizontal brushwoods that were identified in the sandy silt deposit at levels of between -1.39m and -1.43mOD, which is significantly closer to present ground level than the remains found on the NCC / Spencer Dock site. The arrangement of the surviving wood pieces did not retain the original form of the structures from which they came. In addition, there were no in situ pegs and none of the pieces could be described as stakes. Nonetheless, the remains may represent parts of larger structures, possibly fish-traps that had been damaged and displaced by the tide (McQuade 2012; Licence No. 09E0375). All of the remains were preserved by record by means of archaeological excavation[30], though post-excavation analysis was not completed due to funding problems on the part of the developer[31].

8.3.1.3 Post-Medieval Period - Introduction to the Sources

This Section examines the historical evidence for settlement on the Site from the inception of the reclamation project in the late 17th century through to its residential and industrial usage in the 19th and 20th centuries. The industrial heritage is characterised locally by the extension of the Royal Canal navigation to the river and the subsequent arrival of the railway. The introduction of the latter altered the flat landscape of the polder, necessitating the elevation Sheriff Street, one of the principal thoroughfares in this area.

The primary source for the early history of the area is the *Calendar of Ancient Records of Dublin* (CARD), the earlier volumes of which were compiled by Sir John Gilbert in the last decade of the 19th century. The CARD volumes record the activities of the Municipal Corporation of Dublin and, from 1708 onwards, those of the Ballast Office, which elected its committee of directors from the City Assembly.

Other early sources used are primarily cartographic in nature. These include Bolton's Map of 1717, a pictorial representation of the notionally reclaimed area drawn up by J. Macklin during the mayoralty of Thomas Bolton, and later maps drawn up for the Wide Streets Commissioners (WSC). Other maps consulted were Bernard de Gomme's *The city and suburbs of Dublin* and *A map of Dublin harbour*, both dating to 1673; Charles Brooking's *A map of the city and suburbs of Dublin* (London, 1728); John Rocque's *Plan of the city of Dublin and the environs* (Dublin, 1756; his better-known *Exact survey of the city and suburbs of Dublin* stops a few hundred meters short of the site); and the *Modern plan of the city and environs of Dublin, including the Grand and Royal Canals, new docks, etc.*, published in Wilson's *Dublin Directory* in 1798. Various editions of the Ordnance Survey have been consulted for the later period of the site's morphological development.

[28] McQuade, M. (2005)
[29] McQuade, M. (2007)
[30] McQuade, M. (2012)
[31] *Pers. Comm*. Eoin Halpin, ADS Ltd., June 2015

8.3.1.4 Post-Medieval Period

The relatively settled state of Ireland after the succession of James II acted as a catalyst to the continued expansion of the urban centre beyond the medieval walls. In Dublin, the requirement of new building ground to ease the accommodation situation within the walls was analogous with the necessity of keeping the harbour open to shipping. The construction of permanent stone quaysides had the double advantage of providing secure berthing for shipping while allowing the directed flow of the River Liffey to retard the silting up process that had always been a problem for the medieval port. Land thus reclaimed was ostensibly in the hands of the city, the shoreline having been included in the riding of the franchises as early as 1488; private development was encouraged, however, with preferential rents and leases.

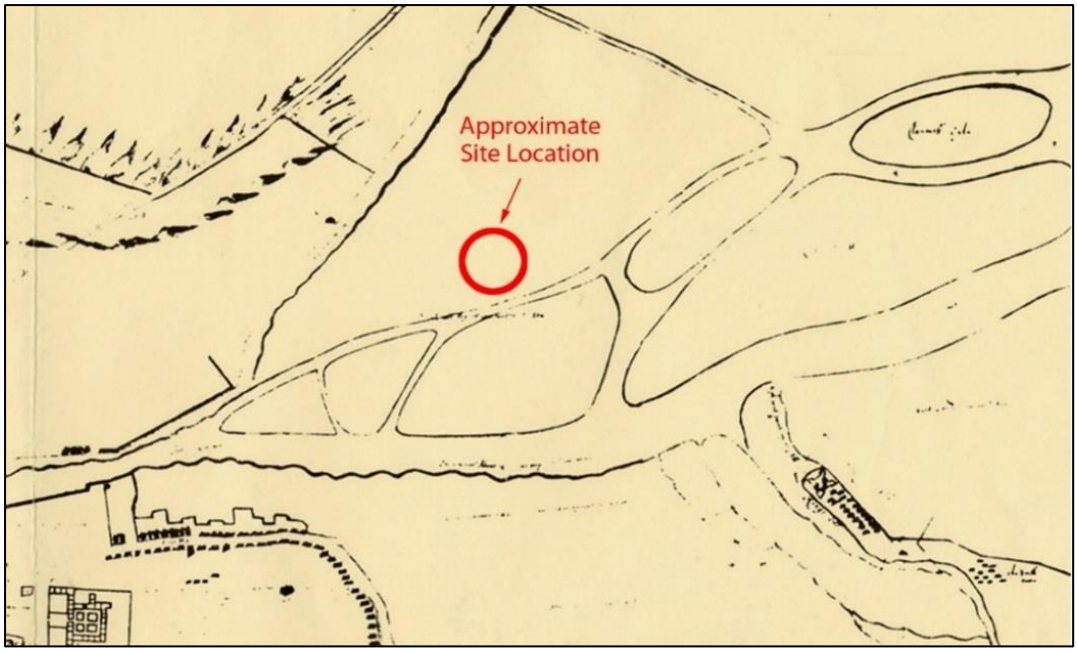
Two maps produced by de Gomme in November 1673 accurately depict the City and harbour in the period immediately prior to the reclamation of the sloblands to the northeast of the City. The map of the harbour was produced as a supplement to the better-known city map and included a contemporary account of the approaches to the port, see Figure 8.1 below. Of particular interest is the description of the area occupied by today's Gardiner and Lower Abbey Streets as '*marsh ground*,' while the slope to the north towards Mountjoy Square and Summerhill is depicted as '*the heights*.' The general area of the Site is located among the tortuous channels of the River Liffey, where expanses of mud may have been exposed at spring tides. The situation was further complicated by the estuary of the Tolka River, which emerged from the northwest, the confluence of both rivers leaving only one area of high ground, Clontarf Island, exposed at high tides.

The shoreline depicted by de Gomme would appear to start from a small promontory in the general area of the Abbey Theatre, continuing along a line which today extends along Amiens Street as far as the Five Lamps before turning slightly to the north between Ballybough Road and North Strand Road to Luke Kelly Bridge (over the Tolka River) and on to Fairview Strand[32]. The shoreline adopted by the Geological Survey of 1915 was based on de Gomme's evidence. The impetus to extend this shoreline to the east came from the City Assembly, which commissioned a survey of the area stretching eastwards to the present-day East Wall Road in 1682.

The assembly had previously taken a speculative interest in the reclamation of the River Liffey sloblands on the southside, offering George Burroes a lease of four and a half acres east of the mouth of the River Staine in 1599 to manufacture bricks[33]. If the ground were to prove inadequate, Burroes was to be given the opportunity to relocate his workings, provided he backfill his old site and '*committ noe nusans*.' The period leading up to the Confederate Wars of the 1640s saw interest grow in the financial possibilities of reclamation work along the south side of the River. This is reflected in the number of disputes between the City Assembly and prominent property speculators of the day. While reclamation work initially focused on the opening of a direct and secure route to Ringsend – and in doing so, provide new ground for the City to lease at a profit – the need for a secure harbour to advance the interest of the city's merchants and traders became paramount. William Hawkins's construction of a wall along the river as far as the present-day Townsend Street in 1662–63 was to have an adverse effect on the northern side of the river, where the force of the incoming tide would redirect the flow, causing the formation of sand banks and shallow streams that were even more hazardous to shipping[34].

Figure 8.1: De Gomme's map of Dublin, 1673

[32] de Courcy 1996, p270
[33] CARD ii, p328-9
[34] CARD vi, p402



The 1682 survey resulted in the division of a notional area on the north side of the river ('the strand between Mabbot's Mill [*in the area of Connolly Station*] and the Furlong of Clontarf') into 152 lots, which were to be granted in fee to the mayor, recorder, aldermen, sheriffs, sheriffs' peers and remainder of the common council, along with one lot each to the clerk of the Tholsel and the city surveyor. The lots were to be drawn from a hat after the lord mayor and recorder had made their choice, and the rent was set at 12 pence sterling per annum[35]. The obligation 'to take in and improve' the plots does not appear to have secured the new land from the sea, as four years later the assembly annulled the granting of the strand 'forasmuch as there were great disorders in doing the same'[36]. This decision may indicate that such a huge reclamation undertaking was beyond the efforts of the individual leaseholders and that a more systematic effort would be necessary – perhaps backed by municipal authority – in order to save and reclaim the area from the sea. The city would not, however, be in a position to support such an undertaking for another generation.

Consequently, at the close of the 17th century, it is unlikely that any development had taken place in the area east of the North Strand. That being said, it would be unusual if the area had not been used for the sorts of riverine activities recorded along other estuaries; such evidence for intertidal activity is usually discovered in the form of fish traps, dugout canoes or trackways. The evidence for such activities in the general area is much earlier in date, with both Neolithic and Mesolithic fish traps excavated on a site at Spencer Dock (as above in Section 8.3.1.2), but presumably continued up to the 17th century.

8.3.1.5 Reclamation, 18th century

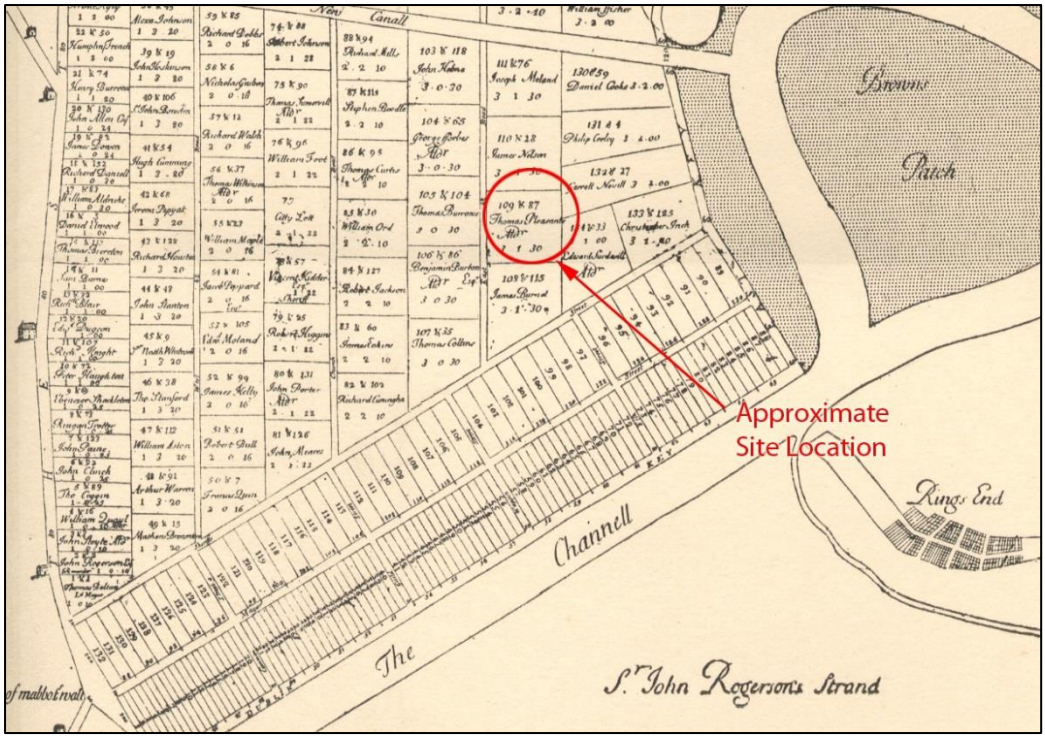
Jurisdiction over tidal waters had, for a long time, been a contentious issue in Dublin. Ostensibly vested in the crown and exercised on the crown's behalf by the lord high admiral, the medieval city charters had given the city the right to construct quays and other structures associated with trade along the river's banks. As trade developed in the post-medieval period, there was a growing demand for the city to take over responsibility for the port and navigation. Private attempts to establish a port authority had, however, been frustrated by the crown's claim to the foreshore and harbour. The corporation itself petitioned the crown on the matter in 1685. The fact that the position of lord high admiral was held by the prince consort, George, did not advance the city's case, and it was not until 1707, when the city was to effectively bribe the admiral with an annual payment of 100 yards of Irish sail cloth, that an act was passed to establish the Ballast Office.

[35] CARD v, p328
[36] CARD v, p383-4

The reclamation of the area between the city and Ringsend has been well documented in the secondary sources[37]. It was accelerated by the assembly's granting of an estate along the strand in 1713 to Sir John Rogerson, who immediately began to enclose his new land with a massive sea wall, thus relieving the Ballast Office of the responsibility. Plans were soon afoot to extend Rogerson's wall out into the bay to provide safer entry for shipping into the port. The Ballast Office now concentrated its efforts on the northern bank of the river, and as early as May 1712, work commenced along the line of the present-day Eden and Custom House Quays. By October, 686 kishes (baskets filled with stone) had been laid down, approximately as far as the western end of the North Wall[38]. As the northern wall began to extend further into the eastern sloblands, the City Assembly ordered that the area between the Tolka River and the River Liffey, along with the sloblands between the Tolka River and Clontarf, be re-surveyed and notionally divided in 132 lots, to be known as the North Lots[39].

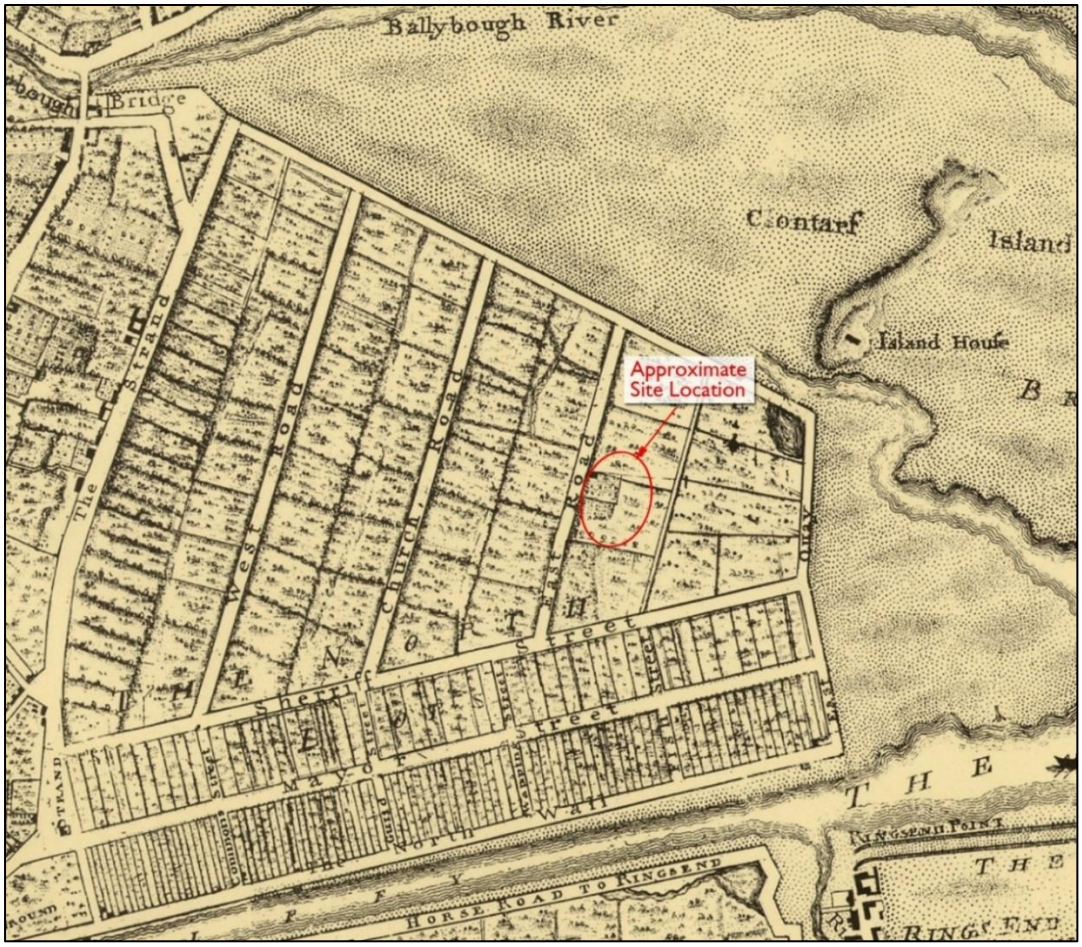
[37] for example de Courcy 1996, p333-5
[38] CARD vi, passim
[39] CARD vii, p30-34

Figure 8.2: Bolton's map of the North Lots, 1717



The survey was carried out by Macklin in 1717, and the resultant schematic map (known as Bolton's Map after the sitting lord mayor) shows both the plots themselves and the names of the initial lease holders, see Figure 8.2 above. East Road is depicted and named and the approximate Site location falls largely within the plot granted to Alderman Thomas Pleasants (Plots No. 109 & 87), but may also include parts of the neighbouring plots (granted to James Nelson and Garrett Nevill). The map also demonstrates confidence in the future development of what effectively became a polder. However, to best appreciate what the City Assembly intended, it is necessary to examine Rocque's 1756 *Plan of the city of Dublin and the Environs, see* Figure 8.3 below*,* which was published just as the reclamation project should have been nearing completion.

Figure 8.3: Rocque's map of Dublin, 1756



The street pattern was to be laid out in grid form (as shown on Rocque's map), the uniformity of which contrasts with the medieval city to the southwest, sprawling out over its walls and merging into the great urban estates, which were themselves in their final state of initial development. The Great North Wall (depicted by Rocque as having an underlying strand extending eastwards for over half its length) fronted a wide quayside, with Mayor Street and Sheriff Street running parallel to the north. These thoroughfares were linked by a series of streets, spaced at regular intervals, named as Commons Street, Guild Street, Wapping Street, Fish Street and the East Wall; the areas in between were divided into plots as indicated on the earlier Bolton's Map. The area north of Sheriff Street is laid out in larger plots that were accessed from The Strand to the west and from West Road, Church Road, East Road and the East Quay, all angled off Sheriff Street, to the northeast. A pool of water is depicted in the very northeast corner of the polder, while there still appears to be streams running through the northern part of the area, indicating the unfinished state of the reclamation work.

The only two plots that were developed to the north of Sheriff Street at the time of Rocque's survey lie on the east side of East Road, within the approximate location of the Site. The northernmost plot contains a small building and garden / cultivated area, with a second cultivated plot immediately south.

The original idea to extend the polder across the Tolka River and to lay out the area as far as Clontarf had been abandoned by the 1730s, and the Tolka River was never channelled into a canal. Reclamation in this area did not commence until the early years of the 20th century.

When, in April 1724, the Ballast Committee informed the City Assembly of its financial difficulties in carrying on projects on both sides of the river simultaneously, the latter voted to extend funding to complete the North Wall

before moving on to the piling for the South Wall[40]. This vote indicated the importance then being placed on northside development by the members of the assembly (not surprisingly, as many of them were lot holders).

The construction of the polder was a classic landfill operation which initially involved the construction of massive sea walls to contain the land and prevent water ingress. As illustrated on Brooking's *A Prospect of the City of Dublin from the North*, by 1728 the North Wall along the Liffey and the East Wall along the southern bank of the Tolka had been constructed, with the area thus contained '*Walled in but as yet overflow'd by ye Tide,* see Figure 8.4 below. His prospect shows ships on the river, their reflections evident on the water behind the wall see Figure 8.5 below. The area of high ground south of the Tolka River appears to be well established with trees and several houses. After the area had been thus enclosed, an attempt was made to pump out the remaining water, a task which had not been completed by 1837.

Figure 8.4: Brooking's map of Dublin, 1728

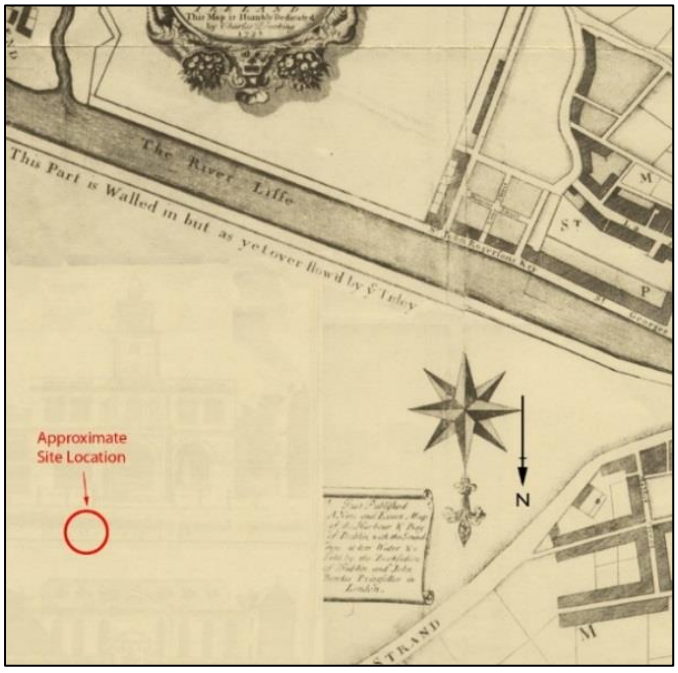


Figure 8.5: Extract from the Prospect from Brooking's map of Dublin, 1728

The material introduced to the new ground came from latrine pits all over the city. This was initially collected by organised groups of scavengers who literally dug out the formal brick or stone-lined pits located in the back plots, carting the material off to laystalls located at strategic points around the city. Here, the material was sorted and dispatched off in barges, the more organic material perhaps being sent up country to be sold as manure, the more

[40]CARD vii, p257-9

general refuse being sent downriver to the reclamation works as evidenced by archaeological work undertaken at different locations on both sides of the River Liffey.

To a greater extent, the urban project at the North Lots was eclipsed by developments happening elsewhere in the City. From the 1740s onwards, the northside estates of Luke Gardiner had attracted those with sufficient funds to invest in property at the upper end of the market. The focus for such investment was soon to shift to the southside again following the construction of Leinster House and the development of the Fitzwilliam estate a decade later, and this area has remained the most fashionable in Dublin until the present day. The Act of Union in 1801 and the resultant exodus of the fashionable classes to London emptied many of the large houses, which soon fell prey to speculative landlords, who needed to fill the properties with as many occupants as possible to pay the high rents. The houses thus became tenements and this phenomenon was particularly evident in the Gardiner estates adjacent to the North Lots.

The slowing demand for accommodation at the upper end of the market was probably detrimental to the development of the North Lots and perhaps retarded the progress of the works. In any case, Gilligan, an authority on the port of Dublin, considers Brooking's 1728 depiction premature (1988, 25).

It would seem likely, therefore, that the impetus to reclaim the North Lots came more as a consequence of the necessity of providing a safe channel for shipping rather than as an attempt to provide more building ground for the City. The changing political situation at the turn of the 19th century dealt the final blow to any possibility of aristocratic settlement on the polder; by the publication of the first edition of the Ordnance Survey in 1843, the industrial nature of the area was becoming increasingly obvious, albeit with residential pockets.

8.3.1.6 Industrial and Residential Development - Late 18th - 20th centuries

Comparing the first edition Ordnance Survey (OS) six-inch map of 1843 (Figure 8.6 below) to Rocque's map of eighty years previously, one is struck more by the similarities than the differences (chief of the latter is the Royal Canal now bisecting the area and entering the River Liffey between Guild and Wapping Streets). The construction of the Royal Canal began after 1789, and the map published in Wilson's Dublin Directory in 1798 (not shown) shows the connection from Broadstone Harbour to the River Liffey through a system of locks. However, this work cannot have been undertaken before 1806, when an appeal was made by the Royal Canal Company (RCC) for more funding to bring the canal to the river. Two berthing pools, the Royal Canal Docks, lay between the riverfront and Mayor Street and between Mayor Street and Sheriff Street, while a spur extended to the west from the northern pool. Although depicted on Taylor's map of 1816 (not shown), this was filled-in by 1837, and Nixon and Newfoundland Streets were constructed on the site before 1850.

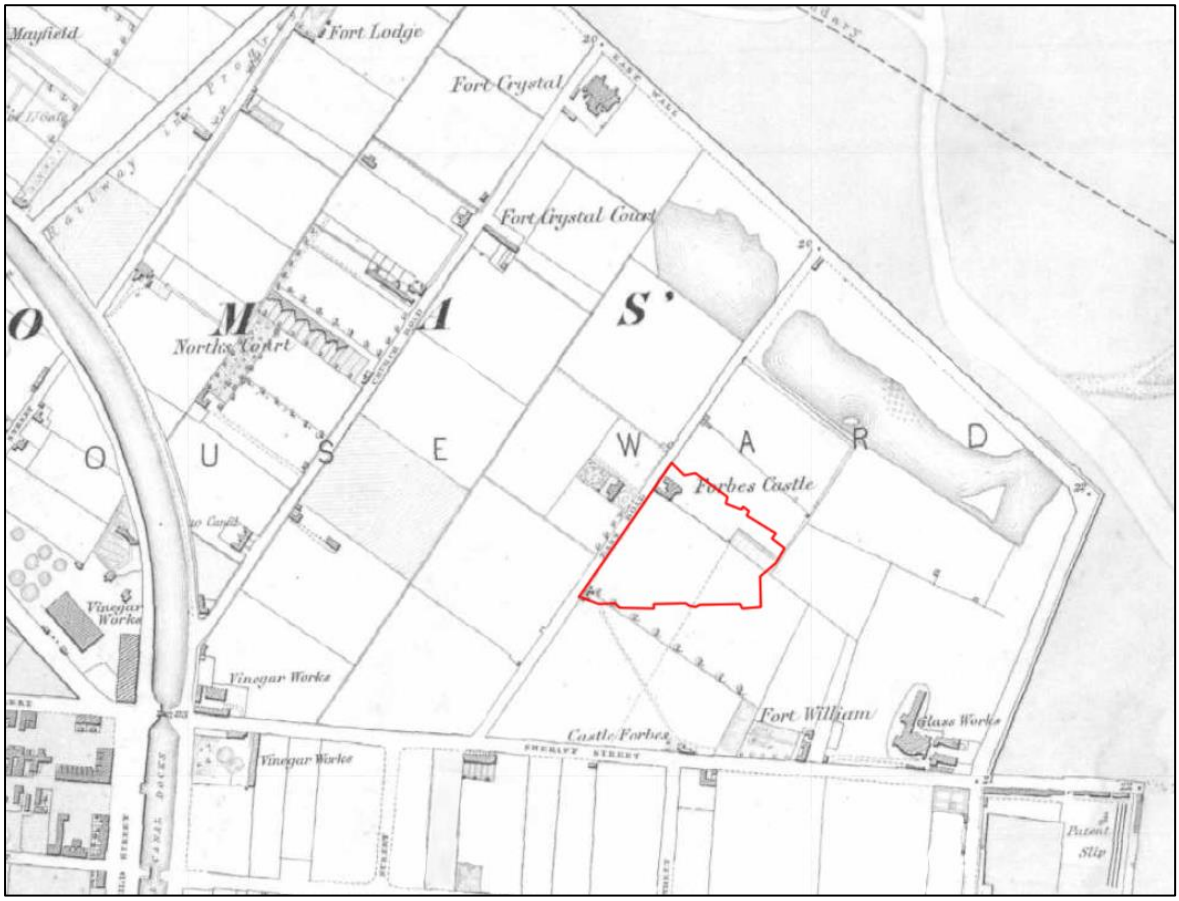
The association of railway and canal occurred in 1845, when the Midland Great Western Railway (MGWR) Company acquired a majority interest in the RCC in order to close the canal and run the tracks along the bottom, thus saving on land purchase and surveying costs. The RCC had, however, initially acquired enough land for the railway to run alongside the canal and the MGWR kept the navigation open without investing further in its operation. The rail spur was opened for freight traffic on the 1st March 1864 and for passenger traffic on the 2nd September 1877[41]. In 1872, the canal bank between Sheriff Street and the North Strand Road was developed by the company, which invested £71,961 in the new wharves and cranes. The new facility enabled coasters of up to 500 tons to discharge coal directly into railway wagons. The lord lieutenant, Earl Spencer, performed the opening ceremony on April 15, 1873 and his name was given to the wharves, sidings and the swivel bridge on Sheriff Street.

The canal cut through Mayor Street and Sheriff Street, neither of which had reached anything near their full urban maturity. The canal was initially crossed on Sheriff Street by means of a narrow swing bridge. The subsequent construction of the railway on its eastern side necessitated raising the road level above the polder. This probably happened prior to 1864, the canal being eventually crossed by means of a Schwerzer lift-bridge in 1912.

[41] Johnson 1997, passim

By the time of the first Ordnance Survey in the late 1830s, some areas behind the East Wall are obviously still under reclamation (with two plots inundated with water, Figure 8.6); indeed, as late as 1835, a request was submitted to the Ballast Committee for one thousand tons of river mud to reclaim a '*low North lot'*[42]. For the most part, the North Lotts was still meadow, pasture and wasteland in the early years of Queen Victoria's reign. The 1843 OS map shows just seven large houses in the North Wall - East Wall area. These were Forbes Castle (on East Road, 'in ruins' by Cosgrave's day, lying within the Site), Fort William (Upper Sheriff St.), Fort Crystal Court, Fort Lodge (West Rd.), North's Court, Mayfield and Fort Crystal (described in 1844 as 'the ruins of an eccentrically constructed glasshouse' on Church St). Sheriff Street comprised just one terrace of five houses and there is no indication of any prison there.

Figure 8.6: First edition Ordnance Survey six-inch map, 1843



It is readily apparent that little building work had been carried out by this time, and the only indication that any of the 1717 plot holders had developed their land for residential use was evident in the names of two houses, 'Forbes Castle' and 'Castle Forbes'; the original plot granted to Ald. George Forbes lay to the northwest of Forbes Castle. The latter is depicted in greater detail on the 1847 OS five-foot plan (see Figure 8.7 below), which shows a large house at the side of East Road, with a curving carriageway and possible gate lodge to the north (outside the Site). Gardens are depicted to the rear (both house and gardens are within the Site). A small rectangular building is depicted in the adjacent plot, at the southwestern end of the Site. The nascent industrial development of the area is also evident, with a large gas works at the East Wall / Sheriff Street junction and several vinegar works clustered around the canal docks, see Figure 8.6 above.

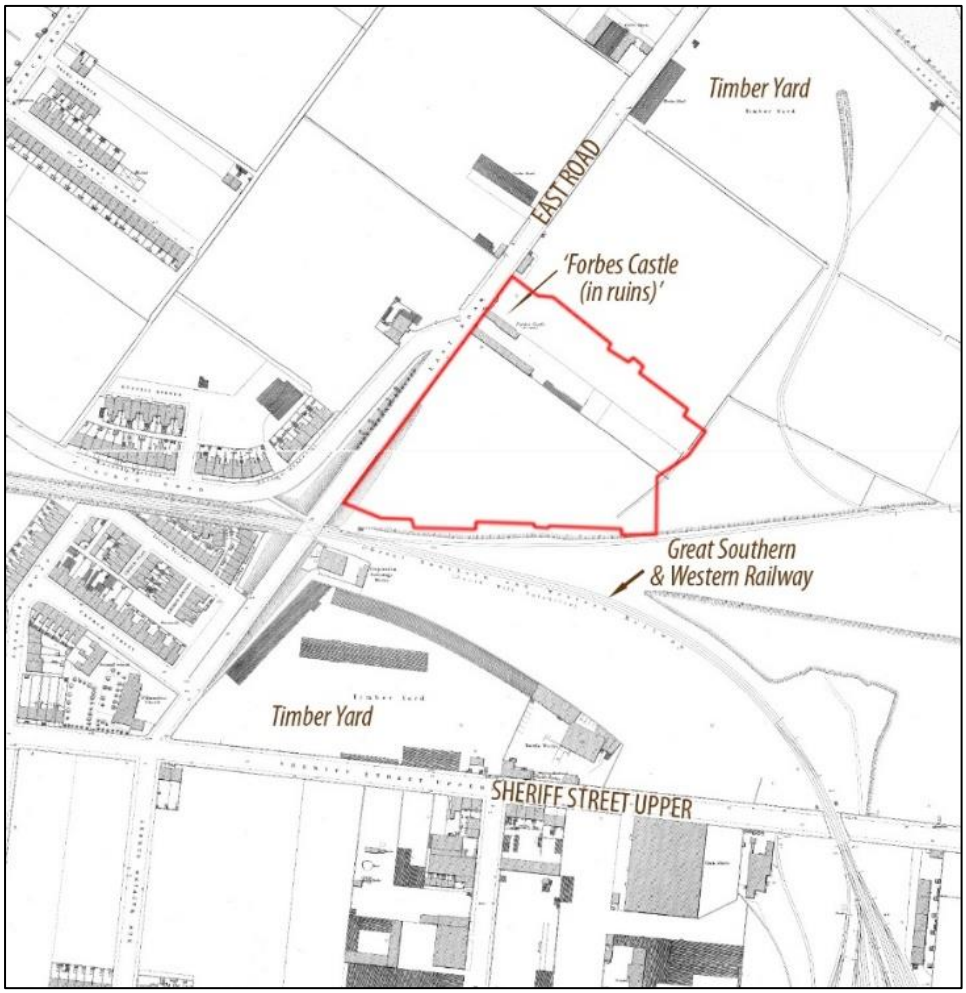
This situation was little changed by the time of the OS five-foot plan of 1864 (not shown), though Forbes Castle is marked as in ruins (the building is otherwise unchanged from the earlier map). The 1887 OS 25-inch map (see Figure 8.8 below) demonstrates the growing development within the North Lots area. Forbes Castle is still named (and

[42] Gilligan 1988, 19

indicated as in ruin) but it is no longer recognisable as the large house it once was. Instead, the remains (the northern wing) appear to have been incorporated into one of three long narrow structures (see Figure 8.8 below), the only features shown within the Site. A timber yard is indicated in a plot to the northeast, with another much larger (vacant) yard shown to the south, at Sheriff Street Upper (on the site of the earlier Vinegar Works). This second yard is separated from the Site by the Great Southern and Western Railway (GSWR) line, and the embankment spur heading northeast-wards, which would become the East Wall Branch. New areas of terraced housing have been built to the north and south of the railway line, on the west side of East Road, with additional industrial development along the south side of Sheriff Street Upper.

Figure 8.7: Ordnance Survey five-foot plan, 1847 (scale 1:1056)

Figure 8.8: Ordnance Survey 25-inch map, 1887



Industrial decline

In 1905, 127,656 tons of coal was discharged on Spencer Dock; however, only 6,000 tons were loaded on canal boats for distribution through the country. This was not surprising due to the difficulties that canal users were encountering with the railway company. Where cranes were in operation to load the train wagons, the barges had to be loaded using planks and wheelbarrows. A further problem emerged at the oral hearing of the Royal Commission on Canals and Inland Waterways, chaired by Lord Shuttleworth in 1907. The commission was told that there was only space for two boats at a time to enter the dock from the river. When canal boats had to unload from boats on the river, access in and out of the canal dock was limited to two hours each side of high tide. This rule was enforced by the railway company, ostensibly to save water in the canal, but more likely to discriminate against the canal traders. The latter alleged that the rule was fabricated to suit the large coasters entering Spencer Dock, which took up all the dock time, after which the lock keeper refused the smaller boats access to the system[43].

As happened elsewhere, the development of the railway system eventually rendered the canals practically obsolete. The arrival of a second railway company to the North Wall had initially occurred as a result of a decision taken by the London and North Western Railway (LNWR) Company to transfer its passenger terminal from Kingstown in 1861. The Chester and Holyhead Railway Company (which had been taken over by the LNWR) had long been in competition with the City of Dublin Steam Packet Company, which had secured the monopoly on the Royal Mail contract between the two islands. It was thought that establishing a terminal in the port of Dublin would reduce sailing times and therefore win the contract. A freight station was constructed alongside the Chester and

[43]Delaney 1992, p160-7

Holyhead berthage, along with a passenger station in 1877, most of which still survives as the former Iarnród Éireann Freight Offices and a rail link, the North Wall Extension Line, was constructed to the main line.

In 1883, increasing passenger traffic encouraged the LNWR to purchase the Prince of Wales Hotel on the junction of (old) Wapping Street and the North Wall. A new hotel was constructed behind the existing one, which was soon demolished. The new building was brought out to the North Wall and renamed the North Western Hotel. It stands today as the Former British Rail Hotel.

By the late beginning of the 20th century, extensive railway marshalling yards extended back from the quays, most tracks running alongside the canal and across the north inner city, with a connection along West Road to the Belfast line and eastern spurs extending back to the area now occupied by the former Point Depot and the docks. The increase in passenger traffic to the North Wall was promoted by the use of larger, faster steam-powered vessels, which required deeper berthage than that provided at the railway terminus.

Although the port was to develop deeper berthages down river, the problem of shallow water had been anticipated by 1842, when wooden wharves were constructed against the quay wall for 500 yards either side of the opening of the Grand Canal Docks. Increased competition for berthage led to the extension of the timber wharves from the Custom House Dock to the present-day Castleforbes Road by the early 1860s[44]. The problem of berthing at the North Wall at low water was only solved several years later with the construction of a new masonry quay wall several meters further out into the river. By the late 1860s, a section 740 feet long had been built west of the junction of the North and East Walls for the use of 'deeply laden vessels from foreign ports with cargoes of grain and timber,' which required sixteen to eighteen feet at low water[45]. This section of quay wall is listed in the RMP (DU018-020564).

The parish of St Barnabas was established in 1866 and named for St Paul's Jewish companion, Saint Barnabas, stoned to death in Cyprus in 61AD. The first parson appointed to the parish was the charismatic Rev J Grainger from the parish of St Thomas. His brief was to look after the Protestant families of English and Welsh men employed by the London and North Western Railway (LNWR) at the company's facilities on the North Wall Quay and on the trains and boats operating, via Holyhead and Liverpool, between Dublin and London. The East Wall at this time was a rough and grimy landscape largely comprised of docks, railways and steamers. By holding services in private houses in the area – primarily at 7 Seaview Terrace and on Albert Avenue – he managed to increase his congregation from 800 to 2000 in three years (*'Dublin Docklands - An Urban Voyage'*).

The development of the Alexandra Basin downstream of the North Wall enabled ships of greater tonnage to discharge their cargoes at all stages of the tide, thus restricting the amount of traffic docking at the railway terminus. Coal continued to be discharged along Spencer Dock, primarily to feed the railway locomotives. The outbreak of the First World War brought renewed passenger activity to the immediate area, and the railway yards were used for troop movements. Railway workers until recently referred to a railway siding alongside Church Road as '*The Dardanelles*.'

[44]Gilligan 1988, p125-6
[45]Gilligan 1988, p129

Figure 8.9: Ordnance Survey 25-inch maps, 1906-9

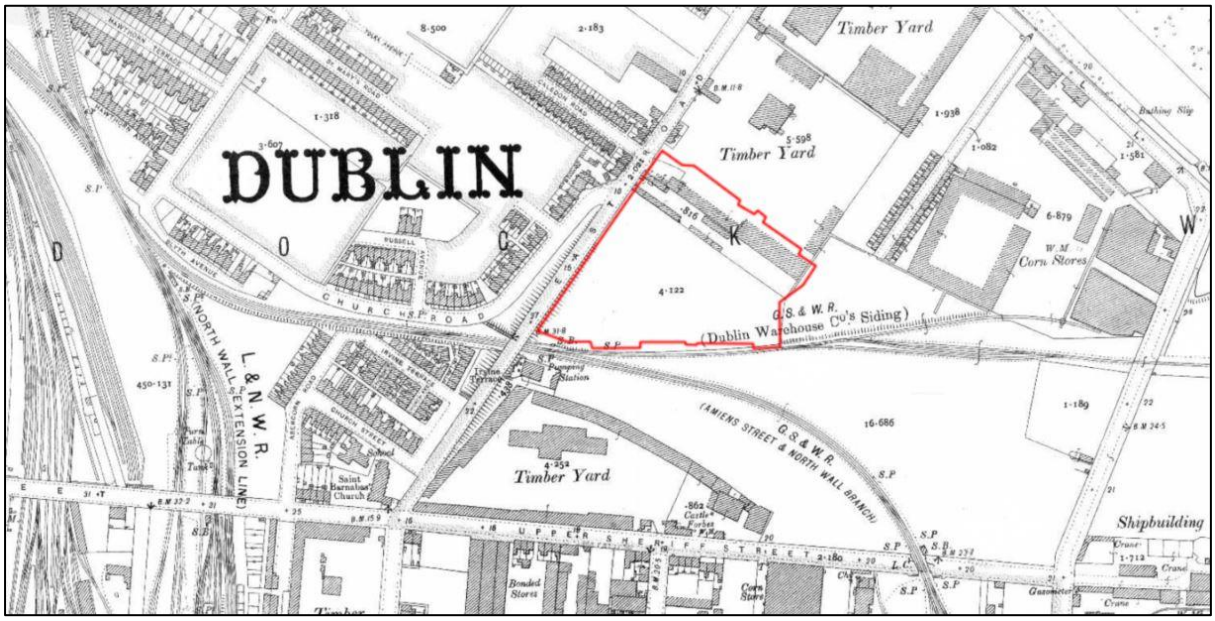
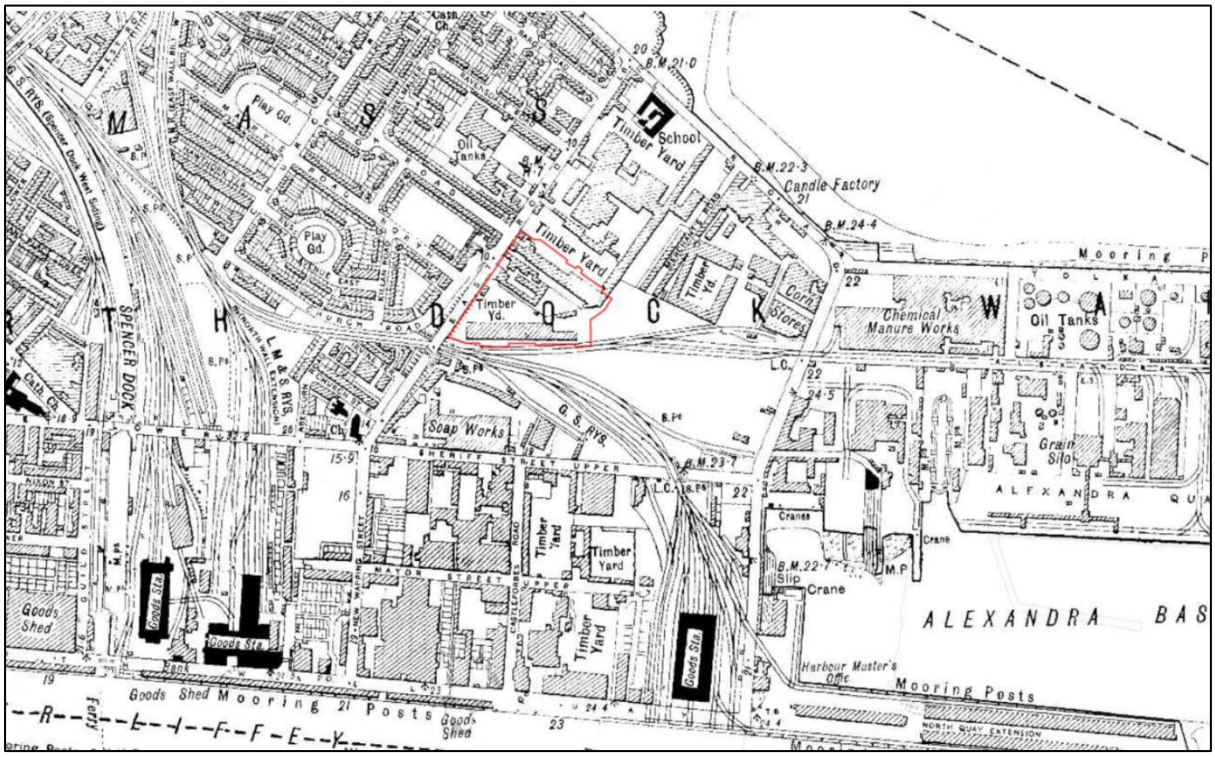


Figure 8.10: Ordnance Survey six-inch map, revised edition 1935-8



The dominance of the railways in the study area can be seen on the 1906-9 25-inch OS map see Figure 8.9 above. The branch line running along the southern side of the Site is annotated as a '*G.S. & W.R. Dublin Warehouse Co's Siding*', accessing corn stores to the northeast at East Wall. Many of the formerly empty lots have been developed by this time, with a mix of warehouses, stores and yards, and rows of small terraced houses (probably occupied largely by the dock workers and their families). The number of buildings along the north-eastern side of the Site had increased by this map edition, forming part of the adjacent timber yard to the north, but the remainder of the Site to the south remained open.

A wider view of the area, provided in Figure 8.10 above, shows that by the 1930s the area was densely packed. Industrial activity was mainly concentrated east of East Road and south of Sheriff Street, framed by the large railway hub and branch lines, with residential streets to the west of East Road.

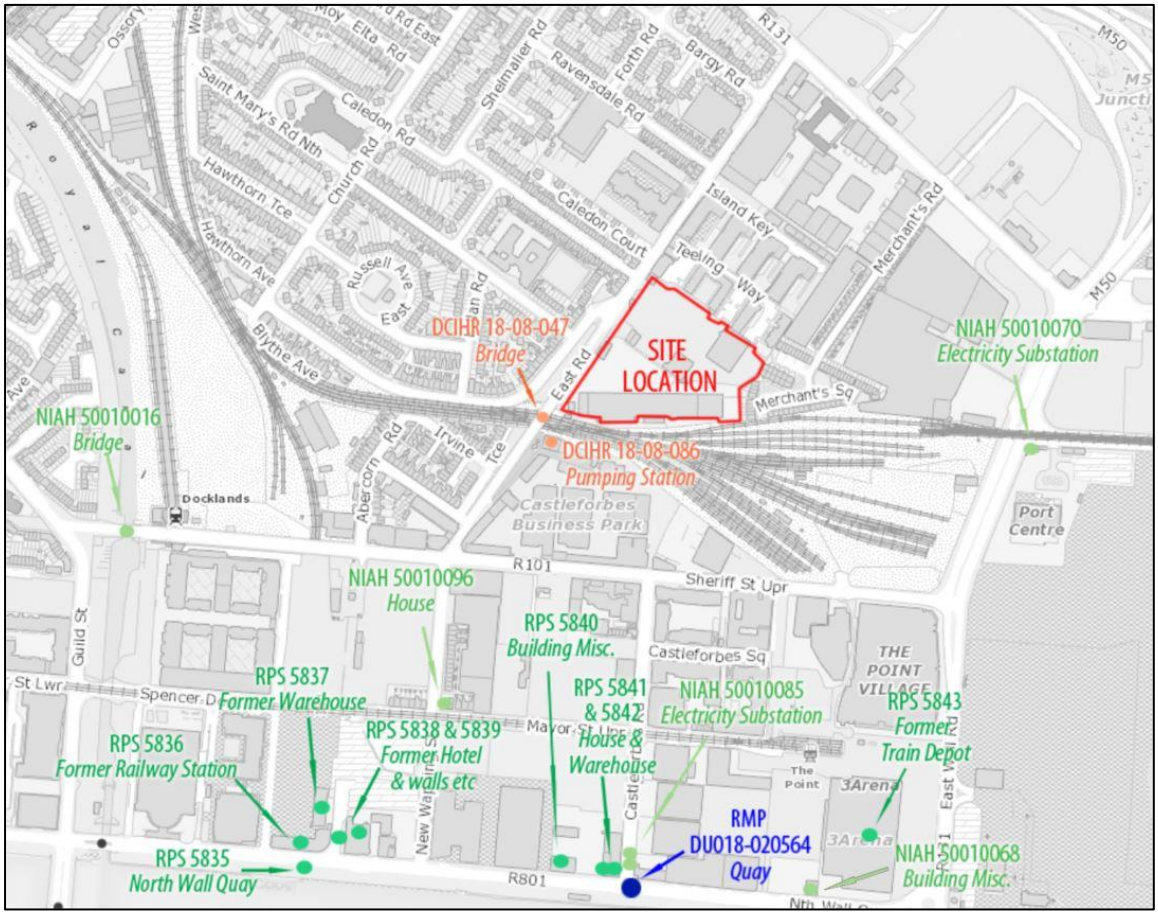
By this time, the Site was entirely occupied by a timber yard, with ranges of buildings across most of the space. The former timber yard to the south of the railway line, beyond the Site was by this time occupied by a large soap works.

8.3.2 Archaeological Heritage

8.3.2.1 Recorded Archaeological Sites (RMP / SMR Sites)

There are no RMP / SMR sites recorded within the Site or in its vicinity. Only one RMP site is recorded within a c.500m radius, the quay at North Wall Quay, c.475m south, see Figure 8.11 below.

Figure 8.11: RMP, RPS, NIAH & DCIHR Sites within c.500m of Site



8.3.2.2 Stray Finds

There are no stray finds recorded in the Topographical Files of the National Museum of Ireland (NMI) along East Road. The nearest, an iron knife-shaped object (typology and date unknown), is recorded c.600m southeast on East Wall Road (NMI Reg. No. 1954:168).

8.3.2.3 Previous Archaeological Investigations

There have been no previous archaeological investigations within the Site or in close proximity to it. A number are recorded in the surrounding area (see Figure 8.12 & Table 8.1 below), the majority of which found no significant archaeological material, mostly uncovering evidence of the large-scale dumping in the 18th and 19th centuries in an effort to reclaim the land. Two of the sites are of note, where excavations at Spencer Dock identified Late Mesolithic

fish traps and a late Neolithic wattle fence preserved in the riverine silts beneath the later reclamation deposits (discussed in more detail above in Section 8.3.1.2).

Figure 8.12: Previous archaeological investigations in vicinity of the Site

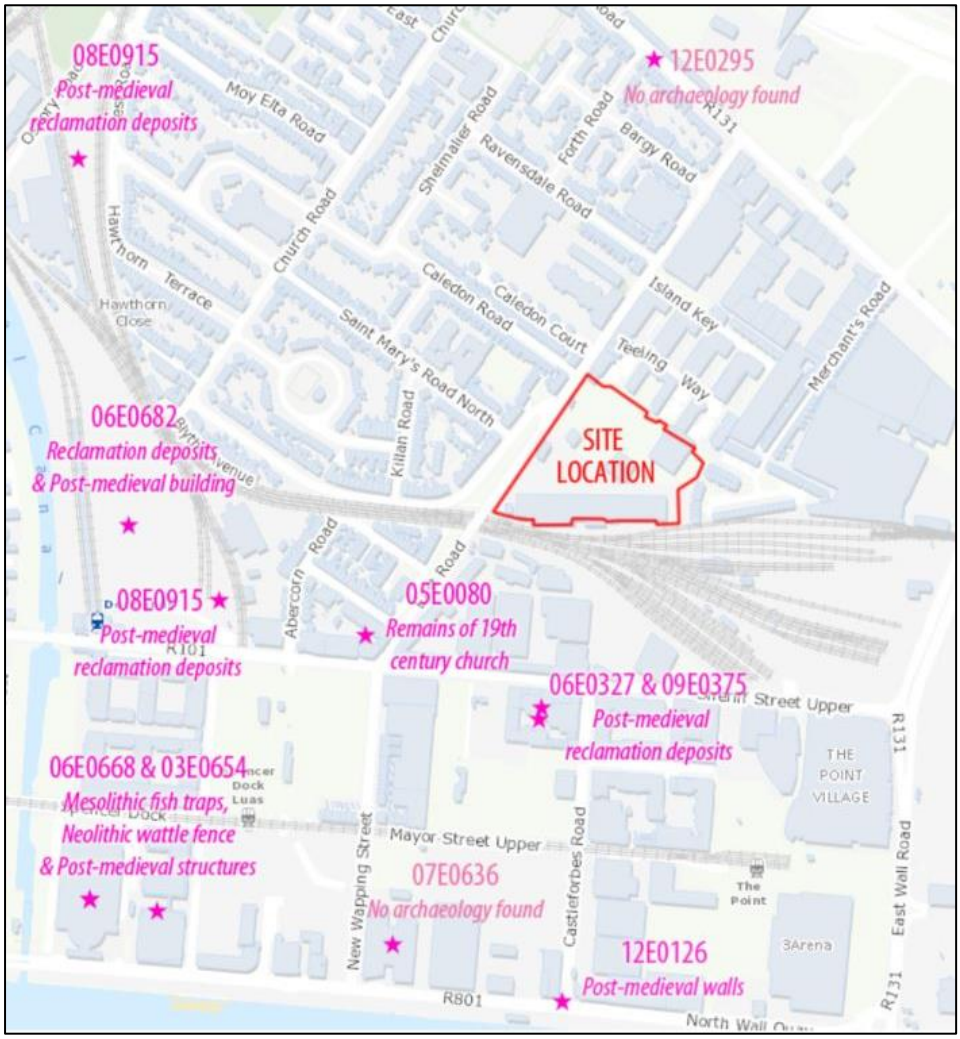


Table 8.1: Previous archaeological investigations in the vicinity

Excavation Licence No.	Excavations Bulletin Ref.	Investigation Type	Results	Street	Distance (m) direction
06E0327	2006:640	Monitoring	No archaeology found.	117-126 Sheriff St. Upr	c.160m S
09E0375	2011:200	Monitoring	Post-medieval reclamation and modern landfill deposits, overlying waterlogged wooden remains of potentially prehistoric date (see Section 8.3.1.2)	New Wapping St. / Sheriff St. Upr	c.160m S
05E0080	2005:477	Testing	Remains of late 18th / 19th century church foundations.	Sheriff St. / Church St. East	c.165m W
08E0915	2009:AD5	Monitoring	Post-medieval reclamation and modern landfill deposits over 7m deep.	North Quays to East Wall	c.275m W & c.500m WNW

Excavation Licence No.	Excavations Bulletin Ref.	Investigation Type	Results	Street	Distance (m) direction
06E0682	2006:639	Monitoring	Uncovered reclamation deposits and remains of post-medieval small red-brick building.	Sheriff St. Lwr	c.365m W
07E0636	2007:492	Monitoring	No archaeology found.	North Wall Quay	c.430m S
03E0654	2004:0565	Monitoring & Excavation	Late Mesolithic fish trap remains (see Section 8.3.1.2)	Spencer Dock	c.520m SW
06E0668	2007:494	Monitoring & Excavation	Late Mesolithic fish trap remains, a mid-Neolithic wattle fence & post-medieval structures (see Section 8.3.1.2)	Spencer Dock	c.550m SW
12E0126	2012:211	Monitoring	Post-medieval. Walls of 19th century structures and 18th /19th century quay wall, with a depth of c.4.3m.	North Wall Quay	c.445m S
12E0295	2012:646	Monitoring	No archaeology found.	East Wall Rd	c.325m NNW

8.3.2.4 Aerial Photographic Analysis

The Site is a brownfield site located at the heart of the industrial docklands. During the early and mid-20th century it was in use as a timber yard (as evident from the historic OS mapping), with several large buildings (stores, sheds and workshops) occupying much of the Site.

By the late 20th century, all but one of the buildings had been removed, with the exception of a row of large stores / sheds extending the width of the Site along its southern boundary; the remainder of the Site was occupied by yards, some smaller modern store buildings and cabins (OSi aerial imagery 1995 & 2000) see Figure 8.13. This last 19th century building was in the process of being demolished when the Site was captured by Digital Globe aerial imagery between 2011 and 2013 (see Figure 8.14 below), and is now entirely removed from the site (Google Earth aerial imagery 2017, Figure 8.15).

Figure 8.13: OSi Aerial Imagery, 2000

Figure 8.14: Digital Globe Aerial Imagery, 2011-13

Figure 8.15: Google Earth Aerial Imagery, 2017

8.3.3 Cultural and Industrial Heritage

8.3.3.1 Undesignated Sites

The Site is bounded along its southern side by the East Wall Branch of the Great Northern Railway. This was one of the many railway lines built in the latter part of the 19th century to serve Dublin's burgeoning Docklands area, providing it with links to Ireland's railway network.

The bridge carrying East Road across the railway line (just outside the Site to the southwest) displays a high level of craftsmanship in the execution of the stonework to its surviving original piers and is recorded in the Dublin City Industrial Heritage Record (DCIHR Ref. 18-08-047; see Figure 8.11). The bridge was an important component amongst the infrastructure of the Docklands, aiding industrial growth in the area (DCIHR appraisal).

Another nearby structure of industrial heritage interest is the early 20th century pumping station c.30m to the south (DCIHR Ref. 18-08-086; see Figure 8.11). Built as part of Dublin Corporation's Main Drainage Scheme, which was completed in 1906, this pumping station forms an important part of Dublin's industrial heritage. The provision of a proper drainage system represented a major development in the infrastructure of the City, tackling what had become a major problem for the City. The structure was extensively rebuilt c.1995 and at the time of the DCIH survey, it was still in use as a pumping station.

No sites of cultural heritage interest were identified during the course of the assessment.

Table 8.2: Industrial Heritage (Undesignated) Sites on East Road

DCIHR Ref.	Site Type	Description	Location	Distance (m) direction
18-08-047	Bridge	Single-span masonry bridge built c.1880, carried East Road over East Wall Branch of Great Northern Railway. Extended to north c.1970. Rock-faced squared uncoursed stone piers with platbands and cornices, random coursed walls to north side of the original north pier, concrete walls to extended section. Piers support the replacement concrete deck, traces of cobbling beneath the tarmacadam surface. Concrete parapet walls	East Road (ITM 717611, 734934)	c.7m SW

DCIHR Ref.	Site Type	Description	Location	Distance (m) direction
		incorporating squared uncoursed limestone piers from original parapet. DCIHR regional merit rating (architectural, social, technical and industrial heritage interest).		
18-08-086	Pumping Station	Detached double-pile pumping station, built c.1905, extensively rebuilt c.1995 with original east and west walls retained. Red and yellow brick gate piers to west giving pedestrian access to site from East Road with pyramidal cap to north pier and wrought-iron gate. DCIHR local merit rating (social, technical and industrial heritage interest).	East Road (ITM 717628, 734904)	c.30m S

8.3.4 Architectural Heritage

8.3.4.1 General

The Site is located in an area which was, and remains, predominantly industrial in nature. The Docklands area was developed following a land reclamation scheme initiated in the late 17th century, with the construction of warehouses and stores beginning in earnest following the building of the Custom House a century later.

The Sheriff Street Lifting Bridge is the nearest site of architectural heritage significance, albeit over 300m to the east on Sheriff Street Upper (NIAH Ref. 50010016). Built between 1789 and 1817, the Royal Canal connected Spencer Dock to the River Shannon. Formally closed in 1961, the canal has gradually been restored and was re-opened c.2010. The commemorative stones were erected on the 15th August 1873 by John Poyntz Spencer, Lord Lieutenant of Ireland, who officially opened the docks in his honour. Although no longer functioning as a bascule draw bridge, this remnant from the canal infrastructure continues to carry traffic across the canal. Now in a semi-derelict state, the bridge retains the industrial aesthetic of the area and forms a visual focal point of the recently landscaped Spencer Dock area.

Other architectural heritage sites in the surrounding area (within c.500m) are similarly industrial in nature, also dating to the late 19th or early 20th centuries (see Table 8.3 and Figure 8.11). These include several stores or warehouses, an electricity substation and railway station situated along North Wall Quay, a train shed at the former Point Depot, and another electricity substation at Alexandra Road. Many of the buildings have decorative elements (often in red brick but occasionally in terracotta or stucco), which attests to the Victorian practice of making even utilitarian buildings pleasing to the eye.

A two-storey house dating to c.1890 survives at No. 7 Mayor Street (c.330m south / southwest) and is an unusual and rare example of domestic Victorian architecture in this area (NIAH Ref. 50010196). Its facade is enlivened by polychrome brick platbands and plinth course, which point to late 19th century technology in brickmaking.

A detached eight-storey red-brick former hotel on North Wall Quay, represents the commercial history of the area, having been built by the London and North Western Railway to replace an earlier hotel called the Prince of Wales Hotel (the present structure was built c.1885, incorporating parts of the earlier 1860s structure; NIAH Ref. 50010014). The rail company had been operating a steam packet service across the Irish Sea and moved its terminus from Dún Laoghaire in 1861 to North Wall Quay. The company bought the previous hotel and opened this hotel in 1890. The hotel provided much employment in the locality until the LNWR ships abandoned the North Wall in 1908. Occupied by British officers during the War of Independence it became known as the British Rail Hotel and ceased to operate as a hotel during the 1920s. Recently used as offices of Irish Rail the building retains all original external fabric, being the most elaborate structure east of the Custom House. Forming part of a small group of associated

buildings, the cluster constitutes an historic site of considerable architectural interest that has the potential to become the focal point of the redeveloped Docklands area fronting onto the River Liffey.

8.3.4.2 Record of Protected Structures and NIAH Sites

There are no architectural heritage sites (RPS or NIAH) in proximity to the Site, with the closest being the Sheriff Street Lifting Bridge, which is located over 300m to the east on Sheriff Street Upper (NIAH Ref. 50010016).

Table 8.3: RPS / NIAH Sites within c. 500m of the Site

RPS No.	NIAH Ref.	Site Name & Description	Location	Distance (m) direction
5835	50010011	North Wall Quay. Granite ashlar quay walls, stone setts, mooring rings, steps, bollards, lamp standards and machinery. Erected c.1800.	North Wall Quay	c.490m S
5836	50010012	CIÉ Goods Depot (originally North Wall Railway Station), built c.1900, including curved wall and chimneys	48-57 North Wall Quay	c.490m S
5837	50010013	The Wool Store, including hexagonal lantern. Former warehouse, built c.1850. Originally built as a port facility the building became incorporated into the adjacent North Wall Railway Station.	North Wall Quay (off)	c.490m S
5838	50010014	Former British Rail hotel. Detached eight-bay four-storey red brick and terracotta former hotel, built c.1885.	58-59 North Wall Quay	c.490m S
5839	50010015	Granite walls at former British Rail hotel, railings, gates, and adjoining setts in cul-de-sac.	58-59 North Wall Quay	c.490m S
5840	50010065	Richford Motors. Building (Miscellaneous) – Façade. Detached multiple-bay three-storey brick commercial building, built c.1900, with central pediment.	73 North Wall Quay	c.475m S
5841	50010066	Business premises. Originally a late Victorian townhouse. Attached two-bay three-storey house over concealed basement, built c.1880, with pub shopfront inserted to ground floor.	81 North Wall Quay	c.465m S
5842	50010067	Attached gable-fronted three-storey warehouse, built c.1900, with attractive gabled brick elevation to the river front. Now derelict.	82 North Wall Quay / Castleforbes Road	c. 465m S
5843	50010069	The O2. Former goods depot / train shed, dated 1878. Converted for use as a concert venue c.1988, E & N facades retained. Front block remains largely as built, presents a very handsome elevation onto North Wall Quay and announces the end of the north quays as well as the end of 19th century developments along the River Liffey. Fine stone masonry evident throughout with decorative arcades and doorcases to the front block. An attractive remnant from the heyday of Dublin's freight industries on the quays.	North Wall Quay / East Wall Road	c.415m SSE
N/A	50010016	Sheriff Street Lifting Bridge (formerly Spencer Bridge), erected c.1900. Wrought and cast-iron single-span bascule draw bridge.	Sheriff Street Upper	c.470m SW

RPS No.	NIAH Ref.	Site Name & Description	Location	Distance (m) direction
N/A	50010096	Detached two-storey three-bay house, built c.1890.	7 Mayor Street	c.330m SSW
N/A	50010070	Electricity Substation. Detached corner-sited two-storey electricity substation, built c.1900, with single-bay breakfronted front elevation and three-bay north side elevation, latter fronting onto Alexandra Road. With decorative brick detailing.	East Wall Road / Alexandra Road	c.305m E
N/A	50010068	Building (Miscellaneous). Detached three-bay two-storey industrial building, built c.1880. Now derelict but retains its form, decorative stuccowork and many other features and details. It is essentially a utilitarian structure with a decorative neo-Classical front.	94 North Wall Quay	c.490m SSE
N/A	50010085	Electricity Substation. Two detached single-storey electricity substations, built c.1900, northern being six-bay and southern two-bay. Subtle yet decorative brick detailing.	Castleforbes Road	c.465m S

8.4 Potential Impact of the Proposed Project

8.4.1 Archaeological Heritage

There are no RMP / SMR sites recorded within the Site or in its vicinity. Only one RMP site is recorded within a c.500m radius, the quay at North Wall Quay, c.475m south. The Site is also located well outside of the ZAP for Historic Dublin (c.475m north and over 1km east of the ZAP boundary).

There have been no previous archaeological investigations within the Site or in close proximity to it. Investigations in the surrounding area (within c.500m) have, for the most part, found no significant archaeological material. The results indicate that the archaeological potential of this area is represented by a sequence of 17th century reclamation deposits (containing dumped post-medieval material) sealed by vestigial remains of 18th-19th century alotment and structural remains.

Of note are the excavations at Spencer Dock, which identified Late Mesolithic fish traps and a late Neolithic wattle fence preserved in the riverine silts beneath the later reclamation deposits (c.550m southwest of the Site, at an average depth of -5mOD). Further waterlogged wooden remains of possible prehistoric date were identified on a neighbouring site during archaeological monitoring of bulk excavations (c.320m southwest of the Site; found at levels of between -1.39m and -1.43mOD).

It is likely that the foundations of the 19th and earlier 20th century buildings that once occupied the site survive below ground; these were mostly industrial buildings (warehouses, sheds etc). The foundation remains of the early 19th century Forbes Castle would be of particular interest, however, as one of the earliest residential buildings in the North Lots. If any such remains survive, they will require full recording prior to removal.

As no basement level is proposed for the development, it is unlikely that any pre-reclamation deposits would be uncovered by ground disturbance works.

8.4.2 Cultural and Industrial Heritage

Two undesignated sites of industrial heritage interest are located in the environs of the Site (listed in the Dublin City Industrial Heritage Record): the late 19th century bridge carrying East Road across the railway line (just outside the Site to the southwest, DCIHR Ref. 18-08-047) and an early 20th century pumping station c.30m to the south (DCIHR Ref. 18-08-086). Neither site will be negatively affected by the proposed Project. It is considered that the

development of an otherwise unattractive (brownfield) urban plot would have a positive impact on the environs of the sites.

No sites of cultural heritage interest are located within or in the vicinity of the proposed Project.

8.4.3 Architectural Heritage

There are no architectural heritage sites (RPS or NIAH) in proximity to the proposed Project. The closest is the Sheriff Street Lifting Bridge, which is located over 300m to the east on Sheriff Street Upper (NIAH Ref. 50010016), and will not be impacted by the proposed Project.

8.5 Mitigation Measures

8.5.1 Archaeological Heritage

Archaeological monitoring of ground disturbance works will be carried out under licence to the National Monuments Service of the Department of Culture, Heritage and the Gaeltacht (DCHG). This will ensure the full recognition of, and – if required – the proper excavating and recording of all archaeological features, finds or deposits which may lie undisturbed beneath the ground surface.

The appointed Contractor's attention is drawn to National Monuments Legislation (1930–94), which states that, in the event of the discovery of archaeological finds or remains, the National Monuments Service and the National Museum of Ireland should be notified immediately (see Appendix A8.1). The appointed Contractor should make provision to allow for, and to fund, the necessary archaeological monitoring, inspection and excavation works that may be needed on the Site during the site preparation and Construction Phase. Such works will need to be carried out under licence to the National Monuments Service (DCHG) and the National Museum of Ireland and sufficient time should be factored into the construction programme to allow licences to be obtained and investigative works completed.

All recommendations in this Chapter are subject to approval of the National Monuments Service of the DCHG, the National Museum of Ireland and the City Archaeologist.

8.5.2 Cultural Heritage

No sites of cultural heritage interest are located within or in the vicinity of the proposed Project, therefore no mitigation is required.

8.5.3 Architectural Heritage

As no adverse impacts were identified, no mitigation measures are required.

8.6 Residual Impacts

As there are no known or recorded archaeological sites, features or deposits within the Site, no predicted impacts have been identified on the known archaeological heritage.

No predicted impacts on architectural or cultural heritage are envisaged within the development footprint.

8.7 Monitoring

All physical archaeological, architectural and cultural heritage impact issues will be resolved at the pre-Construction Phase of the proposed Project and therefore no potential impacts are envisioned at the Operational Phase of the development. There will be no requirement for monitoring post-construction.

8.8 Reinstatement

There will be no requirement for reinstatement.

8.9 Interactions

No interactions were identified during the assessment process.

8.10 Difficulties Encountered in Compiling the Chapter

No difficulties were encountered during the assessment process.

8.11 Cumulative Impacts

No potential cumulative impacts were identified in the course of this assessment.

8.12 'Do-Nothing' Impact

In the '*do-nothing*' scenario the Site would not be redeveloped and therefore there would be no adverse impacts to any as yet undiscovered subsurface archaeological deposits, features or finds, nor to any features of architectural heritage, cultural heritage or historic interest.

However, as the Site is zoned under the Development Plan, this is considered unlikely. In the event that the proposed Project does not proceed, the Site will remain in its current use in the short-term or until alternative redevelopment proposal is granted planning permission.

8.13 References

- Bunbury, T. (2009) *Dublin Docklands: An Urban Voyage*. Dublin: Montague Publications Group on behalf of the Dublin Docklands Development Authority
- Calendar *of Ancient Records of Dublin* (*CARD)*
- Carrig Conservation Ltd & McMahon, M. (2011) *Dublin Historic Industry Database*, Geological Survey of Ireland
- Carroll, J. *Environmental Impact Statement. Archaeology and Cultural Heritage*. Unpublished report.
- De Courcy, J. W. (1996) *the Liffey in Dublin.* Dublin
- Deery, S. (1998) *Proposed Development at North Wall Quays*. Unpublished report, Margaret Gowen & Co. Ltd.
- Deery, S. (2008) *Environmental Impact Statement: Spencer Dock NCC Hotel,* Cultural Heritage chapter. Unpublished report, Margaret Gowen & Co. Ltd.
- Delaney, R. (1992) *Ireland's Royal Canal*, Dublin
- Dublin City Council (2014) *North Lotts and Grand Canal Dock Planning Scheme 2014*, Dublin
- Eriksson, C. (2008) *Archaeological monitoring report, The Stockyard, 20-24 Sheriff Street Upper*. Unpublished report, Margaret Gowen & Co. Ltd.
- Gilligan, H. A. (1988) *A History of the Port of Dublin.* Dublin
- Gowen, M., and Myles, F. (2000) *Planning Appeal Hearing Presentation: Archaeology, History and Built Heritage*. Unpublished report, Margaret Gowen & Co. Ltd.
- Hagen, I (2003) *Spencer Dock, Dublin 1 Environmental Impact Statement* Unpublished report, Margaret Gowen & Co. Ltd.
- Kilfeather, A. (2001) *Environmental Impact Assessment Archaeology: LRT Line C1 North Wall.* Unpublished report, Margaret Gowen & Co. Ltd.
- Myles, F. (2007) *Archaeological excavations at the site of the Spencer Dock Convention Centre, North Wall Quay, Dublin 1. Licence No. 06E0668.* Unpublished report, Margaret Gowen & Co. Ltd.
- Myles, F. (2000) *Historical Background, Building Inventories and Building Condition Reports, Spencer Dock, Dublin 1.* Unpublished report, Margaret Gowen & Co. Ltd.
- McCullough, N. (1989) *Dublin, an Urban History*
- MCQuade, M. (2012) *Preliminary Report for Archaeological Monitoring and Excavation, North Lotts Pumping Station, New Wapping Street / Sheriff Street, Dublin 1. Licence No. 09E0375*. Archaeological Development Services Ltd, unpublished report

- McQuade, M. (2007) *Final Report of Archaeological Excavation National Conference Centre, Spencer Dock, North Wall Quay, Dublin 1. Licence No. 06E0668.* Unpublished report, Margaret Gowen & Co. Ltd.
- McQuade, M. (2003) *Final Report of Archaeological Excavation Building C, Spencer Dock, North Wall Quay, Dublin 1. Licence No. 03E0654* Unpublished report, Margaret Gowen & Co. Ltd.
- McQuade, M & Weldon, K. (2003) *Archaeological Monitoring and Excavation, Block RSTUV, Spencer Dock, North Wall Quay, Dublin 1* Unpublished report, Margaret Gowen & Co. Ltd.
- Pearson, P. (2000) *The Heart of Dublin: resurgence of an Historic City*
- Palmer, M., Neverson, P (1998) *Industrial Archaeology: Principles and Practice*
- Rynne, C. (2006) *Industrial Ireland 1750-1930: An Archaeology*. Cork: The Collins Press.
- School of Architecture, University College Dublin (1996) *Dublin Docklands Area Master Plan. Inventory of the Architectural and Industrial Archaeological Heritage*, Vol. I.
- Sutton, M. (2000) *EIS Archaeology: Proposed Macken Street Bridge, Dublin.* Unpublished report, Margaret Gowen & Co. Ltd.

Online Resources

- www.heritagemaps.ie (Dublin City & County excavation reports, NMI stray finds record)
- www.askaboutireland.ie/griffith-valuation
- www.archaeology.ie (Historic Environment Viewer: Sites and Monuments Record and National Inventory of Architectural Heritage)
- www.downsurvey.tcd.ie
- www.buildingsofireland.ie (National Inventory of Architectural Heritage)
- www.logainm.ie
- www.geohive.ie (Ordnance Survey Maps)
- www.excavations.ie
- www.googleearth.com

9 Biodiversity (Flora & Fauna)

9.1 Introduction

This Chapter comprises an assessment of the likely effects of the proposed Project on Biodiversity (Flora & Fauna).

The proposed Project will require the demolition of all existing structures on the Site and the construction of a mixed-use development set out in 9 blocks, ranging in height from 3 to 15 storeys, to accommodate a total of 554 No. apartments, commercial / enterprise space, 3 No. retail units, foodhub / café / exhibition space, residential amenity services, crèche and a Men's shed. The Site will accommodate 241 No. car parking spaces, 810 No. bicycle parking spaces, storage, services and plant areas. Landscaping will include a new central public plaza and residential podium courtyards, see Chapter 4 (Description of the Proposed Project) for more information on the proposed Project.

The planning application includes all Site landscaping works, green roofs, boundary treatments, lighting, servicing, signage, and associated and ancillary works, including Site development works above and below ground.

The potential for any impacts on sites designated as European (Natura 2000) sites, under the EU Habitats and Birds Directives was also appraised, and the results of that study are presented in a separate report (Information for Screening for Appropriate Assessment (AA)).

9.2 Methodology

9.2.1 Desk Study

A comprehensive desk-based assessment has been undertaken, and Site visits have been carried out in May and June 2018.

This Ecological Impact Assessment (EcIA) has been prepared in accordance with the following publications:

- *EPA Guidelines on the Information to be Contained in Environmental Impact Statements* (EPA, 2002) (and revised and draft guidelines 2015 / 2017);
- EPA Advice Notes of *Current Practice (in the Preparation of Environmental Impact Statements* (EPA, 2003) (and revised advice notes 2015);
- Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment (European Commission, 2013);
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (August 2018);
- *Guidelines for Assessment of Ecological Impacts of National Road Schemes* (Transport Infrastructure Ireland (formerly the National Roads Authority), 2009); and
- *Guidelines for Ecological Impact Assessment in the United Kingdom and Ireland: Terrestrial, Freshwater, Coastal and Marine* ('the CIEEM Guidelines') published by the Chartered Institute of Ecology and Environmental Management (CIEEM), September 2018.

The report has regard to the following legislative instruments:

- The Planning and Development Act (2000, as amended);
- The Wildlife Act 1976 and the Wildlife (Amendment) Act 2000;
- European Commission (EC) Habitats Directive 92/43/EEC;
- European Commission (EC) Birds Directive 2009/147/EC;
- European Communities (Birds and Natural Habitats) Regulations 2011-2015;
- Flora (Protection) Order 2015;
- EIA Directive 2014/52/EU of the European Parliament and of the Council of 16th April 2014; and

- European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018).

This Report has regard to the following **Policies and Plans:**

- Third National Biodiversity Plan 2017-2021 (Department of Culture, Heritage and the Gaeltacht, 2017); and
- Dublin City Development Plan 2016-2022, including the accompanying Appropriate Assessment documentation (Natura Impact Report).

Information was also collated from the **sources** listed below:

- Data on rare and protected plant and animal species contained in the following databases:
  - The National Parks and Wildlife Service (NPWS) of the Department of Culture, Heritage and the Gaeltacht: www.npws.ie ;
  - The National Biodiversity Data Centre (NDBC) www.biodiversityireland.ie ;
  - Birdwatch Ireland www.birdwatchireland.ie ;
  - Bat Conservation Ireland www.batconservationireland.org;
- Recent aerial photography / drone photography and photographs taken at the Site;
- Recent and historic ordnance survey mapping www.geohive.ie;
- Information on protected areas, as well as watercourses, catchments and water quality in the area available from https://gis.epa.ie/EPAMaps/ ;
- Information on soils, geology and hydrogeology in the area available from www.gsi.ie ;
- Information on the status of EU protected habitats in Ireland (NPWS, 2013); and
- Information on land-use zoning from the online mapping of the Department of the Environment, Community and Local Government http://www.myplan.ie/en/index.html.

9.2.2 Field Surveys

An initial biodiversity walkover survey was undertaken on 3rd May 2018 and a further, detailed ecological survey was carried out on the 18th June 2018, in order to order to provide a comprehensive baseline on the local ecological environment.

9.2.2.1 Habitats

During the course of the Site visits the habitats were identified, described and mapped. Habitats were surveyed using the guidelines of Smith *et al*. (2011) and were classified using *A Guide to Habitats in Ireland*[46]. Vascular plant nomenclature follows that of the *New Flora of the British Isles 3rd Edition*[47].

9.2.2.2 Fauna

The Site is entirely urban in nature, regardless the Site was searched for any evidence of large mammals such as badger or otter. The Site was searched for evidence of breeding birds as well as for the presence of any habitat suitable for use by overwintering birds. A daytime assessment (internal and external) was undertaken of all buildings and other structures in order to assess the likely presence of any features suitable for use by roosting bats. Given the features encountered and the lack of any evidence of bats whatsoever it was not considered necessary to undertake a night-time (dawn / dusk) bat detector survey.

[46] Fossitt J. 2000
[47] Stace, 2010

9.2.2.3 Watercourses

There are no watercourses on, or connected to, the Site. A review of Site drainage and potential links to off-site watercourses was therefore undertaken in conjunction with the project engineers[48].

9.2.3 Evaluation of Ecological Features

The methodologies used to determine the value of ecological resources, to characterise impacts of proposed Project and to assess the significance of impacts and any residual effects are in accordance with the NRA *Guidelines for Assessment of Ecological Impacts of National Road Schemes*[49]. This methodology is consistent with the *Guidelines for Ecological Impact Assessment in the United Kingdom and Ireland – Terrestrial, Freshwater, Coastal and Marine*[50].

In accordance with the NRA Guidelines, impact assessment is undertaken of sensitive ecological receptors (Key Ecological Receptors) within the Zone of Influence of the proposed Project. According to the NRA (TII) Guidelines, the Zone of Influence is the '*effect area*' over which change resulting from the proposed Project is likely to occur and the Key Ecological Receptors are defined as features of sufficient value as to be material in the decision-making process for which potential impacts are likely. In the context of the proposed Project, a Key Ecological Receptor is defined as any feature valued as follows:

- International Importance;
- National Importance;
- County Importance; and
- Local Importance (Higher Value).

Features of local importance (Lower Value) and features of no ecological value are not considered to be Key Ecological Receptors.

9.3 Baseline Environment

9.3.1 General Description of the Receiving Environment

The proposed Project Site (see Figure 9.1 below) (c. 2.11ha) is currently occupied by Hireco as a container / trailer park which comprises mostly hardstanding area and buildings. There are also two existing red brick dwellings at the norther corner of the Site. The Site is bound by East Road to the west, the railway sidings to the south, Merchant's Square residential development to the east and the Island Key Apartments to the north.

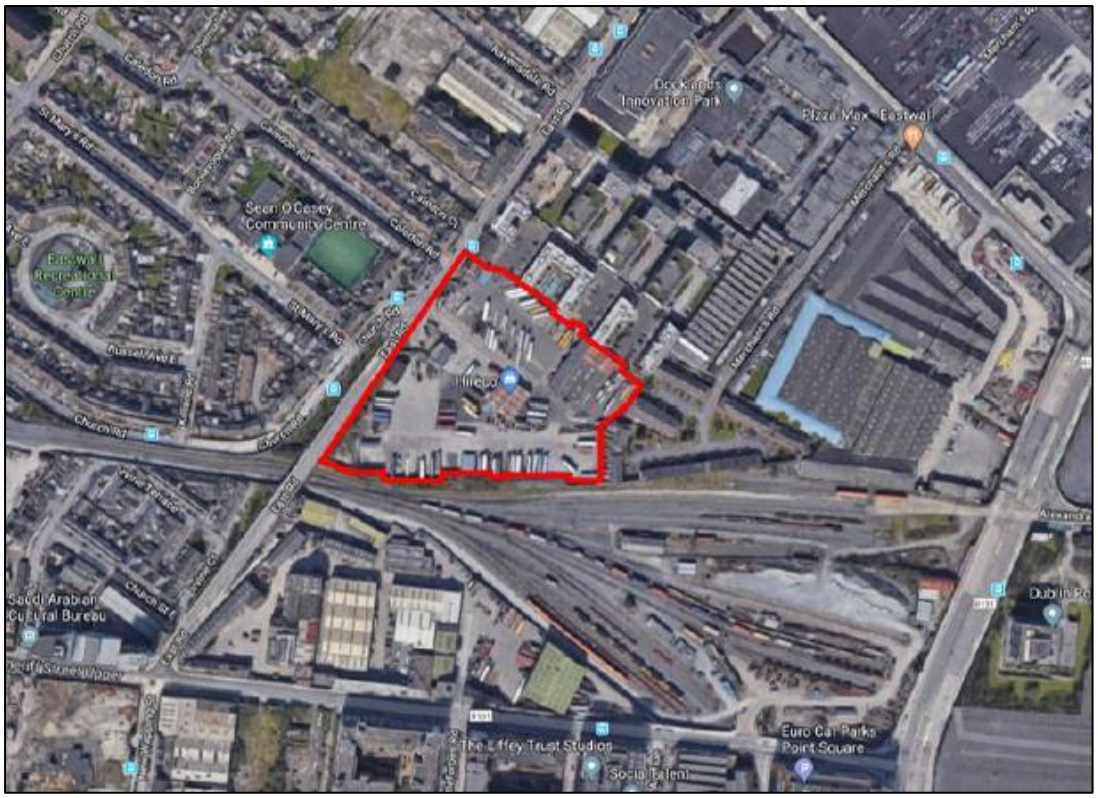
The lands are accessed from East Road on the western boundary of the Site. The eastern boundary of the site abuts Merchant's Square residential development. The southern boundary is constrained by CIÉ lands. Industrial, commercial, leisure and retail land uses are all present in close proximity.

The Site is urban in nature, and with the exception of small pockets of buddleia-dominated scrub and very small amounts of scattered ruderal vegetation, the Site is entirely occupied by hardstanding.

There are no watercourses on, or connected to, the Site. The nearest such features (EPA Maps[51]), are the main channel of the River Liffey (c.550m to the south) and the River Tolka Estuary (c.750m to the north), and the Royal Canal (c.450m to the west).

[48] DBFL Consulting Engineers
[49] NRA, 2009. Guidelines for Assessment of Ecological Impacts of National Road Schemes. National Roads Authority
[50] The CIEEM Guidelines', CIEEM, September 2018
[51] https://gis.epa.ie/EPAMaps/

Figure 9.1: Location of the Proposed Project[52]



9.3.2 Designated Conservation Areas

In ecological and environmental impact assessment, for the risk of an impact to occur there must be a '*source*', such as a construction site; a '*receptor*', such as a designated site for nature conservation; and a '*pathway*' between the source and the receptor, such as a watercourse that links the Site to the designated site. Although there may be a risk of an impact, it may not necessarily occur and if it does occur, the impact may not be significant.

The potential for any impacts on European sites from the Site was considered. Full details of that study are presented in a separate report - *Information for Screening for Appropriate Assessment*. The report concluded that there would be *no likely significant effects* on any European site as a result of the proposed Project, either alone or in-combination with other plans or projects.

9.3.2.1 Relevant European Sites

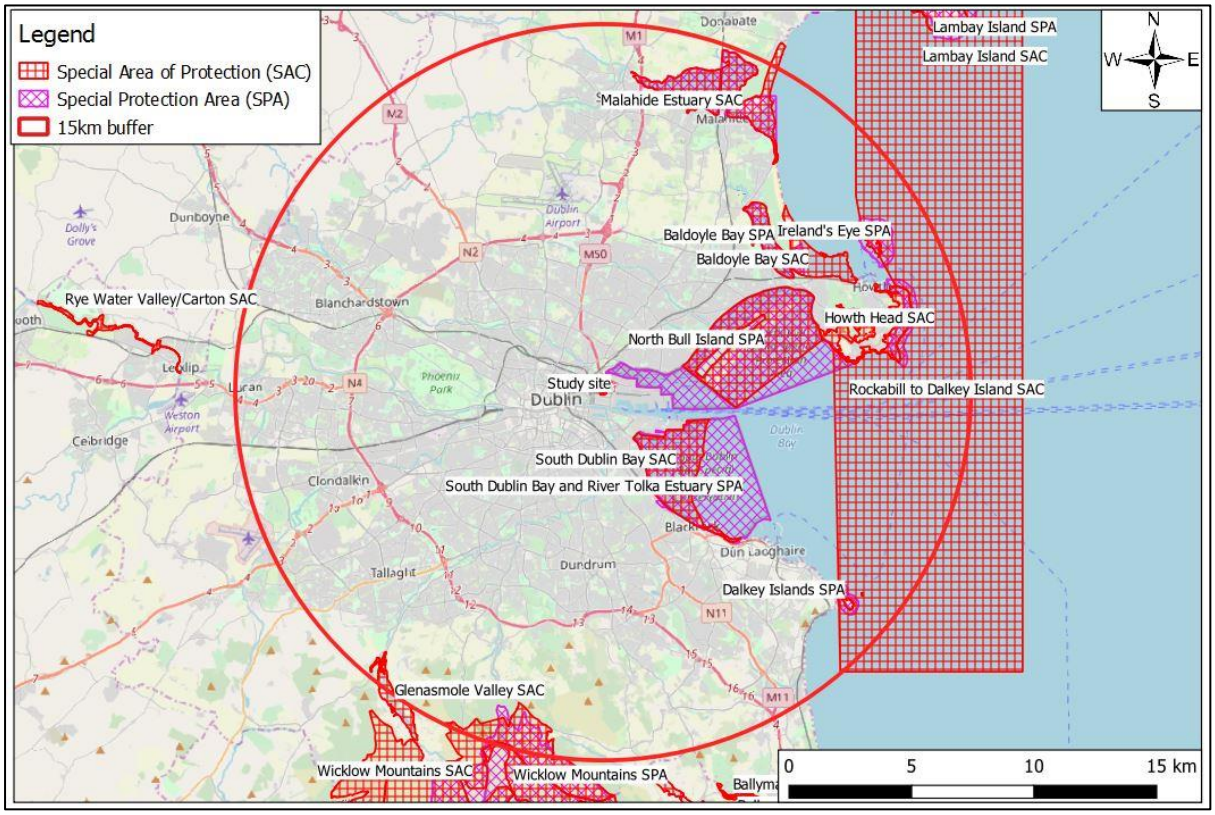
The nearest designated sites are the South Dublin Bay and River Tolka Estuary SPA (c.750m to the north and c.2.2km to the south east), South Dublin Bay SAC (c.2.2km to the south east), North Bull Island SPA (c.3.4km to the east) and North Dublin Bay SAC (c3.4km to the northeast). There is a potential pathway between the proposed Project and these European sites via the local surface water drainage network.

It is considered in the AA Screening report that no other sites have any connection (pathway) with the proposed Project, due to their locations and the features (qualifying interests) for which they are designated, as well as the scale of the development proposed. These sites are not considered further in the report.

The relevant European Sites are shown in Figure 9.2 below.

[52] Google Maps imagery

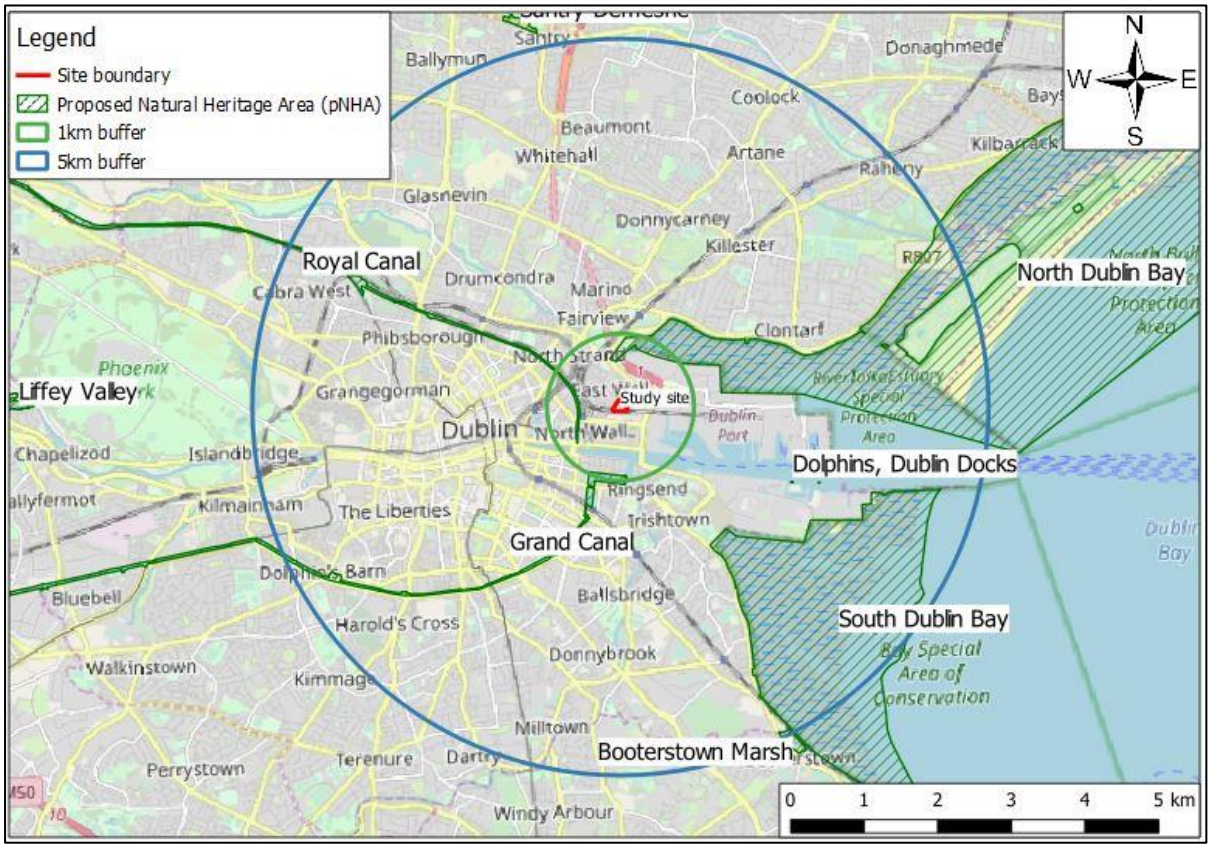
Figure 9.2: European Sites in Relation to the Study Area



9.3.2.2 Other Designated Areas (other than European sites)

The nearest sites designated for nature conservation, not otherwise designated as European sites (see Figure 9.2 above) are the proposed Natural Heritage Areas (pNHA) of the Royal Canal (pNHA Site Code 002103, c. 450m to the west), Grand Canal (Site Code 002104, c.900m to the south) and the Dublin Docks Dolphins (Site Code 000201, c.2.5km to the southeast) (see Figure 9.3 below).

Figure 9.3: Designated Conservation Areas (non-European Sites) in relation to the Study Area



9.3.3 Rare and Protected Plant Species

The NPWS and NBDC databases were consulted with regard to rare species[53] and species protected under the *Flora Protection Order* (2015). There are no known records of rare or protected plant species within the immediate vicinity of the proposed Project.

According to the NBDC database there are no records of protected or rare plants within the 2km grid square (O13S) that covers the East Road site. No such plants were recorded during the surveys undertaken, and the habitat is entirely unsuitable for any protected species.

9.3.4 Habitats

All habitats present on the Site are described in this section and are shown in Figure 9.4 below.

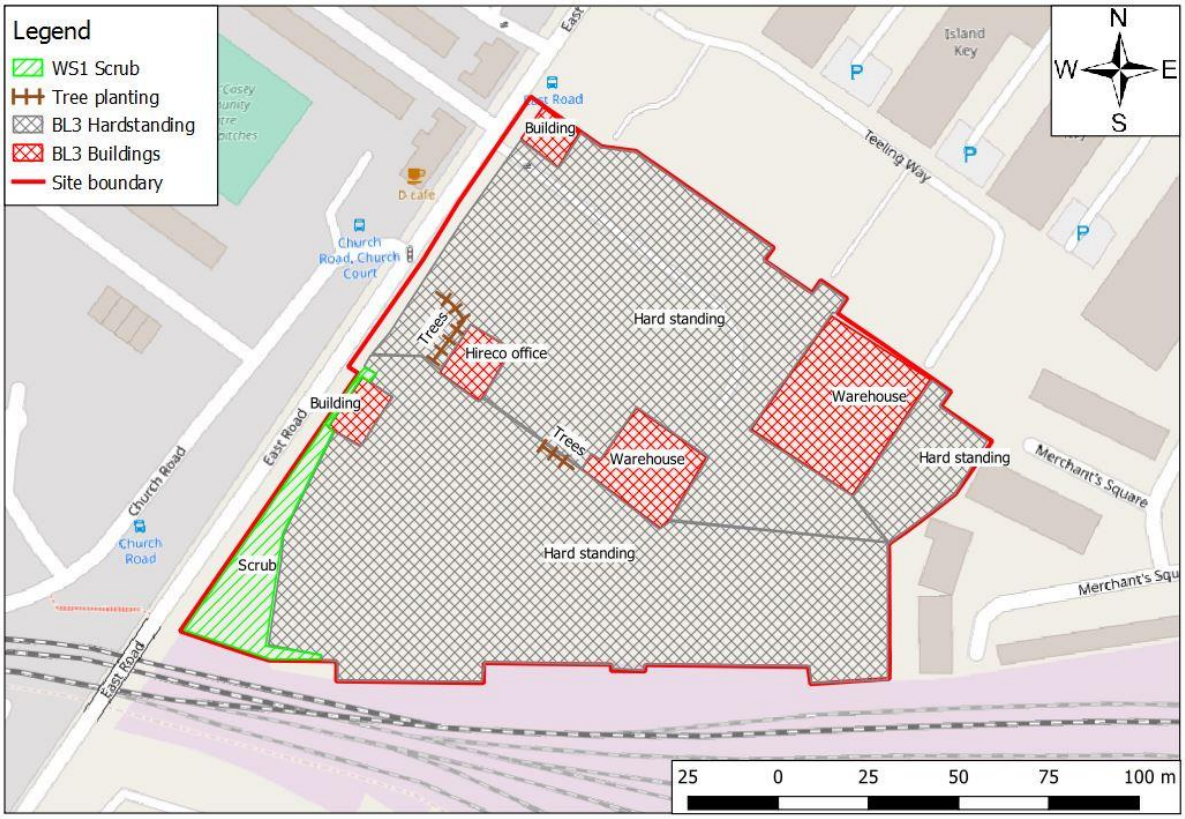
With the exception of a few street trees that have been planted near the entrance to the Site, and an area of buddleia (*Buddleja davidii*) dominated scrub (Fossitt code **WS1**) on the earth embankment in the south-western corner the Site is entirely dominated by buildings or hard surfaces (**BL1**). Occasional ruderal plants are present, dominated by buddleia, with occasional sycamore (*Acer pseudoplatanus*) seedlings, as well as small patches of cleavers (*Galium aparine*) and ragwort (*Senecio vulgaris*). Any patches of vegetation appear to be regularly sprayed with herbicides, resulting in a very poor species mix. Small amounts of ivy (*Hedera helix*) are present on walls on the southern Site boundary.

The scrub in the south-western corner has, in addition to buddleia, substantial amounts of bramble (*Rubus fruticosus* agg.), and cleavers, with occasional elder (*Sambucus nigra*) and a small number of young and semi-mature sycamore trees. Other species present include dandelion (*Taraxacum officinale*), beaked hawk's-beard (*Crepis vesicaria*), ox-eye daisy (*Leucanthemum vulgare*) and herb-Robert (*Geranium robertianum*).

[53] Curtis & McGough 1988

No evidence of any plant species listed on the Third Schedule of the *European Union (Birds and Natural Habitats) Regulations 2011-2015* (such as (Giant hogweed (*Heracleum mantegazzium*) and Japanese knotweed (*Fallopia japonica*)) have been recorded on the Site.

Figure 9.4: Habitat Mapping



9.3.5 Fauna

All Irish bat species are fully protected under the Wildlife Act (1976) and subsequent amendments, and under the *EU Habitats Directive*, via the *European Communities (Birds and Natural Habitats) Regulations,* 2011-2015. However, no evidence of bats was recorded on the Site and the Site contains no features whatsoever of any significant potential for use by roosting bats. Furthermore the presence of significant lighting and the lack of any significant vegetation on the Site greatly reduces the suitability of the Site for commuting or foraging bats.

Similarly no evidence of badgers or other species protected under the *Wildlife Act* including otter (further protected under the *European Communities (Birds and Natural Habitats) Regulations, 2011-2015*) was recorded and it is not considered remotely likely that these or other protected species utilise the Site, even on an occasional basis.

With very limited exceptions, birds, as well as their nests and eggs, are fully protected under the *Wildlife Act (1976)* and subsequent amendments. However, the bird fauna of the Site is notably poor, and other than very small numbers of magpies, a single hooded crow and some feral pigeons, no birds were recorded.

No evidence of any other protected species (such as reptiles, amphibians, butterflies or moths) was recorded on the Site.

9.3.6 Overall Evaluation of the Proposed Project Site

No rare habitats or habitats of any ecological value (*i.e.* International, National or County Importance, or Local Importance) are present, and there are no Key Ecological Receptors at the Site. No rare plants were recorded during the Site visits.

No evidence of badgers, otters, amphibians or reptiles has been recorded on the Site. No evidence of bats was recorded. In fact the Site is entirely unsuited to use by any protected fauna. The bird fauna recorded on the Site was very limited, and there is no habitat on the Site suitable for use, even on a very occasional basis, by any overwintering birds, such as pale-bellied Brent goose, or any other protected bird species listed as a Special Conservation Interest (SCI) in any European Site.

Overall, the Site is of no ecological importance, in accordance with the ecological resource valuations presented in the *Guidelines for Assessment of Ecological Impacts of National Road Schemes*[54].

9.4 Characteristics of the Proposed Project

The proposed Project will consist of the demolition of all structure on the Site and the construction of a mixed-use development set out in 9 No. blocks, ranging in height from 3 to 15 storeys to accommodate 554 No. apartments, enterprise space, retail units, foodhub / café / exhibition space, residential amenity, crèche and Men's shed. The Site will accommodate car parking spaces, bicycle parking, storage, services and plant areas. Landscaping will include a new central public space and residential podium courtyards.

9.5 Potential Impact of the Proposed Project

9.5.1 Construction Phase

9.5.1.1 Designated Conservation Areas - Screening for AA

The potential for any impacts on European designated sites (sites designated for nature conservation under the EU Habitats and Birds Directives) has been assessed separately, and a stand-alone report (Information for Screening for AA), compiled in consultation with the wider design team including the project engineers, has been prepared for submission as part of the overall planning application.

Based on the studies undertaken and the proposed Project, the AA Screening process concluded that none of the habitats and species listed as qualifying features in any European site designation will be affected by the proposed

[54] (NRA, 2009 (Rev. 2) https://www.tii.ie/technical-services/environment/planning/Guidelines-for-Assessment-of-Ecological-Impacts-of-National-Road-Schemes.pdf

Project and full AA, including the preparation of a Natura Impact Statement (NIS), is not required. The following paragraphs are extracted from the AA Screening report conclusions:

> *'This report concludes on the best scientific evidence that it can be clearly demonstrated that no elements of the project will result in any impact on the integrity or Qualifying Interests / Special Conservation Interests of any relevant European site, either on their own or in-combination with other plans or projects, in light of their conservation objectives.*
>
> *As such no mitigation measures are required for the protection of these European sites.*
>
> *It is considered that this report provides sufficient relevant information to allow the Competent Authority (An Bord Pleanála) to carry out an AA Screening, and reach a determination that the proposed development will not affect the integrity of any of the relevant European sites under Article 6 of the Habitats Directive (92/43/EEC) in light of their conservation objectives.'*

9.5.1.2 Habitat Loss and Disturbance

The proposed Project will require the removal of the existing hard-standing areas / buildings as well as an area of scrub and their replacement with the mixed-use development and landscaping.

There will be *no significant impacts* as a result of this habitat loss.

9.5.1.3 Disturbance to or Loss of Habitat for Fauna

There are no bat roosts on the Site, and none of the structures are remotely suitable for roosting bats. Similarly there are no trees on the Site remotely likely to be used by roosting bats, even occasionally. Furthermore there will be no disturbance to or loss of habitat for other mammals, such as otters or badgers.

There will be *no significant impacts* as a result of disturbance to or loss of habitat for mammals.

There will be a very minor reduction in vegetation cover for nesting birds as a result of the proposed Project, following the removal of the scrub in the south-western corner of the Site.

In the absence of mitigation (landscape planting) this would be a *long-term minor negative* impact as there will be a loss in established vegetation. However, the landscaping proposed will lead to an increase in habitat (feeding and nesting) for birds.

It is not expected that there will be any impacts on amphibians, reptiles, lepidoptera or any other species groups as a result of the proposed Project.

9.5.1.4 Discharges to Surface Water

Both the Construction and Operational Phases of the proposed Project could potentially have impacts on water quality, via contaminated run-off and sedimentation. However, all construction works will proceed in line with the recommendations and guidance provided in the pCMP for the proposed Project[55]. See Section 13.5.1 of the Surface Water Chapter for further information.

9.5.2 Operational Phase

9.5.2.1 Discharges to Surface Water from the Proposed Project

The Site is serviced by an existing surface water sewer located to the west of the Site, running in a southerly direction. This sewer in turn connects to the combined sewer on Church Road, before discharging to the existing Irish Water pumping station on East Road.

Given the fact that virtually the entire Site currently comprises impermeable surfaces, the proposed Project of the Site will not result in any increase in paved or impermeable areas or increased volumes of surface water run-off.

[55] DBFL Consulting Engineers

There is potential for run-off to contain contaminants such as petrol and oil from vehicles and other contamination. The potential impacts of the proposed Project on surface and groundwater receptors have been fully assessed in the suite of documents prepared by DBFL Consulting Engineers in support of this planning application, including the following:

- Chapter 13 (Surface Water - Hydrology);
- DBFL: Infrastructure Design Report;
- Site Specific Flood Risk Assessment (SSFRA); and
- the pCMP.

9.6 Mitigation Measures

9.6.1 Construction Phase

9.6.1.1 Designated Conservation Areas

No designated conservation areas will be impacted in any way by the proposed Project and no mitigation measures are required in this regard. Full details are provided in the AA Screening Report that accompanies the planning application.

9.6.1.2 Habitats

There will be no significant habitat loss as a result of the proposed Project. Regardless, new planting will be incorporated into the landscape design. The proposed planting / landscaping strategy (see Chapter 10 (Landscape & Visual) and the Photomontages with the Planning Application pack) will use a mix of appropriate species, incorporating a range of species that will attract feeding invertebrates, including moths, butterflies and bees. It will take account of and implement the relevant objectives of the *All-Ireland Pollinator Plan 2015-2020*.

All planting plans and landscaping proposals will further ensure that no invasive species are introduced, either deliberately or inadvertently, to the Site.

9.6.1.3 Fauna

Where feasible and practicable, the clearance of the scrub area in the south-western corner of the Site, which may be suitable for use by small numbers of nesting birds, will be undertaken outside the bird nesting season (avoiding the period 1st March to 31st August). Should the construction programme require vegetation clearance between March and August bird nesting surveys will be undertaken by suitably qualified ecologists. If no active nests are recorded, vegetation clearance will take place within 24 hours. In the event that active nests are observed, an appropriately sized buffer zone will be maintained around the nest until such time as all the eggs have hatched and the birds have fledged – a period that may be three weeks from the date of the survey. Once it is confirmed that the birds have fledged and no further nests have been built or occupied, vegetation clearance may take place immediately.

No bat roosts have been recorded at the Site and it will not be necessary to apply for a derogation licence under Regulation 54 or 55 of the E*uropean Communities (Birds and Natural Habitats) Regulations 2011-2015*. The lighting design for the proposed Project will not require any particular measures to prevent any impacts on commuting or foraging bats.

No other mitigation measures are considered necessary for the protection of fauna.

9.6.1.4 Surface Water

Surface water mitigation measures will ensure that no sediment contamination, contaminated runoff or untreated wastewater will enter any onsite surface water drains during the construction of the proposed Project. See Section 13.6.1 of the Surface Water Chapter for details on the surface water mitigation measures.

9.6.2 9.6.2 Operational Phase

9.6.2.1 Foul Water

The Site is serviced by an existing 600mm diameter combined sewer on East Road which runs from north to south towards the existing Irish Water pumping station to the south of the Site. According to Irish Water (in its response to the pre-connection enquiry for the proposed Project a wastewater connection would be feasible:

> *"Irish Water confirms that subject to a compliant water and wastewater layout and a valid connection agreement being put in place between Irish Water and the developer, the proposed connection(s) to the Irish Water network can be facilitated."*

Full details of the foul sewer design can be found in DBFL's Infrastructure Design Report submitted as a separate document to this application (Report No. 170200-Rep-002).

9.6.2.2 Surface Water

The design of the surface water drainage network for the proposed Project incorporates a number of SuDS measures, including filter strips, swales, filter drains, permeable paving, green roofs, a cellular attenuation system and an oil / petrol interceptor. The proposed drainage system for the Site as outlined in DBFL's Infrastructure Design Report and has been designed in accordance with Greater Dublin Strategic Design System (GDSDS) specifications.

The drainage system will employ a number of attenuation methods. After attenuation, surface water from the proposed Project will be discharged to the existing surface water sewer located to the west of the Site along East Road.

The final combined discharge rate from the Site has been calculated using a maximum of 2l/s/ha in accordance with the requirements of DCC, using a 'hydrobrake optimum' or similar approved as a flow control device. See Section 13.6.2 of the Surface Water Chapter for details on the surface water mitigation measures.

9.7 Residual Impacts

The proposed Project will result in the removal of derelict buildings, hard surfaces and habitats of negligible ecological value and their replacement with new development and associated public open space and landscaped areas. This will result in no *long-term residual impact* on any ecological receptors, either within or in the vicinity of the Site, or associated with any site designated for nature conservation.

The landscape planting that is proposed will ensure that there will be an overall increase in biodiversity on the Site.

9.8 Monitoring

Should scrub clearance be required during the bird nesting season a Project Ecologist will be retained for the duration, to ensure that all construction works take place in accordance with the pCMP and the mitigation measures set out in the EIAR. No long-term ecological monitoring is required

9.9 Reinstatement

Given the lack of any habitats of any significant ecological value at the Site, no reinstatement is required. As set out in this Chapter and within the Chapter 10 (Landscape & Visual), extensive ecologically sensitive planting will be undertaken, leading to an overall increase in ecological diversity at the Site.

9.10 Interactions

At East Road the main interactions of importance to biodiversity relate to **landscape** and **water**. The mitigation measures for the proposed Project have been designed to minimise the potential impact that the Construction and Operational Phases may have on the receiving environment.

The concept of control and attenuation at source of all emissions to water has been incorporated into the design and the Construction and Operational Phases of the proposed Project, with a pCMP having been prepared for the proposed Project by DBFL Consulting Engineers.

The landscape design for the proposed Project takes into account the requirements to maximise the benefits to biodiversity, both locally and within the wider landscape. The landscape scheme proposes significant ecologically sensitive planting to provide for potentially diverse habitats.

9.11 Difficulties Encountered in Compiling the Chapter

No difficulties were encountered in compiling the Biodiversity Chapter of this EIAR. All surveys were undertaken to an appropriate level given the nature of the Site and the proposed Project.

9.12 Cumulative Impacts

The proposed Project is already developed and is currently entirely in hard-standing, with the exception of the pocket of scrub in the south-west corner. The proposed Project will not lead to any significant habitat loss or loss of green open space and on completion of construction works, the impacts of the proposed Project are *not considered to be significant*.

The landscape proposals for the Site prioritise ecologically sensitive planting including pollinator-friendly planting, with SuDS features and green roofs also featuring.

9.13 'Do-Nothing' Impact

Ecological diversity on the Site is currently *negligible*, as with the exception of the small area of scrub the Site is virtually entirely hardstanding and buildings. Should the Site remain undeveloped and the current uses continue, no improvement in the biodiversity value of the Site can be expected. Should the Site be redeveloped at a later stage it is reasonable to expect that any potential impacts would be similar to those predicted to arise as a result of the proposed Project.

9.14 References

- Bat Conservation Ireland 2010. *Bats and Lighting- Guidance Notes for Planners, engineers, architects and developers.* Bat Conservation Ireland. Accessed online at: http://www.batconservationireland.org/pubs/reports/BCIrelandGuidelines_Lighting.pdf
- CIEEM (2018). *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine*. Chartered Institute of Ecology and Environmental Management, Winchester, United Kingdom
- Council of the European Communities (1992). Council Directive of 21 May 1992 on The Conservation of Natural Habitats and of Wild Fauna and Flora (92/43/EEC). O. J. L 206/35, 22 July 1992
- Council Directive 79/409/EEC on the Conservation of Wild Birds. (The EU Birds Directive)
- Council Directive 92/43/EEC of 21 May 1992 on the Conservation of Natural Habitats and of Wild Fauna and Flora. (The EU Habitats Directive)
- Council Directive 2000/60/EC of the European Parliament and of the Council establishing a Framework for the Community Action in the Field of Water Policy (The Water Framework Directive)
- Department of Culture, Heritage and the Gaeltacht. 2017. *Ireland's Third National Biodiversity Plan*
- DG Environment. 2003. *Interpretation Manual of European Union Habitats*. European Commission
- Doogue D., Nash D., Parnell J., Reynolds S., & Wyse Jackson P. 1998. *Flora of County Dublin*. The Dublin Naturalists' Field Club
- Dublin City Development Plan
- EPA, 2002. *Guidelines on the information to be contained in Environmental Impact Statements.* Environmental Protection Agency
- EPA, 2003. *Advice Notes on Current Practice (in the preparation of Environmental Impact Statements)*

- EPA, 2017. *Revised Guidelines on the Information to be contained in Environmental Impact Statements* (Draft)
- EPA, 2017. *Advice Notes of Current Practice in the Preparation of Environmental Impact Statements* (Draft)
- Fossitt J. 2000. *A Guide to Habitats in Ireland*. Heritage Council
- Hayden T. & Harrington R. 2001. *Exploring Irish Mammals*. Town House Dublin
- Kelleher, C. and Marnell, F. 2006. *Bat Mitigation Guidelines for Ireland. Irish Wildlife Manuals, no. 25*. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht
- NPWS, 2013. *The Status of EU Protected Habitats and Species in Ireland*. Department of Environment, Heritage and Local Government
- NRA. 2009. *Guidelines for Assessment of Ecological Impacts of National Road Schemes*. National Roads Authority
- Smith G. F., O'Donoghue P., O'Hora K. and Delaney E. 2010. *Best Practice Guidance for Habitat Survey and Mapping*. Heritage Council
- Stace, 2010 *New Flora of the British Isles 3rd Edition*. Cambridge University Press
- Webb D.A., Parnell J. & Doogue D. 1996. *An Irish Flora*. Dundalgan Press.

10 Landscape (Townscape) & Visual

10.1 Introduction

This Chapter describes the likely significant effects of the proposed Project on landscape and visual aspects of the receiving environment.

Chapter 4 of the EIAR provides a full description of the proposed Project whilst Section 4.4 describes the Construction Phase & Construction Works. This Chapter is accompanied by a set of Photomontages of the proposed Project which are included in the Planning Application pack.

Table 10.1 below details the aspects which are particularly relevant to the landscape and visual assessment.

Table 10.1: Important Aspects for the Landscape and Visual Assessment

Aspect	Description
Design	Form and massing of the proposed Project.
	Façade on all above ground structures.
	Cognisance of how design elements impact on Views of the proposed Project and any effects on the receiving environment, including landscape character.
Operation	Views of the proposed Project and any effects on the receiving environment, including landscape character.
Construction	Views of the proposed Project and any effects on the receiving environment, including landscape character.
	Loss or change of existing structures that contribute to the receiving environment.

10.2 Methodology

10.2.1 General

The landscape assessment has considered the likely significant effects of the proposed Project on the landscape as an environmental resource and the visual assessment has considered the effect of visual change on receptors. Landscape and visual effects have been considered for the Construction and Operational Phase of the proposed Project.

Further, to support the assessment, a series of photomontages, illustrating the physical and visual appearance of the proposed Project, has been prepared from a range of publicly accessible locations that are representative of the more open views in the surrounding environment. The Photomontage views are included within the see Planning Application pack.

10.2.2 Guidance and Legislation

The assessment has been undertaken with regard to the relevant guidelines for landscape and visual assessment, including:

- EPA Draft '*Guidelines on the information to be contained in Environmental Impact Assessment Reports*' (2017).
- EPA '*Draft Advice Notes for preparing Environmental Impact Statements*' (2015).
- The *Landscape Institute / Institute of Environmental Management and Assessment* (2013). Guidelines for Landscape and Visual Impact Assessment (3rd Edition).
- European Commission (2017) Environmental Impact Assessment of Projects: *Guidance on the preparation of the Environmental Impact Assessment Report*.

- Government of Ireland (2018) *Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment* (August 2018).
- Department of Housing, Planning and Local Government, Urban Development and Building Heights, Guidelines for Planning Authorities, 2018.

The methodology used for the landscape assessment entailed:

- Desktop studies of the Site in relation to its overall context locally, regionally and nationally.
- A Site visit including the environs between June 2018 and April 2019 to assess the following:
    - quality and type of views in the area;
    - the extent of the visual envelope*, i.e.* the potential area of visibility of the Site in the surrounding landscape; and
    - the character and quality of the surrounding landscape in relation to the position of the proposed Project.

10.2.3 Consultation

The proposed Project, from initial concept design through to final design proposal, has been an iterative process, both within the design team, and in consultation with the Planning Department, since early 2018. A full schedule of consultations with the Planning Department is provided in Chapter 6 (Consultation) of this EIAR.

10.2.4 Categorisation of the Baseline Environment

The landscape and visual assessment involved visits to the Site and its environs, from June 2018 to April 2019, to review the nature and scale of existing development both on and surrounding the Site, to identify landscape features, local character and land uses, to identify key views to and from the proposed Project, and to note receptor sensitivity.

This Site based assessment was augmented by reviewing aerial photography, publications and reports and project information included within the application for consent and in this EIAR.

10.2.5 Impact Assessment Methodology

The landscape and visual impact assessment for the proposed Project takes account of the character and nature of the existing Site and its surrounds, the location of sensitive landscapes and visual receptors, the sensitivity and significance of the Site, and its vulnerability to change.

The characteristics of this impact assessment are defined below in Table 10.3 to Table 10.5 below.

Table 10.2 below has been derived from guidance from the EPA[56] and the UK Landscape Institute[57] and from the professional experience of the author in carrying out landscape and visual assessments for over 25 years.

[56] EPA (2017) *Draft Guidelines on the Information to be contained in Environmental Impact Assessment Reports (*Draft August 2017)
[57] UK Landscape Institute and IEMA (2013) Guidelines for Landscape and Visual Impact Assessment; 3rd Edition

Table 10.2: Categorisation of Likely Significant Effects (Matrix derived from the Guidance)

Scale / Magnitude		Sensitivity of Receptor			
		High	Medium	Low	Negligible
Character / Magnitude / Duration / Probability / Consequences	High	Profound	Very Significant	Significant / Moderate	Moderate / Slight
	Medium	Very Significant / Significant	Significant / Moderate	Moderate	Slight / Not Significant
	Low	Significant / Moderate	Moderate / Slight	Slight / Not Significant	Not Significant / Imperceptible
	Negligible	Slight / Not Significant	Not Significant	Not Significant / Imperceptible	Imperceptible

The quality of effects, which in nature may be positive, neutral or negative / adverse, are described in Table 10.3 below:

Table 10.3: Quality of Effects

Quality of Effect	Description of Effect
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 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 a nuisance.

Table 10.4 below outlines the definitions of significance of effects which range from imperceptible to profound effects.

Table 10.4: Definitions of Significance of Effect

Significance of Effects	Description of Significance of Effects
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 noticeable 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 the majority of a sensitive aspect of the environment.
Profound Effects	An effect which obliterates sensitive characteristics.

In terms of duration, effects are considered in Table 10.5 below.

Table 10.5: Describing Duration of Effects

Duration of Effects	Description of Duration of Effects
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.

Further aspects of effects including their **magnitude** (*i.e.* extent, frequency, and context); **probability** (*i.e.* likely, indeterminable, 'worse-case'); and **type** (*i.e.* cumulative, interaction (synergistic), residual, indirect, *etc*.) are also considered in the assessment, where appropriate in accordance with those descriptions outlined in the EPA guidance[58].

The landscape assessment has considered the *likely significant effects* of the proposed Project on the landscape as an environmental resource and the visual assessment has considered the effect of visual change on receptors. Landscape and visual effects have been considered for the Construction and Operational Phase of the proposed Project.

Further, to support the assessment, a series of photomontages, illustrating the physical and visual appearance of the proposed Project, has been prepared from a range of publicly accessible locations that are representative of the more open views in the surrounding environment, see Planning Application pack.

10.3 Baseline Environment

10.3.1 Site Context and Description

The Site is located in the core of the East Wall area of Dublin City and Docklands, and with frontage onto East Road. The East Wall area is north of the River Liffey between the Royal Canal and Dublin Port, and extends from the North Lotts and Sheriff Street in the south to the Tolka River and East Point Business Park in the north, see Figure 10.1 below.

[58] EPA (2017) *Draft Guidelines on the Information to be contained in Environmental Impact Assessment Reports* (Draft August 2017)

Figure 10.1: Current Site Land Use (Site location in red)

The landscape of the East Wall area is typically flat and low lying, and is characterised by the diversity in scale and function of its built fabric, and the confluence of major road, rail and water-based transport infrastructure. The area generally marks the transition from Dublin City to Dublin Port, and from the River Liffey corridor to the residential areas of Fairview and Clontarf, however, as the City has and continues to evolve, the location of the actual transition has moved in response to changing landuse patterns.

East Road runs in a north easterly direction through East Wall. Lands to the west substantially comprise traditional two-storey terraced and semi-detached residential properties with occasional larger community buildings. In more recent times, a number of larger apartment, commercial and retail buildings have been developed to the north and east of this area along the East Wall Road and East Road. Lands to the east are traditionally more industrial in use, with extensive warehousing, marshalling yards and railway sidings serving Dublin Port further east. More recently, this larger scale fabric has been in part redeveloped with mixed-use residential and commercial buildings rising to six and seven storeys already redefining the northern end part of the road, and clearly visible form the bridge over the railway. Merchant Road runs parallel to East Road, and is a two-storey mixed residential and industrial street that leads to a small residential cluster at Merchant's Square adjoining the railway.

The Site is immediately east of East Road where the road rises on embankments to cross the railway that lies to the south of the Site. At present, the Site comprises hardstanding and marshalling areas for truck and container operations, and a number of light industrial units. Located just north of Sheriff Street, and the emerging North Lotts SDZ area to the south, the Site is located within the East Wall area and is typically 400m-600m from the major boundaries of the area to the north, east and west. Within the western low rise residential area East Wall, the established and emerging larger scale context of the North Lotts and Docklands areas are frequently apparent rising above the low roofscapes of the foreground.

It is anticipated that elements of the proposed Project will have a similar presence on the local skyline, and will establish a new landmark that is both part of East Wall but also connects the North Docklands to the wider City and Docklands context.

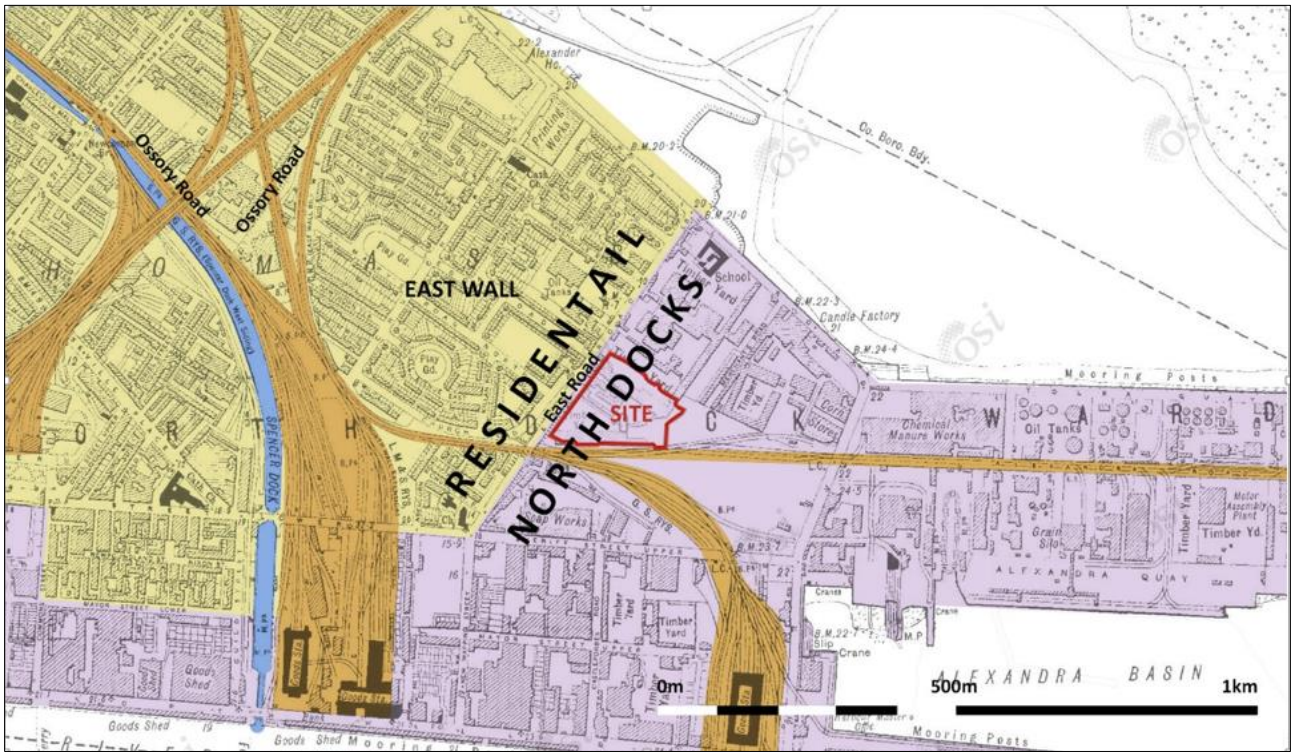
10.3.2 Historic Context

The East Wall area established during the late 18th century as the North Wall was constructed. It was a working class area, with many taking up employment in Dublin Port. The small scale of the houses, typically single and two storey, were located in proximity to the larger scale industrial facilities in the North Docks and along North Wall Quay. A network of railway lines, many elevated, brought both passenger and freight trains to Amiens Street and North Wall Stations, and to the Goods Stations along North Wall Quay and into the North Docks.

The elevated railway defines the edge and a sense of enclosure to the west of East Wall. Movement westwards is limited, with a single tunnel that leads to a circuitous connection from West Road, along both sections of Ossory Road, and towards North Strand. The railway line drops to ground level before crossing East Road, however, the railway corridor is defined by relatively high walls and the sense of enclosure remains strong. The East Road rises for c.130m either side of the railway so that the road crosses over the railway at this location. The rising roadway, with parapet walls and embankments, further contributes to a sense of enclosure of East Wall.

Figure 10.2 below illustrates the historic relationship between the predominantly residential (in yellow) small scale area of East Wall and the larger scale industrial and port related buildings at North Docks (in purple). East Road presented an abrupt change from the residential area into the North Docks, and that transition is also apparent to the south at Mayor Street. Railway infrastructure weaves through the area and was a defining feature of the locality, as goods were brought to and from the North Quays and Dublin Port by rail.

Figure 10.2: Residential and Industrial land use around the Site (Site location in red)



10.3.3 Modern context

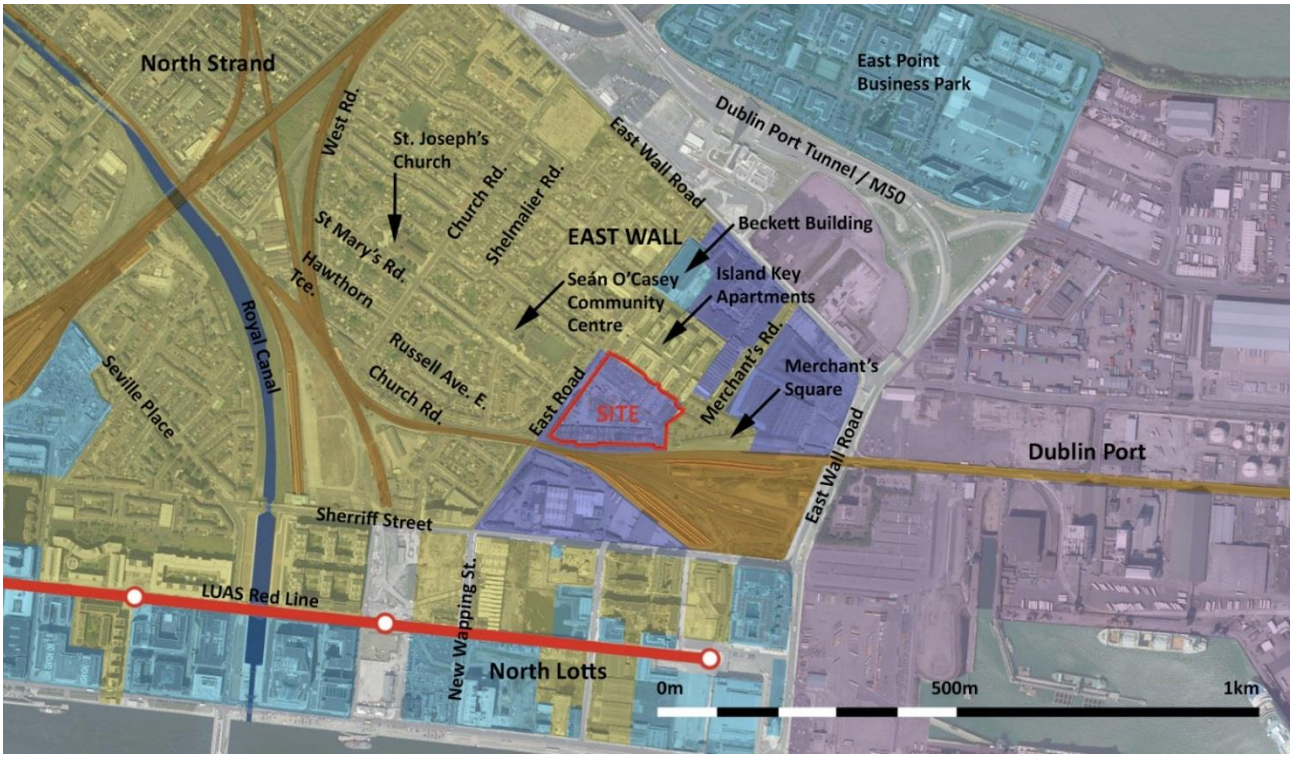
The modern day landscape of the East Wall area retains substantial elements of its origins, however, the area has been expanded through land reclamation to the north of Dublin Port and East Wall Road, and areas to the south, east and north of East Wall have seen extensive changes in the built environment. Significant areas of redevelopment, with taller buildings than before, now form part of the urban landscape, and define and give identity to the different character areas of the newly expanding City. The expansion of the Dublin Port lands northwards and the opening of the Dublin Port Tunnel also introduced significant changes in the perception of the East Wall Road and Port area. The Dublin Port Tunnel now provides immediate access to the National Road network.

Along the North Wall Quay, the former Goods Sheds, Timber Yards and Station Buildings have been substantially redeveloped or re-purposed to provide a mix of higher density modern commercial, residential, cultural and tourism developments along the River Liffey waterfront. This is illustrated below in Figure 10.3 where yellow and light blue indicate substantially residential and commercial / other urban uses respectively. Dublin Port, (in purple), has moved east of the East Wall Road, and now extends northwards into newly reclaimed land.

The railway infrastructure, (in orange), remains prominent, however, it has been rationalised and curtailed as Goods Sheds and Station Buildings have been redeveloped, and also as the Dublin Port Tunnel now facilitates freight haulage to and from Dublin Port by road. The LUAS red line (shown in red) now brings people to and from this part of the expanded City along Mayor Street for work, living and recreation.

The pattern of expansion of the City into East Wall and the North Lotts, with a mix of residential, commercial and other urban uses, can readily be seen in Figure 10.3 below with defined blocks of residential and commercial / other urban uses illustrating an expanded North Lotts urban riverfront and continuing to redevelop the light industrial blocks (in dark purple) that remain between East Road and the East Wall Road.

Figure 10.3: Residential and Industrial land use around the Site (Site location in red)



Plates 1 - 12 below provide a pictorial overview of the context of the proposed Project, with areas of low rise and established residential developments to the north of Sheriff Street at East Wall, Seville Place and East Wall Road. The relationship of the locality to the City, the North Lotts, the Docklands and the emerging regeneration within these areas is also apparent.

Plate 1: View along Seville Place, with residential and City context

Plate 2: View from East Wall Bridge of Docklands context

Plate 3: View from East Wall Bridge of City and East Wall context

Plate 4: View from East Wall Bridge of Docklands and East Wall context

Plate 5: View south from Church Avenue

Plate 6: View south from Abercorn Road

Plate 7: View south from Shelmalier Road

Plate 8: View east from Shelmalier Road at Ravensdale Road

Plate 9: View east from Ravensdale Road

Plate 10: View west from St. Mary's Road

Plate 11: View south from Church Road at St. Mary's Road

Plate 12: View west from St. Mary's Road

10.3.3.1 Character Areas

The landscape of East Wall has a number of distinct character areas that all contribute to the sense of place and to the identity of the wider area:

East Wall

East Wall comprises two distinct but related parts defined by East Road that runs in a northeast to south westerly direction. The first is the area to the **west** of East Road comprises an established residential area of one and two storey dwellings. The earlier buildings are mostly late 19th century red brick terraces located along or perpendicular to Church Road. Subsequent buildings included additional terraces, and extensive infilling with later semi-detached

house types. The area includes a number of community facilities, including St. Joseph's Church, the distinctive Seán O'Casey Community Centre, recreational facilities, and a range of neighbourhood centre facilities. As mentioned above, the area is physically contained and enclosed by the elevated railway line to the west, the walled railway corridor to the south, and the embankment leading to the road bridge along East Road. This area also includes a smaller cluster of established dwellings immediately south of the railway line at Abercorn Road, Church Street East, Irvine Court and Irvine Terrace. Despite being enclosed and physically contained, the proximity of the area to the emerging North Lotts is such that there are many locations within East Wall from where the higher density and taller buildings of the city centre and port context are quite prominent, providing a strong sense that the East Wall is a distinct part of the City Centre and Docklands context.

The second is the East Road itself and the area immediately to the **east**. East Road extends from Sheriff Street in the south to East Wall Road in the north. The junction of East Road and Sheriff Street includes Canon Hall on the western side, a ten storey residential development over a mixed-use ground floor, and a predominantly single storey light industrial complex to the east. The road rises sharply after Church Street and Irvine Court to cross the railway below. At the crest of the bridge, there are views over some of the closer dwellings in East Wall, and also of St. Joseph's Church and the Seán O'Casey Community Centre in the distance. The taller and higher density development further north along East Road are also visible, and there are open views across the railway tracks to the east leading to the Dublin Port Company office and many of the recently built and emerging buildings at the North Lotts. Canon Hall and much of the new development along Sheriff Street Upper are visible, as is the spire of St. Laurence O'Toole Church at Seville Place, and Liberty Hall at Eden Quay. Moving north and coming down form the elevated bridge level, the western side of East Road remains substantially two storey residential, with the exception of Alexandra Place which is a recent development of four storeys residential over a mixed-use ground floor. The eastern side of East Road comprises two semi-detached two storey residences that serve as a Men's Shed facility, a single light industrial unit, and then a range of recent developments including:

- Teeling Way - a three storey apartment development;
- Island Key Apartments - a five to seven storey apartment development over a mixed-use ground floor; and
- The Beckett Building - a six storey commercial development.

North Lotts

The North Lotts is a rapidly emerging regeneration of this former docklands part of the City that has become a new commercial, residential and mixed-use district of the City. It comprises substantially contemporary buildings developed on brownfield sites, and typically ranging from six to eight storeys in height, rising to ten storeys (residential) to the Quays. It retains its original rectilinear grid layout, and the typical urban blocks comprise a variety of proportions of principally commercial and residential uses. Additionally, the Convention Centre and the 3Arena (former Point Depot) are significant destinations that attract people to the area, and the LUAS red line brings people from the city centre directly into the heart of the North Lotts and to the 3Arena. The campshires on North Wall Quay have been upgraded to provide enhanced riverfront public realm along the river frontage of the North Lotts. The Exo building is currently at an advanced stage of construction at the eastern end of the North Lotts and will include the redevelopment of the public realm at Point Square as a major civic space within the area.

M50 / Dublin Port Tunnel

The M50 emerges from the Dublin Port Tunnel as it approaches Dublin Port and the East Link Bridge. The carriageway rises to cross Promenade Road that leads into the reclaimed lands of Dublin Port. This elevated position affords extended views of:

- East Point Business Park to the left;
- Dublin Port straight ahead and to the left, and the Poolbeg Chimneys visible in the distance;
- framed views of the distant Dublin Mountains to the south, including the roof of the Aviva Stadium; and
- views of the emerging North Lotts buildings and the new mixed-use buildings along the eastern side of East Road to the right.

Despite the elevated position, there is little if any awareness of the original East Wall residential area by virtue of its low lying nature and also the intervening presence of the newer higher density structures along East Road.

East Wall Road

The East Wall Road has two parts. The first runs along the northern side of East Wall and leads from the Alfie Byrne Road to the junction with the M50 / Dublin Port Tunnel road. The second part leads from that junction southwards to the River Liffey at the East Link Bridge.

To the north, the road is characterised by a mixture of five and six storey commercial developments, car sales outlets, supermarkets, a filling station and a range of light industrial and retail units. The road itself is either two, three or four lanes wide depending on location, and generous footpaths make good pedestrian provision. Two blocks of the East Wall terraced dwelling, comprising approximately thirty dwellings, form the southern elevation of a short portion of the road. A number a roads lead directly from East Wall Road into East Wall. These include Church Road, Forth Road, East Road and Merchant's Road, and afford glimpse views into the East Wall settlement and framed vistas to the North Lotts developments beyond. The view along East Road is perhaps the most interesting, as it demonstrates the juxtaposition of different periods and scales of development on either side of the road. The right hand side is initially two storey and residential leading to the taller Canon Hall development beyond the elevated bridge in the distance, while the left is up to six and seven storey mixed-use development along the original line of the North Docks boundary, and the vista along the road. The corner tower of the PWC building on north Wall Quay is distinctive at the end of the vista.

To the east, East Wall Road is predominantly vehicular in character and nature, comprising six traffic lanes reducing to three south of Sheriff Street. The current road is a regional distributor road, with extensive undeveloped, vacant and brownfield sites on either side - that has limited offer in terms of urban character. The Dublin Port Company head office has recently upgraded its frontage onto the road and created new contemporary visual interest along that part of the road that draws on the heritage of the Port and on the heavy industrial materials associated with ports and marine activities. A restored gantry crane and sculptural steel display creates a strong visual reference along the road to the port activity beyond. Towards the southern end of the road, the 3Arena and the public space establish a stronger and more attractive pedestrian environment that can be highly animated with larger crowds during events and concerts. The permitted Exo Building is also at an advanced stage of construction and will bring further activity, animation and visual interest to this location, as well as significant upgrade of the public realm of Point Village.

Dublin Port

Dublin Port is a working port, catering for both passenger and freight, and while it immediately adjoins the East Wall Road, the six lane nature of the road and the high boundary walls limit visual awareness of the port from outside. The Dublin Port Company head office building, a seven storey structure, is the most prominent port structure along the East Wall Road. The recent boundary and public realm works along its frontage from Sherriff Street to Alexandra Road, incorporating a gantry crane and contemporary forms of corten steel as sculptural and elements and boundary treatment, has greatly improved the presentation and presence of the head office and the entrance to Dublin Port along East Wall Road.

Royal Canal

The Royal Canal defines the western edge of the area, and was originally constructed for the transport of goods by barge to and from the North Quays to the midlands. Today, the section that forms the western edge of the North Lotts is a linear park, with strong references to the waterways heritage, providing a local amenity, and providing a setting for the Convention Centre and redevelopment at North Lotts.

Summary of Site Context

The East Wall area, including the surrounding area from the Royal Canal to East Wall Road in the east, and from the North Wall Quays to East Wall Road in the north, represents both an established and emerging residential and mixed-use precinct of an expanding City.

The landscape of the East Wall area is typically flat and low lying, and is characterised by the diversity in scale and function of its built fabric, and the confluence of major road, rail and water-based transport infrastructure.

The area includes a number of distinct yet evolving character areas that have and continue to respond to the role of the locality in the wider City. The established settlements and communities have strong relationships with the adjoining Dublin Port and River Liffey, and with the City Centre. The extensive regeneration delivers a new precinct of the City, with higher density commercial, residential and other developments that echo the larger scale of the former port related structures, but in a contemporary form that is commensurate with a modern city.

The area has seen extensive change in its land use and urban form, and will continue to do so as remnant and underutilised industrial sites are redeveloped to form part of the new emerging precinct.

10.3.3.2 Site Description

The Site extends to c.2.11ha on the eastern side of East Road, and is currently used as plant and equipment hire, sales and maintenance facility. There are four separate light industrial units on the lands, and the balance is substantially a concrete surfaced trailer parking yard. At the northernmost extent of the Site, and facing East Road, there is a pair a two storey red-bricked former residential properties that are currently in use as the East Wall Men's Shed.

The northern, eastern and southern Site boundaries are defined by a mix of blockwork and concrete walls. The northern boundary is flanked by four gable ends of the three storey Teeling Way residential apartment blocks. The eastern boundary also forms the rear garden boundary of the two storey residential properties at Merchant's Square. The southern boundary adjoins extensive Irish Rail lands that comprise railway sidings, maintenance and storage facilities for Irish Rail operations.

East Road defines the western Site boundary. The northern half of this boundary comprises block walls and gateways giving access to the lands from East Road. The southern half comprises part retaining walls, and part embankment that support East Road as it rises to bridge the railway lines to the south. A low masonry wall with additional timber fencing is located on top of the embankment and retaining walls along the Site boundary with the public footpath. There is scrub vegetation along the embankment and at the bottom of the retaining walls.

10.3.4 Landscape Planning Context

10.3.4.1 Dublin City Development Plan 2016-2022

Core Strategy

The Core Strategy of the Development Plan promotes the intensification and consolidation of Dublin City, and the Docklands is identified as one of the SDRAs capable of realising this objective.

Land Use Zoning

The Site is located within *SDRA 6 Docklands (SDZ and Wider Docklands Area)* as set out in the Development Plan. The land use zoning within the SDRA is Z14, with the objective:

> "*to seek the social, economic and physical development and/or rejuvenation of an area with mixed use, of which residential and 'Z6' would be the predominant uses*".

The Z6 zoning aims to provide for enterprise and facilitate opportunities for employment creation.

The Dublin City Development Plan, Section 15.1.1.6 identifies that:

'the designation of the Docklands, including the Docklands SDZ, as a strategic development and regeneration area (SDRA) provides for the continued physical and social regeneration of this part of the city, consolidating the area as a vibrant economic, cultural and amenity quarter of the city, whilst also nurturing sustainable neighbourhoods and communities'.

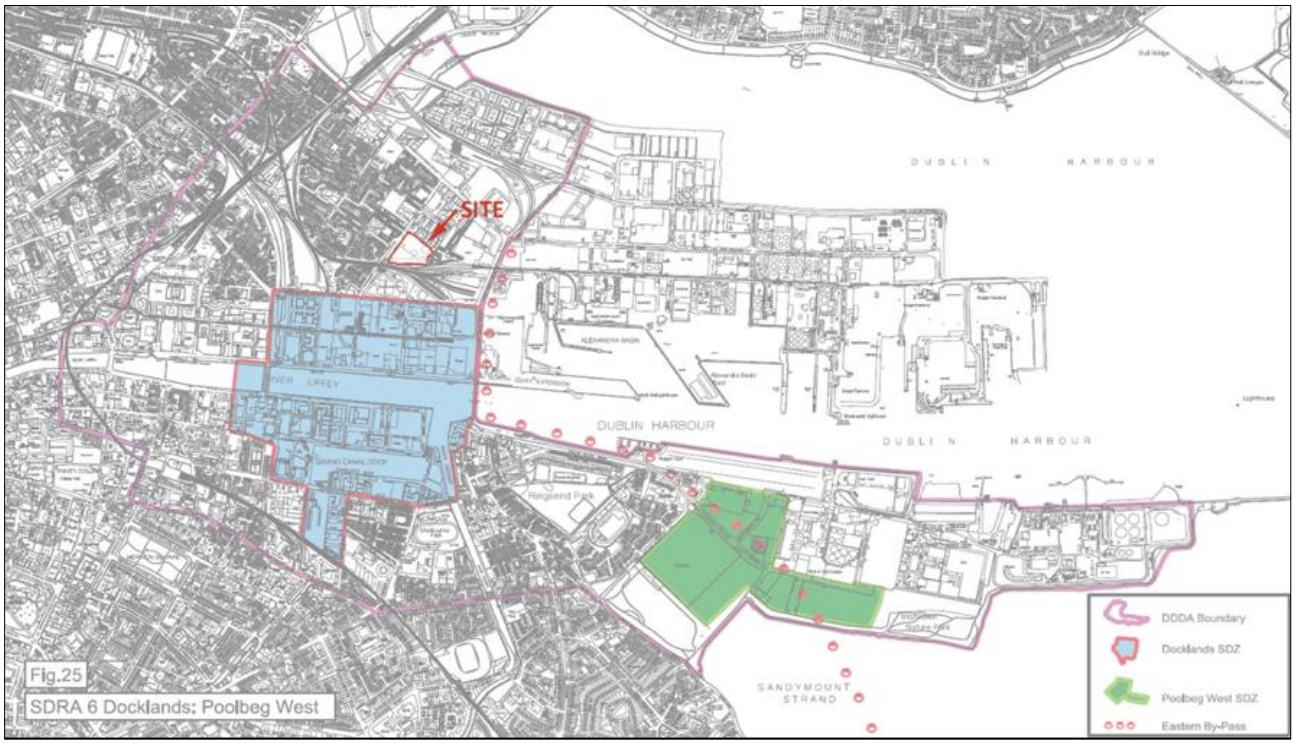
Building Height

The Development Plan Height Strategy identifies a general building height cap of 24m for residential development in this location, however the introduction of the *Urban Building Height Guidelines*[59] establish the principle for the re-examination of height limits on a site specific contextual basis, and these now take precedence over the more general Development Plan height limits.

A comprehensive consideration of the *Urban Building Height Guidelines*, in conjunction with the SDRA objectives, and in the context of the proposed Project, is provided in Chapter 3 (Planning and Development Context) of this EIAR. This sets out a robust rationale for the principle of development of a cluster of buildings of up to 15 storeys at this location.

The proposed Project represents a comprehensive urban regeneration development, that responds both to the existing and emerging context, addresses all of the criteria set out in the *Urban Building Height Guidelines*, and will establish a landmark to the scheme itself and to the wider East Wall area.

Figure 10.4: SDRA 6 Docklands (SDZ and Wider Docklands Area) (Site location in red)

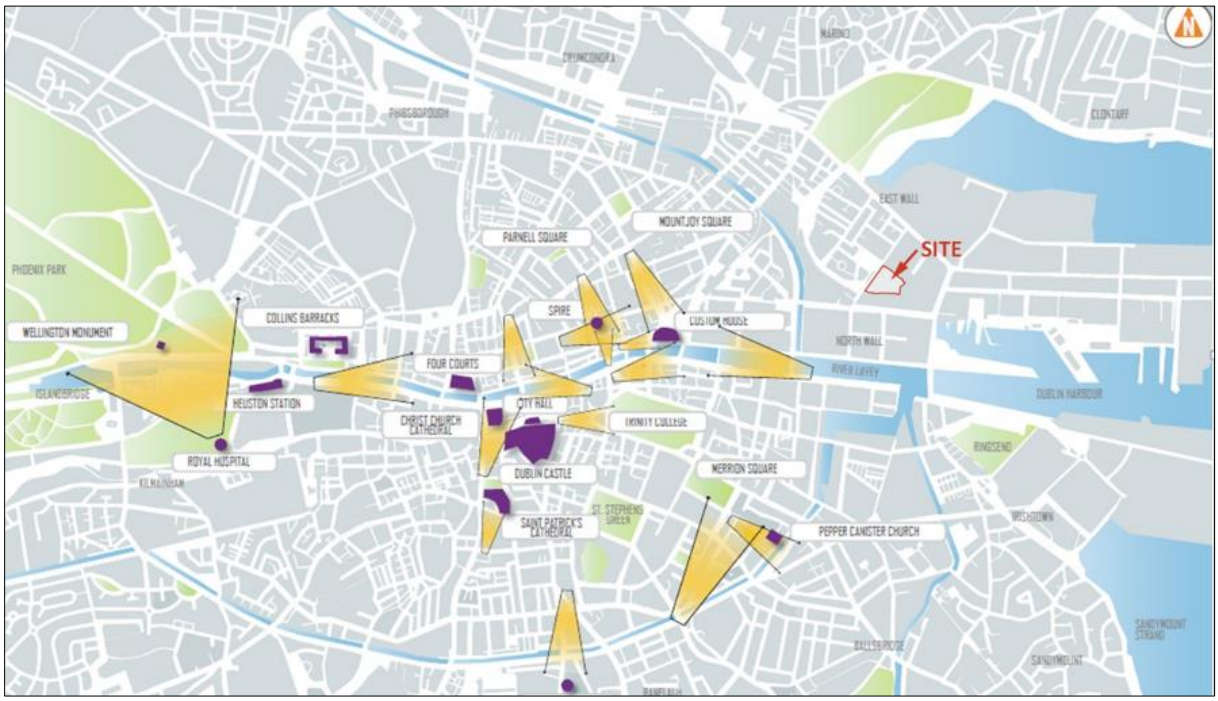


10.3.4.2 Views and Prospects

The key *Views and Prospects of the City are presented in Fig. 4 of Dublin City Development Plan*, although indicative at present and subject to a more detailed review during the lifetime of the Plan, substantially relate to the area between the Canal, and do not pertain to the Site or its surrounds. See Figure 10.5 below.

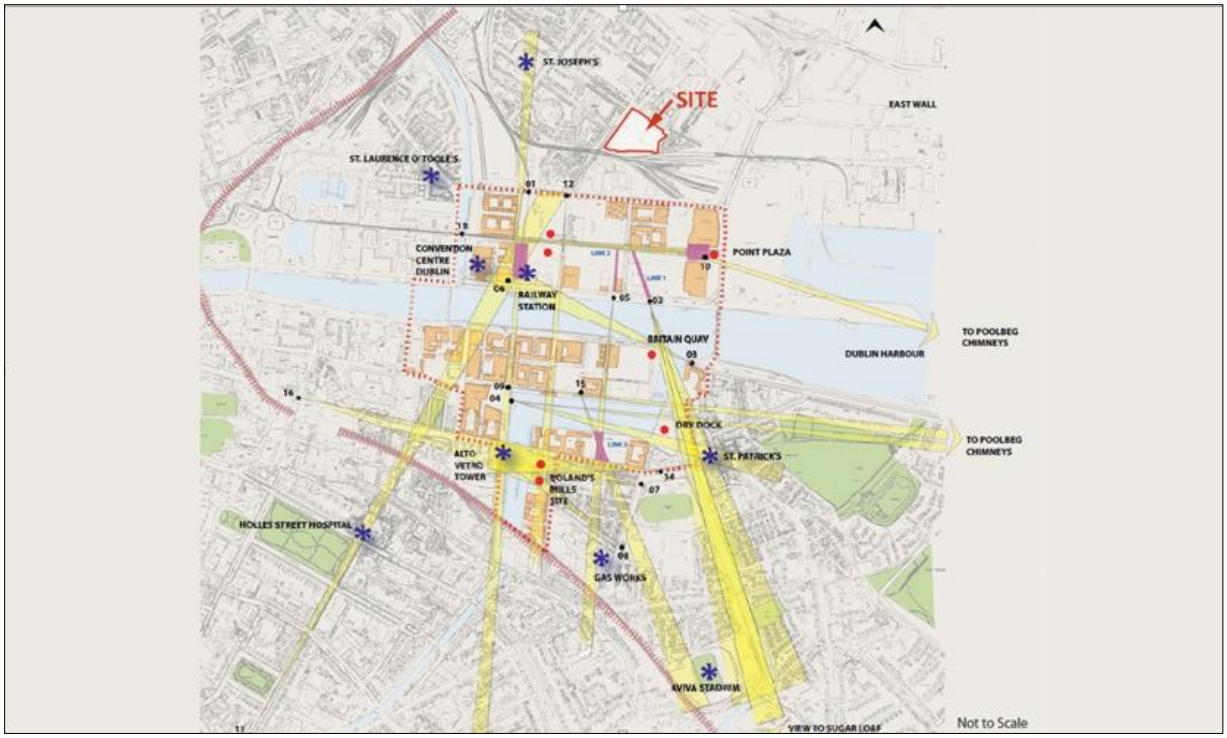
[59] DHPLG, 2018: https://www.housing.gov.ie/sites/default/files/publications/files/draft_urban_development_and_building_heights_guidelines.pdf

Figure 10.5: Extract - Fig. 4 Dublin City Development Plan. Key Views and Prospects (Indicative) (Site location in red)



The *North Lotts and Grand Canal Dock SDZ Planning Scheme*[60], the extent of which is fully contained within the SDRA 6 boundary, identifies additional Views and Prospects within the area of the Planning Scheme (see Section 4.6.7 of the Planning Scheme & Fig. 18). The Site is overlaid on Figure 18 of the Planning Scheme, see Figure 10.6 below, and it is clear that the location of the Site relative to the Views and Prospects will not feature within or obstruct any of the views identified.

Figure 10.6: Extract - Fig. 18, North Lotts and Grand Canal Dock SDZ Planning Scheme 2014 (Indicative) (Site location in red)



[60] DCC, 2014: http://www.dublincity.ie/main-menu-services-planning-urban-development-plans-local-area-plans/north-lotts-grand-canal-dock

10.3.5 Landscape / Townscape and Visual Significance and Sensitivity

The Site is significant in terms of its location along East Road and within the wider Docklands, and for its interface with a diverse range of land uses, building types and scales that characterise East Wall and the Docklands.

The Site itself has no landscape features, trees or other vegetation of any significance.

The principal landscape and visual sensitivities relate to existing residential settlements in the locality of the Site, to the views towards the Site from roads, streets and public open spaces within the wider setting, and views of the East Wall and Docklands skyline from the wider City.

10.4 Characteristics of the Proposed Project

10.4.1 Introduction

The proposed Project is a comprehensive redevelopment of the existing Site that will transform the currently underutilised and light industrial site to become a landmark and gateway building and public space for both the immediate locality and the wider East Wall and Docklands area. It will incorporate a sustainable mix of living, employment, community uses and public realm, and in a manner that will be provide a distinctive, attractive and vibrant contemporary addition to the established and expanding neighbourhood.

The Site extends c.150m from East Road, and varies in length from c.175m along East Road to c.75m where it adjoins Merchant's Square.

The proposed Project comprises nine distinct blocks over ground level podiums, and ranging in height from three to 15 storeys. Accommodation will include apartments, commercial / enterprise space, retail units, foodhub, residential amenity services, a crèche and a Men's shed. Car and bicycle parking, cyclist changing facilities and storage, and services and plant areas will be accommodated within the podiums.

10.4.2 Design Strategy

The development will adopt a primary axis parallel to East Road that facilitates an appropriate interface with the adjoining apartment blocks to the north, and also allows maximum sunlight and daylight penetration to the developments.

The nine blocks will be arranged such that the tallest will establish the landmark and gateway feature, and subsequent blocks will step down so is provide appropriate interfaces at site boundaries and to optimise sunlight and daylight access.

East Yard Lane will lead from East Road, at right angles to the primary axis, and to a multi-functional East Square and East Yard Court. The lane, square and court will form a new neighbourhood environment, as an extension of East Road. A strong mix of uses will front these spaces ensuring active uses, and adding significant new open space and public realm areas to the locality, while also providing a strong focal point to the development.

Landscaping will include a tree-lined East Yard Lane with a series of seating areas, and East Square and East Yard Court with feature tree planting, high quality, robust paving, feature lighting and seating areas. A series of podium level landscaped courtyards will branch of the central spine providing high quality communal open spaces incorporating formal and informal play areas.

Full details of the proposed Project are provided in the Architects Design Statement, and the Landscape Proposal document.

10.5 Potential Impact of the Proposed Project

New development in an urban environment has the potential to impact on the wider city scale, the district within the city, and the locality of the development, or all three. The quality of impacts can be *positive, neutral* or *negative*,

and the significance of impacts is determined by the particular characteristics of the development and the existing context.

The proposed Project will involve the construction of a substantial new mixed-use development on a currently underutilised site, and is intended to provide a landmark and gateway building and public space at East Wall that defines the Site as a destination within the Docklands.

10.5.1 Construction Phase

During construction, which is anticipated to take place over a 30 month period, potential landscape and visual effects will arise from:

- Site establishment, including provision of the site compound, provision of hoarding, etc.;
- Site clearance, including demolition of existing light industrial units and break up and removal of existing concrete marshalling yard;
- earthworks and stockpiling;
- access and egress of construction traffic for material import and export;
- erection and operation of tower cranes;
- construction traffic movement onsite;
- construction site lighting;
- general construction activity, including site personnel and equipment;
- gradual appearance of elements of the development in certain local and wider views towards the Site;
- provision of public realm, lighting, paving, landscaping and planting etc.; and
- completion and occupation of the development.

10.5.1.1 Effects on Landscape / Townscape Character

Effects on landscape / townscape character during the Construction Phase will be *temporary to short term,* and will vary considerably from the wider city scale to the more local context of the Site.

At the wider city scale, and given the height of the tallest element at 15 storeys, and the substantially low rise development to the east and west of the Site, there will be locations from where the construction activity may feature on the Docklands skyline. At distances of c.1-3km from the River Liffey, North Strand, Clontarf and Strand Road, such activity will have *negligible* or *slight* and *neutral* effects on landscape character. From the major open spaces within the Georgian Core, by virtue of distance and built and landscape enclosure, there will be *no landscape effect.*

At the closer Docklands scale, from areas along East Wall Road, Castleforbes Street, Sheriff Street and Royal Canal, construction activity will become apparent along street corridors and across more open settings. Landscape effects will range from *slight* to *moderate*, and from *neutral* to *negative*.

At the local scale, from the adjoining established residential streets and developments at East Wall and at Merchant's Square, construction activity and the emerging taller structures will be more apparent, giving rise to landscape effects typically ranging from *moderate / slight negative* to *significant* / *moderate negative*.

10.5.1.2 Effects on Views

Effects on views during the Construction Phase will be *temporary* to *short term*, and will also vary considerably from the wider city scale to the more local context of the Site.

At the wider city scale, construction cranes and the emerging taller elements of the proposed Project will become visible on the Docklands skyline from locations with more open foregrounds, however, at distances of c.1-3km from the Site, visual effects will be *slight / not significant* and *neutral* in the context of an established and continually evolving Docklands skyline. From the major open spaces within the Georgian Core, by virtue of distance and built and landscape enclosure, there will be no visual effect.

At the closer Docklands scale, there will be views of the construction activity and emerging structures along street corridors and from more open vantage points. Visual effects will range from *slight / not significant* and *negative*, to *significant* / *moderate* and *negative*.

At the local scale, construction activity and the emerging development, particularly following construction of the podium level and lower floors, will be more visible from the adjoining established residential streets and developments at East Wall and at Merchant's Square. Visibility from these closer and generally more sensitive locations will typically give rise to *significant* / *moderate negative* visual effects as the new and larger scale buildings emerge in views where no existing structures are currently visible.

10.5.2 Operational Phase

New development in an urban environment has the potential to impact on the wider city scale, the district within the city, and the locality of the development, or all three. The quality of impacts can be *positive, neutral or negative*, and the significance of impacts is determined by the particular characteristics of the development and the existing context.

The proposed Project will involve the construction of a substantial new mixed-use development on a currently underutilised site, and is intended to provide a landmark and gateway building and public space at East Wall that defines the Site as a destination within the Docklands.

10.5.2.1 Effects on Landscape / Townscape Character

Upon completion, the effects of the proposed Project on the landscape character will depend on form, massing and quality of the development in its receiving environment. Landscape effects will be *permanent* and will vary considerably from the wider city scale to the more local streetscapes depending on its presence within the context.

At the wider city scale, the form and massing of the development, within a substantially low rise development to the east and west of the Site, is such that there will be locations from where the taller parts of the proposed Project may feature on the Docklands skyline. At distances of c.1-3km from the River Liffey, North Strand, Clontarf and Strand Road, the taller elements will introduce a new element on the skyline giving rise to landscape effects ranging from *moderate / slight* to *slight / not significant*. These effects will be *positive* as the new skyline feature will not detract from the existing skyline, and will aid legibility from the wider city by presenting the East Wall landmark. From the major open spaces within the Georgian Core, by virtue of distance and built and landscape enclosure, there will be no landscape effect.

At the closer Docklands scale, from areas along East Wall Road, Castleforbes Street, Sheriff Street and Royal Canal, the proposed Project will provide a substantial new urban landmark within an urban context that is continuing to evolve. The presence of the new buildings will become part of the composition of established and partially established streetscapes, and will provide a landmark focal point on key streets. Where the buildings are set within a more open and undeveloped context, they will also provide a landmark focal point that signals East Wall as a gateway and destination with the Docklands. Landscape effects will range from *moderate* to *moderate* / *slight*, and will typically be *positive* as the buildings provide legibility, order and regeneration within an evolving and regenerating context, and the quality of the architectural design, form and detailing is becoming apparent with proximity to the Site.

At the local scale, from the adjoining established residential streets and developments at East Wall and at Merchant's Square, the new taller buildings will give rise to substantial change with certain streetscapes, where the modern and larger scale development will become part of the character of established low rise residential streetscapes. As mentioned in Section 10.3.3.1 above, the City and Docklands context of the East Wall residential area is already evident, with many streetscapes including larger modern high density commercial and residential development just beyond the immediate streetscape. Landscape effects will range from *significant* / *moderate* to *moderate* / *slight*. Effects are likely to be perceived initially as *negative* by virtue of the change and the larger scale, however these will become more acceptable over time as the buildings are occupied and the development provides a new destination and facilities to the locality.

10.5.2.2 Effects on Views

Upon completion, effects of the proposed Project on views will depend on the form, massing and quality of the development, and also on the distance from which it is viewed and the visual context. Visual effects will be *permanent*, varying considerably from the wider city scale to the more immediate locality of the proposed Project.

At the wider city scale, visual effects will range from *slight / not significant* to *not significant / imperceptible*, and will generally be *positive or neutral* depending on the extent to which the proposed Project provides a visible landmark that signals the East Wall locality within the City and Docklands context. From the major open spaces within the Georgian Core, by virtue of distance and built and landscape enclosure, there will be no visual effect.

At the closer docklands scale, the new buildings will be visible along particular streetscape and from vantage points overlooking undeveloped lands. Visual effects will range from *moderate* to *moderate / slight*, and will generally be *positive* as the buildings provide a landmark and focal point at this locality in the context of the wider Docklands redevelopment.

At the local scale, from the adjoining established residential streets and developments at East Wall and at Merchant's Square, the new taller buildings will be visible along residential streets and adjoining residential developments, and from closer vantage points, will be more pronounced. As noted above, many of the residential streets and developments within the East Wall locality already experience views of increasing numbers of larger new commercial and residential developments just beyond the immediate streetscape. The addition of the proposed Project within East Wall will be consistent with that trend, and is intended to provide a landmark and focal point for the East Wall locality. Visual effects will typically range from significant / moderate to moderate / slight. Visual effects are likely to be perceived initially as negative, however these will become more acceptable over time as the buildings are occupied, the neighbourhood is strengthened, and the value of the new public spaces and facilities to the existing community are realised.

10.6 Mitigation Measures

As the proposed Project proposes a complete redevelopment of an underutilised site to deliver a new and contemporary high density mixed-use development, the primary mitigation measures are by design.

The Architectural Design Statement and the Landscape Proposal document provide comprehensive details of the existing urban context, concept and design development, and the final design solution.

These documents detail how the proposed Project responds to the local context in terms of urban form, massing and height, optimising daylight and sunlight penetration to the development itself and to adjoining properties, and the establishment of a new series of neighbourhood spaces and public realm incorporating active uses.

10.6.1 Construction Phase

Construction activity by its nature can be disruptive to the locality, both in terms of emerging works within the Site, and also with access and egress of construction vehicles to and from the Site and within the local road network.

Mitigation during the Construction Phase will include the establishment of solid perimeter Site hoarding that will restrict views into the Site area and minimise the sense of visual disruption. A TMP for construction traffic will also be agreed with the Local Authority to establish appropriate access routes, times of access, and any occasional or temporary traffic management requirements at the interface of the Site and East Road.

Additionally, permitted construction hours will be agreed in advance with the Local Authority to ensure construction activity does not take place during times that would cause inappropriate inconvenience to local residents.

10.6.2 Operational Phase

The proposed Project is to be a landmark and gateway building, signalling a new destination within the wider docklands, and providing an attractive and vibrant focal community focal point for the locality. The design solution will establish a contemporary identity for the East Wall locality within the Docklands context, and will serve to

integrate the East Wall locality within that wider Docklands and City context. It will establish a contemporary sense of place that builds on the established neighbourhood identity and reinforces it as a distinct locality in a continually evolving city context.

The design of the proposed Project has involved detailed consideration of avoidance of inappropriate landscape and visual effects through an iterative process of Site analysis through to concept design and final design of layout, massing and detailed design of the scheme as a whole.

The distinctive 15 storey block presents as a gateway to East Wall at the elevated railway overbridge on East Road, and will provide a landmark and gateway identity to the proposed Project and to East Wall in an evolving City and Docklands. Subsequent blocks will step down appropriately to the adjoining mid and low rise buildings along East Road and to the east of the Site. The proposed Project presents a clearly defined built edge along East Road, and also along the railway corridor that defines the southern Site boundary.

The height, massing, architectural form and material selection of each element of the proposed Project are informed by the local context. The overall development incorporates a range of architectural forms and expressions that provide diversity and visual interest, and reflect both the robust structures of the former Docklands as well as high quality contemporary mixed urban development. Full details of the architectural design are provided in the Architectural Design Statement.

A series of connected public spaces will lead from East Road, including East Yard Lane and the multi-functional East Square and East Yard Court to provide an attractive new neighbourhood environment, as an extension of East Road, and incorporating a strong mix of uses fronting these spaces so as to ensure active uses. High quality landscape proposals will ensure that these spaces are welcoming, and add significant new open space and public realm areas to the locality, while also providing a strong focal point to the development. Full details of the landscape proposals are provided in the Landscape Proposal document.

10.7 Residual Impacts

The proposed Project provides a *positive* response to the regeneration and re-use of the existing brownfield site. It provides a strong mixed-use profile and intensification of under-utilised urban lands in a manner that responds to the locality and continues the diversity of the built form that is a defining characteristic of East Wall. It strengthens the urban form of East Road as the central spine of the East Wall area, and provides high-quality and attractive building and open space that supports a diverse range of occupancy, amenity and recreational opportunities. The proposed Project will make a significant and positive contribution to the townscape / urban structure of immediate and wider area.

Residual effects are illustrated in the series of 27 photomontage views included in the Planning Application pack. The view locations are representative of the wider city views, the Docklands context, and the more immediate local context. The view location map in included in the Planning Application pack.

10.7.1 Wider City Scale

10.7.1.1 View 01

View 01, Figure 1.1.1, is from the R131 along the southern side of the River Liffey approaching the East Link Bridge. The existing view illustrates the Docklands character of the area, with the River Liffey, cruise and freight ships and the East Link Bridge. The emerging regeneration of the North Lotts and Grand Canal Dock areas on either side of the river beyond the bridge are clearly visible as a new city district, with the taller Capital Dock to the left and the emerging Exo Building beginning to appear just behind the cruise ship. Figure 1.1.2 includes the proposed Project, to the right and behind the Gibson Hotel, and shows that the landscape and visual effect will be sl*ight / not significant* and *neutral*.

10.7.1.2 View 02, 03, 04 and 05

These views are from the north side of the Docklands, from the Annesley Bridge over the Tolka River, from Alfie Byrne Road, and from the Clontarf Road. The existing views, Figures 1.2.1 to 1.5.1, show a mixture of established development along East Wall Road, amenity spaces, the Tolka River, and views over the Docklands and East Point Business Park. The proposed Project is included in Figures 1.2.2 to 1.5.2, and these illustrate landscape and visual effects that are *slight / not significant* and *neutral to positive* as the taller element can be seen as a landmark that will aid legibility of the City.

10.7.1.3 View 06

View 06, Figure 1.6.1, is from Strand Road on the south side of the Poolbeg Peninsula, and shows the Seán O'Casey Park and the Irishtown Nature Park along the southern water edge of the peninsula. Figure 1.6.2 includes the proposed Project, however, by virtue of the middle ground landscaping, the development will not be visible, and its profile is outlined in red. There may be glimpse views of the taller element from other vantage point along this road, however, landscape and visual effects will be *imperceptible*.

10.7.1.4 Views 07, 08 and 09

These views, Figures 1.7.1 to 1.9.2, are from the Georgian Core at open spaces within Trinity College, Merrion Square and St. Stephen's Green. The proposed Project will not be visible, and th*ere will be no landscape or visual effect.*

10.7.2 Docklands Scale

A series of eight representative views are provided to illustrate the landscape and visual effect of the proposed Project from the more local Docklands scale, typically at c.500m from the Site, but the actual location depending on the context of the view.

10.7.2.1 View 10

View 10, Figure 1.10.1, is from East Wall Road at Sheriff Street, and displays a mixture of new urban development and open undeveloped brownfield land. The Canon Hall development, and the spire of St. Laurence O'Toole Church are visible along Sheriff Street. The Island Key apartment block at East Road is just visible to right of the view, but the centre of the view lacks any character or identity. Figure 1.10.2 includes the proposed Project, and indicates the establishment of a new landmark development that will signal the East Wall locality. Landscape and visual effects are considered to be *moderate* and *positive*.

10.7.2.2 View 11

View 11, Figure 1.11.1, is from Sheriff Street at Castelforbes Street, and displays substantially new urban regeneration, with a distinctive stone gabled industrial unit. The LUAS red line travels along Sheriff Street bring passengers between the city centre and Point Village. The vista along the streetscape is terminated by low rise light industrial units. Figure 1.11.2 includes the proposed Project, and shows the six and eight storey brick finished gable block terminating the vista and creating an attractive focal point along the street. Landscape and visual effects are considered to be *moderate* and *positive.*

10.7.2.3 View 12

View 12, Figure 1.12.1, is from Sheriff Street at East Road, and comprises the new Canon Hall development on the left and remnant industrial units on the right. East Road rises towards the centre of the view, but disappears over the crest of the bridge, with only minor elements of the Island Key Apartments partially visible behind the bridge embankment and vegetation. Figure 1.12.2 includes the proposed Project, and shows how the tallest block will form an attractive and deliberate landmark and gateway that creates visual interest and invites people into East Wall. Landscape and visual effects are considered to be *significant* / *moderate* and *positive*.

10.7.2.4 View 13

View 13, Figure 1.13.1, is from Sheriff Street at Docklands Station. New development at Spencer Dock and further along Sheriff Street is clearly visible. The road is elevated, and affords wide views over the East Wall area. The Seán O'Casey Community Centre and the Island Key Apartment blocks are visible, but the view lacks any structured urban character. Figure 1.13.2 includes the proposed Project, and indicates the establishment of a new landmark development that will clearly signal the East Wall locality. Landscape and visual effects are considered to be *moderate* and *positive*.

10.7.2.5 View 14

View 14, Figure 1.14.1, is from Bellman's Walk on the western side of the Royal Canal. This area is a low rise residential area and is separated from the East Wall by the Royal Canal and the railway lines. Some of the new development along Sheriff Street is visible, and the Poolbeg chimneys are visible in the distance. Figure 1.14.2 includes the proposed Project, and indicates the taller block will be visible from this view. Similarly, other nearby views will see the taller block and the upper parts of some of the other blocks proposed. As the proposed Project becomes a known landmark, the visual connection from Bellman's Walk will contribute to establishing identity and sense of place within the Docklands area. Landscape and visual effects are considered to be *moderate / slight* and *positive*.

10.7.2.6 View 15

View 15, Figure 1.15.1, is from Newcomen Bridge over the Royal Canal. Brownfield former industrial lands are prominent, and the Royal Canal and railway lines lead towards the Docklands. The Crosbie's Yard Apartments at Ossary Road are clearly visible to the left, and the emerging North Lotts and Docklands areas are visible to the right at a greater distance. Figure 1.15.2 includes the proposed Project, however, from this vantage point, the development will be fully screened by the Crosbie's Yard Apartments, and there will be no landscape and visual effects.

10.7.2.7 Views 16 and 17

These views, Figures 1.16.1 and 1.17.1 are from East Road approaching from the north. These views illustrate the existing juxtaposition of the established and smaller scale building to the right with the more recent and larger scale developments to the left of the street. The vista along the street is emphasised by the elevated road and by the taller elements beyond including the PWC building on the River Liffey. Figures 1.16.2 and 1.17.2 include the proposed Project, and indicate the new facades defining the street edge with a range of heights, forms and materials and balconies that add visual interest to the street. The taller block is visible behind the building line of the street, and on a rotated grid, forming a distinctive focal element that will be the landmark identity of the development. Landscape and visual effects are considered to be *moderate* and *positive*.

10.7.3 Local Scale

A series of 10 representative views are provided to illustrate the landscape and visual effect of the proposed Project from the local residential scale, from residential streets within East Wall, at Merchant's Square, and from adjoining apartment developments.

10.7.3.1 View 18

View 18, Figure 1.18.1, is from Irvine Terrace. Irvine Terrace, and the adjoining residential streets, and compact narrow streets with terraced and mostly single storey dwellings. Views beyond the immediate streetscapes are mostly contained by the terraced buildings, even from Church Place and Church Avenue that are aligned closer but not towards the Site. It is noted that from Abercorn Road and from Church Street East, views beyond the immediate residential context include views towards large scale development at Spencer Dock and the North Lotts. Figure 1.18.2 shows that the taller block will appear over the ridgeline of the cottages, but at the distance of c.120m, the apparent dimension of the structural grid and rhythm of fenestration makes the building recede. Landscape and

visual effects are likely to be perceived as *moderate* and *negative*, however, this will reduce over time as the building is occupied and becomes an accepted part of the built and community fabric of the locality.

10.7.3.2 Views 19 to 24

These views are from the residential streetscapes of Russell Avenue East, Hawthorne Terrace, St. Mary's Road at Caledon Road, Church Road at St. Mary's Road at Boolavogue Road. All of these streets are established one and two storey residential streets comprising cottages, terraces and semi-detached dwellings. It is an attractive environment with a strong sense of community. The area includes St. Joseph's Church and the Seán O'Casey Community Centre buildings that are taller and distinctive community structures that contribute to the identity of the area and are visible from the network of streets. It is also noted that there are numerous street locations that currently afford views beyond the immediate residential area, and include St. Laurence O'Toole Church, and modern developments at Spencer Dock, North Lotts, Sheriff Street and East Road itself. As such, there is an established sense of the City and Docklands as part of the wider landscape, by virtue of the visual relationship to that wider context.

Figures 1.19.1 to 1.24.2 show the as existing and as proposed versions of a representative range of views from this area towards the proposed Project. These clearly illustrate that the development will give rise to substantial change in the landscape and visual context, however, such change outside the immediate area, will be consistent with other nearby modern developments. Initially, landscape and visual impacts may be perceived to range from be *significant / moderate* and *negative* to *moderate* and *negative*. It is considered that this will reduce over time as the buildings are occupied and become an accepted part of the built and community fabric of the locality, with landscape and visual effects becoming *moderate* and *moderate / slight* and *neutral* or *positive*.

10.7.3.3 Views 25 and 26

These views are from Merchant's Road and Merchant's Square to the east of the proposed Project. Merchant's Road is linear and is defined by two storey terraced residential properties on both sides. The street is aligned on parts of the North Lotts, and the new 10 storey development at the corner of Sheriff Street and Castleforbes Street forms a focal point at the end of the vista. Figure 1.25.2 illustrates the proposed Project will not be visible from the street, and its profile is represented by a red outline. The view from Merchant's Square is more open than from Merchant's Road. The development is defined by two storey terraced residential blocks and includes a central landscaped communal open space and parking area. The proposed Project will be prominent over the western boundary, however, the blocks facing the boundary are three and four storey, stepping up beyond these to the taller blocks proposed. The proposed Project will present as a distinctive contemporary residential development, with the buildings expressed as a range of forms, scales and materials all referenced from the overall design palette. In particular, the roofscape will include a diverse range of gables, eaves, parapet and ridges that will reduce the overall scale and add visual interest. The taller block will be barely visible beyond the lower blocks in the foreground.

Landscape and visual effects are likely to be perceived initially as *significant / moderate* and *negative*, however, it is considered that at this City and Docklands location, with extensive and ongoing regeneration throughout the locality, the landscape and visual effect will be *moderate* and *negative*.

10.7.3.4 View 27

View 27, Figure 1.27.1, is from the Teeling Way Apartment development to the immediate north of the Site. Currently, the communal open spaces and parking areas are terminated by block walls along the Site boundary, affording views over the wall to ongoing development at North Lotts. Figure 1.27.2 shows the proposed Project and includes four and five storey elements that will define the southern edge of the space, with a new communal open space above the podium allowing longer views into the new development. The roofscape will be varied, with gables and ridges at alternative alignments providing an animated roofscape and building massing. Landscape and visual effects are considered to be *significant / moderate* and *positive*.

10.8 Monitoring

10.8.1 Construction Phase

Monitoring during the Construction Phase will requires the regular inspection and maintenance, if required, of Site perimeter hoarding and continual review of access and egress arrangements to and from the Site to ensure minimal impact on road users and the local community.

10.8.2 Operational Phase

The development is for a high quality mixed-use urban regeneration that will transform the existing underutilised site. Monitoring during the Operational Phase will ensure that the proposed Project is implemented as designed so as to deliver on the stated design objectives. A defects liability period will be required for all soft landscaping and any planting that fails to establish will need to be replaced. A maintenance regime will be established to ensure than soft landscaping and public realm is maintained in a high quality manner, and that any damage is repaired promptly so as to ensure the spaces remain attractive to the benefit of the immediate and local community.

10.9 Reinstatement

There is no reinstatement required in accordance with this study.

10.10 Interactions

The main interactions relating to Landscape & Visual are Population & Human Health and Cultural Heritage.

The Landscape & Visual impacts are associated with the Construction Phase works on the Site. Furthermore, the construction works has the potential to impact upon unknown, undiscovered archaeological features at the Site.

During the Operational Phase the proposed Project will impact on the quality of the open spaces, which will ultimately impact on people's health and well-being.

10.11 Difficulties Encountered in Compiling the Chapter

No difficulties were experienced in compiling this Chapter of this EIAR.

10.12 Cumulative Impacts

10.12.1 Cumulative Effects - Construction Phase

The proposed Project is an urban redevelopment that will be part of the wider regeneration and development that is ongoing in the North Lotts and Docklands area. Construction activity in the locality is extensive, with numerous building developments at all stages of construction, and with further streetscape and public realm works ongoing. In that context of an evolving City precinct, the cumulative effect of the Construction Phase of the proposed Project, in-combination with many other construction projects, *will be not significant*.

10.12.2 Cumulative Effects - Operational Phase

The development will establish a distinct urban landmark and gateway to the East Wall locality in the wider docklands context. The docklands and North Lotts is an area undergoing extensive redevelopment with new urban commercial, residential and mixed use blocks continually redefining the urban fabric from the former historic docklands to a modern urban district.

The proposed Project will be consistent with that emerging trend, and the cumulative effect of the proposed Project, in-combination with the continually evolving urban district, *will be not significant*.

10.13 'Do-Nothing' Impact

In the event that the proposed Project does not proceed, it is likely that the Site will remain in its current industrial use in the *short* to *medium term*, or until such time as an alternative redevelopment proposal is granted permission and constructed.

10.14 References

- EPA Draft '*Guidelines on the information to be contained in Environmental Impact Assessment Rep*orts' (2017).
- EPA '*Draft Advice Notes for preparing Environmental Impact Statements'* (2015)
- The Landscape Institute/ Institute of Environmental Management and Assessment (2013). *Guidelines for Landscape and Visual Impact Assessment* (3rd Edition)
- European Commission (2017) Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report
- Government of Ireland (2018) Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (August 2018)
- Department of Housing, Planning and Local Government, Urban Development and Building Heights, Guidelines for Planning Authorities, 2018

11 Traffic & Transport

11.1 Introduction

This Chapter of the EIA) document has been prepared by DBFL Consulting Engineers and addresses all traffic and transport and related sustainability issues including means of vehicular access, pedestrian, cyclist and local public transport connections. The principal objective of this Chapter is to quantify any level of impact across the local road network and subsequently ascertain the operational performance of the local road network.

11.2 Methodology

The assessment was carried out in accordance with policy and guidance both at a national and local level. Accordingly, the adopted methodology responds to best practices, current and emerging guidance, exemplified by a series of publications, all of which advocate this method of analysis. This assessment has been completed in accordance with, but not limited to, the following publications:

- NRA Guidelines '*Traffic and Transport Assessment Guidelines*' (NRA, 2014);
- Dublin Transportation Office & Department of the Environment and Local Government '*Traffic Management Guidelines*' (2003); and
- The Institution of Highways and Transportation (IHT) U.K. '*Guidelines for Traffic Impact Assessments*' (1994).

The methodology incorporated a number of key inter-related stages, which are outlined in Table 11.1 below.

Table 11.1: Methodology Stages

Task	Description
Site Audit	A site audit was undertaken to quantify existing road network issues and identify local infrastructure characteristics, in addition to establishing the level of accessibility to the Site in terms of walking, cycling and public transport. An inventory of the local road network was also developed during this stage of the assessment.
Traffic Counts	Traffic counts were undertaken and analysed with the objective of establishing local traffic characteristics in the immediate area of the proposed Project.
Trip Generation	A trip generation exercise has been carried out to establish the potential level of vehicle trips generated by the proposed Project.
Network Impact	In accordance with the Institute of Highways and Transportation; *Guidelines for Traffic Impact Assessment*, the specific level of influence generated by the proposed Project upon the local road network was ascertained and the junctions which required assessment in greater detail were identified.
Network Assessment	Drawing upon the findings of the previous stages, an Operational Phase assessment of the local road network has been undertaken to evaluate the performance of key junctions following the implementation and occupation of the proposed Project.

11.3 Baseline Environment

11.3.1 Land Use

The Site is a brownfield site currently occupied by Hireco Park (trailer hire company), with vehicular access currently provided from East Road. The Site is situated to the southeast of the East Road corridor, as located on the eastern edge of Dublin City Centre. The Site is bound by East Road to the west, Island Key Apartments to the north, Merchant's Square to the east and the railway sidings to the south.

The land uses surrounding the development site are a mix of commercial and residential (comprising both individual dwellings and larger residential apartment blocks), all of which benefit from direct access to / from East Road.

The Site is zoned Z14 within the Development Plan:

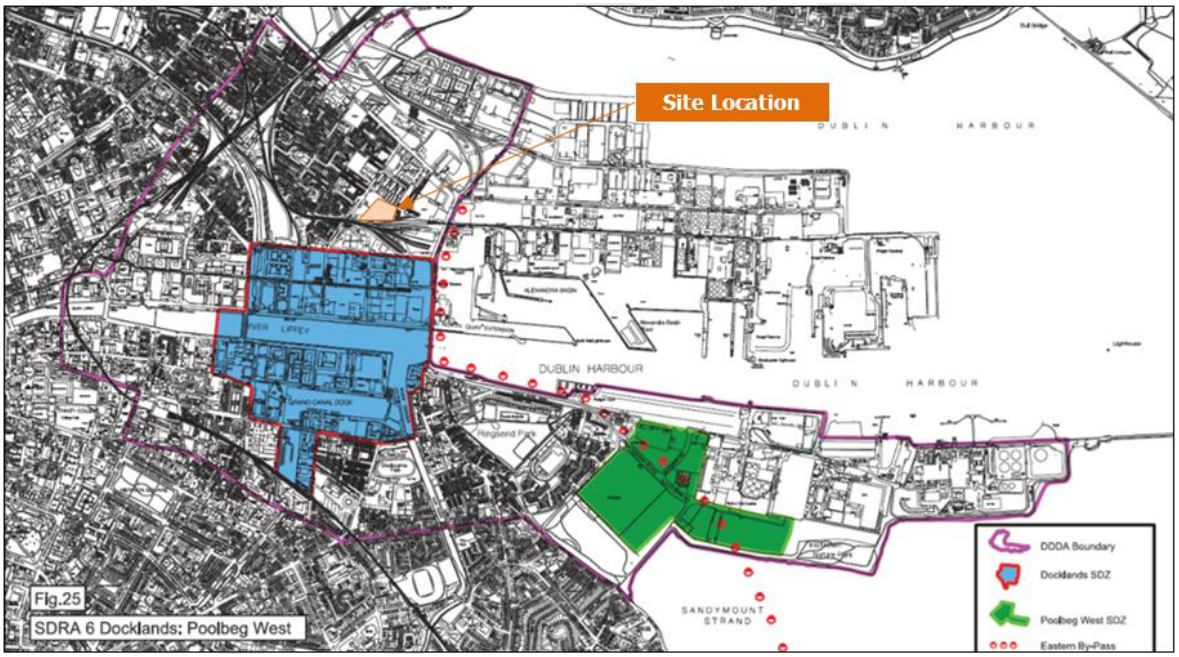
> *'to seek social, economic and physical development and / or rejuvenation of an area with mixed use of which residential and "Z6" would be the predominant uses'*.

Land Use Zoning Objective Z6 is:

> *'to provide for the creation and protection of enterprise and facilitate opportunities for employment creation.'*

The Site is also located immediately to the north of the Docklands SDZ and lie within the Dublin Docklands Development Authority (DDDA) boundary, see Figure 11.1 below.

Figure 11.1: SDRA 6 Docklands (extract Map E the Dublin City Development Plan)



The designation of the Docklands, including the Docklands SDZ, as a SDRA provides for the continued physical and social regeneration of this part of the City, consolidating the area as a vibrant economic, cultural and amenity quarter of the City, whilst also nurturing sustainable neighbourhoods and communities.

11.3.2 Location

The general location of the Site in relation to the surrounding road network is illustrated in Figure 11.2 below. Figure 11.3 below indicatively shows the extent of the Site boundary and neighbouring lands.

The Site is located in the East Wall district which forms the eastern edge of Dublin City Centre. Travelling north along East Road the route terminates at a signalised junction with East Wall Road. East Wall Road provides a direct connection to the strategic M50 Motorway via the Dublin Port Tunnel. To the west, East Wall Road provides access to Fairview and Drumcondra (via Clonliffe Road, in addition to Clontarf via Alfie Byrne Road.

Travelling southbound from the Site along East Road, the route terminates at a signalised junction with Sheriff St. Upper. From Sherriff St. Upper there are various road links available to gain access to the North Quays and Dublin City Centre.

Figure 11.2: Site Location[61]

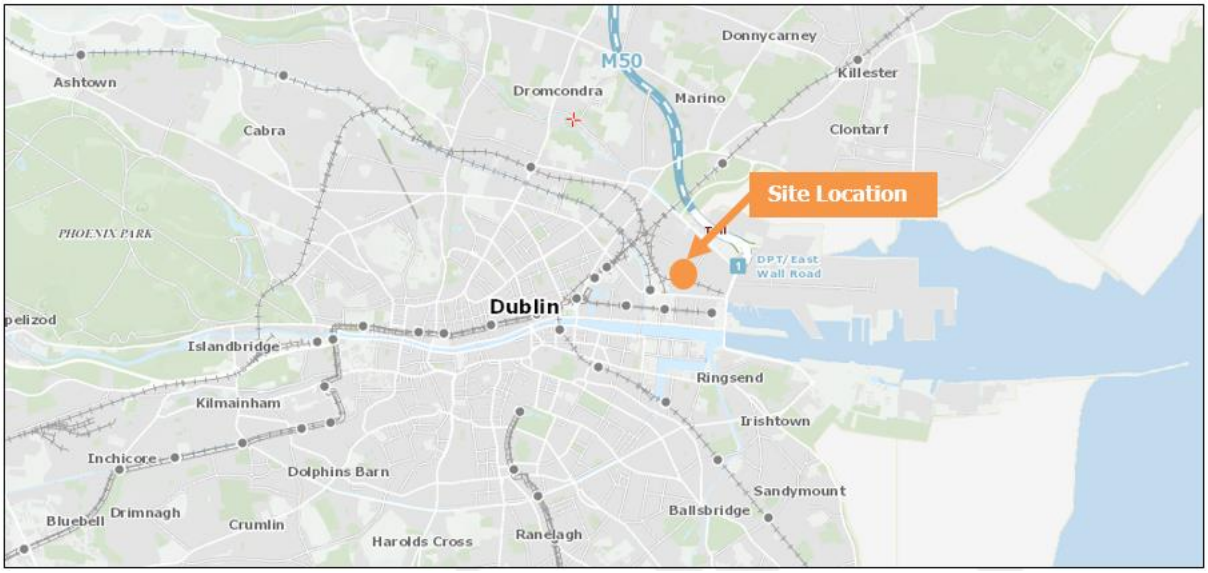
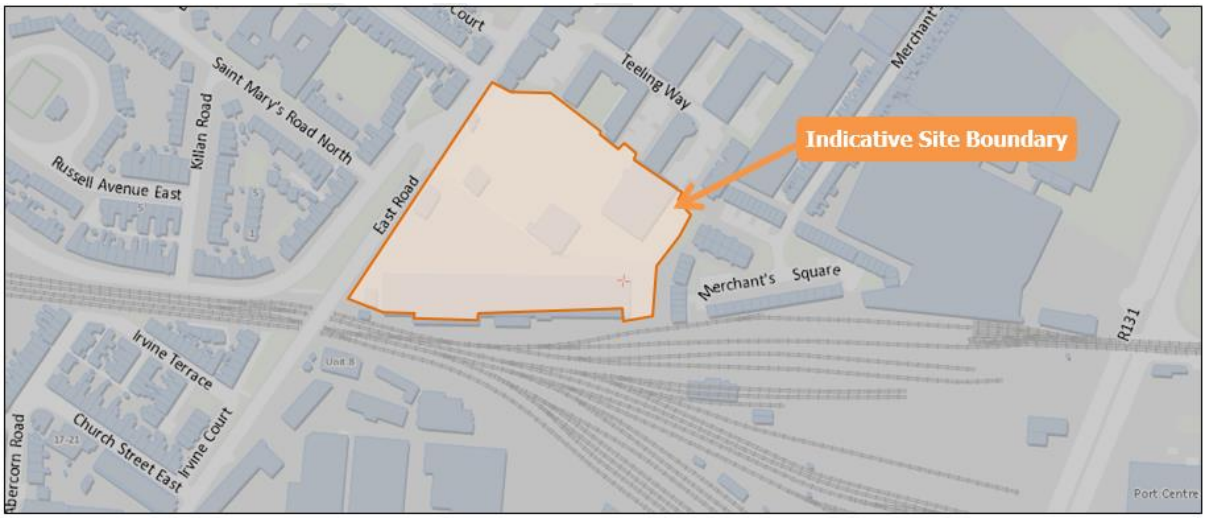


Figure 11.3: The Site Indicative Boundary[62]



11.3.3 Existing Transportation Infrastructure

11.3.3.1 Background

An important stage in the development of a Traffic and Transport Assessment is the identification and appreciation of the local network's existing transport conditions and vehicle movement characteristics.

An audit of the local road network has been undertaken to establish the existing transport conditions and vehicle movement patterns across the existing network.

[61] Ordnance Survey Ireland Maps: http://maps.osi.ie
[62] Ordnance Survey Ireland Maps: http://maps.osi.ie

11.3.3.2 Existing Pedestrian Environment

All pedestrian routes leading to / from the Site benefit from the provision of street lighting in addition to good quality pedestrian footways. There are controlled pedestrian crossing facilities available adjacent to the Site at the East Road/ Church Road junction and to the south at the East Road / Sheriff St. Upper junction.

11.3.3.3 Existing Cycling Environment

In the immediate vicinity of the Site cyclists must share the road carriageway with general vehicular traffic, nonetheless cyclists traveling to / from the Site from the surrounding area can benefit from the provision of a variety of cycle facilities (cycle lanes / tracks) along Seville Place (750m to the west), Guild Street (700m to the southwest), North Strand Road (1.4km to the northwest) and the Quays (600m to the south).

The NTA's Cycle Network Plan for the GDA includes proposals for the provision of a secondary cycle route along East Road adjacent to the Site, see Figure 11.4 below.

Figure 11.4: Existing Cycle Facilities (source: Sheet E1 GDA Cycle Network Plan)

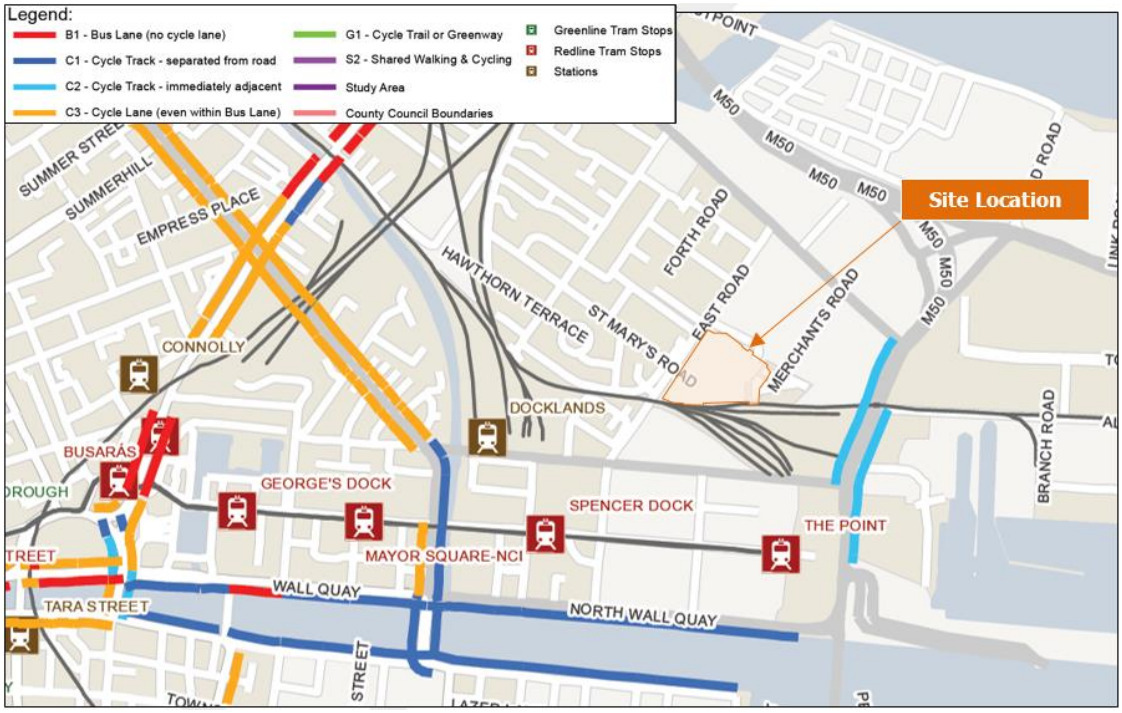
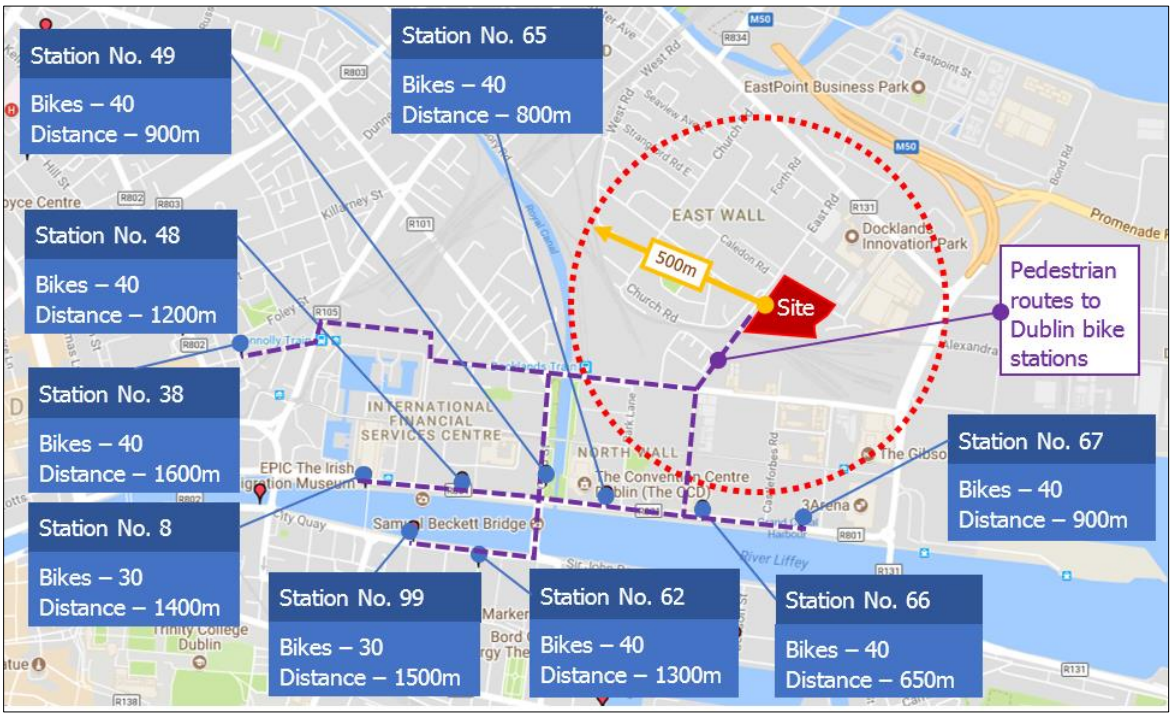


Figure 11.5: Dublinbikes Stations



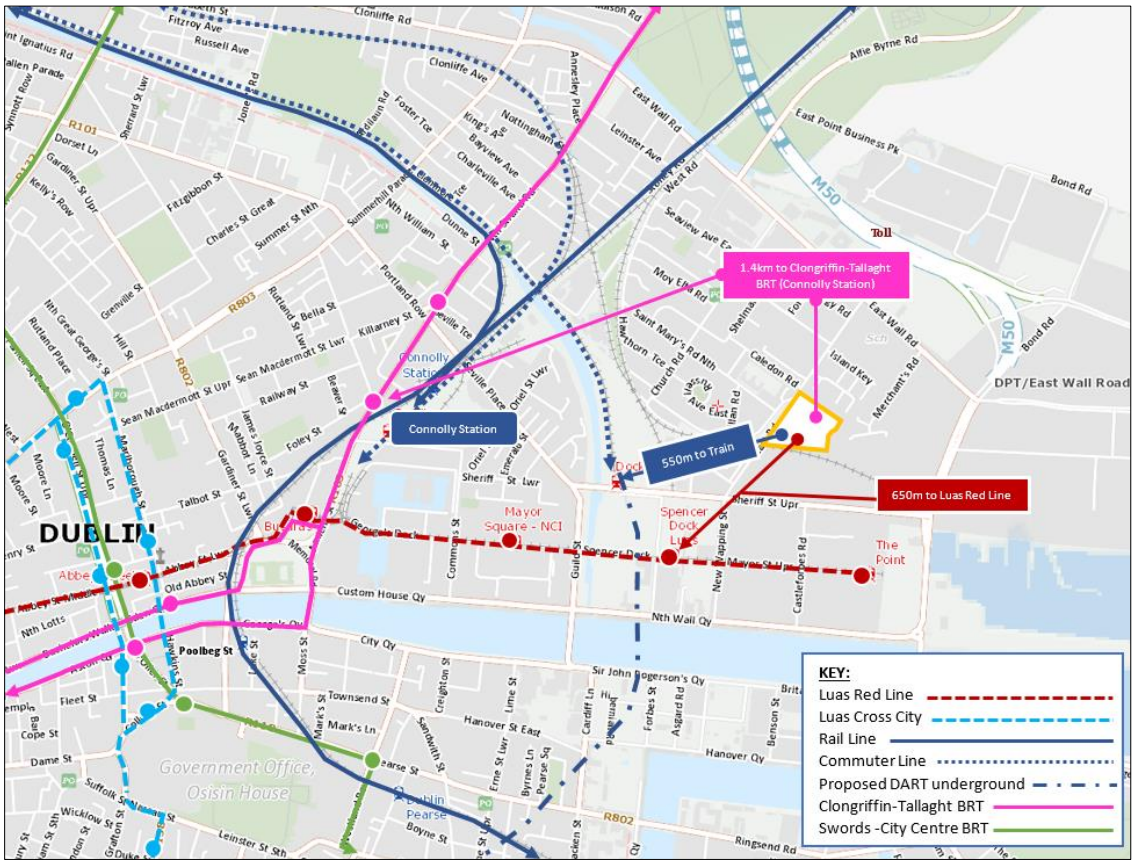
There are also a number of dublinbikes stations located surrounding the Site area on North Wall Quay, Custom House Quay and City Quay. The bike station on North Wall Quay is accessible within c.650m walking distance of the Site, see Figure 11.5 above.

11.3.3.4 Public Transport

As illustrated in Figure 11.6 below the Site is ideally situated to benefit from a comprehensive range of transport connections which result in the Site benefiting from excellent accessibility levels for all modes of travel. Furthermore, the range and proximity of a number of existing (and emerging) public transport interchanges further enhances the sustainability characteristics of the Site. These include both the Docklands Rail Station and the LUAS Red Line (Spencer Dock interchange) being only 550m and 650m, respectively, from the proposed Project.

In addition, Connolly Station and the proposed Clongriffin-Tallaght BRT interchange are within 1.4km from the Site, whilst the proposed interchange for the Dart Underground is located at the Docklands Rail Station, c.550m from the Site.

Figure 11.6: Existing & Proposed Public Transport Rail and BRT Connections



Bus

Dublin Bus operates route numbers 53 and 151 along the East Road corridor, travelling in both directions providing links between Dublin City Centre and Dublin Ferry port and also Foxborough and the Docklands. Routes 33b, 33x, 41x, 142 and 151, in addition to Airlink bus routes 747 and 757 operate along East Wall Road (to the north of the Site) providing links to / from a range of additional destinations including Dublin City centre and Dublin Airport.

Route numbers 53 and 151 are highly accessible with the closest interchange opportunities within 85m of the Site access whilst route numbers 33b, 33x, 41x, 142, 747 and 757 are accessible within 450m of the Site access as detailed in Figure 11.7 below. The Swords Express, which operates daily services, is also accessible along the East Wall Road c.950m southeast of the Site.

These Dublin Bus operated bus services operate on a daily basis and offer relatively frequent schedules as summarised in Table 11.2 below.

Table 11.2: Dublin Bus Service Frequency - No. of Services[63]

Route No.	Route	Mon-Fri	Sat	Sun
53	Talbot St - Dublin Ferryport	13	13	7
151	Docklands (East Rd) – Foxborough (Balgaddy Rd)	48	46	31
33b	Swords - Portrane	24	22	18
33X	Custom House Quay / St. Stephen's Green - Skerries	5*	no service	no service
41X	UCD Belfield - Knocksedan	3*	no service	no service

[63] Dublin Bus: www.dublinbus.ie

Route No.	Route	Mon-Fri	Sat	Sun
	Knocksedan – UCD Belfield	6*	no service	no service
142	Portmarnock – UCD Belfield	11	no service	no service
747	Heuston Station – Dublin Airport	43	43	60
757	Camden St (Charlotte Way) – Dublin Airport	38	38	35

**excluding Bank Holiday*

Figure 11.7: Bus Interchange Locations

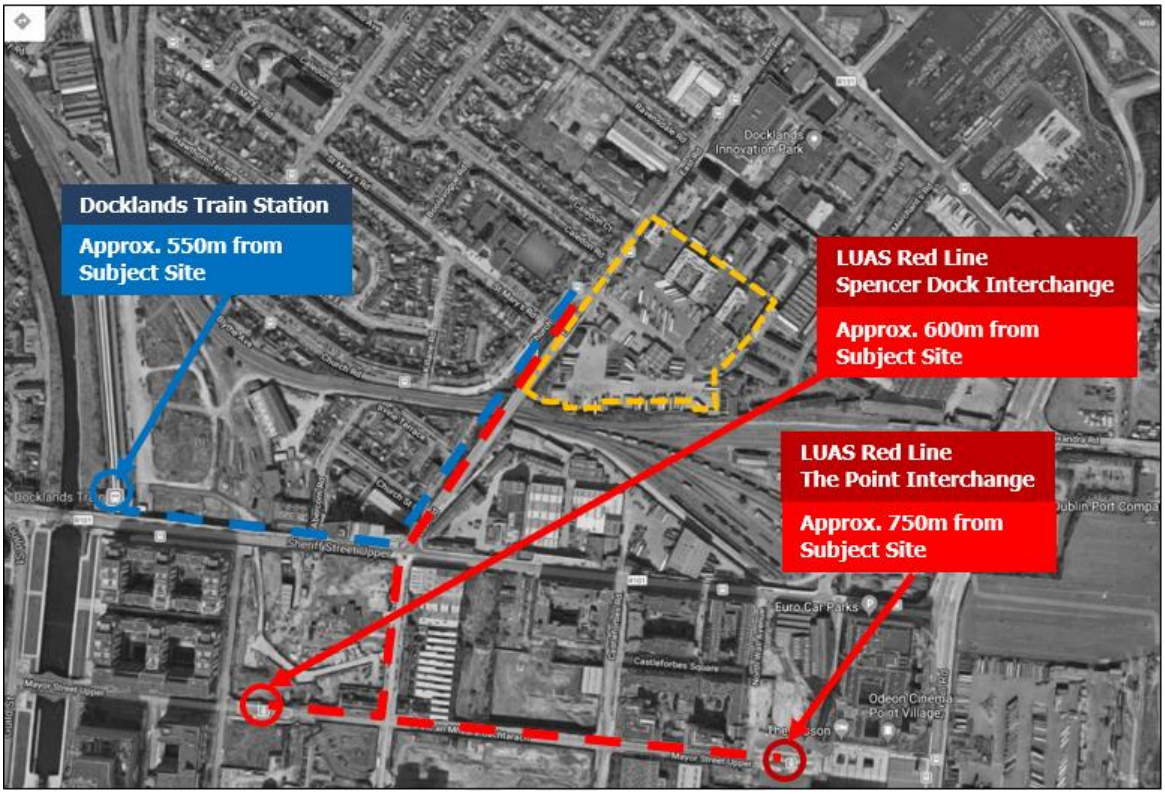
Heavy Rail Network

The Docklands Train Station is located c.550m (8-minute walk) walking distance to the southwest of the Site, see Figure 11.8 below. This interchange provides access to DART and regional Commuter rail services. Furthermore, Connolly Station is only 1400m to the west where additional DART and regional commuter services are available in addition to intercity services. Whilst Heuston Station is accessible via this LUAS connection.

LUAS

The Red Line Luas is also accessible with the '*Spencer Dock*' interchange located c.650m (8-minute walk) walking distance to the south of the Site, see Figure 11.8 below. The LUAS Red Line currently provides access to Busaras, Connolly Station, Dublin City Centre, Hueston Railway Station, Tallaght and Saggart in addition to other intermediate destinations along its route.

Figure 11.8: Train Station and LUAS Interchange Locations



11.3.4 Emerging Transport Developments

11.3.4.1 Cycle Network Proposals

The Site is located within the '*Dublin City Centre Sector*' within the GDA Cycle Network Plan[64]. According to the GDA Plan:

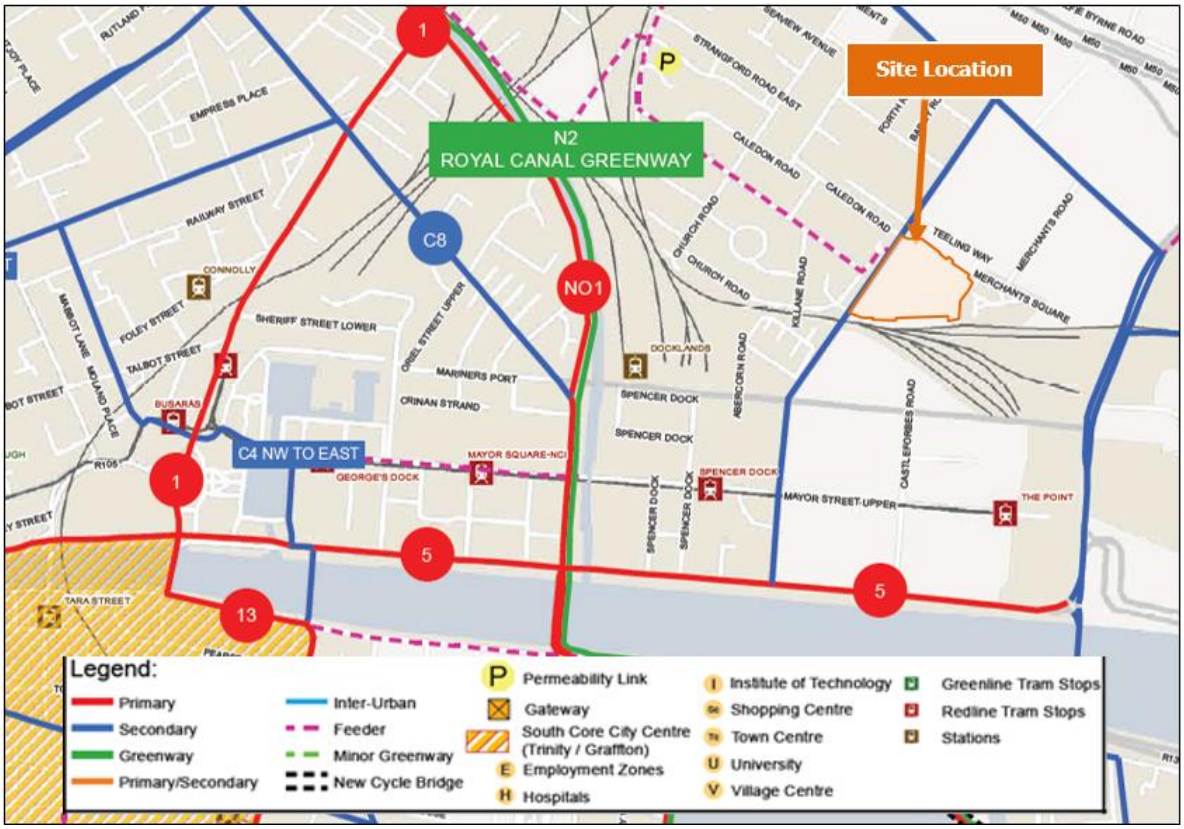
> *'The Dublin City Centre Sector is defined by the Royal Canal and Grand Canal ring on the northern, eastern and southern side. The western boundary is taken as about 0.5km west of a north-south line between Phibsborough and Harold's Cross, and includes areas such as Pimlico, Thomas Street, Manor Street and Grangegorman. This area includes the commercial heart of the city where most employment is concentrated. It excludes the mostly residential areas within the canal ring further west, as these are in effect inner suburbs that do not attract significant numbers of non-local inward trips. On the other hand, the recently redeveloped Docklands area spreads a little way east of the canal ring and has been included in the City Centre sector as it contains significant employment'.*

In the vicinity of the Site the following route additions are proposed, see Figure 11.9 below:

- **Secondary Route 1E** (adjacent to the Site): branches off Route 1A at Clontarf Road and provides an alternative link to the Docklands area via East Wall.
- **Primary Route 5**: Docklands to the North West Sector along the Liffey Quays to Heuston Station, and then through the Phoenix Park to Castleknock and Blanchardstown.
- **Royal Canal Greenway** from Sheriff Street in the Docklands to Drumcondra Road past Croke Park stadium (partly in place west of North Strand).
- **Primary Route NO1:** North Circular Route at the outer edge of the City Centre, from Route 1 at Five Lamps westwards to Phibsborough and eastwards to the Docklands.
- **Secondary Route C8**: North Circular Road East: From Royal Canal Bank at Phibsborough eastward to Docklands.

[64] NTA, 2013: https://www.nationaltransport.ie/publications/strategic-planning/gda-cycle-network-plan/

Figure 11.9: Proposed Cycle Network Enhancements (extract Sheet N1a GDA CNP)



11.3.4.2 Public Transport Proposals

Map J of the Dublin City Development Plan 2016-2022 presents both the existing and proposed public transport routes in the region. An extract of this map illustrating the existing and proposed routes in the vicinity of the subject development site is presented in Figure 11.10 below.

Bus Route Proposals

The Transport Strategy for the GDA (2016-2035)[65] introduces the following three potential Bus Rapid Transit (BRT) routes:

- Airport / Swords - City Centre (subject to amendments in parallel with new Metro North scheme proposals)
- Clongriffin - Tallaght
- Blanchardstown - UCD

Figure 11.11 below presents the proposed routes for these three BRT schemes. The proposed Clongriffin -Tallaght BRT will, when operational, be easily accessible from the Site with the nearest proposed stop located within walking distance to the east at Connolly Station.

[65] NTA: https://www.nationaltransport.ie/wp-content/uploads/2016/08/Transport_Strategy_for_the_Greater_Dublin_Area_2016-2035.pdf

Figure 11.10: DCC Existing & Proposed Public Transport Routes in the Vicinity of the Site

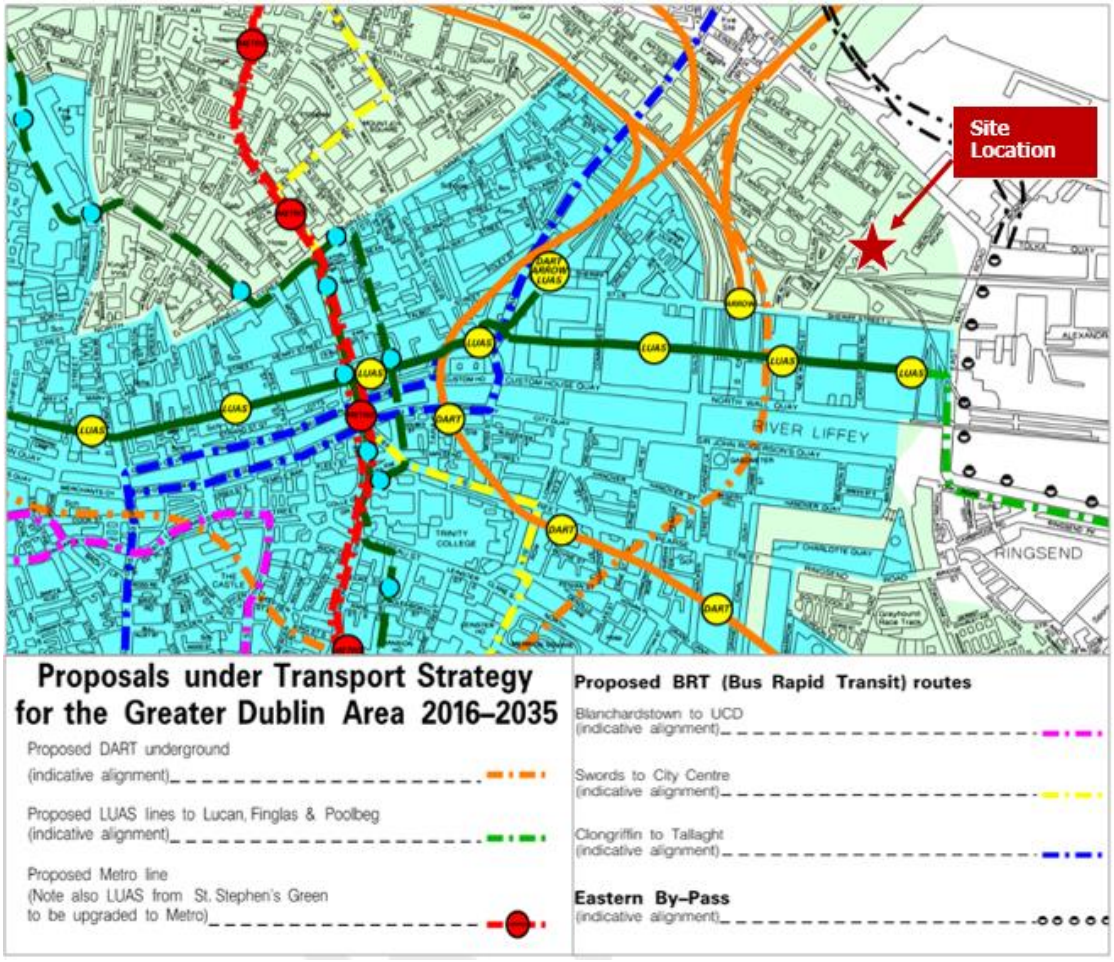
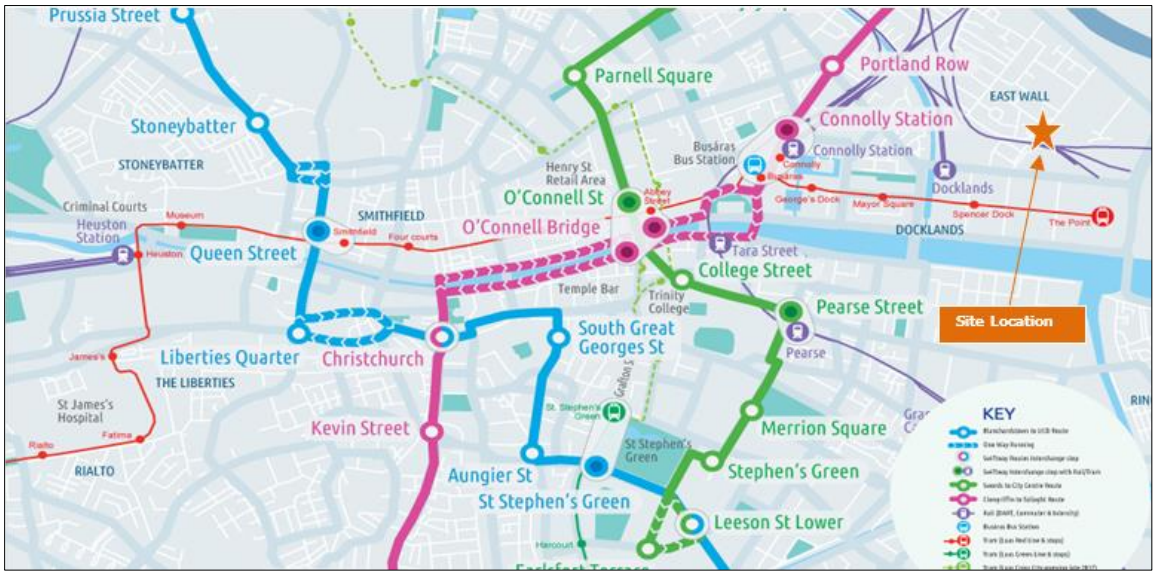


Figure 11.11: Proposed Bus Rapid Transit Schemes



Bus Connects

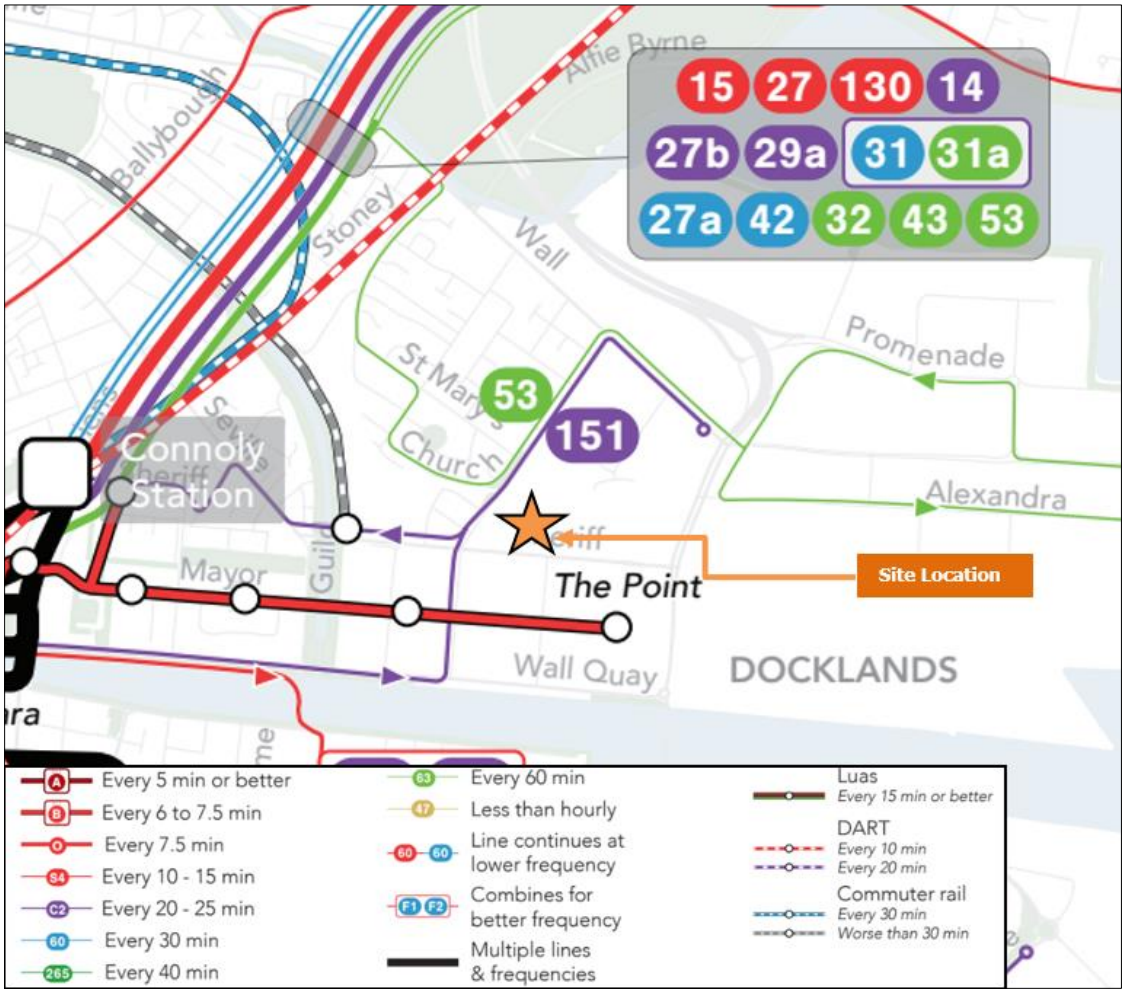
The National Transport Authority (NTA) has recently published a consultation report entitled '*BusConnects Dublin Area Bus Network Redesign Public Consultation Report*'[66]. This report introduces a number of significant changes to the bus services within Dublin including:

- *"Services to be arranged along seven cross-city super-frequent spines*
- *Dramatic increase in the numbers of orbital services*
- *Increase in the number of all-day high-frequency services*
- *Move to a simplified two-fare system*
- *A new route numbering system".*

> *"Under the proposals, the level of bus service will increase by 27%. This includes services on 11 brand-new orbital routes that will operate on a 15-minute frequency or better, in the north, south and west of the network area."*

The public consultation for BusConnects ran from July to September 2018. Figures 11.12 & 11.13 below indicate the existing and the proposed bus service midday frequencies in the vicinity of the Site, prior to and after the BusConnects network redesign.

Figure 11.12: Existing Public Transport Services (weekday midday frequency) (Extract of Map 1[67])

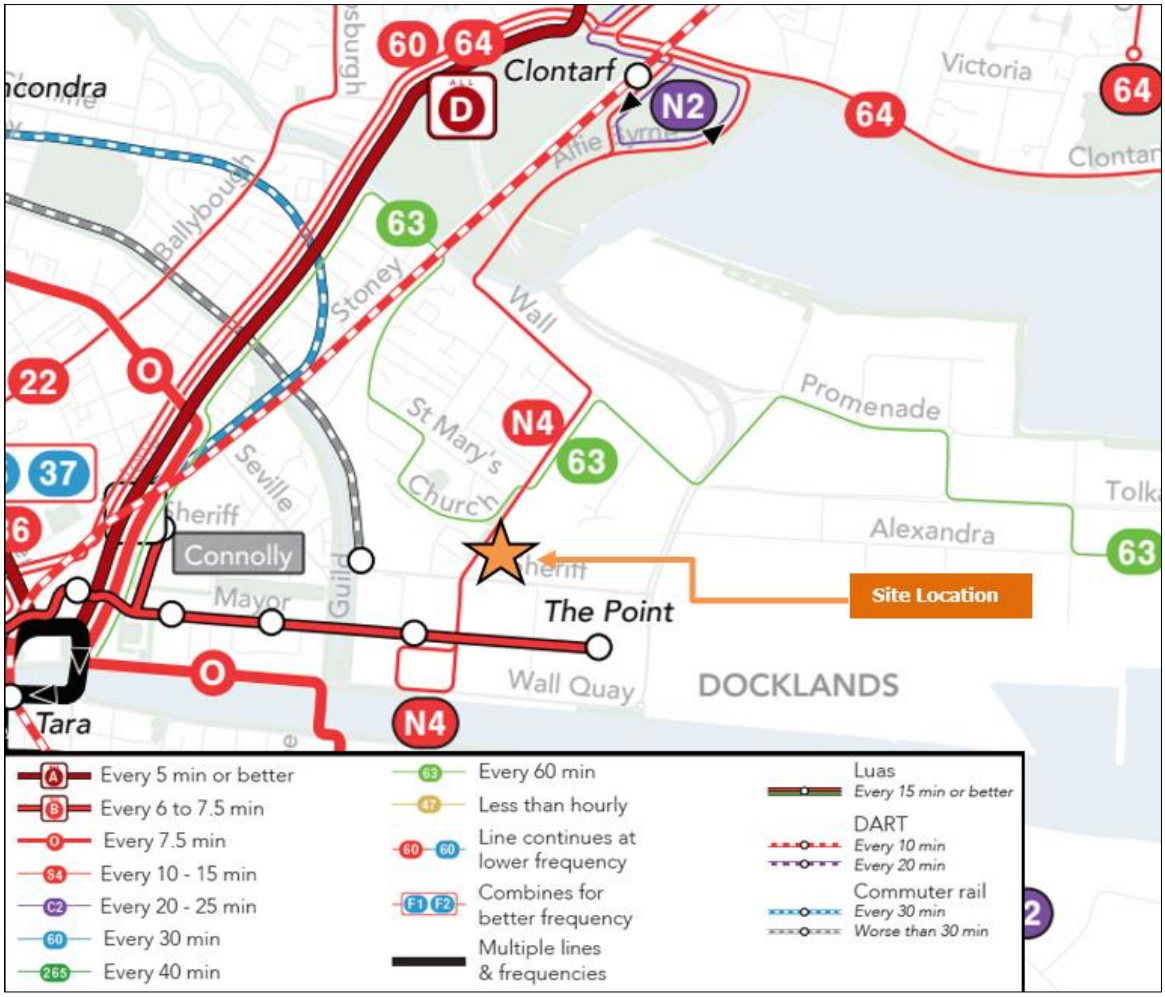


[66] https://www.nationaltransport.ie/consultations/public-consultation-on-the-dublin-area-bus-network-redesign/
[67] https://busconnects.ie/initiatives/dublin-area-bus-network-redesign-maps

Under the BusConnects proposals, the following routes will be available within the immediate vicinity of the Site:

- **Route N4:** *'N4 extends from Blanchardstown to Spencer's Dock in the North Docklands, generally following Glasnevin Road and Collins Avenue. This orbital provides a new direct Docklands service from a large area of north Dublin City, and is the orbital for Dublin City University. With service every 10 minutes all day, this is expected to be the busiest of the northern orbitals.'*
- **Route 63:** *'is an hourly route from the city centre to Citywest. This hourly route is designed to serve very small low-demand areas not reachable by other more frequent routes, generally near the Luas Red Line but not close enough to a station'*.

Figure 11.13: Proposed Public Transport Services (weekday midday frequency) (Extract of Map 2[68])



As part of the BusConnects public consultation, maps are available to show how the proposed changes will affect each area. Figure 11.14 below indicates the areas reachable within 30, 45 and 60-minute journey times.

The travel times of 30, 45 and 60 minutes are based upon the following parameters:

- the times / distances are based upon the public transport frequencies between 09:00-15:00 weekdays;
- there is the assumption that the waiting time for a particular service is half the time of the bus frequency (i.e. if the frequency of the bus is 20 minutes, there is an estimated 10-minute wait time); and
- there are higher frequencies available on some routes during the AM and PM peak hour periods, however this is not applicable to the routes which are within walking distance of the Site.

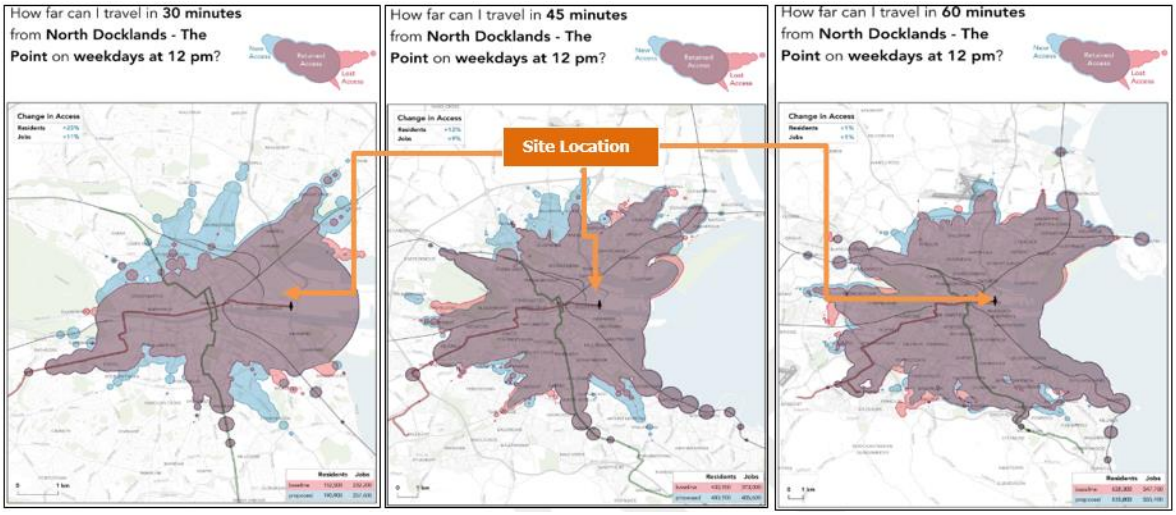
[68] https://busconnects.ie/initiatives/dublin-area-bus-network-redesign-maps/

The maps also provide information regarding how many more jobs that are accessible from a particular location within the 30, 45 and 60-minute travel time. It can be seen from Table 11.3 below, that the proposed Project residents will have the benefit of being able to gain convenient access to an additional 25,400 jobs within a 30-minute travel when compared to the existing bus services.

Table 11.3: % Change in Number of Jobs Accessible before / after BusConnects Implements

How Many More Jobs Can I Reach?			
Travel Time	Jobs in Existing	Jobs in Proposed	% Change
30 mins	232,200	257,600	+11%
45 mins	373,000	405,600	+9%
60 mins	547,700	555,400	+1%

Figure 11.14: Areas Reachable within 30, 45, and 60 minutes by Bus



The Site is ideally located to benefit from the enhanced accessibility levels delivered by the BusConnects proposals.

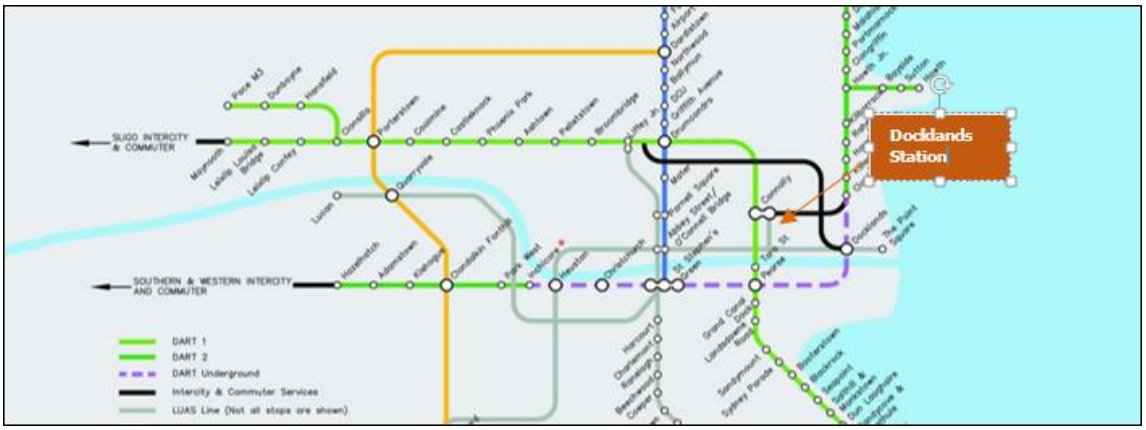
DART Proposals

The DART Expansion Programme will see the DART system expanded, providing fast, high-frequency electrified services to Drogheda on the Northern Line, Hazelhatch on the Kildare Line, Maynooth and M3 Parkway on the Maynooth / Sligo Line, while continuing to provide DART services on the South-Eastern Line as far south as Greystones, see Figure 11.15 below.

The DART Expansion Programme also incorporates the DART Underground Project, which is an underground rail link through the City Centre, allowing DART services to operate on the Kildare line and travel through the Phoenix Park tunnel, enabling passengers to connect with DART services on the other three rail lines.

A location for a DART underground station has been proposed for the Docklands Train Station, located approximately within 8-minutes walking distance from the Site.

Figure 11.15: Proposed Greater Dublin Integrated Transport Network

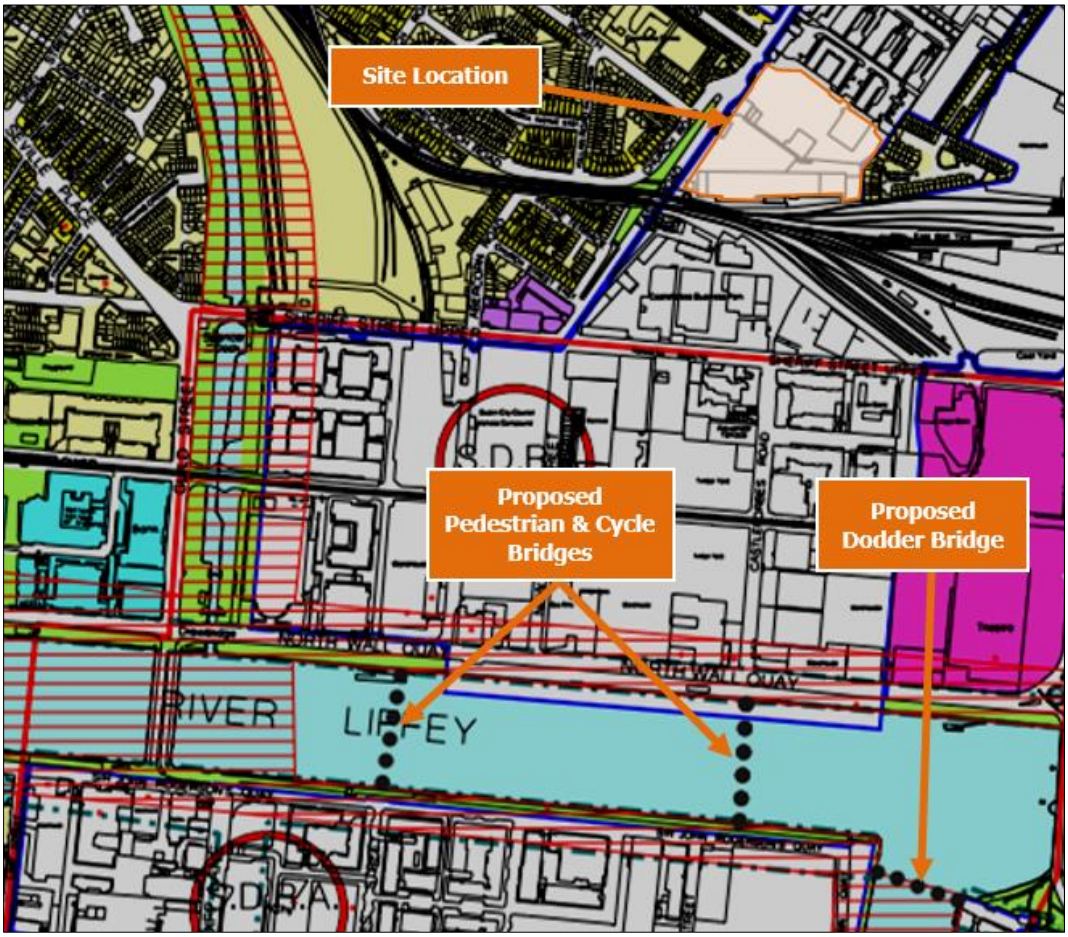


11.3.4.3 Road & Bridge Infrastructure Proposals

As outlined within both the Development Plan and the North Lotts & Grand Canal Dock Planning Scheme 2014, there are objectives for the provision of the following road and bridge infrastructure / improvement schemes within the six-year period of the Development Plan, see Figure 11.16 below:

- Roads - East Wall Road / Sheriff Street to North Quays.
- Bridges - Two new bridges proposed as part of the North Lotts and Grand Canal Dock SDZ, plus Dodder Bridge.

Figure 11.16: Proposed Bridge Infrastructure (Development Plan Map E)



Proposed Amendments to North Lotts and Grand Canal Planning Scheme 2014 (February 2018)

In February 2018 Dublin City Council made a request to ABP to make amendments to the North Lotts and Grand Canal Planning Scheme 2014 stating:

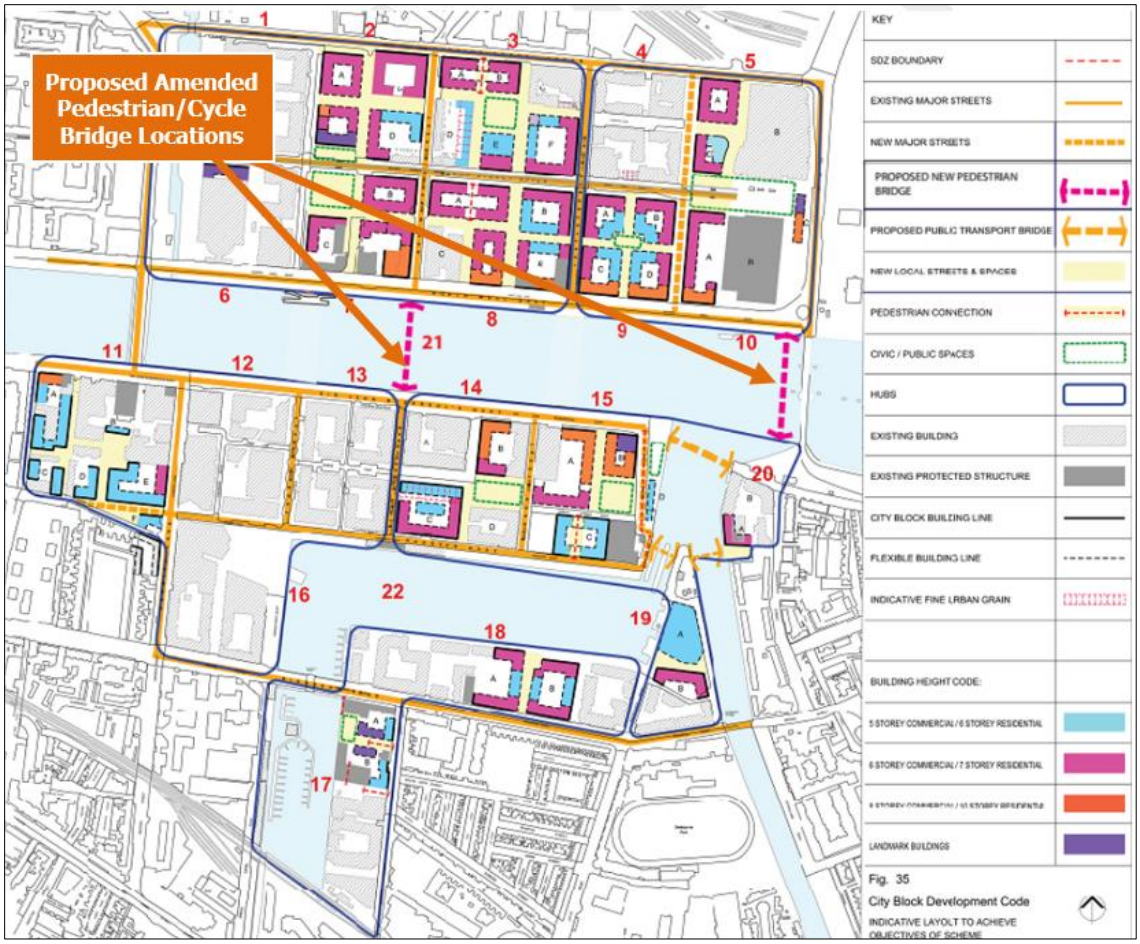
> *'The proposed amendments would allow for the effective relocation of two pedestrian / cycle bridges from the locations shown in the Planning Scheme document, and in response to changed circumstances'.*

As indicated in Figure 11.16 above, the North Lotts and Grand Canal Dock SDZ Planning Scheme contains objectives to provide two separate pedestrian / cycle bridges across the River Liffey, at Forbes Street and Castleforbes Road.

The proposed amendment now seeks to revise the locations of these, replacing them with bridges at: (see Figure 11.17 below):

> *'(a) New Wapping Street/Blood Stoney Road, and…*
>
> *(b) Immediately west of, and parallel to the existing Tom Clarke (former 'East Link') Bridge, which connects North Wall Quay with the southern side of the River.'*

Figure 11.17: Proposed Bridge Infrastructure[69]



11.3.5 Road Safety Authority (RSA) Collision History

The collision statistics on the Road Safety Authority (RSA) website were reviewed in order to ascertain the safety record of the local road network over the most recent ten-year period. This includes information for the years 2005

[69] http://www.dublindocklands.ie

to 2014 inclusive and indicates basic information on all reported incidents. It should be noted that information relating to reported incidents for the years 2015, 2016, 2017 and 2018 is not yet available on the RSA website.

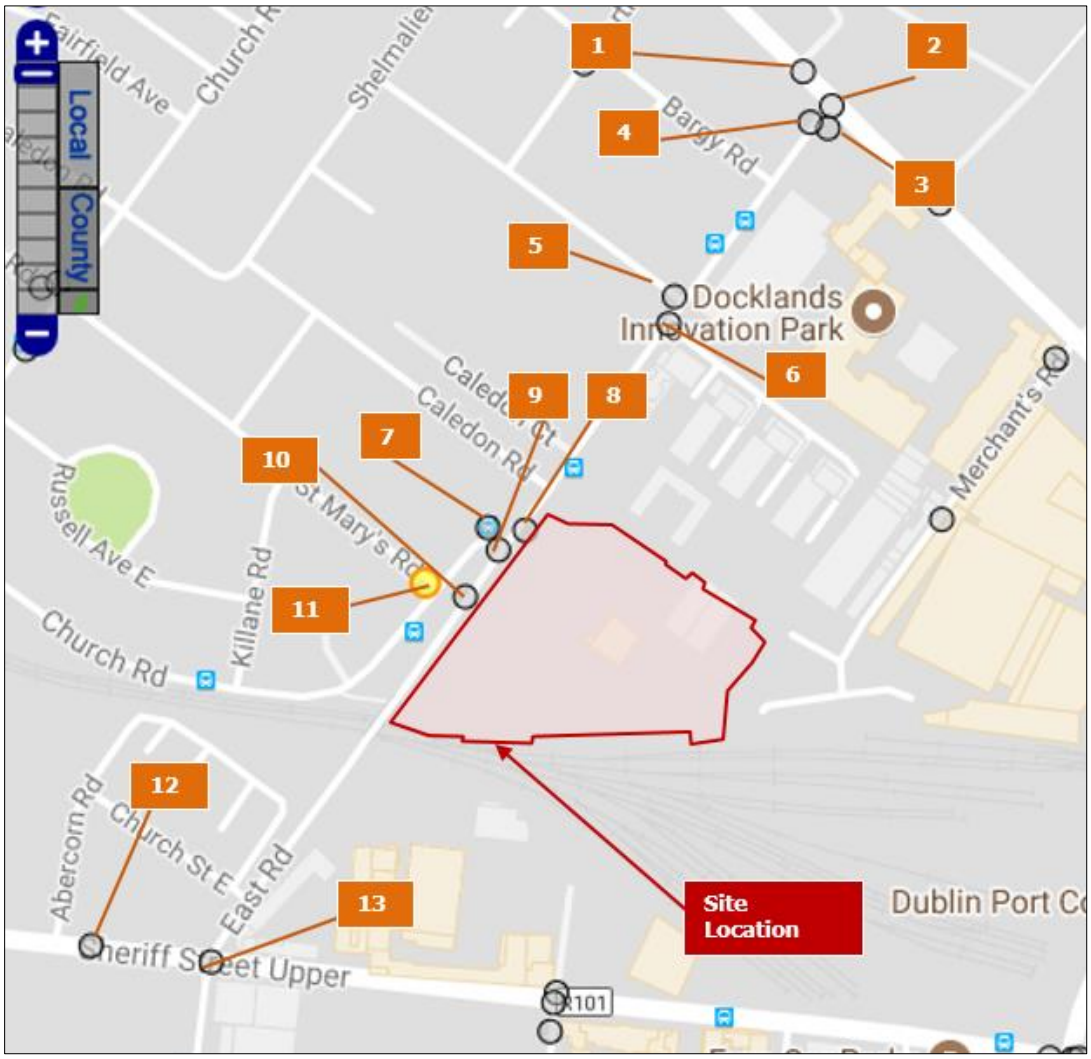
The RSA records detail only those occasions were the incident was officially recorded such as the Garda being present to formally record details of the incident. According to the RSA website there were thirteen reported incidents within the immediate vicinity of the proposed Project, as detailed in the following paragraphs, see Figure 11.18 below.

The review of the RSA data reveals that all incidents recorded along East Road have been classified as '*Minor*'. Whilst there one '*Serious'* incident occurred on Church Road, to the south west of the Church Road / East Road junction.

In reference to Figure 11.18 and Table 11.4 below **incident numbers 1, 2, 3 & 4** occurred in the vicinity of the East Road / East Wall Road junction and resulted in one minor casualty each.

Incident numbers 5 & 6 occurred in vicinity of the priority-controlled junction at East Road / Ravensdale Road, both resulting in a single minor casualty.

Figure 11.18: Collision Records[70]



[70] RSA: www.rsa.ie

Table 11.4: Collision Records[71]

Ref.	Year	Vehicle	Circumstances	Day	Time	Severity	Total Casualties
1	2005	Car	Rear end, straight	Sat	16:00-19:00	Minor	1
2	2014	Bicycle	Other	Sat	23:00-03:00	Minor	1
3	2008	Car	Angle, right turn	Wed	03:00-07:00	Minor	1
4	2009	Car	Other	Mon	16:00-19:00	Minor	1
5	2009	Car	Other	Tue	19:00-23:00	Minor	1
6	2012	Car	Rear end, straight	Fri	23:00-03:00	Minor	1
7	2006	LGV	Other	Wed	07:00-10:00	Minor	1
8	2006	n/a	Pedestrian	Sat	10:00-16:00	Minor	1
9	2011	Bicycle	Other	Tue	19:00-23:00	Minor	1
10	2006	Car	Pedestrian	Mon	10:00-16:00	Minor	1
11	2006	Car	Angle, right turn	Wed	10:00-16:00	Serious	1
12	2014	Bicycle	Other	Sat	07:00-10:00	Minor	1
13	2007	Car	Angle, both straight	Mon	10:00-16:00	Minor	1

Incident numbers 7, 8, 9 & 10 occurred in the vicinity of the Church Road / East Road / Site Access junction on East Road. All 4 incidents resulted in one minor casualty each. The circumstances of two of these incidents involved pedestrians, whilst the remaining two were cited as '*other*'.

Incident number 11 occurred in the vicinity of St Mary's Road / Church Road priority -controlled junction, involved a right turning car. The incident resulted in one serious casualty.

Incident numbers 12 & 13 occurred in the vicinity of the East Road / Sheriff St. / New Wapping St. signal-controlled junction both resulting in a single minor casualty.

Without the provision of more detailed collision data, DBFL have concluded that there are no apparent significant trends in the collisions occurring on and in the vicinity of the proposed Project Site access junction on East Road.

11.4 Characteristics of the Proposed Project

11.4.1 Overview

The proposed Project include the construction of a mixed-use development set out in 9 No. blocks, ranging in height from 3 to 15 storeys to accommodate 554 No. apartments, enterprise space, retail units, foodhub / café / exhibition space, residential amenity, crèche and a Men's shed. The Site will accommodate car parking spaces, bicycle parking, storage, services and plant areas. Landscaping will include a new central public space and residential podium courtyards.

The Enterprise Hub aspect of the East Road development will be run by Element78, who will be responsible for the delivery of an enterprise management plan and onsite duty management of the Enterprise Hub. The Enterprise

[71] RSA: www.rsa.ie

space will feature units / space of varying sizes which will include retail, office, touchdown zones, flexible breakout areas, digital demonstration, café and exhibition zones.

This type of flexible working space does not adopt the typical 09:00-17:00 working approach, instead the anticipated entrepreneurial clientele would work flexible hours (outside of normal office hours) to suit their own timescales. The reception area at the Enterprise Hub will be centrally managed onsite enabling the spaces to be used for multiple purposes on a 24/7 basis. This active management style attracts more enterprise companies into the facility allowing them to rent space by the hour, day, week or year. It also allows the space to host on site events, and activities that directly respond to the needs of start-ups, local communities and businesses.

Similar examples of these types of developments internationally to date can be seen at Media City in Manchester, whilst examples of the Exhibition & Crossover space can be seen at Kraak in Berlin, Edinburgh's 'The Forest', London 'Drink, Shop & Do' and Cardiff's 'Milgi'.

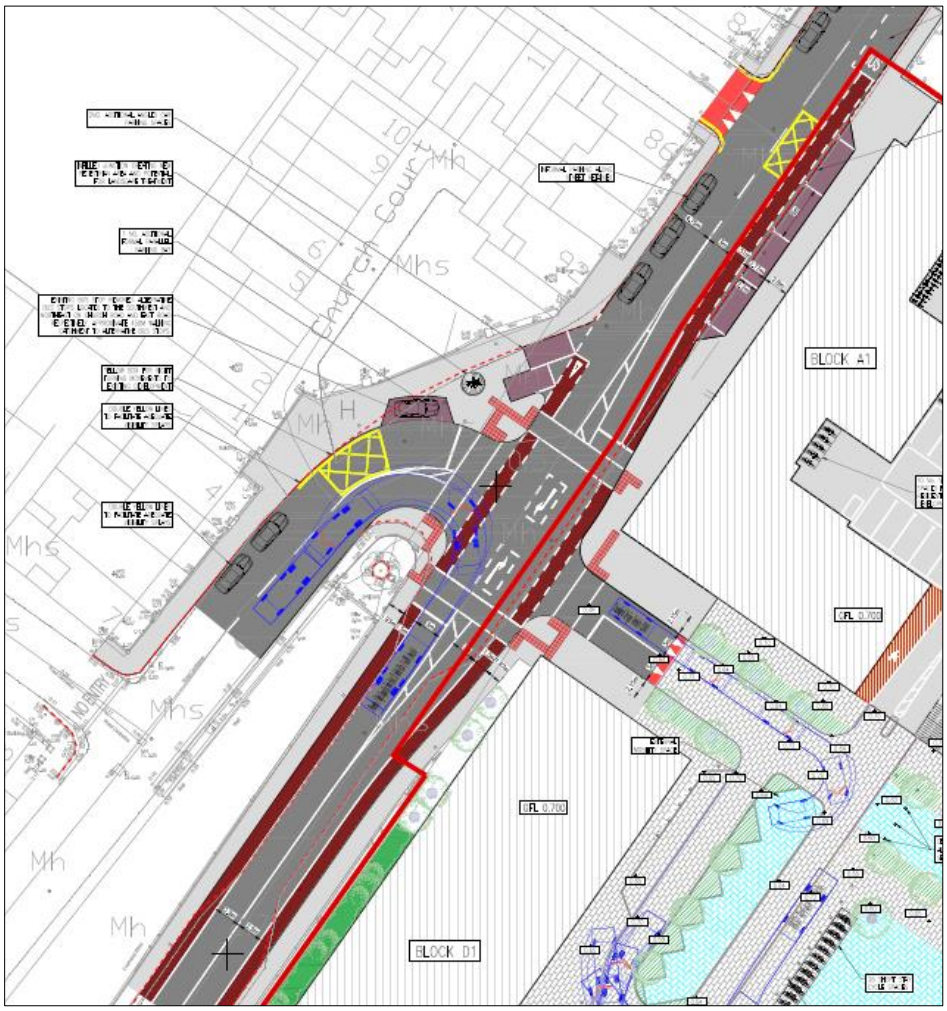
Further details of the proposed Project including the Site layout and transport network arrangements are illustrated in the architects' scheme drawings as submitted with this planning application.

11.4.2 Site Access

The Site will benefit from one vehicle access which will be provided on East Road as shown in Figure 11.19 below. The proposed access will be incorporated into the Church Road / East Road priority-controlled junction and will include the upgrading of the aforementioned junction to traffic signal controlled. This access will be utilised by all modes of transport travelling to / from the proposed Project.

The existing traffic signals and carriageway arrangement at the '*metering'* traffic signal arrangement on East Road at the rail bridge permit only a single lane of traffic to travel through the signals at any one time. On site observations undertaken by DBFL have revealed this arrangement serves the dual purpose of traffic '*metering*' and traffic calming on East Road*, i.e.* reducing the attractiveness of the East Road-Sherriff Road as a '*through route'* by the delays arising from the single lane of traffic permitted to travel through the signals.

Figure 11.19: Proposed Site Access



The upgrading of the Church Road / East Road junction to traffic signal controlled will enable the removal of the existing traffic signal controls at the rail bridge which will be beneficial for a number of reasons including:

- The allocation of dedicated traffic signal stages to the two minor arms of the junction (i.e. Church Road and the Site access road), will effectively impose journey time delays to the north-south traffic movements on East Road, thereby replicating the traffic calming effects of the traffic signals at the rail bridge.
- Should DCC seek to provide additional journey time delays / metering of through traffic on East Road, it will be achievable by adjusting the signal timings at the junction.
- The proposed upgraded junction arrangement will provide dedicated pedestrian crossing facilities (for all travel desire lines), thereby removing the existing lengthy uncontrolled crossings and the associated safety risks that they present to pedestrians at this vehicle dominated location.
- The proposed upgraded junction arrangement will improve the existing restricted visibility available for vehicle drivers exiting Church Road, caused by existing ongoing inappropriate parking practices at the junction.
- The proposed upgraded junction arrangement will control the speed at which vehicles can travel through the junction with the provision of reduced junction corner radii thereby providing a marked improvement over the existing situation.
- The proposed upgraded junction arrangement will enable the provision of c.82m north-eastbound and 124m south-westbound of cycle lanes along the Site boundary on East Road. This route is identified as a secondary cycle route in the GDA Cycle Network Plan.

- The proposed junction arrangement allows the provision of three formal car parking spaces on Church Road and four formal car parking spaces (1 of which is allocated to a car share facility) on East Road adjacent to the Site.

11.4.3 Pedestrian and Cyclists Improvements

The Site will be highly accessible to pedestrians and cyclists from East Road. Pedestrians will be given priority within the internal site layout to ensure desire lines within the site are accommodated providing a good level of service and ensures the risk of vehicle / pedestrian conflict with vehicles is minimised.

The proposed upgraded junction arrangement at the Site access junction will provide dedicated pedestrian crossing facilities (for all travel desire lines).

The proposed Project include the provision of c.82m north-eastbound and 124m south-westbound of cycle lanes along the Site boundary on East Road.

11.4.4 Parking Strategy

11.4.4.1 Car Parking

The vehicle and cycle parking provision for the Site are outlined within the separate Parking Strategy document submitted with the Planning Application pack. In summary the proposals include the provision of a total of 241 car parking spaces on site have been allocated as follows:

- 227 number car parking spaces have been allocated to residents (2 of which are allocated to a car share facility) of the 554 number apartment units;
- 7 number parking spaces have been allocated to staff based at the Enterprise Hub (including the childcare facility staff); and
- 7 number parking spaces are allocated within the internal court yard to facilitate servicing, short duration parking and childcare facility pickup / drop off.

A loading bay has also been provided to facilitate servicing requirements of the Enterprise Hub.

11.4.4.2 Cycle Parking

The appropriate level of cycle parking provision for the proposed Project will also be provided in reference to both:

- the DCC requirements; and
- the Department of Housing, Planning & Local Government (DHPLG) Guidelines.

The DCC cycle parking standards are detailed in Table 11.5 below:

Table 11.5: DCC Cycle Parking Requirements

Land Use Description	Dublin City Council Parking Requirement		DHPLG Requirements	
	Short Stay / Visitor	Long Stay	Short Stay	Long Stay
Houses and Apartments (All zones)	Visitor Parking decided on a case by case basis	1 space per unit	1 visitor space per 2 units	1 space per bedroom
Enterprise & Employment (Zone 2)	N/A	1 per 100m^2	N/A	N/A
Shops / Main Street / Financial Offices (Zone 2)	N/A	1 per 150m^2	N/A	N/A
Childcare	N/A	N/A	N/A	N/A

Table 11.6: Cycle Parking Requirements & Development Provision

Land Use Description	Quantity of Units / GFA	Dublin City Council Parking Requirement			DHPLG Requirements			East Road Development Provision		
		Short Stay	Long Stay	Total	Short Stay	Long Stay	Total	Short Stay	Long Stay	Total
Apartments	554	-	554	554	277	882	1159	84	666	750
Enterprise & Employment	2442.5m^2	N/A	24	24	N/A	N/A	N/A	28	32	60
Shops / Main Street / Financial Offices	1025.2m^2	N/A	7	7	N/A	N/A	N/A			
Crèche	538.1m^2	N/A	N/A	N/A	N/A	N/A	N/A			
Total		**-**	**585**	**585**	**277**	**882**	**1159**	**112**	**698**	**810**

In reference to Table 11.6 above, the proposals include the provision of a total of 112 short-term and 698 long-term bicycle parking stands / opportunities (810 in total) onsite within the proposed Project. The DCC bicycle parking standards are considered to be '*minimum*' standards, whereas the DHPLG requirements are considered to be the preferred level of provision in situations where onsite car parking has been substantially or completely removed as permitted in certain situations by the corresponding DHPLG car parking guidance.

The level of bicycle parking proposed onsite for the apartment units has been provided in the context that the development car parking proposals are below the Development Plan standards (e.g. 224 spaces opposed to 554). DBFL consider this reduction to be consistent with the '*substantial*' reduction that the DHPLG Guidelines recommend and at which the high DHPLG bicycle parking requirements would be of greater relevance. Accordingly, the design approach in regard to the specification of bicycle parking onsite, in the context of the Site's accessibility characteristics (including the proposed car parking provision), is considered to be an appropriate number of bicycle parking opportunities onsite, which is above the DCC cycle parking standards and leans towards the '*maximum*' DHPLG requirements.

In reference to Table 11.7 below is can be established that the proposed onsite bicycle parking provision of 810 spaces (including short and long-term parking spaces) is c.38% more than the 585 parking opportunities required by the DCC development management standards.

The specific location of the proposed onsite bicycle parking facilities are graphically illustrated in DBFL Drawing 170200-2001 which accompany the planning application.

Table 11.7: Comparison of Cycle Parking Provision

Standard / Proposed	Type	Apartments	Enterprise Hub	Sub Total
DCC Standards	Short	-	-	-
	Long	554	31	585
	Total	**554**	**31**	**585**
DHPLG Standards	Short	277	-	277
	Long	882	-	882
	Total	**1159**	**-**	**1159**
Proposed	Short	84	28	112
	Long	666	32	698
	Total	**750**	**60**	**810**

11.4.4.3 Car Share Facility

Further to the above car parking provision, a letter of intent has been received from the private car sharing company "*GoCAR*" to include 3 No. shared car spaces including 1 No. located on East Road adjacent to the Site and 2 No. within the Site boundary GoCar members can book cars online or via the app for as little as an hour, then unlock with their phone or GoCar; the keys are in the car, with fuel, insurance and city parking all included. The benefits of such car sharing services include,

- the reduction of the number of cars on the road and therefore traffic congestion, noise and air pollution;
- frees up land traditionally used for private parking spaces but which may not be used;
- increases use of public transport, walking and cycling as the need for car ownership is reduced and; and
- car sharing allows those who cannot afford a car the opportunity to drive, encouraging social inclusivity.

The GoCar letter of support can be found in Appendix A11.4 of this Report.

11.5 Potential Impact of the Proposed Project

11.5.1 Construction Phase

All construction activities will be governed by a construction Traffic Management Plan (TMP) the details of which will be agreed with the local authority's Roads Department prior to the commencement of the Construction Phase. The principal objective of the TMP is to ensure that the impacts of all building activities generated during the Construction Phase upon both the public (off-site) and internal (on site) workers environments, are fully considered and proactively managed / programmed respecting key stakeholders requirements. This will ensure that both the public and construction workers' safety is maintained at all times, disruptions minimised and undertaken within a controlled hazard free / minimised environment. It is noted that the impact of the Construction Phase will be *temporary* in nature.

11.5.1.1 Construction Traffic Generation

During the general excavation works there will be additional HGV movements from the Site. All suitable material will be used for construction and fill activities where possible and appropriate. All spoil material will be removed to a registered landfill site which will be agreed in full with the Local Authority.

In addition to the traffic generated by the disposal of surplus subsoil from the Site, there will be traffic generated from deliveries of construction materials and equipment. It should be noted that construction traffic generated during the Construction Phase tends to be outside of peak hours. Such trips would generally be spread out over the full working day and will not be higher than the peak hour predicted volumes for the Operational Phase.

Construction traffic will consist of the following categories:

- Private vehicles owned and driven by construction workers and by full time supervisory staff. Site personnel will generally arrive before 07:00, thus avoiding the morning peak hour traffic. These employees will generally depart after 19:00. It should be noted that a large proportion of construction workers would arrive in shared transport.
- Excavation plant and dumper trucks involved in Construction Phase works and material delivery vehicles for the following: granular fill materials, concrete pipes, manholes, reinforcement steel, ready-mix concrete and mortar, concrete blocks, miscellaneous building materials, etc.

Deliveries would arrive at a dispersed rate during the course of the day. It is estimated that peak delivery rates would be in the region of 1 - 2 deliveries per hour throughout the day.

11.5.1.2 Construction Traffic Impact

In the absence of a final construction programme it is difficult to assess the exact impact during the Construction Phase. However, the impact will be greatly reduced for residential areas through utilisation of the haul road (dedicated connection and junction with the Coast Road) as located to the north.

In order to ensure satisfactory operation of the Construction Phase the following is proposed:

- No access will be permitted to the Site via Grange Road unless explicitly agreed with the design team and only in exceptional circumstances.
- Provision of sufficient onsite parking and compounding to ensure no potential overflow onto the local network.
- It is likely that some numbers of the Site personnel will be brought to / from the Site in vans / minibuses, which will serve to reduce the trip generation potential.

Site offices and compound will be located within the Site boundary. The Site will be able to accommodate employee and visitor parking throughout the Construction Phase through the construction of temporary hardstanding areas.

Finally, truck wheel washes will be installed at the Site entrance and any specific recommendations with regard to construction traffic management made by the Local Authority will be adhered to.

11.5.2 Operational Phase

In order to assess the operation of the proposed road network and its future capacity, a traffic model of the existing local road network and proposed links was created. Existing traffic levels were obtained from counts carried out in the vicinity of the Site access in April 2018 therefore peak hour flows were established i.e. base flows for 2018.

11.5.2.1 Traffic Surveys

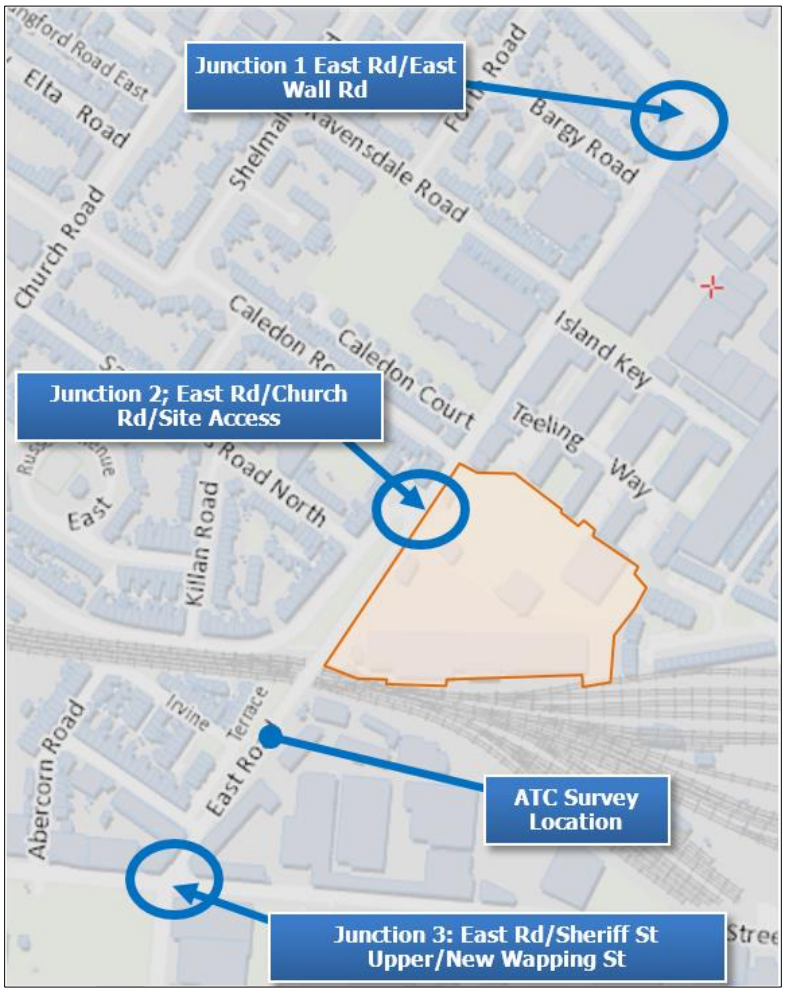
A vehicle turning count survey (classified junction turning count) was conducted between 07:30 to 09:30 and 16:30 to 18:30 on Wednesday 25th April 2018 at the following locations, see Figure 11.20 below:

- **Junction 1:** East Wall Road / East Road signal-controlled junction;
- **Junction 2:** East Road / Church Road / Site Access junction; and
- **Junction 3:** East Road / Sherriff Street Upper / New Wapping St Junction.

A 24-hour automatic traffic counter (ATC) survey was also undertaken on the same day, located between the existing East Road / Church St. East junction and the rail bridge, see Figure 11.20.

The traffic survey established that the local AM and PM peak hours occur between 07:30-08:30 and 17:00-18:00.

Figure 11.20: Traffic Survey Locations



11.5.2.2 Trip Generation and Modal Split

The following paragraphs present the process by which the potential level of person trips and subsequently vehicle trips, associated with the proposed Project have been generated.

Proposed Project - Apartments

The modal choice for the proposed aspect of the proposed Project has been assessed by quantifying the number and nature of trips that would be generated. These trips are assessed based on the area of influence and the available infrastructure and accessibility levels. The predicted 2019 modal split (short-term) are presented in Figure 11.21 and 11.22 below. These have been split between trips made by purpose of trip (i.e. work or school / college). It is expected that in time the number of trips undertaken by sustainable modes of travel will increase with a corresponding drop in the number of vehicle trips.

Due to the Site's convenient location to Dublin City Centre, its high levels of accessibility to public transport, and the development proposals for a reduction in the quantum of vehicle parking spaces, DBFL have undertaken a '*First Principles*' exercise in order to determine the most realistic vehicle trip generation levels for the proposed residential element of the proposed Project. As outlined in Table 11.8 below, the following parameters have been utilised to deduce the trip generation rates for the proposed Project.

In order to determine the typical weekday daily profile for a residential development comprising solely of apartments, we have made reference to the TRICS[72] database. Table 11.8 below summarises the predicted daily profile of vehicle movements as generated by the residential element of the proposed Project. Based on the daily

[72] Trip generation analysis database

profile of trip rates as provided by TRICS, the potential daily profile of traffic generation for the residential element of the proposed Project is calculated based on the provision of 227 No. parking spaces allocated to residents of the proposed Project.

Figure 11.21: Proposed Apartment Modal Split (Short-Term) – Travel to Work

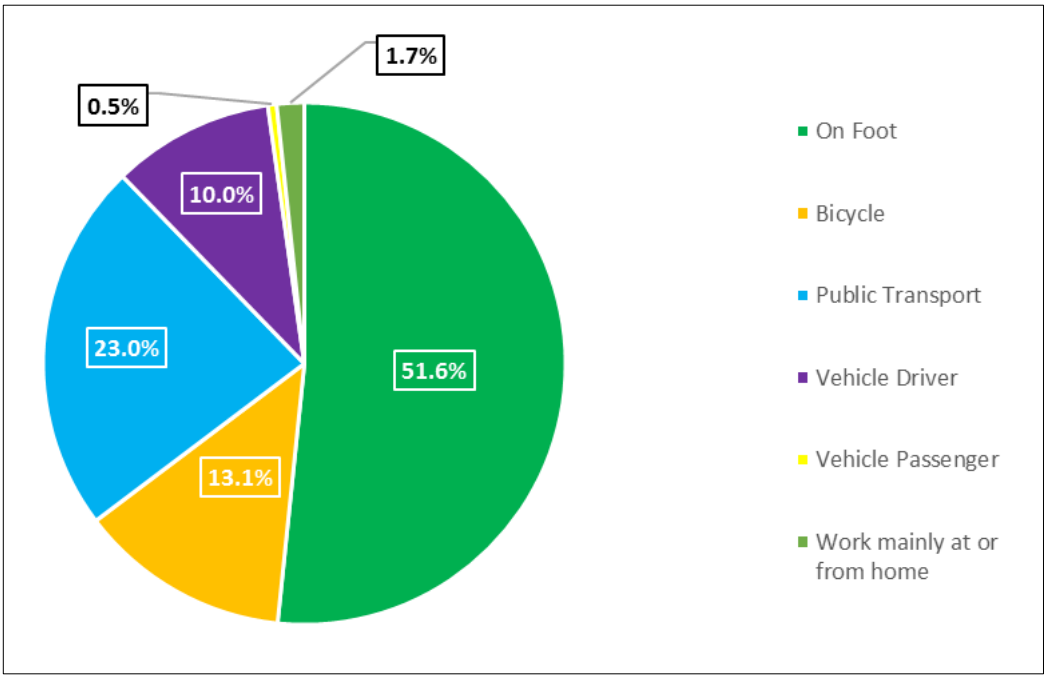


Figure 11.22: Proposed Apartment Modal Split (Short-Term) – Travel to School / College

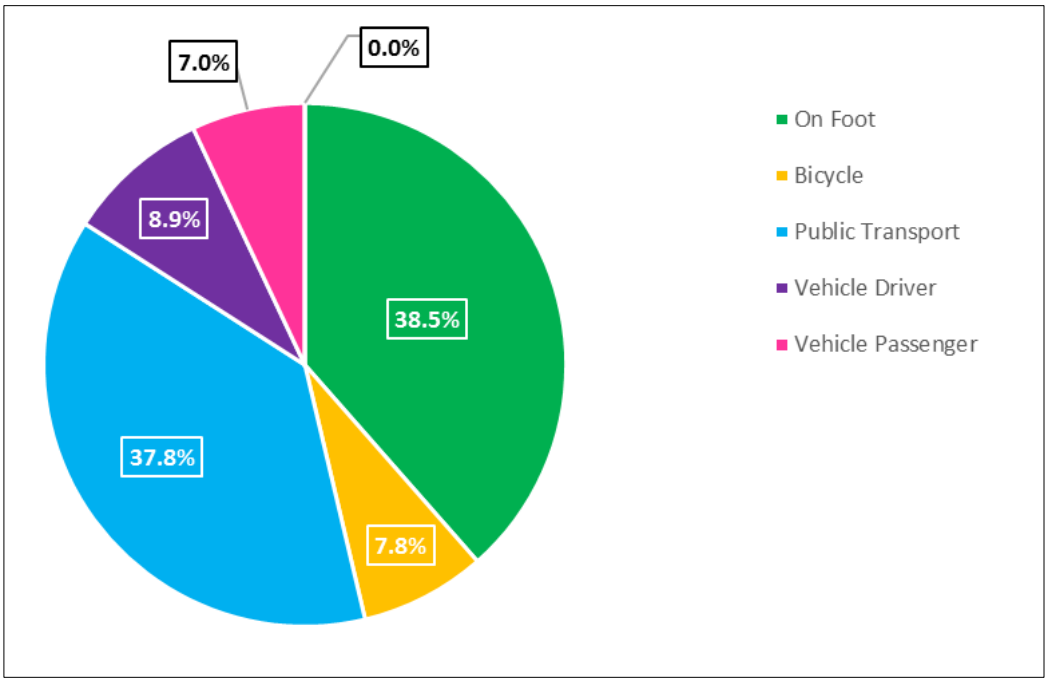


Table 11.8: Proposed Residential Trip Rates & Daily Profile

No of Units			554	
No of Parking Spaces (0.405 per unit)			227	
Residential - Apartments	Arrivals (% of total)	Departures (% of total)	Arrivals	Departures
07:00-08:00	4%	15%	10	34
08:00-09:00	5%	19%	11	42
09:00-10:00	6%	9%	14	20
10:00-11:00	4%	6%	10	13
11:00-12:00	6%	5%	13	12
12:00-13:00	7%	6%	16	14
13:00-14:00	7%	7%	16	16
14:00-15:00	7%	7%	17	15
15:00-16:00	9%	6%	20	13
16:00-17:00	11%	6%	24	14
17:00-18:00	19%	6%	42	14
18:00-19:00	15%	8%	33	17
Total	**100%**	**100%**	**227**	**227**

The traffic survey established that the local AM and PM peak hours occur between 07:30-08:30 and 17:00-18:00. Accordingly, the AM and PM peak hour traffic generation for the residential element of the development are shown in Table 11.9 below.

Table 11.9: Proposed Residential Peak Hour Traffic Generation

AM Peak 07:30-08:30		PM Peak 17:00-18:00	
Arrivals	**Departures**	**Arrivals**	**Departures**
11	38	42	14

Proposed Project – Childcare Facility

Due to the crèche being situated within a 554 No. residential development, and the Sites location within a primarily residential area, it is forecast that the childcare facility element of the proposed Project will primarily attract a walk-in catchment. Accordingly, we have assumed that 25% of children travelling to / from the crèche will travel by car, with the remaining 75% travelling by sustainable modes (walking, cycling, public transport). DBFL have again undertaken a '*First Principles*' exercise in order to determine the most realistic trip generation levels for the childcare facility aspect of the proposed Project. It is estimated that parents / guardians dropping off and collecting children from the crèche will take c.5-10 minutes, as such the arrival / departure profile has been broken down into 5-minute periods. The arrival / departure times have also been staggered to reflect the standard opening hours of a crèche with a capacity for 65 No. children.

Table 11.10: Proposed Childcare Facility AM Arrival / Departure Profile & Traffic Generation

65 No. Children	AM Profile		Travel By All Modes		Travelling By Car (25% Mode Share)	
Time	Arrivals	Departures	Arrivals	Departures	Arrivals	Departures
07:25	2%	0%	1	0	0	0
07:30	2%	2%	1	1	0	0
07:35	2%	2%	1	1	0	0
07:40	2%	2%	1	1	0	0
07:45	2%	2%	1	1	0	0
07:50	3%	2%	2	1	0	0
07:55	4%	3%	3	2	1	0
08:00	6%	4%	4	3	1	1
08:05	6%	6%	4	4	1	1
08:10	6%	6%	4	4	1	1
08:15	6%	6%	4	4	1	1
08:20	6%	6%	4	4	1	1
08:25	6%	6%	4	4	1	1
08:30	6%	6%	4	4	1	1
08:35	8%	6%	5	4	1	1
08:40	9%	8%	6	5	1	1
08:45	7%	9%	5	6	1	1
08:50	7%	7%	5	5	1	1
08:55	7%	7%	5	5	1	1
09:00	3%	7%	2	5	0	1
09:05	0%	3%	0	2	0	0

Table 11.11: Proposed Childcare Facility PM Arrival / Departure Profile & Traffic Generation

65 No. Children	AM Profile		Travel By All Modes		Travelling By Car (25% Mode Share)	
Time	Arrivals	Departures	Arrivals	Departures	Arrivals	Departures
17:00	2%	0%	1	0	0	0
17:05	2%	2%	1	1	0	0
17:10	2%	2%	1	1	0	0
17:15	2%	2%	1	1	0	0
17:20	2%	2%	1	1	0	0
17:25	3%	2%	2	1	0	0
17:30	4%	3%	3	2	1	0
17:35	6%	4%	4	3	1	1
17:40	6%	6%	4	4	1	1
17:45	6%	6%	4	4	1	1
17:50	6%	6%	4	4	1	1
17:55	6%	6%	4	4	1	1
18:00	6%	6%	4	4	1	1
18:05	6%	6%	4	4	1	1
18:10	8%	6%	5	4	1	1

65 No. Children	AM Profile		Travel By All Modes		Travelling By Car (25% Mode Share)	
Time	Arrivals	Departures	Arrivals	Departures	Arrivals	Departures
18:15	9%	8%	6	5	1	1
18:20	7%	9%	5	6	1	1
18:25	10%	7%	7	5	2	1
18:30	7%	17%	5	11	1	3

Accordingly, the AM and PM peak hour traffic generation for the childcare facility element of the development are shown in Table 11.12 below.

Table 11.12: Proposed Childcare Facility Peak Hour Traffic Generation

AM Peak 07:30-08:30		PM Peak 17:00-18:00	
Arrivals	Departures	Arrivals	Departures
8	8	8	7

Proposed Project – Enterprise Hub (Office / Retail / Enterprise Units)

Influenced by the fact that:

- there will only be 7 number short stay duration vehicle parking provided within the internal court yard area;
- there are nominal 'long-term' off-street car parking opportunities in the general area of the Site;
- the local streets are subject to Pay Parking controls; and
- only 7 number parking spaces have been allocated to staff based at the Enterprise Hub, the level of vehicle trip generation by the Enterprise Hub (Office / Retail / Enterprise Units) element of the proposed Project is anticipated to be modest.

The proposed Enterprise Hub will generate a very small level of 'servicing' activities. Unlike a retail scheme no goods are being transferred for onward sale / returns. Accordingly, the majority of 'servicing' activities including inbound delivery and outward collections will constitute waste collections, general maintenance (indoor and outdoor), and general office servicing activities.

These servicing activities will be encouraged to be undertaken outside of peak traffic periods and will not be permitted to coincide with the network AM and PM peak hour periods.

Nonetheless, in order to provide a robust assessment, it is assumed that the co-working space will be serviced by a delivery vehicle in both the AM and PM peak hour periods thereby generating 2 two-way vehicle trips (1 arrival and 1 departure). Furthermore, it has been assumed that the staff of the Enterprise Hub that have been allocated a parking space (7 No.), will all arrive during the AM and depart during the PM peak hour periods. Table 11.13 below indicates the total vehicle trip generation for the Enterprise Hub during the AM and PM peak hour periods.

Table 11.13: Proposed Enterprise Hub Peak Hour Traffic Generation

Enterprise Hub	AM Peak 07:30-08:30		PM Peak 17:00-18:00	
	Arrivals	Departures	Arrivals	Departures
Staff	7	0	0	7
Service / Delivery Vehicles	1	1	1	1
Total	**8**	**1**	**1**	**8**

Proposed Project – Food Hub / Café

The foodhub / café element of the subject developments Enterprise Hub will only be focussing upon (a) a local external 'walk-in' catchment, (b) passing trade already travelling across the local transport network, and (c) the internal 'walk-in' catchment from the Enterprise Hub and residential apartments. Therefore, the only vehicle traffic that could be generated from the café would be delivery vehicles or refuse vehicles. As such this foodhub / café is not expected to generate a material impact in terms of vehicle trip generation.

However, in order to provide a robust assessment and to analyse a *worst-case scenario*, it has been assumed that the foodhub / café will be serviced by a delivery vehicle in both the AM and PM peak hour periods thereby generating 2 two-way vehicle trips (1 arrival and 1 departure).

Table 11.14: Proposed Foodhub / Café Peak Hour Traffic Generation

Foodhub / Café	AM Peak 07:30-08:30	
	Arrivals	Departures
AM	1	1
PM	1	1

Proposed Project – Total Traffic Generation

In conclusion the total vehicle trip generation for the Site is indicated in Table 11.15 below.

Table 11.15: Proposed Project Total Vehicle Trip Generation

Land Use	AM Peak 07:30-08:30		PM Peak 17:00-18:00	
	Arrivals	Departures	Arrivals	Departures
Apartments	11	38	42	14
Childcare Facility	8	8	8	7
Foodhub / Café	1	1	1	1
Enterprise Hub	8	1	1	8
Total	**28**	**48**	**52**	**30**

11.6 Operational Phase Assessment

11.6.1 Trip Distribution & Assignment

For the adopted Opening Year of 2020 and Future Horizon Years of 2025 (+5 years) and 2035 (+15 years), the distribution of proposed Project traffic as proposed by DBFL is presented in Figure 2 as included in Appendix A11.2. The associated residential vehicle trips have been assigned to the network based on the surveyed traffic movements passing the Site on East Road.

11.6.2 Traffic Growth

The TTA adopts an Opening Design Year of 2020. In accordance with TII (NRA) Guidance, Future Design years (+5 and +15 years) of 2025 and 2035 have therefore been adopted.

The TII Project Appraisal Guidelines (PAG) have been utilised to determine the traffic growth forecast rates. The traffic growth forecast rates within the PAG ensures local and regional variations and demographic patterns are accounted for. Table 5.3.2 within the PAG provides Annual National Traffic Growth Factors for the different regions within Ireland. The Site lies within '*Region 1*' Dublin with the growth factors as outlined within Table 11.16 below.

Table 11.16: National Traffic Growth Forecasts: Annual Growth Factors (Extract from Table 5.3.2 PAG)

Region	Name	Low Growth				Medium Growth				High Growth			
		2013-2030		2030-2050		2013-2030		2030-2050		2013-2030		2030-2050	
		LV	HV	LV	HV	LV	HV	LV	HV	LV	HV	LV	HV
1	Dublin	1.0089	1.0221	1.0004	1.0135	1.0134	1.0237	1.0038	1.0176	1.0149	1.0242	1.0054	1.0195

Applying the annual factors (medium growth) as outlined in Table 11.16 above for the adopted Opening Year of 2020 and Future Horizon Years of 2025 (+5 years) and 2035 (+15 years), the following growth rates have been adopted to establish corresponding 2020, 2025 and 2035 baseline network flows:

- 2018 to 2020 - 1.027 (or 2.7%);
- 2018 to 2025 - 1.098 (or 9.8%); and
- 2018 to 2035 - 1.190 (or 19.0%).

11.6.3 Assessment Scope

11.6.3.1 Assessment Scenarios

Two different traffic scenarios have been assessed, namely (a) the '*Base*' (Do-Nothing) traffic characteristics and (b) the '*Post Development*' (Do-Something) traffic characteristics.

The *'Base'* traffic scenario takes into account the potential level of traffic that could be generated by the '*committed development'*, in addition to the existing flows travelling across the network.

The proposed Project traffic flows are then added to the network's '*Base*' (Base + Committed Development) traffic flows to establish the new '*Post Development'* traffic flows.

In summary the following scenarios are considered:

Do Nothing:

- A1 - 2020 Base Flows + Committed Development;
- A2 - 2025 Base Flows + Committed Development; and
- A3 - 2035 Base Flows + Committed Development

Do Something:

- B1 - 2020 Do Nothing (A1) + Proposed Project Flows;
- B2 - 2025 Do Nothing (A2) + Proposed Project Flows; and
- B3 - 2035 Do Nothing (A3) + Proposed Project Flows.

11.6.3.2 Assessment Periods

The AM and PM peak hour flows have been identified as occurring between 07:30-08:30 and 17:00-18:00 respectively.

11.6.3.3 Network Flows

The following Figures as included in Appendix A11.2 present the vehicle flows across the local road network for each of the adopted development scenarios:

- Figure 16 - 2020 Do Nothing (Scenario A1);
- Figure 17 - 2025 Do Nothing (Scenario A2);
- Figure 18 - 2035 Do Nothing (Scenario A3);
- Figure 19 - 2020 Do Something; (Scenario B1);
- Figure 20 - 2025 Do Something (Scenario B2); and
- Figure 21 - 2035 Something (Scenario B3).

11.6.4 Network Analysis

11.6.4.1 Introduction

The operational assessment of the local road network has been undertaken using the Transport Research Laboratory (TRL) computer package TRANSYT for signal-controlled junctions.

When considering signalised junctions, a Degree of Saturation (DoS) of greater than 90% (0.90) would indicate a junction to be approaching operational capacity. A 90-minute AM and PM period has been simulated, from 07:15 to 08:45 and 16:45 to 18:15. Traffic flows were entered using an Origin-Destination table for the peak hours.

In order to determine if the proposed upgraded Site access junction will cater for the predicted level of traffic generation, a traffic modal of the Site access junction was analysed for the schemes 2020 opening year and subsequent 2025 and 2035 future design years.

11.6.4.2 Church Road / East Road / Site Access Junction

The results of the operational assessment of this proposed upgraded four-arm signal-controlled junction during the weekday morning and evening peaks are summarised in Tables 11.17 to 11.19 below. The arms were labelled as follows within the TRANSYT model:

- **Arm A:** East Road North
- **Arm B:** Site Access
- **Arm C:** East Road South
- **Arm D:** Church Road

The assessment has assumed that the '*all red*' pedestrian stage is called every cycle during both the AM and PM Peak period. We believe this demand will actually overestimate the number of times the 'Pedestrian' stage will be called. As a result, the following results represent a worst-case assessment, with the junction actually performing better to that recorded within the following TRANSYT analysis.

A 100 second cycle time has been assessed, however as previously referred to in the Traffic and Transport Assessment submitted with this Planning Application, should DCC seek to provide additional journey time delays / metering of through traffic on East Road, it will be achievable by adjusting the signal timings at the junction.

2020 Opening Year

During the 2020 "Do Something" **AM peak hour**, with the inclusion of the proposed Project traffic, the junction simulation model (see Table 11.17 below) results indicate the maximum DoS of 72% and a corresponding queue of 12.65 pcus will occur on the East Road northern arm of the junction.

For the 2020 "Do Something" **PM peak hour**, with the inclusion of the proposed Project traffic, the junction simulation model (see Table 11.17 below) results indicate the maximum DoS of 62% and a corresponding queue of 11.67 pcus will occur on the East Road southern arm of the junction.

Table 11.17: TRANSYT Results: 2020 Opening Year - Do Something

Arm	AM		PM	
	Do Something		Do Something	
	DoS (%)	Mean Max Queue (pcu)	DoS (%)	Mean Max Queue (pcu)
A	72	12.65	22	3.06
B	39	1.37	24	0.81
C	31	4.25	62	11.67
D	71	7.63	38	1.44

2025 Future Design Year

During the 2025 "Do Something" **AM peak hour**, with the inclusion of the proposed Project traffic, the junction simulation model (see Table 11.18 below) results indicate the maximum DoS of 83% and a corresponding queue of 16.21 pcus will occur on the East Road northern arm of the junction.

For the 2025 "Do Something" **PM peak hour**, with the inclusion of the proposed Project traffic, the junction simulation model (see Table 11.18 below) results indicate the maximum DoS of 68% and a corresponding queue of 13.64 pcus will occur on the East Road southern arm of the junction.

Table 11.18: TRANSYT Results: 2025 Opening Year - Do Something

Arm	AM		PM	
	Do Something		Do Something	
	DOS (%)	Mean Max Queue (pcu)	DOS (%)	Mean Max Queue (pcu)
A	83	16.21	25	3.60
B	39	1.37	24	0.81
C	34	4.66	68	13.64
D	82	9.90	44	1.73

2035 Future Design Year

During the 2035 "Do Something" **AM peak hour**, with the inclusion of the proposed Project traffic, the junction simulation model (see Table 11.19 below) results indicate the maximum DoS of 88% and a corresponding queue of 18.61 pcus will occur on the East Road northern arm of the junction.

For the 2035 "Do Something" **PM peak hour**, with the inclusion of the proposed Project traffic, the junction simulation model (see Table 11.19 below) results indicate the maximum DoS of 72% and a corresponding queue of 15.08 pcus will occur on the East Road southern arm of the junction.

Table 11.19: TRANSYT Results: 2035 Opening Year - Do Something

Arm	AM		PM	
	Do Something		Do Something	
	DOS (%)	Mean Max Queue (pcu)	DOS (%)	Mean Max Queue (pcu)
A	88	18.61	26	3.80
B	39	1.37	24	0.71
C	36	4.98	72	15.08
D	88	11.55	48	1.90

The TRANSYT results (Tables 11.17 to Table 11.19) indicate that the Site access junction will operate within capacity for the 2020 opening year and the 2025 and 2035 future horizon years. The highest DoS and corresponding queues are being experienced on the East Road northern arm during the AM peak period, and the East Road southern arm during the PM peak period, respectively.

DBFL believe these results are consistent with the existing AM and PM travel demands (*i.e.* in the AM peak period the majority of vehicles are travelling southbound / inbound, whilst in the PM peak period the demand is reversed.

11.7 Mitigation Measures

11.7.1 Construction Phase

A final CMP and the associated TMP in addition to the application accompanying Construction and Waste Management Plan will be developed by the appointed Contractor and submitted to DCC for approval prior to commencement of works.

The final CMP will incorporate a range of integrated control measures and associated management initiatives with the objective of mitigating the impact of the proposed Project onsite construction activities.

To minimise disruption to the surrounding environment, the following mitigation measures will be implemented:

- During the Construction Phase (pre), the Site will be securely fenced off from adjacent properties, public footpaths and roads.
- All road works will be adequately signposted and enclosed to ensure the safety of all road users and construction personnel.
- A dedicated 'construction' Site access / egress junction will be provided during the Construction Phase.
- Provision of sufficient onsite parking and compounding to ensure no potential overflow of construction generated traffic onto the local network.
- Site offices and compound will be located within the Site boundary. The Site will be able to accommodate employee and visitor parking throughout the construction period through the construction of temporary hardstanding areas.
- A material storage zone will also be provided in the Construction Compound area. This storage zone will include material recycling areas and facilities.
- A series of 'way finding' signage will be provided to route staff / deliveries into the Site and to designated compound / construction areas.
- Dedicated construction haul routes will be identified and agreed with the local authority prior to the commencement of constructions activities onsite.
- Truck wheel washes will be installed at construction entrances if deem necessary and any specific recommendations with regard to construction traffic management made by the Local Authority will be adhered to.
- On completion of the works all construction materials, debris, temporary hardstands etc. from the Site compound will be removed offsite and the Site compound reinstated in full on completion of the works.

11.7.2 Operational Phase

With the objective of mitigating the potential impact of the proposed Project during its Operational Phase the following initiatives and associated timescale for their implementation have been identified and subsequently form an integral part of the subject development proposals.

- Management - A number of management measures will be implemented prior to the subject scheme opening which include:
    - A Mobility Management (MMP) is to be rolled out with the aim of guiding the delivery and management of coordinated initiatives by the scheme promotor. The MMP ultimately seeks to encourage sustainable travel practices for all journeys to and from the Site. It is proposed that two land use specific MMP's are developed under the framework of a 'parent' MMP for the entire site. These two associated MMP's will be developed in partnership with DCC to specifically consider the opportunities of shaping all journeys and promoting sustainable transport habits at both the proposed (i) apartments, and (ii) the Enterprise Hub.
    - The accesses to the under-croft parking areas will be barrier controlled to ensure unpermitted vehicles cannot gain entry. In order to be allocated a dedicated parking space within these under croft parking areas, both tenants and employees based at the site will have to apply to the management company to gain a parking permit and an assigned dedicated parking space,

i.e. a tenant / employee is not automatically allocated a parking space when they take up residency or employment at the Site.
    - The 7 No. parking spaces within the internal court yard area will be restricted to short duration parking only (*i.e.* 30-60 minutes). A clamping enforcement regime will be in place within the Site to ensure these parking restrictions are adhered to.
- Service - The facilitation of a dedicated car share facility (2 spaces) and associated service (by others) on East Road adjacent to the Site will reduce the need to own a private motor car thereby contributing to reducing the overall number of vehicle trips generated by the proposed Project.
- Facilities - The provision of a total of 112 short-term and 698 long-term bicycle parking stands / opportunities (810 in total).
- Infrastructure - Prior to 2020 Opening Year Upgrading of the East Road / Church Road / Site Access junction to traffic signal controlled.

11.8 Residual Impacts

11.8.1 Construction Phase

Provided the above mitigation measures and management procedures are incorporated during the Construction Phase, the residual impact upon the local receiving environment is predicted to be *temporary* in nature and *slight* in terms of effect.

11.8.2 Operational Phase

11.8.2.1 Network Impact

The IHT document '*Guidelines for Traffic Impact Assessments*' states that the impact of a proposed Project upon the local road network is considered material when the level of traffic it generates surpasses 10% and 5% on normal and congested networks respectively. When such levels of impact are generated a more detailed assessment should be undertaken to ascertain the specific impact upon the networks operational performance. These same thresholds are reproduced in the NRA (TII) document entitled '*Traffic and Transport Assessment Guidelines'* (2014).

In accordance with the IHT and NRA (TII) guidelines we have undertaken an assessment to establish the potential level of impact upon the key junctions of the local road network. To enable this calculation to be undertaken we have based the analysis upon the 2021 Opening Year and 2036 Future Design Year scenarios.

Figure 11.23 below details the amount of two-way vehicle trips to / from the Site that will travel along East Road in the 2035 design year as result of the proposed Project.

The resulting percentage increase in traffic flows as a result of the traffic generated by the proposed Project is established as below the 10% threshold (5% for congested networks) at the adjacent local key junctions.

It can be seen that the proposed Project would result in the following during the 2035 Future Year (Opening Year +15): -

- Junction 1: East Wall Road / East Road signal-controlled junction - an increase of 0.2% (3 New Vehicle Trips) in the AM peak period, and 1.4% (27 New Vehicle Trips) in the PM peak period.
- Junction 2: East Road / Church Road / Site Access junction - an increase of 3.1% (38 New Vehicle Trips) in the AM peak period, and 5.2% (51 New Vehicle Trips) in the PM peak period; and
- Junction 3: East Road / Sherriff St. Upper / New Wapping St. Junction - an increase of 1.77% (31 New Vehicle Trips) in the AM peak period, and 1.4% (22 New Vehicle Trips) in the PM peak period.

The analysis has demonstrated that the proposals will generate a subthreshold impact upon the key off-site junctions. Table 11.20 below details the specific scale of network impact predicted at each of the key local off-site junctions during the 2020 Opening and 2035 Future Design Years.

Table 11.21 and Table 11.22 below presents the Impact level at each of the key off-site junctions during the 2035 Future Design Year. These tables reveal the proposed Project is predicted to result in a negligible to low traffic impact upon the key off-site junctions.

Figure 11.23: Increase in Vehicle Trips Generated at Key Local Junctions 2035

Table 11.20: Proposed Project's Predicted Network Impact

Ref	Junction	Design Year	AM Peak Hour	PM Peak Hour
1	East Road / East Wall Road	2020	0.2%	1.7%
		2035	0.2%	1.4%
2	East Road / Church Road / Site Access	2020	3.8%	6.2%
		2035	3.1%	5.2%
3	East Road / Sheriff St. Upper / New Wapping St.	2020	2.1%	1.7%
		2035	1.8%	1.4%

Table 11.21: Network Impact Categorisation 2035 AM Peak Hour

Ref	Junction	Impact Scale	Impact Level
1	East Road / East Wall Road	0.2%	Negligible
2	East Road / Church Road / Site Access	3.1%	Low
3	East Road / Sheriff St. Upper / New Wapping St.	1.8%	Negligible

Table 11.22: Network Impact Categorisation 2035 PM Peak Hour

Ref	Junction	Impact Scale	Impact Level
1	East Road / East Wall Road	1.4%	Negligible
2	East Road / Church Road / Site Access	5.2%	Low
3	East Road / Sheriff St. Upper / New Wapping St.	1.4%	Negligible

11.9 Monitoring

11.9.1 Construction Phase

During the Construction Phase the following monitoring exercises are likely to be required. The specific compliance exercises to be undertaken in regard to the range of measures detailed in the final construction management plan will be agreed with the planning authority.

- compliance with construction vehicle routing practices;
- compliance with construction vehicle parking practices;
- internal and external road conditions; and
- timings of construction activities.

11.9.2 Operational Phase

The MMP for the residential elements of the proposed Project will be monitored and updated every two years over a period of 10 years from the initial occupancy apartment units. This will allow the progress made towards achieving mode split targets to be tracked and updated as necessary. The information obtained from the monitoring surveys will be used to identify ways in which the MMP initiatives should be taken forward in order to maintain and further encourage sustainable travel characteristics.

11.10 Reinstatement

Reinstatement is not applicable to the Traffic and Transportation Section of this EIAR.

11.11 Interactions

11.11.1 Human Health

11.11.1.1 Construction Phase

Temporary negative impacts to human health may be likely during the Construction Phase due to noise, dust, air quality and visual impacts which are discussed in the relevant chapters of this EIAR. The traffic impacts, which would also *be temporary* in duration are not considered to be significant due to the implementation of the mitigation measures identified in Section 11.6.1.

11.11.1.2 1Operational Phase

Prior to the adopted 2020 Opening Year the East Road / Church Road / Site Access junction will be upgraded to a traffic signal controlled junction incorporating improved cycle and pedestrian facilities thereby making the local road network more pedestrian / cycle friendly.

11.11.2 Noise and Vibration

The influence of traffic upon noise and vibration is considered in Chapter 15 of this EIAR.

11.11.3 Air Quality and Climate

The influence of traffic upon noise and vibration is considered in Chapter 14 of this EIAR.

11.12 Difficulties Encountered in Compiling the Chapter

No difficulties were encountered in completing this Chapter.

11.13 Cumulative Impacts

11.13.1 Overview

DBFL have examined the existing sites with live planning permission within the area of influence of the proposed Project. There are several third party committed developments (see Figure 11.24 below) with existing planning permission located within the area of influence of the Site. DBFL believe these third-party developments may generate an impact on the local road network and as such DBFL have included them as committed development.

Figure 11.24: Third Party Committed Development Indicative Locations

11.13.2 Committed Development

The following paragraphs examine the planning applications for these developments in greater detail.

11.13.2.1 Commercial Development, City Block 3, North Docklands (Ref. DSDZ2135/18)

The City Block 3 Commercial development located at North Docklands (Figure 11.24 above) was granted planning permission by DCC in May 2018. The development proposals include the provision of 43,445m^2 of office space, 91 No. vehicle parking spaces and 450 No. bicycle parking spaces.

In order to quantify the traffic generation from this third-party development, reference has been made to the Traffic Impact Assessment Report (dated 22nd January 2018) that was prepared by Roughan & O'Donovan. The TIA report states:

> *'The North Lotts SDZ Planning Scheme identifies that it is neither feasible nor desirable that demand for movement into or through this area is met by private car travel. Travel by private car will be suppressed by lack of parking supply, and lack of road network capacity. It was therefore agreed that it is not necessary to undertake a detailed assessment of traffic generation for the proposed development.'*

The TIA goes on to state:-

> *'Only 91 car parking spaces will be provided within the proposed development. The development may give rise to a handful of vehicular traffic movements during peak hours during peak hours, but these would have a negligible impact on the surrounding road network.'*

As per the assumptions made within the TIA Report, DBFL have not included traffic generation from this third party development in the subject East Road developments' Traffic & Transport Assessment.

11.13.2.2 Student Accommodation, City Block 5, North Docklands (Ref. DSDZ3689/15 as amended under Ref. DSDZ2155/18, Ref. DSDZ4385/16 and Reg. Ref. DSDZ2460/17)

The City Block 5 Student Accommodation development located at North Docklands (Figure 11.24 above), was originally granted planning permission by DCC in March 2016. The development proposals include the provision of 2 student accommodation blocks encompassing 970 bed spaces, ancillary ground floor uses, and 454 bicycle parking spaces. There are no car parking spaces proposed with the exception of 2 No. mobility impaired parking spaces.

As there is no general vehicle parking provided, and consequently there will be no vehicle traffic generation (during the network peak hours) from this third-party development, DBFL have therefore not included any vehicle traffic generation from this third-party development in the subject East Road developments' Traffic & Transport Assessment.

11.13.2.3 Commercial Development, City Block 8, North Docklands (Ref. DSDZ2496/17, Ref. DSDZ2749/16, Ref. DSDZ3350/15)

The City Block 8 Commercial development as located at North Docklands (Figure 11.24 above) was granted planning permission by DCC in November 2015. The development was subsequently amended under Ref. DSDZ2749/16 (September 2016), and Ref DSDZ2496/17 (May 2017), and now includes the provision of 170 residential units.

In order to quantify the traffic generation from this third-party development, reference has been made to the TIA Report (dated 19th April 2016) that was prepared by O'Connor Sutton Cronin.

The TIA report included estimated traffic generation for the development.

11.13.2.4 Hotel & Office Development, Spencer Place, North Wall Quay (Ref. DSDZ2661/17)

This third-party hotel and office development as located at Spencer Place (Figure 11.24 above) was granted planning permission by DCC in September 2017. The development proposals included the provision of 9,205m^2 Hotel and c.46,184m^2 office space; and retail / café / restaurant (873m^2).

In order to quantify the traffic generation from this third-party development, reference has been made to the TIA Report (dated March 2017) that was prepared by CS Consulting Group.

The TIA report included estimated traffic generation for the development.

11.13.2.5 Residential Development, Block 3 (eastern section), North Lotts (Ref. DSDZ3357/17, Ref. DSDZ2387/18)

The City Block 3 Residential development located at North Docklands (Figure 11.24 above) was granted planning permission by DCC in August 2017 (amended under Ref. DSDZ2387/18). The development proposals include the provision of 360 residential units, 283 vehicle parking spaces and 483 bicycle parking spaces.

In order to quantify the traffic generation from this third-party development, reference has been made to the TIA Report (dated October 2016) that was prepared by Roughan & O'Donovan. The TIA report states:

> *'Pre-planning discussions were held with Ms. Mary Conway of DCC Planning Department and Mr. Kiaran Sweeney of the Transportation department. The discussions identified that the road network in te North Lotts cannot accommodate further peak hour vehicular traffic and that it is not necessary to undertake a detailed assessment of traffic generation The North Lotts SDZ Planning Scheme identifies that the rate of car ownership in the docklands is low and that commuting tends to be by other modes.'*

The TIA goes on to state:

> *'A limited quantum of car parking is proposed on site – but it is not envisaged that the cars will be used for commuting. Rather it is anticipated that the excellent accessibility of the site by foot, bicycle and public transport will result in these modes being preferred for commuting – as is the case in the rest of the docklands area. The development may give rise to a handful of vehicular traffic movements during the peak hours, but these would have a negligible impact on the surrounding road network'.*

As per the assumptions made within the TIA Report, DBFL have not included traffic generation from this third-party development in the subject East Road developments' Traffic & Transport Assessment.

11.13.2.6 Spencer Dock Development (Ref. DSDZ3367/15)

The Spencer Dock development as located at Block 2B of the North Lotts and Grand Canal Dock Planning Scheme 2014 (Figure 11.24 above) was granted planning permission by DCC in December 2015. The development proposals include the provision of 165 residential units, 90 vehicle parking spaces and 186 bicycle parking spaces.

In order to quantify the traffic generation from this third-party development, reference has been made to the Transport Assessment (TA) Report (dated July 2015) that was prepared by Waterman Moylan Engineering Consultants. The TA report states:

> *'A pre-planning consultation was held with Roads and Traffic at the offices of Dublin City Council on Tuesday 9th June 2015. During the course of the meeting the DCC representatives advised that*
>
> *(a) The overall draft proposals for access and circulation prepared by Waterman Moylan looked satisfactory from the traffic point of view. However, it was not possible to confirm that the proposals would be in compliance with the as yet undefined public realm strategy for Docklands…'*

The TIA goes on to state:-

> *'A limited quantum of car parking is proposed on site – but it is not envisaged that the cars will be used for commuting. Rather it is anticipated that the excellent accessibility of the site by foot, bicycle and public transport will result in these modes being preferred for commuting – as is the case in the rest of the docklands area. The development may give rise to a handful of vehicular traffic movements during the peak hours, but these would have a negligible impact on the surrounding road network'.*
>
> *Having regard to the fact that the existing road network infrastructure is running at capacity during peak hours, it is not reasonable to expect free flow traffic conditions in Docklands and surrounding area. It is reasonable to expect that individual transport choices will factor-in issues such as congestion and ease of access to alternative modes. Notwithstanding these capacity issues, the lands within the Planning Scheme including Spencer Dock has been deemed suitable for development being centrally located, with high quality existing and future public transport links.'*

As per the assumptions made within the TIA Report, DBFL have not included traffic generation from this third-party development in the subject East Road developments' Traffic & Transport Assessment.

11.13.2.7 Commercial Development, City Block 5 & 10, North Docklands (Ref. DSDZ3632/15, DSDZ3686/16, DSDZ 3776/17)

The Commercial development as located at City Blocks 5 & 10 of the North Lotts & Grand Canal Dock SDZ Planning Scheme (Figure 11.24 above) was granted planning permission by DCC in October 2017. The development proposals include the provision of 19,263m^2 GFA of commercial space connecting to the existing constructed basement beneath the Point Village Square'. 48 vehicle parking spaces and 300 bicycle parking spaces will be provided.

In order to quantify the traffic generation from this third-party development, reference has been made to the Mobility Management Plan (dated September 2015) that was prepared by O'Connor Sutton Cronin.

11.13.2.8 Residential Development, City Block 9, Dublin Docklands (Ref. DSDZ3779/17)

This third-party residential development as located at City Block 9, Dublin Docklands (Figure 11.24 above) was granted planning permission by DCC in December 2017. The development proposals included the provision 420 residential units, a crèche (c.281m^2), and 4 no. café / restaurant / retail units.

In order to quantify the traffic generation from this third party development, reference has been made to the Traffic and Transport Assessment (TTA) Report (dated August 2017) that was prepared by Punch Consulting Engineers.

The TTA report included estimated traffic generation for the development.

11.13.2.9 Commercial Development, City Block 9, North Docklands (Ref. DSDZ3780/17)

This commercial development as located at City Block 9, Dublin Docklands (Figure 11.24 above) was granted planning permission by DCC in December 2017. The development proposals included the provision 35,883m^2 commercial office space, 90 vehicle parking spaces and 360 bicycle parking spaces.

In order to quantify the traffic generation from this third-party development, reference has been made to the TTA Report (dated August 2017) that was prepared by Punch Consulting Engineers.

The TTA report included estimated traffic generation for the development.

11.13.2.10 Committed Development Summary

Beyond the above 9 number third party committed developments considered in this appraisal, DBFL have determined there are no other significant off-site committed developments that would generate a notable impact upon the local road network serving the Site within the adopted 2035 design year.

11.14 'Do-Nothing' Impact

In the absence of the proposed Project, the operational performance of the existing junctions on the surrounding road network will be affected by the impact caused by the identified committed development schemes and the forecast background network traffic growth.

11.15 References

- NRA Guidelines '*Traffic & Transportation Assessment Guidelines*; (NRA, 2014)
- *TII Project Appraisal Guidelines for National Roads Unit 5.3 – Travel Demand Projections (PE-PAG-02017*); TII (October 2016)
- '*Traffic Management Guidelines'* Dublin Transportation Office & Department of the Environment and Local Government (May 2003): https://www.nationaltransport.ie/downloads/archive/traffic_management_guidelines_2003.pdf
- *'Guidelines for Traffic Impact Assessments'* The Institution of Highways and Transportation (1994)
- Dublin City Development Plan 2016-2022
- North Lotts & Grand Canal Dock Planning Scheme 2014
- Greater Dublin Area Cycle Network Plan; National Transport Authority (NTA) (2013): http://www.nta.ie/
- Dublin Bus Website: www.dublinbus.ie
- Irish Rail Website: www.irishrail.ie
- Ordnance Survey Ireland (OSI): www.osi.ie
- Transport Infrastructure Ireland (TII): www.tii.ie
- Transport for Ireland (TFI): www.transportforireland.ie

12 Land, Soils, Geology & Hyrdogeology

12.1 Introduction

AWN Consulting has prepared this Chapter of the EIAR which assesses and evaluates the *potential impacts* on the land, soil, geological and hydrogeological aspects of the Site and surrounding area.

In assessing *likely potential and predicted impacts*, account is taken of both the importance of the attributes and the predicted scale and duration of the likely impacts.

12.2 Methodology

12.2.1 Appraisals Methodology

The appraisal methodology for the EIAR is completed in accordance with '*Draft Guidelines on the Information to be contained in Environmental Impact Statements'*[73] and Institute of Geologists of Ireland (IGI) '*Geology in Environmental Impact Statements, a Guide*[74]*'* and '*Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements*'[75]. In addition, '*Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes*' by the National Roads Authority[76] (NRA) is referenced where the methodology for assessment of impact is appropriate.

The rating of potential environmental impacts on the land, soils and geological environment is based on the quality, significance, duration and type of impact characteristic identified. Consideration is given to both the importance of an attribute and the magnitude of the potential environmental impacts of the proposed Project activities on that cited attribute. The EIAR guideline tables[77] are presented in Appendix A12.1. The IGI and NRA criteria for rating the magnitude and significance of impacts at EIA stage on the geological related attributes are also relevant in determining impact assessment and are presented in Appendix A12.2.

The principal attributes (and impacts) to be assessed include the following:

- geological heritage sites in the vicinity of the perimeter of the 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 uses of soil around the Site;
- quarries or mines in the vicinity, 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 or requirement to remove it offsite as waste for disposal or recovery;
- high-yielding water supply springs / wells in the vicinity of the Site to within a 2km radius and the potential for increased risk presented by the proposed Project;
- classification (regionally important, locally important etc.) and extent of aquifers underlying the Site perimeter area and increased risks presented to them by the proposed Project associated with aspects of the development for example removal of subsoil cover, removal of aquifer (in whole or part), drawdown in water levels, alteration in established flow regimes, change in 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.

[73] EPA Guidelines: https://www.epa.ie/pubs/advice/ea/EPA%20EIAR%20Guidelines.pdf
[74] IGI 2002: http://igi.ie/assets/files/Codes%20and%20Guidelines/Geology_in_EIS_a_Guide.pdf
[75] IGI 2013: http://igi.ie/assets/files/Codes%20and%20Guidelines/IGI%20Enviro%20Impact%202013.pdf
[76] NRA 2009: https://www.tii.ie/technical-services/environment/planning/Guidelines-on-Procedures-for-Assessment-and-Treatment-of-Geology-Hydrology-and-Hydrogeology-for-National-Road-Schemes.pdf
[77] EPA Guidelines: https://www.epa.ie/pubs/advice/ea/EPA%20EIAR%20Guidelines.pdf

12.2.2 Sources of Information

Desk-based geological information on the substrata (both Quaternary deposits and bedrock geology) underlying the extent of the Site was obtained through accessing databases and other archives where available. Data was sourced from the following:

- GSI - on-line mapping, Geo-hazard Database, Geological Heritage Sites & Sites of Special Scientific Interest, Bedrock Memoirs and 1:100,000 mapping;
- Teagasc soil and subsoil database;
- OSI - aerial photographs and historical mapping;
- EPA - website mapping and database information;
- NPWS - Protected Site Register; and
- DCC - illegal landfill information.

Site specific data was derived from the following sources;

- Ground Investigation Ireland (GII) Ltd. East Road, Dublin 3, Ground Investigation Report, June 2018.
- O'Callaghan Moran & Associates, Environmental Desk Study and Waste Characterisation Assessment, Proposed Student Accommodation Site, East Road, Dublin 3.
- DBFL Consulting Engineers. Proposed Mixed Use Development at 1-4 East Road, East Wall, Dublin 3 Infrastructure Design Report December 2018.
- various design site plans and drawings; and
- consultation with site engineers.

12.3 Baseline Environment

The receiving environment is discussed in terms of; land use, geomorphology; superficial and solid geology and Site history including potential for contamination.

The Site is located at 1-4 East Road, Dublin 3 with an area of 2.11ha. The proposed Project consists of the demolition of all existing structures onsite and the construction of a mixed-use development with a gross floor area of 52,796m^2 (excluding below podium parking areas) set out in 9 No. blocks, ranging in height from 3 to 15 storeys. A full description of proposed Project can be viewed in Chapter 4 (Description of the Proposed Project). The Site is relatively flat with a slight gradient from north to south. Figure 12.1 below presents the topographic nature of the Site and surrounding area.

Figure 12.1: Site Location

12.3.1 Land Use

The Site is located in East Wall, Dublin 3. The area is largely industrial with residential housing to the west. Railway tracks bound the Site to the south with further residential and commercial development to the north. Historical OSI maps (1837) shows the Forbes Castle was originally located on the Site and was surrounded by greenfield. The Site was used a timber yard up until the 1970's. It is currently used as a container / trailer park.

12.3.2 Drainage

The Site is in the catchment of the River Liffey and is in proximity to the Liffey and Tolka Estuaries. The existing drainage is discussed in Chapter 13 (Surface Water - Hydrology) of this EIAR.

12.3.3 Soil & Subsoil

Site specific information was derived from a Site investigation undertaken by Ground Investigations Ireland (GII) in March 2018 and summarised in an Environmental Desk Study and Waste Characterisation Assessment prepared by O'Callaghan Moran & Associates in June 2018. The Site investigations work included relevant to this Chapter include the following;

- Excavation of 10 No. foundation pits (to determine existing foundation details).
- Excavation of 1 No. soakaway pit.
- Drilling of 24 No. window sample boreholes.
- Drilling of 12 No. cable percussion boreholes to a max depth of 22.35m below ground level (bgl).
- Drilling of 3 No. rotary core boreholes to a maximum depth of 30.90mbgl.
- Installation of 5 No. groundwater monitoring wells.
- Geotechnical and environmental testing.

Site investigation locations can be seen in Figure 12.8 in Section 12.3.11. Bedrock was not encountered during works with a maximum borehole depth advanced to 30.9mbgl at BH05. Table 12.1 summarises the ground and subsurface conditions noted during the Site investigations.

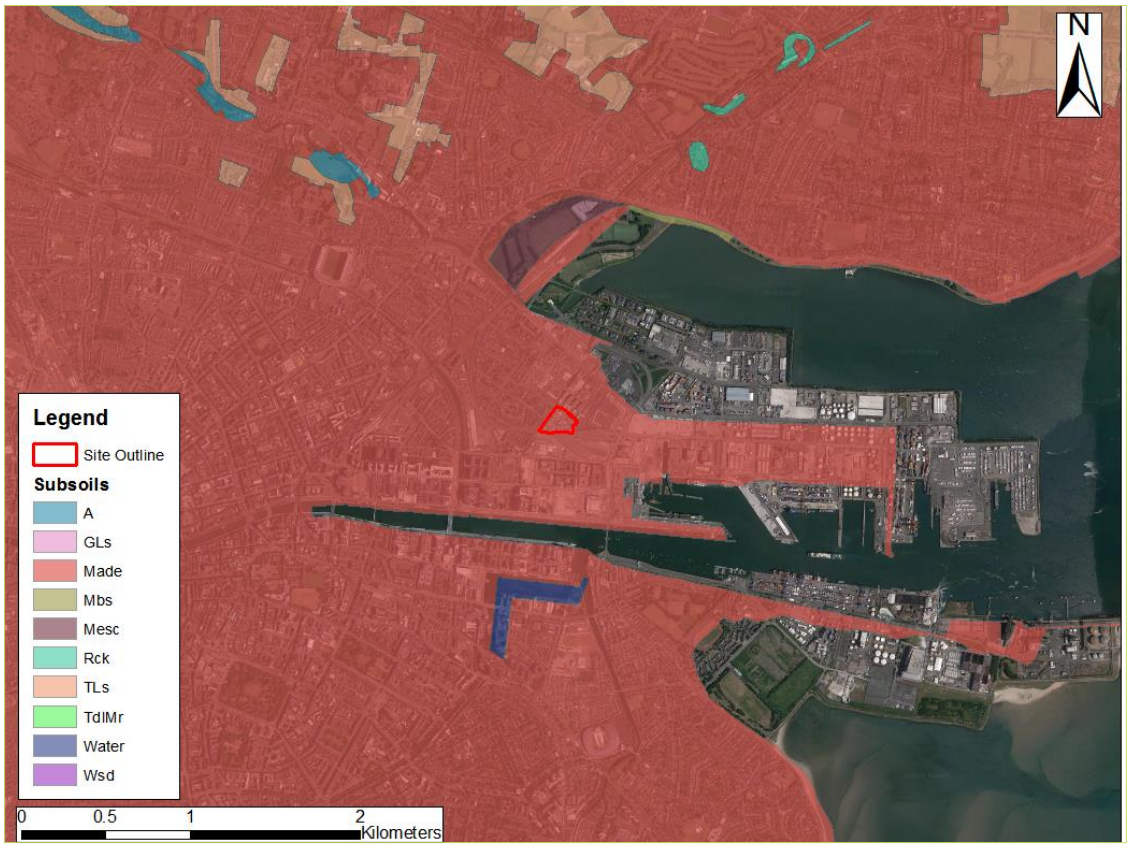
Table 12.1: Subsurface conditions at the Site

Strata	Depth (mbgl) (circa)
Surfacing	0 - 0.10
Made Ground	0.1 - 1.5
Upper Granular Deposits (SAND)	1.5 - 2.8
Upper Cohesive Deposits (SILT)	2.8 - 7.7
Laminated Cohesive Deposits (CLAY)	7.7 - 15.4
Lower Granular Deposited (SAND & GRAVEL)	15.4 - 17.9
Glacial till Deposits*	17.9 - 30.9

Note BH05 sands and gravels to 30.9mbgl*

The Site investigations confirm the GSI regional mapping which states the strata immediately underlying the Site is mostly Made Ground, see Figure 12.2 below.

Figure 12.2: Subsoil map[78]



12.3.4 Bedrock Geology

Inspection of the available GSI data shows that the bedrock geology underlying the Site and surrounding area is dominated by rocks of the Carboniferous age. The Site and local area are underlain by dark grey to black limestone and shales and part of the Lucan (Calp) Formation. The formation comprises dark grey to black, fine grained occasionally cherty, micritic limestone that weather paler, usually pale grey. Figure 12.3 below shows the local

[78] GSI, 2019: www.gsi.ie/mapping

geology. Karstification has been noted in the wider Lucan Formation but there is no Karst feature recorded in the vicinity of the Site.

Figure 12.3: Local Geology[79]

12.3.5 Aquifer Classification

The GSI has devised a system for classifying the bedrock aquifers in Ireland. The aquifer classification for bedrock depends on a number of parameters including, the areal extent (km^2), well yield (m^3/d), specific capacity ($m^3/d/m$) and groundwater throughput (mm^3/d). 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 bedrock aquifer underlying the Site according to the GSI[80] National Draft Bedrock Aquifer Map is classified as a Locally Important Aquifer (Ll) which is described as Bedrock which is Generally Moderately Productive only in local zones, see Figure 12.4.

[79] GSI, 2019: www.gsi.ie/mapping
[80] GSI: www.gsi.ie/mapping

Figure 12.4: Local Groundwater Body Classification[81]

The Site is underlain by the Dublin Groundwater Body (EU code: IE_EA_G_008) which has been investigated by the GSI and its groundwater flow is primarily along fractures, joints and major faults. In general permeability in these rock units are likely to be low (1-10m^2/day). General transmissivity values between 10 and 150m^2/day have also been recorded. There is a distinct reduction in the permeabilities of these rocks with depth (up to 1 order of magnitude for each 5m of depth in limestone). Most groundwater flows will take place close to the surface with additional isolated flow along fractures and fissures.

12.3.6 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 of mixtures of peat, sand, gravel, glacial till, clays or silts).

The GSI currently classifies the bedrock aquifer in the region of the Site primarily as having (L) - Low Vulnerability status indicating >10m of low permeability soil see Figure 12.5 below. This was confirmed by the most recent Site investigations in 2018[82]. Borehole drilling confirmed bedrock depth >30mbgl at location BH05B, see Figure 12.8 in Section 12.3.11 for the location.

[81] GSI, 2019: www.gsi.ie/mapping
[82] GII, 2018:

Figure 12.5: Local Groundwater Vulnerability [83]

12.3.7 Groundwater Wells and Flow Direction

There are no recorded groundwater resource protection zones in the area of the Site, *i.e.* zones surrounding a groundwater abstraction area. The closest can be seen c.21km to the northwest, see Figure 12.6 below.

The GSI Well Card Index is a record of wells drilled in Ireland, water supply and site investigation boreholes. It is noted that this record is not comprehensive as licensing of wells is not currently a requirement in the Republic of Ireland (ROI). This current index, however, shows a number of groundwater monitoring and abstraction wells within a 3km radius of the Site. The closest recorded well is at Sheriff Street upper c.250m southwest of the Site. Borehole depth was recorded at c.7m but there were no well construction details listed on the GSI website and was likely installed as a geotechnical borehole. As the area is served by public mains, it is unlikely that there are any boreholes in the area used for potable water supply. Figure 12.7 below shows the possible known location radius of local wells in the area. No wells were reported in the Site investigation report from GII in June 2018.

The flow direction in overburden generally follows no fixed pattern or trend. Flows of this nature are typical of cohesive clay strata with intermittent fill areas, where often the water level dipped represents pore water seepages into the monitoring well rather than a true perched water table. Site investigations show a high perched water table at the Site. Water inflow was recorded between 0.33 and 1.2mbgl at a number of borehole locations (BH's 02, 03, 07, 09, 10, 11 & 12). There were no bedrock wells installed as part of the investigations but due to the Site's location (<3km west of the Irish Sea and 550m north of the River Liffey Estuary) it can be assumed bedrock groundwater flow direction it south-southeast.

[83] GSI, 2019: www.gsi.ie/mapping

Figure 12.6: Regional Source Protection Areas[84]

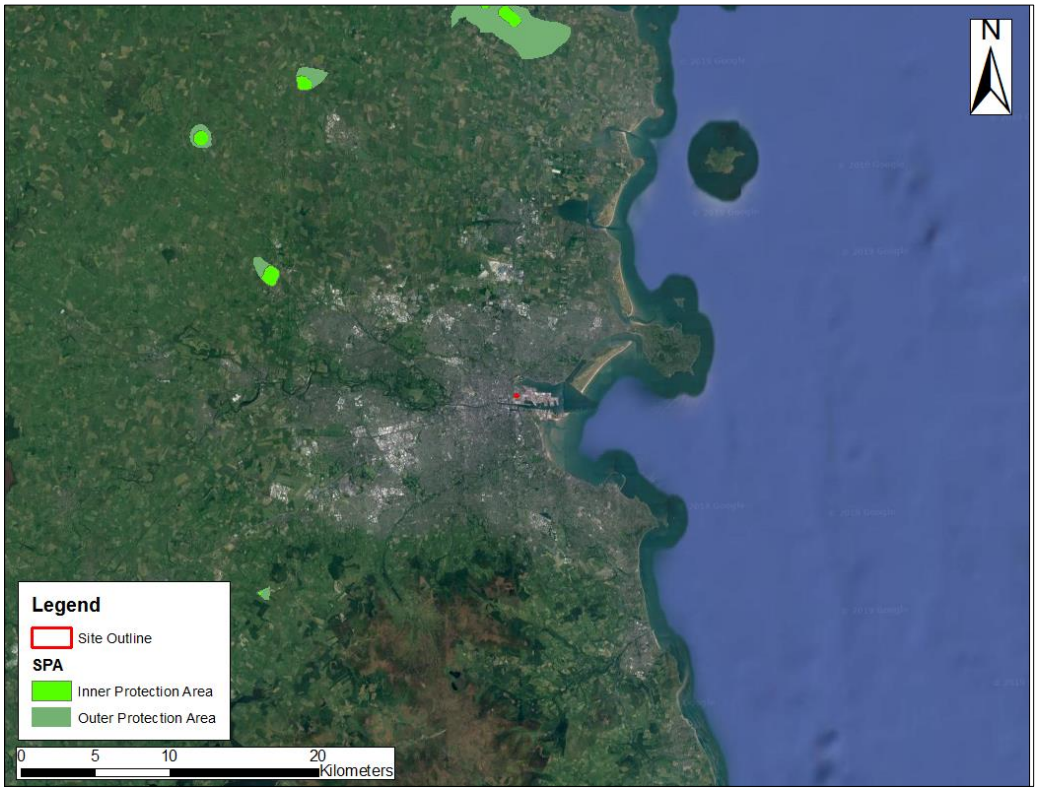


Figure 12.7: Location of Local Wells[85]

[84] GSI, 2019: www.gsi.ie/mapping
[85] GSI, 2019: www.gsi.ie/mapping

12.3.8 Geological Heritage

The GSI Public Viewer was reviewed to identify sites of geological heritage for the Site and surrounding area. There is no evidence of any site which could be considered suitable for protection under this programme or recorded in Dublin City Development Plan 2016-2022.

12.3.9 Economic Geology

The Extractive Industry Register[86] and the GSI mineral database was consulted to determine whether there were any mineral sites close to the proposed Project. There are no active quarries located in the immediate vicinity with the nearest notable quarry located c.10km to the northwest (Huntstown Quarry).

12.3.10 Geo-hazards

There are no expected geohazards at this location. 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 landslides and falls lead 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 nearest landslide to the proposed Project was 4km to the north, the date and exact details were not available on GSI online database. There have been no recorded landslide events at the Site. Due to the 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. However, 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 Site was in the Irish Sea (1.0-2.0Ml magnitude) and ~26km to the south in the Wicklow Mountains. There is a very low risk of seismic activity to the proposed Project.

12.3.11 Soil Quality

As part of the March 2018 investigations 41 composite samples from 21 window sample boreholes (WS-1 - WS-24) and BH-05 were rcovered. The locations are shown on Figure 12.8 below. The samples were subsequently analysed by a UKAS accredited laboratory (Exova Jones) for Total Heavy Metals, Total Organic Carbon (TOC), BTEX (benzene, toluene, ethylbenzene and xylene) aliphatic and aromatic hydrocarbons, Polychlorinated Biphenyls (PCB), Mineral Oil, PAH and asbestos. Leachate generated from the samples was tested for arsenic, barium, cadmium, chromium, copper, mercury, molybdenum, nickel, lead, antimony, selenium and zinc, chloride, fluoride, soluble sulphate, phenols, dissolved organic carbon (DOC), total dissolved solids (TDS).

The laboratory results have been compared to

(i) landfill Waste Acceptance Criteria (WAC) limits for Inert, Non-Hazardous and Hazardous Waste Landfills pursuant to *Article 16 of the EU Landfill Directive 1999/31/EC Annex* II which establishes criteria and procedures for the acceptance of waste at landfills;

and

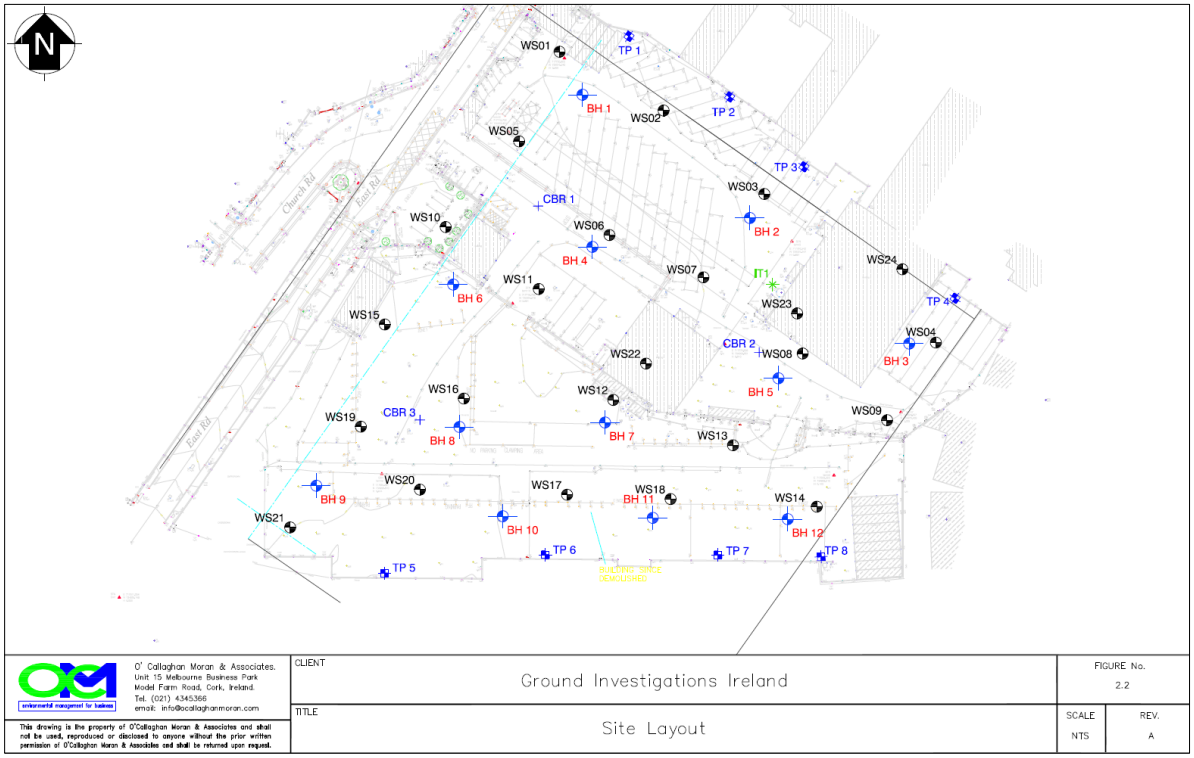
(ii) LQM The WAC criteria is based on suitability for disposal to landfill and soil is assessed as suitable for an inert, non-hazardous or hazardous landfill based on concentration of chemicals of concern.

[86] EPA - www.epa.ie

The inert WAC was exceeded in 20 of the 41 samples. WS-3, 0.5m and 1.5m, WS-4, 0.5m, WS-6, 0.5m and 1.5m, WS-9, 0.5m, WS-13, 0.5m, WS-14, 0.5m, WS-15, 0.5m, WS-16 0.5m, WS-20, 0.5m, WS-21, 0.5m. WS-22, 0.5m, WS-22, 1.5m, WS-23, 0.5m WS-23, 1m, WS-24, 0.5m and BH-5, 1.7+2m, and BH-5, 3m.

The remaining samples meet the inert WAC criteria. The complete Environmental Desk Study and Waste Characterisation Assessment report compiled by O'Callaghan Moran & Associates (OCM) including all lab results, comparison tables and Site investigation locations can be viewed in Appendix A12.3

Figure 12.8: Site Investigation locations



There are no published Generic Assessment Criteria (GACs) for soil contamination in the ROI. However, metal and PAH concentrations were compared to the Land Quality Management Ltd. (LQM) and Chartered Institute of Environmental Health (CIEH) *Suitable for Use levels* for residential thresholds (the most conservative scenario. Comparative threshold tables are presented in Tables 3.1 & 3.2 of Appendix A12.3. The S4UL limits for residential end use were exceeded in 12 of the 41 samples analysed. Exceedances were for inorganic arsenic in five samples, mercury in six samples and PAHs in five samples. The exceeding values are primarily in the upper 0.5m of the Made Ground with two deeper samples (WS-3 (1.5m) and WS-23 (1m). None of the samples exceed S4UL levels for commercial land use[87].

Asbestos was detected in four samples (WS-3, 9, 14 & BH-5). The levels are in the non-hazardous range for asbestos detection in WS-3 and WS-14 but meet the hazardous criteria in WS-9. The material in WS-14, BH-5 (at 1.7m and 2m) and BH-5 (at 3m) contain asbestos materials, see Appendix A12.3.

12.3.12 Groundwater Quality

The European Communities Directive 2000/60/EC established a framework for community action in the field of water policy (commonly known as the Water Framework Directive [WFD]). The WFD required '*Good Water Status*' for all European water by 2015, to be achieved through a system of river basin management planning and extensive monitoring. '*Good status*' means both '*Good Ecological Status*' and '*Good Chemical Status*'.

[87] CIEH, 2015: The LQM / CIEH S4Uls for Human Health Risk Assessment; Land Quality Press, UK

The Groundwater Body (GWB) underlying the Site is the Dublin GWB (EU Code: IE_EA_G_008). Currently, the EPA[88] classifies the Dublin GWB as having '*Good Status'* (2010-2015), with a WFD risk currently '*not at risk*' meaning the Dublin GWB is not at risk of not meeting the WFD objectives. Figures 12.9 and 12.10 below present the most recent data from the EPA website.

Figure 12.9: Dublin GWB WFD Status 2010-2015[89]

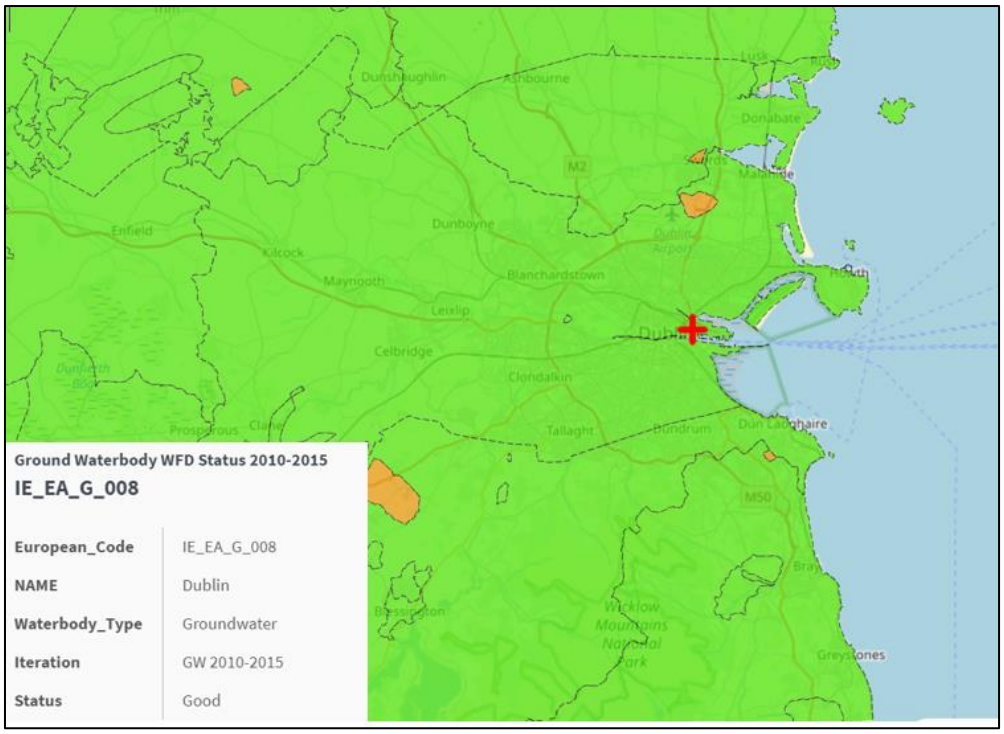
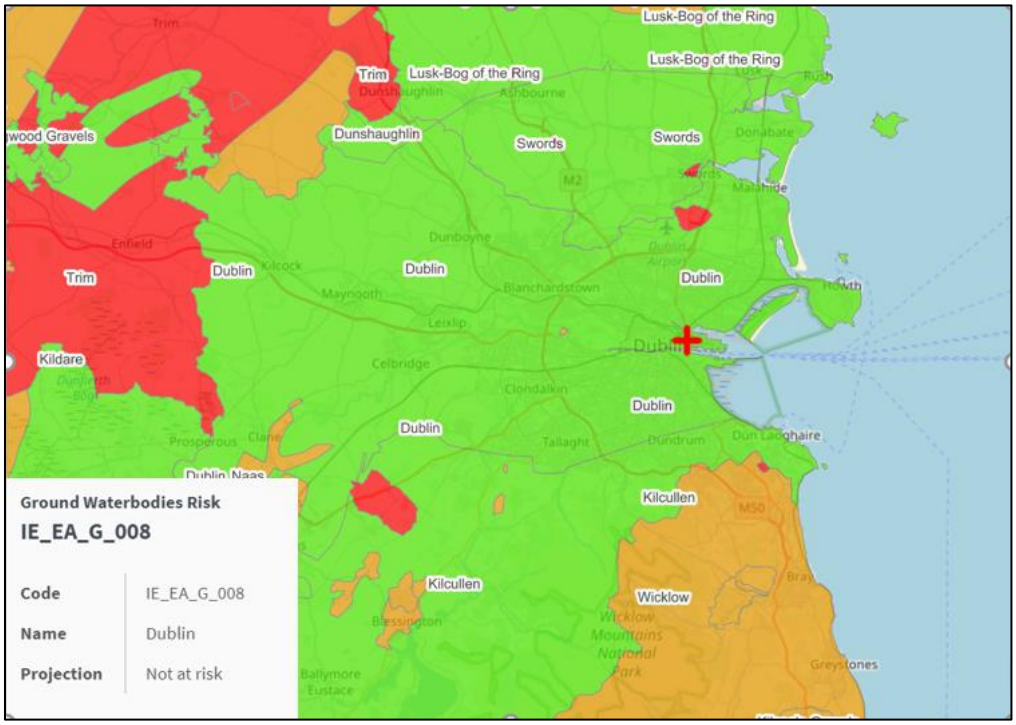


Figure 12.10: Dublin GWB WFD Risk Rating[90]



[88] EPA, 2018: http://gis.epa.ie
[89] EPA, 2019: https://gis.epa.ie/EPAMaps/
[90] EPA, 2019: https://gis.epa.ie/EPAMaps/

No groundwater samples were recovered during the Site investigation work. 5 No. locations were installed as groundwater monitoring locations (RC-1, BH-3, BH-4, BH-7 and BH-9). Boreholes confirmed a shallow water table within the fill / overburden. This perched system is probably due to the Made Ground deposited in the upper strata of the Site and not in hydraulic connection to the deeper larger Dublin GWB. Some contamination of perched water would be expected in previous industrial areas such as Dublin Port and East Wall. Large scale dewatering does not form part of the proposed Project due its design (podium foundation).

12.3.13 Hydrogeological Features

There is no evidence of springs of karstification at the Site according to the GSI Karst database 2015.

12.3.14 Areas of Conservation

The lands in which the proposed Project is located have no formal designations. The nearest designated sites to the proposed Project are the North Dublin Bay SAC (Site Code 000206) at c.3.4km to the northeast and South Dublin Bay SAC (Site Code 000210) at c.2.2km to the southeast of the Site. The South Dublin Bay and River Tolka SPA is c.750m to the north and c.2.2km south of the Site. There are also a number of pNHA in the large Dublin City urban area.

12.3.15 Rating of Site Importance of Geological and Hydrological Features

Based on the NRA methodology[91], see Appendix A12.2, criteria for rating site importance of geological features, the importance of the bedrock and soil features at this Site is rated as *low* importance with *medium quality* significance or value on a local scale. There are no extractable minerals or areas of geological heritage and the soils are not suitable for agricultural use.

Based on the NRA / IGI criteria for rating the importance of hydrogeological features, see Appendix A12.2, the importance of the hydrogeological features at this Site is rated as *Low* to *Medium Importance*. This is based on the assessment that the attribute has a medium quality significance or value on a local scale. The aquifer beneath the Site is a *locally important* (Ll) bedrock aquifer, *Bedrock which is Generally Moderately productive.* It is not used for public water supply or widely used for potable use and is well protected (low vulnerability). In addition, it does not host any groundwater dependent ecosystems (SACs / NHAs).

12.3.16 Conceptual Site Model

Interpretative cross sections have been finalised for the Site with views appropriate to the characterisation of the Site in terms of the geological (and hydrogeological environment). The inserts below present cross sections for the Site and regional area and indicate the following:

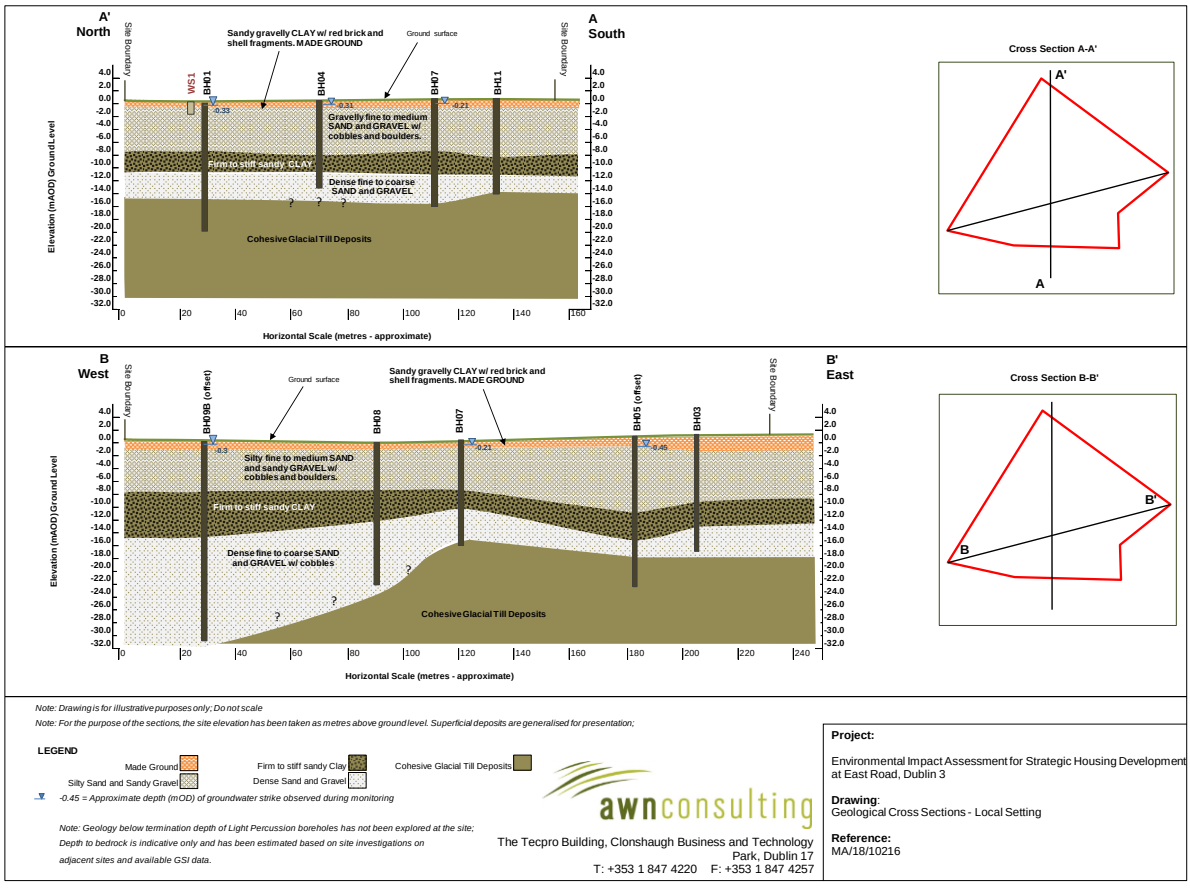
- The profile on Site comprises thin hardstand overlying >1.5m of Made Ground comprising mostly of sandy gravelly CLAY with fragments of redbrick. Beneath this to c.7.5m was fine to coarse SANDS and SILTS with occasional cobbles and occasional CLAY deposits. Underlying this is a CLAY horizon to c.15.6mbgl and the drill logs note this is similar to Dublin Port Clay. An additional layer of GRAVEL & SANDS underly this to c.17.4mbgl with glacial deposits noted at some locations (BH-5A, BH-7 and BH-11). However, stratum depths are not heterogeneous throughout the Site with the deepest borehole (BH-9B) recording sand and gravel deposits to 30.90mbgl.
- Depth to bedrock is believed to be >30m across the Site, with the deepest borehole recorded during investigation drilled to 30.90mbgl (BH-9b). Consultation with the GSI mapping showed a number of geotechnical sites with boreholes installed to 30mbgl without reaching the underlying bedrock. This is to be expected in an area close to the Sea / Estuarine Waters.

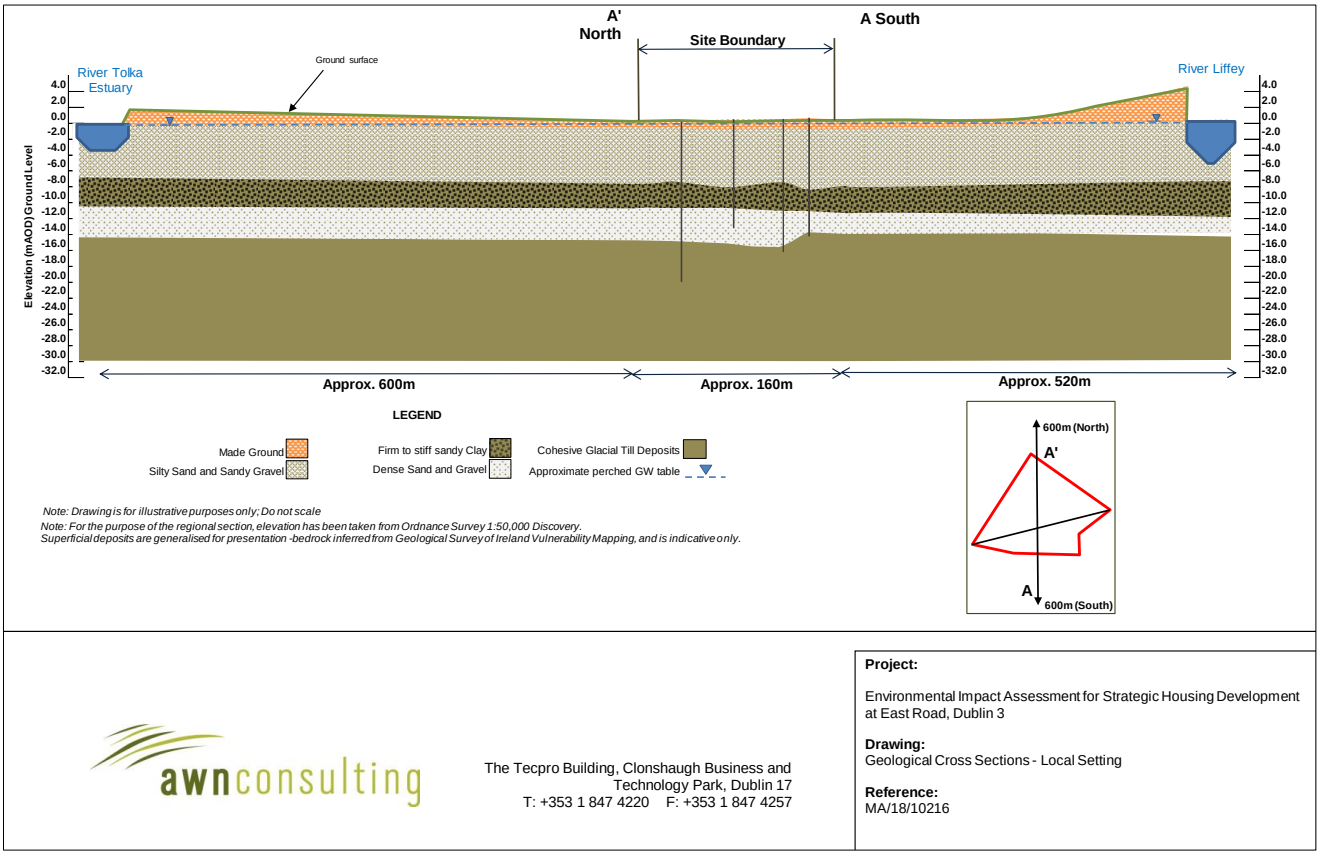
[91] NRA, 2008: https://www.tii.ie/technical-services/environment/planning/Guidelines-on-Procedures-for-Assessment-and-Treatment-of-Geology-Hydrology-and-Hydrogeology-for-National-Road-Schemes.pdf

- The topography of the Site is generally flat with a slight gradient from north to south. The existing topography levels range from 0.88mAOD in the northern extent of the Site to c.0.11mAOD in the southern extents.
- A shallow perched water table was identified within the Made Ground. Localised seepage was encountered within the overburden in a number of soakaway pits during the investigation. Shallow groundwater was also recorded at a number of borehole locations (BH-2, BH-3, BH-7, BH-9b, BH-10, BH-11, & BH-12) at 0.33-1.2mbgl. There were no deeper water strikes recorded during the Site investigation. There is no likely connectivity with the underlying locally important bedrock aquifer.
- The Site was previously used as a timber yard and is currently a container / trailer park. Analysis of chemicals of concern, confirmed contamination in the fill / shallow overburden underlying the Site and has been shown to be contaminated to varying degrees. Comparison with LQMS / CIEH S4Uls showed 12 of the 41 samples analysed exceeded levels for residential land use. All levels were below the corresponding levels for residential for use for commercial development. WAC analysis confirmed that soil (at location where the inert WAC criteria is exceeded) can be disposed of a non-hazardous land fill

Review of the hydrogeology and geology in the surrounding region indicates that there is no groundwater source protection area in the vicinity of the Site. There are a number of SPA and SACs to the north, south and east of the Site. There is *no likely source pathway linkage* to these receptors as no need for significant dewatering during construction and no alteration to the natural groundwater regime during construction or operation.

- The majority of the proposed Project will be constructed over two separate podia. There will be no basement level with undercroft car parking. Current ground levels are to be maintained with excavations being undertaken for the installation of piles, ground beams, attenuation and other associated services. There will be no requirement for dewatering of the underlying aquifer with some dewatering needed of the shallow perched water table encountered during Site investigation





12.4 Potential Impact of the Proposed Project

The proposed Project will consist of the construction of a mixed-use development set out in 9 No. blocks, ranging in height from 3 to 15 storeys to accommodate 554 No. apartments, enterprise space, retail units, foodhub / café / exhibition space, residential amenity, crèche and a Men's shed. The Site will accommodate car parking spaces, bicycle parking, storage, services and plant areas. Landscaping will include a new central public space and residential podium courtyards. The majority of the construction is to be undertaken on over two separate podia. Gross floor area of the development will be 52,796m^2.

A full description of the proposed Project can be viewed in Chapter 4 (Description of the Proposed Project).

Construction Phase activities will include the following:

- Excavation facilitating the installation piles, pile caps, ground beams, attenuation features and interceptors. There will be no largescale excavations as the majority of the development is to construct on two separate podia.
- Temporary storage / use of fuel / oils onsite will be required for construction machinery.
- Removal and disposal of 7,500m^3 of soil. Site investigations have confirmed areas of the Site where shallow fill material exceeds inert WAC criteria.
- Dewatering of shallow perched groundwater recorded at 0.33 and 1.2mbgl during onsite investigations.

Operational Phase activities will include the following;

- There will be no direct discharges to ground during the operation of the proposed Project. Water supply will be supplied from public mains. Foul effluent will be discharged to public foul sewer, see Chapter 13 (Surface Water - Hydrology) for further details.

- It is expected there will be no noticeable increase to the area of hardstand onsite. It is expected that the surface water will be discharge to the public surface water network via attenuation system and oil interceptor(s).

12.5 Potential Impact of the Proposed Project

An analysis of the potential impacts of the proposed Project on the land, soils, geology and hydrogeological environment during the Construction and Operational Phases is outlined below. Due to the interactions between soils, geology and hydrogeology and surface water (hydrology) the following impacts discussed will be considered applicable to both Chapter 12 and 13 of this EIAR.

12.5.1 Construction Phase

12.5.1.1 Excavation & Infilling

Excavation and infilling within the Site will be required as part of the preliminary Site enabling works for pile installation, pile capping and other site services. It is estimated that a maximum of 7,300m^3 of material will excavated. No material will be reused onsite. Site investigation and laboratory analysis have identified residual contamination throughout the Site. All contaminated soil / water / perched water will be required to be removed by a licensed waste contractor see Chapter 19 (Material Assets - Waste) for more information. The proposed Project will also require importation of clean fill.

12.5.1.2 Accidental Release to Ground

During the Construction Phase there is a risk of accidental pollution incidences from the following sources:

- spillage or leakage of temporary oils and fuels stored onsite;
- spillage or leakage of oils and fuels from construction machinery or Site vehicles;
- spillage of oil or fuel from refuelling machinery onsite; and
- runoff from concrete and cement works

Accidental spillages which are not mitigated may result in localised contamination of soils and groundwater underlying the Site, should contaminants migrate through the hardstand and impact the underlying groundwater aquifer. Groundwater vulnerability at the Site is classified as *'low*'. As such there is significant natural protection to the underlying aquifer from any accidental release. The Site is currently hardstand throughout, and it is proposed that the proposed Project will be 70% hardstand also. The thickness of overburden on the Site (>30m) and provision of capping the Site with impermeable paving and building and associated drainage infrastructure will provide additional protection following construction. It is not believed that the perched water is in hydraulic connection with the underlying locally important aquifer.

12.5.1.3 Assessment of Impact Pre-Mitigation - Construction Phase

Based on the points stated above in relation to the Construction Phase the potential impact on the soils, geology and hydrogeology during the Construction Phase[92] is considered to have a *short-term - not significant effect* with a *neutral effect on quality*. *i.e*. an effect which causes noticeable changes in the character of the environment without affecting its sensitivities. This is due to the substantial overburden depth at the Site (>30m) protecting the underlying bedrock aquifer and the lack of largescale excavation and dewatering with the majority of current hardstand onsite remaining in place. The proposed Project does not involve the removal of bedrock.

12.5.2 Operational Phase

There will be no direct discharges to the ground or abstractions from the aquifer during the Operational Phase. The potential impacts of the Operational Phase of the proposed Project in relation to land soils and environment have been assessed under the following headings:

- Accidental Emissions.

[92] EPA Guidelines: https://www.epa.ie/pubs/advice/ea/EPA%20EIAR%20Guidelines.pdf

- Reduction in Local Recharge to Groundwater.

12.5.2.1 Excavation & Infilling

There will be no **direct** discharges of contaminated water to groundwater or soil environments during the Operational Phase. As there will be no bulk storage of chemicals and no large-scale bulk oil storage proposed onsite, the likelihood of a potential significant impact on the soil or groundwater quality *is negligible*. **Indirect** localised discharges could occur from accidental leakages from cars / vehicles in the car parking areas and a life safety generator belly tank with a volume of 1,200L.

12.5.2.2 Reduction in Local Recharge to Groundwater

The Site will be predominately hardstanding (c.70%). As the Site is currently hardstand this will not reduce local recharge to the underlying groundwater aquifer. Additionally, the area proposed for additional is small in relation to the size of the entire Dublin GWB.

12.5.2.3 Assessment of Impact Pre-Mitigation - Operational Phase

Based on the points above in relation to the Operational Phase the potential impact on the land soils, geology and hydrogeology during operation[93] is considered to have a *long-term*, *not significant effect* with a *neutral effect on quality*, *i.e.* an effect which causes noticeable changes in the character of the environment but without significant consequences. There will be no local reduction in recharge to the aquifer due to the increase in hardstand on this and surrounding developed lands. There are no significant potential contaminant sources apart from vehicular traffic which will be mitigated by the introduction of hardstanding and the low vulnerability of the local bedrock aquifer.

12.6 Mitigation Measures

It is important to note that the design of the proposed Project has taken account of the potential impacts on the land, soils and geology environment. Measures have been incorporated into the design to mitigate any potential effects on the surrounding land, soils and geology. These are described in further detail below. Due to the interactions between soils, geology, hydrogeology and hydrology the following mitigation measures will be applicable to each of these characteristics of the environment.

12.6.1 Construction Phase

12.6.1.1 Soil Removal & Compaction

Construction works will require the removal of soils / stones (c.7500m^3). The aquifer vulnerability is classified as *'Low'* throughout the Site based on the Site investigations with c.30m of overburden recorded. As it is not proposed to significantly alter the total hardstand at the Site and due to the thickness of the overburden the underlying hydrogeological environment will have significant protection from surface infiltration during the Construction Phase.

Surface water management in accordance with the design (e.g. runoff directed to a settlement tank and through an oil / petrol interceptor prior to discharge) will ensure there is no risk to the underlying aquifer. Temporary storage of soil will be carefully managed to prevent any potential negative impact on the receiving environment. This material will be stored away from the surface water drainage network. Movement of material will be minimised in order to reduce degradation of soil structure and generation of dust.

All excavated material will be removed offsite. It will be visually assessed for signs of possible contamination such as staining or strong odours. As it has already been determined that the soil material underlying the Site is contaminated, this will be segregated, classified and appropriately disposed of by a suitably permitted / licensed waste disposal contractor.

[93] EPA Guidelines: https://www.epa.ie/pubs/advice/ea/EPA%20EIAR%20Guidelines.pdf

12.6.1.2 Fuel & Chemical Handling

To minimise any impact on the underlying subsurface strata from material spillages it is proposed that all fuels, oils, solvents and paints used during the Construction Phase will be stored within temporary bunded areas or will be contained in double skinned tanks in designated areas of the Site away from surface water drains.

Refuelling of construction vehicles and the addition of hydraulic oils or lubricants to vehicles will take place place in designated bunded areas where possible, that will be away from any existing surface water drains. The area will be determined by the appointed Contractor prior to commencement onsite but is likely to be carried out in a designated area of the Contractor's Construction Compound. In the event of a machine requiring refuelling outside of this area, fuel will be transported in a mobile double skinned tank. Spill kits and hydrocarbon absorbent packs will be stored in the cab of each vehicle and operators will be fully trained in the use of this equipment. 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*'[94] will be complied with.

12.6.2 Operational Phase

12.6.2.1 Indirect Accidental Emissions

There will be no bulk storage of fuel required for the operation of the proposed Project. The Site, c.70%, will be covered in hardstanding. The impermeable surface will minimise the potential influx of any contaminants into soils and underlying groundwater. The only fuel storage onsite will be within the belly tank of the life safety generator (1,200L). This will be internally bunded and double lined.

Any accidental leaks from cars within the car parking / road areas will be directed through the surface drainage system via an appropriately sized oil / petrol interceptor.

Attenuation will be provided by underground tanks to ensure that the discharge rate is maintained at greenfield runoff rate. The attenuation facility will accommodate rainfall events up to, and including, the 1-in-100-year storm event.

The foul water system discharges to the public sewer and subsequently to the Ringsend WWTP to the east of the proposed Project. Due to the close proximity of the WWTP, there is a *very low risk* of contamination to ground from leakage from the foul drainage system.

12.7 Residual Impacts

The proposed Project *will have no significant impact* on the natural groundwater regime either qualitatively or quantitatively. There will be minimal excavations onsite during the Construction Phase. There will *be no impact* to the underlying bedrock from Construction Phase activities.

12.7.1 Construction Phase

Following the implementation of mitigation measures detailed in Section 12.6 above, the predicted impact on the land, soils and geology during Construction Phase[95] is considered to be *short-term, imperceptible* with a *neutral effect on quality*.

12.7.2 Operational Phase

Following implementation of the mitigation measures proposed in Section 12.6 above, the predicted impact on land, soils and geology once the proposed Project is operational[96] is considered to be *long-term, imperceptible* with a *neutral effect on quality*.

[94] CIRIA 532, 2001
[95] in accordance with EPA Draft EIA Guidelines. EPA Guidelines: https://www.epa.ie/pubs/advice/ea/EPA%20EIAR%20Guidelines.pdf
[96] in accordance with EPA Draft EIA Guidelines. EPA Guidelines: https://www.epa.ie/pubs/advice/ea/EPA%20EIAR%20Guidelines.pdf

12.8 Monitoring

12.8.1 Construction Phase

Regular inspection of surface water runoff and any sediment control measures e.g. silt traps will be carried out during the Construction Phase. Regular auditing of construction / mitigation measures will be undertaken e.g. concrete pouring, refuelling in designated areas etc.

12.8.2 Operational Phase

No future soil or groundwater monitoring is proposed as part of the proposed Project. Petrol interceptor(s) will be maintained and cleaned out in accordance with the manufacturer's instructions. Maintenance of the surface water drainage system and foul sewers as per normal urban developments is recommended to minimise any accidental discharges to ground.

12.9 Reinstatement

Any reinstatement from the Construction Phase activities onsite (excavations associated with ancillary / preparation works) will adhere to the design and architectural specifications presented in this application. All fill material to be used will be graded to the project engineers' specifications.

12.10 Interactions

12.10.1 Surface Water - Hydrology

As previously stated, there is an interactions between hydrology and soils, geology and hydrogeology. The underlying aquifer is a locally important source in the surrounding catchment areas. There will be no potential cumulative impacts on the bedrock as the aquifer vulnerability is '*Low*' and the aquifer is locally important with little importance regionally.

Surface water runoff may have the limited potential to enter soil and groundwater. Implementation of appropriate mitigation measures as outlined in Chapter 13 (Surface Water - Hydrology) will eliminate the potential for the influx of surface contaminants into the underlying geology and hydrogeology.

12.10.2 Material Assists - Waste

It has been identified in *O'Callaghan Moran & Associates Report* (Appendix A12.3) that there is a substantial amount of subsurface material which exceeds the WAC inert criteria thresholds. Evidence of non-hazardous and hazardous material have been identified throughout the Site. 7500m^3 of material will be required to be removed from Site to facilitate the installation of piles, attenuation measure, oil interceptors etc. This material will be removed from Site as a waste and appropriate measure for this are covered in Chapter 19 (Material Assets - Waste).

12.11 Difficulties Encountered in Compiling the Chapter

There were no difficulties encountered in compiling this chapter of the EIAR.

12.12 Cumulative Impacts

The primary potential cumulative impact considered the local increase in hardstanding and subsequent decrease in local groundwater recharge. Given the relative scale of the proposed Project and that of the geological and hydrogeological environments in which they are based *i.e.* the bedrock aquifer, the potential cumulative impact with respect to the land, soils and geology of the local and surrounding areas is deemed to be *not significant.*

The Site is situated in a previous industrial area of the Dublin Docklands. Currently there are a number of similar development (residential and mixed-use) under construction in the East Wall area. There is no high value agricultural land in the local area and the majority of the area is hardstand. The proposed Project and similar in the

area would typically have a low impact to soils and groundwater due to the lack of emissions to ground during the Operational Phase.

The potential cumulative impact with respect to the land, soils and geology of the local and surrounding areas is deemed *to be not significant*.

12.13 'Do-Nothing' Impact

'Do-nothing' scenario refers to the environment as it would be in the future should the proposed Project not be carried out. Should the proposed Project not proceed the Site would remain in its current state with the only likely impact on the underlying soil and / or aquifer due the historical industrial nature of the Site and the Dublin Docklands.

The continued use of the Site for industrial / commercial purposes is likely to have a *neutral and imperceptible* effects on the environment. However, a 'do-nothing' scenario is considered to be not be valid, as the lands are currently zoned for redevelopment under the Development Plan.

12.14 References

- CIRIA, (2011). *Environmental good practice on site;* Construction Industry Research and Information Association publication C692 (3rd Edition - an update of C650 (2005); (I. Audus, P. Charles and S. Evans), 2011.
- CIRIA, (2012). *Environmental good practice on site –pocket book;* Construction Industry Research and Information Association publication C715 (P. Charles, and G. Wadams), 2012.
- Chartered Institute of Environmental Health (CIEH) (2015). *The LQM/CIEH S4Uls for Human Health Risk Assessment*; Land Quality Press, UK.
- EPA, (2002). EPA *Guidelines on the information to be contained in Environmental Impact Statements*; (March 2002); Environmental Protection Agency, Co. Wexford, Ireland.
- EPA, (2003). EPA *Advice Notes on Current Practice in the Preparation of Environmental Impact Statements;* Environmental Protection Agency, Co. Wexford, Ireland.
- EPA (2007). *Code of Practice – Environmental Risk Assessment for Unregulated Waste Disposal Sites; Environmental* Protection Agency, Co. Wexford, Ireland.
- EPA, (2017). *'Draft Guidelines on the Information to be contained in Environmental Impact Statements';* Environmental Protection Agency, Co. Wexford, Ireland.
- EPA, (2018). Environmental Protection Agency; Available on-line at: http://gis.epa.ie
- IGI, (2002). *Geology in Environmental Impact Statements, a Guide*; (September 2002); Institute of Geologists of Ireland; Geology Department, University College Dublin.
- IGI, (2013). *Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements.*
- NRA, (2008). *Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes*; June 2009. National Roads Authority, Dublin.

13 Surface Water - Hydrology

13.1 Introduction

AWN Consulting has prepared this Chapter of the EIAR which assesses and evaluates the potential impacts on the surrounding water & hydrological environment.

In assessing *likely potential* and *predicted impacts*, account is taken of both the importance of the attributes and the predicted scale and duration of the likely impacts.

13.2 Methodology

13.2.1 Appraisals Methodology

The appraisal methodology for the EIAR is completed in accordance with '*Draft Guidelines on the Information to be contained in Environmental Impact Statements'*[97] and EPA Draft '*Advice Notes for preparing Environmental Impact Statements*[98]'. In addition, '*Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes*' by the National Roads Authority[99] (NRA) is referenced where the methodology for assessment of impact is appropriate.

The rating of potential environmental impacts on the hydrological environment is based on the quality, significance, duration and type of impact characteristic identified. Consideration is given to both the importance of an attribute and the magnitude of the potential environmental impacts of the proposed activities on that cited attribute. The EIAR guideline tables[100] are presented in Appendix A12.1. The NRA criteria for rating the magnitude and significance of impacts at EIA stage on the geological related attributes are also relevant in determining impact assessment and are presented in Appendix A13.1.

13.2.2 Sources of Information

This assessment was considered in the context of the available baseline information, potential impacts, consultations with statutory bodies and other parties, 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.
- National River Basin Management Plan 2018-2021.
- The Planning System and Flood Risk Management, Guidelines for Planning Authorities (Department of the Environment, Heritage and Local Government (DoEHLG) and the Office of Public Works (OPW).
- Flood points & Historical Floods - Office of Public Works (OPW) floods website www.floodmaps.ie .
- Relevant Eastern Catchment Flood Risk Assessment and Management (CFRAM) Flood Reports.
- Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites (Eastern Regional Fisheries Board (ERFB).
- Dublin City Council (2005) Greater Dublin Strategic Drainage Study (GDSDS): Technical Documents of Regional Drainage Policies. Dublin: Dublin City Council.
- 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).

[97] EPA Guidelines: https://www.epa.ie/pubs/advice/ea/EPA%20EIAR%20Guidelines.pdf
[98] EPA 2015: https://www.epa.ie/pubs/consultation/reviewofdrafteisguidelinesadvicenotes/Draft%20Guidelines%20on%20the%20Information%20to%20be%20contained%20in%20an%20EIS.pdf
[99] NRA 2009: https://www.tii.ie/technical-services/environment/planning/Guidelines-on-Procedures-for-Assessment-and-Treatment-of-Geology-Hydrology-and-Hydrogeology-for-National-Road-Schemes.pdf
[100] EPA Guidelines: https://www.epa.ie/pubs/advice/ea/EPA%20EIAR%20Guidelines.pdf

- Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors" (CIRIA 532, 2001).

Other relevant documentation consulted as part of this assessment included the following:

- DBFL Consulting Engineers. Proposed Mixed-Use Development at 1-4 East Road, East Wall, Dublin 3, Infrastructure Design Report December 2018; and
- DBFL Consulting Engineers. Proposed Mixed-Use Development at 1-4 East Road, East Wall, Dublin 3, Site Specific Flood Risk Assessment. December 2018.

13.3 Baseline Environment

The Site is located in East Wall Dublin 3. The area is largely industrial with residential housing to the west. Railway tracks bound the Site to the south with further residential and commercial development to the north. Figure 13.1 presents the topographic nature and surface water features of the Site and surrounding area.

Figure 13.1: Local Surface Water Environment[101]

13.3.1 Surface Water - Hydrology

The River Liffey Estuary is located c.550m to the south of the Site with the River Tolka Estuary c.750m to the north. The River Liffey and River Tolka drain a large catchment of Dublin City and are located in hydrometric area No. 9[102]. There is no surface watercourse recorded at or bordering the Site and it is not hydraulically linked (other than through man made sewers) to the estuarine waters to the north and south. The Site is serviced by an existing 600mm diameter combined sewer on East Road which runs from north to south towards the existing Irish Water pumping station to the south of the Site

[101] EPA - www.epa.ie
[102] EPA - www.epa.ie

13.3.2 Surface Water Quality

The European Communities Directive 2000/60/EC, establishing a framework for community action in the field of water policy - known as the WFD.

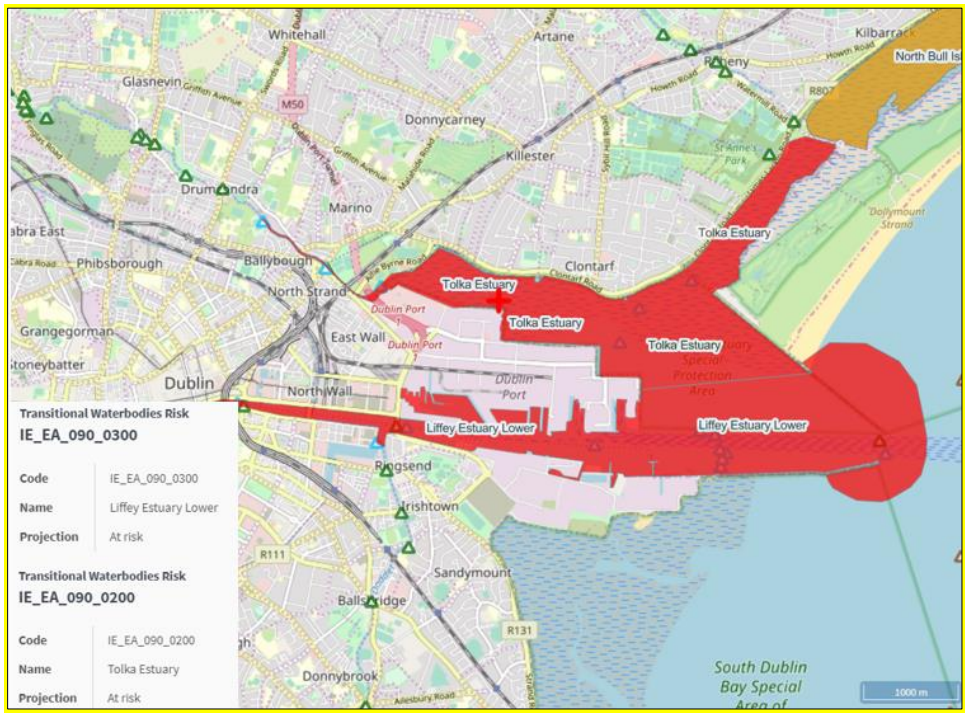
The WFD requires '*Good Water Status'* for all European waters by 2015, to be achieved through a system of river basin management planning and extensive monitoring. '*Good status'* means both '*Good Ecological Status*' and '*Good Chemical Status'*. In the 2nd cycle River Basin Management Plan published in April 2018 which replacing the 1st cycle river management plans (2009-2015), 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 waterbodies at risk of failing to meet the objectives of the WFD and include a programme of measures to address and alleviate these pressures.

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)
- European Communities (Drinking Water) Regulations 2014 (S.I. No. 122 of 2014)
- European Communities Environmental Objectives (Surface Waters) Regulations, 2009 (S.I. No. 272 of 2009)
- European Communities Environmental Objectives (Groundwater) Regulations, 2010 (S.I. No. 9 of 2010).

Figure 13.2 below presents the EPA surface water quality monitoring points in the context of the Site and other regional drainage setting, as well as the waterbodies risk of not achieving good status. The Tolka & Liffey Estuaries (transitional / estuarine water bodies) are identified as being '*At Risk'* of not meeting their WFD objectives (current assessment). These waters were categorised as having a '*Moderate*' status during the previous WFD assessment phase (2009-2015).

Figure 13.2: Transitional Waterbodies Risk[103]



[103] EPA - www.epa.ie

13.3.3 Flood Risk Assessment (FRA)

A Flood Risk Assessment (FRA) has been prepared by DBFL Consulting Engineers in accordance with the *DEHLG / OPW Guidelines on the Planning Process and Flood Risk Management*[104]. The SSFRA is provided as part of the planning application and supporting information is included in the DBFL Infrastructure Design Report. The assessment identifies the existing flood and sets out mitigation measures to ensure there is no likely flooding of the proposed Project or surrounding lands as a result if the proposed Project. It is deemed appropriate for the Site to be located within Flood Zone A.

The OPW Flood Mapping (CFRAM[105] Mapping) shows that the Site is within a modelled flood extent for the 0.5% AEP (Annual Exceedance Probability) *i.e.* 1 in 200-year tidal flood event as per the Irish Costal Protection Study. The Site is however in an area that benefits from flood defence measures. Following the OPW Flood Risk Management Guidelines the SSFRA was advanced to a Stage 3. The conclusion of the SSFRA show that the finished floor levels (FFL) are located above the 0.1% AEP flood level, in addition to a climate change allowance and a conservative freeboard, giving a minimum FFL for this type of development of 4.08m.

A possible source of flood risk from the surcharging or blockage of the proposed Project's drainage system has been identified. This risk is mitigated by suitable design of the drainage network (see the DBFL Infrastructure Design Report), mitigation includes regular maintenance and inspection of the network and establishment of exceedance overland flow routes. The development's drainage design includes for a 10% climate change allowance. The proposed Project will include attenuation, an oil / petrol interceptor to manage stormwater runoff and satisfies the requirement of the Strategic Flood Risk Assessment (SFRA) to reduce flooding and improve water quality.

13.3.4 Areas of Conservation

The nearest designated sites to the proposed Project are the North Dublin Bay SAC (Site Code 000206) at c.3.4km to the northeast and South Dublin Bay SAC (Site Code 000210) at c.2.2km to the southeast of the Site. The South Dublin Bay and River Tolka SPA is c.750m to the north and c.2.2km south of the Site. There are also a number of pNHA in the large Dublin City urban area. The Site is not hydraulically connected by a natural drainage to any of areas of conservation highlighted above.

13.3.5 Rating of Site Importance of the Hydrological Feature

There are no hydrological features at the Site or any in direct hydrological linkage. Based on the NRA methodology (see Appendix A13.1), for the criteria for rating the importance of hydrological features, the features at this Site are rated as *Low Importance*.

13.4 Characteristics of the Proposed Project

The proposed Project will consist of the construction of a mixed-use development set out in 9 No. blocks, ranging in height from 3 to 15 storeys to accommodate 554 No. apartments, enterprise space, retail units, foodhub / café / exhibition space, residential amenity, crèche and a Men's shed. The Site will accommodate car parking spaces, bicycle parking, storage, services and plant areas. Landscaping will include a new central public space and residential podium courtyards. The majority of the construction is to be undertaken on over two separate podia. GFA of the development will be 52,796m^2.

A full description of the proposed Project can be viewed in Chapter 4 (Description of the Proposed Project).

Construction Phase activities with a possible impact to surface water features through indirect impact by run-off to stormwater drainage will include the following:

- Excavation of soil for site preparatory works, infilling and landscaping.

[104] OPW, 2009: https://www.opw.ie/media/Planning%20System%20and%20Flood%20Risk%20Management%20Guidelines.pdf
[105] CFRAM: Coastal Flood Risk Assessment and Management

- Temporary storage / use of fuel / oils onsite required for construction machinery.

Operational Phase activities with a possible impact to surface water features through indirect impact by run-off to stormwater drainage will include the following:

- The total hardstanding of the Site will remain as current. However, the proposed Project includes improved drainage management to attenuate stormwater run-off and water quality improvements will also be managed by discharging through an oil / petrol interceptor. The attenuation system onsite has a capacity of 926.63m^3 and a hydrobrake system will be employed to manage the outflow.

13.5 Potential Impact of the Proposed Project

An analysis of the potential impacts of the proposed Project on the hydrological environment during the Construction and Operational Phases is outlined below. Due to the interactions between surface water (hydrology) and soils, geology and hydrogeology the following impacts discussed will be considered applicable to both Chapters 12 and 13 of this EIAR.

13.5.1 Construction Phase

13.5.1.1 Increased Runoff & Sediment Loading

Surface water runoff during the Construction Phase may contain increased silt levels or become polluted from construction activities. As there is no open stream or river on or near the Site, there is *no potential for a direct water quality impact*. There is a potential for blocking of stormwater drainage if runoff is not managed adequately.

13.5.1.2 Contamination of Surface Water Drainage

During the Construction Phase, there is a risk of accidental pollution incidences from the following sources:

- spillage or leakage of oils and fuels stored on site or refuelling onsite;
- spillage or leakage of oils and fuels from construction machinery or Site vehicles; and
- the use of wet concrete and cement.

Machinery onsite during the Construction Phase may result in contamination of the surface water. The potential impacts could derive from accidental spillage of fuels, oils, paints and solvents, which could impact surface water and groundwater quality if allowed to infiltrate to runoff to surface water systems and / or receiving watercourses. There is currently surface water drains onsite which will be maintained and upgraded during the construction works.

Concrete operations carried out near surface water drains during the Construction Phase activities could lead to a discharge of wastewaters 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. This scenario is unlikely as the Site is not in direct hydraulic connection to any surface water features or protected areas.

13.5.1.3 Assessment of Impact Pre-Mitigation - Construction Phase

Based on the points stated above in relation to the Construction Phase the potential impact on the hydrological environment during the Construction Phase[106] is considered to have a *short term - imperceptible effect* with a *neutral effect on quality*, *i.e.* an effect which alters the character of the environment without affecting is sensitivities. There is no hydraulic connection between the Site and nearby surface waterbodies. The Site is serviced by an existing surface water sewer which connects to the existing 600mm diameter combined sewer on Church Road discharging to the existing Irish Water pumping station on East Road. Hence any surface water / storm water runoff does not discharge directly to receiving water without prior treatment.

[106] EPA Guidelines: https://www.epa.ie/pubs/advice/ea/EPA%20EIAR%20Guidelines.pdf

13.5.2 Operational Phase

Following construction of the proposed Project the potential impacts in relation to water have been assessed under the following headings:

- increased surface water runoff;
- contamination of surface water;
- foul water; and
- water supply.

13.5.2.1 Surface Water Runoff

Without proper control measures, surface water can ingress into the surrounding environment. DCC requires all new developments to adhere to the practice of Sustainable Urban Drainage Systems (SuDS) for the control of surface water onsite.

13.5.2.2 Contamination of Surface Water

Within the curtilage of the Site there is a potential for minor leaks and spillages due to the vehicle movements, and parked cars. The only fuel storage onsite will be a 1,200L capacity belly contained within the life safety generator. As there is no open water on or adjacent to the Site the source pathway linkage in the event of such a leak / spill is very low.

13.5.2.3 Foul Water / Wastewater Services

The proposed Project will lead to an increase in foul water discharge. The Site is currently serviced by an existing 600mm diameter combined sewer on East Road which runs from north to south towards the existing Irish Water pumping station to the south of the Site. The design foul flow has been calculated by project engineers DBFL as 19.22l/s. All foul effluent will be treated at Ringsend WWTP which operates under EPA licence D0034-01.

13.5.2.4 Water Supply

As part of the proposed Project the existing water main onsite will be removed and a new connection to the existing 6" diameter watermain in East Road will be made[107]. This will feed a cold-water storage tank located at undercroft level. Overall peak water demand will be 16.45l/s for residential use and 4.85l/s for commercial use. This requirement has been judged feasible by Irish Water.

13.5.2.5 Assessment of Impact Pre-Mitigation - Operational Phase

Based on the points above in relation to the Operational Phase the potential impact on hydrology and water infrastructure during operation[108] is considered to have *a long-term imperceptible effect* with an *imperceptible effect* on quality *i.e.* an effect which alters the character of the environment without affecting is sensitivities. This is due to the overall minor increase in surface water runoff as the Site is currently mostly hardstand with establishes foul and surface water services onsite.

13.6 Mitigation Measures

The design of the proposed Project has taken account of the potential impacts of the proposed Project and the risks to the water environment local to the area where construction is taking place. Measures have been developed to mitigate the potential effects on the local water environment. These measures seek to avoid or minimise potential effects in the main through the implementation of best practice construction methods and adherence to all relevant legislation.

[107] refer to DBFL Drawings 170200- 3000
[108] EPA Guidelines: https://www.epa.ie/pubs/advice/ea/EPA%20EIAR%20Guidelines.pdf

A final CMP is to be established and maintained by the contractors during the Construction Phase of the proposed Project. The final CMP will cover all potentially polluting activities and include an emergency response procedure. All site personnel will be trained in the implementation of the procedures. As a minimum, the final CMP will be formulated in accordance with best international practice including but not limited to:

- Construction Industry Research and Information Association (CIRIA), Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors, 2001.
- CIRIA, Environmental Good Practice on Site (C650), 2005.
- BPGCS005, Oil Storage Guidelines.
- CIRIA 697, the SUDS Manual, 2007.
- UK Pollution Prevention Guidelines (PPG) UK Environment Agency, 2004.

The Project Engineers (DBFL) have outlined construction design measures for the Site in their Infrastructure Design Report. The following mitigation measures include, but are not limited to, those provided in that report and are designed to address the impacts associated with the Construction and Operational Phase of the proposed Project. Due to the interactions between this section and Chapter 12 (Land, Soils, Geology and Hydrogeology) the following mitigation measures discussed will be considered applicable to both.

13.6.1 Construction Phase

During the Construction Phase, mitigation measures have been applied for potential impacts. The mitigation measures will ensure that no sediment contamination, contaminated runoff or untreated wastewater will enter any onsite surface water drains during the construction of the proposed Project.

13.6.1.1 Increased Runoff and Sediment Loading

During the Construction Phase any outflows carrying a high sediment load will be diverted through settlement ponds / tanks. The settlement ponds / tanks will be located between the area of construction and the surface water drain. Surface water runoff will not be discharged directly to local watercourses. The following mitigation measures will be adopted:

- the drainage system and settlement ponds / tanks will be constructed as a first step;
- silt reduction measures including sit traps and settlement tanks will be employed during the Construction Phase;
- any excavations required will remain open for as little time as possible before the placement of fill. This will help to minimise potential for groundwater ingress into excavations;
- weather conditions will be considered when planning construction activities to minimise risk of runoff from the Site;
- distance between topsoil piles etc. and surface water drains will be maintained - to protect from dampening operations; and
- the generation of runoff from stockpiles of soils, excavated during the Construction Phase, will be prevented from entering surface water drains by diverting runoff to the settlement ponds / tanks onsite, and removing the material offsite as soon as possible to designated storage areas / licenced disposal facility.

13.6.1.2 Contamination of Surface Water Drainage

To minimise any impact on minor drainage channels onsite from material spillages, all oils, solvents, paints and fuels used during the Construction Phase will be stored within temporary bunded areas and each of these areas will be bunded to a volume of 110% of the capacity of the largest tank / container within it (plus an allowance of 30mm for rainwater ingress). Drainage from the bunded area(s) will be diverted for collection and safe disposal. There is no notable surface watercourse onsite. The drainage ditch to the south is to be culverted as part of the initial construction works.

Wet concrete operations adjacent to watercourses will be avoided where possible. 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 groundwater.

The appointed Contractor will be required to make provision for removal of any concrete wash waters, most likely by means of tankering offsite and no such wash waters will be discharged to groundwater. Any effluent generated by temporary onsite sanitary facilities will be taken offsite for appropriate treatment.

Refuelling of construction equipment and the addition of hydraulic oil or lubricants to vehicles will take place in designated bunded areas where possible. The area will be determined by the appointed Contractor prior to commencement onsite but is likely to be carried out in a designated area of the Contractor's Compound. Refuelling will be avoided in so far as possible at the other work sites but where necessary will take place on hard stand areas and fuel stored in bunded areas. If it is not possible to bring a machine to the refuelling point, fuel will be delivered in a double skinned mobile fuel bowser. A drip tray will be used beneath the fill point during refuelling operations in order to contain any spillages that may occur. The vehicles and equipment will not be left unattended during refuelling. Spill kits and hydrocarbon absorbent packs will be stored in the cab of each vehicle and operators 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*'[109] will be complied with.

13.6.2 Operational Phase

13.6.2.1 Surface Water Runoff

The proposed drainage system for the Site as outlined in DBFL's Infrastructure Design Report and has been designed in accordance with Greater Dublin Strategic Design System (GDSDS) specifications. The drainage system will employ a number of attenuation methods. The surface water strategy includes two attenuation tanks to provide the required volume to ensure the proposed Project does not flood in the 1-in-100-year storm event (accounting for a 20% increase with climate change).

The main attenuation storage will be located in the square of the proposed Project (East Square) with another attenuation system located under the pedestrianised street that runs through the spine of the Site. As such the design includes improved measures for management of stormwater runoff in relation to flood impact.

13.6.2.2 Contamination of Surface Water

The proposed Project provides treatment of collected runoff by providing a SuDS treatment train approach resulting in a low risk of pollutants entering offsite drainage.

Due to a variety of measures such as the design of the attenuation system with an oil / petrol interceptor and the design of the wider drainage system (see DBFL Infrastructure Report) in line with SuDS the likelihood of any spills entering the water environment is *negligible*. The only fuel storage onsite will be within the belly tank of the life safety generator (1,200L). This will be internally bunded and double lined. Servicing and inspection of the generator and tank containment will be the responsibility of the presiding management company.

Any accidental leaks from cars within the car parking / road areas will be directed through the surface drainage system via an appropriately sized oil / petrol interceptor.

13.6.2.3 Foul Water / Wastewater Services

The proposed foul drainage has been designed to drain via one outfall to the Irish Water combined sewer in East Road. An Irish Water pre-connection enquiry was sought for the development and the feasibility of this has been confirmed by Irish Water. Full details of the foul sewer design can be found in DBFL's Infrastructure Design Report submitted as a separate document to this application (Report No. 170200-Rep-002).

[109] CIRIA 532, 2001

13.6.2.4 Water Supply

The water main layout and details including valves, hydrants, metering etc. will be in accordance with Irish Water's Code of Practice and Standard Details for water infrastructure.

13.7 Residual Impacts

The proposed Project *will have no significant impact* on the natural surface water regime either qualitatively or quantitatively.

13.7.1 Construction Phase

Following the implementation of mitigation measures detailed in Section 13.6, the predicted impact on the surface water environment during the Construction Phase[110] is considered to be *likely, neutral, imperceptible and short-term*. This is due to the culverting of the control measures highlighted in Section 13.6.1 above.

13.7.2 Operational Phase

Following implementation of the mitigation measures proposed in Section 13.6, the predicted impact on the surface water environment once the proposed Project is operational[111] is considered to be *likely, neutral, imperceptible and long-term*. This is due to the mitigation measures highlighted in Section 13.6.2 above There will be no impact to the quality of local watercourse and the nearby SAC due to lack of hydraulic conductivity, distance to the SAC's and control measures highlighted above. Overall the attenuation proposed for the proposed Project and installation of an oil / petrol interceptor will improve flood management and water quality.

13.8 Monitoring

13.8.1 Construction Phase

Regular inspection of surface water runoff and any sediment control measures e.g. silt traps will be carried out during the Construction Phase. Regular auditing of construction / mitigation measures will be undertaken e.g. concrete pouring, refuelling in designated areas etc.

13.8.2 Operational Phase

No future surface water monitoring is proposed as part of the proposed Project due to the low hazard potential at the Site. Oil / petrol interceptor(s) will be maintained and cleaned out in accordance with the manufacturer's instructions. Maintenance of the surface water drainage system and foul sewers as per normal urban developments is recommended to minimise any accidental discharges to ground.

13.9 Reinstatement

Reinstatement of excavations during the Construction Phase of the proposed Project will meet the design criteria presented in the design specification of this application. All fill material used will be clean and graded to engineers' specifications.

13.10 Interactions

13.10.1 Land Soils Geology & Hydrogeology

As previously stated, there is an interaction between surface water (hydrology) and land, soils, geology and hydrogeology. There will be no potential cumulative impacts on the bedrock as the aquifer vulnerability is *'Low'* (no bedrock was encountered to >30m) and the aquifer is locally important with little importance regionally.

[110] in accordance with EPA Draft EIA Guidelines. EPA Guidelines: https://www.epa.ie/pubs/advice/ea/EPA%20EIAR%20Guidelines.pdf
[111] in accordance with EPA Draft EIA Guidelines. EPA Guidelines: https://www.epa.ie/pubs/advice/ea/EPA%20EIAR%20Guidelines.pdf

Surface water run-off may have the potential to enter soil and groundwater. Implementation of appropriate mitigation measures as outlined in Chapter 12 (Land, Soils, Geology & Hydrogeology) will eliminate the potential for the influx of surface contaminants into the underlying geology and hydrogeology.

13.11 Difficulties Encountered in Compiling the Chapter

There were no difficulties encountered in the compilation of this Chapter of the EIAR.

13.12 Cumulative Impacts

The primary potential cumulative impact considered is the change of / interruption to the current surface water drainage in the local area. Given the relative scale of the proposed Project and that of the hydrological environment in which it is based *i.e*. no notable surface water feature onsite or in the surrounding urban catchment the potential cumulative impact with respect to the hydrology of the local and surrounding areas is deemed to be *Imperceptible.*

The Site is currently in commercial use and is hardstand throughout, as are the majority of the lands surrounding the Site. These lands have been zoned by DCC *to seek the social, economic and physical development and / or rejuvenation of an area with mixed use, of which residential and "Z6" would be the predominant uses*. Further mixed-use development in the area would require all designs to adhere to SuDS and as such would most likely increase recharge to ground in areas where all surface water overflow is currently diverted to surface / water storm water sewers decreasing total volume and impact to receiving surface waters.

13.13 'Do-Nothing' Impact

'Do-nothing' scenario refers to the environment as it would be in the future should the subject proposed Project not be carried out. Should the proposed Project not proceed the Site would remain in its current state. The continued use of the Site for commercial is likely to have a *neutral* and *imperceptible* effects on the environment.

13.14 References

- EPA, (2017). *Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports* (August 2017); Environmental Protection Agency, Co. Wexford, Ireland
- EPA, (2015). Draft *EPA Advice Notes for Preparation of Environmental Impact Statements*; Environmental Protection Agency, Co. Wexford, Ireland.
- NRA, (2009). *Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes*; June 2009. National Roads Authority, Dublin.

14 Air Quality & Climate

14.1 Introduction

This Chapter considers and assesses the likely air quality and climate impacts, if any, associated with the proposed Project. The Site has an area of c.2.11ha, located immediately to the north of the East Wall railway in the North Docks area of the City. The lands are accessed from East Road on the western boundary of the Site. The Site is immediately bound by Merchant's Square to the east, railway sidings to the south and Island Key apartments to the north. Residential, industrial, commercial, amenity and retail land uses are all present in close proximity.

14.2 Methodology

14.2.1 Standards and Guidelines

14.2.1.1 Ambient Air Quality Standards

In order to reduce the risk to health from poor air quality, national and European statutory bodies 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 (see Table 14.1 below and Appendix A14.1).

Air quality significance criteria are assessed on the basis of compliance with the appropriate standards or limit values. The applicable standards in Ireland include the Air Quality Standards (AQS) Regulations 2011 (S.I. No.180 of 2011), which incorporate EU Directive (CAFE) 2008/50/EC, which has set limit values for NO_2, PM_{10}, $PM_{2.5}$, benzene and CO (see Table 14.1 below). Although the EU Air Quality Limit Values are the basis of legislation, other thresholds outlined by the EU Directives are used which are triggers for particular actions (see Appendix A14.1).

14.2.1.2 Dust Deposition Guidelines

The concern from a health perspective is focussed on particles of dust which are less than 10 microns (PM_{10}) and less than 2.5 microns ($PM_{2.5}$) and the EU ambient air quality standards outlined in Table 14.1 have set ambient air quality limit values for PM_{10} and $PM_{2.5}$.

With regards to 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. Furthermore, no specific criteria have been stipulated for nuisance dust in respect of the proposed Project.

With regard to dust deposition, the German TA-Luft standard for dust deposition (non-hazardous dust)[112] sets a maximum permissible emission level for dust deposition of 350 mg/(m^2*day) averaged over a one year period at any receptors outside the site boundary. Recommendations from the Department of the Environment, Health & Local Government[113] apply the Bergerhoff limit of 350 mg/(m^2*day) to the site boundary of quarries. This limit value can also be implemented with regard to dust impacts from construction of the proposed Project.

112 German VDI (2002) Technical Guidelines on Air Quality Control – TA Luft
113 DOEHLG (2004) Quarries and Ancillary Activities, Guidelines for Planning Authorities

Table 14.1: Air Quality Standards Regulations

Pollutant	Regulation[114]	Limit Criteria	Limit Value
Nitrogen Dioxide (NO_2)	2008/50/EC	Hourly limit for protection of human health - not to be exceeded more than 18 times / year	200µg/m^3
		Annual limit for protection of human health	40µg/m^3
		Critical level for protection of vegetation	30µg/m^3 NO + NO_2
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	50µg/m^3
		Annual limit for protection of human health	40µg/m^3
Particulate Matter (as $PM_{2.5}$)	2008/50/EC	Annual limit for protection of human health	25µg/m^3
Benzene	2008/50/EC	Annual limit for protection of human health	5µg/m^3
Carbon Monoxide (CO)	2008/50/EC	8-hour limit (on a rolling basis) for protection of human health	10mg/m^3 (8.6ppm)

14.2.1.3 Climate Agreements

Ireland ratified the United Nations Framework Convention on Climate Change (UNFCCC) in April 1994[115] and the Kyoto Protocol[116] in principle in 1997 and formally in May 2002. For the purposes of the EU burden sharing agreement under Article 4 of the Kyoto Protocol, in June 1998, Ireland agreed to limit the net growth of the six GHGs under the Kyoto Protocol to 13% above the 1990 level over the period 2008 to 2012[117,118]. The UNFCCC is continuing detailed negotiations in relation to greenhouse gases (GHGs) reductions and in relation to technical issues such as Emission Trading and burden sharing.

The most recent Conference of the Parties to the Convention (COP24) took place in Katowice, Poland from the 4th - 14th December 2018 and focussed on advancing the implementation of the Paris Agreement. The Paris Agreement was established at COP21 in Paris in 2015 and is an important milestone in terms of international climate change agreements. The "Paris Agreement", agreed by over 200 nations, has a stated 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 global GHG emissions to 40 gigatonnes as soon as possible whilst acknowledging that peaking of GHG emissions will take longer for developing countries. Contributions to greenhouse gas 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 on elevating adaption onto the same level as action to cut and curb emissions.

On the 23rd/24th October 2014, the EU agreed the '*2030 Climate and Energy Policy Framework*'[119]. The EC endorsed a binding EU target of at least a 40% domestic reduction GHG emissions by 2030 compared to 1990. The target will be delivered collectively by the EU in the most cost-effective manner possible, with the reductions in the Emissions Trading System (ETS) and non-ETS sectors amounting to 43% and 30% by 2030 compared to 2005, respectively. Secondly, it was agreed that all EU Member States will participate in this effort, balancing considerations of fairness and solidarity. The policy also outlines, under '*Renewables and Energy Efficiency*', an EU binding target of at least 27% for the share of renewable energy consumed in the EU in 2030.

114 EU 2008/50/EC – Clean Air For Europe (CAFE) Directive replaces the previous Air Framework Directive (1996/30/EC) and daughter directives 1999/30/EC and 2000/69/EC
115 European Economic Area (2011) NEC Directive Status Reports 2010
116 Framework Convention on Climate Change (1997) Kyoto Protocol To The United Nations Framework Convention On Climate Change
117 Framework Convention on Climate Change (1999) Ireland - Report on the in-depth review of the second national communication of Ireland
118 Environmental Resources Management (1998) Limitation and Reduction of CO2 and Other Greenhouse Gas Emissions in Ireland
119 EU (2014) EU 2030 Climate and Energy Framework

14.2.1.4 Gothenburg Protocol

In 1999, Ireland signed the Gothenburg Protocol to the 1979 UN Convention on Long Range Transboundary Air Pollution. The initial objective of the Protocol was to control and reduce emissions of Sulphur Dioxide (SO_2), Nitrogen Oxides (NO_X), Volatile Organic Compounds (VOCs) and Ammonia (NH_3). To achieve the initial targets Ireland was obliged, by 2010, to meet national emission ceilings of 42kt for SO_2 (67% below 2001 levels), 65kt for NO_X (52% reduction), 55kt for VOCs (37% reduction) and 116kt for NH_3 (6% reduction).

In 2012, the Gothenburg Protocol was revised to include national emission reduction commitments for the main air pollutants to be achieved in 2020 and beyond and to include emission reduction commitments for $PM_{2.5}$. In relation to Ireland, 2020 emission targets are 25kt for SO_2 (65% on 2005 levels), 65kt for NO_X (49% reduction on 2005 levels), 43kt for VOCs (25% reduction on 2005 levels), 108kt for NH_3 (1% reduction on 2005 levels) and 10kt for $PM_{2.5}$ (18% reduction on 2005 levels).

EC Directive 2001/81/EC, the National Emissions Ceiling Directive (NECD)[120], prescribes the same emission limits as the 1999 Gothenburg Protocol. A National Programme for the progressive reduction of emissions of these four transboundary pollutants has been in place since April 2005[121]. Data available from the EU in 2010 indicated that Ireland complied with the emissions ceilings for SO_2, VOCs and NH_3 but failed to comply with the ceiling for NO_X[122]. Directive (EU) 2016/2284 "*On the Reduction of National Emissions of Certain Atmospheric Pollutants and Amending Directive 2003/35/EC and Repealing Directive 2001/81/EC*" was published in December 2016. The Directive will apply the 2010 National Emissions Ceiling Directive (NECD) limits until 2020 and establish new national emission reduction commitments which will be applicable from 2020 and 2030 for SO_2, NO_X, NMVOC, NH_3, $PM_{2.5}$ and CH_4. Table 14.2 below outlines the emission targets for Ireland between 2020 and 2029 and for 2030.

Table 14.2: Irish Emission Targets

Element	2020-29 emission targets	2030 emission targets
SO_2	65% below 2005 levels	85% below 2005 levels
NO_X	49% reduction	69% reduction
VOCs	25% reduction	32% reduction
NH_3	1% reduction	5% reduction
$PM_{2.5}$	18% reduction	41% reduction

14.2.2 Local Air Quality Assessment

The local air quality assessment has been carried out following procedures described in the publications by the EPA and using the methodology outlined in the guidance documents published by the UK DEFRA. The assessment of air quality was carried out using a phased approach as recommended by the UK DEFRA[123].

The phased approach recommends that the complexity of an air quality assessment be consistent with the risk of failing to achieve the air quality standards. In the current assessment, an initial scoping of possible key pollutants was carried out and the likely location of air pollution '*hot-spots*' identified. An examination of recent EPA and Local Authority data in Ireland[124,125] has indicated that SO_2, smoke and CO are unlikely to be exceeded at locations such as the current one and thus these pollutants do not require detailed monitoring or assessment to be carried out. However, the analysis did indicate potential issues in regards to nitrogen dioxide (NO_2), PM_{10} and $PM_{2.5}$ at busy junctions in urban centres[13,14].

120 DEHLG (2003) Strategy to Reduce Emissions of Trans-boundary Pollution by 2010 to Comply with National Emission Ceilings - Discussion Document
121 DEHLG (2004) Progressive Reduction of National Emissions of Transboundary Pollutants by 2010 **and** DEHLG (2007a) Update and Revision for the Progressive Reduction of National Emissions of Transboundary Pollutants by 2010
122 EEA (2012) NEC Directive Status Reports 2011
123 UK Highways Agency (2007) Design Manual for Roads and Bridges, Volume 11, Section 3, Part 1 - HA207/07 (Document & Calculation Spreadsheet)
124 EPA (2017) Air Quality Monitoring Report 2016 (& previous annual reports 1997-2015)
125 EPA Website: http://www.epa.ie/whatwedo/monitoring/air/

Benzene, although previously reported at quite high levels in urban centres, has recently been measured at several city centre locations to be well below the EU limit value[13,14]. Historically, CO levels in urban areas were a cause for concern. However, CO concentrations have decreased significantly over the past number of years and are now measured to be well below the limits even in urban centres[14]. The key pollutants reviewed in the assessments are NO_2, PM_{10}, $PM_{2.5}$, benzene and CO, with particular focus on NO_2 and PM_{10}.

Key pollutant concentrations will be predicted for nearby sensitive receptors for the following scenarios:

- The existing Baseline scenario, for model verification;
- Post Development Year Do-Nothing scenario (DN), which assumes the retention of present site usage with no development in place; and
- Post Development Year Do-Something scenario (DS), which assumes the proposed Project in place.

The assessment methodology involved air dispersion modelling using the UK DMRB Screening Model[126], the NO_x to NO_2 Conversion Spreadsheet[127] and following guidance issued by the TII, UK Highways Agency, UK DEFRA and the EPA.

TII guidance states that the assessment must progress to detailed modelling if:

- Concentrations exceed 90% of the air quality limit values when assessed by the screening method; or
- Sensitive receptors exist within 50m of a complex road layout (e.g. grade separated junctions, hills *etc.*).

The UK DMRB guidance, on which the TII guidance was based, states that road links meeting one or more of the following criteria can be defined as being '*affected*' by a proposed Project and should be included in the local air quality assessment:

- Road alignment change of 5m or more;
- Daily traffic flow changes by 1,000 annual average daily traffic (AADT) or more;
- HGV flows change by 200 vehicles per day or more;
- Daily average speed changes by 10km/h or more; or
- Peak hour speed changes by 20km/h or more.

The proposed Project will increase traffic levels by a maximum of 518 AADT on the entrance of the proposed Project however will not increase traffic (AADT or HGVs) volume, speeds or change the road alignment by an amount greater than the criteria discussed above. Therefore, none of the road links impacted by the proposed Project satisfy the above criteria and an assessment of the impact of traffic emissions on ambient air quality is not necessary.

14.2.2.1 Regional Impact Assessment (including Climate)

The impact of the proposed Project at a national / international level has been determined using the procedures given by TII[128] and the methodology provided in Annex 2 in the UK Design Manual for Roads and Bridges. The assessment focused on determining the resulting change in emissions of volatile organic compounds (VOCs), nitrogen oxides (NO_x) and carbon dioxide (CO_2). The Annex provides a method for the prediction of the regional impact of emissions of these pollutants from road schemes and can be applied to any development that causes a change in traffic flows. The inputs to the air dispersion model consist of information on road link lengths, AADT movements and annual average traffic speeds.

14.2.2.2 Ecological Sites

For routes that pass within 2km of a designated area of conservation (either Irish or European designation) the TII requires consultation with an Ecologist. However, in practice the potential for impact to an ecological site is highest within 200m of a proposed Project and when significant changes in AADT (>5%) occur.

[126] Version 1.03c, July 2007
[127] Version 6.1, October 2017
[128] TII (2011) Guidelines

TII's *Guidelines for Assessment of Ecological Impacts of National Road Schemes*[129] and *Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities*[130] provide details regarding the legal protection of designated conservation areas.

If both of the following assessment criteria are met, an assessment of the potential for impact due to nitrogen deposition should be conducted:

- a designated area of conservation is located within 200m of a proposed Project; and
- a significant change in AADT flows (>5%) will occur.

However, the nearest designated area of conservation (South Dublin Bay and River Tolka SPA) is located a greater than 200m from the Site and any link roads with an AADT change greater than 5%.

14.3 Baseline Environment

14.3.1 Meteorological Data - Wind

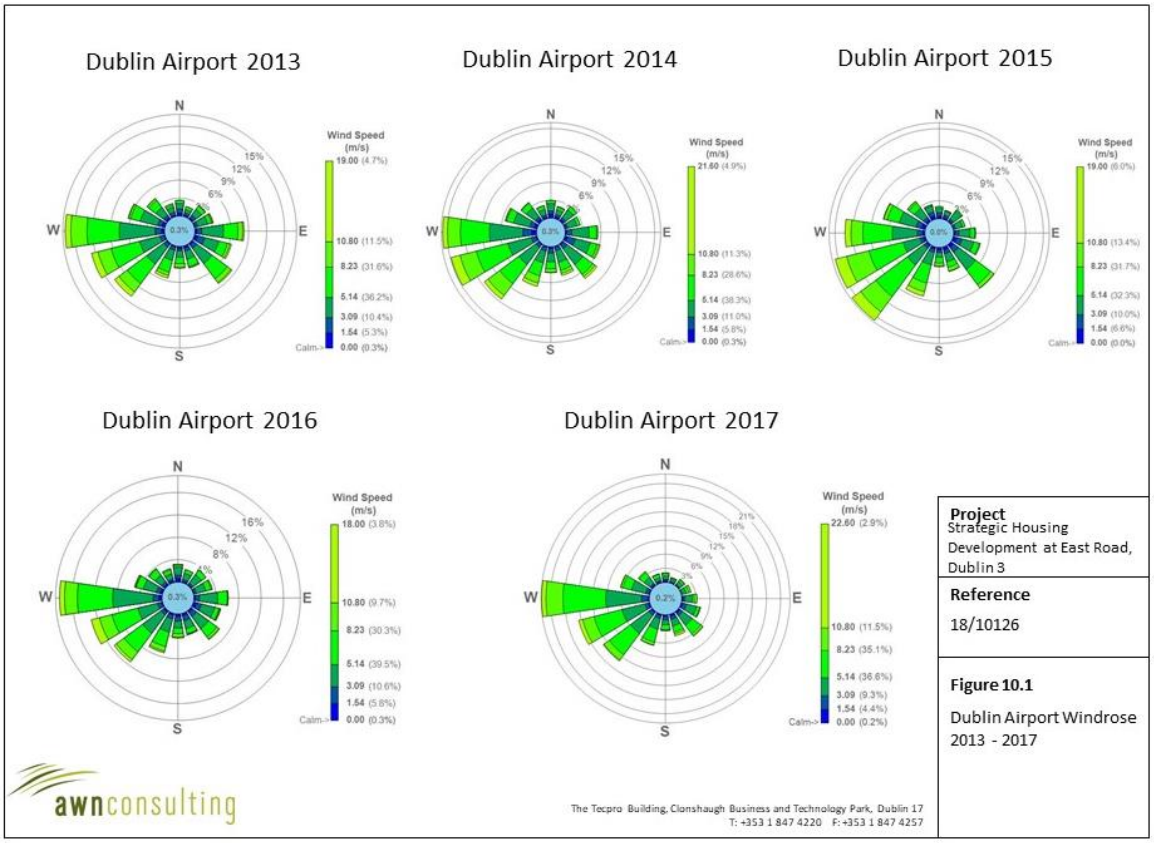
A key factor in assessing temporal and spatial variations in air quality is the prevailing meteorological conditions. Depending on wind speed and direction, individual receptors may experience very significant variations in pollutant levels under the same source strength (*i.e*. traffic levels)[131]. Wind is of key importance in dispersing air pollutants and for ground level sources, such as traffic emissions, 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 actually 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 Dublin Airport, which is located c.8km north of the Site. Dublin Airport met data has been examined to identify the prevailing wind direction and average wind speeds over a five-year period, see Diagram 14.1 below. For data collated during five representative years (2013-2017), the predominant wind direction is south-westerly. The average wind speed over the period 1981-2010 is approximately 5.3m/s.

[129] TII (2009) Guidelines for Assessment of Ecological Impacts of National Roads Schemes (Rev. 2, Transport Infrastructure Ireland, 2009)
[130] DEHLG (2010) Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities
131 WHO (2006) Air Quality Guidelines - Global Update 2005 (and previous Air Quality Guideline Reports 1999 & 2000)

Diagram 14.1: Dublin Airport Windrose Data 2013-2017



14.3.2 Trends in Air Quality

Air quality is variable and subject to both significant spatial and temporal variation. In relation to spatial variations in air quality, concentrations generally fall significantly with distance from major road sources[132]. Thus, residential exposure is determined by the location of sensitive receptors relative to major roads sources in the area. Temporally, air quality can vary significantly by orders of magnitude due to changes in traffic volumes, meteorological conditions and wind direction.

In assessing baseline air quality, two tools are generally used:

- ambient air monitoring; and
- air dispersion modelling.

In order to adequately characterise the current baseline environment through monitoring, comprehensive measurements would be required at a number of key receptors for PM_{10}, NO_2 and benzene. In addition, two of the key pollutants identified in the scoping study (PM_{10} and NO_2) have limit values which require assessment over time periods varying from one hour to one year. Thus, continuous monitoring over at least a one-year period at a number of locations would be necessary in order to fully determine compliance for these pollutants. Although this study would provide information on current air quality it would not be able to provide predictive information on baseline conditions[133], which are the conditions which prevail just prior to opening in the absence of the development. Hence the impacts of the development were fully assessed by air dispersion modelling which is the most practical tool for this purpose. The baseline environment has also been assessed using modelling, since the use of the same predictive technique for both the 'do-nothing' and 'do-something' scenario will minimise errors and allow an accurate determination of the relative impact of the development.

[132] UK Highways Agency (2007) Design Manual for Roads and Bridges, Volume 11, Section 3, Part 1 - HA207/07 (Document & Calculation Spreadsheet)
[133] UK Department of the Environment, Transport and Roads (1998)

In 2011 the UK DEFRA published research[134] on the long-term trends in NO_2 and NO_X for roadside monitoring sites in the UK. This study marked a decrease in NO_2 concentrations between 1996 and 2002, after which the concentrations stabilised with little reduction between 2004 and 2010. The result of this is that there now exists a gap between projected NO_2 concentrations which UK DEFRA previously published and monitored concentrations. The impact of this 'gap' is that the DMRB screening model can under-predict NO_2 concentrations for predicted future years. Subsequently, the UK Highways Agency (HA) published an Interim advice note (IAN 170/12) in order to correct the DMRB results for future years.

14.3.3 Baseline Air Quality

Air quality monitoring programs have been undertaken in recent years by the EPA and Local Authorities. The most recent annual report on air quality "*Air Quality Monitoring Annual Report 2016*", details the range and scope of monitoring undertaken throughout Ireland. As part of the implementation of the *Air Quality Standards Regulations 2002* (S.I. No. 271 of 2002), four air quality zones have been defined in Ireland for air quality management and assessment[135].

- Zone A is the Dublin conurbation.
- Zone B is the Cork conurbation.
- Zone C comprising 23 large towns in Ireland with a population >15,000.
- Zone D is the remaining area of Ireland.

In terms of air monitoring, the region of the proposed Project is categorised as Zone A.

Long-term monitoring data has been used to determine background concentrations for the key pollutants in the region of the proposed Project. The background concentration accounts for all non-traffic derived emissions (e.g. natural sources, industry, home heating etc.).

With regard to **NO_2,** continuous monitoring data from the EPA, at suburban Zone A background locations in Rathmines, St Anne's Park, 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 16-20µg/m^3 in 2016, see Table 14.3 below. Sufficient data is available for the station in Dun Laoghaire to observe long-term trends since 2013[136], with annual average results ranging from 15-19µg/m^3. Based on these results, an estimate of the current background NO_2 concentration in the region of the proposed Project is 19 µg/m^3.

134 Highways England (2013) Interim Advice Note 170/12 v3 Updated air quality advice on the assessment of future NOx and NO2 projections for users of DMRB Volume 11, Section 3, Part 1 'Air Quality

135 EPA (2017) Air Quality Monitoring Report 2016

136 EPA (2017) Air Quality Monitoring Report 2016 and EPA Website: http://www.epa.ie/whatwedo/monitoring/air/

Table 14.3: Annual Mean NO2 Concentrations in Zone a locations (2012-2017) (µg/m^3)

Station	Station Classification Council Directive 96/62/EC	Averaging Period	Year					
			2012	2013	2014	2015	2016	2017
Rathmines	Urban Background	Annual Mean NO_2 (µg/m^3)	21	19	17	18	20	17
		99.8th%ile 1-hr NO_2 (µg/m^3)	96	92	105	105	88	86
Ballyfermot	Suburban Background	Annual Mean NO_2 (µg/m^3)	-	16	16	16	17	17
		99.8th%ile 1-hr NO_2 (µg/m^3)	-	82	93	127	90	112
Dun Laoghaire	Suburban Background	Annual Mean NO_2 (µg/m^3)	18	16	15	16	19	17
		99.8th%ile 1-hr NO_2 (µg/m^3)	107	92	86	91	105	101
Swords	Suburban Background	Annual Mean NO_2 (µg/m^3)	15	15	14	13	16	14
		99.8th%ile 1-hr NO_2 (µg/m^3)	99	87	137	93	96	79

Continuous PM_{10} monitoring carried out at the suburban background locations of Ballyfermot, Dun Laoghaire and Swords showed annual mean concentrations ranging from 9-13µg/m^3 in 2016, with no exceedances of the daily limit value of 50µg/m^3 (35 exceedances are permitted per year). Sufficient data is available for Dun Laoghaire to observe trends over the period 2013-2017. Dun Laoghaire had an average annual mean PM_{10} concentration of 14µg/m^3 over this period. PM_{10} results from the urban background location in the Phoenix Park show similarly low levels over the 2013-2017 period with concentrations ranging from 11-14µg/m^3. Based on these results, a conservative estimate of PM_{10} in the region of the proposed Project is 14µg/m^3.

Continuous $PM_{2.5}$ monitoring carried out at the Zone A location of Rathmines showed an average concentration of 8.5µg/m^3 in 2017. Based on this information, the ratio of $PM_{2.5}$ to PM_{10} is estimated to be in the region of 0.63-0.67 with a representative background concentration of 9.2µg/m^3 estimated for the region of the proposed Project.

CO concentrations for the representative urban Zone A monitoring stations are between 2013 and 2017 on average 0.44mg/m^3 for the 8-hour value. This is significantly below the 10mg/m^3 limit value. Based on this EPA data, a conservative estimate of the background carbon monoxide concentration in East Wall in 2018 is 0.44mg/m^3.

In terms of **benzene**, monitoring data for the Zone A location of Rathmines is available for between 2013-2017 with an average concentration of 0.95µg/m^3. Based on this monitoring data a conservative estimate of the current background concentration in East Wall is 0.95µg/m^3.

14.4 Characteristics of the Proposed Project

The proposed Project will involve residential units and some commercial properties across the c.2.11ha Site. Further details of the development can be found in Chapter 4 (Description of the Proposed Project).

When considering a development of this nature, the potential air quality and climate impact on the surroundings must be considered for each of two distinct stages:

- Construction Phase; and;
- Operational Phase.

During the Construction Phase the main source of air quality impacts will be as a result of fugitive dust emissions from site activities. Emissions from construction vehicles and machinery have the potential to impact climate. The primary sources of air and climatic emissions in the Operational Phase are deemed long-term and will involve the change in traffic flows or congestion in the local areas which are associated with the proposed Project.

The following describes the primary sources of potential air quality and climate impacts which have been assessed as part of this EIAR.

14.5 Potential Impact of the Proposed Project.

14.5.1 Construction Phase

14.5.1.1 Air Quality

It is important to note that the predicted impacts associated with the demolition, earthworks and Construction Phase of the proposed Project are *short-term* and *temporary* in nature. The Institute of Air Quality Management (IAQM) guidelines[137] for assessing the impact of dust emissions from construction and demolition activities based on the scale & nature of the works and the sensitivity of the area to dust impacts. In terms of the prevailing wind, which is south-westerly, the dominant land use downwind of the Site is a mixture of *high sensitivity environments* (residential properties on Merchants Road) and *low sensitivity* (industrial facilities).

Construction dust has the potential to cause local impacts through dust nuisance at the nearest sensitive receptors. Construction activities such as excavation, earth moving and backfilling may generate quantities of dust, particularly in dry and windy weather conditions. While dust from construction activities tends to be deposited within 200m of a construction site, the majority of the deposition occurs within the first 50m. 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. Vehicles transporting material to and from the Site also have the potential to cause dust generation along the selected haul routes from the Site.

As shown in Table 14.4 below the risk from dust soiling at the nearest se*nsitive receptor (a high sensitivity environment, distance <20m*) is considered high under this guidance. The high sensitivity receptors less than 20m from the Site boundary are the residential buildings on Merchants Square (to the east). As a result, the sensitivity of the area to dust soiling effects on people and property is *high* according to IAQM guidance.

Table 14.4: 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

In addition, the IAQM guidelines also outline the assessment criteria for assessing the impact of PM_{10} emissions from construction activities based on the current annual mean PM_{10} concentration, receptor sensitivity and the number of receptors affected. The current PM_{10} concentration in Zone A locations as reported in Section 14.3.3 above is approximately 14µg/m^3. As shown in Table 14.5 below the worst-case sensitivity of the area to human health from PM_{10} (high sensitivity, distance <20m and with receptor numbers between 10-100) is considered *low* under this guidance.

[137] IAQM (2014) Guidance on the Assessment of Dust from Demolition and Construction Version 1.1

Table 14.5: Sensitivity of the Area to Human Health Impacts

Receptor Sensitivity	Annual Mean PM_{10} Concentration	Number Of Receptors	Distance from source (m)			
			<20	<50	<100	<200
High	< 24 µg/m^3	>100	Medium	Low	Low	Low
		10-100	**Low**	Low	Low	Low
		1-10	Low	Low	Low	Low
Medium	< 24 µg/m^3	>10	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
Low	< 24 µg/m^3	>1	Low	Low	Low	Low

In order to determine the level of dust mitigation required during the Construction Phase, the potential dust emission magnitude for each dust generating activity needs to be taken into account, along with the already established sensitivity of the area. These major dust generating activities are divided into four types to reflect their different potential impacts. These are:

- Demolition;
- Earthworks;
- Construction; and
- Trackout.

Demolition

Demolition will primarily involve removal of an area less than 20,000m^2 of existing buildings in order to facilitate construction. Dust emission magnitude from demolition can be classified as small, medium or large and are described in Table 14.6 below.

Table 14.6: Criteria for Assessment of Risk

Scale	Comment
Large	Total building volume >50,000m^3, potentially dusty construction material (e.g. concrete), on-site crushing and screening, demolition activities >20 m above ground level
Medium	Total building volume 20,000m^3-50,000m^3, potentially dusty construction material, demolition activities 10-20m above ground level
Small	Total building volume 20,000m^3, construction material with low potential for dust release, demolition activities <10 m above ground, demolition occurring during wetter months

The dust emission magnitude for the proposed demolition activities can be classified as small, due to the volume of buildings to be demolished. This results in an overall *low* risk of *temporary* dust soiling impacts (as it is high sensitivity area in terms of dust soiling) and an overall *negligible* risk of *temporary* human health impacts (as it is a high sensitivity area in terms of human health) as a result of the proposed demolition activities as outlined in Table 14.7 below.

Table 14.7: Risk of Dust Impacts - Demolition

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
Low	Low Risk	Low Risk	Negligible

Earthworks

Earthworks will primarily involve excavating material, haulage, tipping and stockpiling. This may also involve levelling the site and landscaping. Dust emission magnitude from earthworks can be classified as small, medium and large and are described in Table 14.8 below.

Table 14.8: Criteria for Assessment of Risk

Scale	Comment
Large	Total site area >10,000m^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 2,500m^2-10,000m^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
Small	Total site area <2,500m^2, soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds < 4m in height, total material moved <20,000 tonnes, earthworks during wetter months

The dust emission magnitude for the proposed earthwork activities can be classified as large as the Site is greater than 10,000m^2. This results in an overall *high* risk of *temporary* dust soiling impacts and an overall *low* risk of *temporary* human health impacts as a result of the proposed earthworks activities as outlined in Table 14.9 below.

Table 14.9: Risk of Dust Impacts - 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

Construction

Dust emission magnitude from construction can be classified as small, medium and large and are described Table 14.10 below.

Table 14.10: Criteria for Assessment of Risk

Scale	Comment
Large	Total building volume >100,000m^3, on-site concrete batching, sandblasting
Medium	Total building volume 25,000m^3-100,000m^3, potentially dusty construction material (e.g. concrete), on-site concrete batching
Small	Total building volume <25,000m^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. This results in an overall *medium* risk of *temporary* dust soiling impacts and an overall *low* risk of *temporary* human health impacts as a result of the proposed construction activities as outlined in Table 14.11 below.

Table 14.11: Risk of Dust Impacts – 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

Trackout

Factors which determine the dust emission magnitude are vehicle size, vehicle speed, vehicle numbers geology and duration. Dust emission magnitude from trackout can be classified as small, medium and large and are described Table 14.12 below.

Table 14.12: Criteria for Assessment of Risk

Scale	Comment
Large	>50 HDV (>3.5t) outward movements in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length >100m
Medium	10-50 HDV (>3.5t) outward movements in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50-100m
Small	<10 HDV (>3.5t) outward movements in any one day, surface material with low potential for dust release, unpaved road length <50m

This results in the dust emission magnitude from trackout activities to be classified as medium. This results in an overall *medium* risk of *temporary* dust soiling impacts and an overall *low* risk of *temporary* human health impacts as a result of the proposed trackout activities as outlined in Table 14.13 below.

Table 14.13: Risk of Dust Impacts - 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

The risk of dust impacts as a result of the proposed Project are summarised below in Table 14.14 below. Overall, in order to ensure that no dust nuisance occurs during the construction activities, a range of dust mitigation measures associated with a *high* risk of dust impacts must be implemented. When the dust mitigation measures detailed in the mitigation section of this Chapter are implemented, fugitive emissions of dust from the Site will be *insignificant* and pose no nuisance at nearby receptors.

Table 14.14: Summary of Dust Risk to Define Site-Specific Mitigation

Potential Impact	Dust Emission Magnitude			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	Low Risk	High Risk	Medium Risk	Medium Risk
Human Health	Low Risk	Low Risk	Low Risk	Low Risk

14.5.1.2 Climate

There is the potential for a number of GHG emissions to atmosphere during the construction of the proposed Project. Construction vehicles, generators *etc*., may give rise to CO_2 and N_2O emissions. However, the impact on the climate is considered to be *imperceptible* in the short and long-term.

14.5.1.3 Human Health

Best practice mitigation measures are proposed for the Construction Phase of the proposed 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 proposed Project will ensure that the impact of the development complies with all EU ambient air quality legislative limit values which are based on the protection of human health. Therefore, the impact of construction of the proposed Project is likely to be *short-term* and *imperceptible* with respect to human health.

14.5.2 Operational Phase

14.5.2.1 Local Air Quality and Climate

DBFL have carried out a traffic assessment for the proposed Project. It is envisaged that the worst-case change in AADT on any individual road link due to the proposed Project work will be 382 vehicles per day. As detailed in the DMRB guidance, a quantitative air quality assessment is required under the following circumstances:

- Road alignment change of 5m or more;
- Daily traffic flow changes by 1,000 annual average daily traffic (AADT) or more;
- HGV flows change by 200 vehicles per day or more;
- Daily average speed changes by 10km/h or more; or
- Peak hour speed changes by 20km/h or more.

Therefore, using the DMRB screening criteria, no road links can be classed as '*affected*' by the proposed Project and do not require inclusion in the local air quality and climate assessment.

14.5.2.2 Climate Change

The nature of the development is such that there is no predicted impact on traffic, beneficial or adverse. It is envisaged that there will be no change in AADT due to the proposed Project. Therefore, using the DMRB screening criteria listed above in Section 14.5.2.1, no road links can be classed as *'affected'* by the proposed Project and do not require inclusion in the regional climate assessment.

A floor risk assessment for the proposed Project has been conducted by DBFL. The most likely impact due to climate change on the proposed Project is due to flooding. An assessment has been carried out as part of this EIAR to ensure that the Site has sufficient capacity in the system for adaption to future increased rainfall due to climate change. As the proposed Project is a mixed-use development, it is proposed that all highly vulnerable development (*i.e.* residential and crèche) are located above the 1 in 200-year tidal flood level including an allowance for climate change, with an appropriate freeboard in accordance with the DCC SFRA.

The Site is located in an area protected from tidal by flood defence works on the Royal Canal at Spencer Dock and along the Tolka. The proposed Project design also includes surface water network capacity to be designed in accordance with GDSDS recommendations and incorporate 10% climate change. The design also includes an adequately sized attenuation facility to cater for retained flood volumes. This is designed for the 1 in 100-year storm plus 10% allowance for climate change.

14.5.2.3 Human Health

Due to the nature of the project and scoping out of human health impacts due to operational phase traffic associated with the development, the potential impact on human health is *negligible*.

14.6 Mitigation Measures

14.6.1 Construction Phase

14.6.1.1 Air Quality

A Dust Minimisation Plan has been formulated for the Construction Phase of the proposed Project as construction activities are likely to generate some dust emissions. In order to minimise dust emissions during construction, a series of mitigation measures have been prepared in the form of a Dust Minimisation Plan, see Appendix A14.3. Provided the dust minimisation measures outlined in the plan are adhered to, the air quality impacts during the Construction Phase will be *not be significant*. Activities such as earthworks and the removal of hardstanding should be considered sensitive activities with respect to dust generation. In summary the measures which will be implemented will include:

- Hard surface roads will be swept to remove mud and aggregate materials from their surface while any un-surfaced roads will be restricted to essential site traffic;
- Furthermore, any road that has the potential to give rise to fugitive dust must be regularly watered, as appropriate, during dry and / or windy conditions;
- Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind. Water misting or sprays will be used as required if particularly dusty activities such as rock blasting or earthworks are necessary during dry or windy periods; and
- Before entrance onto public roads, trucks will be adequately inspected to ensure there is no potential for dust emissions and will be cleaned as necessary.

At all times, these procedures will be strictly monitored and assessed. In the event of dust nuisance occurring outside the Site boundary, movements of materials likely to raise dust will be curtailed and satisfactory procedures implemented to rectify the problem before the resumption of construction operations.

When the dust minimisation measures detailed in the mitigation section of this Chapter are implemented, fugitive emissions of dust from the Site will be *insignificant* and pose no nuisance at nearby receptors.

14.6.1.2 Climate

Construction vehicles, generators etc., may give rise to some CO_2 and N_2O emissions. However, due to the *short-term* and *temporary* nature of these works, the impact on climate *will not be significant*.

14.6.2 Operational Phase

14.6.2.1 Air Quality

There are no significant impacts predicted for the Operational Phase with respect to air quality therefore no Site specific mitigation measures are required during the Operational Phase of the proposed Project.

Nevertheless, mitigation measures in relation to traffic-derived pollutants have focused generally on improvements in both engine technology and fuel quality. EU legislation, based on the EU sponsored Auto-Oil programmes, has imposed stringent emission standards for key pollutants (REGULATION (EC) No 715/2007) for passenger cars which were to be complied with in 2009 (Euro V) and 2014 (Euro VI).

With regard to heavy duty vehicles, EU Directive 2005/78/EC defines the emission standard, Euro IV, as well as the next stage (Euro V) which entered into force in October 2009. In addition, it defines a non-binding standard called Enhanced Environmentally-friendly Vehicle (EEV). In relation to fuel quality, S.I. No. 407 of 1999 and S.I. No. 72 of 2000 have introduced significant reductions in both sulphur and benzene content of fuels.

14.6.2.2 Climate

The impact of the proposed Project on climate will be *imperceptible*. Thus, no Site specific mitigation measures are required.

14.7 Residual Impacts

14.7.1 Construction Phase

14.7.1.1 Air Quality

When the dust minimisation measures detailed in the mitigation Section in 14.6.1.1 are implemented, fugitive emissions of dust from the Site will be *short-term, localised, and insignificant* and pose no nuisance at nearby receptors.

14.7.1.2 Climate

Impacts to climate during the Construction Phase are considered *imperceptible* and *short-term*.

14.7.1.3 Human Health

With appropriate dust mitigation measures in place, impacts to human health during the Construction Phase will be *short-term, localised* and *insignificant* at nearby receptors.

14.7.2 Operational Phase

14.7.2.1 Air Quality

The results of the air dispersion modelling study indicate that the impacts of the proposed Project on air quality and climate is predicted to be *localised, imperceptibl*e with respect to the Operational Phase for the *long* and *short-term*.

14.7.2.2 Climate

Impacts to climate during the Operational Phase are considered *imperceptible* in the *long-term*, therefore residual impacts are not predicted.

14.7.2.3 Human Health

Impacts to human health during the Operational Phase are *localised, imperceptible* with respect to the Operational Phase for the *long* and *short term*.

14.8 Monitoring

Monitoring of construction dust deposition at nearby sensitive receptors (residential dwellings) during the Construction Phase of the proposed Project 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 between 28-32 days.

There is no monitoring recommended for the Operational Phase as impacts to air quality and climate are predicted to be *imperceptible*.

14.9 Reinstatement

There are no reinstatement requirements with respect to air quality and climate.

14.10 Interactions

Air Quality does not have a significant number of interactions with other chapters. The most significant interactions are between **human beings** and **air quality**. An adverse impact due to air quality in either the Construction or Operational Phase has the potential to cause health and dust nuisance issues. The mitigation measures that will be put in place at the proposed East Road Project will ensure that the impact of the proposed Project complies with all ambient air quality legislative limits and therefore the predicted impact is long-term and neutral with respect to human beings.

Interactions between **air quality** and **traffic** have the potential to be significant. With increased traffic movements and reduced engine efficiency, i.e. due to congestion, the emissions of vehicles increase. However, in this assessment the impact of the interactions between traffic and air quality are not significant.

With the appropriate mitigation measures in place it is predicted that any interactions on **biodiversity (flora & fauna), water, hydrogeology** and **soils** are *neutral.*

14.11 Difficulties Encountered in Compiling the Chapter

There were no difficulties encountered while carrying out this assessment.

14.12 Cumulative Impacts

Should the Construction Phase of the proposed Project coincide with the construction of any other proposed or permitted developments within 350m of the Site then there is the potential for cumulative dust impacts to the nearby sensitive receptors. The dust mitigation measures outlined in Appendix A14.3 should be applied throughout the Construction Phase of the proposed Project, with similar mitigation measures applied for other proposed or permitted developments which will avoid significant cumulative impacts on air quality. With appropriate mitigation measures in place, the predicted cumulative impacts on air quality and climate associated with the Construction Phase of the proposed Project are deemed *short-term and not significant*.

Permitted developments are included in the traffic impact and therefore the potential for a cumulative impact has already been assessed. Future projects of any future currently unpermitted large scale would need to conduct an EIA to ensure that no significant impacts on air quality will occur as a result of those developments.

14.13 'Do-Nothing' Impact

The '*do-nothing'* scenario includes retention of the current Site without the proposed mixed-use development in place. In this scenario, ambient air quality at the Site will remain as per the baseline and will change in accordance with trends within the wider area (including influences from potential new developments in the surrounding area, changes in road traffic, *etc.*).

14.14 References

- German VDI (2002):Technical Guidelines on Air Quality Control - TA Luft
- DOEHLG (2004): Quarries and Ancillary Activities, Guidelines for Planning Authorities
- European Economic Area (2011): NEC Directive Status Reports 2010
- Framework Convention on Climate Change (1997): Kyoto Protocol To The United Nations Framework Convention On Climate Change
- Framework Convention on Climate Change (1999): Ireland - Report on the in-depth review of the second national communication of Ireland

- Environmental Resources Management (1998): Limitation and Reduction of CO2 and Other Greenhouse Gas Emissions in Ireland
- EU (2014): EU 2030 Climate and Energy Framework
- Department of the Environment, Heritage and Local Government (DEHLG) (2003): Strategy to Reduce Emissions of Trans-boundary Pollution by 2010 to Comply with National Emission Ceilings - Discussion Document
- DEHLG (2004): National Programme for Ireland under Article 6 of Directive 2001/81/EC for the Progressive Reduction of National Emissions of Transboundary Pollutants by 2010
- DEHLG (2007a): Update and Revision of the National Programme for Ireland under Article 6 of Directive 2001/81/EC for the Progressive Reduction of National Emissions of Transboundary Pollutants by 2010
- EEA (2012): NEC Directive Status Reports 2011
- EPA (2002); Guidelines On Information To Be Contained in Environmental Impact Statements
- EPA (2003): Advice Notes On Current Practice (In The Preparation Of Environmental Impact Statements)
- EPA (2017): Guidelines on the Information to be Contained in Environmental Impact Assessment Reports - Draft
- EPA (2015): Advice Notes for Preparing Environmental Impact Statements – Draft
- UK DEFRA (2016a): Part IV of the Environment Act 1995: Local Air Quality Management, LAQM. PG (16)
- UK DEFRA (2016b): Part IV of the Environment Act 1995: Local Air Quality Management, LAQM.PG (16)
- UK Department of the Environment, Transport and Roads (1998): Preparation of Environmental Statements for Planning Projects That Require Environmental Assessment - A Good Practice Guide, Appendix 8 - Air & Climate
- UK Highways Agency (2007): Design Manual for Roads and Bridges, Volume 11, Section 3, Part 1 - HA207/07 (Document & Calculation Spreadsheet)
- EPA (2017): Air Quality Monitoring Report 2016 (& previous annual reports 1997-2015)
- EPA (2018): EPA Website: http://www.epa.ie/whatwedo/monitoring/air/
- UK DEFRA (2017): NO_x to NO_2 Conversion Spreadsheet (Version 6.1)
- TII (2011): Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes
- TII (2009): Guidelines for Assessment of Ecological Impacts of National Roads Schemes (Rev. 2, Transport Infrastructure Ireland, 2009)
- DEHLG (2010): Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities
- World Health Organisation (2006): Air Quality Guidelines - Global Update 2005 (and previous Air Quality Guideline Reports 1999 & 2000)
- Highways England (2013): Interim Advice Note 170/12 v3 Updated air quality advice on the assessment of future NOx and NO2 projections for users of DMRB Volume 11, Section 3, Part 1 'Air Quality
- Institute of Air Quality Management (IAQM) (2014) Guidance on the Assessment of Dust from Demolition and Construction Version 1.1
- EU (2017): Ireland's Final Greenhouse Gas Emissions in 2015
- BRE (2003): Controlling Particles, Vapours & Noise Pollution from Construction Sites
- The Scottish Office (1996): Planning Advice Note PAN50 Annex B: Controlling the Environmental Effects Of Surface Mineral Workings Annex B: The Control of Dust at Surface Mineral Workings
- UK Office of Deputy Prime Minister (2002) Controlling the Environmental Effects of Recycled and Secondary Aggregates Production Good Practice Guidance
- USEPA (1997): Fugitive Dust Technical Information Document for the Best Available Control Measures
- USEPA (1986): Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition (periodically updated)

15 Noise & Vibration

15.1 Introduction

This Chapter of the EIAR has been prepared by AWN to assess the noise and vibration impact of the proposed Project the context of current relevant standards and guidance.

This Chapter includes a description of the receiving ambient noise climate in the vicinity of the Site and an assessment of the *potential noise and vibration impacts* associated with the proposed Project during both the Construction Phase and Operational Phase on its surrounding environment. The assessment of direct, indirect and cumulative noise and vibration impacts on the surrounding environment have been considered as part of the assessment.

Mitigation measures are included, where relevant, to ensure the proposed Project is constructed and operated in an environmentally sustainable manner in order to ensure minimal impact on the receiving environment.

The assessment has been undertaken with reference to the most appropriate guidance documents relating to environmental noise and vibration which are set out within the relevant sections of this Chapter and included in the references section.

In addition to specific noise guidance documents, the following guidelines were considered and consulted for the purposes of this Chapter:

- EPA Guidelines on the Information to be contained in Environmental Impact Statements, (EPA, 2002);
- EPA Advice Notes on Current Practice (in the preparation of Environmental Impact Statements), (EPA, 2003);
- EPA Guidelines on the Information to be contained in Environmental Impact Assessment Reports, (Draft August 2017), and
- EPA Advice Notes for Preparing Environmental Impact Statements, (Draft, September 2015).

15.2 Methodology

This assessment has been undertaken using the following methodology:

- detailed baseline noise monitoring has been undertaken in the vicinity of the nearest *noise sensitive locations* (NSLs) to determine the range of noise levels in the existing environment;
- a review of the most applicable 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, this is summarised in the following sections; and
- where necessary, a schedule of mitigation measures has been proposed to control the noise and vibration emissions associated with both the Construction and Operational Phases of the proposed Project.

15.2.1 Construction Phase - Noise

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. Local Authorities normally control construction activities by imposing limits on the hours of operation and consider noise limits at their discretion.

In the absence of specific noise limits, appropriate criteria relating to permissible construction noise levels for a development of this scale may be found in the *British Standard BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites - Noise*.

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.'*

Note that a typical planning condition in relation to construction noise issued by DCC refer also to compliance with *BS 5228 Part 1* as a means of controlling impacts to the surrounding environment.

BS 5228, has therefore been used to inform the assessment approach for construction noise in line with DCC practice.

For residential properties it is considered appropriate to adopt the 75dB(A)) during daytime.

15.2.2 Construction Phase - Vibration

Guidance relevant to acceptable vibration in order to avoid damage to buildings is contained within *BS 7385-2 (1993*). The guidance values contained within *BS 7385* are reproduced also in *British Standard BS 5228-2 (2009).*

These standards differentiate between transient and continuous vibration. Surface construction activities are considered to be transient in nature as they occur for a limited period of time at a given location. The standards note that the risk of cosmetic damage to residential buildings starts at a Peak Particle Velocity (PPV) of 15mm/s at 4Hz. The standard also notes that below 12.5mm/s PPV the risk of damage tends to zero. Both standards note that important buildings that are difficult to repair might require special consideration on a case by case basis but building of historical importance should not (unless it is structurally unsound) be assumed to be more sensitive. If a building is in a very unstable state, then it will tend to be more vulnerable to the possibility of damage arising from vibration or any other ground borne disturbance.

Table 15.1 below summarises the proposed vibration criteria below which there is no risk of damage to buildings. These limits apply to vibration frequencies below 15Hz where the most conservative limits are required. If there are any protected buildings near the works there is a greater potential for these to be more vulnerable than other adjacent modern structures. Therefore, on a precautionary basis, the guidance values for structurally sound buildings are reduced by 50% in line with the guidance documents referred to above.

Table 15.1: Transient Vibration Impact Criteria for Buildings (Conservative Criteria below which there is No Risk of Cosmetic Damage)

Category of Building	Threshold of potential significant effect (Peak Particle Velocity - PPV - at building foundation) for Transient Vibration
Structurally sound and non-protected buildings	12 mm/s

15.2.3 Operational Phase - Noise

15.2.3.1 Mechanical Plant

Due consideration must be given to the nature of the primary noise sources when setting criteria. Criteria for noise from these sources, with the exception of additional vehicular traffic on public roads, will be set in terms of the $L_{Aeq,T}$ parameter (the equivalent continuous sound level).

In relation to day-to-day Operational Phase noise impacts on off-site residential locations DCC would typically apply the following condition to a development of this nature:

Noise levels from the proposed development shall not be so loud, so continuous, so repeated, of such duration or pitch or occurring at such times as to give reasonable cause for annoyance to a person in any premises in the neighbourhood or to a person lawfully using any public place. In particular, the rated noise levels from the proposed development shall not constitute reasonable grounds for complaint as provided for in B.S. 4142. Method for rating industrial noise affecting mixed residential and industrial areas.

Reason: In order to ensure a satisfactory standard of development, in the interests of residential amenity.

This wording is most relevant to the noise emissions from mechanical plant serving the development and careful consideration will be given to this issue as part of the detailed assessment.

Guidance from DCC on noise emissions from mechanical plant items typically makes reference to the *British Standard BS 4142: 2014: Methods for Rating and Assessing Industrial and Commercial Sound.* This guidance is the industry standard method for analysing building services plant noise emissions to residential receptors and is the document typically used by DCC in their standard planning conditions and also in complaint investigations.

BS 4142 describes methods for rating and assessing sound of an industrial and / or commercial nature. The methods described in this British 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.

For an appropriate *BS 4142* assessment it is necessary to compare the measured external background noise level (i.e. the $L_{A90,T}$ level measured in the absence of plant items) to the rating level ($L_{Ar,T}$) of the various plant items, when operational. Where noise emissions are found to be tonal, impulsive in nature or irregular enough to attract attention, *BS 4142* also advises that a penalty be applied to the specific level to arrive at the rating level.

The subjective method for applying a penalty for tonal noise characteristics outlined in *BS 4142* recommends the application of a 2dB penalty for a tone which is just perceptible at the noise receptor, 4dB where it is clearly perceptible, and 6dB where it is highly perceptible.

The following definitions as discussed in BS 4142 as summarised in Table 15.2 below:

Table 15.2: BS 4142 Tonal Noise Characteristics

Noise	Description
ambient noise level, $L_{Aeq,T}$	is the noise level produced by all sources including the sources of concern, i.e. the residual noise level plus the specific noise of mechanical plant, in terms of the equivalent continuous A-weighted sound pressure level over the reference time interval [T]
residual noise level, $L_{Aeq,T}$	is the noise level produced by all sources excluding the sources of concern, i.e. the ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound, in terms of the equivalent continuous A-weighted sound pressure level over the reference time interval [T]
specific noise level, $L_{Aeq,T}$	is the sound level associated with the sources of concern, i.e. noise emissions solely from the mechanical plant, in terms of the equivalent continuous A-weighted sound pressure level over the reference time interval [T]
rating level, $L_{Ar,T}$	is the specific sound level plus any adjustments for the characteristic features of the sound (e.g. tonal, impulsive or irregular components)
background noise level, $L_{A90,T}$	is the sound pressure level of the residual noise that is exceeded for 90% of the time period T

If the rated plant noise level is +10dB or more above the pre-existing background noise level then this indicates that complaints are likely to occur and that there will be a significant adverse impact. A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context.

The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact.

In this instance the existing prevailing background noise level measured during the noise survey varies across the three noise monitoring locations. Therefore different criteria are set for noise sensitive receivers in different areas in proximity to the Site.

Making the assumption that certain items of mechanical plant serving the proposed Project will operate 24/7 the mechanical plant noise emissions must be designed to achieve the *BS4142* requirements during the night-time period.

Therefore, in order to limit the noise impact of mechanical plant serving the proposed Project, during the detailed design of the proposed Project the specific plant noise levels will be designed to be equal or lower to the prevailing background noise level at the nearest off-site Noise Sensitive Locations (NSL).

Due to the fact that there is the potential for short periods of noise to cause a greater disturbance at night-time, a shorter assessment time period (T) is adopted. Appropriate periods are 15min for daytime (07:00 to 23:00) and 5 minutes for night-time (23:00 to 07:00).

In summary, the following criteria apply at the façades of those residential properties closest to the proposed Project:

In the vicinity of Location A

- Daytime (07:00 to 23:00 hours) 50dB $L_{Aeq,15min}$
- Night-time (23:00 to 07:00 hours) 44dB $L_{Aeq,5min}$

In the vicinity of Location B

- Daytime (07:00 to 23:00 hours) 42dB $L_{Aeq,15min}$
- Night-time (23:00 to 07:00 hours) 35dB $L_{Aeq,5min}$

In the vicinity of Location C

- Daytime (07:00 to 23:00 hours) 50dB $L_{Aeq,15min}$
- Night-time (23:00 to 07:00 hours) 39dB $L_{Aeq,5min}$

15.2.3.2 Traffic Noise

Given that traffic to and from the proposed Project will make use of existing roads already carrying traffic volumes, it is appropriate to consider the increase in traffic noise level that arises as a result of vehicular movements associated with the proposed Project.

In order to assist with the interpretation of the noise associated with vehicular traffic on public roads, Table 15.3 below offers guidance as to the likely impact associated with any particular change in traffic noise level[138]. It shows that small changes in noise levels are not normally noticeable, whereas an increase of 10dB would be described as a doubling of loudness. In summary the assessment looks at the impact with and without development at the nearest NSL.

[138] Design Manual for Roads and Bridges, 2011

Table 15.3: Significance in Change of Noise Level

Change in Sound Level (dB L_{A10})	Subjective Reaction	DMRB magnitude of Impact	EPA Classification Magnitude of Impact
0	Inaudible	No Change	Neutral
0.1 – 2.9	Barely Perceptible	Negligible	Imperceptible
3 – 4.9	Perceptible	Minor	Slight
5 – 9.9	Up to a doubling of loudness	Moderate	Moderate
10+	Doubling of loudness and above	Major	Significant

15.2.3.3 Inward Noise Impact

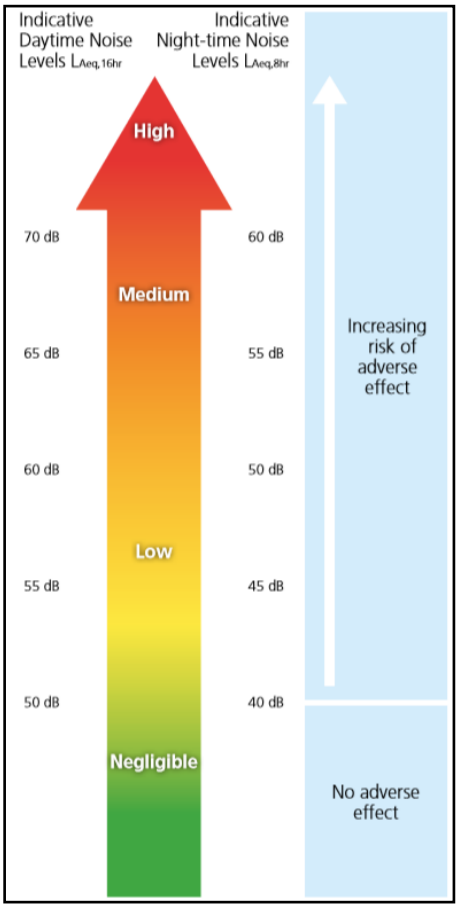
The Professional Guidance on Planning & Noise (ProPG) report was published in May 2017. This guidance was prepared by a working group comprising members of the Association of Noise Consultants (ANC), the Institute of Acoustics (IOA) and the Chartered Institute of Environmental Health (CIEH). Although not a government document, since its adoption it has been generally considered as a best practice guidance and has been widely adopted in the absence of equivalent Irish guidance.

The ProPG outlines a systematic risk based 2 Stage approach for evaluating noise exposure on prospective sites for residential development. The two primary stages of the approach can be summarised as follows:

- **Stage 1 -** Comprises a high-level initial noise risk assessment of the proposed site considering either measured and or predicted noise levels; and
- **Stage 2 -** Involves a full detailed appraisal of the proposed development covering four '*key elements*' that include:
  - **Element 1 -** Good Acoustic Design Process;
  - **Element 2 -** Noise Level Guidelines;
  - **Element 3 -** External Amenity Area Noise Assessment; and
  - **Element 4 -** Other Relevant Issues.

The initial noise risk assessment is intended to provide an early indication of any acoustic issues that may be encountered. It calls for the categorisation of the Site as a *negligible, low, medium or high risk* based on the pre-existing noise environment. Figure 15.1 below presents the basis of the initial noise risk assessment, it provides appropriate risk categories for a range of continuous noise levels either measured and / or predicted onsite.

Figure 15.1: ProPG Stage 1 - Initial Noise Risk Assessment



It should be noted that a site should not be considered a negligible risk if more than 10 L_{AFmax} events exceed 60dB during the night period and the Site should be considered a high risk if the L_{AFmax} events exceed 80dB more than 20 times a night.

Element 2 of the ProPG document sets out recommended internal noise targets derived from *BS 8233 (2014).* The recommended indoor ambient noise levels are set out in Table 15.4 below and are based on annual average data, that is to say they omit occasional events where higher intermittent noisy events may occur.

Table 15.4: ProPG Internal Noise Levels

Activity	Location	(07:00 to 23:00)	(23:00 to 07:00)
Resting	Living room	35 dB $L_{Aeq,16hr}$	-
Dining	Dining room / area	40 dB $L_{Aeq,16hr}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hr}$	30 dB $L_{Aeq,8hr}$ 45 dB $L_{Amax,T}$*

**Note The document comments that the internal $L_{AFmax,T}$ noise level may be exceeded no more than 10 times per night without a significant impact occurring.*

In addition to these absolute internal noise levels ProPG provides guidance on flexibility of these internal noise level targets. For instance, in cases where the development is considered necessary or desirable, and noise levels exceed the external noise guidelines, then a relaxation of the internal L_{Aeq} values by up to 5dB can still provide reasonable internal conditions.

The ProPG guidance provides the following advice with regards to external noise levels for amenity areas in the development:

'The acoustic environment of external amenity areas that are an intrinsic part of the overall design should always be assessed and noise levels should ideally not be above the range 50-55dB $L_{Aeq,16hr}$.'

15.2.4 Operational Phase - Vibration

Taking into account the expected activities associated with the Operational Phase of the proposed Project, it is not anticipated that there will be any impact associated with vibration.

15.3 Baseline Environment

The Site is located off East Road, Dublin 3. The Site is bounded to the west by the East Road, to the south by the railways, and to the east and north by residential properties.

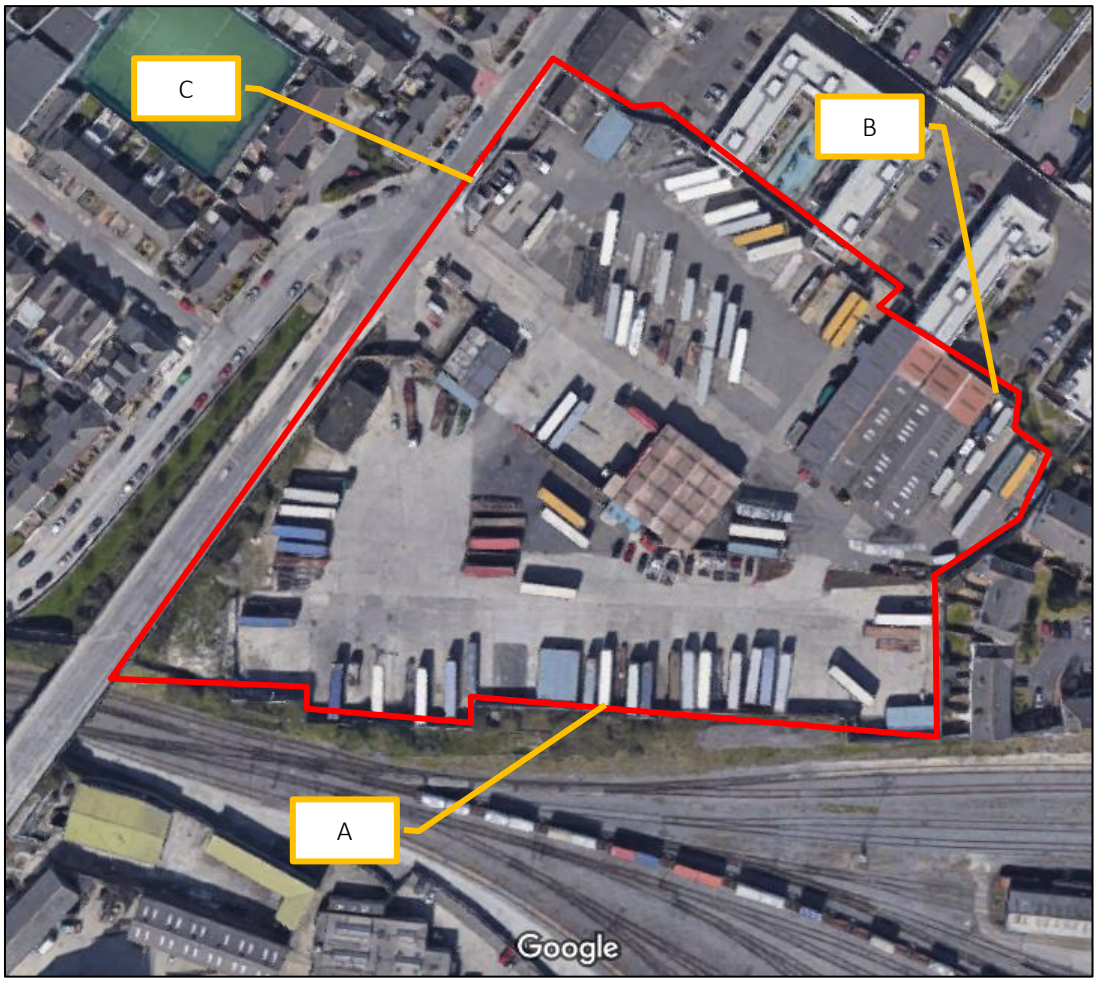
15.3.1 Baseline Noise Survey

An environmental noise survey has been conducted at the site in order to quantify the existing noise environment. The survey was conducted in general accordance with *ISO 1996: 2017: Acoustics - Description, Measurement and Assessment of Environmental Noise*. Specific details are set out below.

Three measurement locations were selected as shown in Figure 15.2 below and described below.

- **Location A -** was located on the south boundary.
- **Location B -** was located on the north east boundary adjacent to apartment complex in this area.
- **Location C** - was located inside the west boundary, adjacent to the East Road.

Figure 15.2: Noise Monitoring Locations



15.3.1.1 Survey Periods

The noise survey was conducted at three locations over the following period:

- 13:00 on 3rd August to 15:00 on 8th August 2018

For the purpose of this assessment, daytime is taken to be between 07:00 and 23:00, whilst night-time is between 23:00 and 07:00. The weather during the daytime survey period was dry and with wind speeds of less than 5m/s. Temperatures were in the range of 18 to 22°C. The weather during the night-time survey period was dry and calm with a scattered shower or two and wind speeds less than 4m/s. Temperatures were in the range of 12 to 15°C (weather information from Met Éireann recording stations nearby).

15.3.1.2 Personnel & Instrumentation

The equipment used during the unattended baseline survey was installed and removed by AWN. The noise measurements were performed using the following equipment. Before and after the survey the measurement apparatus was check calibrated using a *Brüel & Kjær Type 4231 Sound Level Calibrator.*

Table 15.5: Instrumentation Details

Location	Make	Model	Serial Number
A	NTi Audio	XL2	A2A-11092-EO
B	Bruel & Kjaer	2250	2818080
C	Bruel & Kjaer	2250	2818091

15.3.1.3 Measurement Parameters

The noise survey results are presented in terms of the following five 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_{Amax} is the instantaneous maximum sound level measured during the sample period.

L_{Amin} is the instantaneous minimum sound level measured during the sample period.

L_{A10} is the sound level that is exceeded for 10% of the sample period. It is typically used as a descriptor for traffic 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.

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.

15.3.1.4 Survey Results and Discussion

Location A

The survey results for Location A are given in Table 15.6 below.

Table 15.6: Summary of Results for Location A

Date	Period	Measured Noise Levels (dB re. $2x10^{-5}$ Pa)	
		L_{Aeq}	L_{A90}
3rd August 2018	Day	59	47
4th August 2018	Day	54	46
	Night	46	44
5th August 2018	Day	52	46
	Night	46	44
6th August 2018	Day	55	46
	Night	51	44
7th August 2018	Day	60	49
	Night	56	47
8th August 2018	Day	59	50
	Night	54	47

The noise environment at the measurement location comprised nearby HGV movements (engines, container bangs), birdsong, and distant traffic. Intermittent rail movements on the adjacent railway were captured on the audio recording. Daytime noise levels were in the range from 52 to 59dB $L_{Aeq,16hr}$ and 46 to 50dB $L_{A90,16hr}$. Night-time noise levels were in the range of 67 to 68dB $L_{Aeq,8hr}$ and 41 to 52dB $L_{A90,8hr}$.

Location B

The survey results for Location B are given in Table 15.7 below.

Table 15.7: Summary of Results for Location B

Date	Period	Measured Noise Levels (dB re. $2x10^{-5}$ Pa)	
		L_{Aeq}	L_{A90}
3rd August 2018	Day	49	41
4th August 2018	Day	48	40
	Night	42	32
5th August 2018	Day	47	42
	Night	39	33
6th August 2018	Day	48	41
	Night	41	36

The noise environment at the measurement location comprised nearby vehicle and HGV movements, birdsong, and distant traffic. Daytime noise levels were in the range from 54 to 55dB $L_{Aeq,\ 16hr}$ and 32 to 47dB $L_{A90,\ 16hr}$. Night-time noise levels were in the range of 45 to 48dB $L_{Aeq,8hr}$ and 38 to 42dB $L_{A90,8hr}$.

Location C

The survey results for Location C are given in Table 15.8 below.

Table 15.8: Summary of Results for Location C

Date	Period	Measured Noise Levels (dB re. $2x10^{-5}$ Pa)	
		L_{Aeq}	L_{A90}
3rd August 2018	Day	64	50
4th August 2018	Day	64	48
	Night	60	38
5th August 2018	Day	61	46
	Night	58	35
6th August 2018	Day	64	47
	Night	61	53
7th August 2018	Day	64	52
	Night	63	43
8th August 2018	Day	65	53
	Night	62	41

The noise environment at the measurement location comprised nearby vehicle and HGV movements, birdsong, and distant traffic. Daytime period noise levels were in the range of 61 to 65dB $L_{Aeq,16hr}$ and 46 to 53dB $L_{A90,16hr}$. Night-time noise levels were in the range of 64 to 69dB $L_{Aeq,8hr}$ and 38 to 53dB $L_{A90,8hr}$.

Conclusion

The results of the baseline study suggest that baseline noise environment will not require additional constraints to be imposed on the majority of the proposed Project outside of the normal criteria applicable to a development of the scale and nature of that proposed.

Location C (inside main entrance) experienced high L_{Aeq} values during the night-time. This corresponds to short, intermittent periods of elevated noise, which can be attributed to the movements of HGVs into the currently operational haulage site. These HGV movements will not occur once the proposed Project is operational, and traffic noise will dominate the noise environment in this area of the Site.

It is considered that measurements made at Location B are more representative of prevailing noise levels at the apartments adjacent to the north Site boundary.

Rail movements on the line adjacent to the southern boundary have potential to impact on the nearest apartments. This is discussed in later sections.

15.4 Characteristics of the of the Proposed Project

The proposed Project is described in detail in Chapter 4 (Description of the Project Project). The aspects relevant to this chapter are detailed below.

15.4.1 Construction Phase

The Construction Phase will involve the demolition of a number of existing buildings, excavation over the Site, the formation of the basement levels and the construction of the new buildings.

15.4.2 Operational Phase

The primary source of outward noise that are deemed long-term are mechanical plant items that will serve the proposed Project. During the Operational Phase residents, customers and staff will make trips to and from the proposed Project.

15.5 Potential Impact of the Proposed Project

Taking into account the characteristics of the proposed Project, there is the potential for noise and vibration impacts during the short-term Construction Phase associated with construction activities and mobile plant, etc. During the long-term Operational Phase of the proposed Project there is a potential impact associated with noise emissions from mechanical plant items and from an increase in traffic coming to and from the Site.

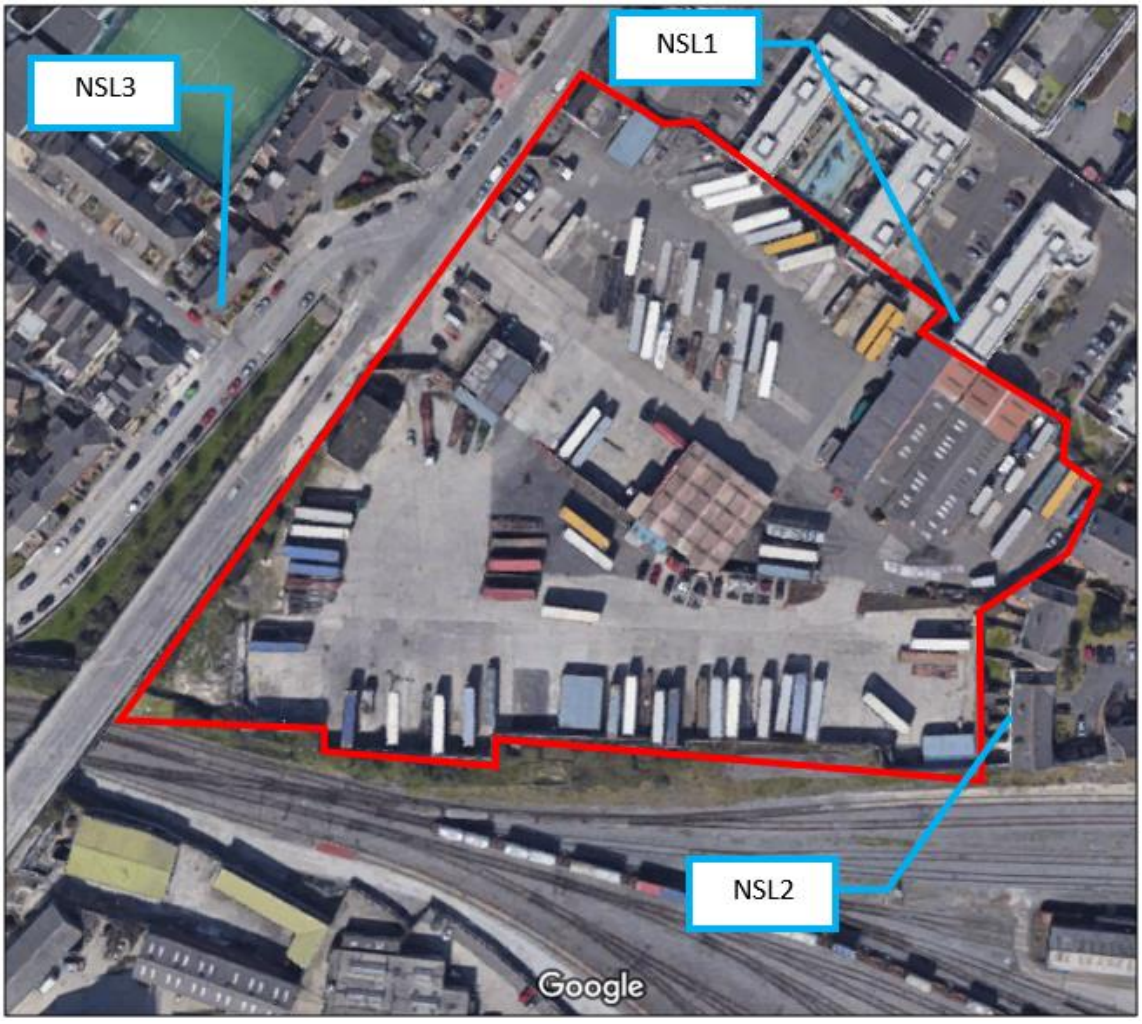
Noise impacts will be assessed to the nearest NSL to the proposed Project. These are identified in Figure 15.3 below.

NSL1 Apartments adjacent to the north boundary of the Site.

NSL2 Residential properties adjacent to the southeast boundary of the Site.

NSL3 Residential properties across the East road outside west boundary of the Site.

Figure 15.3: Noise Sensitive Locations (NSLs)



15.5.1 Construction Phase

15.5.1.1 Noise

The construction programme will create typical construction activity related noise onsite. During the Construction Phase of the proposed Project, a variety of items of plant will be in use, such as breakers, excavators, lifting equipment, dumper trucks, compressors and generators.

Due to the nature of daytime activities undertaken on a construction site of this nature, there is potential for generation of *significant* levels of noise. The flow of vehicular traffic to and from the Site is also a potential source of relatively high noise levels. The potential for vibration at neighbouring sensitive locations during the Construction Phase is typically limited to excavation and piling works and potentially from lorry movements on uneven road surfaces.

Due to the fact that the construction programme has been established in outline form only, it is difficult to calculate the actual magnitude of noise emissions to the local environment. However, it is possible to predict typical noise levels using guidance set out in *BS 5228-1:2009+A1:2014*. Table 15.9 below outlines typical plant items and associated noise levels that are anticipated for various phases of the construction programme.

Table 15.9: Typical Noise Levels Associated with Construction Plant Items

Phase	Item of Plant (BS 5228-1:2009+A1:2014 Ref.)	Construction Noise Level at 10m Distance (dB $L_{Aeq(1hour)}$)
Site Preparation	Wheeled Loader Lorry (D3 1)	75
	Track Excavator (C2 22)	72
	Dozer (C2.13)	78
	Dump Truck (C4.2)	78
Demolition	Pulveriser on Tracked Excavator (C1.5)	72
	Tracked Crusher (C1.14)	82
	Pulveriser on Tracked Excavator (C1.4)	76
	Dump Truck (C4.2)	78
Foundations	Tracked Excavator (C3.24)	74
	Concrete Pump (C3.25)	78
	Compressor (D7 6)	77
	Poker Vibrator (C4 33)	78
General Construction	Hand tools	81
	Tower Crane (C4.48)	76
	Pneumatic Circular Saw (D7.79)	75
	Internal fit – out	70
Landscaping	Dozer (C2.13)	78
	Dump Truck (C4.2)	78
	Surfacing (D8.25)	68

There are several residential and non-residential noise sensitive receivers in the vicinity of the Site. As construction occurs in different areas of the Site, the distance to the respective NSLs will vary, as will the noise level experienced at these receivers. The predicted noise levels for typical construction activities are presented below for increasing distances. It has been assumed that the existing boundary walls will be retained during the Construction Phase and will therefore provide some amount of screening.

As a *worst-case scenario* it is assumed that there will be periods where major works may take place in proximity to offsite noise sensitive receivers. Construction Phase noise levels have been predicted at a distance of 10m from the works.

Table 15.10: Predicted Noise Levels Associated with Construction Plant Items

Distance to NSL	Phase	Predicted Construction Noise Level $L_{Aeq(1hour)}$ (dB)
10m NSL2	Site Preparation	76
	Demolition	78
	Foundations	76
	General Construction	76
	Landscaping	74
15m NSL3	Site Preparation	72
	Demolition	74
	Foundations	72
	General Construction	72
	Landscaping	70

There are noise sensitive residential units close to the north boundary of the Site and to the southeast, c.10m from the Site boundary. At a slightly further distance there are residential properties some 15m from the western Site boundary. While it is likely that construction works will occur in close proximity to sensitive receivers it has been assumed that major works will occur 10m from the nearest NSL. The predicted Construction Phase noise levels at 10m distance, in the absence of noise mitigation measures are slightly above the 75dB(A) criteria and therefore it is expected that there will be a *negative, significant and short-term* impact at these receivers.

Mitigation measures and recommended good practices have been outlined in Section 15.6.

Other properties, such as those to the west, are some 15-30m from areas where construction works are expected to take place, and may experience noise levels that are at or just below the specified noise criteria. The predicted Construction Phase noise levels at this distance are at or below the 75dB(A) criteria therefore it is expected that there will be a *negative, moderate and short-term* impact at these receivers.

Construction Traffic

The noise levels associated with mobile plant items such as concrete mixer trucks, loaders etc. operational onsite have been included as part of the Construction Phase noise assessment and calculated noise levels in Table 15.10 above. Consideration should also be given to the addition of construction traffic along the Site access routes. Access to the Site for construction traffic will be via the East Road.

Since the pCMP is an outline only, it is not possible to comment on the exact numbers of Construction Phase vehicles moving to and from the Site.

There are measures set out in the pCMP to minimise the movement and impact of construction vehicles such as:

- Consolidation of delivery loads to / from the Site and management of large deliveries on site to occur outside of peak hours.
- *'Cut'* materials generated by the construction works to be re-used onsite where possible, through various works.
- The design of the works has involved an element of minimising the quantity of material to be removed from site by way of cut and fill balance.

In addition, considering the existing traffic volumes on the East Road are of the order of 64dB $L_{Aeq,16hr}$ during the daytime period, it is estimated that some 25 No. HGV movements per hour would yield a noise level of 64dB $L_{Aeq,1hr}$.

This would indicate that Construction Phase traffic of this magnitude or less would *not have a significant impact on* nearby noise sensitive receivers.

15.5.1.2 Vibration

The main potential source of vibration during the Construction Phase is associated with piling and ground-breaking activities.

For the purposes of this assessment the expected vibration levels during piling have been determined through reference to published empirical data. The *British Standard BS 5228 - Part 2: Vibration*, publishes the measured magnitude of vibration of rotary bored piling using a 600mm pile diameter for bored piling into soft ground over rock, (Table D.6, Ref. No. 106):

- 0.54mm/s at a distance of 5m, for auguring;
- 0.22mm/s at a distance of 5m, for twisting in casing;
- 0.42mm/s at a distance of 5m, for spinning off; and
- 0.43mm/s at a distance of 5m, for boring with rock auger.

Considering the low vibration levels at very close distances to the piling rigs, vibration levels at the nearby buildings are not expected to pose any significance in terms of cosmetic or structural damage. In addition, the range of vibration levels is typically below a level which would cause any disturbance to occupants of adjacent buildings.

Notwithstanding the above, any Construction Phase activities undertaken on the Site will be required to operate below the recommended vibration criteria set out in Section 15.2.2.

15.5.2 Operational Phase

15.5.2.1 Noise

There are two primary potential sources of noise associated with the development once operational. These are:

- mechanical plant noise; and
- additional vehicular traffic on public roads.

Each of these primary noise sources is addressed in turn in the following sections.

Note that there is *no significant source of vibration* associated with the Operational Phase of the proposed Project.

Mechanical Plant

During the Operational Phase, there will be a variety of mechanical and electrical plant that will be required to service the proposed Project, some of which will have the possibility of emitting noise to the surroundings. Noise emission levels from the proposed Project will be linked to the hours of occupancy of the various buildings meaning that noise emissions will reduce to minimal levels during the most sensitive periods (*i.e.* at night-time). It is understood that the proposed Project plant items includes outdoor comms split units, kitchen extract fans, ventilation louvres, and heat pump units. It is expected that only the heat pumps will operate at night-time.

To ensure noise impacts on the nearest offsite sensitive locations are controlled to be within the criteria discussed in Section 15.2.3.1, noise from building services plant will be controlled during the detailed design such that it does not exceed the criteria discussed in Section 15.2.3.

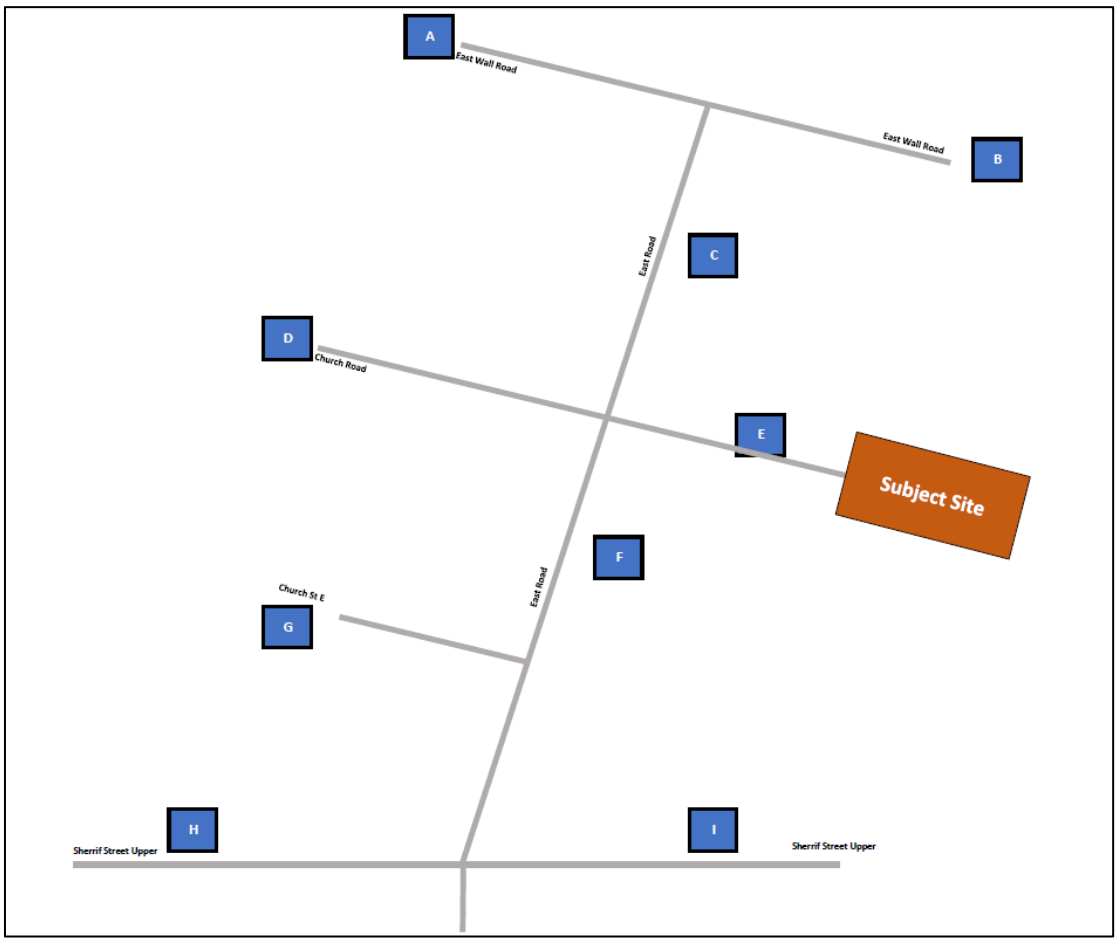
Onsite noise impacts from mechanical plant serving the proposed Project will be controlled to acceptable levels internally within the residential units by the façade specification as discussed in Appendix A15.1.

Additional Traffic on Adjacent Roads

It is anticipated that the proposed Project will attract customers and enterprise workers. There is also provision of some 277 No. resident parking spaces.

Figure 15.4 below from the Traffic and Transport Assessment (TTA) illustrates the road links in the vicinity of the Site. The traffic flows on these road links have been provided by DBFL Traffic Consultants in the form of Annual Average Daily Traffic (AADT).

Figure 15.4: Road Links



The predicted changes in noise level has been calculated based on the change in traffic flows for the various scenarios considered. These are presented in the Table 15.11 below.

Table 15.11: Summary of Predicted Change in Noise Level - Opening Year / Design Year

Road Link	Traffic Flows – AADT		
	Do Nothing – 2020 (Without development)	Do Something – 2020 (With Development)	Predicted Change in Noise Level (dB)
A	16425	16516	0.0
B	12626	12670	0.0
C	5997	6132	0.1
D	2841	2854	0.0
F	9387	9622	+0.1
G	325	325	0.0
H	5605	5686	+0.1
I	7368	7415	0.0
Road Link	Traffic Flows – AADT		
	Do Nothing – 2035 (Without development)	Do Something – 2035 (With Development)	Predicted Change in Noise Level (dB)
A	19360	19451	0.0
B	14601	14645	0.0
C	7242	7377	+0.1
D	3454	3466	0.0
F	11317	11552	+0.1
G	377	377	0.0
H	6907	6988	+0.1
I	9512	9560	0.0

Note - Road link E represents the access road to the proposed site and has been removed from consideration with respect to outward noise impact.

At all external road links the predicted changes in noise levels for the road links under consideration are in the range of 0.0 to 0.1dB. With reference to Table 15.11 above the impact in the vicinity of Link E is *negligible*. The overall impact is determined to be *neutral, imperceptible and long-term*.

Inward Noise Impact

An assessment of the inward noise impact from road and rail traffic sources has been carried out and is included in full in Appendix A15.1. In summary the noise levels across the Site from road, rail and plant result in the Site having a *medium to high* noise risk in accordance with the guidance in ProPG. Full details of the assessment are contained in Appendix A15.1 and the mitigation measures required to protect residential amenity are summarised in Section 15.6.

15.5.2.2 Vibration

There is *no source of significant vibration* associated with the Operational Phase of the proposed Project.

15.6 Mitigation Measures

15.6.1 Construction Phase

Noise

The impact assessment conducted for the Construction Phase activity has highlighted that the predicted Construction Phase noise levels are above the adopted criterion at distances of 10m or less, and that a *negative* impact on nearby receivers will occur.

Best practice control measures for noise and vibration from construction sites are found within *BS 5228 (2009 +A1 2014) Code of Practice for Noise and Vibration Control on Construction and Open Sites Parts 1 and 2*. Whist construction noise and vibration impacts are expected to vary during the Construction Phase depending on the distance between the activities and noise sensitive buildings, the appointed Contractor will ensure that all best practice noise and vibration control methods will be used, as necessary in order to ensure impacts at offsite NSL's are minimised. The best practice measures set out in *BS 5228 (2009) Parts 1 and* 2 includes guidance on several aspects of construction site mitigation measures, including, but not limited to:

- selection of quiet plant;
- noise control at source;
- screening;
- liaison with the public; and
- monitoring.

Detailed comment is offered on these items in the following paragraphs. Noise control measures that will be considered include the selection of quiet plant, enclosures and screens around noise sources, limiting the hours of work and noise and vibration monitoring, where required.

15.6.1.1 Selection of Quiet Plant

This practice is recommended in relation to static plant such as compressors and generators. It is recommended that these units be supplied with manufacturers' proprietary acoustic enclosures. 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 or not said item can be replaced with a quieter alternative.

15.6.1.2 Noise Control at Source

If replacing a noisy item of plant is not a viable or practical option, 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 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.

Referring to the potential noise generating sources for the works under consideration, the following best practice mitigation measures should be considered:

- The Site construction compound should be located away from noise sensitive boundaries within the Site constraints. The use lifting bulky items, dropping and loading of materials within these areas should be restricted to normal working hours.
- For mobile plant items such as 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 concrete mixers, control measures should be employed during cleaning to ensure no impulsive hammering is undertaken at the mixer drum.

- For all materials handling ensure that materials are not dropped from excessive heights, lining drops chutes and dump trucks 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 will 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.

15.6.1.3 Screening

Screening is an effective method of reducing the noise level at a receiver location and can be used successfully as an additional measure to all other forms of noise control. Construction Site hoarding will be constructed around the north, west and southern Site boundaries as standard. The hoarding will be constructed of a material with a mass per unit of surface area greater than 7kg/m^2 to provide adequate sound insulation.

In addition, careful planning of the Site layout will also be considered. The placement of Site buildings such as offices and stores will be used, where feasible, to provide noise screening when placed between the source and the receiver.

15.6.1.4 Liaison with the Public

A Site Manager will be appointed to Site during the Construction Phase. Any noise complaints should be logged and followed up in a prompt fashion by the Site Manager. In addition, where a particularly noisy construction activity is planned or other works with the potential to generate high levels of noise, or where noisy works are expected to operate outside of normal working hours etc., the Site Manager will inform the nearest NSL of the time and expected duration of the noisy works.

15.6.1.5 Project Programme

The phasing programme will be arranged so as to control the amount of disturbance in noise and vibration sensitive areas at times that are considered of greatest sensitivity. During excavation / breaking or other high noise generating works are in progress on a site at the same time as other works of construction that themselves may generate significant noise and vibration, the working programme will be phased so as to prevent unacceptable disturbance at any time.

Vibration

Any Construction Phase activities undertaken on the Site will be required to operate below the recommended vibration criteria set out in Section 15.2.2.

15.6.2 Operational Phase

Mechanical Plant

The assessment outlined previously has specified noise limits at the nearest noise sensitive properties that must be achieved in order to ensure the impact is acceptable. To achieve these noise limits consideration will be given, at the detailed design stage, to a variety of mitigation measures and forms of noise control techniques. Some example of these measures are as follows:

- duct mounted attenuators on the atmosphere side of air moving plant;
- splitter attenuators or acoustic louvres providing free ventilation to internal plant areas;
- solid barriers screening any external plant; and
- anti-vibration mounts on reciprocating plant.

In addition to the above, it is proposed that the following practices are adopted to minimise potential noise disturbance for neighbours.

- all mechanical plant items e.g. motors, pumps etc. shall be regularly maintained to ensure that excessive noise generated any worn or rattling components is minimised; and
- any new or replacement mechanical plant items, including plant located inside new or existing buildings, shall be designed so that all noise emissions from the Site do not exceed the noise limits outlined in this document.

Additional Traffic on Adjacent Roads

The noise impact assessment outlined above has demonstrated that *mitigation measures are not required*.

Inward Noise Impact

The facades highlighted in Figure 15.5 below will be provided with upgraded glazing that achieves the minimum sound insulation performance as set out in Table 15.12 below.

Figure 15.5: Predicted Cumulative Façade Levels

Table 15.12: Sound Insulation Performance Requirements for Glazing, SRI (dB)

Glazing Specification	Octave Band Centre Frequency (Hz)						R_w
	125	250	500	1k	2k	4k	
Red	21	31	39	41	41	52	40
Orange / Green	22	20	26	34	46	39	32

The overall R_w outlined above are provided for information purposes only. The over-riding requirement is the Octave Band sound insulation performance values which may also be achieved using alternative glazing configurations. Any selected system will be required to provide the same level of sound insulation performance set out in Table 15.12 or greater.

It is important to note that the acoustic performance specifications detailed herein are minimum requirements which apply to the overall glazing system. In the context of the acoustic performance specification the 'glazing system' is understood to include any and all of the component parts that form part of the glazing element of the façade, i.e. glass, frames, seals, openable elements etc.

It is also proposed to build an acoustic wall along the south podium edge in order to provide screening to the nearest noise sensitive apartments.

15.7 Residual Impacts

15.7.1 Construction Phase

During the Construction Phase of the proposed Project there is the potential *for significant and moderate impacts* on nearby noise sensitive properties due to noise emissions from Site activities. The application of binding noise limits, hours of operation, along with implementation of appropriate noise and vibration control measures, will ensure that noise and vibration impact will have a *negative, moderate and short-term impact* on the surrounding environment.

15.7.2 Operational Phase

15.7.2.1 Additional Vehicular Traffic

The predicted change noise levels associated with additional traffic is predicted to be of *slight impact* at the Site access road and *imperceptible impact* along the surrounding existing road network. In the context of the existing noise environment, the overall contribution of induced traffic is considered to be of *neutral, imperceptible* and *long-term impact* to nearby residential locations.

15.7.2.2 Mechanical Plant

Once the operational noise levels do not exceed the adopted design goals, the resultant residual noise impact from this source will be of *neutral and long-term impact.*

15.7.2.3 Inward Impact

With the mitigation measures discussed in Section 15.6 in place the internal noise levels within those proposed buildings most exposed to road traffic, rail and mechanical plant noise will achieve the criteria outlined in Table 15.4 when the windows are closed. The resultant residual noise impact from this source will be of *neutral, long-term impact.*

15.8 Monitoring

Where required, Construction Phase noise monitoring will be undertaken at periodic sample periods at the nearest NSLs to the development works to check compliance with the Construction Phase noise criterion.

Noise monitoring should be conducted in accordance with the *International Standard ISO 1996: 2017: Acoustics – Description, Measurement and Assessment of Environmental Noise*.

15.9 Reinstatement

There are no reinstatement requirements with respect to noise and vibration.

15.10 Interactions

Interactions included discussion with mechanical services engineers and architects on the topic of plant locations so as to minimise impact on noise sensitive receivers.

15.11 Difficulties Encountered in Compiling the Chapter

No difficulties were encountered in the preparation of this EIAR Chapter.

15.12 Cumulative Impacts

There are several committed developments in relative proximity to the proposed Project. During the Construction Phase of the proposed Project, Construction Phase noise onsite will be localised and will therefore likely be the primary noise source at the nearest noise sensitive receivers. In the event that Construction Phase activities associated with other committed developments occur simultaneous to the proposed Project they are at sufficient distances such that the cumulative noise levels will remain dominated by the localised works referred to in Table 15.9.

Permitted developments are included in the traffic impact and therefore the potential for a cumulative impact has already been assessed. Future projects of any future currently unpermitted large scale would need to conduct an EIA to ensure that no significant impacts resulting from noise and vibration will occur as a result of those developments.

15.13 'Do-Nothing' Impact

If the proposed Project is not progressed the existing noise environment (as measured in the baseline assessment) in the vicinity of the Site and noise sensitive receivers will remain largely unchanged.

15.14 References

- BS 4142: 2014: Methods for Rating and Assessing Industrial and Commercial Sound
- BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise
- BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration
- BS 6841 (1987): Measurement and evaluation of human exposure to whole-body mechanical vibration and repeated shock
- Design Manual for Roads and Bridges, 2011
- EPA Advice Notes for Preparing Environmental Impact Statements, (Draft, September 2015)
- EPA Advice Notes on Current Practice (in the preparation of Environmental Impact Statements), (EPA, 2003)
- EPA Guidelines on the Information to be contained in Environmental Impact Statements, (EPA, 2002)
- EPA Guidelines on the Information to be contained in Environmental Impact Assessment Reports, (Draft August 2017)
- ISO 1996: 2017: Acoustics – Description, Measurement And Assessment of Environmental Noise
- ProPG: Planning & Noise – Professional Guidance on Planning and Noise, 2017.

16 Microclimate - Daylight / Sunlight

16.1 Introduction

This Chapter assesses the likely potential daylight and sunlight access impacts associated with the microclimate of the proposed Project.

To date, it is understood that no standards or guidance documents (statutory or otherwise) on the subject of sunlight access to buildings or open spaces or daylight access to buildings have been prepared or published in Ireland. In the absence of guidance on the matter of sunlight and daylight access tailored to Irish climatic conditions, Irish practitioners tend to refer to the relevant *British Standard, BS 8206-2:2008: Lighting for buildings - Part 2: Code of practice for daylighting*. The standards for daylight and sunlight access in buildings (and the methodologies for assessment of same) suggested in the British Standard have been referenced in this Chapter.

The Dublin City Development Plan 2016-2022 states as follows in relation to residential development: *'Development shall be guided by the principles of Site Layout Planning for Daylight and Sunlight, A guide to good practice*[139]*.'* As the application is a residential development, the contents of PJ Littlefair's 2011 revision of the 1991 publication *Site Layout Planning for Daylight and Sunlight: A Guide To Good Practice* for the Building Research Establishment (BRE) has been considered in the preparation of this Chapter.

Neither the British Standard nor the BRE Guide set out rigid standards or limits. The BRE Guide is preceded by the following very clear warning as to how the design advice contained therein should be used:

> *'The advice given here is not mandatory and the guide should not be seen as an instrument of planning policy; its aim is to help rather than constrain the designer. Although it gives numerical guidelines, these should be interpreted flexibly since natural lighting is only one of many factors in site layout design.'* [Emphasis added.]

That the recommendations of the BRE Guide are not suitable for rigid application to all developments in all contexts is of particular importance in the context of national and local policies for the consolidation and densification of urban areas or when assessing applications for highly constrained sites (e.g. lands in close proximity or immediately to the south of residential lands).

For a full description of the proposed Project, see Chapter 4 (Description of the Proposed Project).

16.2 Baseline Environment

The Site comprises a large brownfield site to the north of the Dublin Port railway lane. It currently accommodates Hireco Park, which provides services related to articulated trailers, including hire of articulated trailers. The section of East Road opposing the Site and Church Road (which is accessed from East Road) is characterised by two storey terraced buildings largely in residential use. Lands to the north of the application site have been redeveloped with three to six storey commercial, residential and mixed use buildings. The three storey residential development at Teeling Way is located to the north of the Site. Two storey terraced houses at Merchant's Square are located to the east of the Site.

The wider context at the southern end of East Road is characterised by recent dense development of significant scale that has occurred as part of the regeneration of the Dublin Docklands area, including the Convention Centre Dublin at Spencer Dock and the Point Village complex at East Wall Road. With the exception of the new Central Bank development and the now under construction Dublin Landings scheme, much of the Docklands are to the south of the application site remains vacant or underused (e.g. accommodating low density warehousing) pending implementation of the SDZ Planning Scheme. However, it is notable that permission for significant development has recently been granted by Dublin City Council in respect of most of the undeveloped lands at the southern

[139] Building Research Establishment Report, 2011

termination of City Blocks 2 and 3. It is also notable that high density development has occurred outside the boundary of the *North Lotts and Grand Canal Dock SDZ Planning Scheme*, including a residential development rising to a height of eleven storeys at the junction of East Road and Sheriff Street Upper.

Given the vacant character of the Site and relatively large areas of low density development surrounding the site, the shadow environment of the existing site and of its immediate surroundings is inconsistent with what would normally be expected in the urban core or the industrial docklands area of a city.

16.3 Methodology

16.3.1 Sunlight Access Impact Analysis

16.3.1.1 Context under Technical Guidance Documents

The relevant *British Standard, BS 8206-2:2008: Lighting for buildings - Part 2: Code of practice for daylightin*g, recommends, at Section 5.3: Sunlight Duration, the following test for the assessment of sunlight access to residential accommodation: *'Interiors in which the occupants have a reasonable expectation of direct sunlight should receive at least 25% of probable sunlight hours... At least 5% of probable sunlight hours should be received during the winter months, between 21st September and 21st March. Sunlight is taken to enter an interior when it reaches one or more window reference points.' 'Probable sunlight hours'* is described by the British Standard as meaning the *'long-term average of the total number of hours during the year in which direct sunlight reaches the unobstructed ground.'*

The BRE Guide states that *'Any reduction in sunlight access below this level should be kept to a minimum. If the available sunlight hours are both less than the amount above and less than 0.8 times their former value, either over the whole year or just in the winter months (21st September to 21st March), then the occupants of the existing building will notice the loss of sunlight … The room may appear colder and less cheerful and less pleasant'*.

Section 3.3 of the Building Research Establishment's *Site layout planning for daylight and sunlight: a guide to good practice* sets out design advice and recommendations for site layout planning to ensure good sunlight access to amenity spaces and to minimise the impact of new development on existing amenity spaces. The Guide suggests that, for it to appear adequately sunlit throughout the year, at least half of a garden or amenity area should receive at least two hours sunlight at the equinox. The BRE Guide recommends that, as a rule of thumb, the centre of the space should receive at least two hours of sunlight on the 21st March in order to appear adequately sunlit throughout the year.

16.3.1.2 Assessment Methodology for Sunlight Access

A three dimensional digital model of the proposed Project and of existing buildings in the area was constructed by ARC Consultants based on drawings and three dimensional models supplied by the Design Team; and with reference to Dublin City Council's online planning register, on-site, satellite and aerial photography. Using the digital model, shadows were cast by ARC at several times of the day at the summer and winter solstices, and at the equinox. An equinox occurs twice a year: the March or vernal equinox (typically in or around the 20th to 21st March) and the September or autumnal equinox (typically in or around the 21st to 23rd September). For the purposes of this analysis and with reference to the BRE Guide, shadows were cast at several times of the day on 21st March.

In determining whether or not to include existing and proposed substantial trees in the three dimensional model, ARC made reference to the BRE Guide (as updated in 2011), which states that the *'question of whether trees or fences should be included in the calculation depends upon the type of shade they produce. Normally trees and shrubs need not be included, and partly because the dappled shade of a tree is more pleasant than the deep shadow of a building (this applies especially to deciduous trees).'* Given this, ARC did not show the shadows cast by trees on the shadow study diagrams.

The results are presented in shadow study diagrams associated with this report. Two separate pages have been prepared for each time period on each representative date as follows:

- *Receiving Environment:* this page shows the shadows cast by the existing buildings only. Existing buildings surrounding the application site are shown in light grey, while existing buildings on the application site are shown in orange. The shadows cast are shown in a dark grey tone.
- *Proposed Development:* this page shows the shadows cast by the existing buildings together with the shadows cast by the proposed development. The existing buildings surrounding the site are shown in light grey, while the proposed development and existing buildings to be retained on the application site are shown in blue. The shadows cast are shown in a dark grey tone.

In order to calculate sunlight access to rooms, ARC referenced the methodology outlined in *Appendix A: Indicators to calculate access to skylight, sunlight and solar radiation* of the BRE Guide. Using proprietary sunlight and daylight access analysis software, ARC analysed a sunpath diagram overlaid with a shading mask corresponding to the existing or proposed shadow environment (as appropriate) and the sunlight probability diagram for a latitude of 53° N (i.e. Dublin) for a reference point (i.e. the centre point) of each sample study window. The sunlight availability indicator has 100 spots on it. Each of these represents 1% of annual probable sunlight hours (APSH). The percentage of APSH at the reference point is found by counting up all the unobstructed spots.

16.3.1.3 Definitions of Impacts on Sunlight Access

The assessment of impacts on sunlight access had regard to the *Guidelines on the Information to be Contained in Environmental Impact Statements*[140] and to Directive 2011/92/EU (as amended) on the assessment of the likely effects of certain public and private projects on the environment.

Table 16.1 below list the definitions taken from *Section 5: Glossary of Impacts* contained in the *Guidelines on the Information to be Contained in Environmental Impact Statements*[141]. Some comment is also given below on what these definitions might imply in the case of impact on sunlight access. The definitions from the EPA document are in italics.

Table 16.1: Definitions of Significance of Impact

Significance of Impact	Description of Significance of Impact
Imperceptible	*An impact capable of measurement but without noticeable consequences.* The definition implies that the development would cause a change in the sunlight received at a location, capable of measurement, but not noticeable. If the development caused no change in sunlight access, there could be no impact.
Slight Impact	*An impact which* causes *noticeable changes in the character of the environment without affecting its sensitivities.* For this definition to apply, the amount of sunlight received at a location would be changed by shadows cast by the development to an extent that is both capable of measurement and is noticeable to a minor degree. However, the shadow environment of the surrounding environment should remain largely unchanged.
Moderate Impact	*An impact that alters the character of the environment in a manner that is consistent with emerging trends.* In this case, a development must bring about a change in the shadow environment of the area; and this change must be consistent with a pattern of change that is already taking place. This impact would occur where other developments were bringing about changes in sunlight access in the area.
Significant Impact	*An impact which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.*

[140] EPA, 2002

[141] ARC also had regard to the contents of the Guidelines on information to be contained in Environmental Impact Assessment Reports DRAFT (August 2017) in the preparation of this report. However, as this document has yet to be finalized, the 2002 Guidelines were used as the basis for the definition of impacts on sunlight access.

Significance of Impact	Description of Significance of Impact
	This impact would occur where the development overshadows a location to the effect that there is a significant change in the amount of direct sunlight received at that location.
Profound Impact	*An impact which obliterates sensitive characteristics.* In terms of sunlight access, a development must cast shadows over a location, where sunlight access was previously enjoyed, to the extent that all access to sunlight is removed.

The range of possible impacts listed above deal largely with the extent of impact; and the extent of the impact of a development is usually proportional to the extent to which that development is large in scale and / or height and its proximity to the location. This proportionality may be modified by the extent to which the development is seen as culturally or socially acceptable, and on the interaction between the proposed Project, the character of the existing shadow environment and the land use pattern of the receiving environment.

16.3.2 Potential Impact of the Proposed Project on Sunlight Access

The statistics of Met Éireann, indicate that the sunniest months in Ireland are May and June. During December, Dublin receives a mean daily duration of 1.7 hours of sunlight out of a potential 7.4 hours sunlight each day (i.e., only 22% of potential sunlight hours). This can be compared with a mean daily duration of 6.4 hours of sunlight out of a potential 16.7 hours each day received by Dublin during June (i.e. 38% of potential sunlight hours). Therefore, impacts caused by overshadowing are generally most noticeable during the summer months and least noticeable during the winter months. Due to the low angle of the sun in mid-winter, the shadow environment in all urban and suburban areas is generally dense throughout winter.

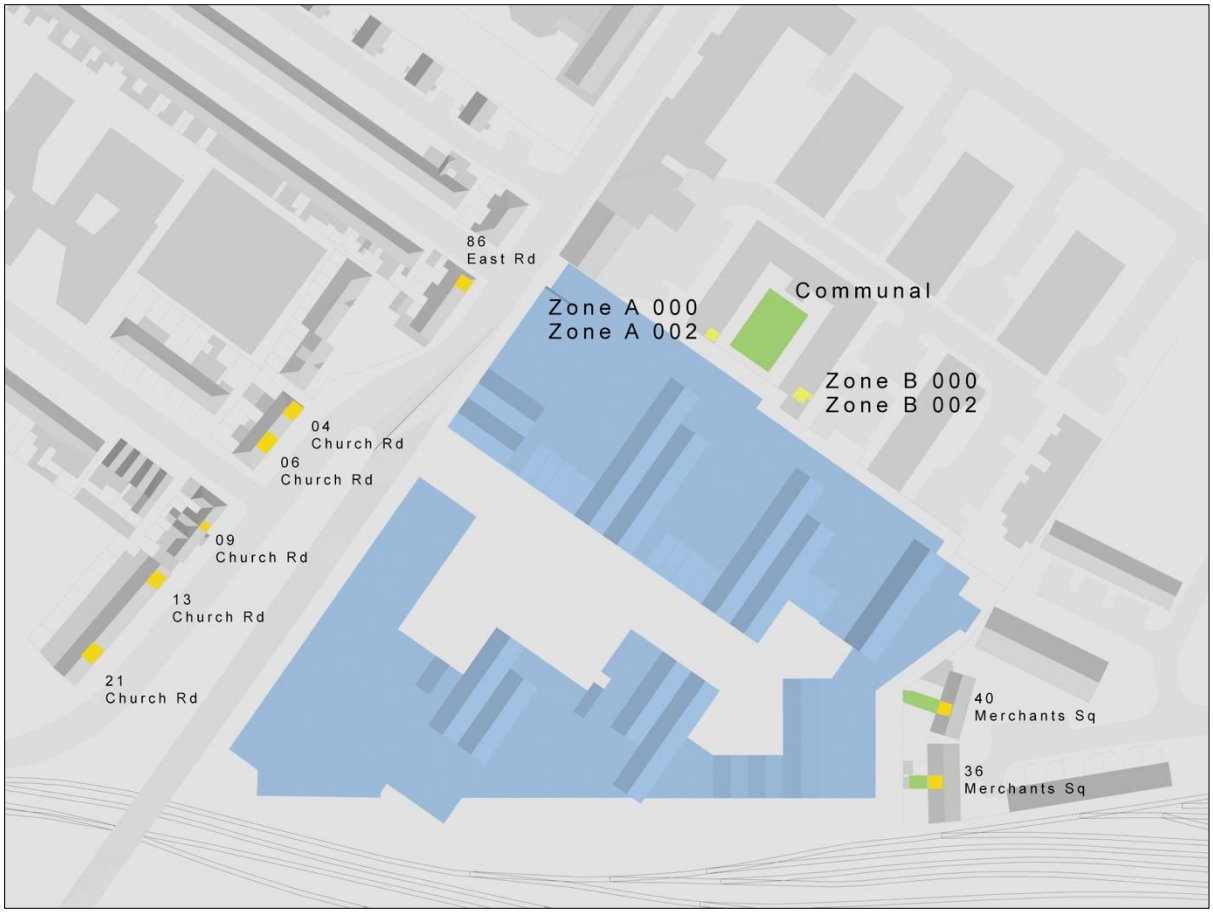
In assessing the impact of a development on sunlight access, the comments of PJ Littlefair in *Site layout planning for Daylight and Sunlight: A Guide to Good Practice* (the BRE Guide) should be taken into consideration. The BRE Guide states that *'it must be borne in mind that nearly all structures will create areas of new shadow, and some degree of transient overshadowing of a space is to be expected.'*

16.3.2.1 Overview of the Potential Impact of Shadows Cast by the Proposed Project outside the Site

Given that the Site is now largely vacant, it is envisaged that shadows cast by the proposed Project have the potential to result in a considerable change in the existing shadow environment of the surrounding area. Specifically, the proposed Project has the potential to result in additional overshadowing of East Road and Church Road to the west during the mornings, Teeling Way to the north at various times of the day and Merchants Square to the east during the afternoons and evenings throughout the year. However, ARC's analysis indicates that the construction of the proposed Project is unlikely to result in any undue adverse impacts on buildings and amenity areas on lands surrounding the Site within the meaning of the BRE Guide. ARC's analysis, therefore, indicates that the potential impact of shadows cast by the proposed Project on lands to the west, north and east is likely to range from '*imperceptible*' to '*moderate*' over the course of the year. Under a worst-case scenario, the potential impact of shadows cast by the proposed Project on East Road, Church Road, Teeling Way and Merchants Square is likely to be consistent with emerging trends for development in the area and is unlikely to result in any undue adverse impacts on sunlight access to existing buildings and amenity areas.

During the winter months, when the sun is low in the sky, shadows cast by the proposed Project have the potential to extend some distance to the west, north and east. However, due to the density of the shadow environment at this time of the year, the construction of the proposed Project is unlikely to result in a material change to the shadow environment of more distant lands to the north of the site. The potential impact of the proposed Project on more distant lands to the west, north and east of the Site is, therefore, likely to range from none to '*imperceptible*' to '*slight*' for a short time during the winter months.

Figure 16.1: Indicative diagram showing location of sample rooms and windows assessed as part of this Sunlight and Daylight Access Impact Analysis



16.3.2.2 Detailed Analysis of the Potential Impact of Shadows Cast by the Proposed Project on Existing Buildings outside the Site

This Chapter assesses the impact of the proposed Project on all potential receptors surrounding the Site - these impacts are described in Section 16.3.2.1 above. However, by way of example in order to illustrate briefly the findings outlined in the overview section, ARC conducted quantitative analysis of the potential for the proposed Project to result in impacts on sunlight access to a representative sample of sensitive receptors (i.e. windows) in buildings in proximity to the Site (see Figure 16.1 above).

The only Irish statutory guidance to provide advice on undertaking sunlight and daylight access impact analysis is set out in the *Advice Notes on Current Practice*[142], which accompany the *Guidelines on the Information to be Contained in Environmental Impact Statements*.

These Advice notes state: *'Climate in an Environmental Impact Statement generally refers to the local climatological conditions or 'microclimate' of an area, such as local wind flow, temperature, rainfall or solar radiation patterns ... it is important to identify receptors which may be particularly sensitive to climate change.'* Having regard to the Advice Notes, ARC undertook detailed quantitative analysis of those receptors particularly sensitive to changes in the sunlight environment in order to illustrate the empirical basis for the conclusions outlined in Section 16.3.2.1 above.

In identifying receptors particularly sensitive to changes in the shadow environment, ARC considered two factors:

142 EPA, 2002

(i) *the use of receptors (i.e. buildings) surrounding the Site*: buildings in residential use (and, particularly, the living rooms of residences) would be considered to be sensitive to changes in the shadow environment;

(ii) *the location of receptors relative to the Site:* as set out in Section 3.2.2 of the BRE Guide *'obstruction to sunlight may become an issue if some part of a new development is situated within 90° of due south of a main windows wall of an existing building'* and if *'in the section drawn perpendicular to this existing window wall, the new development subtends an angle greater than 25° to the horizontal measured from the centre of the lowest window to a main living room'*

Given this, the receptors most sensitive to changes in the shadow environment as a result of the construction of development on the Site would be windows facing towards the proposal at low levels of accommodation with a reasonable expectation of sunlight[143] in buildings in residential use to the west, north and east of the site (i.e. low level windows at East Road, Church Road, Teeling Way and Merchants Square). Therefore, ARC identified a representative sample of windows at East Road, Church Road, Teeling Way and Merchants Square for detailed quantitative analysis. This sample is considered to constitute a worst-case scenario.

Section 3.2.1 of the BRE Guide *Site layout planning for daylight and sunlight: a guide to good practice* provides as follows in relation to the assessment of the impact of development on sunlight access to existing buildings.

> *'If a living room of an existing dwelling has a main window facing within 90° of due south, and any part of a new development subtends an angle of more than 25° to the horizontal measured from the centre of the window in a vertical section perpendicular to the window, then the sunlighting of the existing dwelling may be adversely affected. This will be the case if the centre of the window:*
>
> - *receives less than 25% of* annual *probable* sunlight *hours, or less than 5% of annual probable sunlight hours between 21st September and 21st March and*
> - *receives less than 0.8 times its former sunlight hours during either period and*
> - *has a reduction in sunlight received over the whole year greater than 4% of annual probable sunlight hours.'*

143 The BRE Guide does not identify a need to undertake detailed quantitative assessment of the impact of new development on existing buildings, which do not face within 90° of due south (i.e. such as No. 40 Merchants Square) and does not set out a recommended level of sunlight access for such windows. Given this, the below analysis focuses on windows facing within 90° of due south.

Table 16.2: Impact of the proposed Project on Sunlight Access to Sample Windows in Existing Buildings on Lands Surrounding the Site

Zone	Existing Probable Sunlight Hours Received			Proposed Probable Sunlight Hours Received		
	Annual	Summer*	Winter*	Annual	Summer*	Winter*
Zone a000 Teeling Way Floor 00	34%	30%	4%	34%	30%	4%
	BRE recommendation met: Potential impact below BRE threshold for adverse impact. ARC's analysis of potential impacts on sunlight access indicates that there will be no change in sunlight access to this window after the construction of the proposed Project.					
Zone a002 Teeling Way Floor 02	60%	42%	18%	53%	42%	11%
	BRE recommendation met: Potential impact below BRE threshold for adverse impact. ARC's analysis of potential impacts on sunlight access indicates that this window will continue to receive a level of sunlight in excess of the BRE recommendation of 25% Annual Probable Sunlight Hours (including 5% Annual Probable Sunlight Hours during the winter period) after the construction of the proposed Project.					
Zone b000 Teeling Way Floor 00	26%	21%	5%	25%	21%	4%
	BRE recommendation met: Potential impact below BRE threshold for adverse impact. ARC's analysis of potential impacts on sunlight access indicates that this window will not experience a reduction of greater than 4% of annual probable sunlight hours over the course of the year after the construction of the proposed Project.					
Zone b002 Teeling Way Floor 02	33%	24%	9%	33%	24%	9%
	BRE recommendation met: Potential impact below BRE threshold for adverse impact. ARC's analysis of potential impacts on sunlight access indicates that there will be no change in sunlight access to this window after the construction of the proposed Project.					
Zone 21 Church Road Floor 00	68%	47%	21%	51%	33%	18%
	BRE recommendation met: Potential impact below BRE threshold for adverse impact. ARC's analysis of potential impacts on sunlight access indicates that this window will continue to receive a level of sunlight in excess of the BRE recommendation of 25% Annual Probable Sunlight Hours (including 5% Annual Probable Sunlight Hours during the winter period) after the construction of the proposed Project.					
Zone 13 Church Road Floor 00	69%	47%	22%	51%	36%	15%
	BRE recommendation met: Potential impact below BRE threshold for adverse impact. ARC's analysis of potential impacts on sunlight access indicates that this window will continue to receive a level of sunlight in excess of the BRE recommendation of 25% Annual Probable Sunlight Hours (including 5% Annual Probable Sunlight Hours during the winter period) after the construction of the proposed Project.					
Zone 08 Church Road Floor 00	61%	47%	14%	42%	37%	5%
	BRE recommendation met: Potential impact below BRE threshold for adverse impact. ARC's analysis of potential impacts on sunlight access indicates that this window will continue to receive a level of sunlight in excess of the BRE recommendation of 25% Annual Probable Sunlight Hours (including 5% Annual Probable Sunlight Hours during the winter period) after the construction of the proposed Project.					
Zone 06 Church Road Floor 00	68%	47%	21%	48%	37%	11%
	BRE recommendation met: Potential impact below BRE threshold for adverse impact. ARC's analysis of potential impacts on sunlight access indicates that this window will continue to receive a level of sunlight in excess of the BRE recommendation of 25% Annual Probable Sunlight					

Zone	Existing Probable Sunlight Hours Received			Proposed Probable Sunlight Hours Received		
	Annual	Summer*	Winter*	Annual	Summer*	Winter*
	Hours (including 5% Annual Probable Sunlight Hours during the winter period) after the construction of the proposed Project.					
Zone 04 Church Road Floor 00	69%	46%	23%	50%	38%	12%
	BRE recommendation met: Potential impact below BRE threshold for adverse impact. ARC's analysis of potential impacts on sunlight access indicates that this window will continue to receive a level of sunlight in excess of the BRE recommendation of 25% Annual Probable Sunlight Hours (including 5% Annual Probable Sunlight Hours during the winter period) after the construction of the proposed Project.					
Zone 86 East Road Floor 00	64%	42%	22%	37%	31%	6%
	BRE recommendation met: Potential impact below BRE threshold for adverse impact. ARC's analysis of potential impacts on sunlight access indicates that this window will continue to receive a level of sunlight in excess of the BRE recommendation of 25% Annual Probable Sunlight Hours (including 5% Annual Probable Sunlight Hours during the winter period) after the construction of the proposed Project.					
Zone 36 Merchants Square Floor 00	35%	27%	8%	32%	24%	8%
	BRE recommendation met: Potential impact below BRE threshold for adverse impact. ARC's analysis of potential impacts on sunlight access indicates that this window will continue to receive a level of sunlight in excess of the BRE recommendation of 25% Annual Probable Sunlight Hours (including 5% Annual Probable Sunlight Hours during the winter period) after the construction of the proposed Project.					

* *For the purposes of this calculation, summer is taken to mean the period between March and September, and winter is considered to be the period between September and March.*

** *While Section 3.2.1 of the BRE Guide refers to assessing the impact on living room windows, the windows assessed as part of this analysis have been chosen on the basis of potential for impact on sunlight access rather than the use of rooms.*

ARC's analysis indicates that the potential impact of the proposed development on sample studied windows with a reasonable expectation of sunlight on lands surrounding the application site is unlikely to be of a level, which would suggest that *'sunlighting of the existing dwelling may be adversely affected'* (i.e. the three criteria set out in the BRE Guide will not be met in the case of the sample windows with a reasonable expectation of sunlight). The potential impact of shadows cast by the proposed development on the sample studied windows in buildings in proximity to the application site is, therefore, likely to range from '*imperceptible*' to '*slight*'.

16.3.2.3 Detailed Analysis of the Potential Impact of Shadows Cast by the Proposed Project on Gardens and Amenity Areas outside the Site

Insofar as amenity spaces / gardens are concerned, the BRE Guide provides that *'It is recommended that for it to appear adequately sunlit throughout the year, at least half of a garden or amenity area should receive at least two hours of sunlight on 21st March. If as a result of new development an existing garden or amenity area does not meet the above, and the area which can receive two hours of sun on 21st March is less than 0.8 times its former value, then the loss of sunlight is likely to be noticeable.'* [Emphasis added.] This suggests that where a garden or amenity area can receive two hours of sun over half its area on the 21st March notwithstanding the construction of a proposed Project, loss of sunlight as a result of additional overshadowing is not likely to be noticed.

There are few existing amenity spaces (e.g. rear gardens or communal open spaces serving residential development) sufficiently close to the Site that the potential for impacts due to overshadowing might arise. For the purposes of this analysis, ARC identified the communal open space associated with Teeling Way to the north of the Site and two rear gardens at Merchants Square adjoining the eastern boundary of the Site as sample zones for detailed quantitative analysis.

Table 16.3 below sets out the likely proportion of these gardens / amenity areas in sunlight before and after the construction of the proposed Project throughout the day on the 21st March. As set out in Table 16.3 below, ARC's analysis indicates that the proposed Project will result in little or no additional overshadowing of the gardens and amenity areas on lands in the vicinity of the Site on the 21st March.

Table 16.3: Impact of the Proposed Project on Sunlight Access to Sample Neighbouring Gardens and Amenity Areas

Time	Teeling Way Communal Area Percentage hours in sunlight		36 Merchant Square Rear Garden Percentage hours in sunlight		40 Merchant Square Rear Garden Percentage hours in sunlight	
	Existing	Proposed	Existing	Proposed	Existing	Proposed
10:00	2%	2%	0%	0%	1%	1%
10:30	20%	20%	7%	7%	1%	1%
11:00	38%	36%	9%	9%	3%	3%
11:30	47%	36%	12%	12%	10%	10%
12:00	66%	64%	19%	19%	30%	30%
12:30	70%	67%	21%	21%	32%	32%
13:00	82%	76%	25%	25%	30%	30%
13:30	87%	81%	26%	26%	28%	28%
14:00	83%	57%	10%	10%	19%	19%
14:30	83%	27%	13%	13%	19%	19%
15:00	73%	0%	1%	1%	6%	6%
15:30	64%	0%	0%	0%	0%	0%
16:00	57%	9%	0%	0%	0%	0%
16:30	36%	6%	0%	0%	0%	0%
17:00	17%	0%	0%	0%	0%	0%

As illustrated above, ARC's analysis indicates that the potential impact of the proposed Project on the amenity area serving the Teeling Way development to the north of the northern boundary of the Site and the sample gardens at Merchants Square to the east of the Site is unlikely to be of a level, which would suggest that sunlighting of the existing amenity area may be adversely affected within the meaning of the BRE Guide.

Specifically, while the proposed Project has the potential to overshadow the amenity area at Teeling Way during the afternoons of the 21st March, ARC's analysis of potential impacts indicates that the amenity area will continue to receive at least two hours of sunshine over half its area after the construction of the proposed Project. Having regard to the pattern of development of lands to the north of the Site and the wider pattern of development within the Dublin Docklands area, ARC's analysis indicates that the potential impact of shadows cast by the proposed Project on lands to the north is likely to be consistent with emerging trends for development in the area and, therefore, '*moderate*' in extent during the spring and autumn months. It should be noted that shadows cast by the proposed Project have the potential to result in only '*imperceptible*' impacts on the Teeling Way amenity space during the summer months, when the space is most likely to be used.

To the east, ARC's analysis of potential impacts of the proposed Project on sunlight access indicated that the proposal will not result in any change to the shadow environment of the sample rear gardens at Merchants Square on the 21st March.

16.3.3 Cumulative Impacts

A review of the Dublin City Council online planning register did not identify any developments for which permission has been granted, which, in combination with the development now proposed, would have the potential to result in material cumulative impacts on sunlight access to the area surrounding the application site, within the meaning of the *British Standard, BS 8206-2:2008: Lighting for buildings - Part 2: Code of practice for daylighting* or *Site layout planning for daylight and sunlight: a guide to good practice* (the BRE Guide).

16.3.4 'Do-Nothing' Impact

In a '*do-nothing*' scenario, the existing shadow environment will remain unchanged.

16.3.5 Mitigation Measures

The proposed Project proposes the major redevelopment of a brownfield site situated in an urban location characterised by medium and high density development. In these circumstances, during the Construction or Operational Phases scope for mitigation measures, which would preserve a sustainable level of density, is limited.

16.3.6 Residual Impacts

As no ameliorative, remedial or reductive measures are now proposed, the predicted impact of the proposed Project on sunlight access will be as described in Section 16.3.2 above.

16.4 Daylight Access Impact Analysis

16.4.1 Study Methodology

16.4.1.1 Context under Technical Guidance Documents

BS 8206-2:2008: Lighting for buildings - Part 2: Code of practice for daylighting states as follows at Section 8.2.1: Loss of Daylight to Existing Buildings:

> *'The BRE Report sets out two guidelines regarding the vertical sky component.*
>
> *a) If the vertical sky component at the centre of the existing window would exceed 27% with the new development in place, then enough skylight would still be reaching the existing window.*
>
> *b) If the vertical sky component with the new development in place would be both less than 27% and less than 0.8 times its former value, then the area lit by the window would be likely to appear more gloomy, and electric lighting would be needed for more of the time.'*

16.4.1.2 Assessment Methodology for Daylight Access

A 3-D digital model of the proposed Project and of existing buildings in the area was constructed by ARC Consultants based on drawings and three dimensional models supplied by the Design Team; and with reference to Dublin City Council's online planning register, onsite, satellite and aerial photography. In assessing the impact of the proposed Project on existing buildings, assumptions were made as to the use of the existing rooms, the size and layout of the interior of the rooms (informed, where possible, by drawings available on the Dublin City Council online planning register), the colour schemes (e.g. materials, reflectances, etc.) used in the decoration of the walls, floor and ceiling of the room and the type of glazing used in the window opes. In all cases, rooms are assessed as excluding furniture and window treatments (e.g. curtains, blinds). Assumptions are also made as to the materials and reflectances of external surfaces.

In assessing the impact of the proposed Project on existing buildings, ARC assessed the Vertical Sky Component of each window at a point at the centre of each window. Having regard to the extreme variability in sky luminance over the course of any given day depending on weather conditions and the changing seasons, in order for daylight factor to be a meaningful and comparable measure of daylight access, it is necessary to assume a particular luminance distribution for the sky when calculating Average Daylight Factor. This daylight access analysis uses the Commission Internationale de l'Eclairage (CIE) Standard Overcast Sky Distribution model in its calculations, which is the standard sky most commonly used in daylight access analysis.

16.4.1.3 Definitions of Impacts on Daylight Access

The assessment of impacts on daylight access had regard to the EPA *Guidelines on the Information to be Contained in Environmental Impact Statements*, and to Directive 2011/92/EU (as amended) on the assessment of the likely effects of certain public and private projects on the environment.

Table 16.4 below list the definitions taken from *Section 5: Glossary of Impacts* contained in the *Guidelines on the Information to be Contained in Environmental Impact Statements*[144]. Some comment is also given below on what these definitions might imply in the case of impact on daylight access. The definitions from the EPA document are in italics.

Table 16.4: Definitions of Significance of Impact

Significance of Impact	Description of Significance of Impact
Imperceptible	*An impact capable of measurement but without noticeable consequences.* The definition implies that the development would cause a change in the daylight received at a location, capable of measurement, but not noticeable. If the development caused no reduction in daylight access, there could be no impact.
Slight Impact	*An impact which causes noticeable changes in the character of the environment without affecting its sensitivities.* For this definition to apply, the amount of daylight received at a location would be changed by the development to an extent that is both capable of measurement and is noticeable. Published guidance on daylight access suggests that a reduction in the amount of daylight received in a room only becomes noticeable if the average daylight factor in the room is reduced by one fifth
Moderate Impact	*An impact that alters the character of the environment in a manner that is consistent with emerging trends.* This would occur where there is a noticeable reduction in daylight received in a room and where this reduction is ongoing because of development already taking place in the area.
Significant Impact	*An impact which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.* In terms of daylight access, a development, to have a significant impact, must result in a diminution of daylight access to the extent that minimum standards for daylighting are not met and artificial lighting is required for part of the day.
Profound Impact	*An impact* which *obliterates sensitive characteristics.* A profound impact would occur where a development would result in daylight received in a room falling well below the minimum standard for average daylight factor and where artificial lighting would be required in that room as the principal source of lighting all the time.

[144] ARC also had regard to the contents of the Guidelines on information to be contained in Environmental Impact Assessment Reports DRAFT (August 2017) in the preparation of this report. However, as this document has yet to be finalized, the 2002 Guidelines were used as the basis for the definition of impacts on daylight access.

16.4.2 Potential Impact of the Proposed Project on Daylight Access

The BRE Guide provides that *'The quantity and quality of daylight inside a room will be impaired if obstructing buildings are large in relation to their distance away'*. Generally speaking, new development is most likely to affect daylight access in existing buildings in close proximity to the Site.

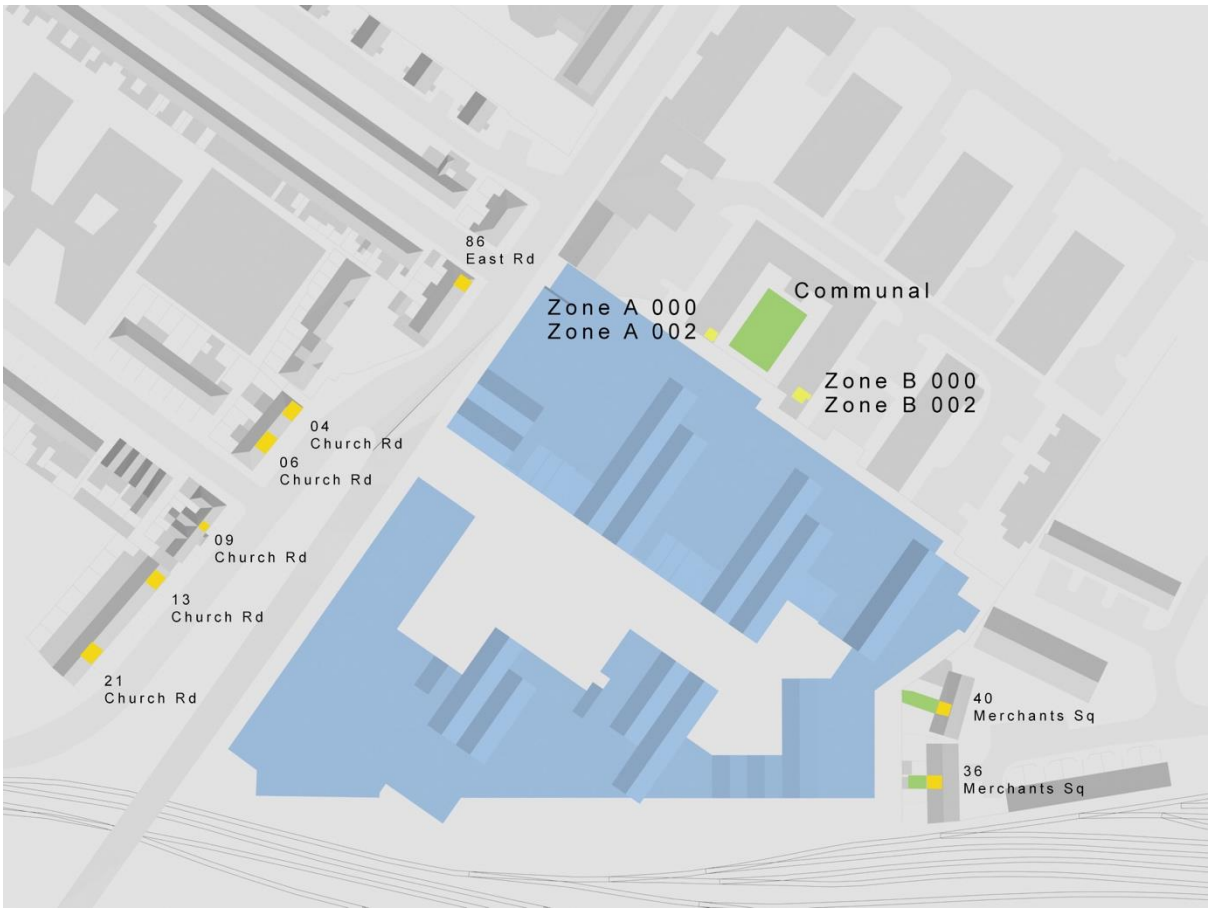
16.4.2.1 Overview of the Potential Impact of the Proposed Project on Daylight Access to Existing Buildings outside the Site

The impact of the proposed Project on daylight access within existing buildings has the potential to be most significant in the case of existing buildings at close proximity with windows directly opposing the Site. Specifically, development on the Site has the potential to result in a reduction in daylight access to rooms in buildings opposing the application site at Church Road, East Road, Teeling Way and Merchants Square, as would be expected where the major redevelopment of a largely vacant, brownfield site takes place. The potential impact of the proposed Project on daylight access to existing residences in proximity to the application site is likely to range from '*imperceptible*' to '*slight'* to '*moderate*'.

Having regard to the pattern of development in the area and to statutory planning policy for densification for the urban area, under a worst-case scenario, the potential impact of the proposed Project on existing buildings in proximity to the Site is likely to considered to be consistent with an emerging pattern of medium to high density development in the area and, therefore, '*moderate*' in extent.

Given that the potential for development to result in impacts on daylight access diminishes with distance, ARC's analysis of the potential impacts of the proposed Project on daylight access indicates that the proposal will have no undue adverse impact on daylight access within buildings in the wider area surrounding the Site.

Figure 16.4: Indicative diagram showing location of sample rooms and windows assessed as part of this Sunlight and Daylight Access Impact Analysis



16.4.2.2 Detailed Analysis of the Potential Impact of the Proposed Project on Daylight Access to Existing Buildings outside the Site

This Chapter assesses the impact of the proposed Project to all potential receptors surrounding the Site - these impacts are described in Section 16.4.2.1 above. However, by way of example in order to illustrate briefly the findings outlined in the overview section, ARC conducted detailed analysis of the potential for the proposed Project to result in impacts on daylight access to a representative sample of sensitive receptors (i.e. rooms) in buildings in proximity to the Site, see Figure 16.4 above. However, by way of example in order to illustrate briefly the findings outlined in the overview section, ARC conducted quantitative analysis of the potential for the proposed Project to result in impacts on daylight access to a representative sample of sensitive receptors (i.e. rooms) in buildings in proximity to the Site.

The only Irish statutory guidance to provide advice on undertaking sunlight and daylight access impact analysis is set out in the EPA *Advice Notes on Current Practice* which accompany the EPA *Guidelines on the Information to be Contained in Environmental Impact Statements*. These Advice notes state: *'Climate in an Environmental Impact Statement generally refers to the local climatological conditions or 'microclimate' of an area, such as local wind flow, temperature, rainfall or solar radiation patterns ... it is important to identify receptors which may be particularly sensitive to climate change.'* [Emphasis added.] Having regard to the Advice Notes, ARC undertook detailed quantitative analysis of those receptors particularly sensitive to changes in the daylight environment in order to provide an empirical basis for the conclusions outlined in Section 16.4.2.1 above.

In identifying receptors particularly sensitive to changes in the shadow environment, ARC considered two factors:

(i) *the use of receptors (i.e. buildings) surrounding the Site*: buildings in residential use (and, particularly, habitable rooms within residences) would be considered to be sensitive to changes in the shadow environment;

(ii) *the location of receptors relative to the Site:* as set out in Section 2.2.21 of the BRE Guide *'If any part of a new building or extension, measured in vertical section perpendicular to a main window wall of an existing building, from the centre of the lowest window, subtends to an angle of more than 25° to the horizontal, then the diffuse daylighting of the existing building may be adversely affected.'* (Emphasis added).

Given this, the receptors most sensitive to changes in the daylight environment as a result of the proposed Project would be windows facing towards the proposal at low levels of accommodation in buildings in residential use in close proximity to the site (i.e. low level rooms East Road, Church Road, Teeling Way and Merchants Square). Therefore, ARC identified a representative sample of rooms and windows at East Road, Church Road, Teeling Way and Merchants Square for detailed quantitative analysis. This sample is considered to constitute a worst-case scenario.

In carrying out the detailed analysis of the proposed Project on neighbouring existing buildings, ARC measured daylight access to existing buildings before and after the construction of the proposed Project in two different ways as described in Sections 16.4.2.2.1 and 16.4.2.2.2 below. The results of ARC's analysis are presented in Table 16.5, with commentary on the results of the analysis set out in Section 16.4.2.3.

16.4.2.2.1 Vertical Sky Component

ARC measured Vertical Sky Component (VSC) to sample windows in existing buildings (i) before the construction of the proposed Project; and (ii) after the construction of the proposed Project. The impact of the proposed Project on daylight access within existing and permitted buildings was measured with regard to VSC having regard to the BRE Guide, which states as follows:

> *'In assessing the loss of light to an existing building, the VSC is generally recommended as the appropriate parameter to use.'*

Section 2.2.21 of the BRE Guide suggests that:

> *'If any part of a new building or extension, measured in a vertical section perpendicular to a main window wall of an existing building, from the centre of the lowest window, subtends an angle of more than 25° to the horizontal, then the diffuse daylighting of the existing building may be adversely affected. This will be the case if ...*
>
> *the VSC measured at the centre of an existing main window is less than 27%, and less than 0.8 times its former value...'*

Adherence to the recommendations of the BRE Guide with regard to achieving a VSC of 27% has been shown to lead to densities of development, which would be very considerably too low to be sustainable and would be inconsistent with the local, regional and national statutory planning policy. The BRE Guide acknowledges this. At Appendix F: Setting Alternative Target Values for Skylight and Sunlight Access, it states: *'Sections 2.1, 2.2 and 2.3 give numerical target values in assessing how much light from the sky is blocked by obstructing buildings. These values are purely advisory and different targets may be used based on the special requirements of the proposed development or its location... Whatever the targets chosen for a particular development, it is important that they should be self-consistent. Table F1 can be used to ensure this.'* In order to determine what would be an appropriate target value for skylight in the urban context of East Road, ARC had regard to statutory planning policy.

The *Urban Development and Building Heights Guidelines for Planning Authorities* (December 2018) provide that: *"these guidelines require that the scope to consider general building heights of at least three to four storeys, coupled with appropriate density, in locations outside what would be defined as city and town centre areas, and which would include suburban areas, must be supported in principle at development plan and development management levels".*

These Guidelines go on to suggest that *"it would be appropriate to support the consideration of building heights of at least 6 storeys at street level"* in city centre areas. The *Design Manual for Urban Roads and Streets* (DMURS) recommends a strong sense of enclosure in large centres (i.e. a building height to street width ratio of between 1:1 and 1:2). A 12.5m wide distance (e.g. 3m wide footpath + 3.25m lane + 3.25m lane + 3m wide footpath) between opposing four storey residential blocks (approximate height of 12m) would represent an approximate building height to street width ratio of 1:1. Therefore, given that the *Urban Development and Building Height Guidelines* would seem to suggest building heights of at least four to six storeys for areas like East Road and having regard to the recommendations of DMURS with regard to achieving a sense of enclosure, it was considered appropriate for the purposes of this assessment to determine an alternative target value on the basis of a building height to street width ratio of 1:1. Table F1 of the BRE Guide suggests that a building height to street width ratio of 1:1 corresponds to a VSC of 16%.

The results of ARC's analysis are set out in Table 16.5 below, together with a short comment on each result.

16.4.2.2.2 Average Daylight Factor

While BRE Guide discusses the use of VSC in assessing impact on daylight access, it is notable that, while the relevant *British Standard, BS 8206-2:2008: Lighting for buildings - Part 2: Code of practice for daylighting* makes reference to the fact that the BRE Guide recommends the use of VSC in assessment of the impact on existing buildings, the British Standard stops short of making the same recommendation. To the contrary, the British Standard states: *'The vertical sky component is one of the factors on which the average daylight factor in an existing interior depends.'* (Emphasis added.)

VSC refers to the amount of light from the sky falling directly at a particular point on a vertical surface such as a window or wall. ADF takes into account daylight coming from the sky, externally reflected light and internally reflected light. Given this, it is considered that ADF provides a more comprehensive picture of daylight access within existing buildings and the extent to which new development will change the daylight environment within those existing buildings.

BS 8206-2:2008: Lighting for buildings - Part 2: Code of practice for daylighting states as follows at Section 5.5: ADF:

> *'The average daylight factor is used as the measure of general illumination from skylight. It is considered good practice to ensure that rooms in dwellings and in most other buildings have a predominantly daylit appearance. In order to achieve this the average daylight factor should be at least 2%.'*

In terms of assessing the impact of development on daylight access in an existing room, the British Standard suggests that, where a room has an ADF of 5%, a reduction in daylight access of between 15% and 8% is likely to be noticed - the room *'would be likely to appear more gloomy, and electric lighting would be needed for more of the time'*. In other words, where daylight access is reduced to between 0.85 times and 0.92 times its former value, the occupant of that residence is likely to notice the change. What this is saying is that, in some cases (the details of which are not explained in the British Standard), a reduction in ADF to anything less than 0.92 times the former light levels will be noticeable. In other cases (again not explained), light levels will have to fall to 0.85 times their former value before the change is noticed. Therefore, in all cases where a room has an ADF of 5%, anything greater than a 15% drop in daylight levels (or a drop to 0.85 times its former value) will be noticed. A general rule of thumb is that if daylight access was reduced by one fifth (or a drop to 0.8 times its former value), the occupants will be likely to notice.

For the purpose of this analysis, assumptions were made as to the use of the studied rooms within existing buildings, the size and layout of the interior of the rooms, the colour schemes used in the decoration of the walls, floor and ceiling of the room and the type of glazing used in the window opes. As such, the rooms in existing buildings adjoining the Site analysed as part of this analysis must be considered to be notional. While it was necessary, in undertaking the analysis, to make assumptions regarding the parameters of chosen sample rooms, comparative

analysis of daylight access within assumed rooms is instructive as to the likely extent of change in the daylight environment in existing buildings in proximity to the Site.

16.4.2.3 Summary Findings

As set out in Table 16.5 below, ARC's analysis indicated that:

- All sample studied windows neighbouring residences will continue to achieve in excess of the alternative target value of 16% VSC after the construction of the proposed Project. Where sample zones were found to receive a VSC of less than 16% at present (e.g. Zones b000 and b002 at Teeling Way and the zones studied at Nos. 36 and 40 Merchants Square), ARC's analysis indicated that the potential impact of the proposed Project to these windows would not fall within adverse ranges (i.e. the VSC of studied windows is not likely to fall to less than 0.8 times its former value).
- The proposed Project will have little or no impact on ADF in notional sample studied rooms. The proposed Project is not likely to reduce the ADF in any notional sample studied room below 0.8 times its former value. Where the impact of the proposed Project is likely to fall within noticeable ranges, the proposed Project is not likely to affect the sensitivities of the daylight environment within the studied room.

Given this, ARC's analysis indicates that, under a worst-case scenario, the potential impact of the proposed Project on daylight access to the sample zones at East Road, Church Road, Teeling Way and Merchants Square is likely to be consistent with emerging trends for development or '*moderate*' in extent.

Table 16.5: Potential impact of the proposed Project on Daylight Access to Sample Rooms in Buildings In Proximity to the Site

Sample Room	Vertical Sky Component (VSC)		Average Daylight Factor (ADF)	
	Existing VSC	Proposed VSC	Existing ADF	Proposed ADF
Zone a000 Teeling Way Floor 00	20.70%	20.60%	2.60%	2.44%
	ARC's analysis of potential impacts on daylight access indicates that VSC is likely to remain above 16% after the construction of the proposed Project.		ARC's analysis of potential impacts on daylight access indicates that ADF is likely to decrease to 0.94 times its former value after the construction of the proposed Project.	
Zone a002 Teeling Way Floor 02	32.40%	29.10%	0.96%	0.96%
	ARC's analysis of potential impacts on daylight access indicates that VSC is likely to remain above 16% after the construction of the proposed Project.		No change.	
Zone b000 Teeling Way Floor 00	10.00%	9.10%	2.44%	2.44%
	ARC's analysis of potential impacts on daylight access indicates that VSC is likely to decrease to 0.91 times its former value (i.e. not less than 0.8 times its former value) and so the impact of the proposed Project is below the threshold for adverse impact.		No change.	
Zone b002 Teeling Way Floor 02	14.20%	13.00%	2.52%	2.50%
	ARC's analysis of potential impacts on daylight access indicates that VSC is likely to decrease to 0.92 times its former value (i.e. not less than 0.8 times its former value) and so the impact of the proposed Project is below the threshold for adverse impact.		ARC's analysis of potential impacts on daylight access indicates that ADF is likely to decrease to 0.99 times its former value after the construction of the proposed Project.	
	32.20%	24.80%	3.63%	3.22%

Sample Room	Vertical Sky Component (VSC)		Average Daylight Factor (ADF)	
	Existing VSC	Proposed VSC	Existing ADF	Proposed ADF
Zone 21 Church Road Floor 00	ARC's analysis of potential impacts on daylight access indicates that VSC is likely to remain above 16% after the construction of the proposed Project.		ARC's analysis of potential impacts on daylight access indicates that ADF is likely to decrease to 0.89 times its former value after the construction of the proposed Project.	
Zone 13 Church Road Floor 00	34.70%	24.10%	3.86%	3.50%
	ARC's analysis of potential impacts on daylight access indicates that VSC is likely to remain above 16% after the construction of the proposed Project.		ARC's analysis of potential impacts on daylight access indicates that ADF is likely to decrease to 0.91 times its former value after the construction of the proposed Project.	
Zone 08 Church Road Floor 00	35.20%	23.40%	3.92%	3.33%
	ARC's analysis of potential impacts on daylight access indicates that VSC is likely to remain above 16% after the construction of the proposed Project.		ARC's analysis of potential impacts on daylight access indicates that ADF is likely to decrease to 0.85 times its former value after the construction of the proposed Project.	
Zone 06 Church Road Floor 00	37.10%	25.00%	2.30%	1.91%
	ARC's analysis of potential impacts on daylight access indicates that VSC is likely to remain above 16% after the construction of the proposed Project.		ARC's analysis of potential impacts on daylight access indicates that ADF is likely to decrease to 0.83 times its former value after the construction of the proposed Project.	
Zone 04 Church Road Floor 00	36.20%	24.60%	2.30%	1.98%
	ARC's analysis of potential impacts on daylight access indicates that Vertical Sky Component is likely to remain above 16% after the construction of the proposed development		ARC's analysis of potential impacts on daylight access indicates that Average Daylight Factor is likely to decrease to 0.86 times its former value after the construction of the proposed development.	
Zone 86 East Road Floor 00	35.50%	19.00%	2.66%	2.19%
	ARC's analysis of potential impacts on daylight access indicates that VSC is likely to remain above 16% after the construction of the proposed Project.		ARC's analysis of potential impacts on daylight access indicates that ADF is likely to decrease to 0.82 times its former value after the construction of the proposed Project.	
Zone 40 Merchants Square Floor 00	25.30%	19.30%	4.48%	4.00%
	ARC's analysis of potential impacts on daylight access indicates that VSC is likely to remain above 16% after the construction of the proposed Project.		ARC's analysis of potential impacts on daylight access indicates that ADF is likely to decrease to 0.89 times its former value after the construction of the proposed Project.	
Zone 36 Merchants Square Floor 00	24.20%	21.10%	3.65%	3.47%
	ARC's analysis of potential impacts on daylight access indicates that VSC is likely to remain above 16% after the construction of the proposed Project.		ARC's analysis of potential impacts on daylight access indicates that ADF is likely to decrease to 0.95 times its former value after the construction of the proposed Project.	

16.4.3 Cumulative Impacts

A review of the DCC online planning register did not identify any developments for which permission has been granted, which, in combination with the development now proposed, would have the potential to result in material

cumulative impacts on daylight access to the area surrounding the application site, within the meaning of the *British Standard, BS 8206-2:2008: Lighting for buildings - Part 2: Code of practice for daylighting* or *Site layout planning for daylight and sunlight: a guide to good practice* (the BRE Guide).

16.4.4 'Do-Nothing' Impact

In a '*do-nothing*' scenario, the existing daylight environment will remain unchanged.

16.4.5 Mitigation Measures

The proposed Project proposes the major redevelopment of a brownfield site situated in an urban location characterised by medium and high density development. In these circumstances, during the Construction or Operational Phases scope for mitigation measures, which would preserve a sustainable level of density, is limited.

16.4.6 Residual Impacts

As no ameliorative, remedial or reductive measures are now proposed, the predicted impact of the proposed Project on daylight access will be as described under Section 16.4.2 above.

16.5 Monitoring

Monitoring of avoidance, remedial and mitigation measures is not relevant to the assessment of impacts on sunlight access in the case of the subject application.

16.6 Reinstatement

Reinstatement is not relevant to the assessment of impacts on sunlight access in the case of the subject application. It is intended that the proposed Project will be *permanent*.

16.7 Interactions

As is always the case where a development will result in a change to the sunlight and daylight environment of an area, the impacts of the development on sunlight access will result in interactions with:

- Climate
- Population and Human Health
- Material Assets
- Landscape.

16.8 Difficulties Encountered in Compiling the Chapter

As is the case in any urban area, it was neither possible nor practical for the Design Team to gain unfettered access to every parcel of private property within the study area surrounding the Site in order to carry out measured building survey. Therefore, while ARC has confidence that the three dimensional model used in the assessment of the impact of the proposal on sunlight access achieves a high degree of accuracy, it should be noted that some level of assumption was necessary in completing the model.

The purpose of this Chapter is to provide a general indication of daylight performance and sunlight access before and after the construction of the proposed Project on the basis of the assumptions outlined above and with reference to design tools set out in the guidance documents referenced above. ARC takes no responsibility for any errors introduced by the third party proprietary sunlight and daylight analysis software used to perform the quantitative assessment.

16.9 References

- British Standards Institution (2008) BS8206: Part 2: 2008 Lighting for Buildings: Part 2 – Code of Practice for Daylight. Milton Keynes, BSI.
- Council Directive 14/52/EU (amending Directive 85/337/EEC on the assessment of the effects of certain public and private projects on the environment) (Official Journal No. L 124/1, 25.4.2014).
- Department of Housing, Planning and Local Government. 2018. *Urban Development and Building Heights Guidelines for Planning Authorities.* Dublin: Government Publications Office.
- Department of Transport, Tourism and Sport & Department of Environment, Community and Local Government. 2013. *Design Manual for Urban Roads and Streets*. Dublin: Government Publications Office.
- *Dublin City Development Plan 2016-2022.*
- Environmental Protection Agency. 2002. *Guidelines on the Information to be Contained in Environmental Impact Statements.* Wexford: Environmental Protection Agency.
- Environmental Protection Agency. 2003. *Advice Notes on Current Practice*. Wexford: Environmental Protection Agency.
- Environmental Protection Agency. 2015. *Advice note for Preparing Environmental Impact Statements DRAFT*. Wexford: Environmental Protection Agency.
- Environmental Protection Agency. 2017. *Guidelines on information to be contained in Environmental Impact Assessment Reports DRAFT*. Wexford: Environmental Protection Agency.
- Littlefair, PJ. 1991. *Site Layout Planning for Daylight and Sunlight: A Good Practice Guide*. Watford: Building Research Establishment.
- Littlefair, PJ. 2011. *Site Layout Planning for Daylight and Sunlight: A Good Practice Guide*. Watford: Building Research Establishment.

17 Microclimate - Wind

17.1 Introduction

This Chapter of the EIAR assesses the impact of the proposed Project on the wind conditions affecting activities in areas within and surrounding the development. This Chapter describes the methods used to assess these impacts in terms of pedestrian comfort and safety.

The presence of taller buildings among lower buildings provides the potential for windiness in surrounding areas. The windiness depends on both the massing of the buildings within their surroundings, their orientation with respect to the wind, and the local climate.

The study is based on drawings and computer-generated imagery provided by O'Mahony Pike Architects and the landscape design by Brady Shipman Martin. It considers the influence of the proposed Project on the local wind conditions using computational fluid dynamics (CFD) to model the wind flow through the development in conjunction with Arup's previous extensive experience of wind studies around buildings.

17.2 Methodology

It is important to understand the wind microclimate around the proposed Project in order to understand the level of pedestrian comfort. The assessment has been undertaken in the following key locations:

- recreational areas;
- entrances;
- pedestrian access routes; and
- pedestrian walkways and cycle thoroughfares.

In addition, the study has examined any additional mitigation measures, such as canopies, screens and landscaping.

17.2.1 Objectives

The objectives of the wind assessment are as follows:

- evaluate local microclimate that is experienced on site and examine the level of pedestrian comfort within the proposed Project;
- propose mitigation measure to alleviate the corresponding issues relating to pedestrian comfort and distress; and
- assessment of the effectiveness of the mitigation measures, which are adopted in the design, at alleviating pedestrian discomfort and distress.

17.2.2 Lawson Comfort Criteria

The criteria used to describe windiness in this study are those of TV Lawson of Bristol University, extracted from "*The evaluation of the windiness of a building complex before construction*", TV Lawson, London Docklands Development Corporation. These are used widely in Ireland, UK and around the world.

The acceptability of windy conditions is subjective and depends on several other factors, including but not limited to, normal clothing for the time of the year, expectations of the wind environment, air temperature, humidity and sunshine and most notably the activities to be performed in the area being assessed. The Lawson Criteria describe acceptability for particular activities in terms of '*comfort*' and '*distress*' (or safety). Acceptable conditions for various activities in order of increasing windiness are described in Table 17.1 below.

Gusts cause the majority of cases of annoyance and distress and are assessed in addition to average wind speeds. Gust speeds should be divided by 1.85 and these "*gust equivalent mean*" (GEM) speeds are compared to the same criteria as for the mean hourly wind speeds. This avoids the need for different criteria for mean and gust wind speeds.

Table 17.1: Comfort Criteria as Defined by TV Lawson

Activity	Description
'sitting'	Regular use for reading a newspaper and eating and drinking
'standing'	Appropriate for bus stops, window shopping, building entrances, and public amenity spaces such as parks
'strolling'	General areas of walking and sightseeing
'business walking'	Local areas around tall buildings where people are not expected to linger

Note: *A classification of 'business walking' does not mean that a location will never be suitable for 'sitting', however, it is likely to occur relatively infrequently.*

17.2.2.1 Comfort Levels

The onset of discomfort depends on the activity in which the individual is engaged and is defined in terms of a mean hourly wind speed (or GEM, see above) which is exceeded for 5% of the time. The conditions, as described in Table 17.1 above, are the limiting criteria for comfort. For ideal conditions, the windiness will be a category better than outlined above. For more sensitive activities, such as regular use for external eating, conditions should be well within the '*sitting*' category. Ireland is a windier climate than the UK, where these criteria were developed. It is generally accepted that residents in windier climates are more resilient to stronger winds. Therefore, a slight exceedance of the limiting criteria for comfort is not considered significant.

17.2.2.2 Distress Levels

There is a criterion to define the onset of distress. For the '*General Public*', this is equivalent to an hourly mean speed of 15m/s and a gust speed of 28m/s to be exceeded less often than once a year. This is intended to identify wind conditions which less able individuals or cyclists may find physically difficult. Conditions in excess of this limit, may be acceptable for optional routes and routes which less physically able individuals are unlikely to use.

There is a further limiting distress criterion beyond which even '*able-bodied*' individuals may find themselves in difficulties at times. This corresponds to a mean speed of 20m/s and a gust speed of 37m/s to be exceeded less often than once a year. Aerodynamic forces may exceed body weight in stormy conditions, which makes it difficult for anyone to remain standing. Where wind speeds exceed these values, pedestrian access should be limited.

Table 17.2: Distress Criteria as Defined by TV Lawson

Activity	Description
General Public Access	Above which the less able and cyclists may at times find conditions physically difficult
Able-bodied Access	Above which it may become impossible at times for an able bodied person to remain standing

17.2.3 Computational Fluid Dynamics

Computational Fluid Dynamics (CFD) is a numerical technique to simulate fluid flow, heat and mass transfer, chemical reaction and combustion, multiphase flow, and other phenomena related to fluid flows. Modelling in CFD includes three main stages: pre-processing, simulation and post-processing. Computational Wind Engineering (CWE) is a branch of CFD concerned with behaviour of wind. It can be used to understand the wind flow through an urban environment and the effect of a proposed Project on the local wind microclimate.

17.3 Baseline Environment

17.3.1 Wind Climate

Met Éireann's meteorological station at Dublin Airport is the closest meteorological station to Dublin and to the Site. The expected statistics for wind strength and direction are based on historic wind data recorded at this weather station. The meteorological data, which was associated with the hourly wind speeds recorded over a 30-year period between 1988 and 2018, was analysed. The data is recorded at a weather station at the airport, which is located 10m above ground or 71mOD.

Figure 17.1: Dublin Airport Wind Rose

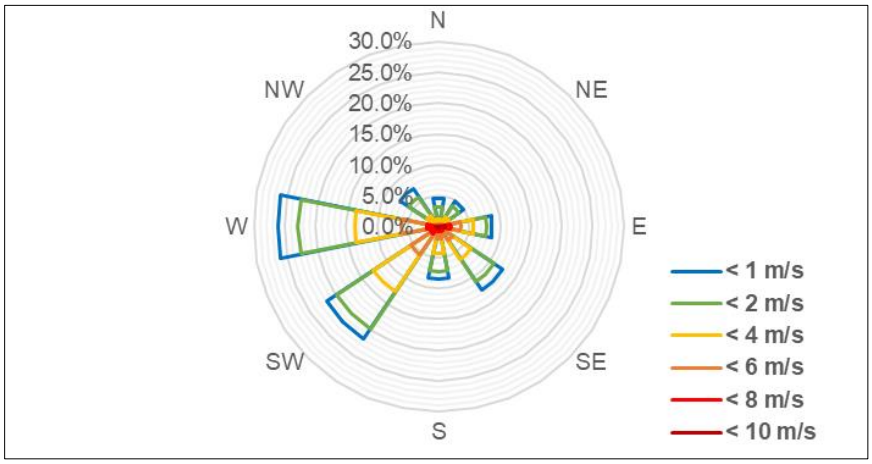


Table 17.3: Weibull Distribution Parameters (based on wind speed in m/s)

Wind Direction	N	NE	E	SE	S	SW	W	NW
Directional probability, p	5.6%	5.3%	9.1%	13.1%	9.1%	22.5%	27.4%	8.1%
Dispersion parameter, c	4.02	4.95	4.75	5.3	6	7	6.4	4.7
Shape parameter, k	1.45	1.9	1.67	1.9	1.8	2.25	1.93	1.95

In this study, winds were considered to approach from eight distinct sectors. A Weibull distribution was fitted to the wind data for each sector through the adoption of an appropriate **dispersion parameter, c,** and **shape parameter, k**, provided in Table 17.3 above. The 95th percentile and '*once-a-year*' wind speeds were derived from the subsequent cumulative Weibull distributions.

In order to account for differences in topography and terrain exposure, the local wind data from Dublin Airport was transposed to the Site using the ESDU (Engineering Sciences Data Unit) methodology, which is compatible with Irish practice for wind loading. The transformation considers the exposure of the Site, which is a measure of the terrain roughness (i.e. size and number of obstacles) upstream of the Site. The exposure is dependent on the direction of the oncoming wind. The local transformation factors used in this study are outlined in Table 17.4 below.

Table 17.4: Local wind transformation factors

Wind Direction	N	NE	E	SE	S	SW	W	NW
'Open' terrain at 10m to Dublin Airport at 10m								
Mean wind speed	1.00	0.95	0.95	0.95	0.92	0.90	1.00	1.00
Gust Speed	1.61	1.57	1.58	1.57	1.54	1.52	1.61	1.61

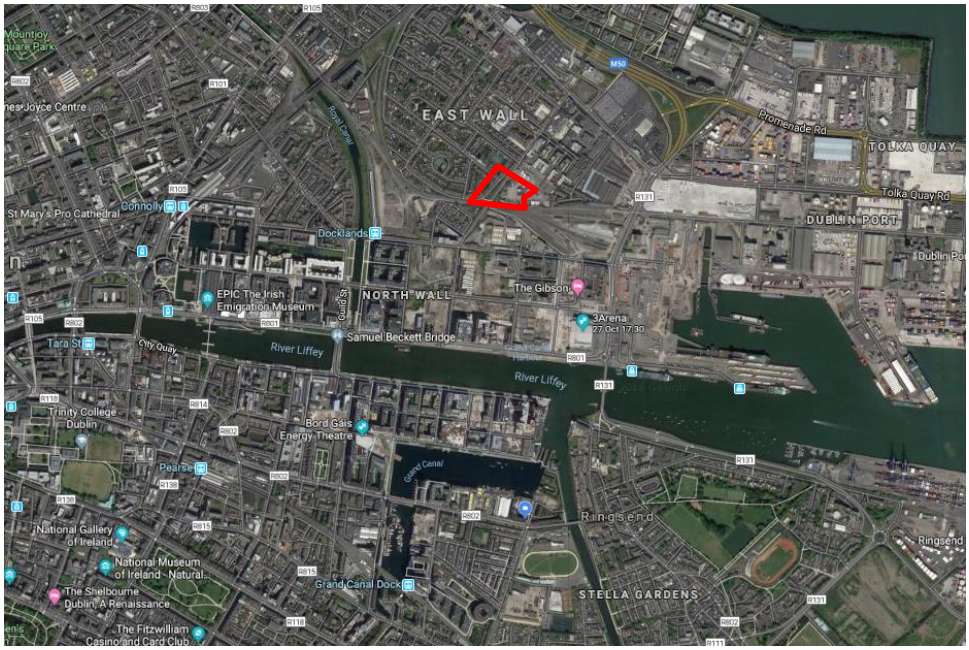
Wind Direction	N	NE	E	SE	S	SW	W	NW
'Open' terrain at 10m to the Proposed Project at 10m								
Mean wind speed	0.76	0.88	0.84	0.85	0.87	0.88	0.74	0.73
Gust speed	1.43	1.50	1.46	1.46	1.46	1.46	1.40	1.40

17.4 Characteristics of the Proposed Project

17.4.1 Site Location and Surrounding Area

The proposed Project is situated to the east of East Road immediately north of the railway yard in the North Docks area of the city. The lands are accessed from East Road on the western boundary of the Site. The eastern boundary of the site abuts Merchant's Square Residential Development. The southern boundary is bounded by CIÉ lands. There are existing apartment buildings in the lands adjacent to the north while there is lower level terraced housing (i.e. 2-3 storeys) situated on the opposite side of the East Road to the west.

Figure 17.2: Proposed Project Site location



17.4.2 Proposed Project

Figure 17.3: 3D View of Proposed Project

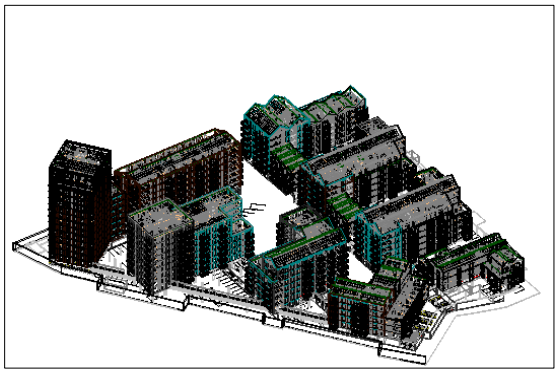


Figure 17.4: Development Block Heights

The proposed Project comprises the demolition of all existing structures on Site and the construction of a mixed-use development including 9 no. blocks, ranging in height from 3 to 15 storeys to accommodate 554 no. apartments, commercial / enterprise space, residential amenity services, retail units, food hub / café / exhibition space, residential amenity services, a crèche and a men's shed. Landscaping will include a new central public space and residential podium courtyards.

The development also serves a leisurely function through the provision of open public spaces. This space will include landscaping and planters designed for sitting purposes.

To accommodate for the residents' accessibility the proposed Project includes 241 No. carpark spaces under the podium with some visitor spaces at surface. This is accessible from the existing East Road / Church Road Junction. Furthermore, the proposed Project also includes for 810 No. bicycle spaces, with long-term cycle spaces being covered and secure. Short-term cycle parking will be located in easily accessible areas in close proximity to entrances and desire lines. Additional cycle spaces will be provided for the commercial element of the development in accordance with the Dublin City Development Plan.

17.5 Potential Impact of the Proposed Project

17.5.1 Construction Phase

The potential effects on wind microclimate at the Site during the Construction Phase have not been assessed as they depend on the phasing of the proposed Project.

Depending on the order of the development, windiness may be greater than in the final condition. If it is the intention for parts of the proposed Project to become operational before construction is completed, then temporary mitigation may be needed or desirable to achieve safe access. It is appropriate, however, to seek guidance on this as the detailed phasing is known.

17.5.2 Operational Phase

In general, the proposed Project is likely to provide a comfortable and an attractive environment for pedestrians and occupants. It is exposed to the easterly, southeasterly, westerly and southwesterly winds which have the potential, on occasions, to cause conditions that pedestrians may find distressing without the appropriate mitigation measures in place.

17.5.2.1 East Road

East Road provides connectivity between the proposed Project and its surroundings. Pedestrians and cyclists will use East Road to access other places in the City. The main vehicular and pedestrian access into the development will be via East Road, however, there are no entrances directly accessing the Site from East Road. The road consists

of a single carriageway with pedestrian footpaths on either side and therefore, it will be used as a thoroughfare by pedestrians and cyclists.

Figure 17.5: Lawson Comfort Wind Speeds Within the Proposed Project Excluding any Landscape Features or other Mitigation Measures

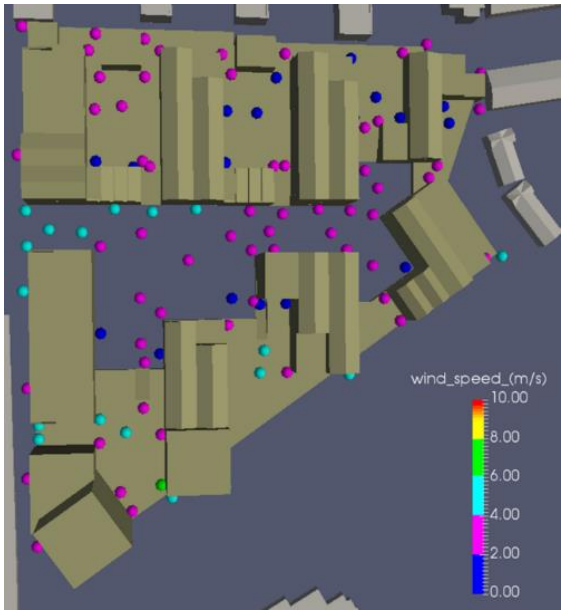
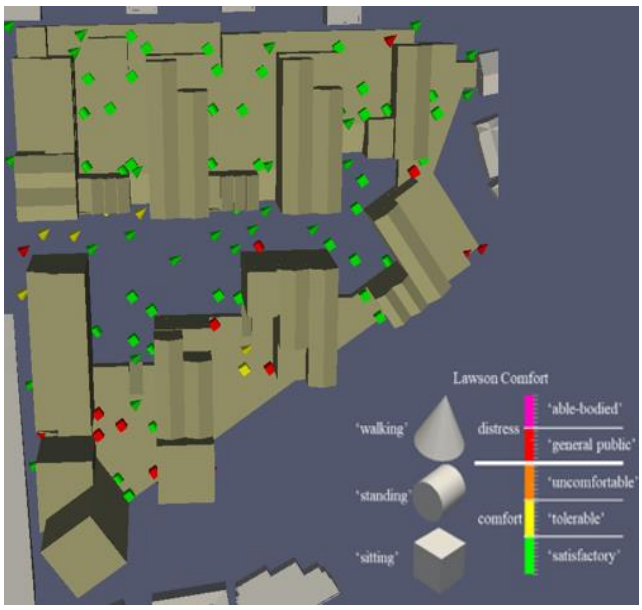


Figure 17.6: Lawson Comfort Criteria Within the Proposed Project Excluding any Landscape Features or Other Mitigation Measures



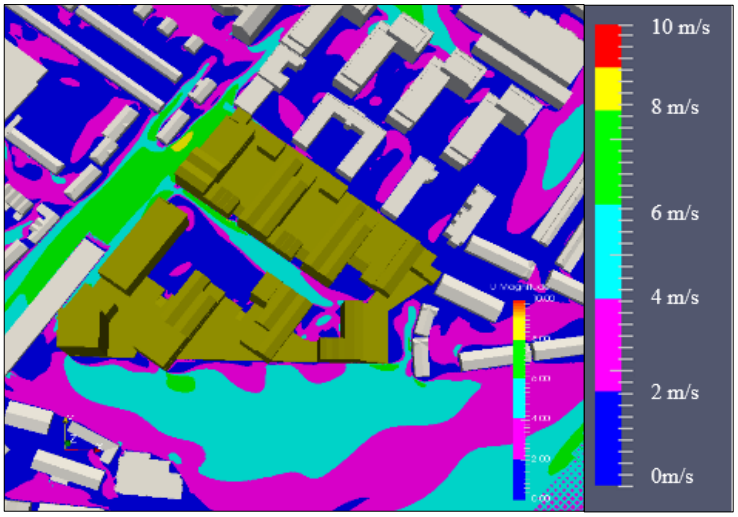
Thoroughfare

The study reveals strong wind conditions due to southwest winds along East Road due to the orientation of the proposed Project and its relationship to the East Road, as shown in Figures 17.8 below. The wind speeds are envisaged to be in the '*walking*' range with the potential to exceed the threshold for distress for more vulnerable pedestrians *(i.e*. young children, the elderly or cyclists) on occasion with any further mitigation. This is found to be the case near the main access to the proposed Project.

The provision of clustering planting along the pathway would be beneficial for the occupants of the development, eliminating to some extent the distress that might be caused to pedestrians and cyclists.

Figure 17.7: Extent of East Road

Figure 17.8: Wind Speed (m/s) at East Road due to Southwest Winds at Ground Level



17.5.2.2 Central Thoroughfare

The main thoroughfare from the main vehicular and pedestrian access into the proposed Project is across the development to Blocks B1 and B2. It is a multi-functional space, which includes:

- access into the proposed Project for vehicles and pedestrians;
- access to raised plazas at podium level for pedestrians and cyclists via ramps and stairs;
- access to residential blocks via entrances;
- amenity and leisure spaces for pedestrians; and
- parking areas for vehicles.

The raised podium at the end of the central thoroughfare between Blocks B1 and B2 is a green roof. It will not be accessible to the general public or occupants of the proposed Project it will only be accessible for the purposes of operations and maintenance, see Figure 17.9 below.

Figure 17.9: Extent of Central Thoroughfare

Public Realm

The model indicates that the eastern extent of the main thoroughfare may suffer from windiness. It is most exposed to east winds at the ground and podium levels. It is anticipated that wind will funnel through the gap between corner Block B2 and Block B1. However, it is only a concern when the high speed winds are encountered at ground level given that the green roofs at podium level are not readily accessible.

The provision of a 2.1m high balustrade in the gap between Blocks B1 and B2 will force the wind to funnel between the blocks at a higher level and therefore, it should help limit the windiness that occurs at ground level. Typically, the wind speeds are likely to be within the '*walking*' range, which will be acceptable to most pedestrians, and pedestrians may encounter winds that are distressing on occasion.

In addition, it is recommended that the provision of further landscape features along the main thoroughfare will help provide some localised shelter to pedestrians from the wind.

Entrances

It is beneficial that the entrances are located near the centre of the building and away from the corners of the block, where the higher speed winds occur. The outcome is that the wind conditions are tolerable for '*standing*' and therefore, they are considered acceptable for their proposed use.

Thoroughfares

The results reveal that there would be general windiness along the main entrance caused by westerly, southeasterly and easterly winds which might cause distress to pedestrians and cyclists, as shown in Figures 17.10, to 17.12 below.

Where high wind speeds are unavoidable, the provision of substantial planting along the entire main walkway is recommended to reduce the influence of wind. In addition, consideration should be given to redirecting pedestrians away from corners, where appropriate.

Figure 17.10: Wind Speed (m/s) due to East Winds at Ground level

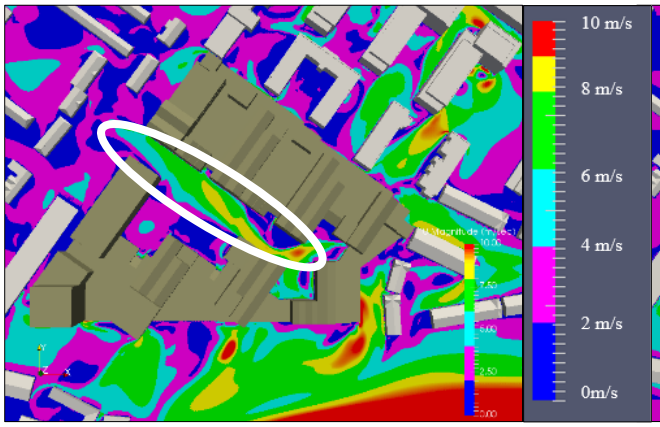


Figure 17.11: Wind Speed (m/s) due to West Winds at Ground Level

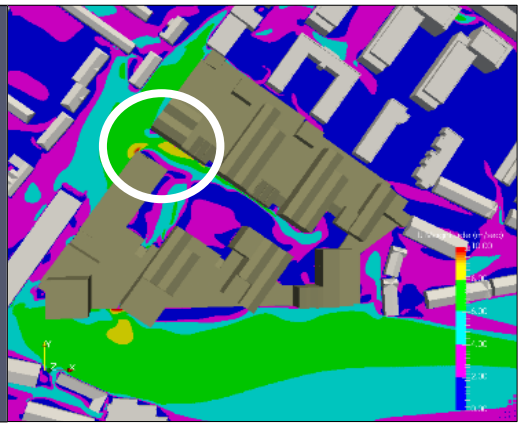
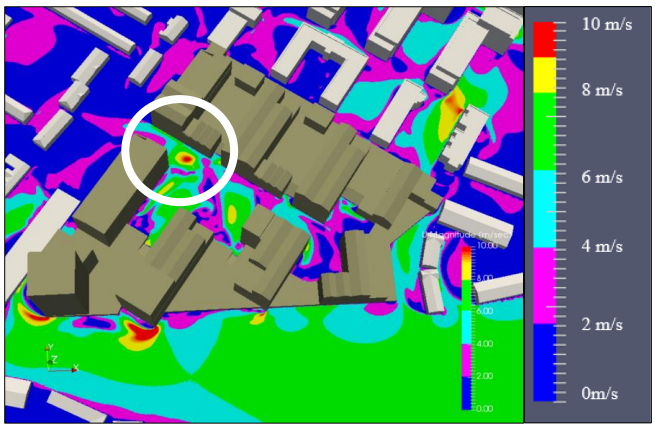


Figure 17.12: Wind Speed (m/s) due to Southeast Winds at Ground Level



17.5.2.3 Southern Plazas and Crèche Outdoor Play Area (Blocks B2, C1, C2, D1 and D2)

There are three plazas on the raised podium on the southern side of the proposed Project. The plazas between Blocks C1 and C2 and between Blocks D1, D2 and C2, respectively, are multi-functional plazas. The plazas can be accessed from the main thoroughfare via ramps and stairs. They facilitate access into the surrounding blocks through designated entrances as well as acting as amenity and leisure spaces for occupants and public alike. The plaza between Blocks B2 and C1 is designated as the play area for the crèche. It is accessed from Block B2.

Figure 17.13: Extent of Southern Plazas

Public Realm

The study revealed that the plaza between Block C2, D1 and D2 of the proposed Project suffers from windiness due to east and southeast winds.

Block DT2 is considerably higher than its surrounding buildings. Winds from the east are downdraft into the elevated plaza below, as shown in Figure 17.14 below. It is anticipated that the typical wind speeds will be tolerable for pedestrians within the public realm, however, it is likely that wind speeds could be distressing on occasion. The provision of a canopy will help maintain wind at high levels and prevent it from descending to ground level.

In addition, wind will funnel between Blocks D1 and D2 due to east winds. It is predicted that the wind speeds could be distressing from time to time. Funnelling in the narrow gap between Blocks D1 and D2 at East Road will be mitigated through landscape treatment that will shelter pedestrians on the pathway between the blocks.

Funnelling between Blocks C2 and DT2 due to southeast winds cause the formation of high speed winds in the public plaza, as shown in Figure 17.14 below. It is anticipated that pedestrians will find these winds distressing. The provision of a 2.1m high windscreen along the south edge of the development on podium level will provide shelter to the users from southeast winds. In addition, the provision of tall vegetation in the gap between Blocks C2 and DT2 will also assist in mitigating the wind.

Funnelling between Blocks C1 and C2 due to southeast winds cause the formation of high speed winds in the public plaza, as shown in Figure 17.15 below, that pedestrians will find uncomfortable and may even be distressing on occasion. The provision of a 2.1m high windscreen along the south edge of the proposed Project at podium level will provide shelter to the users from southeast winds. In addition, the provision of tall vegetation in the gap between Blocks C1 and C2 will also assist in mitigating the wind.

It is anticipated that the crèche will suffer from windiness due to easterly and south-easterly winds without mitigation. It is predicted that the wind speeds within the crèche may exceed the *'sitting'* threshold without mitigation, which could render the space unsuited to its intended use. The provision of a 2.1m high windscreen on either side of the podium level will provide shelter the occupants of the crèche from the wind.

Figure 17.14: Wind Speed (m/s) due to East Winds at Ground Level

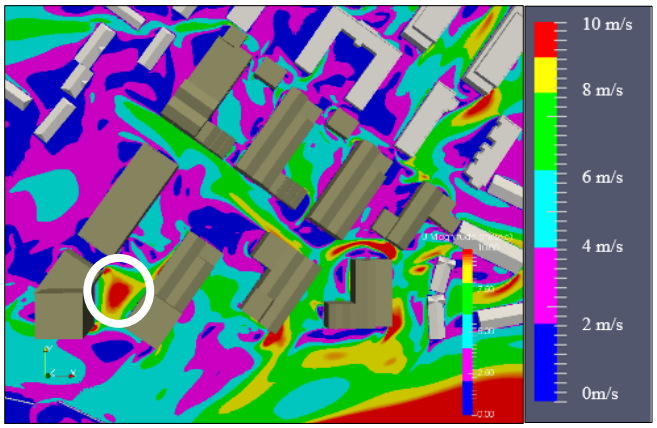
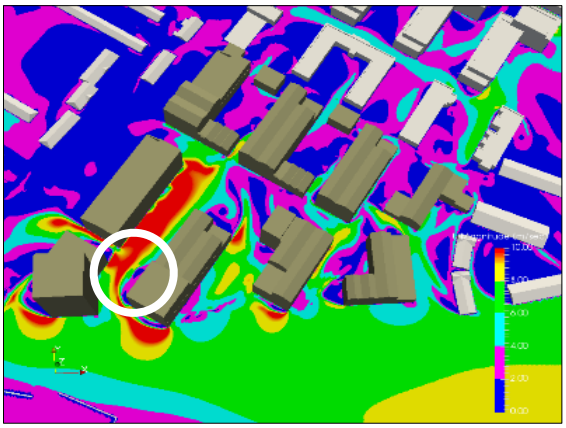


Figure 17.15: Wind Speed (m/s) due to Southeast Winds at Podium Level



Entrances

It is beneficial that the entrances are located near the centre of the buildings and away from the corners of the block, where the higher speed winds occur. The outcome is that the wind conditions are suitable for '*standing*' and therefore, they are considered acceptable for their proposed use.

Thoroughfare

In general, the wind conditions along the thoroughfares around these blocks will be suitable for pedestrian '*walking*'.

The windiness that occurs in the vicinity of Block DT2, which are discussed in Section 17.3.1, will impact on pedestrians walking through the elevated plaza. The provision of a canopy will help maintain wind at high level and protect pedestrians from the worst effects of the wind. Moreover, the provision of a 2.1m high windscreen along the south edge of the proposed Project on podium level will provide shelter to the users from southeast winds. In addition, the provision of tall vegetation in the gap between Blocks C2 and DT2 will also assist in mitigating the wind. Landscape treatment between Blocks D1 and D2 will shelter pedestrians on the pathway between the blocks.

17.5.2.4 Northern Plazas (Blocks A1, A2, A3 and B1)

Figure 17.16: Extent of Northern Plazas

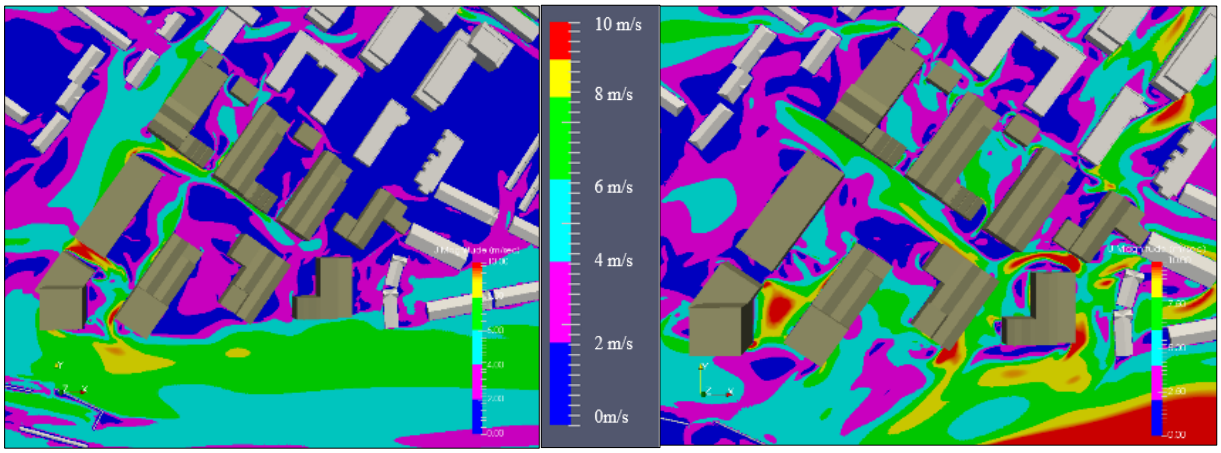
Northern plazas are sheltered from the most critical winds, *i.e.* east, southeast, west and southwest, anticipated in the proposed Project.

Public Realm

In general, the northern plazas are sheltered from the wind. The plazas suffer from slight windiness due to easterly winds. The conditions within the plazas will be suitable for pedestrian '*sitting*'. Landscape treatments within the plazas will be beneficial in providing more localised shelter.

Figure 17.17: Wind Speed (m/s) due to West Winds at Podium Level

Figure 17.18: Wind Speed (m/s) due to Southeast Winds at Podium Level



Entrances

It is beneficial that the entrances are located near the centre of the buildings and away from the corners of the block, where the higher speed winds occur. The outcome is that the wind conditions are suitable for '*standing*' and therefore, they are considered acceptable for their proposed use.

Thoroughfare

In general, the wind conditions along the thoroughfares around these blocks will be suitable for pedestrian '*walking*'. Trees and planting between and along the pedestrian linkage will be beneficial in roughening the terrain and providing more localised shelter.

17.6 Mitigation Measures

Design stage mitigation measures which have been incorporated into the proposed Project in order to improve the wind conditions at the proposed Project include the following:

- provision of planting and soft landscape features at ground level along the main thoroughfare;
- provision of planting and soft landscape features along the East Road;
- provision of planting and soft landscape features at podium level along the gap between Blocks D1 and D2;
- provision of 2.1m high wind screen at podium level between Blocks B1 and B2 to provide shelter to the public realm at ground level below;
- provision of 2.1m high wind screens on either side of the outdoor play area for the crèche;
- provision of 2.1m high wind screens in conjunction with planting along the edge of the southern plazas; and
- provision of canopy along western edge of Block D2 / DT2 in conjunction with a covered walkway between Blocks C2 and D2 to provide shelter against the downdraft occurring at the southwest plaza.

Figure 17.19: Landscape Design at Ground Level and Podium Level

Figure 17.20: Landscape Design at Podium Level between Blocks C2 and D2

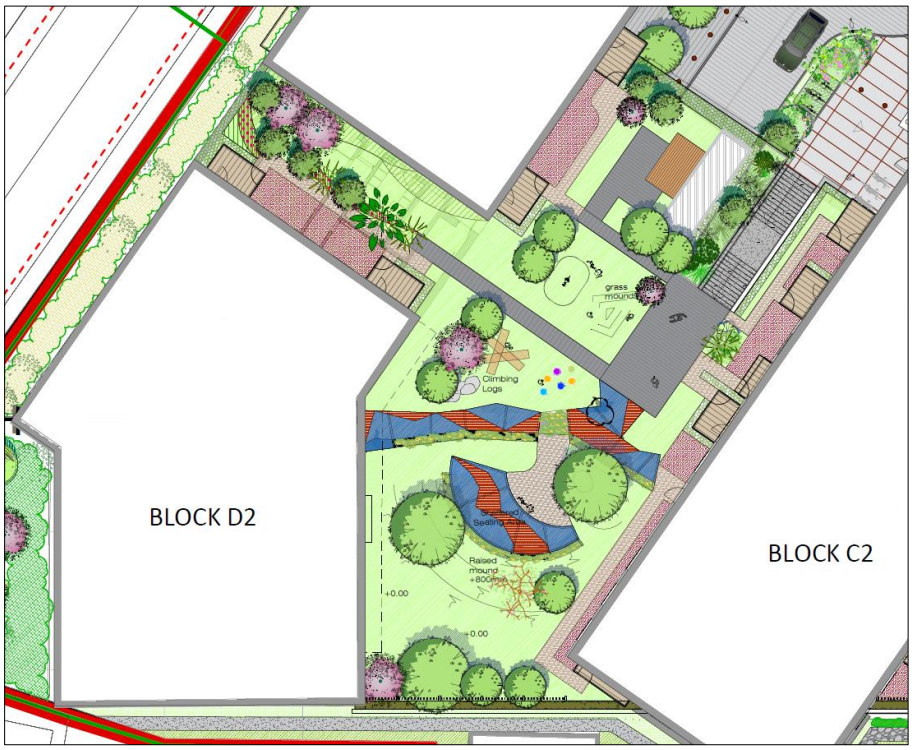
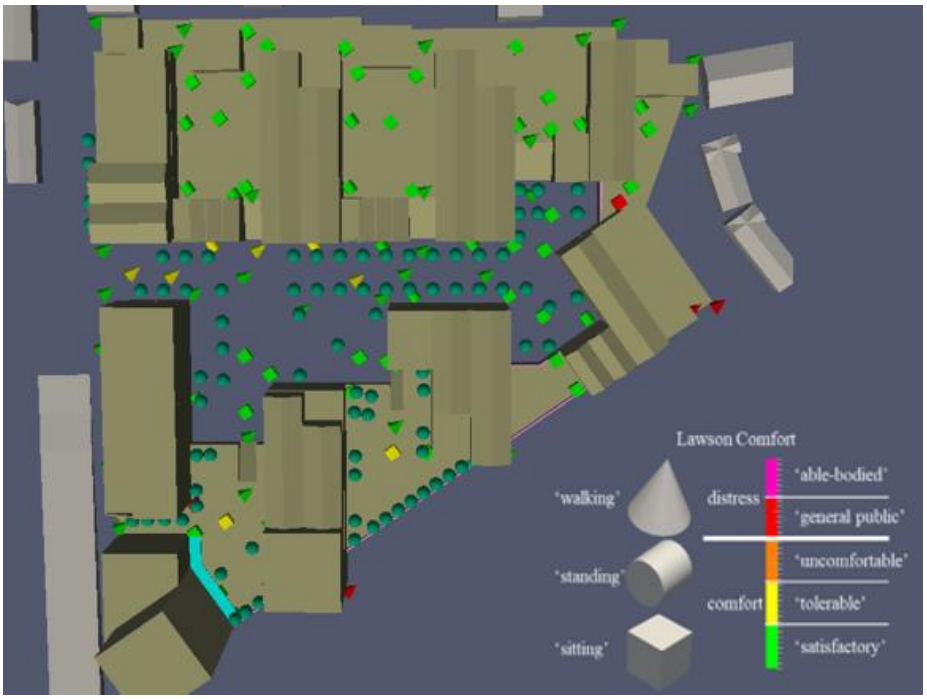


Figure 17.21: Lawson Comfort Criteria following Mitigation



17.6.1 East Road

17.6.1.1 Thoroughfare

The initial model did not contain any soft landscape features. The introduction of these features into the model reveal that they act to further disrupt the wind. In general, the wind conditions along the East Road will be suitable for pedestrian '*walking*' with the provision of suitable landscaping.

Figure 17.22: Wind Speed (m/s) due to Southwest winds before Mitigation

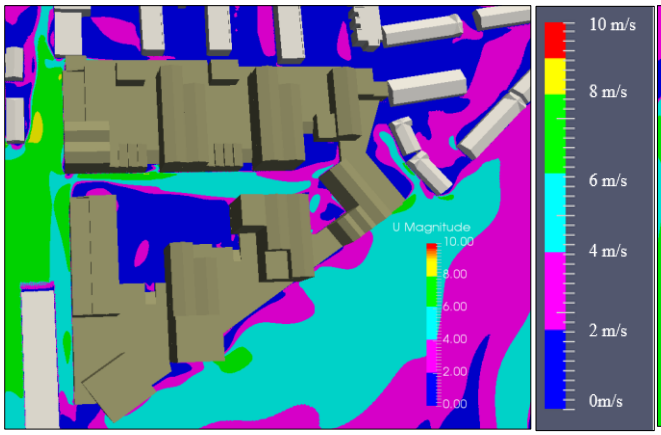
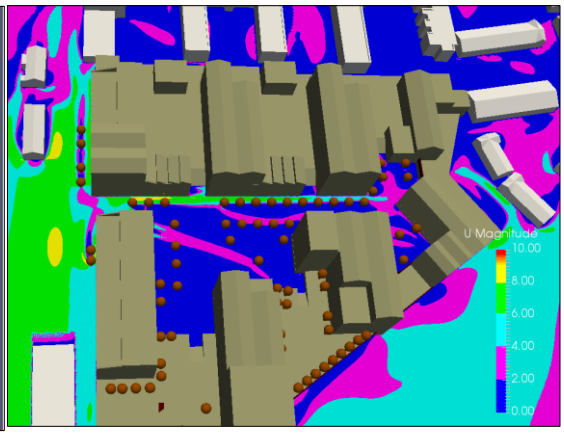


Figure 17.23: Wind Speed (m/s) due to Southwest winds following Mitigation



17.6.2 Central Thoroughfare

17.6.2.1 Public Realm

The results reveal that the wind conditions along the main promenade are mostly in '*sitting*' or '*standing*' range and therefore, is considered acceptable for its intended use.

Figure 17.24: Wind Speed (m/s) due to East Winds at ound level before Mitigation

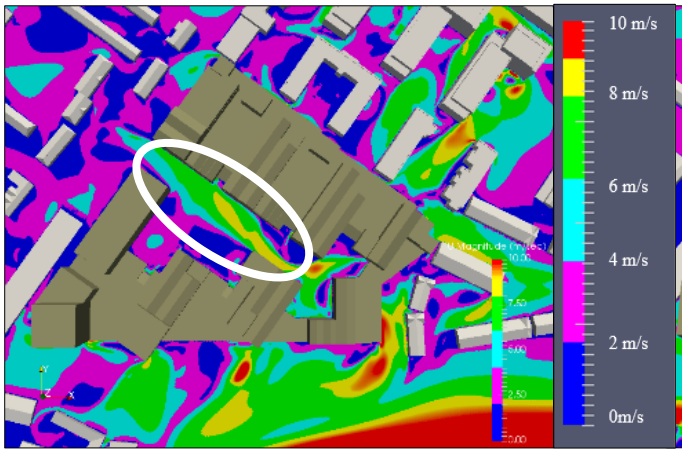


Figure 17.25: Wind Speed (m/s) due to East Winds a ground level following Mitigation

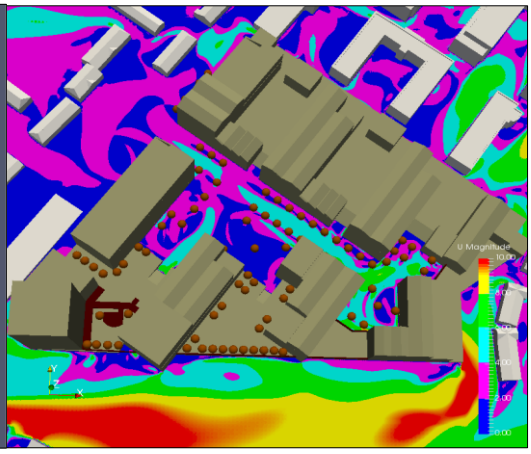


Figure 17.26: Wind Speed (m/s) due to East Wind before Mitigation

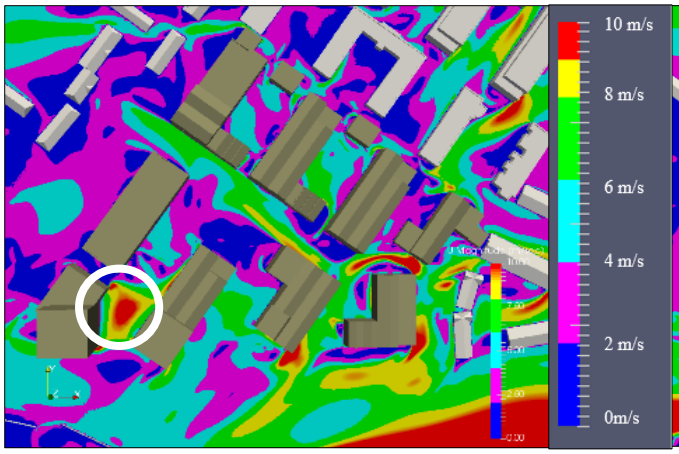


Figure 17.27: Wind Speed (m/s) due to East Wind following Mitigation

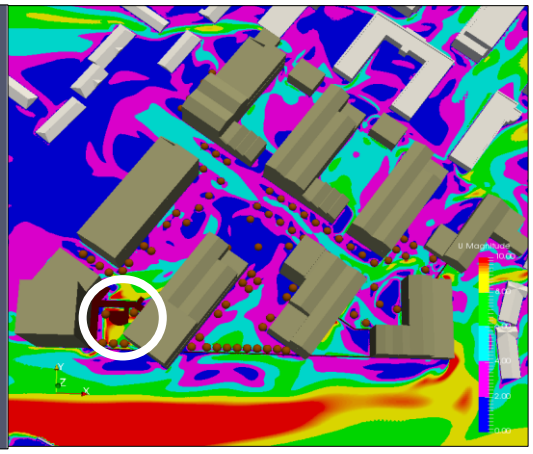


Figure 17.28: Wind Speed (m/s) due to Southeast wind before Mitigation

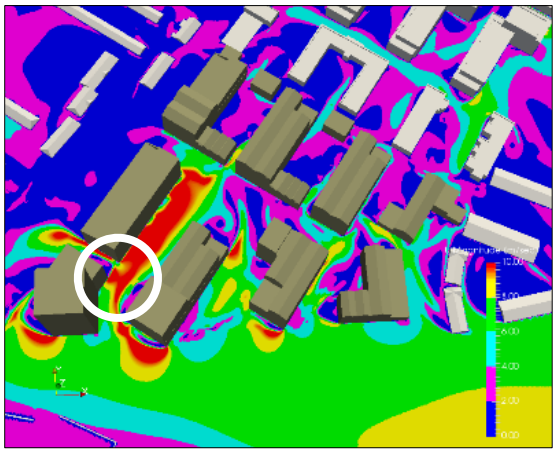
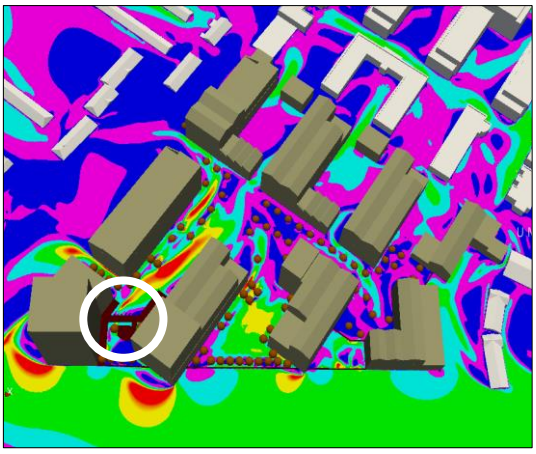


Figure 17.29: Wind Speed (m/s) due to Southeast win following Mitigation



17.6.2.2 Entrances

The provision of landscape features along the main thoroughfare does not significantly impact the wind conditions near entrances. The results reveal that the wind conditions are tolerable for '*standing*' and therefore, they are considered acceptable for their proposed use.

17.6.2.3 Thoroughfare

In general, the wind conditions along the thoroughfare around will be suitable for pedestrian '*walking*'. Trees and planting will be beneficial in roughening the terrain and providing more localised shelter.

17.6.3 Southern Plazas and Crèche Outdoor Play Area (Blocks B2, C1, C2, D1 and D2)

17.6.3.1 Public Realm

The results reveal that the wind conditions on the elevated plazas are typically acceptable for their intended use, although there are a few locations within the plazas that are only tolerable for '*sitting*'.

The provision of a canopy limits the high level easterly winds reaching the elevated plaza between Blocks C2 and DT2. The canopy all acts to maintain the southeasterly winds at a higher level across the plaza in conjunction with the 2.1m wind screens and soft landscaping along the southern edge of the plaza. While some areas of windiness remain, the outcome is a calmer and more attractive plaza for pedestrians, as shown in Figures 17.25, 17.27 and 17.29 above. Similarly, the provision of 2.1m wind screens and soft landscaping, as appropriate, in the other

southern plazas is also beneficial in producing a calmer and more comfortable environment for pedestrians and occupants.

17.6.3.2 Entrances

The entrances benefit from the calmer wind microclimate in the southern plazas due to the provision of the canopy, screens and landscaping. The entrance to the tall tower (Block DT2) shelters the entrance from the downdraft. It is anticipated that the wind conditions are suitable for '*standing*' and therefore, they are considered acceptable for their proposed use.

17.6.3.3 Thoroughfare

The thoroughfares benefit from the calmer wind microclimate in the southern plazas due to the provision of the canopy, screens and landscaping. The canopy provides a sheltered route for pedestrians through the plaza. It is anticipated that the wind conditions are suitable for '*walking*' and therefore, they are considered acceptable for their proposed use.

17.7 Residual Impacts

A study of the proposed Project was carried out to help assess the windiness in and around the development in terms of suitability for pedestrian activities. The critical wind directions for this development in terms of pedestrian comfort are the **east, southeast, southwest and west**. In general, the proposed Project is likely to provide a comfortable and an attractive environment for pedestrians and occupants. Without suitable mitigation, the winds can produce wind conditions that pedestrians may find distressing in certain areas of the Site. It is anticipated that the proposed mitigation measures will help alleviate distress that could be encountered on occasion in certain areas of the site. Overall, it is anticipated that the wind conditions within the proposed Project are considered within suitable limits with the adoption of appropriate mitigation measures and therefore, it is likely to provide a wind microclimate suitable for its intended use.

17.8 Monitoring

It is anticipated that the proposed Project will be constructed using conventional methods. It is recommended that the local weather conditions should be reviewed routinely, particularly for construction works carried out at a height. It is not considered necessary to undertake any formal wind speed and direction monitoring on site during the Construction or Operational Phases.

17.9 Reinstatement

There is no reinstatement required in accordance with this study.

17.10 Interactions

The proposed landscape design has been considered in this study.

17.11 Difficulties Encountered in Compiling the Chapter

There were no significant difficulties in compiling this chapter.

17.12 Cumulative Impacts

The proposed Project consists of relatively medium to tall buildings ranging up to fifteen storeys tall. Much of the surrounding area is already developed as low-to-medium level residential housing. The lands immediately south of the railway yard will be developed in future. Given the distance between the two developments, it is anticipated that there will be limited interaction between the two developments.

17.13 'Do-Nothing' Impact

In the '*do-nothing'* scenario, a large proportion of the proposed Project will be sheltered from the wind. In particular, the entrances are well located in calmer wind conditions near the centre of the buildings and the northern plazas benefit from the shelter provided by the blocks that surround them. However, is it anticipated that there will be areas within the proposed Project where high speed winds will occur at the locations outlined below.

17.13.1 East Road

- Near the main access to the Site: the wind speeds are envisaged to be in the '*walking*' range with the potential to exceed the threshold for distress for more vulnerable pedestrians *(i.e.* young children, the elderly or cyclists) on occasion.

17.13.2 Central Thoroughfare

- Eastern extent of the main thoroughfare: It is anticipated that wind will funnel through the gap between corner Block B2 and Block B1. The wind speeds are likely to be within the 'walking' range, which will be acceptable to most pedestrians, and pedestrians may encounter winds that are distressing on occasion.
- Main access to the development: The wind speeds are likely to be within the '*walking*' range, which will be acceptable to most pedestrians, and pedestrians may encounter winds that are distressing on occasion.

17.13.3 Southern Plazas and Crèche Outdoor Play Area (Blocks B2, C1, C2, D1 and D2)

- Plaza between **Block C2, D1 and D2**: It is anticipated that the typical wind speeds will be tolerable for pedestrians within the public realm, however, it is likely that wind speeds could be distressing on occasion.
- Between **Block D1 and D2**: It is predicted that the wind speeds could be distressing from time to time.
- Between **Blocks C2 and DT2**: It is anticipated that pedestrians will find these winds distressing.
- Plaza between **Blocks C1 and C2:** It is expected that pedestrians will find the winds uncomfortable and may even be distressing on occasion.
- Crèche outdoor play area: It is anticipated that the crèche will suffer from windiness. It is predicted that the wind speeds within the crèche may exceed the '*sitting*' threshold, which could render the space unsuited to its intended use.

17.14 References

- Lawson, TV, 1990. The evaluation of the windiness of a building complex before construction. London Docklands Development Corporation / Department of aerospace engineering, University of Bristol report Number TVL 9025.
- Lawson, TV, 2001, 'Building Aerodynamics', Imperial College Press, London.
- Met Éireann, 2018. www.meteireann.ie visited on 23rd July 2018.

18 Material Assets - Services

18.1 Introduction

This Chapter describes material assets that are potentially impacted by the proposed Project. Material assets are resources that are valued and intrinsic to the site of the proposed Project and the surrounding area. Material assets may be of either natural or human origin and the value may arise for economic or cultural reasons.

This Chapter considers and assesses the effects of the proposed Project on the material assets, including the existing major utilities within and around the Site during the Construction and Operational Phases.

The EPA Guidelines (Draft 2017) state that:

> *'The meaning of this factor is less clear than others. In Directive 2011/92/EU it included architectural and archaeological heritage. Directive 2014/52/EU includes those heritage aspects as components of cultural heritage. Material assets can now be taken to mean built services and infrastructure. Traffic is included because in effect traffic consumes roads infrastructure. Sealing of agricultural land and effects on mining or quarrying potential come under the factors of land and soils.'*

As such, the EIA Directive requires that Architectural and Archaeological Heritage (Cultural Heritage) is assessed as part of Material Assets. However, as this is an important element in Ireland, EIA best practice has established that it is important to address this issue separately and not part of the Material Assets section in the EIAR, see Chapter 8 (Cultural Heritage, Archaeology & Architectural) for more information.

The potential impacts associated with the proposed Project, if any, are assessed with regards to the following proposed built services:

- urban settlements;
- ownership and access;
- wastewater services;
- water supply;
- gas supply;
- electricity; and
- telecommunication.

Furthermore, the impact on the surface water infrastructure and the road infrastructure are discussed in Chapter 13 (Surface Water - Hydrology) and Chapter 11 (Traffic & Transport) respectively.

18.2 Methodology

The potential impacts to material assets as a result of the proposed Project were assessed through a desktop study of available information. The methodology is consistent with the following relevant guidance:

- EPA Guidelines on the *Information to be Contained in Environmental Impact Statements* (EPA, 2002) (and revised and draft guidelines 2015/2017);
- EPA Advice Notes on *Current Practice in the Preparation of Environmental Impact Statements* (EPA,
- 2003) (and revised advice notes 2015); and
- National Roads Authority (NRA) *Environmental Impact Assessment of National Road Schemes - A Practical Guide* (NRA, 2008).

A comprehensive topographical survey was carried out for the Site and existing drainage and utility records in the vicinity of the Site obtained and surveyed in detail[145].

[145] Infrastructure Design Report, DBFL Consulting Engineers, April 2019

A pre-connection enquiry was issued to Irish Water in 2018, in relation to water and wastewater connections at the Site. Irish Water have confirmed by return of letter, subject to a valid connection agreement, that the proposed Project connection to the Irish Water network can be facilitated.

Consultation took place with the Electricity Supply Board (ESB) and Gas Networks Ireland with regard to the availability of power and gas supplies and no concerns have been raised.

The characteristic of an impact relates to the quality, significance and duration of the impact. The definition of these impact characteristics as per the EPA Guidelines (EPA 2002, EPA 2015) is provided in the tables below:

Table 18.1: Quality of Effects

Quality of Effect	Description of Effect
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 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 a nuisance.

Table 18.2 below outlines the definitions of significance of effects which range from imperceptible to profound effects.

Table 18.2: Definitions of Significance of Effect

Significance of Effects	Description of Significance of Effects
Imperceptible	An effect capable of measurement 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.
Profound Effects	An effect which obliterates sensitive characteristics.

Table 18.3 below describes the duration of effects. Momentary effects lasting from seconds to minutes will often be less concerning than long term and permanent effects, depending on their severity.

Table 18.3: Describing Duration of Effects

Duration of Effects	Description of Duration of Effects
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.

18.3 Baseline Environment

This Section provides a description of the relevant aspects of the baseline (current state) environment in relation to Material Assets, under the built services listed in Section 18.1.

18.3.1 Urban Settlements

The Site is currently occupied by Hireco Park as a container / trailer park. The Site comprises mostly of hardstanding together with warehouses and industrial shed's. The Site is zoned Z14 within the Dublin City Development Plan, with the objective to: '*to seek the social, economic and physical development and/or rejuvenation of an area with mixed use, of which residential and 'Z6' would be the predominant uses.'*

This planning application relates to a landholding of c.2.11ha. The proposed Project will provide a mixed-use development of 9 No. blocks to accommodate apartments and amenity facilities. The development will also include car parking spaces, bicycle parking, storage, services and plant areas. More details on the proposed Project are set out in Chapter 4 (Description of the Proposed Project).

The Site is located in the Docklands which is bound by East Road to the west, Island Key Apartments to the north, Merchant's Square to the east and the railway sidings to the south. The Site is located at an important transition point, from East Wall Road to the North Lotts, adjacent to the Dublin Port railyards, and less than 200m from Sherriff Street junction with New Wapping Street. East Road represents a key entry point to the Docklands and the wider City area.

18.3.2 Ownership & Access

The Site is currently accessed with a single entry point on East Road, opposite the existing East Road / Church Road priority junction, to the west of the Site.

To the west, East Wall Road provides access to Fairview and Drumcondra (via Clonliffe Road, in addition to Clontarf via Alfie Byrne Road. Travelling southbound from the Site along East Road, the route terminates at a signalised junction with Sheriff St. Upper. From Sherriff St. Upper there are various road links available to gain access to the North Quays and Dublin City Centre.

A Traffic and Transport Assessment[146] which is submitted with this planning application to address potential concerns that An Bord Pleanála may have pertaining to the level of influence of the proposed Project (Operational Phase) upon the local transportation system.

18.3.3 Wastewater Services

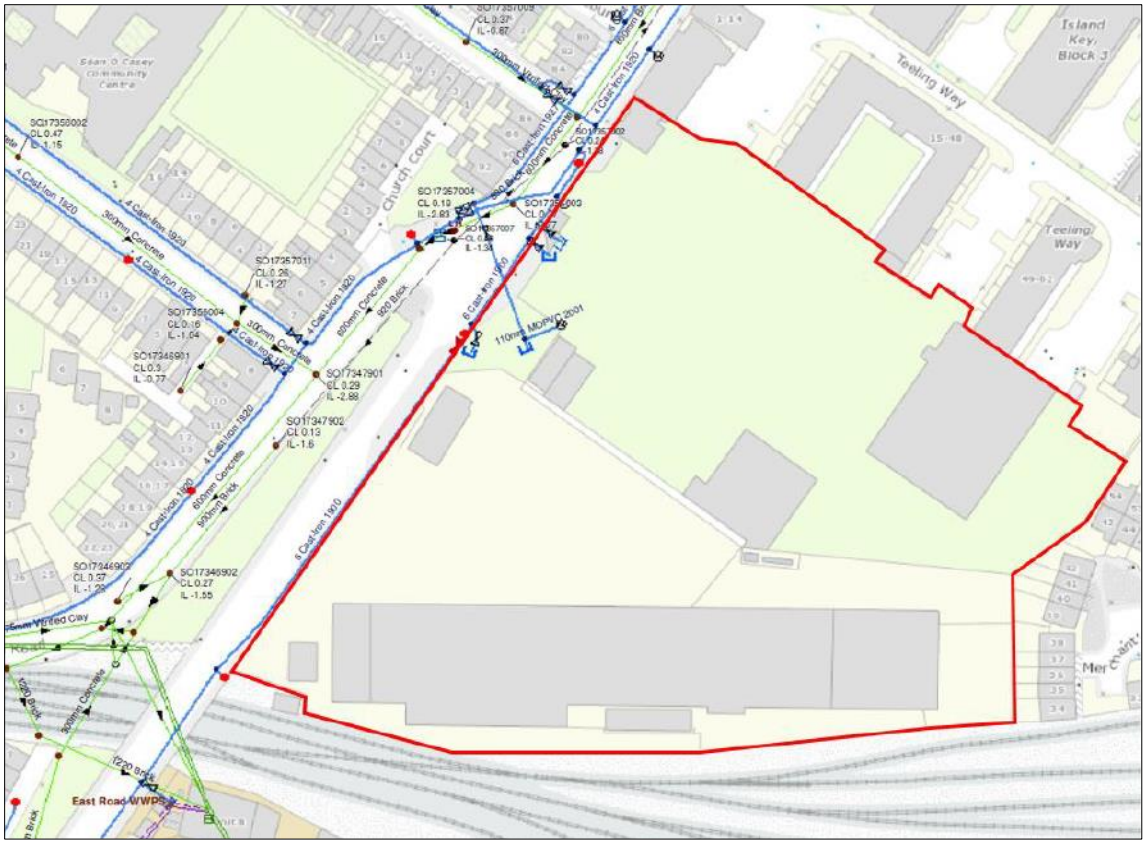
The Ringsend Wastewater Treatment Plant (WwTP) which serves Dublin City, parts of Fingal County Council, South Dublin County Council, Dun Laoighaire-Rathdown County Council and Meath County Council agglomeration (D0034) lies within 3km of the proposed Project. Together with the non-domestic contribution, the existing treatment works is currently operating at its full capacity of 1.64 million population equivalent (PE)[147].

Following a desktop review by DBFL Consulting Engineering, the surrounding area predominately uses a combined drainage network. The existing combined drainage network provide services to domestic, commercial and industrial customers in the immediate vicinity of the Site.

The Site is serviced by an existing 600mm diameter combined sewer on East Road which runs from north to south towards the existing Irish Water pumping station to the south of the Site, see Figure 18.1 below.

[146] The Assessment was prepared by DBFL Consulting Engineers April 2019
[147] Irish Water, 2016: https://www.water.ie/projects-plans/ringsend/environment-planning/Ringsend-WwTP-Upgrade-Information-Booklet.pdf

Figure 18.1: Existing Wastewater and Watermain Records[148] (Site location in red)



18.3.4 Water Supply

Currently the mains water is supplied into the Site from the Local Authority. The Site is served by a series of watermains in East Road and Church Road, with several spurs for connections, some of which may well be historical. The Site is served by a 6" diameter watermain in East Road while also having a separate connection to a 6" diameter watermain located on the junction of East Road and Church Road. The existing watermains to the Site will need to be upgraded to facilitate the development of the proposed Project.

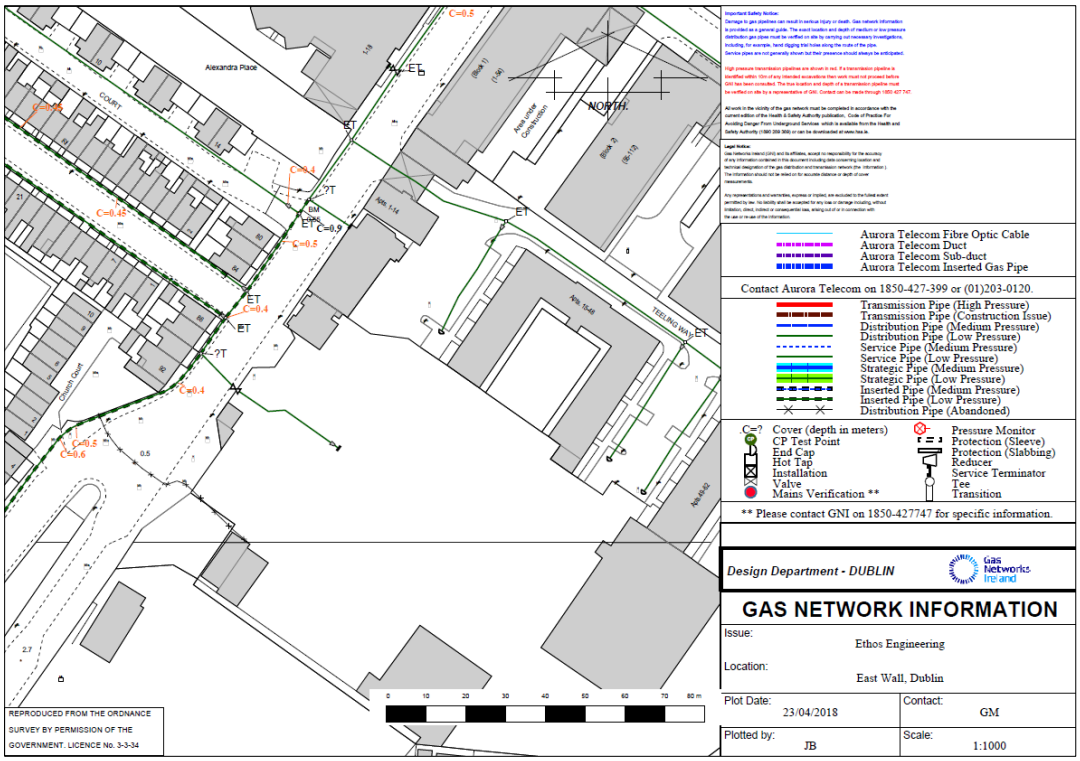
There is an existing fire hydrants located along the Site frontage in East Road, see Figure 18.1 above.

18.3.5 Gas Supply

Gas is fed to the Site from a gas main running onto the Site from East Road. The gas main comes into the Site and runs to a gas meter. The existing gas meter will need to be removed, upgraded, and relocated to an appropriate location to facilitate the development of the proposed Project, see Figure 18.2 below.

[148] DBFL Consulting Engineers: Infrastructure Design Report, April 2019

Figure 18.2: Gas Network Map[149]



18.3.6 Electricity

Based on information received from ESB Networks (ESBN), there are underground cables (10KV/20KV/400V/230V) traversing the Site. These cables will need to be rerouted as part of the enabling works for the proposed Project.

18.3.7 Telecommunication

Based on the information received from telecommunication providers, the area appears to be will serviced and there will be no supply issues going forward.

18.4 Potential Impact of the Proposed Project

This section provides a description of the potential impacts that the proposed Project may have during the Construction and Operational Phases. The impact assessment addresses the *direct, indirect*, *cumulative, short*, *medium* and *long-term*, *permanent, temporary, positive* and *negative* effects.

18.4.1 Construction Phase

18.4.1.1 Urban Settlements

The Construction Phase activates will cause local disturbance to the existing urban settlements in the vicinity of the Site. This will likely have a *temporary* impact on the existing urban settlement. There may also be some additional *slight* and *temporary* impacts to the local population which may arise during the Construction Phase, see Chapter 7 (Population & Human Health), Chapter 14 (Air Quality & Climate) and Chapter 15 (Noise & Vibration) for more information.

[149] Ethos Engineering Mechanical & Electrical Services Basis of Design, July 2018

18.4.1.2 Ownership & Access

During the Construction Phase access to the Site will be via East Road where the existing entrance is currently located. The appointed Contractor shall provide arrangements to provide for vehicular traffic to the Site with control measures where crossing the public footpath.

The proposed Project includes the upgrade of the existing East Road / Church Road priority junctions to be traffic signal controlled. The Construction Phase Site access will be incorporated into the aforementioned junction, creating a four-arm signalised crossroads junction[150].

As a result, there will be a *temporary* disturbance to traffic in the surrounding area, however, traffic volumes are not anticipated to be significant during construction. Appropriate warning signage will be provided for pedestrians and road users on all approaches in accordance with the *Traffic Signs Manual*[151] and the Contractor's *Traffic Management Plan*[152].

The details surround deliveries and access to the Site, during construction, will be decided on prior to construction commencing and will be subject to agreement with the Planning Authority as part of the final CMP. Access and alterations to the local road network are likely to have a *negative, short-term* impact on road users.

18.4.1.3 Wastewater Services

The Construction Phase will involve reconfiguration works to the existing network, in the vicinity of the East Road Pumping station, to accommodate the proposed Project. As a results of these works there is potential for *temporary* impacts to the local network, while these works are being carried out, however the impact is likely to be *neutral.*

During the Construction Phase there will be no discharge of wastewater at the Site, as the provision of welfare facilities on-site will be portable units, with wastewater removed off-site for disposal by an authorised contractor. See Chapter 13 (Surface Water - Hydrology) for more information.

18.4.1.4 Water Supply

The Construction Phase will result in the water main onsite to be removed and a new connection to the existing 6"diameter watermain in East Road will be made (refer to DBFL Drawings 170200- 3000).

As a result of such works there is potential for *temporary* impacts to the local water supply network, by way of disruption in water supply to the local area. However it is likely that this potential impact will have a *neutral* effect.

18.4.1.5 Gas Supply

The existing gas meter and incoming pipe size is insufficient for the proposed Project, so it will need to be removed, upgraded, and relocated to an appropriate location on the Site. The supply of gas to the Site will not be operational during the Construction Phase. There is potential for *temporary* impacts to the local gas supply network, by way of disruption in gas supply to the local area.

However, the potential impact from the Construction Phase on the local gas supply network is likely to be *neutral.*

18.4.1.6 Electricity

Once the Site is secure, the Site compound will be established and the existing Site services will be isolated including the decommissioning of existing substations. In conjunction with the ESB, the provision of a temporary builder's power supply will be provided.

[150] DBFL Consulting Engineers: Infrastructure Design Report, April 2019
[151] Department of Transport, Tourism & Sport: http://www.dttas.ie/roads/publications/english/traffic-signs-manual-2010
[152] DBFL Consulting Engineers: pCMP April 2019

The proposed Project will be provided with a medium voltage (MV) power supply from ESBN. The local area ESBN maps appear to be underground cables traversing the Site and therefore will need to be rerouted as part of the enabling works for the proposed Project.

The Construction Phase work impact on the local electrical supply network is likely to be *neutral, slight* and *temporary.*

18.4.1.7 Telecommunication

Telecommunications will not be operational during the Construction Phase. However, there is a potential that existing fixed telecom lines may need to be diverted, which has the potential to impact on local telecoms connectivity.

The Construction Phase impact on local telecoms is likely to be *neutral, slight and temporary.*

18.4.2 Operational Phase

18.4.2.1 Urban Settlements

The proposed Project will result in the provision of 554 No. apartments, an enterprise space, retail units, foodhub / café / exhibition space, residential amenity, crèche and a Men's shed. The proposed Project is in accordance with the statutory land use zoning pertaining to the Site.

18.4.2.2 Ownership & Access

The Operational Phase of the proposed Project will likely result in an increase in traffic volumes to the local road network. A *Traffic and Transport Assessment* report has been prepared by DBFL Consulting Engineers, which is submitted with this planning application. See also Chapter 11 (Traffic & Transport).

18.4.2.3 Wastewater Services

Irish Water have confirmed by return of letter, subject to a valid connection agreement, that the proposed Project connection to the Irish Water wastewater network can be facilitated.

The proposed Project design will incorporate SuDS / attenuation for the management of stormwater and to reduce surface water inflow into the combine sewers.

The proposed foul drainage has been designed to drain via one outfall to the Irish Water combined sewer in East Road. The design foul flow has been calculated by the project engineers DBFL as 19.22l/s. The Operational Phase of the proposed Project will lead to an increase in the foul discharge from the Site, therefore increasing the pressure on the existing public foul sewer. All foul effluent will be treated at Ringsend WWTP which operates under EPA licence D0034-01. The potential impact is likely to be *moderate* and *long-term.*

18.4.2.4 Water Supply

Irish Water have confirmed by return of letter, subject to a valid connection agreement, that the proposed Project connection to the Irish Water network can be facilitated.

The watermain will feed a cold-water storage tank located at undercroft level. Overall peak water demand will be 16.45l/s for residential use and 4.85l/s for commercial use.

The new mains water supply will serve four separate tanks in each of the separate plant rooms for:

- the cold water supply tank;
- the mains water supply tank;
- the sprinkler water tank; and
- the housekeeping water tank.

Leak detection and metering will be installed as part of the water system to monitor usage in the building and advise facilities management in the event of a leak.

The impact of the Operational Phase on the water supply network is likely to be an increase in the demand on the existing supply. The potential impact is likely to be *moderate* and *long-term.*

18.4.2.5 Gas Supply

The Operational Phase of the proposed Project will require a gas supply. The existing gas meter and incoming pipe size will be upgraded, and relocated during the Construction Phase.

It is proposed that the natural gas supply will be taken from East Road[153] to serve a new natural gas meter skid located externally in the northwest of the Site. The gas skid will serve the gas fired boilers on the ground floor. The gas meter will be installed with a digital output to facilitate with monitoring gas usage on the building management system (BMS).

The impact of the Operational Phase on the gas supply network is likely to be an increase in the demand on the existing supply. The potential impact on the gas supply network is likely to be *moderate* and *long-term.*

18.4.2.6 Electricity

The Operational Phase of the proposed Project will require electricity supplies, which will be an increase in the demand on the existing supply. ESBN will provided with an MV power supply to the proposed Project, this will then be stepped down to a low voltage (LV) power supply using a transformer before feeding a utility metering switch room[154]. Each apartment will have its own ESB meter.

The building load and capacity shall be designed with future capacity allowed to meet the requirements of the proposed Project.

The assessed electrical loads for the proposed Project will be requested from ESB and are as follows:

- Total (District Heating with HIUs[155] Option): ~2,000kVA (kilo-volt-ampere)
- Total (Heat Pumps Option): ~2,900kVA.

The potential impact from the Operational Phase on the electricity supply network is likely to be *moderate* and *long-term.*

18.4.2.7 Telecommunication

The Operational Phase of the proposed Project will require telecommunication connections, which will result in a marginal increase in demand. The area appears to be well serviced with telecommunication provides, and so will provide the building users with a greater choice of service. This will result in *a positive, long-term* effect for the building users.

The potential impact from the Operational Phase on the telecommunication network is likely to be *neutral, imperceptible* and *long-term*.

18.5 Mitigation Measures

All possible precautions shall be taken to avoid unplanned disruptions to any services / utilities during the Construction Phase of the proposed Project. It should be noted that a number of mitigation measures proposed in other EIAR Chapters are also of relevance to Material Assets but are not repeated here.

[153] TBC by Gas Networks Ireland
[154] DBFL Consulting Engineers: Infrastructure Design Report, April 2019
[155] HIU - Heat Interface Units

18.5.1 Construction Phase

The Construction Phase mitigation measures includes avoidance, reduction and remedy measures as set out in Section 4.7 of the Development Management Guidelines (2007)[156] to reduce or eliminate any significant adverse impacts identified.

Service disruptions impacting the surrounding residential / commercial properties shall be kept to a minimum and only occurring where unavoidable. Notification of disruptions shall be given to all impacted properties prior to the works being carried out (this will include information on when disruptions are scheduled and the approximate duration of the disruption). Consultation with relevant neighbouring parties shall be undertaken prior to any proposed disruptions.

The following mitigation measures are proposed for the Construction Phase of the proposed Project:

- Consultation with the relevant services providers shall be undertaken in advance of works. This will ensure all works are carried out to the relevant standards and ensure safe working practices are implemented - i.e. for overhead electricity lines, live electricity lines and gas mains.
- All infrastructure is to be installed and constructed to the relevant codes of practice and guidelines.
- A final CMP and TMP will be implemented by the appointed Contractor for the duration of the Construction Phase. This will ensure protection to the local amenities and the operation of the local road network.
- The potable **water supply** and **wastewater infrastructure** will be pressure tested by an approved method during the Construction Phase, prior to connection to the public networks, all in accordance with Irish Water Requirements.
- Gas Networks Ireland will carry out the works on the **gas supply** network in a controlled manner to avoid loss of service to adjacent customers.

With the above mitigation measures implemented, the severity of the impact is reduced to *slight* as the services will have been satisfactorily diverted or amended, and will therefore continue to operate in their current form as required.

18.5.2 Operational Phase

The design and construction of the necessary service infrastructure will be in accordance with relevant codes of practice and guidelines. As a result this is likely to mitigate any potential impacts during the Operational Phase of the proposed Project.

However, routine maintenance of the Site services will be required from time to time, as such any mitigation measures will be advised by the relevant service provider.

18.6 Residual Impacts

If unregulated, predicted impacts associated with the Construction Phase of the proposed Project would be expected to include potential disruption to local natural and human material assets resulting in both short-term and long-term impacts. The implementation of the mitigation measures set out in this Chapter and other Chapters of the EIAR document would ensure that there is *unlikely to be any significant residual impact* during the Construction Phase. Therefore impacts are likely to be *temporary* and *neutral*.

During the Operational Phase the impact to services / utilities is considered to be positive and *permanent positive* to all the end users.

[156] DEHLG: https://www.housing.gov.ie/sites/default/files/migrated-files/en/Publications/DevelopmentandHousing/Planning/FileDownLoad%2C14467%2Cen.pdf

18.7 Monitoring

Prior to the Operational Phase of the proposed Project, all connections (wastewater, water supply, gas and electricity) will be tested by a suitable qualified person under the supervision of DCC. The proposed Project water supply will be tested to the satisfaction of DCC prior to the connection to the public potable water.

Any monitoring of the built services required during the operational phase of the proposed project will be as advised by the relevant services providers.

18.8 Reinstatement

There are no reinstatement plans proposed specifically with respect to Material Assets. Residual impacts on services / the major utilities are considered to be *imperceptible.*

18.9 Interactions

The main interactions relating to Material Assets - Services are **Water, Air Quality** and **Population & Human Health.**

During the **Construction Phase,** the availability of **water** supplies to the Site and during the connection of the water supply and wastewater services has the potential to impact of the local surface water. There is also implications for the local **population** if these services are disrupted during the Construction Phase. The development and installation of the Material Assets - Services during construction has the potential to impact on the local **air quality**.

During the **Operational Phase** the water supply and wastewater services will have a potential interaction with the available water supply and the potential emissions to the water cycle.

18.10 Difficulties Encountered in Compiling the Chapter

The exact location of the existing services infrastructure is reliant upon the records obtained, which are indicative. The exact location of services infrastructure can only be determined by an intrusive survey investigation. However, the information received gives a good indication of the approximate location of the various built services.

18.11 Cumulative Impacts

The assessment has considered cumulative impact of Construction and Operational Phase in conjunction with surrounding developments.

Considering the minimal use of material assets (i.e. temporary power) during the Construction Phase, there *is no likely impact*.

18.12 'Do-Nothing' Impact

A '*do-nothing'* scenario is not considered valid, as the lands are currently zoned for redevelopment under the Development Plan.

However, in the '*do-nothing'* scenario the Site would not be redeveloped and therefore there would be no adverse impacts to Material Assets - Services. In the event that the proposed Project does not proceed, the Site will remain in its current use in the short-term or until alternative redevelopment proposal is granted planning permission.

18.13 References

- DBFL Consulting Engineers: Infrastructure Design Report, April 2019
- DBFL Consulting Engineers: pCMP, April 2019
- Department of the Environment, Heritage and Local Government: https://www.housing.gov.ie/sites/default/files/migrated-files/en/Publications/DevelopmentandHousing/Planning/FileDownLoad%2C14467%2Cen.pdf

- Department of Transport, Tourism & Sport: http://www.dttas.ie/roads/publications/english/traffic-signs-manual-2010
- EPA Advice Notes on *Current Practice in the Preparation of Environmental Impact Statements* (EPA,2003) (and revised advice notes 2015)
- EPA Guidelines on the *Information to be Contained in Environmental Impact Statements* (EPA, 2002) (and revised and draft guidelines 2015 / 2017)
- Ethos Engineering Mechanical & Electrical Services Basis of Design, July 2018
- National Roads Authority (NRA) Environmental Impact Assessment of National Road Schemes - A Practical Guide (NRA, 2008) https://www.tii.ie/technical-services/environment/planning/Environmental-Impact-Assessment-of-National-Road-Schemes-Practical-Guide.pdf

19 Material Assets - Waste

19.1 Introduction

This Chapter of the EIAR comprises an assessment of the likely impact of the proposed Project on the waste generated from the development as well as identifying proposed mitigation measures to minimise any impacts.

A site-specific Construction and Demolition Waste Management Plan (C&DWMP) has been prepared to deal with waste generation during the Construction Phase of the proposed Project and is included with the Planning Application pack. The C&DWMP was prepared in accordance with the *'Best Practice Guidelines for the Preparation of Waste Management Plans for Construction and Demolition Projects'* document produced by the National Construction and Demolition Waste Council (NCDWC) in conjunction with the Department of the Environment, Heritage and Local Government (DEHLG) in July 2006.

A separate Operational Waste Management Plan (OWMP) has also been prepared for the operational phase of the development and is included with the Planning Application pack.

These documents will ensure the sustainable management of wastes arising at the development in accordance with legislative requirements and best practice standards.

19.2 Methodology

The assessment of the impacts of the proposed Project 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. A summary of the documents reviewed, and the relevant legislation is provided with the Planning Application pack.

This Chapter is based on the proposed Project, as described in Chapter 4 (Description of the Proposed Project) and considers the following aspects:

- legislative context;
- Construction Phase (including demolition site preparation, excavation and levelling); and
- Operational Phase.

A desk 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.

Estimates of waste generation during the Construction and Operational Phases of the proposed Project have been calculated. The waste types and estimated quantities are based on published data 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, other available research sources and waste collection data from the existing neighbouring development.

Mitigation measures are proposed to minimise the effect of the proposed Project 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 19.8.

A detailed review of the existing ground conditions on a regional, local and site-specific scale are presented in Chapter 12 (Land, Soils, Geology and Hydrogeology). Chapter 12 of the EIAR also discusses the environmental quality of any soils which will have to be excavated to facilitate construction of the proposed Project.

19.2.1 Legislation and Guidance

Waste management in Ireland is subject to EU, national and regional waste legislation 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).

In addition, the Irish government issues policy documents which outline measures aimed to improve waste management practices in Ireland and help the country to achieve EU targets in respect of recycling and disposal of waste. The most recent policy document *A Resource Opportunity – Waste Management Policy in Ireland*[157] was published in 2012 and stresses the environmental and economic benefits of better waste management, particularly in relation to waste prevention.

The strategy for the management of waste from the construction phase is in line with the requirements of the *Best Practice Guidelines for the Preparation of Waste Management Plans for Construction and Demolition Projects*[158] published in 2006. The guidance document *Construction and Demolition Waste Management: A handbook for Contractors and Site Managers* was 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*;
- BS 5906:2005 Waste Management in Buildings - Code of Practice;
- DCC *Bye-Laws for the Storage, Presentation and Collection of Household and Commercial Waste 2013;*
- DCC *Dublin City Council (Storage, Presentation and Segregation of Household and Commercial Waste) Bye-Laws 2018;*
- EPA National Waste Database Reports 1998-2016; and
- EPA National Waste Statistics Web Resource.

19.3 Baseline Environment

The Site is located at 1-4 East Road, Dublin 3. The Site is bounded by East Road to the West, railway tracks to the South, Merchant's Square to the East and Island Key Apartments to the North.

In terms of waste management, the receiving environment is largely defined by DCC as the Local Authority responsible for setting and administering waste management activities in the area. This is governed by the requirements set out in the *EMR Waste Management Plan 2015-2021*[159].

The waste management plan sets the following targets for waste management in the region:

- A 1% reduction per annum in the quantity of household waste generated per capita over the period of the plan;
- Achieve a recycling rate of 50% of managed municipal waste by 2020; and
- Reduce to 0% the direct disposal of unprocessed residual municipal waste to landfill (from 2016 onwards) in favour of higher value pre-treatment processes and indigenous recovery practices.

The Regional Plan sets out the strategic targets for waste management in the region and sets a specific target for C&D waste of *'70% preparing for reuse, recycling and other recovery of construction and demolition waste'* (excluding natural soils and stones and hazardous wastes) to be achieved by 2020.

[157] EPA 2012: https://www.epa.ie/pubs/reports/waste/plans/Resource_Opportunity2012.pdf
[158] DEHLG 2006: https://www.leanbusinessireland.ie/includes/documents/BPGConstructionand%20demolition.pdf
[159] Eastern – Midlands Waste Region http://emwr.ie/

The National Waste Statistics update published by the EPA in October 2018 identifies that Ireland's current progress against this C&D waste target is at 68% and our progress against '*Preparing for reuse and recycling of 50% by weight of household derived paper, metal, plastic & glass (includes metal and plastic estimates from household WEEE)*' is at 45%. Both of these targets are required to be met by December 2020 in accordance with the requirements of the Waste Framework Directive.

The Dublin City Development Plan 2016-2022 also sets policies and objectives for the DCC area which reflect those set out in the regional waste management plan.

In terms of physical waste infrastructure, DCC no longer operates any municipal waste landfill in the area. There are a number of waste permitted and licensed facilities located in the Eastern-Midlands Waste Region 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.

19.4 Characteristics of the Proposed Project

A full description of the proposed Project can be found in Chapter 4 (Description of the Proposed Project). The characteristics of the proposed Project that are relevant in terms of waste management are summarised below.

The development will consist of the demolition of all existing structures onsite and the construction of a mixed-use development consisting of 9 no. blocks over two separate podiums ranging in height from 3 to 15 storeys. The proposed Project will accommodate residential apartments, commercial / enterprise space, retail units, foodhub / café / exhibition space, residential amenity services, crèche and Men's shed.

The proposed Project also includes for a new centrally landscaped public plaza, which also incorporates surface car-parking and cycle parking. The proposed Project planning application includes all Site landscaping works, green roofs, boundary treatments, lighting, servicing, signage, and associated and ancillary works, including site development works above and below ground.

19.4.1 Construction Phase

19.4.1.1 Demolition Works

There will be waste materials generated from the demolition of the existing buildings and hardstanding areas onsite, as well as from the excavation of the building foundations. The volume of waste generated from demolition will be more difficult to segregate than waste generated from the Construction Phase, as many of the building materials will be bonded together or integrated *i.e.* plasterboard on timber ceiling joists, steel embedded in concrete etc.

A Refurbishment / Demolition Asbestos Survey was undertaken by CMSE Consultancy on the 27th of June 2018, for the purpose of identifying and managing any Asbestos Containing Materials (ACMs) on the premises. The scope of the asbestos survey was confined to all accessible areas of the five buildings within the boundary of the Site. During the course of the survey, ACMs were identified in a number of locations including asbestos roof sheeting and an asbestos cement sheeting.

Brady Shipman Martin undertook a site assessment / survey searching directly for evidence of Japanese Knotweed and other invasive species on the 19th of May 2018. This included a walkover survey of the entire Site, and around part of the outside perimeter. No Knotweed plant species were recorded inside the Site boundary.

The estimated quantum of demolition waste and indicative reuse / recovery / recycling / disposal targets as detailed in the C&DWMP are presented in Table 19.1 below.

Table 19.1: Estimated Off-Site Reuse, Recycle and Disposal Rates for Demolition Waste

Waste Type	Tonnes	Reuse / Recovery		Recycle		Disposal	
		%	Tonnes	%	Tonnes	%	Tonnes
Glass	7.0	0	0.0	85	6.0	15	1.1
Concrete, Bricks, Tiles, Ceramics	386.7	30	116.0	65	251.4	5	19.3
Plasterboard	28.1	0	8.4	80	16.9	20	2.8
Asphalts	7.0	0	0.0	25	1.8	75	5.3
Metal	133.6	5	6.7	80	106.9	15	20.0
Slate	56.2	0	0.0	85	47.8	15	8.4
Timber	84.4	20	8.4	40	50.6	50	25.3
Asbestos & Asbestos Containing Material	2.4	0	0.0	0	0.0	100	2.4
Total	**705.5**	**-**	**139.6**	**-**	**481.3**	**-**	**42.7**

It should be noted that until a detailed survey of the areas to be demolished is carried out, it is difficult to predict with a high level of accuracy the demolition waste that will be generated from the proposed works.

As noted in Section 19.1, a Site-specific C&DWMP has been prepared by AWN consulting for the proposed Project and is included with the Planning Application pack. The plan will be updated, or a demolition plan will be prepared and submitted prior to commencement of the demolition works which may refine the demolition waste figures detailed in Table 19.1 above.

19.4.1.2 Construction Phase

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.

In addition, stone, gravel, clay and made ground will require excavation to piles, pile capping, ground beams the installation of underground services and attenuation tank. The project engineers have estimated that c. 7,500m^3 of material will require excavation. These estimates will be refined prior to commencement of the Construction Phase works. It is anticipated that there will be no opportunities for reuse of the excavated material onsite and so it will require removal from site for off-site reuse, recovery and / or disposal. If the surplus 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 license is required by the receiving facility.

In order to establish the appropriate reuse, recovery and / or disposal route for the 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*. Environmental soil analysis will be carried out prior to removal of the material on a number of the soil samples in accordance with the requirements for acceptance of waste at landfills (Council Decision 2003/33/EC Waste Acceptance Criteria). This legislation sets limit values on landfills for acceptance of waste material based on properties of the waste including potential pollutant concentrations and leachability. It is anticipated that the surplus material will be suitable for acceptance at either inert or non-hazardous soil recovery facilities / landfills in

Ireland or, in the unlikely event of hazardous material being encountered, be transported for treatment / recovery or exported abroad for disposal in suitable facilities.

Waste will also be generated from construction workers e.g. organic / food waste, dry mixed recyclables (waste paper, newspaper, plastic bottles, packaging, aluminium cans, tins and Tetra Pak cartons), mixed non-recyclables and potentially sewage sludge from temporary welfare facilities provided onsite during the construction phase. Waste printer / toner cartridges, waste electrical and electronic equipment (WEEE) and waste batteries may also be generated infrequently from site offices.

Further detail on the waste materials likely to be generated during the Construction Phase are presented in the project-specific C&DWMP included with the Planning Application pack. The C&DWMP provides an estimate of the main waste types likely to be generated during the Construction Phase of the proposed Project and these are summarised in Table 19.2 below.

Table 19.2: Reuse, Recycle / Recovery and Disposal Rates for Construction Waste

Waste Type	Tonnes	Reuse / Recovery		Recycle		Disposal	
		%	Tonnes	%	Tonnes	%	Tonnes
Mixed C&D	818.1	10	81.8	80	654.5	10	81.8
Timber	694.1	40	277.7	55	381.8	5	34.7
Plasterboard	247.9	30	74.4	60	148.7	10	24.8
Metals	198.3	5	9.9	90	178.5	5	9.9
Concrete	148.7	30	44.6	65	96.7	5	7.4
Other	371.9	20	74.4	60	223.1	20	74.4
Total	**2479.1**	-	**562.7**	-	**1683.3**	-	**233.0**

It should be noted that until final materials and detailed construction methodologies have been confirmed it is difficult to predict with a high level of accuracy the Construction Phase waste that will be generated from the construction of the proposed Project as the exact materials and quantities may be subject to some degree of change and variation during the construction process. However, the above estimates are considered to be the worst-case scenario.

19.4.2 Operational Phase

As noted in Section 19.1, an OWMP has been prepared for the development and is included with the Planning Application pack. The OWMP provides a strategy for segregation (at source), storage and collection of all wastes generated within the building during the Operational Phase including dry mixed recyclables, organic waste and mixed non-recyclable waste as well as providing a strategy for management of waste glass, batteries, WEEE, printer / toner cartridges, chemicals, textiles, waste cooking oil and furniture.

The total estimated waste generation for the proposed Project for the main waste types is presented in Table 19.3 & Table 19.4 below and is based on the uses and areas as advised by the project architects[160] April 2019.

[160] O'Mahoney Pike

Table 19.3: Estimated Waste Generation for the Proposed Project for the Main Waste Types

Waste Type	Waste Volume (m^3 / week)			
	Residential (Combined)	Retail Units (3 No. Combined)	Food hub /Café / Exhibition Space / Men's Shed Units (Combined)	Crèche
Organic Waste	8.05	0.11	0.71	0.05
DMR	58.99	2.17	1.67	1.96
Glass	1.56	0.06	0.03	0.01
MNR	32.69	0.90	1.86	0.87
Total	**101.29**	**3.24**	**4.26**	**2.89**

Table 19.4: Estimated Waste Generation for the Proposed Project for the Main Waste Types

Waste Type	Waste Volume (m^3/week)
	Enterprise Units -Offices (Combined)
Organic Waste	0.27
Paper (Confidential)	2.41
DMR	5.90
Glass	0.05
MNR	2.56
Total	**11.19**

The *BS5906:2005 Waste Management in Buildings-Code of Practice* was considered in the estimations of the waste arising. It has been assumed that the retail, food hub, café, exhibition space, men's shed and residential units will generate similar waste volumes over a seven-day period, while the enterprise offices will operate over a five-day period. It is anticipated that the conservative estimation of waste quantities from the residents will be sufficient to cover the small quantities likely to be generated in the community facilities on a weekly basis.

AWN's modelling methodology is based on data from recent published data and data from numerous other similar developments in Ireland and based on AWN's experience it is a more representative estimate of the likely waste arisings from the proposed Project.

Residential waste will be conveyed by occupants to one of two dedicated communal waste storage areas on ground level. The bins / FIBCs / compactors of segregated waste / recyclables will be conveyed by the facilities management other waste contractor via the internal roads temporary waste collection area or directly to the loading bay outside of block D1 for collection / emptying by the nominated waste contractor(s). Once emptied, bins should be promptly returned to the units.

Commercial tenants waste will be conveyed by the tenants to one of the four designated waste storage area (WSAs). Bins will be conveyed by the facilities management or the waste contractor via the internal roads to the temporary waste collection area or directly to the loading bay outside of block D1 for collection / emptying by the nominated waste contractor(s). They will be positioned such that they don't obstruct pedestrian traffic on the footpath. Once emptied, bins should be promptly returned to the units.

The designated loading bay located within in the development parallel to block D1 will be readily accessible by the waste contractor during the designated collection days / times.

The OWMP seeks to ensure the proposed Project contributes to the targets outlined in the *EMR Waste Management Plan 2015-2021*, the *DCC Bye-Laws for the Storage, Presentation and Collection of Household and Commercial Waste* and the *DCC Dublin City Council (Storage, Presentation and Segregation of Household and Commercial Waste) Bye-Laws*.

Mitigation measures proposed to manage impacts arising from wastes generated during the operation of the proposed Project are summarised below.

19.5 Potential Impact of the Proposed Project

This section details the potential waste effects associated with the proposed Project.

19.5.1 Construction Phase

The proposed Project will generate a range of non-hazardous and hazardous waste materials during demolition, excavation and Construction Phase. 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 onsite pending collection by a waste contractor. Dedicated areas for waste skips and bins will be identified across the Site. These areas will need to be easily accessible to waste collection vehicles.

If waste material is not managed and stored correctly, it is likely to lead to litter or pollution issues at the development and on adjacent developments. The knock-on effect of litter issues is the presence of vermin within the Site and the surrounding areas.

The use of non-permitted waste contractors or unauthorised waste facilities could give rise to inappropriate management of waste and result in negative environmental impacts or pollution. 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.

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 Eastern Midlands region which can accept hazardous and non-hazardous waste materials and acceptance of waste from the proposed Project 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 arisings at facilities in the region. Where possible, waste will be segregated into reusable, recyclable and recoverable materials. The majority of demolition and construction materials are either recyclable or recoverable.

Recovery and recycling of C&D waste has a positive impact on sustainable resource consumption, for example where waste timber is mulched into a landscaping product or waste asphalt is recycled for use in new pavements. The use of recycled materials, where suitable, reduces the consumption of natural resources.

There is a quantity of soil and stone which will need to be excavated to facilitate the proposed Project. It is anticipated that there will be limited or no opportunities for reuse of the excavated material onsite and so it will require removal from site for off-site reuse, recovery and / or disposal. Correct classification and segregation of the excavated material 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.

The potential effect of construction waste generated from the proposed Project is considered to be *short-term, not significant* and *neutral.*

19.5.2 Operational Phase

The potential impacts on the environment of improper, or a lack of, waste management during the Operational Phase would be a diversion from the priorities of the waste hierarchy which would lead to small volumes of waste being sent unnecessarily to landfill.

The nature of the development means the generation of waste materials during the Operational Phase is unavoidable. Networks of waste collection, treatment, recovery and disposal infrastructure are in place in the region to manage waste efficiently from this type of development. Waste which is not suitable for recycling is typically sent for energy recovery. There are also facilities in the region for segregation of municipal recyclables which is typically exported for conversion in recycled products (e.g. paper mills and glass recycling).

If waste material is not managed and stored correctly, it is likely to lead to litter or pollution issues at the Site and on adjacent developments. The knock-on effect of litter issues is the presence of vermin within the Site and the surrounding areas.

Waste contractors will be required to service the proposed Project on a regular basis to remove waste. The use of non-permitted waste contractors or unauthorised facilities could give rise to inappropriate management of waste and result in negative environmental impacts or pollution. It is essential that all waste materials are dealt with in accordance with National and Regional legislation, as outlined previously, and that time and resources are dedicated to ensuring efficient waste management practices.

The potential impact of operational waste generation from the proposed Project is considered to be long- *term, not significant* and *negative.*

19.6 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.

19.6.1 Construction Phase

As previously stated, a Site specific C&DWMP has been prepared in line with the requirements of the guidance document issued by the DEHLG and is included with the Planning Application pack. Adherence to the high-level strategy presented in this C&DWMP will ensure effective waste management and minimisation, reuse, recycling, recovery and disposal of waste material generated during the demolition, excavation and Construction Phases of the proposed Project. Prior to commencement of demolition, the appointed Contractor will be required to refine / update the C&DWMP or submit an addendum to the C&DWMP to DCC to detail specific measures to minimise waste generation and resource consumption and provide details of the proposed waste contractors and destinations of each waste stream.

The project engineers have estimated that c.7,500m^3 of material will be generated from the excavations required to facilitate piles, pile caps, ground beams, construction of new foundations, the installation of underground services and attenuation tank. It is anticipated that this material will require removal from the Site for offsite reuse, recovery, recycling and / or disposal. The appointed Contractor will endeavor to ensure that material is reused or recovered offsite insofar as is reasonably practicable or disposed of at authorised facility.

In addition, the following mitigation measures will be implemented:

- building materials will be chosen with an aim to ‘design out waste’;
- onsite segregation of waste materials will be carried out to increase opportunities for off-site reuse, recycling and recovery – it is anticipated that the following waste types, at a minimum, will be segregated:
    - concrete rubble (including ceramics, tiles and bricks);
    - plasterboard;
    - metals;
    - glass; and
    - timber.

- left over materials (e.g. timber off-cuts, broken concrete blocks / bricks) and any suitable construction materials shall be re-used onsite, where possible;
- 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 waste manager will be appointed by the main contractor(s) to ensure effective management of waste during the excavation and construction works;
- all site personnel 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 suitable permitted contractors and taken to suitably registered, permitted or licensed facilities; and
- all waste leaving the Site will be recorded and copies of relevant documentation maintained.

Nearby sites requiring clean fill material will be contacted to investigate reuse opportunities for clean and inert material, if required. If any of the material is to be reused on another site as by-product (and not as a waste), this will be done in accordance with Article 27 of the *EC (Waste Directive) Regulations (2011)* as detailed in the C&DWMP (Planning Application pack). EPA approval will be obtained prior to moving material as a by-product. However, it is not currently anticipated that Article 27 will be used.

These mitigation measures will ensure that the waste arising from the Construction Phase of the proposed Project is dealt with in compliance with the provisions of the *Waste Management Act 1996, as amended*, associated Regulations, *the Litter Pollution Act 1997*, *the EMR Waste Management Plan (2015-2021)* and the and the DCC Bye-Laws for the Storage, Presentation and Collection of Household and Commercial Waste and the DCC waste and draft waste bye-laws. It will also ensure optimum levels of waste reduction, reuse, recycling and recovery are achieved and will encourage sustainable consumption of resources.

19.6.2 Operational Phase

As previously stated, a project specific OWMP has been prepared and is included with the Planning Application pack. Implementation of this OWMP will ensure a high level of recycling, reuse and recovery at the development. All recyclable materials will be segregated at source to reduce waste contractor costs and ensure maximum diversion of materials from landfill, thus achieving the targets set out in the *EMR Waste Management Plan 2015-2021* and the DCC waste and draft waste bye-laws.

In addition, the following mitigation measures will be implemented:

- Onsite segregation of all waste materials into appropriate categories including (but not limited to):
    - organic waste;
    - dry Mixed Recyclables;
    - mixed Non-Recyclable Waste;
    - glass;
    - waste electrical and electronic equipment (WEEE);
    - batteries (non-hazardous and hazardous);
    - cooking oil;
    - light bulbs;
    - cleaning chemicals (pesticides, paints, adhesives, resins, detergents, etc.);
    - furniture (and from time to time other bulky waste); and
    - abandoned bicycles.
- all waste materials will be stored in colour coded bins or other suitable receptacles in designated, easily accessible locations. Bins will be clearly identified with the approved waste type to ensure there is no cross contamination of waste materials;

- all waste collected from the proposed Project will be reused, recycled or recovered where possible, with the exception of those waste streams where appropriate facilities are currently not available; and
- all waste leaving the Site will be transported by suitable permitted contractors and taken to suitably registered, permitted or licensed facilities.

These mitigation measures will ensure the waste arising from the proposed Project is dealt with in compliance with the provisions of the *Waste Management Act 1996*, as amended, associated Regulations, the *Litter Pollution Act 1997*, the *EMR Waste Management Plan (2015-2021)* and the DCC waste and draft waste bye-laws. It will also ensure optimum levels of waste reduction, reuse, recycling and recovery are achieved.

19.7 Residual Impacts

The implementation of the mitigation measures outlined in Section 19.6 will ensure that a high rate of reuse, recovery and recycling is achieved at the proposed Project during the demolition, excavation and Construction Phases as well as during the Operational Phase. It will also ensure that European, National and Regional legislative waste requirements with regard to waste are met and that associated targets for the management of waste are achieved.

19.8 Monitoring

The management of waste during the Construction Phase should be monitored to ensure compliance with relevant local authority requirements, and effective implementation of the C&DWMP including maintenance of waste documentation.

The management of waste during the Operational Phase should be monitored to ensure effective implementation of the C&DWMP by the building management company and the nominated waste.

19.8.1 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 Construction Phase where there is a potential for waste management to become secondary to progress and meeting construction schedule targets. The C&DWMP specifies the need for a waste manager 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 should identify the reasons for targets not being achieved and work to resolve any issues. Recording of waste generation during the proposed Project will enable better management of waste contractor requirements and identify trends. The data should be maintained to advise on future projects.

19.8.2 Operational Phase

During the Operational Phase, waste generation volumes should be monitored against the predicted waste volumes outlined in the OWMP. There may be opportunities to reduce the number of bins and equipment required in the WSAs where estimates have been too conservative. Reductions in bin and equipment requirements will improve efficiency and reduce waste contractor costs.

Waste legislation should also be consulted on a regular basis in case of any changes which may impact on waste management procedures.

19.9 Reinstatement

There is no reinstatement required in accordance with this study.

19.10 Interactions

Adherence to the mitigation measures outlined in Sections 19.6.1 and 19.6.2 will ensure that there are no significant impacts on resource or waste management from the proposed Project. The management of waste during the Construction Phase in accordance with the C&DWMP and during the operational phase in accordance with the OWMP will meet the requirements of National and Regional waste legislation and promote the management of waste in line with the priorities of the waste hierarchy.

19.10.1 Land and Soils

During the Construction *Phase* excavated soil and stone (c. 7,500m^3) will be generated from the excavations required to facilitate construction of piles, pile caps, ground beams, new foundations, the installation of underground services and attenuation tank. It is envisaged that all excavated material will be taken off-site it will be taken for reuse or recovery, where practical, with disposal as last resort. Adherence to the mitigation measures in this Chapter and the requirements of the C&DWMP (included with the Planning Application pack), will ensure the effect is *long-term, imperceptible* and *neutral.*

19.10.2 Traffic and Transportation

Local traffic and transportation will be impacted by the additional vehicle movements generated by removal of waste from the Site during the Construction and Operational Phases of the proposed Project. The increase in vehicle movements as a result of waste generated during the Construction Phase will be *temporary* in duration. There will be an increase in vehicle movements in the area as a result of waste collections during the Operational Phase but these movement will be *imperceptible* in the context of the overall traffic and transportation increase and has been addressed in Chapter 11 (Traffic and Transport). Provided the mitigation measures detailed in Chapters 19 and 21 and the requirements of the OWMP (included with the Planning Application pack) are adhered to, the effects should be *short* to *long-term, imperceptible* and neutral.

19.10.3 Population and Human Health

The potential impacts on human beings in relation to the generation of waste during the Construction and Operational Phases are that incorrect management of waste could result in littering which could cause a nuisance to the public and attract vermin. A carefully planned approach to waste management and adherence to the project specific C&DWMP and OWMP, will ensure appropriate management of waste and avoid any negative impacts on the local population. The effects will be *long-term, imperceptible* and *neutral.*

19.11 Difficulties Encountered in Compiling the Chapter

There were no difficulties encountered during the production of this Chapter of the EIAR.

19.12 Cumulative Impacts

Multiple permission remains in place for both residential and commercial developments within the immediate vicinity. In a worst-case scenario, multiple developments in the area could be developed concurrently or overlap in the Construction Phase. Due to the high number of waste contractors in the Dublin region 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 the developments.

There are similar existing residential and commercial developments close by, along with the neighbouring residential sites and these developments will generate similar waste types during their Operational Phases. Authorised waste contractors will be required to collect waste materials segregated, at a minimum, into recyclables, organic waste and non-recyclables. An increased density of development in the area is likely improve the efficiencies of waste collections in the area.

Other developments in the area will be required to manage waste in compliance with national and local legislation, policies and plans which will minimise / mitigate any potential cumulative impacts associated with waste generation and waste management. As such the effect will be a *long-term*, *imperceptible* and *neutral*.

19.13 'Do-Nothing' Impact

If the proposed Project was not to go ahead there would be no construction or operational waste generated at this Site. There will would be a *neutral effect* on the environment.

19.14 References

- Waste Management Act 1996 (No. 10 of 1996) as amended. Sub-ordinate and associated legislation include:
  - European Communities (Waste Directive) Regulations 2011 (S.I. No. 126 of 2011) as amended
  - Waste Management (Collection Permit) Regulations 2007 (S.I. No. 820 of 2007) as amended
  - Waste Management (Facility Permit and Registration) Regulations 2007 (S.I No. 821 of 2007) as amended
  - Waste Management (Licensing) Regulations 2000 (S.I No. 185 of 2000) as amended
  - European Union (Packaging) Regulations 2014 (S.I. No. 282 of 2014) as amended
  - Waste Management (Planning) Regulations 1997 (S.I. No. 137 of 1997) as amended
  - Waste Management (Landfill Levy) Regulations 2015 (S.I. No. 189 of 2015)
  - European Union (Waste Electrical and Electronic Equipment) Regulations 2014 (S.I. No. 149 of 2014)
  - European Union (Batteries and Accumulators) Regulations 2014 (S.I. No. 283 of 2014) as amended
  - Waste Management (Food Waste) Regulations 2009 (S.I. No. 508 of 2009) as amended
  - European Union (Household Food Waste and Bio-waste) Regulations 2015 (S.I. No. 191 of 2015)
  - Waste Management (Hazardous Waste) Regulations 1998 (S.I. No. 163 of 1998) as amended
  - Waste Management (Shipments of Waste) Regulations 2007 (S.I. No. 419 of 2007) as amended
  - The European Communities (Transfrontier Shipment of Hazardous Waste) Regulations 1988 (S.I. No. 248 of 1988)
  - European Communities (Shipments of Hazardous Waste exclusively within Ireland) Regulations 2011 (S.I. No. 324 of 2011)
  - European Union (Properties of Waste which Render it Hazardous) Regulations 2015 (S.I. No. 233 of 2015)
- Protection of the Environment Act 2003, (No. 27 of 2003) as amended
- Litter Pollution Act 1997 (S.I. No. 12 of 1997) as amended
- Eastern-Midlands Region Waste Management Plan 2015 – 2021 (2015
- Department of Environment and Local Government (DoELG) *Waste Management – Changing Our Ways, A Policy Statement* (1998)
- Forum for the Construction Industry – *Recycling of Construction and Demolition Waste*
- Department of Environment, Communities and Local Government (DoECLG), *A Resource Opportunity - Waste Management Policy in Ireland* (2012)
- Department of Environment, Heritage and Local Government, *Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects* (2006)
- FÁS and the Construction Industry Federation (CIF), *Construction and Demolition Waste Management – a handbook for Contractors and Site Managers* (2002)
- Dublin City Council (DCC), *Dublin City Develoment plan 2016-2022 (2015)*
- Planning and Development Act 2000 (S.I. No. 30 of 2000) as amended
- EPA, *Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous* (2015)
- Council Decision 2003/33/EC, establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 of and Annex II to Directive 1999/31/EC
- EPA, *National Waste Database Reports 1998 – 2012*
- EPA and Galway-Mayo Institute of Technology (GMIT), *EPA Research Report 146 – A Review of Design and Construction Waste Management Practices in Selected Case Studies – Lessons Learned* (2015)

- BS 5906:2005 Waste Management in Buildings – Code of Practice
- DEHLG, Sustainable Urban Housing: Design Standards for New Apartments, Guidelines for Planning Authorities (2018)
- DCC *Bye-Laws for the Storage, Presentation and Collection of Household and Commercial Waste (2013)*
- DCC Draft *Dublin City Council (Storage, Presentation and Segregation of Household and Commercial Waste) Bye-Laws (2018*)

20 Interactions

All environmental factors are interlinked to a degree such that interrelationships exist on numerous levels. Interactions within the study area can be one-way interactions, two-way interactions and multiple-phase interactions which can be influenced by the proposed Project. The construction, operational and cumulative impacts of the proposed Project have been assessed within each chapter of the EIAR. This Chapter considers the potential significant interactions of impacts between the environmental factors. Table 20.1 below provides a matrix summarising potential interactions.

Potential significant interactions are discussed in the relevant chapters and appropriate mitigation measures are proposed where required. The majority of these potential Construction Phase interactions will be managed and mitigated through the implementation of the pCMP (see the Planning Application pack).

20.1 Description of Potential Interactions

The primary interactions can be summarised as follows:

- Population and Human Health with Air Quality and Climate and Traffic
- Land and Soils and Cultural Heritage;
- Stormwater attenuation design with Biodiversity and Hydrogeology;
- Landscape and Biodiversity;
- Biodiversity with Water and Soils;
- Noise and Vibration and Traffic;
- Air Quality and Climate and Traffic; and
- Design and Landscape Proposals with Wind.

Population & Human Health

Risks to Human Health have been considered by each discipline of the EIAR. Several disciplines have potential for significant impacts on human health, during the Construction Phase these include:

- **Traffic & Transport:** Traffic flow for construction vehicles in the locality has potential to impact upon road safety;
- **Surface Water (Hydrology):** Control of surface water during construction has potential to impact human health due to emissions from site to the hydrosphere or potential flooding during ground works;
- **Noise & Vibration:** There is potential for impact on human health from noise associated with construction activities and inward traffic noise; and
- **Air Quality & Climate:** There is potential for impact on human health from dust associated with construction activities.

During the Operational Phase potential interactions include:

- **Landscape:** The landscape plan will impact on the quality of the private and public open spaces, which can impact on people's health and well-being;
- **Traffic & Transport:** Traffic flow within the site has the potential to create safety risks for pedestrians and cyclists, where the design does not provide for safe pedestrian / cycling environments;
- **Surface Water (Hydrology):** Surface water management during the operational phase has the potential to cause flooding which may impact human health and safety;
- **Air Quality & Climate:** There is potential for impact on human health from climate change associated with greenhouse gas emissions.

The potential impacts on human health have been considered within the relevant discipline and mitigation measures outlined where required. With mitigation measures in place, no potential significant residual negative impacts on human health are predicted.

Landscape and Visual

Chapter 10 assessed the likely landscape impacts arising from the proposed Project. The following have potential for interaction during the Operation Phase:

- **Landscape:** The landscape plan will impact on the quality of the private and public open spaces, which will impact on people's health and well-being; and
- **Biodiversity:** The landscaping has interaction with biodiversity in relation to the planting

The potential significant interactions have been considered within the relevant discipline and mitigation measures outlined where required. With mitigation measures in place, no potential significant residual negative impacts are predicted.

Traffic and Transport

Chapter 11 assesses the likely traffic impacts arising from the proposed Project. Potential interaction with Population & Human Health has been discussed previously. The following potential interactions with other disciplines during the construction and operation phases have been identified:

- **Noise & Vibration**: Construction traffic has the potential to have an impact in terms of noise and vibration. The Noise and Vibration chapter has been prepared in close consultation with the traffic consultant; and
- **Air Quality & Climate:** Construction traffic has the potential to have an impact in terms of air quality. The Air Quality chapter has been prepared in close consultation with the traffic consultant.

The potential significant interactions have been considered within the relevant discipline and mitigation measures outlined where required. With mitigation measures in place, no potential significant residual negative impacts are predicted.

Land, Soils Geology & Hydrogeology

Chapter 12 assesses the likely impacts on land and soils arising from the proposed Project. Potential interaction with Population & Human Health and Landscape has been discussed previously and the following potential interactions with other disciplines have been identified during the construction phase:

- **Surface Water (Hydrology):** Excavation and soil works (i.e. through Site clearance, re-profiling etc.) during the Construction Phase have the potential to cause impact on the hydrology and hydrogeology of the site; and
- **Cultural Heritage**: Excavation and soil works has the potential to uncover unknown heritage features.

No potential significant operational interactions were identified.

The potential significant interactions have been considered within the relevant discipline and mitigation measures outlined where required. With mitigation measures in place, no potential significant residual negative impacts are predicted.

Surface Water (Hydrology)

Chapter 13 assesses the likely hydrological and hydrogeological impacts arising from the proposed Project. Potential interaction with Population & Human Health, Material Assets; Built Services and Land & Soils have been discussed previously. The following potential interactions with another discipline during construction phase has been identified:

- **Biodiversity:** Surface water / surface water contamination has potential to effect biodiversity in the area of the site.

No potential significant operational interactions were identified.

The potential significant impact on human health have been considered within the relevant discipline and mitigation measures outlined where required. With mitigation measures in place, no potential significant residual negative impacts on human health are predicted.

Table 20.1: Interactions with the Environmental Factors

Inter-Relationship Matrix	Population & Human Health	Cultural Heritage	Biodiversity	Traffic & Transport	Landscape & Visual	Land, Soils, Geology & Hydrogeology	Surface Water - Hydrology	Air Quality & Climate	Noise & Vibration	Microclimate - Daylight / Sunlight	Microclimate - Wind	Material Assets - Services	Material Assets - Waste
Population & Human Health													
Cultural Heritage													
Biodiversity													
Traffic & Transport	X												
Landscape & Visual	X	X											
Land, Soils, Geology & Hydrogeology	X		X										
Surface Water - Hydrology			X			X							
Air Quality & Climate	X			X									
Noise & Vibration	X			X									
Microclimate - Daylight / Sunlight	X				X			X					
Microclimate - Wind	X												
Material Assets - Services	X						X	X					
Material Assets - Waste	X			X		X	X	X					

21 Cumulative Impacts

21.1 Introduction

This Chapter considers the potential cumulative impacts on the environment of the proposed Project with other developments (*i.e.* permitted development) in the locality.

The EU Guidelines define cumulative impacts as:

> *'Impacts that result from incremental changes caused by other past, present or reasonably foreseeable actions together with the project. For example:*
>
> - *incremental noise from a number of separate developments;*
> - *combined effect of individual impacts, e.g. noise, dust and visual, from one development on a particular receptor; and*
> - *several developments with insignificant impacts individually but which together have a cumulative effect.'*

Cumulative impacts of the proposed Project and other committed development in the area can be assessed by taking account of the existing baseline environment and the predicted impacts associated with the operation of the proposed Project in-combination with predicted impacts of any other proposed developments in the area.

It is noted that *temporary/short-term* cumulative impacts during the Construction Phase and the Operational Phase impacts are also assessed in the individual specialist chapters of this EIAR (Chapters 7 to 19).

21.2 Permitted Development

Cumulative impacts were assessed by looking at the permitted and in progress developments for which planning has been received within the area of influence of the Site. A search in relation to plans and projects that may have the potential to result in cumulative impacts was carried out. In assessing cumulative impacts the following were the principal sources consulted:

- Dublin City Council Planning Department
- Dublin City Development Plan 2016-2022
- An Bord Pleanála.

Much of the development is located with the area of the North Lotts & Grand Canal Dock SDZ Planning Scheme to the south of the Site – and specifically the North Lotts, located north of the River Liffey (refer to Figure 21.1).

The search identified the following developments with existing planning permission located within the area of influence of the Site. Figure 21.1 presents a map showing the location of the committed development and Table 21.1 below provides a brief description of these developments.

Figure 21.1: Committed Development Indicative Locations near the Site[161] (Site location in red)

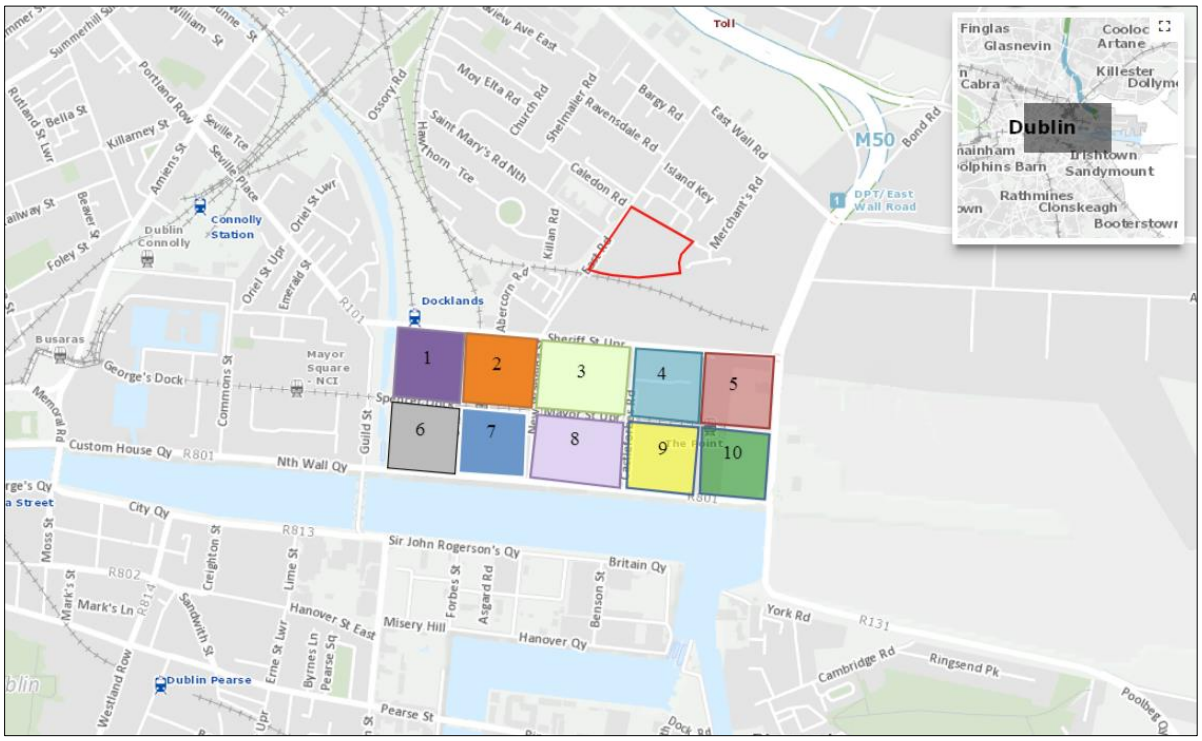


Table 21.1: Committed Developments located near the Site

Development Type	Planning Ref.
Commercial Development North Docklands (Block No. 3 on Figure 21.1)	DSDZ2135/18
The development proposals include the provision of: ▪ 43,445m^2 of office space ▪ 91 No. vehicle parking spaces ▪ 450 No. bicycle parking spaces. This commercial development was granted planning permission by DCC in May 2018.	
Student Accommodation North Docklands (Block No. 5 on Figure 21.1)	DSDZ3689/15 as amended under Ref. DSDZ2155/18, DSDZ4385/16 and Reg. Ref. DSDZ2460/17
This development proposals include the provision of 2 No. student accommodation blocks encompassing: ▪ 970 No. bed spaces ▪ ancillary ground floor uses ▪ 454 No. bicycle parking spaces. There are no car parking spaces proposed with the exception of 2 No. mobility impaired parking spaces. The Student Accommodation development located at North Docklands was originally granted planning permission by DCC in March 2016.	
Commercial Development North Docklands (Block No. 8 on Figure 21.1)	DSDZ2496/17, DSDZ2749/16, DSDZ3350/15

[161] DHPLG (My Plan): https://www.myplan.ie/webapp/

Development Type	Planning Ref.
This Commercial development located at North Docklands was granted planning permission by DCC in November 2015. The development was subsequently amended under Ref. DSDZ2749/16 (September 2016), and Ref DSDZ2496/17 (May 2017), and now includes the provision of 170 residential units.	
Hotel & Office Development Spencer Place, North Wall Quay (Block No. 7 on Figure 21.1)	DSDZ2661/17
The development proposals included the provision of: ▪ 9,205m^2 Hotel ▪ c.46,184m^2 office space ▪ retail / café / restaurant 873m^2. This hotel and office development is located at Spencer Place was granted planning permission by DCC in September 2017.	
Residential Development North Lotts (Block No. 8 (eastern section) on Figure 21.1)	DSDZ3357/17 DSDZ2387/18
The development proposals include the provision of: ▪ 360 residential units ▪ 283 vehicle parking spaces ▪ 483 bicycle parking spaces This residential development located at the North Docklands was granted planning permission by DCC in August 2017 (amended under Ref. DSDZ2387/18).	
Spencer Dock Development Spencer Dock (Block No. 2 (eastern section) on Figure 21.1)	DSDZ3367/15
The development proposals include the provision of: ▪ 165 residential units ▪ 90 vehicle parking spaces ▪ 186 bicycle parking spaces The Spencer Dock development at the North Lotts and Grand Canal Dock Planning Scheme 2014 was granted planning permission by DCC in December 2015.	
Commercial Development North Docklands (Blocks No. 5 & 10 on Figure 21.1)	DSDZ3632/15, DSDZ3686/16 DSDZ 3776/17
The development proposals include the provision of: ▪ 19,263m^2 GFA of commercial space connecting ▪ 48 vehicle parking spaces ▪ 300 bicycle parking spaces. This commercial development located at the North Lotts & Grand Canal Dock SDZ Planning Scheme was granted planning permission by DCC in October 2017.	
Residential Development Dublin Docklands (Block No. 9 on Figure 21.1)	DSDZ3779/17

Development Type	Planning Ref.
The development proposals included the provision of: ▪ 420 residential units ▪ a crèche (c.281m^2) ▪ 4 no. café / restaurant / retail units. This residential development located in the Dublin Docklands was granted planning permission by DCC in December 2017.	
Commercial Development North Docklands (Block No. 9 on Figure 21.1)	DSDZ3780/17
The development proposals included the provision of: ▪ 35,883m^2 commercial office space ▪ 90 vehicle parking spaces ▪ 360 bicycle parking spaces. This commercial development located in the Dublin Docklands was granted planning permission by DCC in December 2017.	

21.3 Planning Framework

As outlined in Chapter 3 (Planning & Development) the Site lies within DCC administrative area, north of the North Lotts and Grand Canal Dock SDZ and within the '*Docklands Area'*, where it is designated as a SDRA 6 in the Development Plan. Therefore the Site is subject to the land use policies and objectives of the Development Plan, see Figure 21.2 below.

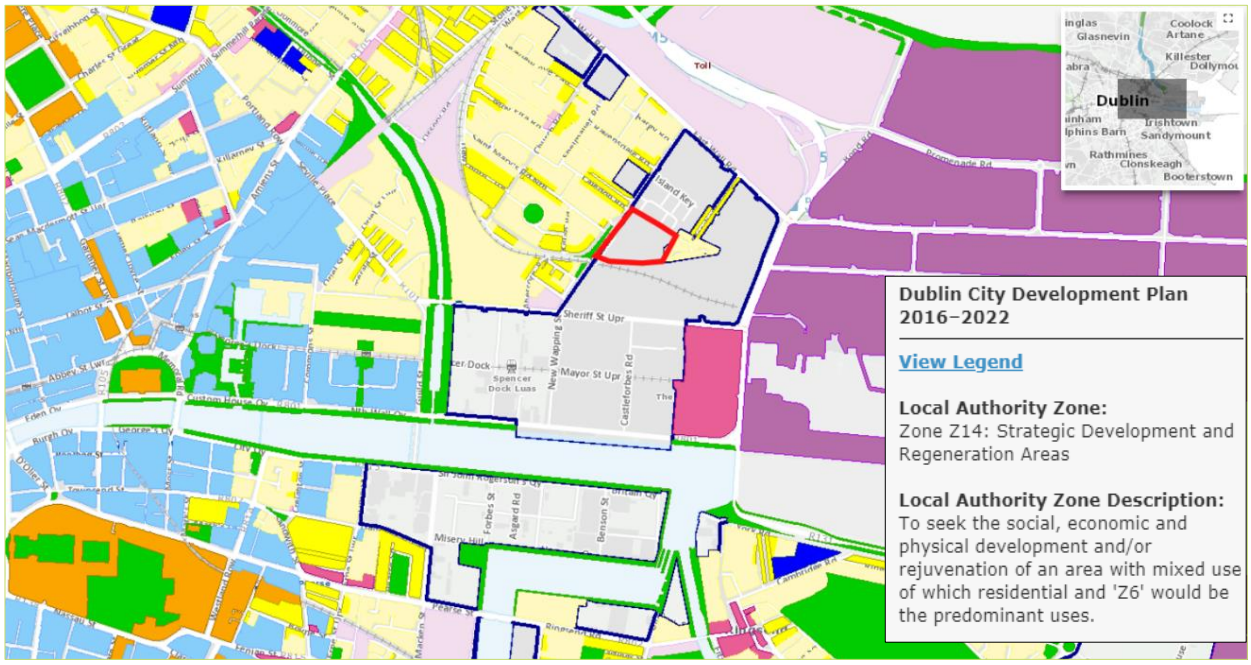
The Core Strategy of the Development Plan promotes the intensification and consolidation of Dublin City, and the Docklands is identified as one of the SDRA capable of realising this objective.

The Site and surrounding area is identified as SDRA 6. In respect of SDRA 6, the City Development Plan identifies that:

> *'the designation of the Docklands, including the Docklands SDZ, as a strategic development and regeneration area (SDRA) provides for the continued physical and social regeneration of this part of the city, consolidating the area as a vibrant economic, cultural and amenity quarter of the city, whilst also nurturing sustainable neighbourhoods and communities.'*

As such it is likely that other lands within the SDRA – and surrounding the Site – will also undergo similar regeneration development in line with the designation and Z14 land use zoning.

Figure 21.2: Land Use Zoning under the Current Dublin City Development Plan 2016-2022[162] (Site location in red)



21.4 Conclusion

Therefore, the assessment of cumulative impacts considers the total impact associated with the proposed Project when combined with committed development within the area of influence of the Site. Due to the City Centre location of the proposed Project and the planning objectives / zoning outlined above for this area, development is continually occurring in the area.

However, no major projects have been identified that would result in a significant cumulative impact with the proposed Project.

[162] DHPLG (My Plan): http://www.myplan.ie/webapp/

22 Schedule of Environmental Commitments

22.1 Introduction

This Chapter collates the environmental commitments / mitigation measures identified in the specialist chapters of the EIAR. These mitigation measures are considered necessary to protect the environment prior to the commencement of works and during both the Construction and Operational Phases of the proposed Project.

The appointed Contractor will be required to adhere to these mitigation measures of the EIAR for the protection of the environment and to ensure sustainable development.

The environmental commitments are provided in Table 22.1 below.

Table 22.1: Schedule of Environmental Commitments

Mitigation No.	Description of Mitigation / Environmental Commitment	Phase
General Mitigation Measures		
G_1	Immediately after access to the Site is made and it is secure, the **Site Compound** will be established.	Construction
G_2	Once the Site is secure, existing Site services will be isolated including the decommissioning of existing substations in conjunction with the ESB and the provision of a temporary builder's power supply.	Construction
G_3	A **preliminary Construction Management Plan (pCMP)** (see the Planning Application pack) and **Construction & Demolition Waste Management Plan (C&DWMP)** (see the Planning Application pack) are included with this planning application. The appointed Contractor will prepare a detailed final CMP, including detailed construction phasing.	Construction
G_4	As a minimum, the final CMP will be formulated in accordance with best international practice including but not limited to: ▪ Construction Industry Research and Information Association (CIRIA), Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors, 2001. ▪ CIRIA, Environmental Good Practice on Site (C650), 2005. ▪ BPGCS005, Oil Storage Guidelines. ▪ CIRIA 697, the SUDS Manual, 2007. ▪ UK Pollution Prevention Guidelines (PPG) UK Environment Agency, 2004.	Construction
G_5	**Site Hours:** There will be no works on Sundays or bank / public holidays in accordance with the Environmental Noise Regulations (S.I. No. 140 of 2006 Environmental Noise Regulations) and subject to final agreement with DCC. From time to time, in exceptional instances, works may be required outside of these hours. However, this will be agreed with DCC prior to any works taking place.	Construction
G_6	**Site Access / Security:** During the Construction Phase (including demolition and excavation works), construction traffic will access the Site via the existing access off East Road. The routing will be strictly managed and controlled, and details will be incorporated into the Traffic Management Plan (TMP). Site security will include the following ▪ Pedestrian access will be strictly controlled. ▪ Only SafePass accredited personnel will be permitted ▪ A daily record (access / egress) of site personnel will be maintained. ▪ No pedestrian access points will be provided during the Construction Phase. ▪ Site security will be provided by way of a monitored infrastructure systems such as site lighting and CCTV cameras, when deemed necessary. ▪ All site personnel and delivery drivers will have to undergo Site induction. ▪ Unscheduled deliveries will not be allowed access.	Construction
G_7	A preliminary **H&S Plan** will be developed during detailed design. This Plan will address health and safety issues from the design stages. The appointed Contractor will be required to prepare a final Construction Phase H&S Plan and any employed subcontractors will also be required adhere to this Plan. This Plan will operate in line with ISO 18001 & ISO 14001.	Construction / Operational

Mitigation No.	Description of Mitigation / Environmental Commitment	Phase
G_8	A suitably qualified and competent Project Supervisor Design Process has been appointed and a suitably qualified and competent Project Supervisor (Construction Phase) will be appointed in line with those requirements laid down in the *Safety, Health and Welfare at Work Construction Regulations 2013 (S.I. No. 291 of 2013 Safety, Health and Welfare at Work (Construction)).*	Construction
Population & Human Health		
PPH_1	The proposed Project will look to procure material and services from local providers, where reasonably practicable, and within the requirements of the procurement process.	Construction
PPH_2	No significant risks to Population & Human Health, as a result of the proposed Project, have been identified during the Operational Phase.	Operational
Cultural Heritage. Archaeology & Arch		
CHAA_1	**Archaeological** monitoring of ground disturbance works will be carried out under licence to the National Monuments Service of the DCHG. This will ensure the full recognition of, and (if required) the proper excavating and recording of all archaeological features, finds or deposits which may lie undisturbed beneath the ground surface.	Construction
CHAA_2	Attention is drawn to National Monuments Legislation (1930-94), which states that, in the event of the discovery of archaeological finds or remains, the NMS and the National Museum of Ireland should be notified immediately (see Appendix A8.1).	Construction
CHAA_3	The appointed Contractor should make provision to allow for, and to fund, the necessary archaeological monitoring, inspection and excavation works that may be needed on the Site during the site preparation and Construction Phase. Such works will need to be carried out under licence to the National Monuments Service (DCHG) and the National Museum of Ireland and sufficient time should be factored into the construction programme to allow licences to be obtained and investigative works completed.	Construction
CHAA_4	All recommendations in the Cultural Heritage Chapter are subject to approval of the National Monuments Service of the DCHG, the National Museum of Ireland and the City Archaeologist.	Construction
CHAA_5	No sites of **Cultural Heritage** interest are located within or in the vicinity of the proposed Project, therefore no mitigation is required.	Construction / Operational
CHAA_6	As no adverse impacts were identified on the **Architectural Heritage**, no mitigation measures is required.	Construction / Operational
Biodiversity (Flora & Fauna)		
B_1	No designated conservation areas will be impacted in any way by the proposed Project. The proposed planting / landscaping strategy (Chapter 10 (Landscape & Visual) will use a mix of appropriate species, incorporating a range of species that will attract feeding invertebrates, including moths, butterflies and bees. It will take account of and implement the relevant objectives of the *All-Ireland Pollinator Plan 2015-2020.*	Construction

Mitigation No.	Description of Mitigation / Environmental Commitment	Phase
B_2	**Habitats:** All planting plans and landscaping proposals will further ensure that no invasive species are introduced, either deliberately or inadvertently, to the Site.	Construction
B_3	**Fauna:** Where feasible and practicable, the clearance of the scrub area in the south-western corner of the Site, which may be suitable for use by small numbers of nesting birds, will be undertaken outside the bird nesting season (avoiding the period 1st March to 31st August).	Construction
B_4	**Fauna:** Should the construction programme require vegetation clearance between March and August bird nesting surveys will be undertaken by a suitably qualified ecologist. If no active nests are recorded, vegetation clearance will take place within 24 hours. In the event that active nests are observed, an appropriately sized buffer zone will be maintained around the nest until such time as all the eggs have hatched and the birds have fledged - a period that may be three weeks from the date of the survey. Once it is confirmed that the birds have fledged and no further nests have been built or occupied, vegetation clearance may take place immediately.	Construction
Landscape (Townscape) & Visual		
LV_1	The Construction Phase will include the establishment of solid perimeter Site hoarding that will restrict views into the Site area and minimise the sense of visual disruption.	Construction
LV_2	The design of the proposed Project has involved detailed consideration of avoidance of inappropriate landscape and visual effects through an iterative process of Site analysis through to concept design and final design of layout, massing and detailed design of the scheme as a whole.	Operational
LV_3	High quality landscape proposals will ensure that the public spaces are welcoming, and add significant new open space and public realm areas to the locality, while also providing a strong focal point to the development.	Operational
Traffic & Transport		
TT_1	A **TMP (Traffic Management Plan)** for construction traffic will also be agreed with the Local Authority to establish appropriate access routes, times of access, and any occasional or temporary traffic management requirements at the interface of the Site and East Road.	Construction
TT_2	Warning signage will be provided for pedestrians and other road users on all approaches in accordance with the Traffic Signs Manual and the appointed Contractor's TMP.	Construction
TT_3	Provision of sufficient onsite parking and compounding to ensure no potential overflow of construction generated traffic onto the local network. Construction traffic will not be permitted to park on the public roads or within the general area outside the Site.	Construction
TT_4	A series of '*way finding*' signage will be provided to route staff / deliveries into the Site and to designated compound / construction areas.	Construction
TT_5	Dedicated construction **haul routes** will be identified and agreed with the local authority prior to the commencement of constructions activities onsite.	Construction
TT_6	Truck wheel washes will be installed at construction entrances if deem necessary and any specific recommendations with regard to construction traffic management made by the Local Authority will be adhered to.	Construction

Mitigation No.	Description of Mitigation / Environmental Commitment	Phase
TT_7	On completion of the works all construction materials, debris, temporary hardstands etc. from the Site compound will be removed offsite and the Site compound reinstated in full on completion of the works.	Construction
TT_8	A Mobility Management (MMP) is to be rolled out with the aim of guiding the delivery and management of coordinated initiatives by the scheme promotor. The MMP ultimately seeks to encourage sustainable travel practices for all journeys to and from the proposed development site. It is proposed that two land use specific MMP's are developed under the framework of a 'parent' MMP for the entire site. These two associated MMP's will be developed in partnership with DCC to specifically consider the opportunities of shaping all journeys and promoting sustainable transport habits at both the proposed (i) apartments, and (ii) the Enterprise Hub.	Operational
TT_9	The accesses to the under-croft parking areas will be barrier controlled to ensure unpermitted vehicles cannot gain entry. In order to be allocated a dedicated parking space within these under croft parking areas, both tenants and employees based at the site will have to apply to the management company to gain a parking permit and an assigned dedicated parking space, i.e. a tenant / employee is not automatically allocated a parking space when they take up residency or employment at the Site.	Operational
TT_10	The 7 No. parking spaces within the internal court yard area will be restricted to short duration parking only (i.e. 30-60 minutes). A clamping enforcement regime will be in place within the Site to ensure these parking restrictions are adhered to.	Operational
TT_11	Infrastructure - Prior to 2020 Opening Year Upgrading of the East Road / Church Road / Site Access junction to traffic signal controlled.	Operational
Land, Soils, Geology & Hydrogeology		
LSGH_1	**Soil:** Temporary storage of soil will be carefully managed to prevent any potential negative impact on the receiving environment. This material will be stored away from the surface water drainage network. Movement of material will be minimised in order to reduce degradation of soil structure and generation of dust.	Construction
LSGH_2	**Soil:** All excavated material will be removed offsite. It will be visually assessed for signs of possible contamination such as staining or strong odours.	Construction
LSGH_3	**Soil:** As it has already been determined that the soil material underlying the Site is contaminated, this will be segregated, classified and appropriately disposed of by a suitably permitted / licensed waste disposal contractor.	Construction
LSGH_4	**Indirect Emissions:** The Site, c.70%, will be covered in hardstanding. The impermeable surface will minimise the potential influx of any contaminants into soils and underlying groundwater. The only fuel storage onsite will be within the belly tank of the life safety generator (1,200L). This will be internally bunded and double lined. Servicing and inspection of the generator and tank containment will be the responsibility of the presiding management company.	Operational
LSGH_5	**Attenuation** will be provided by underground tanks to ensure that the discharge rate is maintained at greenfield runoff rate. The attenuation facility will accommodate rainfall events up to, and including, the 1-in-100-year storm event.	Operational
Surface Water - Hydrology		
W_1	The final CMP will cover all potentially polluting activities and include an emergency response procedure. All site personnel will be trained in the implementation of the procedure.	Construction

Mitigation No.	Description of Mitigation / Environmental Commitment	Phase
W_2	**Runoff and Sediment Loading:** During the Construction Phase any outflows carrying a high sediment load will be diverted through settlement ponds / tanks. The settlement ponds / tanks will be located between the area of construction and the surface water drain. The design of the surface water drainage network for the proposed Project incorporates a number of SuDS measures, including filter strips, swales, filter drains, permeable paving, green roofs, a cellular attenuation system and an oil / petrol interceptor. The proposed drainage system for the Site as outlined in DBFL's Infrastructure Design Report and has been designed in accordance with Greater Dublin Strategic Design System (GDSDS) specifications.	Construction
W_3	**Runoff and Sediment Loading:** Surface water runoff will not be discharged directly to local watercourses. This will also ensure there is no risk to the underlying aquifer.	Construction
W_4	**Runoff and Sediment Loading:** The following mitigation measures will be adopted: ▪ the drainage system and settlement ponds / tanks will be constructed as a first step; ▪ silt reduction measures including sit traps and settlement tanks will be employed during the Construction Phase; ▪ any excavations required will remain open for as little time as possible before the placement of fill. This will help to minimise potential for groundwater ingress into excavations; ▪ weather conditions will be considered when planning construction activities to minimise risk of runoff from the Site; ▪ distance between topsoil piles etc. and surface water drains will be maintained - to protect from dampening operations; and ▪ the generation of runoff from stockpiles of soils, excavated during the Construction Phase, will be prevented from entering surface water drains by diverting runoff to the settlement ponds / tanks onsite, and removing the material offsite as soon as possible to designated storage areas / licenced disposal facility.	Construction
W_5	**Surface Water Drainage:** To minimise any impact on minor drainage channels onsite from material spillages, all oils, solvents, paints and fuels used during the Construction Phase will be stored within temporary bunded areas and each of these areas will be bunded to a volume of 110% of the capacity of the largest tank / container within it (plus an allowance of 30mm for rainwater ingress).	Construction
W_6	**Surface Water Drainage:** Drainage from the bunded area(s) will be diverted for collection and safe disposal. There is no notable surface watercourse onsite. The drainage ditch to the south is to be culverted as part of the initial construction works.	Construction
W_7	**Surface Water Drainage:** Wet concrete operations adjacent to watercourses / drain will be avoided where possible. 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 groundwater.	Construction
W_8	**Surface Water Drainage:** The appointed Contractor will be required to make provision for removal of any concrete wash waters, most likely by means of tankering offsite and no such wash waters will be discharged to groundwater. Any effluent generated by temporary onsite sanitary facilities will be taken offsite for appropriate treatment.	Construction
W_9	**Fuel & Chemical Handling:** Refuelling of construction vehicles and the addition of hydraulic oils or lubricants to vehicles will take place in designated bunded areas where possible, that will be away from any existing surface water drains. This will also minimise any impact on the underlying subsurface strata from material spillages. The refuelling area will be determined by the appointed Contractor prior to commencement onsite but is likely to be carried out in a designated area of the Contractor's Construction Compound.	Construction

Mitigation No.	Description of Mitigation / Environmental Commitment	Phase
W_10	**Fuel & Chemical Handling:** In the event of a machine requiring refuelling outside of this area, fuel will be transported in a mobile double skinned tank. Spill kits and hydrocarbon absorbent packs will be stored in the cab of each vehicle and operators will be fully trained in the use of this equipment.	Construction
W_11	**Fuel & Chemical Handling:** 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'* will be complied with.	Construction
W_12	**Surface Water Runoff:** The proposed drainage system for the Site as outlined in DBFL's Infrastructure Design Report and has been designed in accordance with Greater Dublin Strategic Design System (GDSDS) specifications. The surface water strategy includes two attenuation tanks to provide the required volume to ensure the proposed Project does not flood in the 1-in-100-year storm event (accounting for a 20% increase with climate change).	Operational
W_13	**Surface Water Runoff:** The main attenuation storage will be located in the square of the proposed Project (East Square) with another attenuation system located under the pedestrianised street that runs through the spine of the Site. As such the design includes improved measures for management of stormwater runoff in relation to flood impact.	Operational
W_14	The treatment of collected runoff by providing a SuDS treatment train approach resulting in a low risk of pollutants entering offsite drainage.	Operational
W_15	The **water main** layout and details including valves, hydrants, metering etc. will be in accordance with Irish Water's Code of Practice and Standard Details for water infrastructure.	Operational
W_16	**Indirect Emissions**: Any accidental leaks from cars within the car parking / road areas will be directed through the surface drainage system via an oil / petrol interceptor.	Operational
Air Quality & Climate		
AQC_1	A **Dust Minimisation Plan** has been formulated for the Construction Phase of the proposed Project as construction activities are likely to generate some dust emissions. See Appendix A14.3. The appointed Contractor shall put in place a regime for monitoring dust levels in the vicinity of the Site during the Construction Phase. The level of monitoring and adoptions of mitigation measures will vary throughout the Construction Phase depending on the type of activities being undertaken and the prevailing weather conditions at the time	Construction
AQC_2	**Air Quality:** In summary the measures which will be implemented will include: ▪ Hard surface roads will be swept to remove mud and aggregate materials from their surface while any un-surfaced roads will be restricted to essential site traffic; ▪ Furthermore, any road that has the potential to give rise to fugitive dust must be regularly watered, as appropriate, during dry and / or windy conditions; ▪ Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind. Water misting or sprays will be used as required if particularly dusty activities such as rock blasting or earthworks are necessary during dry or windy periods; and ▪ Before entrance onto public roads, trucks will be adequately inspected to ensure there is no potential for dust emissions and will be cleaned as necessary.	Construction
AQC_3	At all times, these procedures (Mitigation No. AQC_2) will be strictly monitored and assessed. In the event of dust nuisance occurring outside the Site boundary, movements of materials likely to raise dust will be curtailed and satisfactory procedures implemented to rectify the problem before the resumption of construction operations.	Construction

Mitigation No.	Description of Mitigation / Environmental Commitment	Phase
AQC_4	**Climate:** Construction vehicles, generators etc., may give rise to some CO2 and N2O emissions. However, due to the short-term and temporary nature of these works, the impact on climate will not be significant.	Construction
AQC_5	**Air Quality:** There are no significant impacts predicted for the Operational Phase with respect to air quality therefore no Site specific mitigation measures are required during the Operational Phase of the proposed Project.	Operational
Noise & Vibration		
NV_1	The appointed Contractor shall ensure that the level of noise and vibration resulting from the Construction Phase, does not constitute a nuisance, and that noise and vibration emissions conform to the requirements *of BS 5228: 2009 Code of Practice for Noise and Vibration Control on Construction Sites, Part 1 and Part* 2. Including, but not limited to: ▪ selection of quiet plant; noise control at source; screening; liaison with the public; and monitoring.	Construction
NV_2	This practice is recommended in relation to **static plant** such as compressors and generators. It is recommended that these units be supplied with manufacturers' proprietary acoustic enclosures. 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 or not said item can be replaced with a quieter alternative. If replacing a noisy item of plant is not a viable or practical option, consideration will be given to noise control "*at source.*"	Construction
NV_3	Referring to the potential noise generating sources for the works under consideration, the following best practice mitigation measures should be considered: ▪ The Site construction compound should be located away from noise sensitive boundaries within the Site constraints. The use lifting bulky items, dropping and loading of materials within these areas should be restricted to normal working hours. ▪ For mobile plant items such as 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 concrete mixers, control measures should be employed during cleaning to ensure no impulsive hammering is undertaken at the mixer drum. ▪ For all materials handling ensure that materials are not dropped from excessive heights, lining drops chutes and dump trucks 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 will 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.	Construction
NV_4	**Screening:** The hoarding will be constructed of a material with a mass per unit of surface area greater than 7kg/m^2 to provide adequate sound insulation. The placement of Site buildings such as offices and stores will be used, where feasible, to provide noise screening when placed between the source and the receiver.	Construction
NV_5	A Site Manager will be appointed to Site during the Construction Phase. Any noise complaints should be logged and followed up in a prompt fashion by the Site Manager. In addition, where a particularly noisy construction activity is planned or other works with the potential to generate high levels of noise, or where noisy works are expected to operate outside of normal working hours etc., the Site Manager will inform the nearest NSL of the time and expected duration of the noisy works.	Construction

Mitigation No.	Description of Mitigation / Environmental Commitment	Phase
NV_6	The **phasing programme** will be arranged so as to control the amount of disturbance in noise and vibration sensitive areas at times that are considered of greatest sensitivity. During excavation / breaking or other high noise generating works are in progress on a site at the same time as other works of construction that themselves may generate significant noise and vibration, the working programme will be phased so as to prevent unacceptable disturbance at any time.	Construction
NV_7	**Noise control techniques** during the Operational Phase include: ▪ duct mounted attenuators on the atmosphere side of air moving plant; ▪ splitter attenuators or acoustic louvres providing free ventilation to internal plant areas; ▪ solid barriers screening any external plant; and ▪ anti-vibration mounts on reciprocating plant. In addition to the above, it is proposed that the following practices are adopted to minimise potential noise disturbance for neighbours. ▪ all mechanical plant items e.g. motors, pumps etc. shall be regularly maintained to ensure that excessive noise generated any worn or rattling components is minimised; and ▪ any new or replacement mechanical plant items, including plant located inside new or existing buildings, shall be designed so that all noise emissions from the Site do not exceed the noise limits outlined in this document.	Operational
NV_8	The facades will be provided with upgraded glazing that achieves the minimum sound insulation performance. It is proposed to build an acoustic wall along the south podium edge in order to provide screening to the nearest noise sensitive apartments.	Operational
Microclimate - Daylight / Sunlight		
MC_DS_1	The proposed Project will see the redevelopment of a brownfield site situated in an urban location characterised by medium and high density development. In these circumstances, during the Construction or Operational Phases scope for mitigation measures, which would preserve a sustainable level of density, is limited.	Construction / Operational
Microclimate - Wind		
MC_W_1	In order to improve the wind conditions at the proposed Project include the following: ▪ provision of planting and soft landscape features at ground level along the main thoroughfare; ▪ provision of planting and soft landscape features along the East Road; ▪ provision of planting and soft landscape features at podium level along the gap between Blocks D1 and D2; ▪ provision of 2.1m high wind screen at podium level between Blocks B1 and B2 to provide shelter to the public realm at ground level below; ▪ provision of 2.1m high wind screens on either side of the outdoor play area for the crèche; ▪ provision of 2.1m high wind screens in conjunction with planting along the edge of the southern plazas; and ▪ provision of canopy along western edge of Block D2 / DT2 in conjunction with a covered walkway between Blocks C2 and D2 to provide shelter against the downdraft occurring at the southwest plaza.	Operational

Mitigation No.	Description of Mitigation / Environmental Commitment	Phase
Material Assets - Services		
MA_S_1	The Construction Phase mitigation measures includes avoidance, reduction and remedy measures as set out in *Section 4.7 of the Development Management Guidelines (2007)* to reduce or eliminate any significant adverse impacts identified. The following mitigation measures are proposed for the Construction Phase of the proposed Project: ▪ Consultation with the relevant services providers shall be undertaken in advance of works. This will ensure all works are carried out to the relevant standards and ensure safe working practices are implemented - i.e. for overhead electricity lines, live electricity lines and gas mains. ▪ All infrastructure is to be installed and constructed to the relevant codes of practice and guidelines. ▪ A final CMP and TMP will be implemented by the appointed Contractor for the duration of the Construction Phase. This will ensure protection to the local amenities and the operation of the local road network. ▪ The potable water supply and wastewater infrastructure will be pressure tested by an approved method during the Construction Phase, prior to connection to the public networks, all in accordance with Irish Water Requirements. ▪ Gas Networks Ireland will carry out the works on the gas supply network in a controlled manner to avoid loss of service to adjacent customers.	Construction
MA_S_2	Service disruptions impacting the surrounding residential / commercial properties shall be kept to a minimum and only occurring where unavoidable.	Construction
MA_S_3	Notification of disruptions shall be given to all impacted properties prior to the works being carried out (this will include information on when disruptions are scheduled and the approximate duration of the disruption).	Construction
MA_S_4	Consultation with relevant neighbouring parties shall be undertaken prior to any proposed disruptions.	Construction
MA_S_5	The design and construction of the necessary service infrastructure will be in accordance with relevant codes of practice and guidelines.	Operational
MA_S_6	Routine maintenance of the Site services will be required from time to time, as such any mitigation measures will be advised by the relevant service provider.	Operational
Material Assets - Waste		
MA_W_1	A Site specific **C&DWMP (Construction & Demolition Waste Management Plan)** has been prepared in line with the requirements of the guidance document issued by the DEHLG and is included in the Planning Application pack.	Construction
MA_W_2	The C&DWMP has been prepared includes information on the legal and policy framework for C&D waste management in Ireland, estimates of the type and quantity of C&D waste to be generated by the proposed Project and makes recommendations for management of different types of waste.	Construction
MA_W_3	Prior to commencement of demolition, the appointed Contractor will be required to refine / update the C&DWMP or submit an addendum to the C&DWMP to DCC to detail specific measures to minimise waste generation and resource consumption and provide details of the proposed waste contractors and destinations of each waste stream.	Construction
MA_W_4	It is anticipated that the excavated material will require removal from the Site for offsite reuse, recovery, recycling and / or disposal. The appointed Contractor will endeavour to ensure that material is reused or recovered offsite insofar as is reasonably practicable or disposed of at authorised facility.	Construction
MA_W_5	In addition, the following mitigation measures will be implemented:	Construction

Mitigation No.	Description of Mitigation / Environmental Commitment	Phase
	▪ building materials will be chosen with an aim to '*design out waste*'; ▪ onsite segregation of waste materials will be carried out to increase opportunities for off-site reuse, recycling and recovery - it is anticipated that the following waste types, at a minimum, will be segregated: ○ concrete rubble (including ceramics, tiles and bricks); plasterboard; metals; glass; and timber. ▪ left over materials (e.g. timber off-cuts, broken concrete blocks / bricks) and any suitable construction materials shall be re-used onsite, where possible; ▪ all waste materials will be stored in skips or other suitable receptacles in designated areas of the Site. This storage zone will include material recycling areas and facilities; ▪ 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 waste manager will be appointed by the main contractor(s) to ensure effective management of waste during the excavation and construction works; ▪ all site personnel 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 suitable permitted contractors and taken to suitably registered, permitted or licensed facilities; and ▪ all waste leaving the Site will be recorded and copies of relevant documentation maintained.	
MA_W_6	Nearby sites requiring clean fill material will be contacted to investigate reuse opportunities for clean and inert material, if required. If any of the material is to be reused on another site as by-product (and not as a waste), this will be done in accordance with *Article 27 of the EC (Waste Directive) Regulations (2011*) as detailed in the C&DWMP (see the Planning Application pack).	Construction
MA_W_7	EPA approval will be obtained prior to moving material as a by-product. However, it is not currently anticipated that Article 27 will be used.	Construction
MA_W_8	As previously stated, a project specific Operational Waste Management Plan (OWMP) has been prepared and is included in the Planning Application pack. Implementation of this OWMP will ensure a high level of recycling, reuse and recovery at the development.	Operational
MA_W_9	All recyclable materials will be segregated at source to reduce waste contractor costs and ensure maximum diversion of materials from landfill, thus achieving the targets set out in the *EMR Waste Management Plan 2015-2021* and the DCC waste and draft waste bye-laws. Onsite segregation of all waste materials into appropriate categories including (but not limited to): ○ organic waste; ○ dry Mixed Recyclables; ○ mixed Non-Recyclable Waste; ○ glass; ○ waste electrical and electronic equipment (WEEE); ○ batteries (non-hazardous and hazardous); ○ cooking oil; ○ light bulbs; ○ cleaning chemicals (pesticides, paints, adhesives, resins, detergents, etc.); ○ furniture (and from time to time other bulky waste); and ○ abandoned bicycles.	Operational

Mitigation No.	Description of Mitigation / Environmental Commitment	Phase
	▪ all waste materials will be stored in colour coded bins or other suitable receptacles in designated, easily accessible locations. Bins will be clearly identified with the approved waste type to ensure there is no cross contamination of waste materials; ▪ all waste collected from the proposed Project will be reused, recycled or recovered where possible, with the exception of those waste streams where appropriate facilities are currently not available; and ▪ all waste leaving the Site will be transported by suitable permitted contractors and taken to suitably registered, permitted or licensed facilities.	
MA_W_10	Waste arising from the Construction and Operational Phases of the proposed Project is dealt with in compliance with the provisions of the *Waste Management Act 1996*, as amended, associated Regulations*, the Litter Pollution Act 1997, the EMR Waste Management Plan (2015-2021)* and the and the DCC Bye-Laws for the Storage, Presentation and Collection of Household and Commercial Waste and the DCC waste and draft waste bye-laws. It will also ensure optimum levels of waste reduction, reuse, recycling and recovery are achieved and will encourage sustainable consumption of resources.	Construction / Operational

23 References

- Environmental Noise Regulations: S.I. No. 140 of 2006 - Environmental Noise Regulations 2006: http://www.irishstatutebook.ie/eli/2006/si/140/made/en/print
- *European Waste Catalogue and Hazardous Waste List,* Jan 2002: http://www.nwcpo.ie/forms/EWC_code_book.pdf
- *Guidelines for Managing Openings in the Public Road*, Department of Transport, Tourism and Sport (2017): http://www.dttas.ie/sites/default/files/publications/roads/english/guidelines-managing-openings-public-roads-2017/170420-purplebook-full-april2017-min.pdf
- Safety & Health Regulations 2013: (S.I. No. 291 of 2013 Safety, Health and Welfare at Work (Construction)): https://www.hsa.ie/eng/Legislation/New_Legislation/SI_291_2013.pdf
- Department of Transport, Tourism & Sport (2010) *Traffic Signs Manual*: http://www.dttas.ie/sites/default/files/publications/roads/english/traffic-signs-manual-2010/traffic-signs-manual-2010-chapter-8-temporary-traffic-measures-and-signs-roadworks.pdf
- Advice Notes on Current Practice in the Preparation of EIS (2003): http://www.epa.ie/pubs/advice/ea/guidelines/EPA_advice_on_EIS_2003.pdf

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