

**Response to Further Information Request
DCC Reg. Ref. 5126/22 & 5432/22**

**Addendum Environmental Impact Assessment
Report**

Mixed-Used Development at Dublin Central

For Dublin Central GP Limited

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TABLE OF CONTENTS OF THE ENVIRONMENTAL IMPACT ASSESSMENT REPORT

EIAR VOLUME 1 – WRITTEN STATEMENT, INCLUDING NON-TECHNICAL SUMMARY

- Chapter 1 – Introduction (No Change)
- Chapter 2 – Non-Technical Summary (Updated)
- Chapter 3 – Description of Proposed Development (See RFI Planning Report)
- Chapter 4 – Examination of Alternatives (No Change)
- Chapter 5 – Population and Human Health (Updated)
- Chapter 6 – Biodiversity (No Change)
- Chapter 7 – Land, Soils and Geology (Updated)
- Chapter 8 – Water (Updated)
- Chapter 9 – Climate (Air Quality & Climate Change) (No Change)
- Chapter 10 – Climate (Sunlight & Daylight) (No Change)
- Chapter 11 – Air (Noise & Vibration) (No Change)
- Chapter 12 – Landscape and Visual Impact (Updated)
- Chapter 13 – Material Assets (Transportation) (No Change)
- Chapter 14 – Material Assets (Waste) (Updated)
- Chapter 15 – Cultural Heritage (Architectural) (Updated)
- Chapter 16 – Cultural Heritage (Archaeological) (No Change)
- Chapter 17 – Risk Management (Major Accidents & Disasters) (No Change)
- Chapter 18 – Summary of Mitigation Measures (Updated)
- Chapter 19 – Summary of Cumulative Impacts and Interactions (Updated)
- Chapter 20 – Summary of Residual Impacts (Updated)
- Chapter 21 – Bibliography (Updated)

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EIAR VOLUME 2 – APPENDICIES

- Appendix 3.1 – Outline Construction & Demolition Management Plan – Masterplan (No Change)
- Appendix 3.2 – Outline Construction & Demolition Management Plan – Site 2 (Updated)
- Appendix 3.3 – Outline Construction & Demolition Management Plan – No. 61 O'Connell Street Upper (No Change)
- Appendix 6.1 – Protected Sites for Nature Conservation in the Vicinity of the Proposed Development and the Masterplan (No Change)
- Appendix 6.2 – Desk Study Flora and Fauna Records (No Change)
- Appendix 6.3 – Examples of Valuing Important Ecological Features (No Change)
- Appendix 6.4 – Potential Roost Feature (PRF) Photos from Building Inspections (Masterplan) (No Change)

- Appendix 7.1 – Environmental Assessment (Site Investigation) (No Change)
- Appendix 7.2 – Dublin Central Ground Investigation (Added)
- Appendix 7.2 – Basement Impact Assessment (Added)
- Appendix 8.1 – Irish Water Confirmation of Feasibility (No Change)
- Appendix 8.2 – Basement Impact Assessment (Added)
- Appendix 8.3 – Subterranean Construction Method Statement (Added)
- Appendix 9.1 – Ambient Air Quality Standards (No Change)
- Appendix 9.2 – Dust Management Plan (No Change)
- Appendix 11.1 – Glossary of Acoustic Terminology (No Change)
- Appendix 11.2 – Air Quality Monitoring and Noise Control Unit's Good Practice Guide for Construction and Demolition (No Change)
- Appendix 12.1 – Photomontages (Updated)
- Appendix 14.1 – Resource & Waste Management Plan (Updated)
- Appendix 14.2 – Operational Waste Management Plan (Updated)
- Appendix 15.1 – Dublin Central Masterplan Conservation Management Plan (No Change)
- Appendix 15.2 – Chronology Drawings (No Change)
- Appendix 15.3 – 43 O'Connell Street Upper; Building Inventory, Record and Description (No Change)
- Appendix 15.4 – 44 O'Connell Street Upper; Building Inventory, Record and Description (No Change)
- Appendix 15.5 – 45 O'Connell Street Upper; Building Inventory, Record and Description (No Change)
- Appendix 15.6 – 46-49 O'Connell Street Upper; Building Inventory, Record and Description (No Change)
- Appendix 15.7 – 50-51 O'Connell Street Upper; Building Inventory, Record and Description (No Change)
- Appendix 15.8 – 52-54 O'Connell Street Upper; Building Inventory, Record and Description (No Change)
- Appendix 15.9 – 55-56 O'Connell Street Upper; Building Inventory, Record and Description (No Change)
- Appendix 15.10 – 57 O'Connell Street Upper; Building Inventory, Record and Description (No Change)
- Appendix 15.11 – 58 O'Connell Street Upper; Building Inventory, Record and Description (No Change)
- Appendix 15.12 – 59 O'Connell Street Upper; Building Inventory, Record and Description (No Change)
- Appendix 15.13 – 60A, 60B, 60C O'Connell Street Upper; Building Inventory, Record and Description (No Change)
- Appendix 15.14 – 61 O'Connell Street Upper; Building Inventory, Record and Description (No Change)

- Appendix 15.15 – Outline Schedule of Proposed Works to Retained Fabric (No Change)
- Appendix 15.16 – Impact Assessment – Public Realm (No Change)
- Appendix 16.1 – Summary of National Monument Legislation (No Change)
- Appendix 16.2 – Dublin City Development Plan 2016 – 2022 – Archaeology (No Change)
- Appendix 16.3 – Archaeological Assessment Methodology (No Change)
- Appendix 16.4 – Archaeological Testing Report (No Change)

5 POPULATION & HUMAN HEALTH

5.1 INTRODUCTION

This chapter of the Environmental Impact Assessment Report (EIAR) evaluates the impacts of the Proposed Development (as set out in Chapter 3: Description of Proposed Development of this EIAR) on population and human health.

In accordance with the European Commissions *Guidelines, Guidance on the preparation of the Environmental Impact Assessment Report (EU,2017) Guidelines on the Information to be contained in Environmental Impact Assessment Reports (EPA, 2022)*, and *Draft Advice Notes for Preparing Environmental Impact Statements (EPA, 2015)*, this chapter has considered the “*existence, activities and health of people*” with respect to “*topics which are manifested in the environment such as employment and housing areas, amenities, extended infrastructure or resource utilisation and associated emissions*”. Risk of Major Accidents is covered in Chapter 17: Risk Management (Major Accidents and Disasters) of this EIAR. Issues examined in this chapter include: -

- Demography.
- Population.
- Employment.
- Social Infrastructure.
- Landscape, Amenity and Tourism.
- Natural Resources.
- Air Quality.
- Noise & Vibration.
- Material Assets.
- Traffic.
- Health and Safety.

Where these topics are dealt with in further detail elsewhere in this EIAR, the relevant chapters have been cross referenced in this chapter.

5.2 ASSESSMENT METHODOLOGY

In accordance with the Guidelines on the Information to be contained in Environmental Impact Assessment Reports (EPA, 2022), this chapter has considered that:

“in an EIAR the assessment of impacts on population and human health should refer to the assessment of those factors under which human health effects might occur, as addressed elsewhere in the EIAR e.g., under environmental factors of air, water soil etc”.

As per Article 3 of Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment, as amended by Directive 2014/52/EU: -

- 1) *The environmental impact assessment shall identify, describe, and assess in an appropriate manner, in the light of each individual case, the direct and indirect significant effects of a project on the following factors:*

population and human health;

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

land, soil, water, air and climate;

material assets, cultural heritage and the landscape;

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

The effects referred to in paragraph 1 on the factors set out therein shall include the expected effects deriving from the vulnerability of the project to risks of major accidents and/or disasters that are relevant to the project concerned."

The 2017 publication by the European Commission (EC), *Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report*, considered that: -

"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 the other factors in Article 3(1) of the EIA Directive and thus environmentally related health issues (such as health effects caused by the release of toxic substances to the environment, health risks arising from major hazards associated with the Project, effects caused by changes in disease vectors caused by the Project, changes in living conditions, effects on vulnerable groups, exposure to traffic noise or air 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."

This chapter will follow these EC guidelines and will examine the health effects relevant to the proposed development as they relate to a relevant, defined study area. The effects of the proposed development on the population and human health are analysed in compliance with the requirements of the EPA Guidelines.

5.2.1 Assessment of Significance & Sensitivity

The assessment of significance is a professional appraisal based on the sensitivity of the receptor and the magnitude of the effect.

Within any area, the sensitivity of individuals in a population will vary. As such, it would be neither representative of the population, nor a fair representation of the range of sensitivities in a population was an overall sensitivity classification assigned to the population in question. As such, the precautionary principle has been adopted for this assessment, which assumes that the population within the study area is of a uniformly high sensitivity.

5.2.2 Magnitude of Impact

The magnitude of predicted impacts has been quantified in this assessment using the terms outlined in Table 5.1 below.

Magnitude	Description of Magnitude
High	Change in an environmental and/or socio-economic factor(s) as a result of the Proposed Development which would result in a major change to existing baseline conditions (adverse or beneficial)
Medium	Change in an environmental and/or socio-economic factor(s) as a result of the Proposed Development which would result in a moderate change to existing baseline conditions (adverse or beneficial)
Low	Change in an environmental and/or socio-economic factor(s) as a result of the Proposed Development which would result in a minor change to existing baseline conditions (adverse or beneficial)
Negligible	Change in an environmental and/or socio-economic factor(s) as a result of the Proposed Development which would not result in change to existing baseline conditions at a population level, but may still result in an individual impact (adverse or beneficial)
No change	No change would occur as a result of the Proposed Development which would alter the exiting baseline conditions (adverse or beneficial)

Table 5.1 Description of magnitude of predicted impacts.

5.2.3 Significance of Effects

The assessment of significant effects in this assessment is a professional appraisal and has been based on the relationship between the magnitude of effects (Section 5.2.2) and the sensitivity of the receptor. Table 5.2 below provides a matrix on the measure of the significance of effects as determined by the relationship between the magnitude of impact and the sensitivity of receptors.

		Magnitude of Impact			
		Negligible	Low	Medium	High
Sensitivity of Receptor	Negligible	Negligible	Negligible or minor	Negligible or minor	Minor
	Low	Negligible or minor	Negligible or minor	Minor	Minor or moderate
	Medium	Negligible or minor	Minor	Moderate	Moderate or major
	High	Minor	Minor or moderate	Moderate or major	Major

Table 5.2: Significance of effects and the sensitivity of the receptor.

5.2.4 Study Area

The proposed development site is located in central Dublin City. Given the nature of the Dublin Central development at the heart of Dublin City Centre and associated public realm, contributing towards the enhancement of Dublin City and the proposed O'Connell street metro stop as a transport interchange, the key population catchments (study areas) to consider are the 'City Area' and the 'ED Area'. The site adjoins the existing O'Connell, Street, Moore Street Parnell Street and Henry Street. The area selected for the assessment of the impact on human health has been defined as the Electoral Divisions (ED) of North City (ED 02075) Rotunda B (02089), Rotunda A (02088), Mountjoy A (02073), Mansion House A (02117), Royal Exchange A (02144), and North Dock C (02078). These areas have been considered in this chapter to provide a representative overview of the area within which the site is located. Therefore, the assessment in this chapter will apply to both the Dublin Central Masterplan area and the Proposed Development (Site 2 & No. 61 O'Connell Street).

City Area

The subject site is located centrally within the Dublin City area, which is within the administrative area of Dublin City Council. As per the Dublin City Development Plan (2022 – 2028), Dublin City is zoned as objective Z5 – 'To consolidate and facilitate the development of the central area and to identify, reinforce, strengthen and protect its civic design character and dignity' (Figure 5.1).



Figure 5.1: Zoning Map of Dublin City Central Area (DCC Development Plan 2022-2028).

The site is located within the Dublin region, as defined by the Nomenclature of Territorial Units for Statistics (NUTS) developed by Eurostat. The Dublin region comprises counties Dublin city, Dun Laoghaire-Rathdown, Fingal and South Dublin.

5.3 RECEIVING ENVIRONMENT

5.3.1 Population & Demographics

5.3.1.1 Population

The most recent census of population was carried out by the CSO on the 3 April 2022. However full results of this census are yet to be published. Preliminary results regarding population growth have been published and are utilised in section 5.3.1.1 of this study. For the purposes of the remainder of this study the results of the census of population carried out by the CSO on the 24 April 2016 will be used, and the previous census on the 10 April 2011. The census compiles data for the whole state as well as smaller individual areas including counties, cities, towns, and electoral divisions. Taking into consideration the location of the Proposed Development, the census information on population, age profile, employment, and social class, has been analysed in relation to the development site.

Table 5.3 denotes the population change at for the state, and electoral districts for the census years 2016 and 2022. The latest census data shows that the population surrounding the development site in the North City ED decreased in size by 15.5% between the years 2016 and 2022 compared with a growth of 7.6% nationally. However, the average rate of population growth across the study area as a whole was an increase in 7.6%, in line with the national growth. The general increase in growth rate of surrounding areas, when compared to the state figures, suggests the increasing economic role of the areas surrounding the Proposed Development site.

Area	2016	2022	% Change 2016 – 2022
State	4,761,865	5,123,536	+7.6%
North City	5,654	4,777	-15.5%
Rotunda B	2,458	4,401	+79.0%
Rotunda A	5,965	6,069	+1.7%
Mountjoy A	5,389	6,629	+23.0%
Mansion House A	4,665	4,179	-10.4%
Royal Exchange A	4,329	4,849	+12.0%
North Dock C	4,214	4,254	+0.9%
Study Area (mean)	4,667	5,023	+7.6%

Table 5.3: Population change 2016 – 2022 (Source: www.cso.ie).

5.3.1.2 Age Profile

The age profile of the population in the area is an important parameter as it provides a good insight into the potential labour force, the demand for schools, amenities, other facilities, and the future housing demand. Table 5.4 shows the age profiles at a national level and electoral districts for the census year 2016.

Age	0-12	13-18	19-24	25-44	45-64	65+	Total Persons
State	18.48%	7.80%	6.96%	29.53%	23.84%	13.39%	4,761,865
North City	7.9%	2.6%	10.8%	55.9%	16.6%	6.1%	5,654
Rotunda B	9.8%	1.8%	11.1%	57.1%	15.9%	4.3%	2,458
Rotunda A	10.5%	4.1%	10.9%	47.8%	19.9%	6.8%	5,965
Mountjoy A	10.4%	6.3%	13.7%	47.5%	16.8%	5.3%	5,389
Mansion House A	8.9%	9.2%	18.1%	37.7%	17.1%	8.9%	4,665
Royal Exchange A	3.2%	4.2%	16.7%	44.8%	22.8%	8.2%	4,329
North Dock C	8.4%	4.2%	14.0%	47.8%	19.0%	6.6%	4,214
Study Area (Mean)	8.5%	4.8%	13.6%	48%	18.4%	6.7%	4,667.7

Table 5.4: Age profile 2016 (Source: www.cso.ie).

This table shows that both nationally and in the study area, the dominant age grouping is 25-44 at 29.53% and 48% of the total population, respectively. This also reflects that the overall labour force population (12-64 age group) in the study area is reflective of the national level. This is in keeping with census data from 2011 and 2006.

5.3.2 Socioeconomics

5.3.2.1 Employment

Table 5.5 presents the employment statistics nationally and at the county level in 2016 compared with 2011. The data shows that unemployment decreased significantly in the county, as well as nationally, reflecting the economic recovery in recent years.

	At Work	Looking for First Regular Job	Unemployed having Lost or given up Previous Job	Total in Labour Force	% Unemployment
2011 Labour Force					
State	1,807,360	34,166	390,677	2,232,203	19.03%
North City	2,938	112	369	3,419	14.1%
Rotunda B	2,095	72	527	2,694	22.2%
Rotunda A	1,261	42	294	1,597	21.0%
Mountjoy A	2,304	119	677	3,100	25.7%
Mansion House A	1,883	61	365	2,309	18.4%
Royal Exchange A	2,311	49	330	2,690	14.1%
North Dock C	2,015	53	548	2,616	23%
2016 Labour Force					
State	2,006,641	31,434	265,962	2,304,037	12.91%
North City	3,496	86	382	3,964	11.8%
Rotunda B	1,404	30	217	1,651	15%
Rotunda A	3,231	86	503	3,820	15.4%
Mountjoy A	2,819	91	526	3,436	17.9%
Mansion House A	2,227	52	296	2,575	13.5%
Royal Exchange A	2,642	38	214	2,894	8.7%
North Dock C	2,284	41	383	2,708	15.6%

Table 5.5: Employment statistics 2011 and 2016 (Source: www.cso.ie).

The 2016 census data shows that the percentage of unemployed has decreased for the state and the area surrounding the development site since the 2011 census.

5.3.2.2 Education

Census data presenting the highest level of education completed for key educational levels by people living in the county and the area surrounding the development site is presented in Table 5.6. The table presents key milestone education and ignores people undertaking other studies or where information was not stated.

Area	No Formal Education	Primary Education	Secondary ¹	Higher Education ²	Under-graduate Degree ³	Post-graduate Degree ⁴	Total Persons
Highest Level of Education in 2011							
Dublin City	4,635	56,817	109,746	50,898	67,398	46,007	335,501
North City	28	140	574	529	790	530	2,591
Rotunda B	23	118	353	239	352	203	1,288
Rotunda A	38	257	692	431	422	287	2,127
Mountjoy A	56	483	722	455	474	291	2,481
Mansion House A	31	468	623	277	466	521	2,386
Royal Exchange A	26	221	415	343	582	450	2,037
North Dock C	46	413	608	328	573	425	2,393
Highest Level of Education in 2016							
Dublin City	1,435	8,816	30,167	20,004	17,946	9,190	87,558
North City	32	104	531	445	835	584	2,531
Rotunda B	29	102	213	216	344	254	1,158
Rotunda A	62	265	896	578	678	378	2,857
Mountjoy A	78	331	706	455	514	353	2,437
Mansion House A	48	343	574	339	568	548	2,420
Royal Exchange A	37	146	333	303	603	485	1,907
North Dock C	67	388	496	277	569	521	2,318

Table 5.6: Highest level of education in 2011 and 2016 (Source: www.cso.ie).

5.3.2.3 Labour Force Survey

The Labour Force Survey (LFS) is a large-scale, nationwide survey of households in Ireland carried out every three months. It generates labour force estimates which include the official measure of employment and unemployment for the state.

The LFS results nationally for Q4 2021 showed that there were 2,506,000 people employed in the state with 127,400 classified as unemployed (aged 15-64 years). In Q4 2021, the majority of people were employed in the broad occupations of 'Industry' or as 'Human Health and Social Work Activities' and 'Wholesale and Retail Trade'.

It is important to note that the effects of COVID-19 on the labour market in the results from the Labour Force Survey (LFS) in Quarter 1 (Q1) 2021. The results reflect some of the economic impacts of the COVID-19 situation. The LFS estimates that at the end of December 2021, the COVID-19 Adjusted Measure of Unemployment is currently estimated to have been 195,313 with an associated COVID-19 Adjusted Unemployment Rate of 7.4%

¹ Lower secondary and Upper secondary

² Higher Certificate, Advanced certificate/completed apprenticeship or Technical/vocational training

³ Ordinary bachelor's degree, Honours bachelor's degree/professional qualification

⁴ Postgraduate degree or Ph.D

5.3.2.4 Income

The below data in Table 5.7 is obtained from CSO Statbank (CIA02), this demonstrates the levels of total income and disposable income per person in the Dublin area are 15-20% higher over the study years than the State in 2018.

A similar pattern of income distribution is observed in data on disposable income per person.

The below data in Table 5.7 is obtained from CSO Statbank (CIA02), this demonstrates the levels of total income and disposable income per person in the Dublin area are 14-18% higher over the study years than the State in 2019.

A similar pattern of income distribution is observed in data on disposable income per person.

Area	Income	2017	2018	2019
State	Total Income per Person (€)	29,239	30,753	31,812
	Disposable Income per Person (€)	20,714	21,270	22,032
Dublin	Total Income per Person (€)	35,197	37,530	38,903
	Disposable Income per Person (€)	23,864	24,969	25,696

Table 5.7: Income per Person (Source: CSO Statbank CIA02).

5.3.2.5 Deprivation

Deprivation in small areas is mapped using the Pobal HP Deprivation Index. This Index draws on data from censuses and combines three dimensions of relative affluence and deprivation: Demographic Profile, Social Class Composition and Labour Market Situation. Figure 5.2 below shows a graphical representation of how the concepts of Demographic Growth, Social Class Composition and Labour Market Situation are measured by ten key socio-economic indicators from the Census of Population. In this EIA Report, the Relative Index Score is considered as the measure for deprivation, as these Relative Index Scores are rescaled such that the mean is 0 and the standard deviation is 10 at each census wave. This allows for the provision of descriptive labels with the scores, which are grouped by standard deviation as seen in Table 5.8 below.

Graphical representation of how the concepts of Demographic Growth, Social Class Composition and Labour Market Situation are measured by ten key socio-economic indicators from the Census of Population.

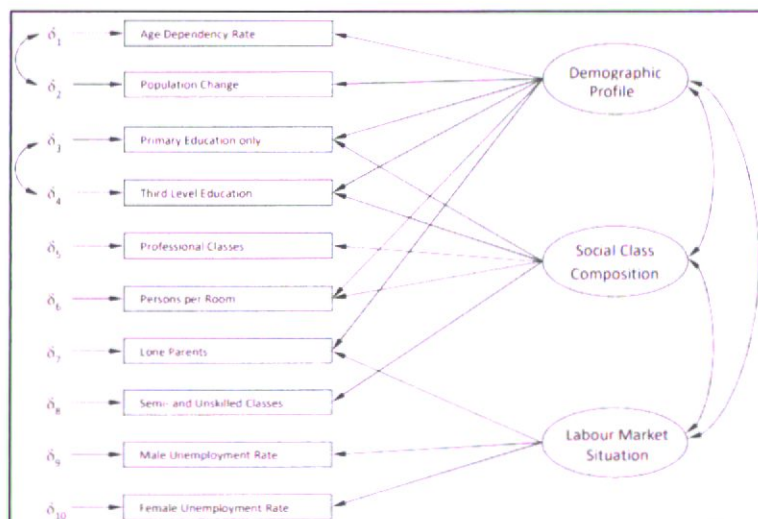


Figure 5.2: Basic Model of the Pobal HP Deprivation Index.

Relative Index Score	Standard Deviation	Label
> 30	> 3	Extremely affluent
20 – 30	2 – 3	Very affluent
10 – 20	1 – 2	Affluent
0 – 10	0 – 1	Marginally above average
0 – -10	0 – -1	Marginally below average
-10 – -20	-1 – -2	Disadvantaged
-20 – -30	-2 – -3	Very disadvantaged
< -30	< -3	Extremely disadvantaged

Table 5.8: Pobal HP Index Relevant Index Score labels (Source: Pobal HP Deprivation Index).

The data in Table 5.9 shows the Pobal HP Index Relevant Index Score Figures at a local and County level (Source: *Pobal HP Deprivation Index*). These figures show that the population living within the Study Area are generally classified as 'Marginally above average' and 'Affluent'. The county of Dublin is classified as 'Marginally above average' for the year 2011. Figure 5.3 below presents the Pobal HP Index map illustrating the Study Area.

Area	Relative Index Score	Pobal HP Description 2011
Dublin County	3.74	Marginally above average
North City	14.97	Affluent
Rotunda B	8.95	Marginally above average
Rotunda A	3.64	Marginally below average
Mountjoy A	2.60	Marginally above average
Mansion House A	4.62	Marginally above average
Royal Exchange A	13.79	Affluent
North Dock C	4.61	Marginally above average

Table 5.9: Pobal HP Index Relevant Index (Source: Pobal HP Deprivation Index).

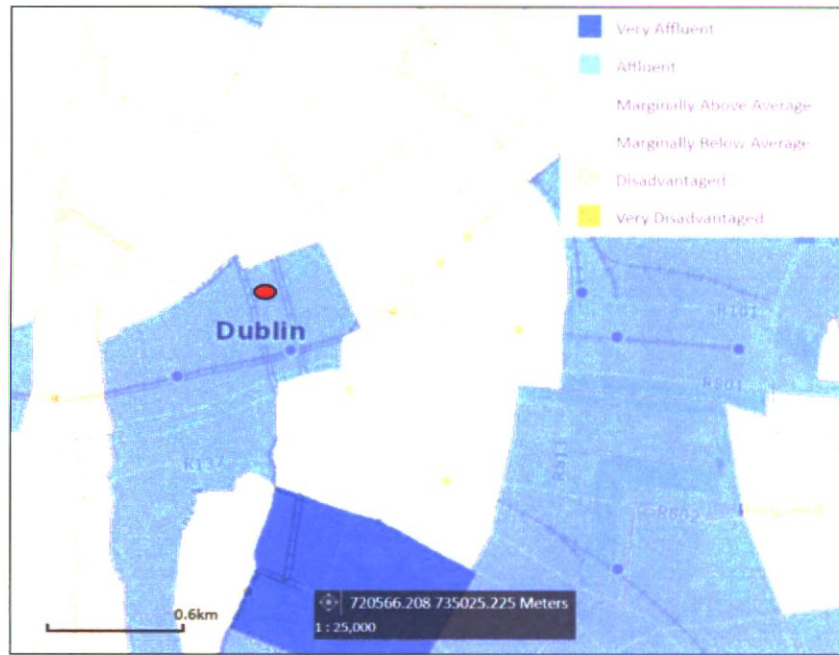


Figure 5.3: Pobal HP Index Electoral Division, Site is indicated with a red dot (Source: Pobal HP Deprivation Index).

5.3.3 Health

5.3.3.1 Physical Health

Life expectancy in Ireland by sex is a key metric for assessing population health; data for the study area is shown in Table 5.10. Dublin data shows that life expectancy for both males and females has increased consistently, with female life expectancy consistently higher than male.

Period Life Expectancy in Dublin by Sex					
Area	Sex	2002	2006	2011	2016
Dublin	Male	75.2	76.7	78.3	80.1
	Female	80.2	81.2	82.7	83.4

Table 5.10: Period Life Expectancy in Dublin by Sex.

Table 5.11 shows Circulatory Diseases Admission Rate per 100,000 Population at a National and County level (Source: Public Health Well Community Profiles). The rate of hospital admissions in Dublin City tends to generally fall in line with that of the State for all study years.

Circulatory Diseases Admission Rate per 100,000 Population					
Area	2010	2011	2013	2014	2015
State	4,308.6	4,026.8	4,495.6	4,644.6	3,794.9
Dublin City	3,805.56	3,498.7	3,950.4	4,716.7	3,425.8

Table 5.11: Circulatory Diseases (Source: Public Health Well Community Profiles).

Respiratory Diseases Admission Rate per 100,000 Population at a National and County level are shown in Table 5.12. The rate of hospital admissions in Dublin City tends to generally fall in line with that of the State for all study years.

Circulatory Diseases Admission Rate per 100,000 Population					
Area	2010	2011	2013	2014	2015
State	2,402.6	2,361.0	2,633.6	2,691.0	2,712.5
Dublin City	2,483.7	2,349.7	2,585.7	2,693.7	2,597.9

Table 5.12: Respiratory Diseases (Source: Public Health Well Community Profiles).

With respect to mental health the rates of death by suicide and intentional self-harm rate per 100,000 population is shown in Table 5.13 below. The rate in Dublin is overall lower over the study years compared with those in the State. The rate of death by suicide and intentional self-harm are generally decreasing year-on-year, this is generally in line with the pattern seen in the State.

Death by Suicide and Intentional Self Harm Rate per 100,000 Population				
Area	2014	2015	2016	2017
State	10.46	9.07	9.22	8.18
Dublin City	6.22	3.88	3.97	3.48

Table 5.13: Death by Suicide and Intentional Self Harm (Source: CSO Statbank DHA12).

The number of admissions to hospital for anxiety or depression per 1,000 people (Table 5.14) in Dublin City have followed the same pattern of the State, which shows a decline from 2013 to 2014. However, there was a steep incline in 2015 which occurred in Dublin City but did not occur for the overall State (Table 5.14).

Number of Admissions to Hospital for Anxiety Or Depression per 1,000 People			
Area	2013	2014	2015
State	2	1.8	1.8
Dublin City	2	1.4	24.9

Table 5.14: Number of admissions to hospital for anxiety or depression (Source: Public Health Well Community Profiles).

5.3.4 Social Infrastructure

5.3.4.1 Residential Dwellings

Currently, the proposed site has little to no residential units present. The nearest existing residential units to the proposed development are those located at Greeg Court Apartments, to the northwest of the site boundary, and Jurys Inn Hotel Parnell Street and Lynams Hotel, which are located beyond the north and east boundaries respectively. Other hotels in close proximity to the eastern site boundary are Holiday Inn Express and The Gresham Hotel on O'Connell Street.

As the site is centrally located within Dublin City centre there are a large number of commercial premises in close proximity including Henry Street to the South, and the nearby Jervis and Ilac Shopping Centres.

5.3.4.2 Schools

The area is well served by educational institutions. There are a number of primary and secondary schools in the vicinity of the Proposed Development including: -

- Central Model Infant School c. 214 m east of the site.
- Rutland National School c. 500 m east of the site.
- St. Marys Primary School c. 570 m north west of the site.
- Central Model Senior School c. 370 m east of the site.
- Mount Carmel Secondary School c. 470 m to the north west of the site.
- St. Pauls Secondary School c. 500 west of the site.

The closest third level institutions in the area include Trinity College Dublin (500 m to the south east), IBAT College Dublin (621 m to the south west) and the National College of Art and Design (1.3 km to the south west).

5.3.4.3 Health

The nearest hospital to the site is the Rotunda Hospital located c. 230 m to the north of the site. Talbot Street and Jervis Street Medical Centres are located c. 350 m to the east and west of the site respectively.

5.3.4.4 Security

The O'Connell street Garda Station is located 60 metres to the north with Store Street Garda Station located 640 m to the east.

5.3.5 Landscape Amenity and Tourism

In terms of landscape amenity of the Proposed Development site, there are no listed or scenic views, no landscape or amenity designations or protected trees pertaining to the site. There are a number of protected structures listed on the Sites and Monuments Record (SMR) in the Dublin City Centre area. Directly to the west bounding the site is No. 14 – 17 Moore Street (DU018-390). An historical Brickworks site is located to the north east of the site on Moore Land (DUB018-020506). See Chapter 16: Cultural Heritage (Archaeological).

The primary areas of landscape amenity in the immediate vicinity of the Proposed Development site are Mountjoy Square Park (620 m to the north east) and Kings Inn Park (c. 700 m to the north west), which are all small recreational parks. Primary amenity areas such as Stephen's Green Park, Dublin Bay and the Phoenix Park are located c. 1.4 km to the south, 4 km to the south east and c. 2.3 km west of the site, respectively.

The Proposed Development site is not considered to be significant or sensitive from a natural landscape aspect due to its city central location. The lands are appropriately zoned in the Dublin City Development Plan 2022 – 2028 as Z5 – *'To consolidate and facilitate the development of the central area, and to identify, reinforce, strengthen and protect its civic design character and dignity'* The immediate surrounding area is contained within an environment of an established city centre setting.

Tourism is a major industry in the immediate environs of the Proposed Development site; with the General Post Office, O'Connell Street, Moore Street bounding the site. Section 6.5.6 of the Dublin City Development Plan lists a number of policy's to promote and facilitate tourism in the city centre area. A number of hotels are located in and around the proposed development site with a large number of hotels opening in Dublin City in the last number of years the closest of these would be Jury's Inn Parnell Street bounding the site to the north, and the Gresham Hotel 20 metres to the east.

5.3.6 Natural Resources

Natural resources and land use in the hinterland of the Proposed Development have also been considered as they may have implications for the development of the lands.

The site is within the historical centre of Dublin City. Historical Ordnance Survey (OS) maps indicate that much of the surrounding land has been in a similar use for over 200 years.

Data from the Geological Survey of Ireland indicates that there are no areas of geological heritage within the vicinity of the proposed site. In terms of extractive industries, the closest active quarries are the Huntstown Quarry in Finglas (c. 7.4 km north west of the site) and the Belgard Quarry in West Dublin (c. 10.5 km south west of the site), both of which are operated by Roadstone Ltd. There are no anticipated impacts on these facilities from the Proposed Development. Further detail on extractive industries is presented in Chapter 7: Land, Soils & Geology.

5.4 CHARACTERISTICS OF PROPOSED DEVELOPMENT

5.4.1 Dublin Central Masterplan

The Dublin Central project is an expansive (c.2.2 Ha) and complex regeneration project. It needs to be delivered in stages to overcome site and project constraints.

A site wide cumulative masterplan has been prepared by 'the Applicant' to set out the overall development vision for the Dublin Central project.

The Dublin Central Masterplan area encompasses almost entirely three urban blocks. The area is bounded generally by O'Connell Street Upper and Henry Place to the east, Henry Street to the south, Moore Street to the west, and O'Rahilly Parade and Parnell Street to the north. Moore Lane extends south from Parnell Street through the centre of the masterplan area, as far as its junction with Henry Place.

A detailed description of the development site context is presented in Chapter 3: Description of Proposed Development.

5.4.2 Proposed Development – Site 2 & No. 61 O'Connell Street Upper

Site 2 comprises a mixed-use scheme incorporating retail, office, hotel, residential uses, associated car parking, landscaping and an interface with the underground Metro Station (to be provided by TII should planning permission be granted for the scheme). Its development will be guided by the Dublin Central Masterplan which will consist of at least five separate phases.

No. 61 O'Connell Street Upper comprises the refurbishment of the existing building as residential use (comprising 3no. 2-bed apartment units) from 1st to 3rd floor including the creation of a new covered pedestrian link through part of the ground floor connecting O'Connell Street Upper and Henry Place. A café / restaurant units is proposed at ground floor onto O'Connell Street and a retail kiosk is proposed at ground floor onto Henry Place.

A detailed description of the development site context is presented in Chapter 3: Description of Proposed Development.

5.5 POTENTIAL IMPACTS

5.5.1 Dublin Central Masterplan

The impact of construction, commissioning, operation and decommissioning of the Dublin Central Masterplan is considered below. As the study area is based on Local Electoral Districts the impacts and mitigation measures for both the Dublin Central Masterplan and the Proposed Development (Site 2 and No. 61 O'Connell Street Upper) will be similar or identical for some of the criteria listed.

5.5.1.1 Construction Stage

5.5.1.1.1 Impacts on Business and Residences

The main potential impacts on local businesses and residences associated with the implementation of the Dublin Central Masterplan will be in relation to air quality, noise, visual impact and traffic. The potential impacts and mitigation measures to address them are dealt with within the corresponding chapters of this EIAR as follows: -

- Chapter 9: Climate (Air Quality and Climate Change).
- Chapter 10: Climate (Sunlight & Daylight).
- Chapter 11: Air (Noise & Vibration).
- Chapter 12: Landscape and Visual Impact.
- Chapter 13: Material Assets (Transportation).

It is predicted that there will be a slight positive impact on local business activity during the construction phase with the increased presence of up to 400no. construction workers using local facilities. It is also believed there will be a long-term positive impact during the operational phase due to the residential aspect of the scheme and the increase in people requiring the use of the City Centre Facilities.

There may be a short term slight negative impact on the local residential population during the construction phase and the operational phase, as well as the potential additional housing demand in the wider commuter area as a result of increased employment provided by the implementation of the Dublin Central Masterplan. It is also anticipated that the implementation of the Dublin Central Masterplan will have indirect positive effects on employment in terms of construction material manufacture, maintenance contracts, equipment supply, landscaping etc.

The potential increase in the temporary population of the area during construction as a result of the employment of workers from outside the wider Dublin area that may choose to reside in the immediate and wider local area is likely to amount to only a small percentage of the workforce employed during the construction phase but will result in some additional trade for local accommodation and services. It is expected that the majority of the work force will travel from existing places of residence to the construction site rather than reside in the immediate environs of the site. However, some local employment from within the wider local area is expected.

Construction will have an indirect positive effect on support industries such as builder suppliers, construction material manufacture, maintenance contracts, equipment supply, landscaping and other local services. There will also be a need to bring in specialist workers on a regular basis that may increase the above estimated working population at times. Specialists are only likely to stay for shorter periods depending on the nature of the work. The construction phase, therefore, is considered to have the potential to have a **positive, moderate, short to medium term** impact on the economy and employment of the local and wider area.

The completed development will also have a positive impact in the provision of additional capacity for residential units in the city centre, the demand for which remains high due to the current nationwide housing crisis.

5.5.1.1.2 Impact on Human Health from Air Quality

As outlined in Chapter 9: Climate (Air Quality and Climate Change) of this EIAR, 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 based on the protection of the environment as well as the protection of human health. Additional factors such as natural background levels, environmental conditions and socio-economic factors are also considered in the limit values which are set (see Chapter 9, Table 9.1). The ambient air quality standards established are designed to minimise harmful effects to health.

Dust emissions from the demolition and construction phase of the proposed development have the potential to impact human health through the release of PM₁₀ and PM_{2.5} emissions. As per Table 9.6 the surrounding area is considered of low sensitivity to significant dust related human health impacts. There is an overall medium risk of human health impacts as a result of the demolition and construction works from the implementation of the Dublin Central Masterplan (see Table 9.11). Therefore, in the absence of mitigation there is the potential for **negative, slight and short-term** impact to human health as a result of the proposed development.

Traffic emissions from construction vehicles also have the potential to impact human health. However, as per Section 9.5.1.1.1 the change in local air quality as a result of construction traffic is considered **negative, imperceptible and short-term** impact in the absence of mitigation.

5.5.1.1.3 Impact on Human Health from Noise & Vibration

Noise and vibration impacts associated with the implementation of the Dublin Central Masterplan have been fully considered within Chapter 11: Air (Noise & Vibration) of this EIAR. Commentary on the impact assessment and related noise levels are summarised below with respect to potential environmental health impacts.

As detailed in Chapter 11, there will be some impact on nearby noise sensitive properties due to noise emissions from site activity. A variety of items of plant will be in use, such as breakers, excavators, lifting equipment, dumper trucks, compressors and generators. At distances beyond the immediate site boundary (greater than 50m), with the presence of existing buildings and distance attenuation, the construction threshold value for residential receivers is likely to be achieved during the various stages of works. Therefore, it is expected in the absence of specific mitigation measures that there will be **negative, slight to moderate and short term** noise impact at the closest receptors.

The flow of vehicular traffic to and from a construction site is also a potential source of relatively high noise levels. The assessment of cumulative construction traffic presented in Chapter 11 indicates that a change in noise level from this source would be barely perceptible. Therefore, it is expected in the absence of specific mitigation measures that there will be a **negative, not significant and short-term** impact at the closest receptors.

With respect to the potential vibration impact, the only significant source of vibration is expected to be due to excavations, piling and foundation activities. However, the distance between the areas where these activities are to occur and the nearest noise sensitive locations are such that all vibration transmission would be below recommended guideline criteria. The vibration impact will be **neutral, not significant and temporary**.

5.5.1.1.4 Impact on Local Amenities and Tourism

There are no listed or scenic views, no landscape or amenity designations or protected trees pertaining to the site, and no protected structures or National Monuments within the boundary of the Dublin Central Masterplan area. There are a number of protected structures listed on the Sites and Monuments Record (SMR) in the Dublin City Centre area. Directly to the west bounding the site is 14-17 Moore Street (DU018-390). A historical Brickworks site is located to the north east of the site on Moore Land (DUB018-020506). These will be protected and not impacted by the proposed construction and demolition works.

During construction and demolition works there may be a **negative, slight and short-term** impact on the surrounding tourist attraction of the GPO to the south and north O'Connell Street due to works. There will be no impacts to the nearby park amenities identified above.

The Dublin Central Masterplan will create a wastewater discharge but will not have an impact on local amenities or the local population.

5.5.1.1.5 Impact on Material Assets

The Proposed Development will require connections to the utility networks and the requirements for this supply have been detailed in the Outline Construction & Demolition Management Plan – Masterplan, prepared by Waterman Moylan Consulting Engineers Limited.

5.5.1.1.6 Impacts from Additional Traffic

An assessment of the additional traffic movements associated with the implementation of the Dublin Central Masterplan during the construction and operational phases is presented in Chapter 13: Material Assets (Transportation).

As stated in Section 13.4.1.1.13 of Chapter 13: Material Assets (Transportation), the increase in traffic volumes, the reduction in the width or local carriageways, temporary road closures, reduction in width of select pathways etc associated with the construction and demolition phase (see Section 13.4.1.1) would lead to a **likely, slight, negative and short-term** impact.

5.5.1.1.7 Impacts from Unplanned Events / Impacts on Health and Safety

The Dublin Central Masterplan has been designed in accordance with the Safety, Health and Welfare at Work Act 2005 (S.I. 10 of 2005) as amended and the Safety, Health and Welfare at Work (General Application) Regulations 2007 (S.I. 299 of 2007) as amended and associated regulations. The plant has been designed by skilled personnel in accordance with internationally recognised standards, design codes, legislation, good practice and experience based on a number of similar existing facilities operated by the operator.

The implementation of the Dublin Central Masterplan has the potential for an impact on the health and safety of workers employed on the site, particularly during the construction phase. The activities of contractors during the construction phase will be carried out in accordance with the Safety, Health and Welfare at Work (Construction) Regulations 2013 (S.I. No. 291 of 2013) as amended to minimise the likelihood of any impacts on worker's health and safety. The health and safety planning for the construction phase of the Dublin Central Masterplan will consider any appropriate measures to safeguard workers' health and safety with regards to Covid-19.

During the operational phase of the Dublin Central Masterplan, the operator will implement an Environmental Safety and Health (EH&S) Management System and associated procedures at the facility. Full training in the EH&S Management System and relevant procedures will be provided to all employees. The Operator will also implement any appropriate health and safety measures to safeguard workers' health and safety with regards to Covid-19.

The 2014 EIA Directive, 2018 EIA Regulations and associated EPA EIA Report Guidelines 2022 require that the vulnerability of the project to major accidents and / or natural disasters (such as earthquakes, landslides, flooding, sea level rise etc.) is considered in the EIA Report.

The site has been assessed in relation to the following external natural disasters; landslides, seismic activity, volcanic activity and sea level rise / flooding as outlined below. The potential for major accidents to occur at the facility has also been considered with reference to Seveso / Control of Major Accident Hazards (COMAH) Regulations. See Chapter 17: Risk Management (Major Accidents and Disasters) for more details.

There is a negligible risk of landslides occurring at the site and in the immediate vicinity due to the topography and soil profile of the site and surrounding areas. There is no history of seismic activity in the vicinity of the site. There are no active volcanoes in Ireland so there is no risk of volcanic activity.

The potential risk of flooding on the site was also assessed. A site-specific flood risk assessment was carried out by the project engineers, Waterman Moylan Consulting Engineers and it was concluded that there is a very low risk of flooding. Furthermore, the Dublin Central Masterplan design has adequate attenuation etc. to ensure there is no potential impact on flood risk for other neighbouring properties, nor is the site at risk from sea level rise.

The Dublin Central Masterplan will not be a Seveso / COMAH facility. The only substance stored on site controlled under Seveso / COMAH will be diesel for generators and the amounts proposed do not exceed the relevant thresholds of the Seveso Directive. The Dublin Central Masterplan site is not located within the consultation distance of any COMAH establishment that is notified to the HSA.

There is a potential impact on the receiving environment as a result of minor accidents / leaks of fuel / oils during the construction and operational phases. However, the implementation of the mitigation measures set out in Chapter 7: Land, Soils & Geology and Chapter 8: Water of the EIA Report will ensure the risk of a minor / accident is low and that the residual effect on the environment is imperceptible.

5.5.1.2 Operational Stage

5.5.1.2.1 Impacts on Business and Residences

The implementation of the Dublin Central Masterplan will result in significant and positive impact to local residents in the area. There will be a varied mix of residential and employment opportunities provided which will be of direct benefit, allowing a diverse range of community to work, and live within the city centre.

The implementation of the Dublin Central Masterplan will result in increased employment during the operational phase and will significantly reduce the pressure on local housing supply. The provision of residential units will benefit the adjacent businesses.

As stated in Chapter 10: Climate (Sunlight & Daylight) of this EIAR, the BRE 209 Guideline recommends that in all relevant amenity spaces; at least half of the area should receive at least two hours of sunlight on 21st March. The Proposed Development will have a slight overshadowing impact on the new Dublin Central Site 4 & 5 public plaza. The public plaza within Site 4 & 5 receives at least 2 hours of direct sunlight on over 90% of the designated amenity area for residents (see Figure 10.5 of Chapter 10: Climate (Sunlight & Daylight)). It is clear that residents will receive high levels of sunlight and the BRE 209 Guidelines are met. The analysis carried out in Chapter 10: Climate (Sunlight & Daylight) demonstrates that the design of Dublin Central Masterplan maximises access to sunlight in amenity spaces for both residents and the public and so the BRE 209 Guidelines are easily achieved.

In the case of Site 2, there are no existing residential properties impacted by overshadowing due to the site location and orientation to other existing buildings. Whilst it should be noted there are apartments on the North of Moore Street that face the existing Jurys Inn, Parnell Street; Sunlight analysis completed by shows the roof top amenity space is not affected by the Proposed Development due to the orientation and height relative to the building. The apartment windows are facing Northeast and therefore are overshadowed by the existing Jurys Inn and as the elevation angle is more than 90 degrees from due south the impact on sunlight is not significant or considered relevant under BRE 209 guidance.

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 development, the character of the existing shadow environment and the land use pattern of the receiving environment.

The impact of the Dublin Central Masterplan on sunlight access to the adjacent properties is therefore defined as **not significant**: An effect which causes noticeable changes in the character of the environment but without significant consequences. This is the second lowest definition of impact taken from the Guidelines on the Information to be contained in Environmental Impact Statements prepared by the Environmental Protection Agency (2022).

5.5.1.2.2 Impact on Human Health from Air Quality

Traffic related air emissions have the potential to impact human health if they do not comply with the ambient Air Quality Standards detailed in Table 9.1 of Chapter 9: Climate (Air Quality & Climate Change). However, as there is minimal car parking associated with the proposed development, the traffic generated does not satisfy the assessment criteria to require an air modelling assessment as outlined in Section 9.2.3.1 of Chapter 9 and therefore there is no potential for significant impacts. It can be determined that the impact to human health during the operational stage is **negative, imperceptible and long-term**.

5.5.1.2.3 Impact on Human Health from Noise & Vibration

As detailed in Chapter 11: Air (Noise & Vibration), once the Dublin central Masterplan becomes fully operational, a variety of electrical and mechanical plant will be required to service the development. Most of this plant will be capable of generating noise to some degree. Some of this plant may operate 24 hours a day, and hence would be most noticeable during quiet periods (i.e. overnight). Table 11.28 of Chapter 11 illustrates the recommended indoor ambient noise levels to ensure there is no adverse impact on the future inhabitants of the Proposed Development itself. It is recommended that the cumulative plant noise levels from the Dublin Central Masterplan site be designed so as to meet these relevant noise criteria.

In the case of the Proposed Development potential sources of entertainment noise include restaurant/bar areas, communal amenity spaces (residential), presentation/convention spaces, retail units and food & beverage units. A criterion is presented in Chapter 11 regarding entertainment noise based on the guidance contained within the Draft IOA Code of Practice Guide on the Control of Noise from Pubs and Clubs (November 1999).

A potential source of outward noise impact associated with a Proposed Development relates to additional traffic associated with journeys to and from the development on the surrounding road network. The Dublin Central Masterplan site includes for some 33 no. parking spaces in Site 2. In order to assist with the interpretation of the noise associated with vehicular traffic on public roads, **Error! Reference source not found.** of Chapter 11 offers guidance as to the likely impact associated with any particular change in traffic noise level.

The proposed development will not generate any perceptible levels of vibration during operation and will have a negligible significance of effect with respect to human health. Therefore, there will be no impact from vibration on human health.

Overall, the noise and vibration levels that are encountered at the nearest sensitive onsite and offsite locations are predicted to be within relevant noise criteria that have been adopted here for the operation of the proposed development. These criteria have been selected with due consideration to human health, therefore, will not result in a significant effect on human health.

5.5.1.2.4 Impact on Local Amenities and Tourism

Once operation the Proposed Master Development will have significant and positive impact upon the availability and quality of local amenities and also upon tourism.

The implementation of the Dublin Central Masterplan will provide increased leisure opportunities, public open spaces, community meetings areas and cultural facilities, all of which will have significant and positive impact on local amenities. Access to other amenities in the area will remain unaffected.

The implementation of the Dublin Central Masterplan will improve tourism resources in Dublin City, providing increased tourism accommodation which will be augmented by the provision of retail, cafes, restaurants and the aforementioned leisure, community and cultural provisions.

5.5.1.2.5 Impact on Material Assets

The implementation of the Dublin Central Masterplan will require power supply, fresh water and foul sewerage. It is intended that the national grid will supply power to site. The utility providers have provided confirmation that there is sufficient capacity in the area network for the required power demand and as such there will be no impact on power supply to local residential or business users, who may be reliant upon these areas for healthcare.

Dublin City Council and Irish Water have been consulted and there is capacity within the public water system and the foul sewerage system for the proposed development, and as such will not impact upon any individuals relying on these services for healthcare reasons.

5.5.1.2.6 Impacts from Additional Traffic

There will be an increase in traffic arising from the operational phase of the implementation of the Dublin Central Masterplan. As detailed in Chapter 13: Material Assets (Transportation) of this EIAR, there will be no discernible impact to human health arising from the noise and air quality related to additional traffic.

5.5.1.2.7 Impacts from Unplanned Events / Impacts on Health and Safety

The Dublin Central Masterplan has been designed by skilled personnel in accordance with internationally recognised standards, design codes, legislation, good practice and experience based on a number of similar existing developments.

5.5.1.3 Do-Nothing Impact

If the Dublin Central Masterplan were not to proceed, the subject land would for the short term remain as it is in which case there is no potential for the positive impacts associated with increased housing supply, increased tourist revenue, and increased local amenities and community spaces.

In the long-term, it is likely that the lands would be developed in time for another similar development in line with the zoning of the site.

5.5.2 Proposed Development – Site 2 & No. 61 O'Connell Street Upper

5.5.2.1 Construction Stage

The Potential Impacts of the Proposed Development (Site 2) are the same as the Potential Impacts of the Dublin Central Masterplan described in Section 5.5.1.1. Any differing sections are covered below.

5.5.2.1.1 Impact on Human Health from Noise and Vibration

As part of the construction works for Site 2, MetroLink Enabling Works (MEW) will take place at the same time as excavation and below-ground works for Site 2. These works for the two developments are assessed as one activity and therefore the potential cumulative impact is predicted.

Two MEW construction phase activities were identified as having potential to cause significant adverse impacts on the nearest sensitive receptors; demolition and D-wall operations.

During demolition activities there is one residential receptor to the northwest and two commercial receptors, with a **not significant** predicted noise impact. Three commercial receptors to the east have a **moderate to significant** predicted noise impact. There is one clinical receptor to the north, one residential receptor to the west, fourteen commercial receptors to north, east, south and west of the site, all with a **significant to very significant** predicted noise impact. All of the above impacts are in the absence of noise mitigation.

During D-wall activities there are two commercial receptors to the north with a **not significant** predicted noise impact. There is one residential receptor to the west and six commercial receptors to north and west of the site, with a **moderate** to **significant** predicted noise impact. One commercial receptor to the northwest has a **significant** to **very significant** predicted noise impact. All of the above impacts are in the absence of noise mitigation.

The predicted noise impacts for all construction activities with the exception of demolition and D-wall activities, is **not significant** at all receptors in the absence of noise mitigation.

It is not anticipated in a worst-case Proposed Development vibration assessment that the relevant limit values would be exceeded i.e. the impact from vibration would be relative to the closest phase of construction, and the distance to the next phase would be negligible. Therefore, it is expected that there will be a **neutral**, **not significant** and **temporary** impact at the closest receptors during the Proposed Development.

5.5.2.1.2 Impact on Material Assets

The Proposed Development will require connections to the utility networks and the requirements for this supply have been detailed in the Outline Construction & Demolition Management Plan – Site 2 and No. 61 O'Connell Street Upper, prepared by Waterman Moylan Consulting Engineers Limited.

5.5.2 Operational Stage

The Potential Impacts of the Proposed Development (Site 2) are the same as the Potential Impacts of the Dublin Central Masterplan described in Section 5.5.1.2

5.5.2.3 Do-Nothing Impact

If the Proposed Development were not to proceed, the subject land would for the short term remain as it is in which case there is no potential for the positive impacts associated with increased housing supply, increased tourist revenue, and increased local amenities and community spaces.

In the long-term it is likely that the lands would be developed in time for another similar development in line with the zoning of the site.

5.5.3 Cumulative

5.5.3.1 Construction Stage

The cumulative impact of other potential impacts on human health from air quality, noise quality and traffic have been incorporated into the various models and assessments that have contributed to Section 5.5.1 of this EIAR.

5.5.3.2 Operational Stage

The cumulative impact of other potential impacts on human health from air quality, noise quality and traffic have been incorporated into the various models and assessment that have contributed to Section 5.5.1 of this EIAR.

5.6 MITIGATION MEASURES (AMELIORATIVE, REMEDIAL OR REDUCTIVE MEASURES)

The impacts on the local population in terms of residents and businesses are considered to be mainly positive in the sense of creating direct employment opportunities and indirect additional business, both during the construction and operational phases. Once operational there will be

significant positive contributions to the residential, community and cultural aspects of Dublin City Centre.

Mitigation measures proposed to minimise the potential impacts on human health in terms of Climate (Air Quality and Climate Change), Climate (Daylight & Sunlight), Air (Noise and Vibration), Landscape and Visual Impact Assessment and Material Assets (Transportation) are discussed in the relevant sections of Chapters 9, 10, 11, 12 and 13 of this EIAR respectively.

Similarly, mitigation measures set out in Chapter 7: Land, Soils & Geology and Chapter 8: Water of the EIAR will ensure the risk of impacts to Human Health is low and that the residual effect on the environment is imperceptible.

5.6.1 Dublin Central Masterplan

5.6.1.1 Construction Stage

Prior to the commencement of construction, the appointed contractor will be required to obtain formal agreement from the Local Authority on pollution prevention measures as well the overall approach and emergency procedures for all construction stages. All demolition works are to be in accordance with the following guidelines:

- BS 6187:2000 '*Code of practice for demolition*'
- Health and Safety Executive Guidance Notes GS 29 / 1, 2, 3 & 4.
- S.I. 504 Safety, Health & Welfare at Work (Construction) regulations 2013
- Air Pollution Act 1987
- Environmental Protection Agency Act 1992
- BS 5228:2009 Part 1 '*Noise Control on Construction & Open Sites*'.

Prior to the works commencing, detailed photograph surveys (condition schedules) of adjoining walls, roads, footpaths, grass verges etc. are to be prepared. Copies of the relevant parts are to be made available to adjoining owners and Dublin City Council. This record will form the basis of assessing repairs to adjoining areas in the future should a dispute arise as to their cause.

Roadways are to be kept clean of dirt and other debris. A road sweeping truck is to be provided if necessary, to ensure that this is so.

The Contractor will be responsible for the security of the site. The Contractor will be required to: -

- Operate a site induction process for all site staff.
- Ensure all site staff shall have current 'safe pass' cards.
- Install adequate site hoarding to the site boundary.
- Maintain site security staff at all times.
- Separate pedestrian access from construction at the main site entrance off the Naas Road and provide a safe walkway for pedestrians along the main access road into the site.
- Ensure restricted access is maintained to the works.

The construction works will be hoarded off or fenced off from the public at all times. A 2.4 m minimum high plywood painted timber hoarding will be provided along the long-term boundaries at the entrance, and at other areas around the site where the perimeter fence/wall is not deemed sufficient for safety and security reasons. Heras type fencing will be used on short term site boundaries where appropriate to suit the works.

Controlled access points to the site, in the form of gates or doors/turnstiles, will be kept locked any time that these areas are not monitored (e.g., outside working hours). During working hours, a gates person will control traffic movements and deliveries at any active site access to ensure safe access and egress to and from site onto the public roads.

A Traffic Management Plan has been prepared by the contractor and will be agreed with Dublin City Council's Transportation Department and An Garda Síochána, to mitigate any impact of construction on the surrounding road network (Further details are provided in Chapter 13: Material Assets (Transportation) of this EIAR and in the Traffic Management Plan).

As detailed in Chapter 7: Land, Soil & Geology of this EIAR, there is no evidence of a significant soil hazard on site or requirement for dewatering of groundwater. Waste Acceptance Criteria (WAC) testing was carried out on soil samples. In RC-8 and W-2, the levels of sulphate, total dissolved solids, TPH and PAHs exceeded the inert waste WAC. However, all of the levels were less than the non-hazardous WAC. In BH-12, which was located on the southeast perimeter of the site TPH and mercury were detected above the inert waste WAC in the upper fill sample; however the levels of these parameters in the underlying fill and natural ground were less than the inert WAC.

Chapter 8: Water of this EIAR states that there is no potential for flooding and the proposed design incorporates attenuation measures to ensure development will not result in increased flooding off site. In order to mitigate the potential dust-related health impacts during the construction phase, a dust minimisation plan will be formulated. This plan will draw upon best practice mitigation measures from Ireland, the UK and the USA to ensure the highest level of mitigation possible. Further detail is provided in Chapter 9: Climate (Air Quality and Climate Change) of this EIAR.

Best practice noise and vibration control measures will be employed by the contractor during the construction phase in order to avoid significant impacts at the nearest sensitive buildings. The best practice measures set out in BS 5228 (2009) Parts 1 and 2 will be complied with. Further details are provided in Chapter 11: Air (Noise & Vibration).

5.6.1.2 Operational Stage

In light of the fact that any of the impacts associated with the operation of the Dublin Central Masterplan on Human Health and Population are either not significant or positive, no further mitigation measures are required. Notwithstanding the lack of need for mitigation measures, Section 11.6.2 of Chapter 11: Air (Noise & Vibration) of this EIAR outlines a number of noise mitigation measures which will further reduce the likely noise impacts arising from entertainment noise and internal building façade noise.

5.6.2 Proposed Development – Site 2 & No. 61 O'Connell Street Upper

5.6.2.1 Construction Stage

The mitigation measures of the Proposed Development are the same as the mitigation measures of the Dublin Central Masterplan described in Section 5.6.1.1.

5.6.2.2 Operational Stage

The mitigation measures of the Proposed Development are the same as the mitigation measures of the Dublin Central Masterplan described in Section 5.6.1.2.

5.7 RESIDUAL IMPACT

5.7.1 Dublin Central Masterplan

5.7.1.1 Construction Stage

5.7.1.1.1 Residual Impacts on Business and Residences

Taking into account the mitigation measures outlined in Section 5.6.6.1 it is predicted that there will be no likely significant effect with regard to the construction phase on business and residences.

5.7.1.1.2 Residual Impacts on Human Health from Air Quality

The greatest residual impact on air quality during the demolition and construction phase of the Dublin Central Masterplan is from construction dust emissions and the potential for nuisance dust. Taking into account the mitigation measures in Section 9.6 (and Appendix 9.2 'Dust Minimisation Plan') of this EIAR, there will be no residual impact to human health arising from air quality impact

5.7.1.1.3 Residual Impacts on Human Health from Noise & Vibration

The implementation of the mitigation measures outlined in Chapter 11 will aim to minimise impact of construction noise experienced at nearby sensitive receptors.

All commercial and residential receptors are predicted to have residual construction noise levels below the relevant noise criteria during general construction work activities and below the existing baseline noise levels. At all commercial and residential receptors there will be a **neutral, not significant** and **short-term** impact during general construction work activities.

During utilities and structural construction works at the closest commercial receptors (within 10m) there will be a **negative, slight to moderate** and **short-term** residual noise impact, which will decrease to **neutral, not significant** and **short-term** for all residential receptors and all commercial receptors outside of the closer range detailed above.

During the initial site work activities at the closest commercial receptors (within 10m) and the closest residential receptors (within 15m) there will be a **negative, moderate to significant** and **short-term** residual noise impact. At a 10 – 15m distance from the works this will decrease to a **negative, slight to moderate** and **short-term** noise impact. As the works move to a greater distance from the sensitive receptors there will be a **neutral, not significant** and **short-term** noise impact.

The closest clinical receptor is at 20m distance and there will be a **neutral, not significant** and **short-term** residual noise impact during all works activities at closest boundaries to the clinical receptors.

There are no predicted significant adverse impact arising from vibration during construction provided the relevant vibration mitigation detailed in Chapter 11 is implemented.

5.7.1.1.4 Residual Impacts on Local Amenities and Tourism

It is predicted that there will be no likely significant effect of the residual impacts of the construction of the Dublin Central Masterplan on material assets.

5.7.1.1.5 Residual Impacts from Additional Traffic & Roadworks

Taking into account mitigation measures outlined in Chapter 13: Material Assets (Transportation) it is predicted that the predicted residual impacts with regard to the construction phase on the local population is concluded to be **temporary, short-term, slight** and **negative**.

5.7.1.1.6 Unplanned Events / Impacts on Health and Safety

Taking into account the mitigation measures outlined in Section 5.6 it is predicted that there will be no likely significant effect arising from the predicted residual impacts with regard to the construction phase for unplanned events and human health and safety.

5.7.1.2 Operational Stage

5.7.1.2.1 Residual Impacts on Businesses and Residences

Taking into account the mitigation measures outlined in Section 5.6 the predicted residual impacts with regard to the operational phase on business and residences is concluded to be **positive** and **significant**.

5.7.1.2.2 Residual Impacts on Human Health from Air Quality

It is predicted that there will be no likely significant effect of the residual impact of air quality on Human Health.

5.7.1.2.3 Residual Impacts on Human Health from Noise & Vibration

Taking into account the mitigation measures and design recommendations outlined in Section 11.6 of Chapter 11: Air (Noise & Vibration) of this EIAR, there will be no residual impact to human health arising from noise and vibration impact.

5.7.1.2.4 Residual Impacts on Local Amenities and Tourism

It is predicted that there will be no likely significant effect of the residual impact of the operational phase of the Dublin Central Masterplan on local amenities and tourism.

5.7.1.2.5 Residual Impacts on Material Assets

It is predicted that there will be no likely significant effect of the residual impact of the operational phase of the Dublin Central Masterplan on material assets.

5.7.1.2.6 Residual Impacts from Additional Traffic

Taking into account the mitigation measures and design recommendations outlined in Section 13.6 of Chapter 13: Material Assets (Transportation) of this EIAR, there will be no residual impact to human health arising from noise and vibration impact.

5.7.1.2.7 Unplanned Events / Impacts on Health and Safety

It is predicted that there will be no likely significant effect of the residual impact of the operational phase of the Dublin Central Masterplan on unplanned events and human health and safety.

5.7.1.3 Worst Case Effect

The precautionary principle has been applied throughout this assessment.

5.7.2 Proposed Development – Site 2 & No. 61 O'Connell Street Upper

5.7.2.1 Construction Stage

The residual impacts of the Proposed Development are the same as the residual impacts of the Dublin Central Masterplan described in Section 5.7.1.1. Any differing sections are covered below.

5.7.2.1.1 Residual Impacts on Human Health from Noise and Vibration

The residual impacts on Human Health from Noise and Vibration of the Proposed Development are the same as the residual impacts of the Dublin Central Masterplan described in Section 5.7.1.1.3 with the exception of clinical receptors.

The closest clinical receptor is at 20m distance and there will be a **negative, not significant and short-term** residual noise impact during all works activities at closest boundaries to the clinical receptors.

5.7.2.2 Operational Stage

The residual impacts of the Proposed Development are the same as the residual impacts of the Dublin Central Masterplan described in Section 5.7.1.2.

5.7.2.3 Worst Case Impact

The precautionary principle has been applied throughout this assessment.

5.7.3 Cumulative

5.7.3.1 Construction Stage

The cumulative impact of other potential impacts on human health from air quality, noise quality and traffic have been incorporated into the various models and assessments that have contributed to Section 5.5 of this EIAR.

5.7.3.2 Operational Stage

The cumulative impact of other potential impacts on human health from air quality, noise quality and traffic have been incorporated into the various models and assessment that have contributed to Section 5.5 of this EIAR.

5.8 MONITORING

5.8.1 Dublin Central Masterplan

5.8.1.1 Construction Stage

A monitoring regime will be put in place to protect neighbours & neighbouring properties with a full and detailed vibration, noise, dust, and groundwater monitoring regime put in place for the duration of the works.

The Contractor will be obligated to work in compliance with the Outline Construction & Demolition Management Plan (C&D MP) which is submitted as part of this planning application. The Contractor will appoint a competent person to be referred to as the Surveying, Instrumentation and Monitoring Subcontractor (MSC) and together with them will prepare and maintain and the vibration, noise, dust and groundwater monitoring plan.

The MSC will be responsible for preparing or organizing the preparation of condition surveys of surrounding buildings, walls, hardstanding area etc. prior to the carrying out of any works on site. The condition surveys shall be carried out to a level of detail, suitable to the nature and extent of conditions encountered in order to obtain an understanding of the general structural condition of the property / structure and / or external environments.

Additional monitoring requirements are set out in Chapters 7: Land, Soil & Geology, 8: Water, 9: Climate (Air Quality and Climate Change), 10: Climate (Sunlight & Daylight), 11: Air (Noise & Vibration), 12: Landscape and Visual Impact Assessment and 13: Material Assets (Transportation) of this EIAR.

5.8.1.2 Operational Stage

No additional monitoring other than that which is set out in Chapters 7: Land, Soil & Geology, 8: Water, 9: Climate (Air Quality and Climate Change), 10: Climate (Sunlight & Daylight), 11: Air (Noise & Vibration), 12: Landscape and Visual Impact Assessment and 13: Material Assets (Transportation) of this EIAR required.

5.8.2 Proposed Development – Site 2 & No. 61 O'Connell Street Upper

5.8.2.1 Construction Stage

The monitoring requirements are the same as those of the Dublin Central Masterplan described in Section 5.8.1.1

5.8.2.2 Operational Stage

The monitoring requirements are the same as those of the Dublin Central Masterplan described in Section 5.8.1.2

5.9 REINSTATEMENT

This is not applicable to Chapter 5 of this EIAR.

5.10 DIFFICULTIES ENCOUNTERED

No difficulties were encountered during the drafting of this chapter.

7 LAND, SOIL & GEOLOGY

7.1 INTRODUCTION

This chapter of the Environmental Impact Assessment Report (EIAR) provides an assessment of the impact that the proposed mixed-use developments at the Dublin Central Masterplan and also at Site 2AB, Site 2C and No. 61 O'Connell Street Upper of Dublin Central will have on the surrounding soil and geology in the vicinity of the site. It also sets out mitigation and remedial measures and methods of monitoring once the development is operational.

A full description of the development can be found in Chapter 3: Description of Proposed Development of this EIAR.

This chapter was completed by Stephen Dent-Neville and Joe Gibbons of Waterman Moylan Consulting Engineers. Stephen is a Chartered Engineer with 8 years' experience and Joe is a Chartered Engineer with 35 years' experience.

7.2 ASSESSMENT METHODOLOGY

A desktop study to classify the geological features related to the site was undertaken. Data from the Geological Survey of Ireland (GSI) was reviewed, including the following maps:

- Bedrock Geology Map
- Bedrock Aquifer Map
- Ground Water Vulnerability Map

This information was supplemented by a review of geotechnical Site Investigations carried out within the Dublin Central site by Causeway Geotech between November 2022 and January 2023 (Appendix 8.2), and geotechnical Site Investigations carried out by IGSL in 2008 (Appendix 8.1). These comprehensive ground investigations assessed the soil, rock and groundwater conditions across the site and included boreholes, rotary coreholes, piezometers, geophysical surveys, permeability testing and laboratory testing of selected soil and rock samples. Both Site Investigation reports are appended to this EIAR.

Furthermore, a Basement Impact Assessment has been prepared and is appended to this EIAR (Appendix 8.3). The Basement Impact Assessment includes Ground Movement Assessments and modelling, and the results of the modelling have been used to inform this EIAR.

7.3 RECEIVING ENVIRONMENT

The subject development is located in Dublin City Centre. The overall Dublin Central Masterplan site is bounded by Henry Street to the south, O'Connell Street Upper to the east, Parnell Street and O'Rahilly Parade to the north-east and north-west respectively, and Moore Street to the west. Topographic survey data shows that the subject site and the surrounding roads are generally flat, at a level of between 4.85m OD Malin and 5.40m OD Malin.

The site is a brownfield site, comprising of numerous buildings including various retail units, restaurants, offices, and derelict buildings. The subject development will involve a complete redevelopment of the site, though several protected buildings and façades are to be retained, rejuvenated and incorporated into the scheme.

The baseline conditions associated with the Dublin Central Masterplan area are considered to be the same for the individual sites which are subject to this planning application (i.e. Site 2AB, Site 2C and O'Connell Street Upper).

7.3.1 Desktop Study

Geological Survey Ireland (GSI) produces a wide range of datasets, including bedrock geology mapping, extracted in the Figure below.

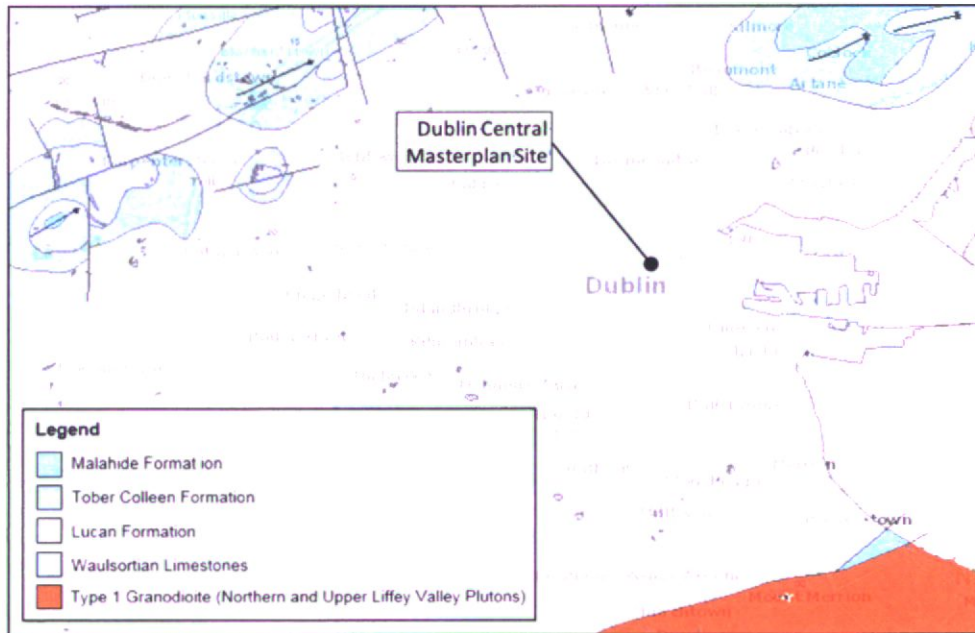


Figure 7.1: Extract from GSI Bedrock Geology Map

The bedrock geology map indicates that most of Dublin City Centre, including the subject site, lies within the Lucan Formation. This formation comprises dark-grey to black, fine-grained, occasionally cherty, micritic limestones that weather paler, usually to pale grey. There are rare dark coarser grained calcarenitic limestones, sometimes graded, and interbedded dark-grey calcar.

The National Aquifer Bedrock Map prepared by the Geological Survey of Ireland was consulted and is extracted below. From this map, it was established that the entirety of the site is within the designation LI, which represents locally important moderately productive aquifer.

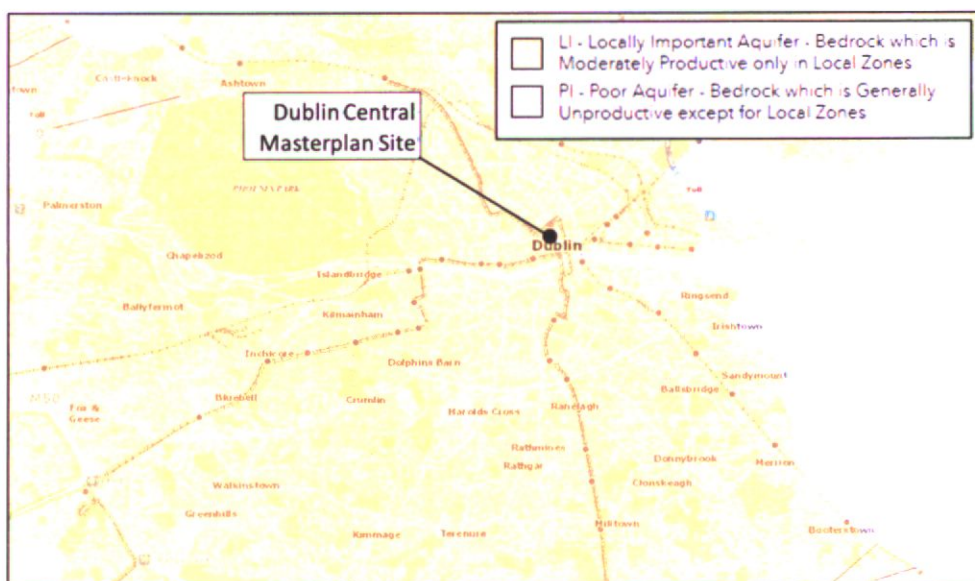


Figure 7.2: Extract from GSI Groundwater Aquifer Map

The vulnerability of the groundwater in the vicinity of the subject site was also examined by referencing the Geological Survey of Ireland, and it was established that the vulnerability of the aquifer is low.

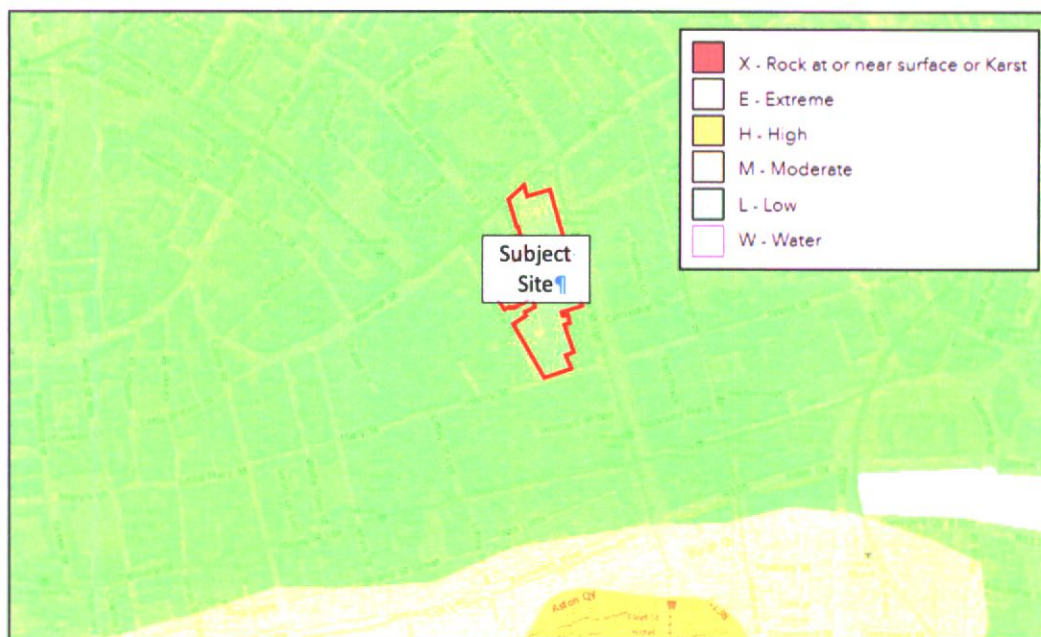


Figure 7.3: Extract from GSI Groundwater Vulnerability Map.

7.3.2 Ground Investigations

7.3.2.1 Causeway Geotech Ground Investigations

Intrusive ground investigations were carried out at the site between November 2022 and January 2023 by Causeway Geotech. The scope of the site investigation works carried out at the site comprised the following:

- 9no. boreholes by sonic drilling techniques. The boreholes were completed using a Fraste CRS XL Duo rubber-tracked sonic drilling rig.
- Standpipe installations in the 9no. boreholes.
- 3no. step tests and 1no. continuous rate pump test (CRT) were undertaken after the installation of a 100mm groundwater well.
- Monitoring of nearby standpipes was carried out using manual dip-meters and digital data loggers to measure “drawdown” of the groundwater during tests.
- Laboratory testing, which included: -
 - Moisture content measurement.
 - Atterberg Limit tests.
 - Particle size distribution analysis.
 - Soil Chemistry – BRE suites B and D.
 - Testing was carried out for a range of determinants, including metals, Speciated total petroleum hydrocarbons (TPH), Speciated polycyclic aromatic hydrocarbons (PAH), BTEX compounds, Polychlorinated biphenyls (PCBs), Phenols, Organic matter, Cyanides, Asbestos screen, Sulphate and sulphide, pH, and Waste acceptance criteria (WAC).

A summary of the ground types encountered in the exploratory holes is listed below, in approximate stratigraphic order:

- Paved surface: DC-BH105-108 and DC-BH110 encountered 100-250mm of concrete surfacing. In addition, DC-BH103 encountered 70mm of bitmac surfacing.
- Made Ground (fill): reworked sandy gravelly clay/silt or sandy clayey gravel or gravelly clayey sand fill encountered across the site to a maximum depth of 4.90m in BDC-BH102. Anthropogenic material comprising varying fragments of red brick, concrete, wood, steel, rebar and plastic was encountered across the site within the made ground.
- Fluvio-glacial deposits: typically medium dense to dense sands and gravels with varying cobble content encountered across the site to a maximum depth of 21.10m in DC-BH104 generally overlying glacial till.
- Glacial Till: sandy gravelly clay, frequently with low cobble content, generally stiff underlying fluvio-glacial deposits and overlying bedrock to a maximum depth of 23.25m in DC-BH104.
- Bedrock (Limestone): Extremely weak to medium strong grey limestone encountered at depths ranging from 14.65m in DC-BH108 to 23.25m in DC-BH104.

Groundwater was encountered during drilling as water strikes at depths of 5.00 and 20.50m in the borehole south of O'Rahilly Parade (DC-BH-103). Groundwater was not noted during drilling at any of the other borehole locations. However, it should be noted that the casing used in supporting the borehole walls during drilling may have sealed out any or additional groundwater strikes and the possibility of encountering groundwater at other depths during excavation works should not be ruled out.

It should be noted that any groundwater strikes within the overburden and bedrock may have been masked by the fluid used as the drilling flush medium. Seasonal variation in groundwater levels should also be factored into design considerations and continued monitoring of the two installed standpipes will give an indication of the seasonal variation.

7.3.2.2 IGSL Ground Investigations

Intrusive ground investigations were carried out at the site in 2008 by IGSL. The scope of the site investigation works carried out at the site comprised the following:

- 10no. shell and auger boreholes on an approximately 50m grid spacing across the site. The boreholes were taken to refusal in dense gravel or very stiff to hard boulder clay over rock.
- 13no. rotary coreholes on taken a minimum of 10m into rock to depths of 30-37m using a special triple-tube coring system with a polymer gel drilling fluid to maximise core recovery in very stiff to hard boulder clay and weathered rock.
- Sealed piezometers in soil and rock to observe groundwater levels across the site and any variations in water level between the gravel aquifer and the bedrock. A total 20no. piezometers were installed in 11no. locations (with multiple piezometers in some boreholes).
- 2no. wells and 2no. observation wells for pump tests were installed in the centre of the site for the purpose of measuring the mass permeability of the gravel and the bedrock.
- In-situ SPT tests and variable head permeability testing in boreholes.
- In-situ packer testing in rotary coreholes to assess the permeability of the rock.
- Downhole optical and acoustic imaging of rock coreholes to determine the in situ characteristics of the rock discontinuities such as joints and fractures to assess the stability of rock slopes and the variability in rock quality and type with depth.
- 2-D geophysical profiles around the perimeter of the excavation to obtain a continuous profile of soil and rock along the line of retaining walls and to obtain advanced parameters for numerical modelling of excavation support systems. This consisted of 2-D seismic

refraction surveys and shear velocity (MASW) surveys carried out to an effective depth of 30m. A 2-D Resistivity survey was also carried out through the centre of the site.

- 9no. trial pits carried out at the Nos. 40 – 41 O'Connell Street site to investigate the foundations of existing buildings for underpinning design.
- Laboratory classification and strength testing. This included: -
 - Moisture content and Atterburg limit tests.
 - Particle size distribution tests – wet sieve and hydrometer.
 - Consolidated Undrained Triaxial tests.
 - Bender Element Tests carried out by a specialist laboratory to obtain the small strain stiffness of the boulder clay.
 - pH, sulphate and chloride tests.
 - Uniaxial compressive strength and point load index tests on rock.

Borehole locations are indicated on the Figure below: -

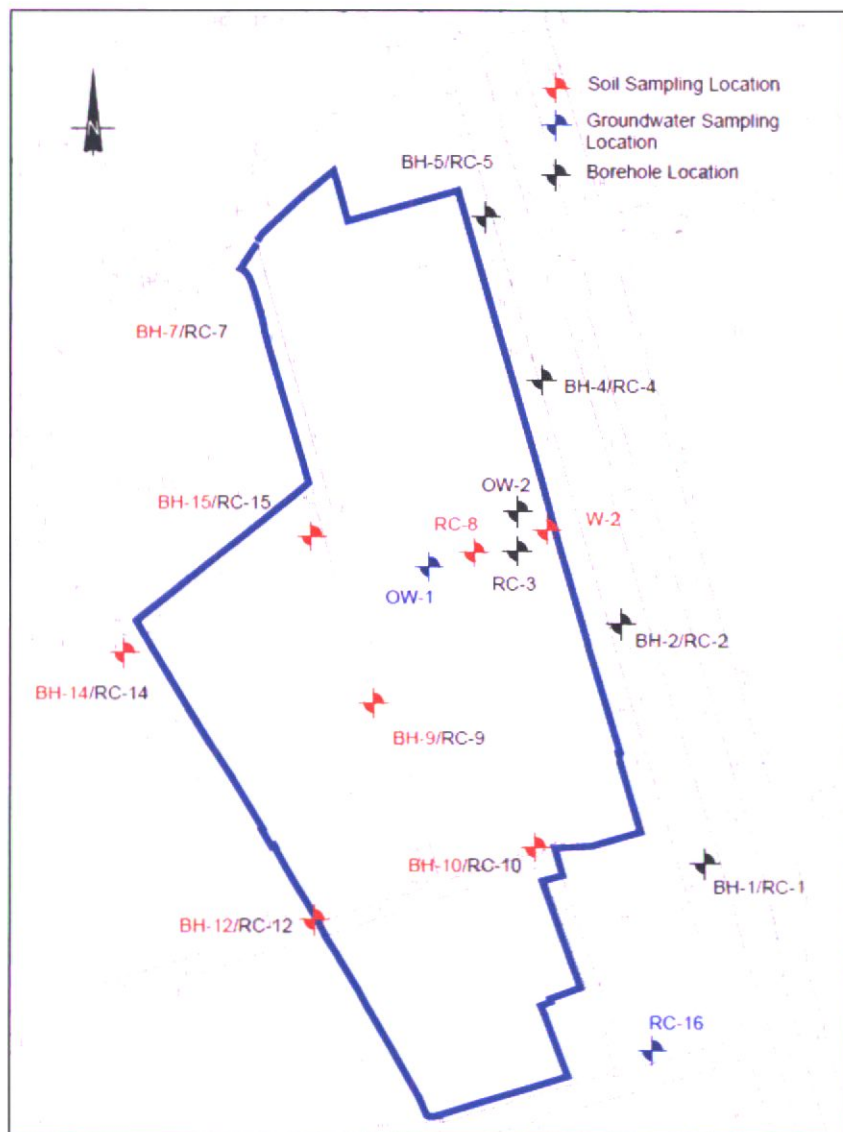


Figure 7.4: Site Investigation Locations

The ground conditions encountered during the site investigations included made ground immediately below the ground surface between 2m to 5m deep. It was found to be predominantly a gravel with varying proportions of silt, sand and clay. It was also found to be highly variable in strength and stiffness.

Gravel was generally encountered below the fill material, with a high degree of variability in thickness, ranging from about 6m to 21m but thinning out to less than 1m at the corner of Moore Street and Henry Place. The gravel is a medium dense to dense sandy gravel with cobbles and boulders and occasional layers of sand and silt.

The gravel is underlain by Boulder Clay at a depth of 13m to 16m below ground level. The boulder clay is typically a stiff, very stiff or hard stony fine-grained soil which contains varying amounts of gravel, cobbles and boulders. However, some seams of boulder clay were encountered in the gravel at higher levels, and locally at Nos. 40 – 41 O'Connell St. the depth to the top of the Boulder Clay drops to 23.5m. The gravel and boulder clay deposits are water bearing, although the gravel deposits would have a significantly higher permeability.

Bedrock was encountered at depths that varied between 17 and 27m below ground level and comprised interbedded Limestone and Shale with strengths in the range of moderately weak to strong. A thin layer of weathered rock up to 1m thick was occasionally encountered at the upper surface of the bedrock. Weathered seams were also encountered with the Limestone and the Shale.

Waste Acceptance Criteria (WAC) testing was carried out on soil samples. In RC-8 and W-2, the levels of sulphate, total dissolved solids, TPH and PAHs exceeded the inert waste WAC. However all of the levels were less than the non-hazardous WAC. In BH-12, which was located on the southeast perimeter of the site TPH and mercury were detected above the inert waste WAC in the upper fill sample; however the levels of these parameters in the underlying fill and natural ground were less than the inert WAC.

There was no evidence of significant contamination in any of the other samples and the tested parameters, where detected, are at levels generally below the inert WAC.

The groundwater table was found to be between +0.1 and +0.5m OD Malin, within the overburden and the bedrock. Groundwater samples were collected from four groundwater monitoring wells (OW-1 Subsoils, OW-1 Bedrock, RC-16 Subsoils and RC-16 Bedrock) and sent to the STL laboratory in Santry for analysis.

The range of parameters tested included dissolved metals (arsenic, antimony, barium, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel, tin and zinc), sodium, chloride, potassium, magnesium, sulphate, sulphide, total hardness, bicarbonate, TPH, BTEX and PAH.

Elevated PAH levels were detected in the groundwater wells immediately to the south but not within the portion of the site where deep excavation will occur.

7.4 CHARACTERISTICS OF PROPOSED DEVELOPMENT

7.4.1 Dublin Central Masterplan

The Dublin Central Masterplan is divided into seven sites. The overall development site is bounded by Henry Street to the south, O'Connell Street Upper to the east, Parnell Street and O'Rahilly Parade to the north-east and north-west respectively, and Moore Street to the west. The development is a mixed-use development, and includes office, hotel, residential, café / restaurant and retail spaces. There is also provision made in Site 2AB and Site 2C for a proposed Metrolink station, to be implemented separately by Transport Infrastructure Ireland (TII).

A breakdown of the schedule of accommodation is shown in the Table below: -

Site	Office	Hotel	Residential	Retail	Café/ Restaurant	Gym/ Studio	Cultural/ Gallery/ Café	Extension to National Monument	Site Enabling Works	Total
Site 1	3,610.0m ²	8,094.4m ²	-	-	-	-	-	-	-	11,704.4m ²
61 O'CSU	-	-	294.0m ²	-	52.0m ²	206.0m ²	-	-	-	552.0m ²
Site 2AB	16,804.0m ²	-	-	1,810.4m ²	1,705.5m ²	-	-	-	2,387.6m ²	22,707.5m ²
Site 2C	16,910.0m ²	-	-	812.0m ²	437.0m ²	-	-	-	7,424.0m ²	25,583.0m ²
Site 3	-	7,175.3m ²	6,451.5m ²	1,954.1m ²	138.1m ²	-	123.4m ²	-	-	15,842.4m ²
Site 4	295.0m ²	-	1,454.0m ²	617.0m ²	864.0m ²	-	-	60.0m ²	-	3,290.0m ²
Site 5	5,798.9m ²	-	-	-	679.0m ²	-	-	-	-	6,477.9m ²
Total	43,417.9m²	15,269.7m²	8,199.5m²	5,193.5m²	3,875.6m²	206.0m²	123.4m²	60.0m²	9,811.6m²	86,157.2m²

Table 7.1: Schedule of Accommodation by Application

The blocks which form the sites of the Dublin Central Masterplan are highly interconnected, and as such a holistic approach has been taken in preparing this EIAR.

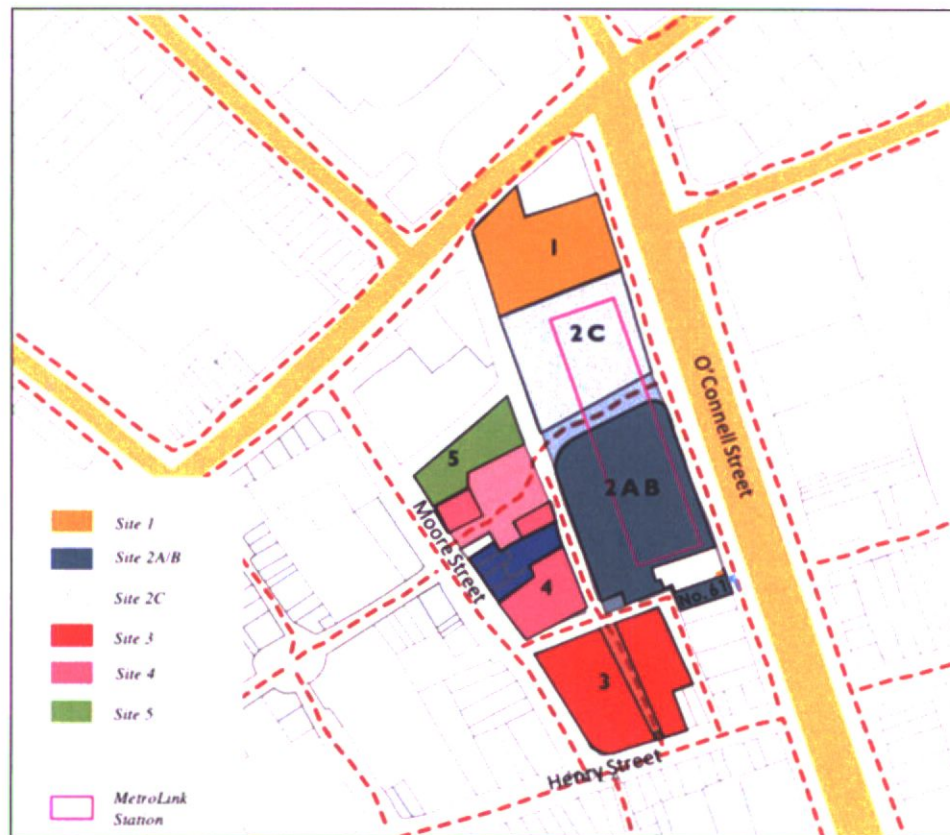


Figure 7.5: Dublin Central Masterplan with each site identified.

7.4.2 Proposed Development – Site 2 & No. 61 O'Connell Street Upper

The proposed development includes provision of a new street connecting O'Connell Street and Moore Lane, with Site 2C to the north and Site 2AB to the south of this new street. No. 61 O'Connell Street Upper, to the south of Site 2AB, is also included.

7.4.2.1 Site 2AB

Site 2AB is a mixed use scheme accommodating office, retail and café/restaurant uses in 1no. block ranging in height from 2 to 6 storeys over a new single storey combined basement with Phase 2C. Site 2AB also includes provision of a new pocket square.

7.4.2.2 Site 2C

Site 2C accommodates office, retail and café/restaurant uses in a single block, with the Site 2 block ranging in height from 5 to 8 storeys over a new single storey combined basement with Phase 2AB.

7.4.2.3 No. 61 O'Connell Street Upper

It is proposed to carry out refurbishment work to No. 61 O'Connell Street Upper. The proposed refurbishment comprises residential accommodation over 4-storeys, all over the existing single-storey basement. A new pedestrian through-route is proposed at ground floor, linking between O'Connell Street Upper and Henry Place/Moore Lane. A café/restaurant and a retail kiosk are proposed at ground floor level. An external area to the rear will replace the existing single-storey extension, to provide cycle and refuse storage areas.

7.4.2.4 Metro Enabling Works

TII is expected to make an application for a Railway Order for the MetroLink project, including a future MetroLink Station serving O'Connell Street within the Dublin Central site.

The Dublin Central proposed development accommodates a structural box beneath the ground floor level that has been designed to accommodate the independent construction and operation of the planned O'Connell Street MetroLink Station by TII, including provision of the structural envelope and co-ordinated voids to accommodate station entrances, ventilation and fire escape shafts through this part of the Dublin Central proposed development. These ensure that the Dublin Central proposed development is structurally independent of, and not prejudicial to, the MetroLink project.

This application does not include any request for permission for railway works, the use of railway works or the operation of a railway. The MetroLink project will be the subject of a separate application for railway order to be made by TII. In the event that MetroLink project is delayed or does not proceed, the Dublin Central proposed development can be completed, occupied and used regardless. The Dublin Central proposed development is not dependent on the MetroLink project in any way, whether functionally or otherwise. The MetroLink project is not, therefore, part of the project the subject of this EIAR. The description of the likely significant effects on the environment of the Dublin Central proposed development within this EIAR is not required to include effects on the environment resulting from the cumulation of effects with the MetroLink project.

This EIAR describes, in outline, the likely evolution of the current state of the environment (the baseline scenario), both with and without the MetroLink project. This outline has been completed with reasonable effort on the basis of available information, at the date of this application. For this purpose, the potential for the Dublin Central proposed development to impact on a future environment that includes the MetroLink project has been carefully considered, by the Applicant and TII. The MEW has been designed and incorporated to the Dublin Central proposed development to ensure that it is structurally independent of, and not prejudicial to, the MetroLink project. It follows that the Dublin Central proposed development is not likely to have any significant impact on the MetroLink project to report within this EIAR, or any different effect on the environment, after its evolution to include the MetroLink project.

The likely evolution of the current state of the environment (the baseline scenario) with the MetroLink project involves the excavation of material for construction of the intended station and railway line. The Dublin Central proposed development is not likely to have any significant impact on the MetroLink project to report within this EIAR, or any different effect on the environment, after its evolution to include the MetroLink project.

7.4.2.5 Public Realm Works

The subject Site 2 application includes public realm works to Henry Place, Moore Lane and O'Rahilly Parade, and road opening will be required at Parnell Street to facilitate drainage connection to the existing surface water network.

The proposed development of Site 2AB, Site 2C and No. 61 O'Connell Street Upper, including associated Metro Enabling Works and Public Realm Works, with respect to soils and geology, includes the following characteristics: -

- Excavation of basements and foundations, including the Metro Enabling Works excavation.
- Excavation of drainage sewers and utilities.
- Minor regrading and landscaping.
- Disposal of any surplus excavated soils including any contaminated material.

7.5 POTENTIAL IMPACTS

7.5.1 Dublin Central Masterplan

7.5.1.1 Construction Stage

The interaction between the proposed Dublin Central development (Site 2) and the neighbouring properties within the zone of influence of the scheme has been reviewed as part of a Ground Movement Assessment (GMA) study, presented in full in the Basement Impact Assessment report, which accompanies this submission under separate cover.

The proposed works, in relation to lands, soils and geology, primarily involve the demolition of a number of existing buildings present across the site, the excavation of basements and the excavation of an approximately 25m deep box as part of the Metro Enabling Works to facilitate a future O'Connell Street Metro Station.

The potential impact/damage induced on primary façade/wall elements of the buildings surrounding the proposed scheme have been evaluated on the basis of the calculated ground movement fields. Each wall has been assumed to behave as an equivalent beam subject to a bending and extension/compression deformation mechanism, based on the evaluated greenfield ground movement. The results of the assessment found that the demolition stage will result in negligible impacts, with very slight impacts during excavation. The full modelling and results are set out in the Basement Impact Assessment, which accompanies this submission under separate cover.

The removal of structures and ground bearing concrete slabs/paving and other earthworks together with the construction of roads/paving, services and buildings, in particular basements and foundations, will expose subsoil to weathering and may result in the erosion of soils during adverse weather conditions. Surface water runoff from the surface of the excavated areas may result in silt discharges to the drainage network or overland and ultimately to the River Liffey.

Dewatering in order to construct the Metro box could reduce the surrounding water table resulting in shrinkage of the soil and induce settlement in the neighbouring buildings.

Excavations for foundations, remaining roadworks and services will result in a surplus of subsoil. Surplus subsoil will be used in fill areas where applicable. Significant excavation is required to facilitate the Metro Enabling Works, which involves excavation of an approximately 25m deep box.

Dust from the site and from soil spillages on the existing road network around the site may be problematic, especially during dry conditions.

Accidental oil or diesel spillages from construction plant and equipment, in particular at refuelling areas, may result in oil contamination of the soils and underlying geological structures.

During excavation works, especially in public roads around the Dublin Central Site there is a potential impact upon existing buried services. Damage could be caused to the services resulting in a loss of supply to the surrounding properties.

7.5.1.2 Operational Stage

During the operational stage of the development, it is not envisaged that there will be any ongoing impacts on the underlying soil as a result of the proposed development.

Once the metro box is constructed it may impact upon the groundwater movement and there may be a rise in water table.

7.5.1.3 Do-Nothing Impact

There is no impact on the soils and geology in the do-nothing scenario.

7.5.2 Proposed Development – Site 2 & No. 61 O'Connell Street Upper

7.5.2.1 Construction Stage

The potential impacts of the Proposed Development (Site 2AB, Site 2C and No. 61 O'Connell Street Upper, including associated Metro Enabling Works and Public Realm Works) are the same as the potential impacts of the Dublin Central Masterplan described in Section 7.5.1.1.

7.5.2.2 Operational Stage

The potential impacts of the Proposed Development (Site 2AB, Site 2C and No. 61 O'Connell Street Upper, including associated Metro Enabling Works and Public Realm Works) are the same as the potential impacts of the Dublin Central Masterplan described in Section 7.5.1.2.

7.5.2.3 Do-Nothing Impact

The do-noting impact of the Proposed Development (Site 2AB, Site 2C and No. 61 O'Connell Street Upper, including associated Metro Enabling Works and Public Realm Works) is the same as the do noting impact of the Dublin Central Masterplan described in Section 7.5.1.3.

7.6 MITIGATION MEASURES (AMELIORATIVE, REMEDIAL OR REDUCTIVE MEASURES)

7.6.1 Dublin Central Masterplan

7.6.1.1 Construction Stage

7.6.1.1.1 General Measures

The construction of the proposed underground MEW will require significant volumes of soil to be removed from the site. It is estimated that the volume of material to be exported off site for the MEW will be 108,323m³.

A further approximately 25,242m³ of material will be required to be excavated and removed from the site for the Site 2 basement, foundations, and utilities (133,565m³ in total for Site 2), with a further approximately 29,925m³ for the basement, foundations, and utilities at other sites in the development. Thus, the cumulative volume of material to be exported off site for the overall Dublin Central Masterplan, including the MEW, is estimated to be 163,490m³.

A detailed Construction Traffic Management Plan will be prepared in conjunction with the roads and traffic departments at Dublin City Council. In this regard a preliminary Construction Traffic Management Plan has been prepared in consultation with Dublin City Council for the overall Masterplan and this will be used by the appointed contractor as a guide to acceptable traffic routes for construction traffic. All excavated material from the site which is to be removed shall be disposed of in an approved licensed land fill. The nearest approved licensed land fill which has capacity (at the time of writing) to receive the excavated material from this site is located at Balrath, Co Meath.

Where contaminated soils are encountered during the works, they will be excavated and disposed of off-site in accordance with the Waste Management Acts, 1998-2006, and associated regulations and guidance provided in Guidelines for the Management of Waste from National Road Construction Projects published by the National Roads Authority in 2008.

The provision of wheel wash facilities at the construction entrances to the development will minimise the amount of soils deposited on the surrounding road network. The adjoining road network will be cleaned on a regular basis, as required, to prevent the build-up of soils from the development site on the existing public roads.

Measures will be implemented throughout the construction stage to prevent contamination of the soil and adjacent watercourses from oil and petrol leakages. Suitable bunded areas will be installed for oil and petrol storage tanks. Designated fuel filling points will be put in place with appropriate oil and petrol interceptors to provide protection from accidental spills. Refuelling will be restricted to these allocated re-fuelling areas. This area is to be an impermeable bunded area designed to contain 110% of the volume of fuel stored.

During excavation works, temporary sumps will be used to collect any surface water run-off thereby avoiding of standing water within the basement and other excavations.

Silt traps, silt fences and tailing ponds will need to be provided by the contractor where necessary to prevent silts and soils being washed away by heavy rains during the course of the construction stage. Surface water runoff will be discharged via a silt trap / settlement pond to the existing combined drainage system which discharges to the Dublin Wastewater Treatment Plant at Ringsend.

During construction it is proposed that de-watering of the excavations (including the Metro Box) will be discharged back to ground. A series of well will be drilled around the outside perimeter of the Metro Box excavation and water pumped from the excavation will be discharged back to these wells. In advance of discharge to the wells the pumped water will be passed through a settlement tank to avoid silts/pollutants being pumped into the ground water aquifer. Water discharged back to ground will be regularly monitored and tested to ensure that the quality of the water is satisfactory for discharge back to ground.

Dampening down measures with water sprays will be implemented during periods of dry weather to reduce dust levels arising from the development works.

In advance of carrying out any excavation works in public road or in any location where there is likely to be underground services, the appointed contractor shall in the first instance obtain all record drawings from the statutory providers for the existing services. A CAT scan shall be undertaken to identify the location of the services and where deemed necessary slit trenches shall be carefully excavated to locate the exact position of the existing underground services.

After implementation of the above measures, the proposed development will not give rise to any significant long term adverse impact. Moderate negative impacts during the construction stage will be short term only in duration.

A Construction Management Plan, Traffic Management Plan and Waste Management Plan will be implemented by the contractor during the construction stage to control the above remedial measures.

7.6.1.1.2 Metro Enabling Works

The final construction sequence for the Metro Enabling Works (MEW) will be based on the contractor's preferred method. However, the typical construction sequence will involve the construction of a shallow guide wall to maintain the setting out and verticality of the main wall. Panels of the diaphragm wall will then be excavated using cutting or grabbing machinery. Based on the depth to the Calp Limestone formation, and the proposed levels of the station box, it is assumed a proportion of the excavation will be within the rock, and therefore a hydraulic cutting machine is likely to be used.

In order to support the sides of the excavation prior to concreting, Bentonite will be pumped into the excavation, which will exert a hydraulic pressure against the trench walls and prevent collapse of the side. The bentonite fluid will be mixed and stored on site and re-used across multiple excavations.

Reinforcement is to be prefabricated on site and then positioned in the bentonite-filled trench. The connection points for the curved base slab, and the slabs at the mezzanine, concourse, and capping slab levels can be blocked out within the reinforcement cage to allow for connection at the relevant point of the construction sequence. Concrete will then be poured into the trench, typically through tremie pipes that extend to the bottom of the trench and fill from the bottom up. The support fluid will be displaced as the concrete is pumped into the trench and can be re-used in other excavations for the wall.

The MEW construction has been considered as a bottom-up construction, where the excavation will be advanced down to the lowest level, with the structure then being constructed from this bottom level. In the permanent condition, the reinforced concrete slabs will act as permanent props between the diaphragm walls to resist lateral pressures. In the temporary condition, horizontal props will be installed successively as excavation progresses downwards.

Once bottomed out, the new lowest-level slab can be cast, and work will proceed upwards, with the temporary props being removed once the concrete slabs have reached the desired strength at each level. This will continue until the basement MEW works are complete.

To the east and west of the MEW, a piled wall is to be installed to support the transfer structures bridging over the station box, which in turn will support the proposed Block 2AB and Block 2C superstructures above.

It is critical that the permanent and temporary works designs are carried out in a coordinated manner between performance specified elements and substructure contractors, to ensure that such design elements are in alignment with the assumptions and findings of the Ground Movement Assessment and overall design intent.

7.6.1.2 Operational Stage

No mitigation measures for soils or geology will required during the operational stage.

7.6.2 Proposed Development – Site 2 & No. 61 O'Connell Street Upper

7.6.2.1 Construction Stage

The mitigation measures for the Proposed Development (Site 2AB, Site 2C and No. 61 O'Connell Street Upper, including associated Metro Enabling Works and Public Realm Works) are the same as the mitigation measures set out for the Dublin Central Masterplan described in Section 7.6.1.1.

7.6.2.2 Operational Stage

No mitigation measures for soils or geology will required during the operational stage.

7.7 RESIDUAL IMPACT

7.7.1 Dublin Central Masterplan

7.7.1.1 Construction Stage

With the protective measures noted above in place during excavation works, any potential impacts on soils and geology in the area will be minimised.

The proposed development will result in a surplus of excavated material, which may contain contaminants. Any contaminated material will be exported to an approved licensed waste facility.

No significant adverse impacts on the soils and geology of the subject lands are envisaged.

7.7.1.2 Operational Stage

During the operational stage, the buildings and public realm will be an urban environment, largely covered in roof and hard standing. Some areas with permeable paving, tree pits and green planting will allow for some surface water to permeate the soil. These SuDS devices treat and improve water quality by trapping suspended solids and filtering pollutants before they enter the soil.

No likely significant adverse impacts are predicted on soils or geology.

7.7.1.3 Worst Case Impact

The worst case scenario would be for contaminated soils to be encountered during the works. As noted above, any contaminated soils encountered will be excavated and disposed of off-site in accordance with the Waste Management Acts, 1998-2006, and associated regulations and guidance provided in Guidelines for the Management of Waste from National Road Construction Projects published by the National Roads Authority in 2008.

There may be disruption to existing services supplying adjacent properties should damage be caused to the service during excavation works.

In the worst case scenario, subsoil may be exposed to inclement weather during construction and may result in the erosion of soils. However, with the proposed mitigation measures the quantity of soils exposed and the duration of that exposure will be minimised.

7.7.2 Proposed Development – Site 2 & No. 61 O'Connell Street Upper

7.7.2.1 Construction Stage

The residual impacts for the Proposed Development (Site 2AB, Site 2C and No. 61 O'Connell Street Upper, including associated Metro Enabling Works and Public Realm Works) are the same as the residual impacts described for the Dublin Central Masterplan described in Section 7.7.1.1.

7.7.2.2 Operational Stage

The residual impacts for the Proposed Development (Site 2AB, Site 2C and No. 61 O'Connell Street Upper, including associated Metro Enabling Works and Public Realm Works) are the same as the residual impacts described for the Dublin Central Masterplan described in Section 7.7.1.2.

7.7.2.3 Worst Case Impact

The worst case impact for the Proposed Development (Site 2AB, Site 2C and No. 61 O'Connell Street Upper, including associated Metro Enabling Works and Public Realm Works) are the same as the worst case impact described for the Dublin Central Masterplan described in Section 7.7.1.3.

7.8 MONITORING

7.8.1 Dublin Central Masterplan

7.8.1.1 Construction Stage

Monitoring during the construction stage is recommended, in particular in relation to the following:

- Adequate protection from contamination of soils for removal.
- Monitoring of surface water discharging to the existing drainage network.

- Monitoring and testing of water from de-watering which will be pumped back to ground.
- Monitoring cleanliness of the adjoining road network.
- Monitoring measures for prevention of oil and petrol spillages.
- Dust control by dampening down measures close to the boundaries of the site, when required due to unusually dry weather conditions.

7.8.1.2 Operational Stage

During the operational stage, the surface water network (drains, gullies, manholes, AJs, SuDS devices, attenuation system) will need to be regularly maintained and where required cleaned out. A suitable maintenance regime of inspecting and cleaning should be incorporated into the safety file/maintenance manual for the development.

7.8.2 Proposed Development – Site 2 & No. 61 O'Connell Street Upper

7.8.2.1 Construction Stage

The monitoring for the Proposed Development (Site 2AB, Site 2C and No. 61 O'Connell Street Upper, including associated Metro Enabling Works and Public Realm Works) is the same as the monitoring for the Dublin Central Masterplan described in Section 7.8.1.1.

7.8.2.2 Operational Stage

The monitoring for the Proposed Development (Site 2AB, Site 2C and No. 61 O'Connell Street Upper, including associated Metro Enabling Works and Public Realm Works) is the same as the monitoring for the Dublin Central Masterplan described in Section 7.8.1.2.

7.9 REINSTATEMENT

7.9.1 Dublin Central Masterplan

Trenches opened during construction will be backfilled with subsoil to reinstate existing ground levels. Upon completion no impact is foreseen.

7.9.2 Proposed Development – Site 2 & No. 61 O'Connell Street Upper

The reinstatement for the Proposed Development (Site 2, including associated Metro Enabling Works and Public Realm Works) is the same as the reinstatement for the Dublin Central Masterplan described in Section 7.9.1.

7.10 DIFFICULTIES ENCOUNTERED

There were no difficulties encountered when undertaking this assessment.

8 WATER

8.1 INTRODUCTION

This chapter of the Environmental Impact Assessment Report (EIAR) provides an assessment of the impact that the proposed mixed-use developments at the Dublin Central Masterplan and also at Site 2AB, Site 2C and No. 61 O'Connell Street Upper of Dublin Central will have on the network of water (water supply, foul drainage, surface water) in the vicinity of the site. It also sets out mitigation and remedial measures and methods of monitoring while the development is operational.

A full description of the development can be found in Chapter 3: Description of Proposed Development of this EIAR.

This chapter was completed by Stephen Dent-Neville and Joe Gibbons of Waterman Moylan Consulting Engineers. Stephen is a Chartered Engineer with 8 years' experience and Joe is a Chartered Engineer with 35 years' experience.

8.2 ASSESSMENT METHODOLOGY

8.2.1 Water Supply

Research for this section included a review of the existing watermain layout from Irish Water / Dublin City Council records for the area.

8.2.2 Foul Water Drainage

Research for this section included a review of the existing foul water layout from Irish Water / Dublin City Council records for the area.

8.2.3 Surface Water Drainage

Research for this section included a review of Ordnance Survey and Topographical surveys of the subject site and surrounding area and a review of the existing surface water layout from Irish Water / Dublin City Council records for the area.

8.2.4 Groundwater

Datasets produced by Geological Survey Ireland (GSI) were reviewed to establish existing groundwater conditions in the vicinity of the site. A-squared Studio Engineers Ltd. were appointed to support the geotechnical and substructure engineering scope relating to the proposed development, including a Barrier Effect Study incorporating Ground Modelling and a Groundwater Seepage Assessment.

8.3 RECEIVING ENVIRONMENT

8.3.1 Water Supply

There are a number of existing interconnected water supply mains in the vicinity of the Dublin Central Masterplan site, including: -

- A 200mm ductile iron main in Moore Street, constructed in 1986.
- A 350mm ductile iron main in Parnell Street, constructed in 1986.
- A 250mm ductile iron main on the western side of O'Connell Street Upper, constructed in 2006.
- A 12-inch (c. 300mm) cast iron main on the northern side of Henry Street, constructed in 1900.

- A 6-inch (c. 150mm) cast iron main on the southern side of Henry Street, constructed in 1900.
- A 125mm HDPE main in Henry Place, constructed in 2019.
- A 4-inch (c. 100mm) cast iron main in Moore Lane, constructed in 1900.
- A 110mm HPPE main in O'Rahilly Parade, constructed in 2007.

Existing buildings at the subject site are currently fed water by various connections to this existing network.

8.3.2 Foul Water Drainage

The drainage network surrounding the Dublin Central Masterplan site consists of combined foul and surface water sewers. There are a number of existing combined sewers in the vicinity of the subject Dublin Central Masterplan site, including: -

- A brick sewer conveying flows in a southerly direction along Moore Street, varying in size from 2220mm x 1200mm at Parnell Street to the north to 2160mm x 1230mm at Henry Street to the south.
- This brick sewer continues east along Henry Street, where it reduces in size to 1860mm x 730mm.
- A brick sewer conveying flows in a southerly direction along O'Connell Street Upper, varying in size from 1670mm x 970mm near the north-east corner of the site to 2200 x 760 near the south-eastern corner, where it connects with the sewer coming from Henry Street and both continue east away from the site along North Earl Street.
- A 1200mm concrete sewer in Parnell Street flowing west.
- An 810mm x 510mm brick sewer in Henry Place, connected to the Henry Street sewer.
- An 810mm x 510mm brick sewer in Moore Lane flowing south to the sewer in Henry Place.
- A 300mm vitrified clay sewer in Moore Lane, flowing west to the brick sewer in Moore Street.
- A 300mm concrete sewer on the eastern side of O'Rahilly Parade, flowing westwards into a 300mm concrete sewer at the eastern side of O'Rahilly Parade, connected to the Moore Street brick sewer.

Foul and surface water currently run uncontrolled / unattenuated from the Dublin Central Masterplan site, discharging to the existing combined network via several connections.

8.3.3 Surface Water Drainage

The Dublin Central Masterplan site is bounded by Henry Street to the south, O'Connell Street Upper to the east, Parnell Street and O'Rahilly Parade to the north-east and north-west respectively, and Moore Street to the west. The site is generally flat, at a level of approximately 5m OD Malin.

The surrounding drainage network consists of combined foul and surface water sewers, as described in Section 8.3.2 above. Foul and surface water currently run uncontrolled / unattenuated from the subject site, discharging to the existing combined network via several connections.

In addition to this combined network, there are also some separated surface water sewers in the vicinity of the site. There is a 225mm concrete sewer in Parnell Street, increasing to 300mm near the intersection with Dominick Street Lower. There is a 375mm concrete surface water sewer in Henry Street approximately 110m west of the site's southern boundary.

8.3.4 Groundwater

The groundwater vulnerability at the site is low, based on groundwater vulnerability mapping produced by Geological Survey Ireland, extracted below:-

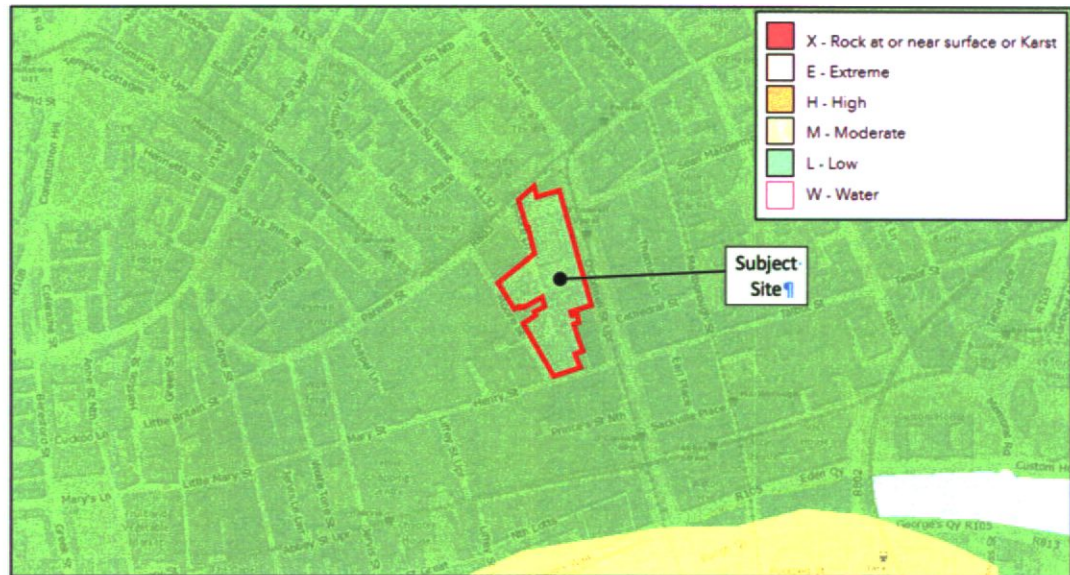


Figure 8.1: Groundwater Vulnerability Map.

The subject site is located within the Lucan Formation. The Lucan Formation is productive only in local zones, indicating water movement through the bedrock is very slow. The site is in an area of low groundwater vulnerability with very slow water movement through the bedrock.

8.4 CHARACTERISTICS OF PROPOSED DEVELOPMENT

8.4.1 Dublin Central Masterplan

The Dublin Central Masterplan site is divided into seven separate sites. The overall development site is bounded by Henry Street to the south, O'Connell Street Upper to the east, Parnell Street and O'Rahilly Parade to the north-east and north-west respectively, and Moore Street to the west. The development is a mixed-use development, and includes office, hotel, residential, café / restaurant and retail spaces. There is also provision made in Site 2AB and Site 2C for a proposed Metrolink station, to be implemented separately by Transport Infrastructure Ireland (TII). A breakdown of the schedule of accommodation is shown in the Table below: -

Site	Office	Hotel	Residential	Retail	Café/ Restaurant	Gym/ Studio	Cultural/ Gallery/ Café	Extension to National Monument	Site Enabling Works	Total
Site 1	3,610.0m ²	8,094.4m ²	-	-	-	-	-	-	-	11,704.4m ²
61 O'CSU	-	-	294.0m ²	-	52.0m ²	206.0m ²	-	-	-	552.0m ²
Site 2AB	16,804.0m ²	-	-	1,810.4m ²	1,705.5m ²	-	-	-	2,387.6m ²	22,707.5m ²
Site 2C	16,910.0m ²	-	-	812.0m ²	437.0m ²	-	-	-	7,424.0m ²	25,583.0m ²
Site 3	-	6,453.1m ²	6,908.6m ²	1,935.2m ²	-	-	123.4m ²	-	-	15,420.3m ²
Site 4	295.0m ²	-	1,454.0m ²	617.0m ²	864.0m ²	-	-	60.0m ²	-	3,290.0m ²
Site 5	5,798.9m ²	-	-	-	679.0m ²	-	-	-	-	6,477.9m ²
Total	43,417.9m²	14,547.5m²	8,656.6m²	5,174.6m²	3,737.5m²	206.0m²	123.4m²	60.0m²	9,811.6m²	85,735.0m²

Table 8.1: Schedule of Accommodation by 'Site' within the Dublin Central Masterplan.

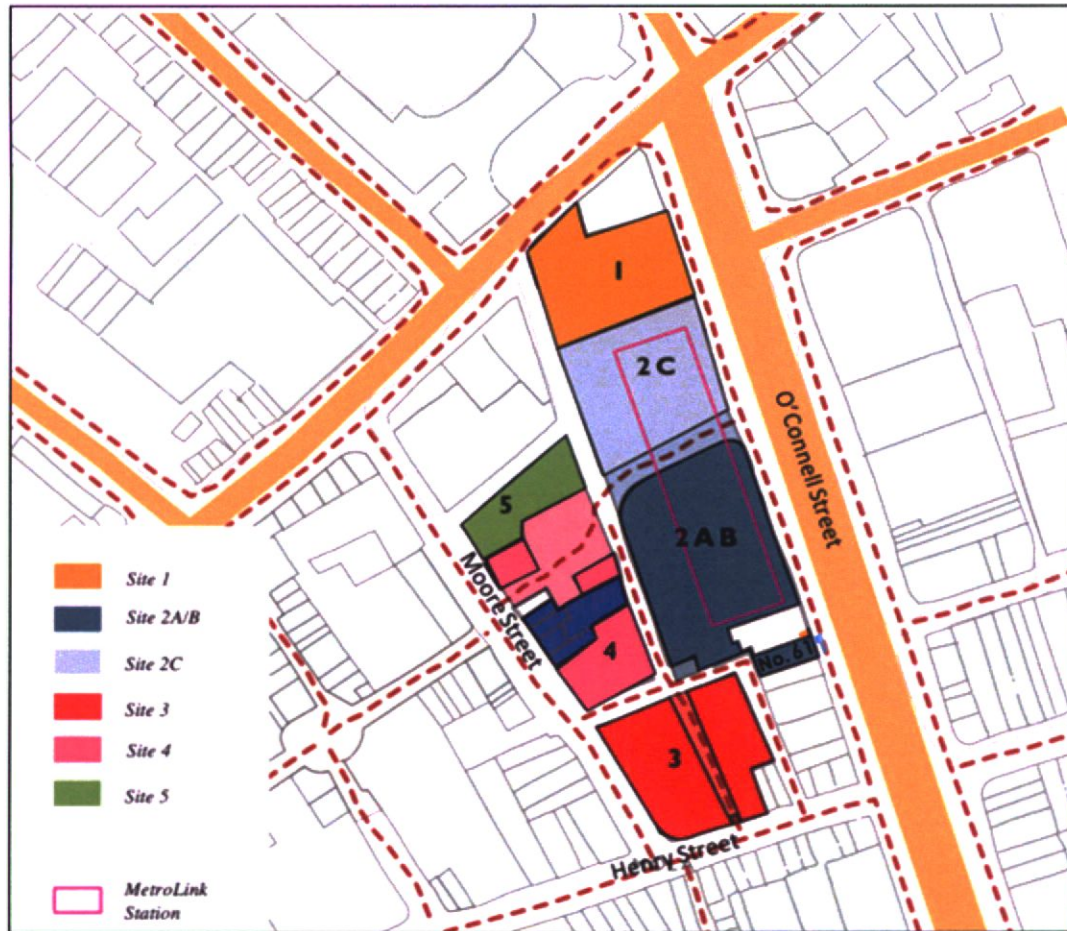


Figure 8.2: Dublin Central Masterplan with each site identified.

8.4.1.1 Water Supply

It is proposed to supply water to each site within the Dublin Central Masterplan via new metered connections to the existing watermain network.

An estimate of the water demand from the public water supply system for the Dublin Central Masterplan is shown in the Table below. An approximate allocation has been made for the Metrolink project also to provide a more robust assessment of water demand.

The average domestic demand has been established based on an average occupancy ratio of 2.7 persons per dwelling with a daily domestic per capita consumption of 150 litres per head per day and with a 10% allowance factor. Note that the Irish Water Code of Practice assumes 2.7 residents per unit regardless of the unit type. In the case of the subject development, the residential units are studio, 1-bed and 2-bed apartments, so 2.7 persons per unit is considered a very conservative estimate and the actual number of residents will likely be much lower.

The average day / peak week demand has been taken as 1.25 times the average daily domestic demand, while the peak demand has been taken as 5 times the average day / peak week demand, as per Section 3.7.2 of the Irish Water Code of Practice for Water Infrastructure.

Description		Quantity	Total Population	Per Capita Water Demand	Water Demand	Average Demand	Average Peak Demand	Peak Demand
			No. People	l/hd/day	l/day	l/s	l/s	l/s
Office	Staff	1 staff per 10m ² GFA	4,342 Staff	90	429,837	4.975	6.219	31.094
Hotel	Guests	210 Rooms	420 Customers	250	115,500	1.337	1.671	8.355
	Staff	1 staff per 5 rooms	42 Staff	90	4,158	0.048	0.060	0.301
Residential	Residents	97 Apartments	262 Residents	150	43,214	0.500	0.625	3.126
Retail	Customers	1 customer per 5m ² GFA	1,035 Customers	15	17,076	0.198	0.247	1.235
	Staff	1 staff per 15m ² GFA	345 Staff	45	17,076	0.198	0.247	1.235
Café/ Restaurant	Customers	1 customer per 3m ² GFA	1,246 Customers	30	41,112	0.476	0.595	2.974
	Staff	1 staff per 15m ² GFA	249 Staff	45	12,334	0.143	0.178	0.892
Gym/ Studio	Customers	1 customer per 10m ² GFA	21 Customers	30	680	0.008	0.010	0.049
	Staff	1 staff per 30m ² GFA	7 Staff	45	340	0.004	0.005	0.025
Metro	Public Restrooms	2 Toilet Blocks	250 Uses	10	2,750	0.032	0.040	0.199
	Staff	25 Full Time Staff	25 Staff	90	2,475	0.029	0.036	0.179
Total					686,551	7.946	9.933	49.664

Table 8.2: Estimate of the Water Demand for the Dublin Central Masterplan.

Based on these figures, the water demand that will be generated by the Dublin Central Masterplan is approximately 7.970l/s, or 688.651m³ per day.

Irish Water issued a Confirmation of Feasibility letter for the proposal, dated 12 May 2022, which is included in Appendix 8.1 of this report (reference number CDS20006528). The letter notes that connection to the existing water supply network is feasible without the need for any infrastructure upgrade works by Irish Water.

8.4.1.2 Foul Water Drainage

An estimate of the foul water discharge rate from the Dublin Central Masterplan to the public drainage network is shown in the Table below. An approximate allocation has been made for the Metrolink project also to provide a more robust assessment of water demand.

Domestic wastewater loads have been calculated based on 2.7 persons per unit with a per capita wastewater flow of 150 litres per head per day along with a 10% unit consumption allowance, in line with Section 3.6 of the Irish Water Code of Practice for Wastewater Infrastructure. Note that the Irish Water Code of Practice assumes 2.7 residents per unit regardless of the unit type. In the case of the subject development, the residential units are studio, 1-bed and 2-bed apartments, so 2.7 persons per unit is considered a very conservative estimate and the actual number of residents will likely be much lower.

Per capita wastewater flows for the commercial areas have been based on the flow rates set out in Appendix C of the Code of Practice, and a peak flow multiplier of 6 has been used, as per Section 2.2.5 of Appendix B of the Code of Practice.

Description		Quantity	Total Population	Load per Capita	Daily Load	Total DWF	Peak Flow
			No. People	l/hd/day	l/day	l/s	l/s
Office	Staff	1 staff per 10m ² GFA	4,342 Staff	90	429,837	4.975	29.850
Hotel	Guests	210 Rooms	420 Customers	250	115,500	1.337	8.021
	Staff	1 staff per 5 rooms	42 Staff	90	4,158	0.048	0.289
Residential	Residents	97 Apartments	262 Residents	150	43,214	0.500	3.001
Retail	Customers	1 customer per 5m ² GFA	1,035 Customers	15	17,076	0.198	1.186
	Staff	1 staff per 15m ² GFA	345 Staff	45	17,076	0.198	1.186
Café/ Restaurant	Customers	1 customer per 3m ² GFA	1,246 Customers	30	41,112	0.476	2.855
	Staff	1 staff per 15m ² GFA	249 Staff	45	12,334	0.143	0.857
Gym/ Studio	Customers	1 customer per 10m ² GFA	21 Customers	30	680	0.008	0.047
	Staff	1 staff per 30m ² GFA	7 Staff	45	340	0.004	0.024
Metro	Public Restrooms	2 Toilet Blocks	250 Uses	10	2,750	0.032	0.191
	Staff	25 Full Time Staff	25 Staff	90	2,475	0.029	0.172
Total					686,551	7.946	47.677

Table 8.3: Foul Discharge Rate for the Dublin Central Masterplan.

Dry Weather Flow (DWF) from the Development = 7.970 l/s

Peak Flow (6 x DWF) = 47.823 l/s

It is proposed to drain wastewater from each site within the Dublin Central Masterplan via new connections to the existing combined drainage network.

Irish Water issued a Confirmation of Feasibility letter for the proposal, dated 12 May 2022, which is included in Appendix 8.1 of this report (reference number CDS20006528). The letter notes that connection to the existing wastewater network is feasible without the need for any infrastructure upgrade works by Irish Water.

8.4.1.3 Surface Water Drainage

It is proposed to drain surface water from Dublin Central Masterplan site to the existing public surface water sewer at Parnell Street where feasible, and elsewhere to the adjacent combined network.

Dublin Central Masterplan incorporates a Storm Water Management Plan within each Site through the use of various SuDS techniques. Treatment and storage of surface water at source will intercept and slow down the rate of runoff from the site to the existing surface water sewer system.

Based on three key elements, Water Quantity, Water Quality and Amenity, the targets of the SuDS train concept have been implemented in the design. The SuDS devices proposed within and around the individual sites include green and blue roofing, tree pits and planted areas, underground attenuation and flow control devices.

Attenuation storage is provided to limit the discharge rate from the site into the public network. As per the GDSDS, the required attenuation volume is calculated assuming 100% runoff from paved areas, and has been calculated for the 1-year, 30-year and 100-year return periods, identifying the critical storm for each. Surface water runoff will be restricted via a hydro-brake or similar approved flow control device, limited to 2 l/s for each Site.

8.4.1.4 Groundwater

The proposal includes construction of basements, and construction of an approximately 25m deep box as part of the enabling works to facilitate a future Metro Station. Section 8.5, below, sets out the potential impact that this may have on the groundwater in the vicinity of the site.

8.4.2 Proposed Development – Site 2 & No. 61 O'Connell Street Upper

A full description of the development can be found in Chapter 3: Description of Proposed Development of this EIAR. The following is a broad outline of the subject development: -

- The proposed development includes provision of a new street connecting O'Connell Street and Moore Lane, with Site 2C to the north and Site 2AB to the south of this new street.
- Site 2AB: Site 2AB is a mixed-use scheme accommodating office, retail and café/restaurant uses in 1no. block ranging in height from 2 to 6 storeys over a new single storey combined basement with Phase 2C. Site 2AB also includes provision of a new pocket square.
- Site 2C: Site 2C accommodates office, retail and café/restaurant uses in a single block, with the Site 2 block ranging in height from 5 to 8 storeys over a new single storey combined basement with Phase 2AB.
- No. 61 O'Connell Street Upper: It is proposed to carry out refurbishment work to 61 O'Connell Street Upper. The proposed refurbishment comprises residential accommodation over 4-storeys, all over the existing single-storey basement. A new pedestrian through-route is proposed at ground floor, linking between O'Connell Street Upper and Henry Place/Moore Lane. A café/restaurant and a retail kiosk are proposed at ground floor level. An external area to the rear will replace the existing single-storey extension, to provide cycle and refuse storage areas.