of greenhouse gas emissions that are permitted during the budget period'. The 2021 Climate Act removes any reference to a national mitigation plan and instead refers to both the Climate Action Plan, as published in 2019, and a series of National Long Term Climate Action Strategies. In addition, the Environment Minister shall request each local authority to make a '*local authority climate action plan*' lasting five years and to specify the mitigation measures and the adaptation measures to be adopted by the local authority.

The Dublin City Council Climate Change Action Plan published in 2019 (Dublin City Council and Codema, 2019) outlines a number of goals and plans to prepare for and adapt to climate change. There are five key action areas within the plan: energy and buildings, transport, flood resilience, nature-based solutions and resource management. Some of the measures promoted within the Action Plan under the 5 key areas involve building retrofits, energy master-planning, development of segregated cycle routes, the promotion of bike share schemes, development of flood resilient designs, promotion of the use of green infrastructure and water conservation initiatives. The implementation of these measures will enable the Dublin City Council area to adapt to climate change and will assist in bringing Ireland closer to achieving its climate related targets in future years. New developments need to be cognisant of the Action Plan and incorporate climate friendly designs and measures where possible.

9.2.2 Construction Phase

9.2.2.1 Air Quality

The Institute of Air Quality Management in the UK (IAQM) guidance document '*Guidance on the Assessment of Dust from Demolition and Construction*' (2014) outlines an assessment method for predicting the impact of dust emissions from construction activities based on the scale and nature of the works and the sensitivity of the area to dust impacts. The IAQM methodology has been applied to the construction phase of this development in order to predict the likely risk of dust impacts in the absence of mitigation measures and to determine the level of site specific mitigation required. The use of UK guidance is considered best practice in the absence of applicable Irish guidance.

The study area for the demolition and construction stage assessment is defined as up to 350 m from the site boundary for the assessment of demolition and construction dust emissions, and 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s) as per the IAQM guidance (2014).

The major dust generating activities are divided into four types within the IAQM guidance (2014) to reflect their different potential impacts. These are: -

- Demolition.
- Earthworks.
- Construction.
- Trackout (movement of heavy vehicles).

The magnitude of each of the four categories is divided into Large, Medium or Small scale depending on the nature of the activities involved. The magnitude of each activity is combined with the overall sensitivity of the area to determine the risk of dust impacts from site activities. This allows the level of site specific mitigation to be determined.

Construction phase traffic also has the potential to impact air quality and climate. The UK DMRB guidance (UK Highways Agency, 2019), states that road links meeting one or more of the following criteria can be defined as being 'affected' by a proposed development and should be included in the local air quality assessment. The use of the UK guidance is recommended by the TII (2011) in the absence of specific Irish guidance, this approach is considered best practice and can be applied to any development that causes a change in traffic.

- Annual average daily traffic (AADT) changes by 1,000 or more;
- Heavy duty vehicle (HDV) AADT changes by 200 or more;
- A change in speed band;
- A change in carriageway alignment by 5m or greater.

The construction stage traffic will not increase by 1,000 AADT or 200 HDV AADT on the surrounding roads. It is estimated that there will be a maximum of 60 inward and outward HGV trips per day during the peak construction period, for deliveries and removal of waste material (see Traffic and Transport Assessment for further details). Therefore, the construction stage traffic does not meet the above scoping criteria. As a result a detailed air assessment of construction stage traffic emissions has been scoped out from any further assessment as there is no potential for significant impacts to air quality.

9.2.2.2 Climate

The impact of the construction phase of the development on climate was determined by a qualitative assessment of the nature and scale of greenhouse gas generating construction activities associated with the proposed development.

9.2.3 Operational Phase

9.2.3.1 Air Quality

The air quality assessment has been carried out following procedures described in the publications by the EPA (2015; 2022) and using the methodology outlined in the guidance documents published by the UK Highways Agency (2019a) and UK Department of Environment Food and Rural Affairs (DEFRA) (2016; 2018). Transport Infrastructure Ireland (TII) reference the use of the UK Highways Agency and DEFRA guidance and methodology in their document *Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes* (2011). This approach is considered best practice in the absence of Irish guidance and can be applied to any development that causes a change in traffic.

The study area for the operational phase assessment includes sensitive receptors within 200 m of impacted road links. The UK Highways Agency guidance (2019a) states that road links at a distance of greater than 200 m from a sensitive receptor will not influence pollutant concentrations at the receptor and thus the study area is confined to receptors within 200 m.

Operational phase traffic has the potential to impact local air quality as a result of increased vehicle movements associated with the proposed development. Traffic data for the proposed development was provided by PMCE. This included details of the traffic for the proposed development in addition to the cumulative traffic associated with the proposed development, existing developments and committed developments that are permitted but not yet constructed. The UK Highways Agency DMRB scoping

criteria detailed in Section 9.2.2 was used to determine if any road links are affected by the proposed development and require inclusion in a detailed air dispersion modelling assessment. The proposed development will not increase traffic volume (AADT or HGVs), by an amount greater than the scoping criteria (Section 9.2.2), in addition, there are no proposed changes to the traffic speeds or road alignment. It is predicted that there will be a total of 109 daily trips by personal vehicles associated with the proposed development, this is below the scoping criteria when calculated as an AADT (see Chapter 13 Traffic & Transportation). In addition, the low car parking provision will discourage the use of private cars and promote the use of more sustainable modes of transport such as walking, cycling, bus or Luas. Therefore, it can be concluded that no road links impacted by the proposed development satisfy the scoping criteria and a quantitative assessment of the impact of traffic emissions on ambient air quality is not necessary as there is no potential for significant impacts to local air quality.

9.2.3.2 Climate

Ireland has annual GHG targets which are set at an EU level and need to be complied with in order to reduce the impact of climate change. Impacts to climate as a result of GHG emissions are assessed against the targets set out by the EU under *Regulation (EU) 2018/842 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No. 525/2013,* which has set a target of a 30% reduction in non-ETS sector emissions by 2030 relative to 2005 levels.

As per the EU guidance document *Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment* (European Commission, 2013) the climate baseline is first established by reference to EPA data on annual GHG emissions (see Section 9.3.3). Thereafter the impact of the proposed development on climate is determined. Emissions from road traffic associated with the proposed development have the potential to emit carbon dioxide (CO_2) which will impact climate.

The UK Highways Agency has published an updated DMRB guidance document in relation to climate impact assessments *LA 114 Climate* (UK Highways Agency, 2019b). The following scoping criteria are used to determine whether a detailed climate assessment is required for a proposed project during the operational stage. During the operational phase, if any of the road links impacted by the proposed development meet the below criteria then further assessment is required.

- A change of more than 10% in AADT;
- A change of more than 10% to the number of heavy duty vehicles; and
- A change in daily average speed of more than 20 km/hr.

Similar to the air quality assessment above (Section 9.2.3.1) none of the road links impacted by the proposed development satisfy the above criteria and a quantitative assessment of the impact of traffic emissions on climate is not necessary as there is no potential for significant impacts to climate.

The EU guidance (2013) also states indirect GHG emissions as a result of a development must be considered, this includes emissions associated with energy usage. In addition to the EU guidance, the Institute of Environmental Management and Assessment (IEMA) guidance note on 'Assessing Greenhouse Gas Emissions and Evaluating their Significance' (IEMA, 2022) states that "*the crux of significance regarding impact on climate is not whether a project emits GHG emissions, nor even*

the magnitude of GHG emissions alone, but whether it contributes to reducing GHG emissions relative to a comparable baseline consistent with a trajectory towards net zero by 2050". Mitigation has taken a leading role within the guidance compared to the previous edition published in 2017. Early stakeholder engagement is key and therefore mitigation should be considered from the outset of the project and continue throughout the project's lifetime in order to maximise GHG emissions savings.

The Climate Action and Energy Statement prepared by Penston MEP Consulting Ltd. in relation to this assessment has been reviewed and used to inform the operational phase climate assessment. This report outlines a number of measures in relation to energy usage from the proposed development primarily in relation to heat and electricity. A number of measures have been incorporated into the overall design of the development to reduce the impact to climate where possible, in line with the objectives of the IEMA guidance (2022).

9.3 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed development involves the construction of an office development and Arts Centre at 1-4 City Quay, Dublin 2 D02KT32, 23-25 Moss Street, Dublin 2 D02 F854 and 5 City Quay, Dublin 2 D02PC03. A full description of the development can be found in Chapter 2.

In terms of air quality and climate a development of this nature will result in impacts during both the demolition/construction and operational phases. During the demolition/construction phase impacts to air quality will occur as a result of construction dust emissions. Dust emissions will primarily occur as a result of site demolition and preparation works, earthworks and the movement of trucks on site and exiting the site. There is also the potential for engine emissions from site vehicles and machinery to impact air quality. Engine emissions from site vehicles and machinery also have the potential to impact climate through the release of CO_2 and to a lesser extent, other GHGs.

Engine emissions from vehicles accessing the site have the potential to impact air quality and climate during the operational phase of the development through the release of NO_2, PM_{10}, $PM_{2.5}$ and CO_2. However, the additional vehicles associated with the operation of the proposed development are not expected to significantly alter the existing traffic on the surrounding road network.

9.4 RECEIVING ENVIRONMENT

9.4.1 Meteorological Data

A key factor in assessing temporal and spatial variations in air quality is the prevailing meteorological conditions. Depending on wind speed and direction, individual receptors may experience very significant variations in pollutant levels under the same source strength (i.e. traffic levels) (WHO, 2006). Meteorological conditions significantly affect the level of dust emissions and subsequent deposition downwind of the source. The most significant meteorological elements affecting dust deposition are rainfall and wind-speed. High levels of moisture either retained in soil or as a result of rainfall help suppress the generation of dust due to the cohesive nature of water between dust particles. Rain also assists in removing dust from the atmosphere through washout.

Wind can lift particles up into the air and transport the dust downwind as well as drying out the surface. The worst dust deposition conditions typically occur, therefore, during dry conditions with strong winds.

The nearest representative weather station collating detailed weather records is Dublin Airport meteorological station, which is located approximately 8 km north of the site. Dublin Airport met data has been examined to identify the prevailing wind direction and average wind speeds over a five-year period (see Figure 9.1). For data collated during five representative years (2017 – 2021), the predominant wind direction is westerly to south-westerly with a mean wind speed of 5.3 m/s over the 30-year period 1990 - 2010 (Met Éireann, 2022).

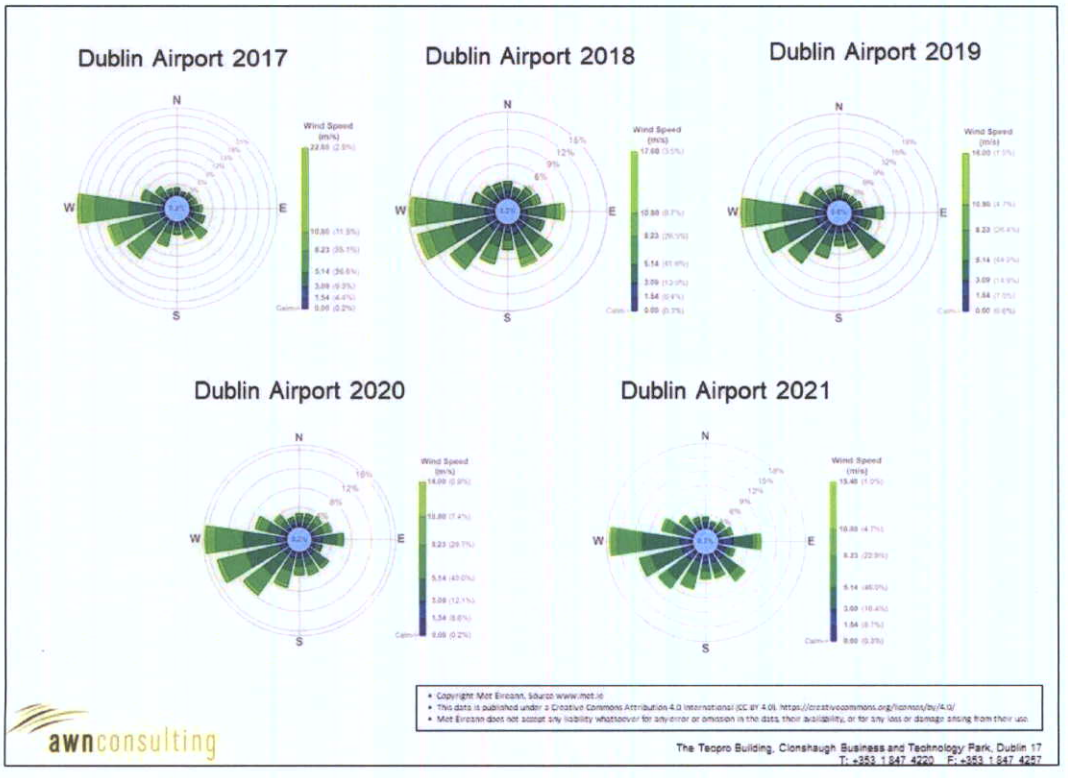

Figure 9.1 *Dublin Airport Windrose 2017 - 2021*

9.4.2 Baseline Air Quality

Air quality monitoring programs have been undertaken in recent years by the EPA. The most recent annual report on air quality in Ireland is "*Air Quality In Ireland 2020*" (EPA, 2021a). The EPA website details the range and scope of monitoring undertaken throughout Ireland and provides both monitoring data and the results of previous air quality assessments (EPA, 2022).

As part of the implementation of the Air Quality Standards Regulations 2011 (S.I. No. 180 of 2011), as amended, four air quality zones have been defined in Ireland for air quality management and assessment purposes (EPA, 2021b). Dublin is defined as Zone A and Cork as Zone B. Zone C is composed of 23 towns with a population of greater than 15,000. The remainder of the country, which represents rural Ireland but also includes all towns with a population of less than 15,000, is defined as Zone D.

In terms of air monitoring and assessment, the proposed development site in Dublin City is within Zone A (EPA, 2022). The long-term monitoring data has been used to determine background concentrations for the key pollutants in the region of the proposed development. The background concentration accounts for all non-traffic derived emissions (e.g. natural sources, industry, home heating etc.).

In 2020 the EPA reported (EPA, 2021a) that Ireland was compliant with EU legal air quality limits at all locations, however this was largely due to the reduction in traffic due to Covid-19 restrictions. The EPA *Air Quality in Ireland 2020* report details the effect that the Covid-19 restrictions had on air monitoring stations, which included reductions of up to 50% at some monitoring stations which have traffic as a dominant source. The report also notes that CSO figures show that while traffic volumes are still slightly below 2019 levels, they have significantly increased since 2020 levels. 2020 concentrations are therefore predicted to be an exceptional year and not consistent with long-term trends. For this reason, they have not been included in the baseline section and previous long-term data has been used to determine baseline levels of pollutants in the vicinity of the proposed development.

Long-term NO_2 monitoring was carried out at the Zone A suburban locations of Rathmines, Ballyfermot, Dun Laoghaire and Swords and the urban traffic location of Winetavern Street for the period 2015 – 2019 (EPA, 2021a) (see Table 9.2). Long term average concentrations are significantly below the annual average limit of 40 µg/m^3 for the suburban locations; average results range from 13 – 22 µg/m^3. Annual mean NO_2 concentrations for the urban traffic location of Winetavern Street range from 27 – 37 µg/m^3 for the period 2015 – 2019. In addition, the 1-hour limit value of 200 µg/m^3 (as a 99.8th percentile) was not exceeded in any year at any of the monitoring stations, albeit 18 exceedances are allowed per year. The station in Rathmines is considered a representative monitoring station for determining background pollutant concentrations in relation to the proposed development due to its increased distance from a major road source. Based on the above information a conservative estimate of the current background NO_2 concentration for the region of the proposed development is 22 µg/m^3.

Table 9.2 *Trends In Zone A Air Quality – Nitrogen Dioxide (NO_2)*

Station	Station Classification	Averaging Period Note 1,2	Year				
			2015	2016	2017	2018	2019
Rathmines	Suburban Background	Annual Mean NO_2 (µg/m^3)	18	20	17	20	22
		99.8th%ile 1-hr NO_2 (µg/m^3)	105	88	86	87	102
Ballyfermot	Suburban Background	Annual Mean NO_2 (µg/m^3)	16	17	17	17	20
		99.8th%ile 1-hr NO_2 (µg/m^3)	127	90	112	101	101
Dun Laoghaire	Suburban Background	Annual Mean NO_2 (µg/m^3)	16	19	17	19	15
		99.8th%ile 1-hr NO_2 (µg/m^3)	91	105	101	91	91
Swords	Suburban Background	Annual Mean NO_2 (µg/m^3)	13	16	14	16	15
		99.8th%ile 1-hr NO_2 (µg/m^3)	93	96	79	85	80

Winetavern Street	Urban Traffic	Annual Mean NO_2 ($\mu g/m^3$)	31	37	27	29	28
		99.8th%ile 1-hr NO_2 ($\mu g/m^3$)	128	120	110	115	115

Note 1 Annual average limit value – 40 $\mu g/m^3$ (EU Council Directive 2008/50/EC & S.I. No. 180 of 2011).
Note 2 1-hour limit value – 200 $\mu g/m^3$ as a 99.8th%ile, i.e. not to be exceeded >18 times per year (EU Council Directive 2008/50/EC & S.I. No. 180 of 2011).

Continuous PM_{10} monitoring was carried out at the Zone A locations of Rathmines, Dun Laoghaire, Ballyfermot, Phoenix Park and Winetavern Street from 2015 – 2019. Annual mean concentrations range from 9 – 16 $\mu g/m^3$ over the five year period (see Table 9.3) with at most 9 exceedances of the 24-hour limit value of 50 $\mu g/m^3$ in Rathmines and Winetavern Street in 2019, albeit 35 exceedances are permitted per year (EPA, 2021a). As mentioned above, the station in Rathmines is considered a representative monitoring station for determining background pollutant concentrations in relation to the proposed development. Based on the EPA data, a conservative estimate of the current background PM_{10} concentration in the region of the proposed development is 15 $\mu g/m^3$.

Table 9.3 *Trends In Zone A Air Quality – PM_{10}*

Station	Station Classification	Averaging Period Note 1, 2	Year				
			2015	2016	2017	2018	2019
Ballyfermot	Suburban Background	Annual Mean PM_{10} ($\mu g/m^3$)	12	11	12	16	14
		24-hr Mean > 50 $\mu g/m^3$ (days)	3	0	1	0	7
Dún Laoghaire	Suburban Background	Annual Mean PM_{10} ($\mu g/m^3$)	13	13	12	13	12
		24-hr Mean > 50 $\mu g/m^3$ (days)	3	0	2	0	2
Rathmines	Suburban Background	Annual Mean PM_{10} ($\mu g/m^3$)	15	15	13	15	15
		24-hr Mean > 50 $\mu g/m^3$ (days)	5	3	5	2	9
Phoenix Park	Urban Background	Annual Mean PM_{10} ($\mu g/m^3$)	12	11	9	11	11
		24-hr Mean > 50 $\mu g/m^3$ (days)	2	0	1	0	2
Winetavern Street	Urban Traffic	Annual Mean PM_{10} ($\mu g/m^3$)	14	14	13	14	15
		24-hr Mean > 50 $\mu g/m^3$ (days)	4	2	3	1	9

Note1 Annual average limit value – 40 $\mu g/m^3$ (EU Council Directive 2008/50/EC & S.I. No. 180 of 2011).
Note 2 24-hour limit value – 50 $\mu g/m^3$ as a 90.4th%ile, i.e. not to be exceeded >35 times per year (EU Council Directive 1999/30/EC & S.I. No. 180 of 2011).

Monitoring of both PM_{10} and $PM_{2.5}$ takes place at the station in Rathmines which allows for the $PM_{2.5}/PM_{10}$ ratio to be calculated. Average $PM_{2.5}$ levels in Rathmines over the period 2015 – 2019 ranged from 9 – 10 $\mu g/m^3$, with a $PM_{2.5}/PM_{10}$ ratio ranging from 0.60 – 0.68 (EPA, 2021a). Based on this information, a conservative ratio of 0.7 was used to generate an existing $PM_{2.5}$ concentration in the region of the development of 10.5 $\mu g/m^3$.

Based on the above information the air quality in the Dublin area is generally good, with concentrations of the key pollutants generally well below the relevant limit values. However, the EPA have indicated that road transport emissions are contributing to increased levels of NO_2 with the potential for breaches in the annual NO_2 limit value in future years at locations within urban centres and roadside locations. In addition, burning of solid fuels for home heating is contributing to increased levels of particulate matter (PM_{10} and $PM_{2.5}$). The EPA predict that exceedances in the particulate matter limit values are likely in future years if burning of solid fuels for residential heating continues (EPA, 2021a).

9.4.3 Climate Baseline

Anthropogenic emissions of greenhouse gases in Ireland included in the EU 2020 strategy are outlined in the most recent review by the EPA which details provisional emissions up to 2020 (EPA, 2021b). The data published in 2021 states that Ireland will exceed its 2020 annual limit set under the EU's Effort Sharing Decision (ESD), 406/2009/EC1 by an estimated 6.73 Mt. For 2021, total national greenhouse gas emissions are estimated to be 57.70 million tonnes carbon dioxide equivalent (Mt CO_2eq) with 44.38 MtCO_2eq of emissions associated with the ESD sectors for which compliance with the EU targets must be met. Agriculture is the largest contributor in 2021 at 37.1% of the total, with the transport sector accounting for 17.9% of emissions of CO_2.

GHG emissions for 2020 are estimated to be 3.6% lower than those recorded in 2019. Emission reductions have been recorded in 6 of the last 10 years. However, compliance with the annual EU targets has not been met for five years in a row. Emissions from 2016 – 2020 exceeded the annual EU targets by 0.29 MtCO_2eq, 2.94 MtCO_2eq, 5.57 MtCO_2eq,6.85 MtCO_2eq and 6.73 MtCO_2eq respectively. Agriculture is consistently the largest contributor to emissions with emissions from the transport and energy sectors being the second and third largest contributors respectively in recent years.

The EPA 2022 GHG Emissions Projections Report for 2021 – 2040 (EPA, 2022) provides an assessment of Ireland's total projected greenhouse gas (GHG) emissions from 2021 to 2040, using the latest inventory data for 2020 and provides an assessment of Ireland's progress towards achieving its National ambitions under the Climate Action and Low Carbon Development (Amendment) Act 2021 (Government of Ireland, 2021) and EU emission reduction targets for 2030 as set out under the EU Effort Sharing Regulation (ESR) 2018/842. Two scenarios are assessed – a "*With Existing Measures*" (WEM) scenario, which is a projection of future emissions based on the measures currently implemented and actions committed to by Government, and a "*With Additional Measures*" (WAM) scenario, which is the projection of future emissions based on the measures outlined in the latest Government plans at the time projections are compiled. This includes all policies and measures included in the WEM scenario, plus those included in government plans but not yet implemented.

The EPA report states under the "*With Existing Measures*" scenario, the projections indicate that Ireland will cumulatively exceed its ESR emissions allocation by 52.3 Mt CO_2 eq over the 2021-2030 period even with full use of the flexibilities available. Under the "*With Additional Measures scenario*", the projections indicate that Ireland can achieve compliance under the ESR over the 2021-2030 period using both flexibilities but only with full implementation of the 2021 Climate Action Plan. Both projected

scenarios indicate that implementation of all climate plans and policies, plus further new measures, are needed for Ireland to meet the 51 per cent emissions reduction target and put the country on track for climate neutrality by 2050 (EPA, 2022).

9.4.4 Sensitivity of the Receiving Environment

In line with the IAQM guidance document (2014) prior to assessing the impact of dust from a proposed development, the sensitivity of the area must first be assessed as outlined below. Both receptor sensitivity and proximity to proposed works areas are taken into consideration. For the purposes of this assessment, high sensitivity receptors are regarded as residential properties where people are likely to spend the majority of their time, schools and hospitals. Commercial properties and places of work are regarded as medium sensitivity while low sensitivity receptors are places where people are present for short periods or do not expect a high level of amenity.

In terms of receptor sensitivity to dust soiling, there is the City Quay National School bordering the site to the east (see Figure 9.2). The school is considered a high sensitivity receptor. There are also a number of medium sensitivity receptors in the form of office buildings and a hotel within 20m of the site. Based on the IAQM criteria outlined in Table 9.4, the worst case sensitivity of the area to dust soiling is considered medium.

Table 9.4 *Sensitivity of the Area to Dust Soiling Effects on People and Property*

Receptor Sensitivity	Number Of Receptors	Distance from source (m)			
		<20	<50	<100	<350
High	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

In addition to sensitivity to dust soiling, the IAQM guidelines also outline the assessment criteria for determining the sensitivity of the area to human health impacts. The criteria take into consideration the current annual mean PM_{10} concentration, receptor sensitivity based on type and the number of receptors affected within various distance bands from the proposed demolition and construction works. A conservative estimate of the current annual mean PM_{10} concentration in the vicinity of the proposed development is 15 $\mu g/m^3$ and there is 1 no. high sensitivity receptor located within 20m of the site boundary: the City Quay National School (see Figure 9.2). There are also a number of medium sensitivity office buildings and a hotel within 20m of the site boundary. Based on the IAQM criteria outlined in Table 9.5, the worst case sensitivity of the area to human health impacts is considered low.

Table 9.5 *Sensitivity of the Area to Human Health Impacts*

Receptor Sensitivity	Annual Mean PM_{10} Concentration	Number Of Receptors	Distance from source (m)				
			<20	<50	<100	<200	<350
High	< 24 $\mu g/m^3$	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low

Medium	< 24 µg/m^3	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Low	< 24 µg/m^3	>1	Low	Low	Low	Low	Low

Figure 9.2 *Sensitive Receptors Within 20m of Site Boundary*

9.5 POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT

9.5.1 Demolition/Construction Phase

9.5.1.1 Air Quality

The greatest potential impact on air quality during the construction phase of the proposed development is from demolition and construction dust emissions and the potential for nuisance dust. While construction dust tends to be deposited within 350m of a construction site, the majority of the deposition occurs within the first 50m. The extent of any dust generation depends on the nature of the dust (soils, peat, sands, gravels, silts etc.) and the nature of the construction activity. In addition, the potential for dust dispersion and deposition depends on local meteorological factors such as rainfall, wind speed and wind direction. A review of Dublin Airport meteorological data (see Section 9.4.1) indicates that the prevailing wind direction is westerly to south-westerly and wind speeds are generally moderate in nature. In addition, dust generation is considered negligible on days where rainfall is greater than 0.2 mm. A review of historical 30 year average data for Dublin Airport indicates that on average 191 days per year have rainfall over 0.2 mm (Met Eireann, 2022) and therefore it can be determined that over 50% of the time dust generation will be reduced.

In order to determine the level of dust mitigation required during the proposed works, the potential dust emission magnitude for each dust generating activity needs to be

taken into account, in conjunction with the previously established sensitivity of the area (see Section 9.4.4). As per Section 9.2.2.1 the major dust generating activities are divided into four types within the IAQM guidance to reflect their different potential impacts. These are:

- Demolition;
- Earthworks;
- Construction; and
- Trackout (movement of heavy vehicles).

Demolition

Demolition will primarily involve the removal of buildings or structures currently on the site in a potentially dusty manner. This may also involve dust generation at heights. Dust emission magnitude from demolition can be classified as small, medium and large and are described below: -

- **Large**: Total building volume >50,000m^3, potentially dusty construction material (e.g. concrete), on-site crushing and screening, demolition activities >20m above ground level.
- **Medium**: Total building volume 20,000m^3 – 50,000m^3, potentially dusty construction material, demolition activities 10 – 20m above ground level.
- **Small**: Total building volume less than 20,000m^3.

The total building volume to be demolished is estimated to be 7,750 m^3 which is significantly less than 20,000 m^3 and therefore the demolition works can be categorised as small under the IAQM guidance.

As the overall sensitivity of the area to dust soiling impacts is medium as per Section 9.4.4, there is a low risk of dust soiling impacts from the proposed demolition activities according to the IAQM guidance (see Table 9.6). There is a negligible risk of human health impacts as a result of the demolition activities as the overall sensitivity of the area to human health impacts is low (Section 9.4.4).

Table 9.6 *Risk of Dust Impacts – Demolition*

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Medium Risk
Medium	High Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible

Source: IAQM (2014) Guidance on the Assessment of Dust from Demolition & Construction

Earthworks

Earthworks primarily involve excavating material, loading and unloading of materials, tipping and stockpiling activities. Activities such as levelling the site and landscaping works are also considered under this category. The dust emission magnitude from earthworks can be classified as small, medium or large based on the definitions from the IAQM guidance as transcribed below:

- **Large:** Total site area > 10,000 m^2, potentially dusty soil type (e.g. clay which will be prone to suspension when dry due to small particle size), >10 heavy

earth moving vehicles active at any one time, formation of bunds > 8 m in height, total material moved >100,000 tonnes;

- **Medium:** Total site area 2,500 m² – 10,000 m², moderately dusty soil type (e.g. silt), 5 - 10 heavy earth moving vehicles active at any one time, formation of bunds 4 – 8 m in height, total material moved 20,000 – 100,000 tonnes;
- **Small:** Total site area < 2,500 m², soil type with large grain size (e.g. sand), < 5 heavy earth moving vehicles active at any one time, formation of bunds < 4 m in height, total material moved < 20,000 tonnes, earthworks during wetter months.

The total site area is 0.22 ha which is less than 10,000 m². There will be in the region of 25,000 m³ (approximately 42,500 tonnes) of soil and stone excavated for the basement works which is less than 100,000 tonnes. The dust emission magnitude for the proposed earthwork activities can be classified as medium due to the volume of material required for excavation. As outlined in Table 9.7, this results in an overall medium risk of dust soiling impacts and a low risk of human health impacts as a result of the proposed earthworks activities.

Table 9.7 *Risk of Dust Impacts – Earthworks*

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Source: IAQM (2014) Guidance on the Assessment of Dust from Demolition & Construction

Construction

Dust emission magnitude from construction can be classified as small, medium or large based on the definitions from the IAQM guidance as transcribed below:

- **Large:** Total building volume > 100,000 m³, on-site concrete batching, sandblasting;
- **Medium:** Total building volume 25,000 m³ – 100,000 m³, potentially dusty construction material (e.g. concrete), on-site concrete batching;
- **Small:** Total building volume < 25,000 m³, construction material with low potential for dust release (e.g. metal cladding or timber).

The dust emission magnitude for the proposed construction activities can be classified as large as the total building volume to be constructed will be greater than 100,000 m³. As outlined in Table 9.8, this results in an overall medium risk of dust soiling impacts and a low risk of human health impacts as a result of the proposed construction activities.

Table 9.8 *Risk of Dust Impacts – Construction*

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Source: IAQM (2014) Guidance on the Assessment of Dust from Demolition & Construction

Trackout

Factors which determine the dust emission magnitude are vehicle size, vehicle speed, number of vehicles, road surface material and duration of movement. Dust emission magnitude from trackout can be classified as small, medium or large based on the definitions from the IAQM guidance as transcribed below:

- **Large:** > 50 HGV (> 3.5 t) outward movements in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length > 100 m;
- **Medium:** 10 - 50 HGV (> 3.5 t) outward movements in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50 - 100 m;
- **Small:** < 10 HGV (> 3.5 t) outward movements in any one day, surface material with low potential for dust release, unpaved road length < 50 m.

The dust emission magnitude for the proposed trackout can be classified as large, as at worst-case peak periods during the site preparation phase there will be at most 60 outward HGV movements per day however, there will be no unpaved roadways. As outlined in Table 9.9, this results in an overall medium risk of dust soiling impacts and a low risk of human health impacts as a result of the proposed trackout activities.

Table 9.9 *Risk of Dust Impacts – Trackout*

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Source: IAQM (2014) Guidance on the Assessment of Dust from Demolition & Construction

Summary of Dust Emission Risk

The risk of dust impacts as a result of the proposed development are summarised in Table 9.10 for each activity. The magnitude of risk determined is used to prescribe the level of site specific mitigation required for each activity in order to prevent significant impacts occurring.

Overall, in order to ensure that no dust nuisance occurs during the earthworks, construction and trackout activities, a range of dust mitigation measures associated with a medium risk of dust impacts will be implemented. In the absence of mitigation dust soiling impacts from demolition and construction works are predicted to be short-term, localised, negative and slight.

Table 9.10 *Summary of Dust Impact Risk used to Define Site-Specific Mitigation*

Potential Impact	Dust Emission Risk			
	Demolition	Earthworks	Construction	Trackout
Dust Emission Magnitude	Small	Medium	Large	Large
Dust Soiling Risk	Low Risk	Medium Risk	Medium Risk	Medium Risk
Human Health Risk	Negligible Risk	Low Risk	Low Risk	Low Risk

There is also the potential for traffic emissions to impact air quality in the short-term over the construction phase. Particularly due to the increase in HGVs accessing the site. The construction stage traffic has been reviewed and a detailed air quality assessment has been scoped out as none of the road links impacted by the proposed development satisfy the DMRB assessment criteria in Section 9.2.2.1. It can therefore be determined that the construction stage traffic will have an imperceptible, neutral and not significant short-term impact on air quality.

9.5.1.2 Climate

There is the potential for a number of greenhouse gas emissions to atmosphere during the construction of the development. Construction vehicles, generators etc., may give rise to CO_2 and N_2O emissions. The Institute of Air Quality Management document *Guidance on the Assessment of Dust from Demolition and Construction* (IAQM, 2014) states that site traffic and plant is unlikely to make a significant impact on climate. Therefore, the potential impact on climate is considered to be imperceptible, neutral , not significant and short-term.

9.5.1.3 Human Health

Dust emissions from the demolition and construction phase of the proposed development have the potential to impact human health through the release of PM_{10} and $PM_{2.5}$ emissions. There is a high sensitivity receptor within 20m of the proposed development site boundary, City Quay National School located directly adjacent to the site. As per Section 9.4.4 and Table 9.5 the area is of low sensitivity to human health impacts from construction dust emissions. There is at most a low risk of human health impacts as a result of the demolition and construction phase of the proposed development. Therefore, in the absence of mitigation there is the potential for imperceptible, negative, short-term non-significant impacts to human health as a result of the proposed development.

9.5.2 Operational Phase

9.5.2.1 Air Quality

There is the potential for a number of emissions to the atmosphere during the operational phase of the development. In particular, the traffic-related air emissions may generate quantities of air pollutants such as NO_2, PM_{10} and $PM_{2.5}$. However, impacts from these emissions have been screened out using the UK DMRB guidance (UK Highways Agency, 2019), on which the TII guidance (2011) was based. None of the road links impacted by the proposed development satisfy the screening criteria (see Section 9.2.2.1) and an assessment of the impact of traffic emissions on ambient air quality is not necessary as there is no potential for significant impacts. It can therefore be determined that the impact to air quality from traffic emissions during the operational stage is neutral, localised, long-term and imperceptible.

9.5.2.2 Climate

Climate change has the potential to alter weather patterns and increase the frequency of rainfall in future years. As a result of this there is the potential for flooding related impacts on site in future years. However, a proposed floor level for the development has been provided for to prevent potential significant flood related impacts. In addition, adequate attenuation and drainage have been provided as part of the design of this

development. Therefore, the impact will be long-term, localised, not significant, neutral and imperceptible.

There is also the potential for increased traffic volumes to impact climate. The change in AADT values is not of the magnitude to require a detailed climate assessment as per the DMRB screening criteria outlined in Section 9.2.3.2 (UK Highways Agency, 2019b). It can therefore be determined that traffic related CO_2 emissions during the operational phase are long-term, localised, neutral and imperceptible.

The proposed development has been designed to reduce the impact to climate where possible through sustainable design. A number of measures have been incorporated into the design of the development to ensure the operational phase emissions are minimised. These are outlined fully within the Climate Action and Energy Statement prepared by Penston MEP Consulting Ltd. and are summarised below.

The development will be a Nearly Zero Energy Building (NZEB) in accordance with the Part L 2017 requirements for nondomestic buildings. Each building will have a Building Energy Rating (BER) that will comply with the Part L requirements and a BER of A1 has been targeted throughout. In addition, the building will be designed to conform to the RIAI 2030 Climate Challenge energy usage targets. The following measures, or similar will be incorporated into the proposed development to achieve a more energy efficient (i.e. less carbon intensive) design. All measures will be reviewed at the detailed design stage and the most appropriate options will be implemented.

- PV (photo voltaic) Panels
- Phase change materials
- Rainwater harvesting
- Geothermal heat recovery
- District heating
- Demand control ventilation
- High performance U-values
- Improved air tightness
- Improved thermal transmittance and thermal bridging
- Use of energy efficient light fittings
- Building energy management system.

It is proposed to incorporate bicycle parking spaces within the proposed development to promote the use of sustainable transport. Overall these measures will aid in reducing the impact to climate during the operational phase of the proposed development.

9.5.2.3 Human Health

Traffic related air emissions have the potential to impact air quality which can affect human health. However, the traffic generated by the proposed development does not satisfy the assessment criteria to require an air modelling assessment as outlined in Section 9.2.2.1 and therefore there is no potential for significant impacts. It can be determined that the impact to human health during the operational stage is neutral, local, non-significant, long-term and imperceptible.

9.6 REMEDIAL AND MITIGATION MEASURES

9.6.1 Demolition/Construction Phase

There is the potential for a number of impacts to air quality and climate during the demolition and construction phases of the proposed development. Demolition and construction dust emissions are considered the primary source of air quality impacts associated with the proposed development. It has been established that there is an overall medium risk of dust related impacts as a result of the proposed development. There is high sensitivity receptor within 20m of the proposed development boundary, the City Quay National School therefore, it must be ensured that dust emissions are mitigated to prevent significant impacts occurring. To avoid any potential significant impacts the following mitigation measures have been proposed.

9.6.1.1 Air Quality

The proactive control of fugitive dust will ensure the prevention of significant emissions. The key aspects of controlling dust are listed below. Full details of the dust management plan can be found in Appendix 9.1. Care has specifically been paid to the requirements and recommendations within the Dublin City Council's guidance entitled "*Air Quality Monitoring and Noise Control Unit's Good Practice Guide for Construction and Demolition*" (DCC, 2018). The dust minimisation measures will be incorporated into the overall Construction Environmental Management Plan (CEMP) being prepared in relation to the development. In summary the measures which will be implemented will include:

- Hard surface roads will be swept to remove mud and aggregate materials from their surface while any un-surfaced roads will be restricted to essential site traffic.
- Any road that has the potential to give rise to fugitive dust will be regularly watered, as appropriate, during dry and/or windy conditions.
- Vehicles exiting the site shall make use of a wheel wash facility prior to entering onto public roads.
- Vehicles using site roads will have their speed restricted, and this speed restriction must be enforced rigidly. On any un-surfaced site road, this will be 20 kph.
- Public roads outside the site will be regularly inspected for cleanliness and cleaned as necessary.
- Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind. Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods.
- During movement of materials both on and off-site, trucks will be stringently covered with tarpaulin at all times. Before entrance onto public roads, trucks will be adequately inspected to ensure no potential for dust emissions.

At all times, these procedures will be strictly monitored and assessed. In the event of dust nuisance occurring outside the site boundary, movements of materials likely to raise dust will be curtailed and satisfactory procedures implemented to rectify the problem before the resumption of construction operations.

9.6.1.2 Climate

Impacts to climate during the demolition and construction stage are predicted to be imperceptible however, good practice measures can be incorporated to ensure potential impacts are lessened. These include:

- Prevention of on-site or delivery vehicles from leaving engines idling, even over short periods.
- Ensure all plant and machinery are well maintained and inspected regularly.
- Minimising waste of materials due to poor timing or over ordering on site will aid to minimise the embodied carbon footprint of the site.

9.6.2 Operational Stage

The impact of the operational traffic associated with proposed development on air quality and climate is predicted to be imperceptible with respect to the operational phase in the long term. Therefore, no site specific mitigation measures are required other than those set out in Section 9.5.2 in relation to operational phase energy usage.

9.7 RESIDUAL IMPACTS OF THE PROPOSED DEVELOPMENT

9.7.1 Demolition/Construction Phase

9.7.1.1 Air Quality

It has been established that in the absence of mitigation there is an overall medium risk of dust soiling impacts and a low risk of human health impacts as a result of the demolition and construction phase of the proposed development (see Section 9.5.1.1). As there is a high sensitivity receptor within 20m of the proposed development boundary, City Quay National School directly adjacent to the site, a detailed dust management plan has been formulated to mitigate potential dust impacts. The plan draws on best practice measures from Ireland, the UK and the USA. Once the dust minimisation measures outlined in Section 9.6 and Appendix 9.1 are implemented, the impact of the proposed development in terms of dust soiling will be short-term, negative, localised, non-significant and imperceptible at nearby receptors.

9.7.1.2 Climate

According to the IAQM guidance (2014) site traffic, plant and machinery are unlikely to have a significant impact on climate. Therefore the predicted impact is short-term, non-significant, neutral and imperceptible.

9.7.1.3 Human Health

Best practice mitigation measures are proposed for the demolition and construction phase of the proposed development which will focus on the pro-active control of dust and other air pollutants to minimise generation of emissions at source. The mitigation measures that will be put in place during construction of the proposed development will ensure that the impact of the development complies with all EU ambient air quality legislative limit values which are based on the protection of human health. Therefore, the impact of construction of the proposed development is likely to be negative, short-term, non-significant and imperceptible with respect to human health.

9.7.2 Operational Stage

9.7.2.1 Air Quality

None of the road links impacted by the proposed development satisfied the assessment criteria outlined in Section 9.2.2.1 for carrying out a detailed air modelling assessment. Therefore, there is no potential for significant impacts to air quality as a result of traffic related to the proposed development. It can therefore be determined that the impact to air quality as a result of increased traffic volumes during the operational phase of the proposed development is localised, neutral, non-significant, imperceptible and long-term.

9.7.2.2 Climate

None of the road links impacted by the proposed development satisfied the assessment criteria outlined in Section 9.2.3.2 for carrying out a detailed air modelling assessment of CO_2 emissions from traffic. Therefore, there is no potential for significant impacts to climate as a result of traffic related to the proposed development. It can therefore be determined that the impact to climate as a result of increased traffic volumes during the operational phase of the proposed development is neutral, imperceptible and long-term. In addition, the proposed development has been designed to reduce the impact to climate where possible during operation.

9.7.2.3 Human Health

Emissions of air pollutants are predicted to be significantly below the ambient air quality standards which are based on the protection of human health. Therefore, impacts to human health are long-term, neutral, non-significant and imperceptible.

9.8 MONITORING OR REINSTATEMENT

9.8.1 Demolition/Construction Phase

Monitoring of demolition and construction dust deposition along the site boundary to nearby sensitive receptors during the demolition and construction phase of the proposed development is recommended to ensure mitigation measures are working satisfactorily. This can be carried out using the Bergerhoff method in accordance with the requirements of the German Standard VDI 2119. The Bergerhoff Gauge consists of a collecting vessel and a stand with a protecting gauge. The collecting vessel is secured to the stand with the opening of the collecting vessel located approximately 2m above ground level. The TA Luft limit value is 350 mg/(m^2*day) during the monitoring period of 30 days (+/- 2 days).

9.8.2 Operational Phase

There is no monitoring recommended for the operational phase as it is predicted to have a non-significant, imperceptible impact on air quality and climate.

9.9 CUMULATIVE IMPACTS OF THE PROPOSED DEVELOPMENT

9.9.1 Demolition/Construction Phase

According to the IAQM guidance (2014) should the demolition/construction phase of the proposed development coincide with the demolition/construction of any other permitted developments within 350m of the site then there is the potential for cumulative dust impacts to the nearby sensitive receptors. A review of recent planning permissions for the area was conducted and cumulative developments are detailed in Chapter 2.

There is the potential for cumulative construction dust impacts to occur if the demolition/construction phase of the proposed development overlaps with that of a proposed development at La Touche House (Planning Ref: 33151/22) and permitted developments at Brunswick Villas (Planning Ref: 2877/21), Townsend House (Planning Ref: 3091/21) and Apollo House (Planning Ref: 3684/21). These developments are all within 350m of the proposed development site boundary and have not yet undertaken construction works, therefore cumulative construction dust impacts may occur if construction phases overlap. The other cumulative developments identified within Chapter 2 (Planning Refs: 2532/20, 4054/19, 3560/19, and 4826/19) have all completed construction and therefore there is no potential for cumulative construction dust impacts to nearby receptors. The dust mitigation measures outlined within Section 9.6 and Appendix 9.1 of this chapter will prevent significant dust emissions from occurring and therefore significant cumulative impacts are not predicted. Cumulative impacts during the construction phase are likely to be short-term, negative, non-significant and slight.

9.9.2 Operational Phase

Cumulative impacts have been incorporated into the traffic data supplied for the operational stage air and climate assessments where such information was available which includes traffic associated with the other committed but not yet constructed developments in the area. The following committed developments were included within the traffic figures: Dublin City Council Planning Refs. 3794/18, 3037/16 and 3637/17. The operational phase assessment has determined there will be long-term, neutral, non-significant and imperceptible impact to air quality and climate during the operational stage.

9.10 REFERENCES

BRE (2003) Controlling Particles, Vapours & Noise Pollution From Construction Sites

Department of the Environment, Heritage and Local Government (DEHLG) (2004) Quarries and Ancillary Activities, Guidelines for Planning Authorities

Dublin City Council (2018) Air Quality Monitoring and Noise Control Unit's Good Practice Guide for Construction and Demolition

Dublin City Council and Codema (2019) Dublin City Council Climate Change Action Plan 2019 -2024

Environmental Protection Agency (2015) Advice Notes for Preparing Environmental Impact Statements – Draft

Environmental Protection Agency (2021a) Air Quality Monitoring Report 2020 (& previous annual reports)

Environmental Protection Agency (2021b) Ireland's Provisional Greenhouse Gas Emissions 1990 – 2020

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Environmental Protection Agency (2022) EPA website Available at: http://www.airquality.ie

Environmental Protection Agency (2022) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports

European Commission (2013) *Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment*

German VDI (2002) Technical Guidelines on Air Quality Control – TA Luft

Government of Ireland (2015) Climate Action and Low Carbon Development Act

Government of Ireland (2019a) Climate Action Plan 2019

Government of Ireland (2019b) Draft General Scheme of the Climate Action (Amendment) Bill 2019

Government of Ireland (2021a) Climate Action Plan 2021

Government of Ireland (2021b) Climate Action and Low Carbon Development (Amendment) Act 2021

Institute of Air Quality Management (IAQM) (2014) Guidance on the Assessment of Dust from Demolition and Construction Version 1.1

Institute of Environmental Management and Assessment (IEMA) (2022) Assessing Greenhouse Gas Emissions and Evaluating their Significance

Met Éireann (2022) Met Eireann website: https://www.met.ie/

The Scottish Office (1996) Planning Advice Note PAN50 Annex B: Controlling The Environmental Effects Of Surface Mineral Workings Annex B: The Control of Dust at Surface Mineral Workings

Transport Infrastructure Ireland (2011) Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes

UK DEFRA (2016) Part IV of the Environment Act 1995: Local Air Quality Management, LAQM. PG(16)

UK DEFRA (2018) Part IV of the Environment Act 1995: Local Air Quality Management, LAQM.TG(16)

UK Highways Agency (2019a) UK Design Manual for Roads and Bridges (DMRB), Volume 11, Environmental Assessment, Section 3 Environmental Assessment Techniques, Part 1 LA 105 Air quality

UK Highways Agency (2019b) UK Design Manual for Roads and Bridges (DMRB) Volume 11 Environmental Assessment, Section 3 Environmental Assessment Techniques, Part 14 LA 114 Climate

UK Office of Deputy Prime Minister (2002) Controlling the Environmental Effects of Recycled and Secondary Aggregates Production Good Practice Guidance

USEPA (1997) Fugitive Dust Technical Information Document for the Best Available Control Measures

World Health Organisation (2006) Air Quality Guidelines - Global Update 2005 (and previous Air Quality Guideline Reports 1999 & 2000)

APPENDIX 9.1

Dust Management Plan

The objective of dust control at the site is to ensure that no significant nuisance occurs at nearby sensitive receptors. In order to develop a workable and transparent dust control strategy, the following management plan has been formulated by drawing on best practice guidance from Ireland (DCC, 2018), UK (IAQM (2014), BRE (2003), The Scottish Office (1996), UK ODPM (2002)) and the USA (USEPA, 1997). Care has specifically been paid to the requirements and recommendations within the Dublin City Council's guidance entitled "*Air Quality Monitoring and Noise Control Unit's Good Practice Guide for Construction and Demolition*" (DCC, 2018). The dust minimisation measures will be incorporated into the overall Construction Environmental Management Plan (CEMP) being prepared in relation to the development.

Site Management

The aim is to ensure good site management by avoiding dust becoming airborne at source. This will be done through good design and effective control strategies.

At the construction planning stage, the siting of activities and storage piles will take note of the location of sensitive receptors and prevailing wind directions in order to minimise the potential for significant dust nuisance (see Figure 9.1 for the windrose for Dublin Airport). As the prevailing wind is predominantly westerly to south-westerly, locating construction compounds and storage piles downwind (to the east / north-east) of sensitive receptors will minimise the potential for dust nuisance to occur at sensitive receptors.

Good site management will include the ability to respond to adverse weather conditions by either restricting operations on-site or quickly implementing effective control measures before the potential for nuisance occurs. When rainfall is greater than 0.2mm/day, dust generation is generally suppressed (IAQM, 2014; UK ODPM, 2002). The potential for significant dust generation is also reliant on threshold wind speeds of greater than 10 m/s (19.4 knots) (at 7m above ground) to release loose material from storage piles and other exposed materials (USEPA, 1986). Particular care should be taken during periods of high winds (gales) as these are periods where the potential for significant dust emissions are highest. The prevailing meteorological conditions in the vicinity of the site are favourable in general for the suppression of dust for a significant period of the year. Nevertheless, there will be infrequent periods where care will be needed to ensure that dust nuisance does not occur. The following measures shall be taken in order to avoid dust nuisance occurring under unfavourable meteorological conditions:

- The Principal Contractor or equivalent must monitor the contractors' performance to ensure that the proposed mitigation measures are implemented and that dust impacts and nuisance are minimised;
- During working hours, dust control methods will be monitored as appropriate, depending on the prevailing meteorological conditions;
- The name and contact details of a person to contact regarding air quality and dust issues shall be displayed on the site boundary, this notice board should also include head/regional office contact details;
- It is recommended that community engagement be undertaken before works commence on site explaining the nature and duration of the works to local residents and businesses;
- A complaints register will be kept on site detailing all telephone calls and letters of complaint received in connection with dust nuisance or air quality concerns, together with details of any remedial actions carried out;

- It is the responsibility of the contractor at all times to demonstrate full compliance with the dust control conditions herein;
- At all times, the procedures put in place will be strictly monitored and assessed.

The dust minimisation measures shall be reviewed at regular intervals during the works to ensure the effectiveness of the procedures in place and to maintain the goal of minimisation of dust through the use of best practice and procedures. In the event of dust nuisance occurring outside the site boundary, site activities will be reviewed and satisfactory procedures implemented to rectify the problem. Specific dust control measures to be employed are described below.

Preparing and Maintaining the Site

- Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.
- Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.
- Fully enclose specific operations where there is a high potential for dust production and the site is active for an extensive period.
- Avoid site runoff of water or mud.
- Keep site fencing, barriers and scaffolding clean using wet methods.
- Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below.
- Cover, seed or fence stockpiles to prevent wind whipping.

Operating Vehicles / Machinery and Sustainable Travel

- Ensure all vehicles switch off engines when stationary - no idling vehicles.
- Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery powered equipment where practicable.
- Impose and signpost a maximum-speed-limit of 20 kph for haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate).
- Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.
- Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing)

Operations

- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g., suitable local exhaust ventilation systems.
- Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.
- Use enclosed chutes and conveyors and covered skips.
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.

- Ensure equipment is readily available on site to clean any dry spillages and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.

Waste Management

- Avoid bonfires and burning of waste materials.

Measures Specific to Demolition

- Prior to demolition blocks should be soft striped inside buildings (retaining walls and windows in the rest of the building where possible, to provide a screen against dust).
- During the demolition process, water suppression should be used, preferably with a hand-held spray. Only the use of cutting, grinding or sawing equipment fitted or used in conjunction with a suitable dust suppression technique such as water sprays/local extraction should be used.
- Drop heights from conveyors, loading shovels, hoppers and other loading equipment should be minimised, if necessary fine water sprays should be employed.
- Avoid explosive blasting, using appropriate manual or mechanical alternatives.

Measures Specific to Earthworks

- Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.
- Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.
- Only remove the cover in small areas during work and not all at once.
- During dry and windy periods, and when there is a likelihood of dust nuisance, a bowser will operate to ensure moisture content is high enough to increase the stability of the soil and thus suppress dust.

Measures Specific to Construction

- Avoid scabbling (roughening of concrete surfaces) if possible.
- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.
- Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.
- For smaller supplies of fine power materials ensure bags are sealed after use and stored appropriately to prevent dust.

Measures Specific to Trackout

Site roads (particularly unpaved) can be a significant source of fugitive dust from construction sites if control measures are not in place. The most effective means of suppressing dust emissions from unpaved roads is to apply speed restrictions. Studies show that these measures can have a control efficiency ranging from 25 to 80%[11].

- A speed restriction of 20 km/hr will be applied as an effective control measure for dust for on-site vehicles.
- Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use. If sweeping using a road sweeper is not possible due to the nature of the surrounding area then a suitable smaller scale street cleaning vacuum will be used.
- Avoid dry sweeping of large areas.
- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.
- Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.
- Record all inspections of haul routes and any subsequent action in a site logbook.
- Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).
- Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.
- Access gates to be located at least 10 m from receptors where possible.

Dust Monitoring

It is recommended that dust deposition monitoring be put in place to ensure dust mitigation measures are adequately controlling emissions. Dust monitoring along the site boundary with sensitive receptors shall be conducted using the Bergerhoff method in accordance with the requirements of the German Standard VDI 2119. The Bergerhoff Gauge consists of a collecting vessel and a stand with a protecting gauge. The collecting vessel is secured to the stand with the opening of the collecting vessel located approximately 2m above ground level. The TA Luft limit value is 350 mg/(m^2*day) during the monitoring period of 30 days (+/- 2 days).

Summary of Dust Mitigation Measures

The pro-active control of fugitive dust will ensure that the prevention of significant emissions, rather than an inefficient attempt to control them once they have been released, will contribute towards the satisfactory performance of the contractor. The key features with respect to control of dust will be:

- The specification of a site policy on dust and the identification of the site management responsibilities for dust issues;
- The development of a documented system for managing site practices with regard to dust control;
- The development of a means by which the performance of the dust minimisation plan can be regularly monitored and assessed; and
- The specification of effective measures to deal with any complaints received.

CHAPTER 10

NOISE

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10.0 NOISE

10.1 INTRODUCTION

10.1 This chapter of the Environmental Impact Assessment Report assess impacts associated with the proposed development at lands contained within 1-4 City Quay, Dublin 2 D02KT32, 23-25 Moss Street, Dublin 2 D02 F854 and 5 City Quay, Dublin 2 D02PC03. A full description of the development can be found in Chapter 2.

10.2 The application site consists of lands bounded by City Quay to the north, Moss Street to the west, Gloucester Street to the south and the City Quay National School to the east.

10.3 This chapter considers both the short-term demolition/construction phase and the long-term operational phase impacts on the surrounding environment. Mitigation measures are included, where relevant, to ensure the proposed development is constructed and operated with minimal impact on the receiving noise environment.

10.2 METHODOLOGY

10.4 The assessment has been undertaken with reference to the most appropriate guidance documents relating to environmental noise and vibration which are set out in the following sections. In addition to specific noise and vibration guidance documents, the following Environmental Protection Agency (EPA) Guidelines the Information to be Contained in Environmental Impact Assessment Reports (EPA 2022) were considered and consulted in the preparation of this Chapter:

10.5 There are no statutory standards in Ireland relating to noise and vibration limit values for construction works or for environmental noise relating to the operational phase. In the absence of specific statutory Irish guidelines, the assessment has made reference to non-statutory national guidelines, where available, in addition to international standards and guidelines relating to noise and / or vibration impact for environmental sources. These are summarised below

- British Standard Institute (BSI) British Standard (BS) 5228-1:2009 +A1 2014 Code of Practice for noise and vibration control of construction and open sites - Part 1: Noise (hereafter referred to as BS 5228–1) (BSI 2014a);
- BS 5228-2:2009+A1:2014 Code of Practice for noise and vibration control of construction and open sites - Part 2: Vibration (hereafter referred to as BS 5228 – 2) (BSI 2014b);
- BS 7385: 1993 Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration (hereafter referred to as BS 7385–2). (BSI 1993);
- BS 6472-1: 2008 Guide to evaluation of human exposure to vibration in buildings, Part 1 Vibration sources other than blasting (hereafter referred to as BS 6472–1) (BSI 2008);
- BS 8233:2014 Guidance on sound insulation and noise reduction for buildings (hereafter referred to as BS 8233) (BSI 2014c);
- BS 4142: 2014 +A1 2019 Methods for Rating and Assessing Industrial and Commercial Sound (hereafter referred to as BS 4142) (BSI 2019);

- UK Highways Agency (UKHA) Design Manual for Roads and Bridges (DMRB) LA 111 Sustainability and Environmental Appraisal LA 111 Noise and Vibration Revision 2 (hereafter referred to as DMRB Noise and Vibration) (UKHA 2020);
- Dublin Local Authorities including Dublin City Council (DCC), Fingal County Council (FCC), South Dublin County Council (SDCC) and Dún Laoghaire Rathdown County Council (DLRCC) Dublin Agglomeration Third Environmental Noise Action Plan December 2018 – July 2023 (hereafter referred to as the Dublin Agglomeration NAP 2018 – 2023) (DCC; FCC; SDCC; DLRCC 2018);
- Dublin City Council (DCC) Air Quality Monitoring and Noise Control Unit's Good Practice Guide for Construction and Demolition
- S.I. No. 549/2018 – European Communities (Environmental Noise) Regulations 2018 (hereafter referred to as the Noise Regulations);
- S.I. No. 241/2006 - European Communities Noise Emission by Equipment for Use Outdoors (Amendment) Regulations 2006;
- International Organization for Standardization (ISO) 9613-2:1996 Acoustics – Attenuation of sound during propagation outdoors - Part 2: General method of calculation (hereafter referred to as ISO 9613 – 2) (ISO 1996);
- ISO 1996-1:2016 Acoustics - Description, measurement and assessment of environmental noise. Part 1: Basic quantities and assessment procedures (hereafter referred to as ISO 1996 – 1) (ISO 2016);
- ISO 1996-2:2017 - Description, measurement and assessment of environmental noise - Part 2: Determination of sound pressure levels (hereafter referred to as ISO 1996 – 2) (ISO 2017), and;
- The UK Department of Transport Calculation of Road Traffic Noise (hereafter referred to as the CRTN) (UK Department of Transport 1988)

10.6 This study has been undertaken using the following methodology

- Environmental noise surveys have been conducted in the vicinity of the proposed development to assess the existing baseline noise environment;
- A review of the most applicable standards and guidelines has been carried out in order to set a range of acceptable noise and vibration criteria for the construction and operational phases of the proposed development;
- Predictive calculations have been performed to determine the noise and vibration impact on the nearest sensitive locations during the construction phase;
- A review of potential noise sources and their noise impact has been undertaken to determine the noise impact on the nearest noise-sensitive locations during the operational phase, and;
- A schedule of mitigation measures has been proposed for both the construction and operational phases to reduce, where necessary, the outward noise and vibration from the development.

10.2.1 Assessment Criteria

Construction Phase - Noise

10.7 There is no published statutory Irish guidance relating to the maximum permissible noise level that may be generated during the demolition/construction phase of a project. Local Authorities typically control demolition/construction activities by imposing limits on the hours of construction and consider noise limits at their discretion.

Construction noise sources include construction plant and machinery and construction related traffic on surrounding roads.

10.8 The British Standard BS 5228–1 (BSI 2014a) is referenced here for the purposes of setting appropriate construction noise limits for the development. This is the most widely accepted standard for this purpose in Ireland.

Relative Noise Limits (ABC approach)

The approach adopted here calls for the designation of a noise sensitive residential location into a specific category (A, B or C) based on exiting ambient noise levels in the absence of construction noise. This then sets a threshold noise value that, if exceeded at this location, indicates a potential significant noise impact is associated with the construction activities. This is set as a construction noise threshold (CNT).

10.9 This document sets out guidance on permissible noise levels relative to the existing noise environment. Table 10.1 sets out the values which, when exceeded, signify a potential significant effect at the facades of residential receptors as recommended by BS 5228-1:2009+A1:2014.

Table 10.1 *Threshold of Potential Significant Effect at Dwellings*

Assessment Category and Threshold Value Period	Construction Noise Threshold (CNT) Value (dB)		
	Category A [A]	Category B [B]	Category C [C]
Daytime (07:00 – 19:00) Saturdays (07:00 – 13:00)	65	70	75
Evening and Weekends [D]	55	60	65
Night-time (23:00 – 07:00)	45	50	55

A) Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values.

B) Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values.

C) Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values.

D) 19:00–23:00 weekdays, 13:00–23:00 Saturdays and 07:00–23:00 Sundays

10.10 It should be noted that this assessment method is only valid for residential properties and if applied to commercial premises without consideration of other factors may result in an excessively onerous thresholds being set.

Fixed Limits

10.11 BS 5228-1:2009+A1:2014 gives several examples of acceptable limits for construction or demolition noise, the most simplistic being based upon the exceedance of fixed noise limits. For example, paragraph E.2 states:

"Noise from construction and demolition sites should not exceed the level at which conversation in the nearest building would be difficult with the windows shut."

Paragraph E.2 goes on to state:

"Noise levels, between say 07.00 and 19.00 hours, outside the nearest window of the occupied room closest to the site boundary should not exceed:

70 decibels (dBA) in rural, suburban areas away from main road traffic and industrial noise;

75 decibels (dBA) in urban areas near main roads in heavy industrial areas".

10.12 Given the urban environment in which the site is located and the nature and proximity of the surrounding building uses, the following demolition/construction noise thresholds (CNT) are proposed for the development:

- City Quay National School: 70 dB $L_{Aeq,T}$ (During school hours)
- All other locations (residential and offices buildings) and school boundary outside of school hours: 75 dB $L_{Aeq,T}$

Exceedance of the above CNTs are deemed to result in a potentially significant effect, depending on the duration or the impact and margin above the threshold level is calculated.

Significance of Construction Noise Thresholds

10.13 In order to assist with interpretation of significance relative to calculated construction noise level (CNL) compared to the CNTs, Table 10.2 includes guidance as to the likely magnitude of impact associated with demolition/construction noise levels, relative to the threshold value. This guidance is taken from DMRB: Noise and Vibration (UKHA 2020) and adapted to include the EPA EIAR Guidelines.

Table 10.2 *Example Threshold of Significant Effect*

Impact Guidelines for Noise Impact Assessment Significance (Adapted from DMRB)	Classification of Impact		
	CNL per Period	EPA EIAR Guidelines	Determination
Negligible	Below or equal to baseline noise level	Not Significant	Depending on range of CNL and baseline noise level
Minor	Above baseline and below or equal to CNL	Slight to Moderate	
Moderate	Above CNL and below or equal to CNL +5 dB	Moderate to Significant	
Major	Above CNL +5 dB	Significant to Very Significant	

Demolition/Construction Phase- Vibration

10.14 There are two aspects to the issue of vibration that are addressed in the standards and guidelines: the risk of cosmetic or structural damage to buildings; and human

perception of vibration. In the case of this development, vibration levels used for the purposes of evaluating building protection and human comfort are expressed in terms of Peak Particle Velocity (PPV) in mm/s.

10.15 There is no published statutory Irish guidance relating to the maximum permissible vibration level. The following standards are the most widely accepted in this context and are referenced here in relation to cosmetic or structural damage to buildings:

- British Standard BS 5228-2 (BSI 2014b); and
- British Standard BS 7385-2 (BSI 1993)

10.16 BS 5228-2 and BS 7385-2 define the following thresholds for cosmetic damage to residential or light commercial buildings: PPV should be below 15 mm/s at 4 Hz to avoid cosmetic damage. This increases to 20 mm/s at 15 Hz and to 50 mm/s at 40 Hz and above. At frequencies below 4 Hz, a maximum displacement of 0.6 mm (zero to peak) is not to be exceeded. For reinforced and heavy commercial buildings, higher vibration thresholds apply. These is summarised in Table 10.3.

Table 10.3 *Transient vibration guide values for cosmetic damage*

Type of Building	Peak component particle velocity in frequency range of predominant pulse	
	4 Hz to 15 Hz	15 Hz and above
Unreinforced or light framed structures. Residential or light commercial buildings.	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above
Reinforced or framed structures. Industrial and heavy commercial buildings	50mm/s	

Note 1: Values referred to are at the base of the building.
Note 2: At frequencies below 4 Hz, a maximum displacement of 0.6 mm (zero to peak) is not to be exceeded.

10.17 Furthermore, BS 5228-2 and BS 7385-2 state that minor structural damage can occur at vibration magnitudes greater than twice those in Table 10.3 and major structural damage can occur at vibration magnitudes greater than four times those in Table 10.3.

10.18 BS 5228-2 also provides guidance relating to the human response to vibration. Guidance is again provided in terms of PPV in mm/s since this parameter is routinely measured when monitoring the structural effects of vibration. The potential human response at different vibration levels, as set out in BS 5228-2, is summarised in Table 10.4.

Table 10.4 *Guidance on human response to construction vibration in buildings*

Vibration level (mm/s) Note A) B) C)	Effect
0.14	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.

Vibration level (mm/s) Note A) B) C)	Effect
0.3	Vibration might be just perceptible in residential environments.
1.0	It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents.
10	Vibration is likely to be intolerable for any more than a very brief exposure to this level in most building environments.

A) The magnitudes of the values presented apply to a measurement position that is representative of the point of entry into the recipient.

B) A transfer function (which relates an external level to an internal level) needs to be applied if only external measurements are available.

C) Single or infrequent occurrences of these levels do not necessarily correspond to the stated effect in every case. The values are provided to give an initial indication of potential effects, and where these values are routinely measured or expected then an assessment in accordance with BS 6472-1 or -2, and/or other available guidance, might be appropriate to determine whether the time varying exposure is likely to give rise to any degree of adverse comment.

Demolition/Construction Phase- Traffic

10.19 Vehicular movement to and from the demolition/construction site for the proposed development will make use of the existing road network. In order to assess the potential impact of additional traffic on the human perception of noise, the following two guidelines are referenced DMRB Noise and Vibration (UKHA 2020) and the EPA Guidelines (EPA, 2022). For construction traffic, due to the short-term period over which this impact occurs, the magnitude of impacts is assessed against the 'short term' period in accordance with the DMRB Noise and Vibration (UKHA 2020) document.

10.20 Table 10.5 sets out the classification of changes in noise level to impact on human perception based on the guidance contained in these documents

Table 10.5 *Classification of Magnitude of traffic noise changes for Construction Traffic*

Change in Sound Level (dB)	Subjective Reaction	DMRB Magnitude of Impact (Short-term)	EPA Significance of Effect
Less than 1 dB	Inaudible	Negligible	Imperceptible
1 – 2.9	Barely Perceptible	Minor	Not Significant
3 – 4.9	Perceptible	Moderate	Slight, Moderate
≥ 5	Up to a doubling of loudness	Major	Significant

Operational Phase – Building Services Plant Noise

10.21 Building services required for ventilation, heating or other active process have the potential to emit noise to the surrounding environment. To assess any noise impacts from these sources, reference is made here to the British Standard BS 4142 (BSI 2019). This standard can be used to assess the impact of a new continuous source into the existing environment and is used commonly by local authorities in their standard planning conditions and also in compliant investigations.

10.22 Dublin City Council (DCC) refer to the BS 4142 document as a means of controlling noise emissions from new developments. Typical planning conditions relating to the control of noise from new commercial development state the following:

> *Noise levels from the proposed development shall not be so loud, so continuous, so repeated, of such duration or pitch or occurring at such times as to give reasonable cause for annoyance to a person in any premises in the neighbourhood or to a person lawfully using any public place. In particular, the rated noise levels from the proposed development shall not constitute reasonable grounds for complaint as provided for in B.S. 4142. Method for rating industrial noise affecting mixed residential and industrial areas.*

10.23 The method for assessing plant noise set out in BS 4142 (BSI 2019) is based on the following definitions

> *"Specific noise level, $L_{Aeq,\ T}$"* is the equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, T;
>
> *"Rating level, $L_{Ar,\ T}$"* is the specific noise level plus adjustments for the character features of the sound (if any);
>
> *"Residual noise level, $L_{Aeq,\ T}$"* is the noise level produced by all sources excluding the sources of concern, in terms of the equivalent continuous A-weighted sound pressure level over the reference time interval, T;
>
> *"Background noise level, $L_{A90,\ T}$"* is the A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T. This level is expressed using the L_{A90} parameter. These levels were measured as part of the baseline survey.

10.24 Adjustments to the rating level are appropriate where noise emissions are found to be tonal, impulsive in nature or irregular enough to attract attention. In these cases, penalties are applied of either an additional 2 dB, 4 dB or 6 dB depending on how perceptible the tone is at the noise receptors.

10.25 The background level should then be subtracted from the rating level. The greater this difference, the greater the magnitude of the impact will be, in general. A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, while a difference of around +5 dB is likely to be an indication of an adverse impact (as referred to in BS 4142 (BSI 2019)), depending on the context.

10.26 For office and commercial areas within the proposed development, acceptable noise levels both internally and externally, can be determined by referring to the British Standard BS 8233 (BSI 2014c). The following guidance, summarised in Table 10.6, is provided in this standard for internal ambient noise levels in the spaces noted

Table 10.6 *Guidance on Indoor Ambient Noise Levels Development Buildings*

Activity	Location	Occupied Periods	Derived External Levels
Offices	Executive office	35 - 40 dB $L_{Aeq,\ T}$	50 – 55 dB $L_{Aeq,\ T}$
	Open Plan	45 - 50 dB $L_{Aeq,\ T}$	60 – 65 dB $L_{Aeq,\ T}$

	Staff areas/ meeting rooms	35 - 45 $L_{Aeq, T}$	50 – 65 dB $L_{Aeq, T}$
Commercial Spaces	Shops, cafes, etc	50 - 55 $L_{Aeq, T}$	65 – 70 L_{Aeq}

10.27 The derived external levels are based on the approximate attenuation provided by a partially open window of 15 dB, as advised in BS 8233 (BSI 2014c), and represent the appropriate noise level at the external façade of the building. For mechanically ventilated buildings, higher external noise levels will achieve the same internal noise levels with closed windows.

Operational Phase – Additional Traffic on Surrounding Roads

10.28 Vehicular movement to and from the proposed development will make use of the existing road network. In order to assess the potential impact of additional traffic on the human perception of noise, the following two guidelines are referenced DMRB Noise and Vibration (UKHA 2020) and the EPA Guidelines (EPA, 2022).

10.29 Table 10.7 relates to changes in noise level to impact on human perception based on the guidance contained in these documents

Table 10.7 *Classification of magnitude of changes in traffic noise in the long term*

Change in Sound Level (dB)	Subjective Reaction	DMRB Magnitude of Impact (Long-term)	EPA Significance of Effect
0	Inaudible	No impact	Imperceptible
0.1 – 2.9	Barely Perceptible	Negligible	Not significant
3 – 4.9	Perceptible	Minor	Slight, Moderate
5 – 9.9	Up to a doubling of loudness	Moderate	Significant
10+	Doubling of loudness and above	Major	Very significant

Operational Phase – Vibration

10.30 The development is commercial and mixed use in nature. There are no vibration sources associated with the proposed development, therefore there are no outward impact associated with vibration for the operational phase, and accordingly such impacts have been scoped out.

10.3 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

10.31 A description of the project is included in Chapter 2 (Description of the Proposed Development).

10.32 When considering a development of this nature, the potential noise and vibration impact on the surroundings are considered for each of three distinct stages:

- Demolition and Site Remediation Phase;
- Construction Phase; and
- The Operational Phase.

10.3.1 Demolition and Site Remediation Phase

10.33 During the short-term demolition and site remediation phase, items of plant have the potential to generate high levels of noise. These works will involve the use of excavators, loaders, cranes and HGVs.

10.3.2 Construction Phase

10.34 During the short-term construction phase, construction works will involve site establishment, ground works, secant piling works, basement excavation, basement slab construction, concrete works, steel works and construction of the superstructure and fit out works. In addition to the construction activities on site there will be construction traffic including movement of machinery and materials within and to and from the construction site.

10.35 A variety of items of plant will be in use during these construction works all of which have the potential to generate high levels of noise and potential levels of perceptible vibration. These will include breakers, excavators, loaders, piling rigs, cranes and static plant such as generators, compressors and pumps.

10.3.3 Operational Phase

10.36 The proposed development would consist of a new 24-storey building accommodating offices (c. 22,587m^2), a gym (c. 244m^2) and a community arts facility (c. 1,404m^2).

10.37 Once operational the potential noise sources associated with the development relate to any external operational plant items required to serve the building uses noted above.

10.38 Vehicular access to the development would be via Gloucester Street South, where a loading bay for service/maintenance vehicles would also be located and a car lift for private vehicle access to the proposed basement parking.

10.39 The relevant potential sources associated with each phase are discussed in the following sections.

10.4 RECEIVING ENVIRONMENT

10.40 The application site consists of lands bounded by City Quay to the north, Moss Street to the west, Gloucester Street to the south and the City Quay National School, and the Immaculate Heart of Mary Church further east. The site is brownfield in nature and accommodates a c. 20th century three storey building of poor condition which is derelict and vacant. The southern part of the site exists as a commercially operated surface car park.

10.41 The surrounding area is currently evolving with numerous developments completed, underway or on stream. Such developments include the 8-storey, 393-bedroom hotel and residential development currently under construction to the immediate south of the subject site at 44-53 Townsend Street, 33-39 Moss Street, 31-33 Gloucester Street South, and including Bracken's Lane, as well as the recently granted 22-storey office development located to the west along Tara Street. Road traffic, car parking and operational plant noise from surrounding buildings make up the prevailing noise environment within and surrounding the development site.

10.4.1 Baseline Noise Survey

10.42 A baseline noise survey was undertaken within and adjacent to the site to characterise the prevailing noise environment. The surveys were conducted in general accordance with ISO 1996-1 (ISO 2017).

Survey Locations

10.43 The measurement locations were selected to represent the noise environment at noise-sensitive locations (NSL) surrounding the proposed development. The selected locations are shown in Figure 10.1 and described as follows:

N1: Located to the south of the site along Gloucester Street outside site hoarding and opposite the entrance of the City Quay National School.

N2: Located to the north of the site along City Quay adjacent to existing office buildings

N3: Located within the car park of the development site along the mid-western boundary of the site. This location was screened by surrounding road traffic by boundary walls and structures.

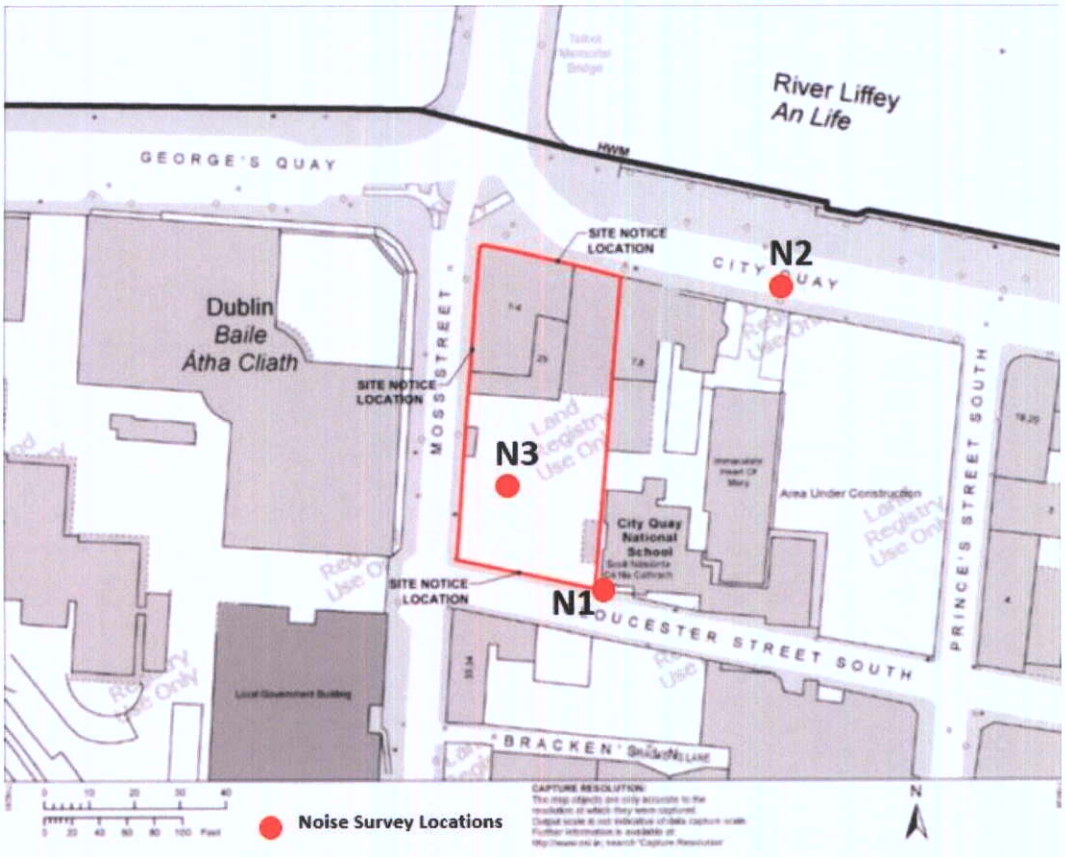


Figure 10.1 *Baseline Noise Survey Locations*

Survey Periods and Survey Conditions

10.44 The surveys were conducted between 10:55 and 16:00 on Thursday 16 June 2022.The survey periods are sufficient to capture the main sources in the surrounding environment. Given the sources in question which dominate the prevailing noise environment is road traffic and background operational plant noise, there is little variation in the ambient noise environment as is evident from the baseline noise results (Refer to Tables 10.8 and Tables 10.9).

10.45 Weather conditions during the survey periods were dry and clear with low cloud cover. Temperatures were between 15°C and 17°C during the day and between 10°C and 12°C at night. Wind speeds were below 5 m/s, which is the maximum wind speed at which the microphone windshield is effective.

Instrumentation and Parameters

The survey was undertaken using a Bruel and Kjaer 2250 Sound Level Meter. Before and after each survey period, the measurement instrument was check calibrated using a Brüel & Kjær Type 4231 Sound Level Calibrator.

10.46 The noise survey results are presented in terms of the following parameters:

L_{Aeq} is the equivalent continuous sound level. It is a type of average and is used to describe a fluctuating noise in terms of a single noise level over the sample period.

L_{A10} is the sound level that is exceeded for 10% of the sample period. It is typically used as a descriptor for traffic noise.

L_{A90} is the sound level that is exceeded for 90% of the sample period. It is typically used as a descriptor for background noise.

L_{AFmax} is the instantaneous maximum sound level measured during the sample period using the 'F' time weighting.

10.47 The "A" suffix for the noise parameters denotes the fact that the sound levels have been "A-weighted" in order to account for the non-linear nature of human hearing. All sound levels in this report are expressed in terms of decibels (dB) relative to 2×10^{-5} Pa.

Survey Results

10.48 The results of the baseline noise surveys at N1 to N3 are summarised in the following sections.

Location N1

The measured survey results for Location N1 are presented in Table 10.8.

Table 10.8 *Baseline Survey Results Location N1*

Start Time	Measured Noise Levels, dB			
	L_{Aeq}	L_{AFmax}	L_{A10}	L_{A90}

10:55	57	79	59	52
14:15	56	75	58	52
15:12	55	70	57	51

10.49 The primary noise contributor at location N1 was plant noise from adjacent buildings, distant construction noise and intermittent passing traffic. The ambient noise level ranged between 55 and 57 dB $L_{Aeq,15min}$. The background noise levels were measured between 51 and 52 dB $L_{A90,15min}$.

Location N2

10.50 The measured survey results for Location N2 are presented in Table 10.9.

Table 10.9 *Baseline Survey Results Location N2*

Start Time	Measured Noise Levels, dB			
	L_{Aeq}	L_{AFmax}	L_{A10}	L_{A90}
11:21	66	82	69	55
14:38	69	87	73	53
15:40	68	92	70	53

10.51 The primary noise contributor at location N2 was passing traffic along city quay. Additional sources were noted from general urban activity including pedestrian conversations, café activity nearby, distant sirens and distant construction. The ambient noise level ranged between 68 and 69 dB $L_{Aeq,15min}$. The background noise levels were measured between 53 and 55 dB $L_{A90,15min}$.

Location N3

The measured survey results for Location N3 are presented in Table 10.10.

Table 10.10 *Baseline Survey Results Location N3*

Start Time	Measured Noise Levels, dB			
	L_{Aeq}	L_{AFmax}	L_{A10}	L_{A90}
13:57	53	67	54	49
14:51	54	70	57	50
15:57	52	70	54	48

10.52 The primary noise contributor at location N3 was car parking activities within the existing car park. Additional sources were noted from general urban activity including pedestrian conversations, distant construction and operational plant noise sources. The ambient noise level ranged between 52 and 54 dB $L_{Aeq,15min}$. The background noise levels were measured between 49 and 50 dB $L_{A90,15min}$.

10.4.2 Desktop Review of Noise Maps

10.53 A desktop review of publicly available data has been undertaken to further characterise the baseline noise environment in the study area. Reference has been made to the most recent Round 3 noise maps published by the Environmental Protection Agency (EPA) (http://gis.epa.ie) for road traffic noise within the Dublin Agglomeration. The published noise maps are provided for the overall day-evening-night period in terms of L_{den} and the L_{night} parameters, defined below.

L_{den} is the 24-hour noise rating level determined by the averaging of the L_{day} with the $L_{evening}$ (plus a 5 dB penalty) and the L_{night} (plus a 10 dB penalty). L_{den} is calculated using the following formula, as defined within the Noise Regulations:

$$L_{den} = 10log\left(\frac{1}{24}\right)\left(12 * \left(10^{\frac{Lday}{10}}\right) + 4 * \left(10^{\frac{Levening+5}{10}}\right) + 8 * \left(10^{\frac{Lnight+10}{10}}\right)\right)$$

Where:

L_{day} is the A-weighted long-term average sound level as defined in ISO 1996-2, determined over all the day periods of a year. The 12 hour daytime period is between 07:00hrs and 19:00hrs

$L_{evening}$ is the A-weighted long-term average sound level as defined in ISO 1996-2, determined over all the evening periods of a year. The four-hour evening period is between 19:00hrs and 23:00hrs

L_{night} is the A-weighted long-term average sound level as defined in ISO 1996-2, determined over all the night periods of a year. The eight-hour night-time period is between 23:00hrs and 07:00hrs.

10.54 Figure 10.2 presents the mapped road traffic noise levels in the vicinity of the development site as reported in the Dublin Agglomeration NAP 2018 – 2023 (DCC; FCC; SDCC; DLRCC 2018) in terms of the L_{den} parameter

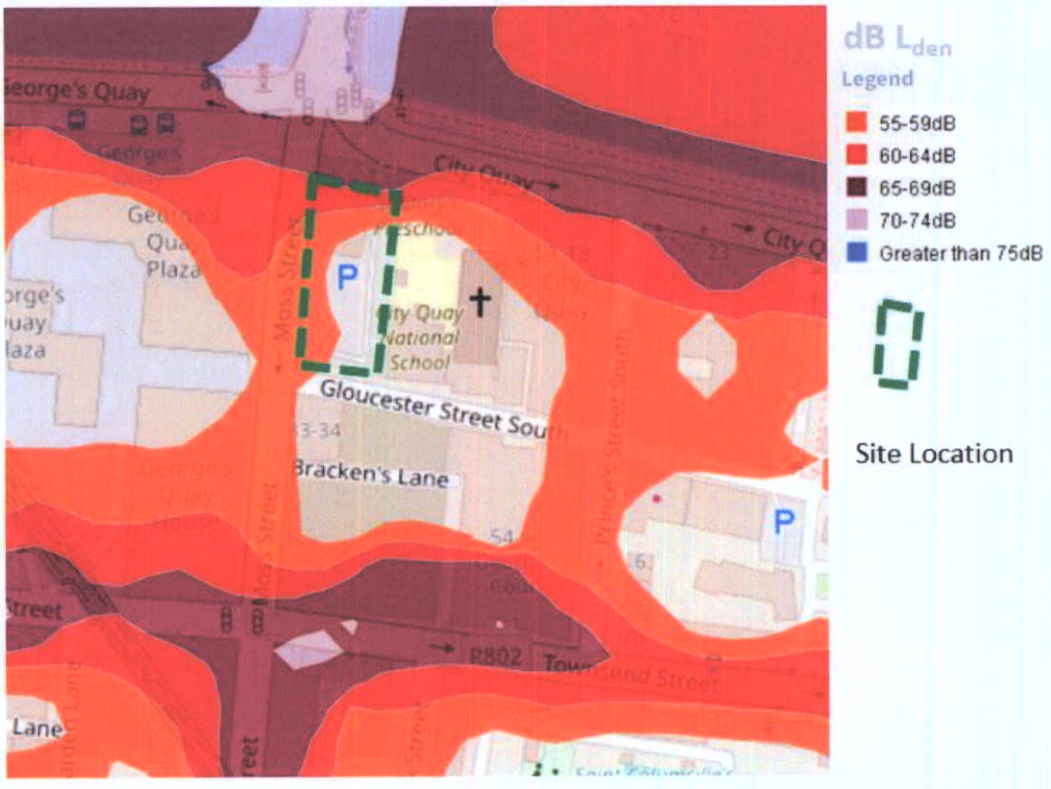


Figure 10.2 *Mapped L_{den} Traffic Noise Level (Source: http://gis.epa.ie)*

10.55 Traffic noise to the north of the site is dominated by traffic along City Quay with the noise levels mapped in the range of 60 to 64 dB L_{den} along the northern site boundary, reducing to between 55 and 59 dB L_{den} and below further south into the site. Buildings along City Quay to the east of the development site are mapped in the range of 60 to 64 dB L_{den} to 65 to 69 dB L_{den} depending the proximity from the road edge. To the south of the site, traffic noise levels along Gloucester Street South are not mapped due to lower traffic flows along this street. Mapped traffic noise levels along the west of the site are in the range of 55 to 64 dB L_{den}.

10.56 Figure 10.3 presents the mapped road traffic noise levels in the vicinity of the development site as reported in the Dublin Agglomeration NAP 2018 – 2023 (DCC; FCC; SDCC; DLRCC 2018) in terms of the L_{night} parameter:

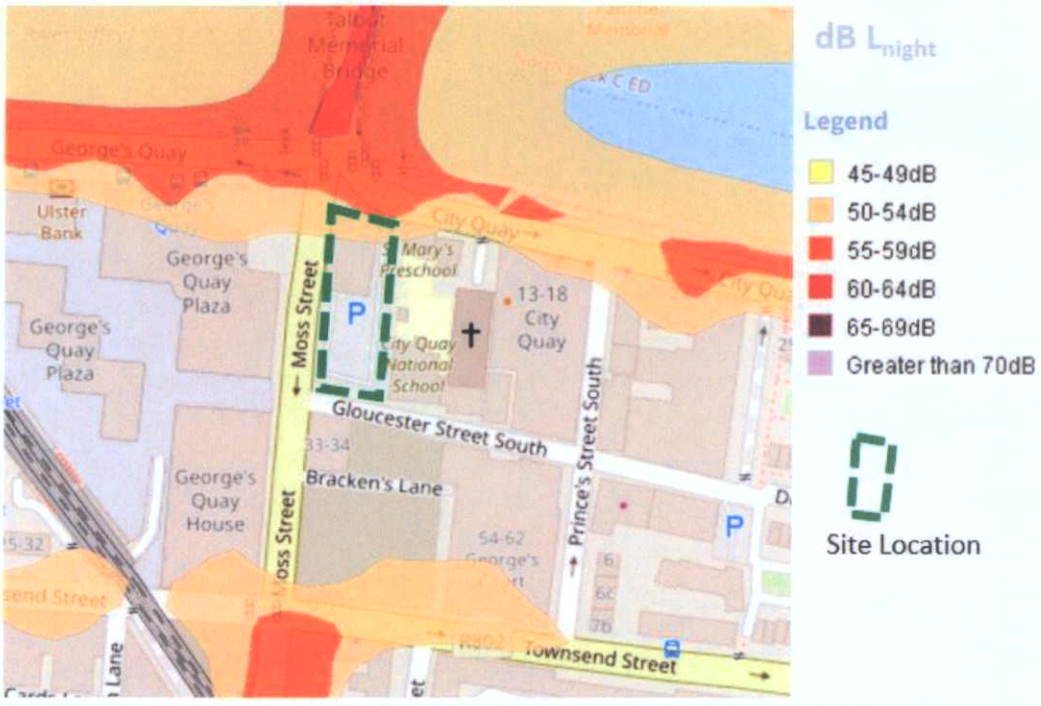


Figure 10.3 Mapped L_{night} Traffic Noise Level (Source: http://gis.epa.ie)

10.57 Night-time traffic noise to the north of the site is dominated by traffic along City Quay with the noise levels mapped in the range of 50 to 54 dB L_{den} along the northern site boundary, reducing to below 50 dB L_{night} further south into the site. Buildings along City Quay to the east of the development site are mapped in the range of 50 to 54 dB L_{night} to 55 to 59 dB L_{night} depending the proximity from the road edge. Moss Street to the west and Gloucester Street to the south are not mapped.

10.5 POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT

10.58 This section (section 10.5) describes the potential effect / impact of the development that would occur, taking into account any mitigations already designed in, but ignoring any additional mitigations set out in the section below (section 10.6).

10.5.1 Demolition/Construction Phase

10.59 The highest potential noise and vibration impact of the proposed development will occur during the construction phase due to the different phases of work requiring a range of construction plant and equipment with high noise levels. However, impacts during this phase are short-term in duration at c. 32-36 months (i.e. less than 7 years)

10.60 The nearest NSL to the site are the City Quay National School which is adjacent to the eastern boundary, an aparthotel and residential block to the south and the Georges Quay office development to the west.

10.61 Given that the construction stage is highly transient in nature and involves a number of various stages which will encompass a range of different activities on a day to day and week to week basis, it is not possible to calculate with a high degree of accuracy the specific levels of noise associated with each stage. The construction stage will be undertaken over a number of stages from site preparation through to building

construction and internal fit out. In terms of the potential noise and vibration impacts, the key stages and activities are expected to involve:

- Demolition of existing structures;
- Site remediation;
- Secant Piled Walls;
- Basement excavation;
- Retaining structures, foundation and basement slab construction;
- Superstructure Construction; and
- Façade and internal fit out.

10.62 The impact at nearby NSLs will depend upon a number of variables, the most notable of which are:

- the amount of noise generated by plant and equipment being used at any one time, expressed in terms of sound pressure or sound power;
- the periods of operation of the plant at the development site, known as the "on-time";
- the distance between the noise source and the receptor;
- the attenuation due to ground absorption or barrier screening effects from walls, buildings, site hoarding etc.

10.63 The construction programme will create typical construction activity related noise onsite. Due to the fact that the construction programme has been established in outline form only, it is difficult to calculate the actual magnitude of noise emissions to the local environment. Indicative ranges of noise levels associated with construction may be calculated in accordance with the methodology set out in BS 5228-1:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites – *Noise*. This standard sets out sound power / sound pressure levels for plant items normally encountered on construction sites, which in turn enables the prediction of noise levels.

10.64 The following section discusses typical noise levels associated with the proposed development demolition/construction phase and comments on potential noise impacts at distances to the nearest NSLs during the key stages and types of activities that will occur on site.

Intrusive Works and High Noise Activities: Demolition and Basement Excavation

10.65 Reference to BS 5288:2009+A1: Part 1 indicates that highest noise levels likely to be required on the site are associated with activities associated with site enabling, demolition and ground breaking associated with the initial demolition and ground clearance phase. Noise levels from these activity types are typically in the range of 80 to 90 dB L_{Aeq} at 10m.

10.66 For construction activities associated with demolition and ground breaking phase, a total construction noise level of 92 dB L_{Aeq}, at 10m has been used for the purposes of indicative calculations. This would involve for example, one item of plant at 90 dB L_{Aeq} and two items of plant at 85 dB L_{Aeq} and one item of plant at 80 dB L_{Aeq} operating simultaneously within one work area which is considered a highly worst-case scenario. The basement depth is above the underlying bedrock level and hence the requirement for rock breaking, crushing or extraction is not envisioned at this site. The higher noise

activities discussed above are therefore associated with the first stages of the site works prior the substantial excavation of the basement.

Utilities and Structural Works Including Secant Piled Walls, Retaining Structures, Piling and Basement Foundation Slab Construction

10.67 For construction works associated with activities such as excavation, basement construction and structural works including excavators, loaders, dozers, cranes, generators, concreting works and secant piling etc. noise levels are typically in the range of 70 to 80 dB L_{Aeq} at 10m.

10.68 For ongoing construction activity associated with the above activities, a total construction noise level of 82 and 85 dB L_{Aeq} at 10m has been used for the purposes of indicative calculations for these activities representing a variety over this stage. This would include, for example two items of plant at 80 dB L_{Aeq} and three items of plant at 75 dB L_{Aeq} operating simultaneously within one work area resulting in a total noise level of 85 dB L_{Aeq} and up to six items of plant with a noise level of between 70 and 75 dB L_{Aeq} resulting in a total noise level of 82 dB L_{Aeq} at 10m

Superstructure and Lower Noise Activities

10.69 For construction work areas with lower noise levels such as those associated with superstructure works including site compounds (for storage, offices and material handling, generators etc.), smaller items of mobile plant (excavators, cranes, dozers), landscaping and concreting works with lower noise emissions, a total construction noise level of 78 dB L_{Aeq} at 10m has been used for the purposes of indicative calculations. This would include, for example one item of plant at 75 dB L_{Aeq} and three items of plant at 70 dB L_{Aeq} operating simultaneously within a work area.

Indicative Construction Noise Calculations at Varying Distances

10.70 The closest external NSLs to the proposed development are directly adjacent to the site boundaries to the west, south and northeast within 10 to 20m, with other buildings at distances beyond 50m.

10.71 The calculations assume that plant items are operating for 66%[1] of the time. For the purpose of the assessment, a standard site hoarding of 2.4m high has been included in the calculations for noise sensitive boundaries to the west and south and the existing 3m high wall to the east is maintained. Screening from existing buildings have not been included in the calculations. It must be stated that for most of the time, plant and equipment will be a greater distance from the nearest NSLs than those used within the calculations and the "on-time" of plant and equipment will be less than those assumed over a normal working day (i.e. the use of hydraulic breakers or piling rigs will be in use for shorter periods than those assumed over a normal working day) and consequently will have lower noise levels. The assessment presented is therefore representative of a best estimate conservative scenario representing construction activities. Table 10.11 and the following tables presents the calculated noise levels at the closest NSLs.

Eastern Boundary

[1] This estimate assumes that the plant will operate for approximately 6.5 hours over the proposed 10 hour working period which equates to a 66% on time over a daytime period or 40 minutes over a 1 hour period. The dynamic nature of construction sites is such that this is deemed to be a conservative estimate, particularly for breaking and drilling work.

10.72 The City Quay National School is the closest NSL to the works located along the immediate eastern site boundary. The western boundary of the school is separated by the development site by a wall of approximately 3m in height which will remain in place. The western façade of the school building does not have any openings facing onto the construction site and hence construction activities within the southern portion of the site will be substantially screened from the school. The upper floors of the north facade of the school building will have a line of sight to works occurring within the central and northern portion of the site. The lower floors and external play area will benefit by screening from the existing boundary wall. The commercial buildings along the north-eastern boundary of this site also do not have any open façade elements (windows) facing towards the development site, however there are windows at upper floor level along the south façade of these buildings which will have a line of sight to construction activities occurring within the mid and southern portion of the site.

10.73 Table 10.11 presents the indicative calculated noise levels at NSLs to the east of the site. The results presented do not take account of any on-site specific noise mitigation measures.

Table 10.11 *Indicative Construction Noise Calculations at Eastern Boundary*

Construction Programme Activity	Combined L_{Aeq} at 10 m	Cumulative Predicted Construction Noise Level at a Specific Distance with plant operating at 66% On-Time (dB $L_{Aeq,12hour}$)			
		School Ground Floor (15m from works)	School Upper Floors (construction activities at 15m)	School Upper Floors (construction at 30m)	Commercial Building Upper South façade (15m)
Initial Works Stage including Intrusive Ground Breaking, demolition	92	75	82	76	82
Utilities and Structural Works including Secant Piled Walls, Retaining Walls, Basement Foundation Slab Construction	85	68	75	69	75
	82	65	72	66	72
General Site Work including Superstructure and Fit out	78	61	68	62	68

10.74 Reference to Table 10.11 indicates that during the initial stage works associated with intrusive ground works, highest noise levels will be experienced at the upper floor levels of the adjacent school building and commercial building when works are occurring along the immediate eastern boundary. Calculated noise levels are in exceedance of the CNTs for both buildings as defined in paragraphs 10.12 and 10.13

Construction noise levels are reduced at further distances into the site. During subsequent construction phases involving activities with lower noise emissions, construction noise levels are typically below the CNT with the exception of periods where activities are occurring along the immediate eastern site boundary. Noise mitigation measures will be required therefore to reduce construction noise levels during the initial work phases to reduce significant effects.

Southern and Western Boundary

10.75 To the south, an aparthotel and residential building across Gloucester Street overlooks the site and upper floors of the north façade of this building will have a direct line of sight to construction activities. The Georges Quay office development is located to the west across Moss Street. Both buildings are at a distance of approximately 15m from the closest site boundary. The site extends 80m north of the aparthotel building and approximately 40m east of the office building.

10.76 Table 10.12 presents the indicative calculated noise levels at varying distances from the site boundary. Whilst a standard 2.4m hoarding will be included along these boundaries, noise levels presented in the following table reflect those calculated at upper floor levels, hence no screening effect has been included to account for a conservative scenario. Construction noise levels at lower floor levels will therefore be lower than those presented in Table 10.12. In addition, the results presented no not take account of any on-site specific noise mitigation measures.

Table 10.12 *Indicative Construction Noise Calculations at South and Western Boundaries*

Construction Programme Activity	Combined L_{Aeq} at 10 m	Cumulative Predicted Construction Noise Level at a Specific Distance with plant operating at 66% On-Time (dB $L_{Aeq,12hour}$)					
		15m	20m	30m	40m	50m	80m
Initial Works Stage including Intrusive Ground Breaking, demolition	92	87	84	81	78	76	72
Utilities and Structural Works including Secant Piled Walls, Retaining Walls, Basement Foundation Slab Construction	85	80	77	74	71	69	65
	82	77	74	71	68	66	62
General Site Work including Superstructure and Fit out	78	73	70	67	64	62	58

10.77 Reference to Table 10.12 indicates that during the initial stage works, highest noise levels will be experienced at the upper floor levels of the adjacent buildings and are likely to exceed the CNT without mitigation. During the subsequent construction phases, calculated construction noise levels are for the majority below the CNT of 75 dB $L_{Aeq,T}$ when construction activities are at distances beyond 15m. Noise mitigation measures will be required therefore to reduce construction noise levels along these boundaries to reduce significant effects.

Demolition/Construction Phase Traffic

10.78 During the demolition/construction phase, traffic associated with the proposed development would consist of a mix of Light Goods Vehicles (LGVs) and Heavy Goods Vehicles (HGVs) travelling to and from the site. Chapter 13 (Traffic and Transportation) includes information relating to traffic generated and traffic management during this phase.

10.79 Works associated with the proposed development will generate temporary additional traffic on the surrounding road network for a period of approximately 33-36 months, assumed to commence in 2023. The most likely construction access and materials handling locations for the site are considered to be via City Quay or Moss Street and Townsend Street.

10.80 Chapter 13 notes that due to the constrained nature of the existing site, it is considered that no more than one HGV at-a-time could be accommodated at the site either for waste removal or materials delivery. Assuming an average turnaround time per HGV of 15 minutes, then a maximum of 60 deliveries per day could be accommodated, resulting in a total of 120 trips associated with the removal of waste or delivery of materials to the site. Existing traffic volumes along Moss Street are of the order of 3,200 vehicles per day, approximately 5,000 per day along Townsend Street East and 10,700 per day along City Quay.

10.81 In terms of potential noise impact, traffic volumes would need to increase by 25% or greater along the designated network to result in a negligible (1 dB) increase in traffic noise level. Based on the traffic numbers set out above, additional traffic introduced onto the local road network during peak construction periods are significantly less than 25% along the surrounding roads where construction traffic will travel.

10.82 The related increase in road traffic noise along the surrounding road network is less than 1 dB. Reference to Table 10.5 confirms an increase in traffic noise of this magnitude is not significant. The impact is therefore determined to be negative, short-term and not significant.

Construction Phase Vibration

10.83 The main potential source of vibration during the construction programme is associated with piling and ground breaking activities. The proposed building formation level and basement slab will require made ground and overburden to be excavated from the main site level down to basement level. The basement depth is above the underlying bedrock level and hence the requirement for rock breaking or extraction is not envisioned at this site.

10.84 A secant pile perimeter wall will be constructed to the basement perimeter. This piling method minimises the vibration levels generated as it is a non-percussive piling technique.

10.85 For the purposes of this assessment the expected vibration levels during piling have been determined through reference to published empirical data. Measured data from BS 5228-2 (BSI 2009 +A1 2014b) pertaining to rotary driven piles using a 600mm pile diameter for bored piling into soft ground over rock, (Table D.6, Ref. No. 106) quote the following vibration magnitudes:

- 0.54mm/s at a distance of 5m, for auguring.

- 0.22mm/s at a distance of 5m, for twisting in casing.
- 0.42mm/s at a distance of 5m, for spinning off.
- 0.43mm/s at a distance of 5m, for boring with rock auger

10.86 Considering the low vibration levels at very close distances to the piling rigs, vibration levels at the surrounding buildings will not pose any significance in terms of cosmetic or structural damage and are also below the criteria set for significant effects to people within buildings.

10.87 During intermittent breaking activity at ground level, there is also potential for vibration to be generated. Empirical data for this activity is not provided in the BS 5228-2:2009+A1:2014 standard, however the likely levels of vibration from this activity is expected to be significantly below the vibration criteria for building damage on experience from other sites. AWN Consulting have previously conducted vibration measurements under controlled conditions, during trial construction works, on a sample site where concrete slab breaking was carried out. The trial construction works consisted of the use of the following plant and equipment when measured at various distances:

- 3 tonne hydraulic breaker on small CAT tracked excavator
- 6 tonne hydraulic breaker on large Liebherr tracked excavator

10.88 Vibration measurements were conducted during various staged activities and at various distances. Peak vibration levels during staged activities using the 3 Tonne Breaker ranged from 0.48 to 0.25 PPV (mm/s) at distances of 10 to 50m respectively from the breaking activities. Using a 6 Tonne Breaker, measured vibration levels ranged between 1.49 to 0.24 PPV (mm/s) at distances of 10 to 50m respectively. Whilst these measurements relate to a solid concrete slab, the range of values recorded provides some context in relation typical ranges of vibration generated by construction breaking activity.

10.89 Vibration magnitudes associated with this activity are well below those associated with any form of cosmetic damage to buildings. There is potential for a negative moderate brief impact for building occupants within 20m of this activity using a 6 Tonne Breaker or equivalent. The impacts however, are significantly reduced in terms of human response once the source of vibration is known and good communications are in place.

10.5.2 Operational Phase

10.90 The main potential sources of outward noise from the development during the operational phase will be traffic flows to and from the development via public roads, and mechanical and electrical plant used to service the buildings. The review of standards and guidelines in Section 10.2.1 will be used here to assess the potential impact of the proposed development during the operational phase. A gym/spa facility exclusive for use by the office users and Art Centre staff is proposed on the upper basement floor level (-1 level), situated in the centre of the floor between the Art Centre and the changing rooms area.

Building Services Plant Noise

10.91 There will be a variety of mechanical and electrical (M&E) items required to serve the proposed development once it becomes operational. These are likely to include water pumps, air handling systems, condensers, etc. Depending on the operational hours

and occupancy of the various spaces within the building, some of these will operate on a 24/7 basis depending on the specific use.

10.92 The M&E plant requirements for the building have not yet been progressed to detailed design stage at this stage of the development. The location of plant items required for within the proposed development will be developed as part of detailed design once the final tenant requirements are known. It is envisaged, however there will be external plant requirements which are likely to be at roof level or venting from basement levels.

10.93 BS 4142 (BSI 2019) sets out a method for assessing the impact of a new continuous noise source to a residential environment such as plant items used to service the office and commercial elements within the proposed development. The closest off-site NSLs are the school building to the east and aparthotel building to the south. BS 4142 (BSI 2019) states that if the rating level of the item exceeds the background noise level by 5 dB, an adverse impact is likely to occur, while an exceedance of 10 dB is likely to cause a significant adverse impact, depending on the context.

10.94 The lowest background noise level at the boundaries of the site were determined through baseline noise surveys. Lowest background noise levels during the day were in the range 49 to 52 dB $L_{A90,T}$ at monitoring locations N1 and N3.

10.95 Based on the above, it is recommended that cumulative plant noise from associated with the development does not exceed 45 dB $L_{Aeq,15min}$ and does not contain audible tones at NSLs outside of the site. This is set to ensure no significant increase in the prevailing background noise level occurs at existing NSL.

10.96 As noted above, the key design criteria for the proposed development for operational plant noise relates to the achievement of acceptable noise levels external at NSLs adjacent to the site. As the final specifics in terms of plant selection has not yet been established, the choice, location and number of items during detailed design will be reviewed to control noise within the development. Once the operational design criterion is not exceeded, the operational noise impact from building services noise to the surrounding environment is therefore not significant and long-term.

Traffic and Vehicle Noise

10.97 The vehicular site access to the proposed development shall be located along Gloucester Street South. At this access point there will be a loading bay for service/maintenance vehicles and a car lift to allow private vehicles to access basement parking. Reference to Chapter 13 notes that the percentage change in traffic volumes along the surrounding road network is less than 2% along all roads with the exception of Gloucester Street South where a 32% increase is forecast. The higher percentage increase along this street is due to the lower baseline volumes and the vehicular site access here.

10.98 In terms of potential noise impact, traffic volumes increases of this magnitude along this road results in a change in noise level of less than 1.5 dB. Reference to Table 10.7 confirms this results in a negligible change in noise level. The resultant impact is not significant and long term.

10.6 REMEDIAL AND MITIGATION MEASURES

10.6.1 Demolition/Construction Phase

10.99 The appointed contractor will be required to take specific noise abatement measures to the extent required and comply with the recommendations of BS 5228–1 (BSI 2014a) and S.I. No. 241/2006 - European Communities (Noise Emissions by Equipment for Use Outdoors) (Amendment) Regulations 2006. In addition, the Dublin City Council's (DCC) *"Air Quality Monitoring and Noise Control Unit's Good Practice Guide for Construction and Demolition"* outlines a risk assessment methodology to be followed for construction activities which will be undertaken as part of the site control measures.

10.100 These measures will ensure that:

- During the Construction Phase, the appointed contractor will be required to manage the works to comply with the limits detailed in Section 11.2.1 using methods outlined in BS 5228–1 (BSI 2014a) and control measures outlined in the DCC *Air Quality Monitoring and Noise Control Unit's Good Practice Guide for Construction and Demolition* risk assessment document; and
- The best means practicable, including proper maintenance of plant and equipment, will be employed to minimise the noise produced by on-site operations.

10.101 BS 5228–1 includes guidance on several aspects of construction site practices, which include, but are not limited to:

- Selection of quiet plant;
- Control of noise sources;
- Screening;
- Hours of work;
- Liaison with the public; and
- Monitoring.

10.102 The contractor will put in place the most appropriate noise control measures depending on the level of noise reduction required during specific phases of work (i.e. based on the construction threshold values for noise and vibration set out in 10.2.1). Reference to Table 10.11 and Table 10.12 indicates that intrusive works associated with occurring within 50m of NSLs will need specific noise control measures to reduce impacts.

Selection of Quiet Plant

10.103 The potential for any item of plant to result in exceedance of construction noise thresholds will be assessed prior to the item being brought onto the site. The least noisy item of plant will be selected wherever practicable (e.g. plant items with sound attenuation incorporated). Should a particular item of plant already on the site be found to exceed the construction noise thresholds, the first action will be to identify whether the item can be replaced with a quieter alternative.

10.104 The appointed contractor will evaluate the choice of excavation, breaking or other working method taking into account various ground conditions and site constraints. Where alternative lower noise generating equipment are available that will provide equivalent structural / excavation / breaking results, these will be selected to control noise within the relevant thresholds, where it is practicable to do so.

10.105 The decision regarding the type of excavation technique or other construction activity to be used on a site will normally be governed by a range of engineering and environmental constraints. In these instances, it may not be possible for technical reasons to replace an item of plant with a quieter alternative. In some instances, the adoption of a quieter method may prolong the overall process, with the net result being that the overall disturbance to the community will not necessarily be reduced.

Noise Control at Source

10.106 The following measures will be implemented, if required, by the appointed contractor to control noise at source. These measures relate to specific site considerations:

- For mobile plant items such as dump trucks, cranes, excavators and loaders, the installation of an acoustic exhaust, utilising an acoustic canopy to replace the normal engine cover and / or maintaining enclosure panels closed during operation can reduce noise levels by up to 10 dB;
- For percussive tools such as pneumatic concrete breakers and tools a number of noise control measures include fitting a muffler or sound reducing equipment to the breaker 'tool' and ensuring any leaks in the air lines are sealed;
- Where compressors, generators and pumps are located in proximity to NSLs and have the potential to exceed the construction noise thresholds, these will be surrounded by acoustic lagging or enclosed within acoustic enclosures providing air ventilation; and
- Resonance effects in panel work or cover plates can be reduced through stiffening or the application of damping compounds, while other noise nuisance can be controlled by fixing resilient materials in between the surfaces in contact

Screening

10.107 Screening is an effective method of reducing CNLs at a receiver location and can be used successfully as an additional measure to other forms of noise control. The effectiveness of a noise screen will depend on the height and length of the screen, its mass, and its position relative to both the source and receiver. BS 5228–1 (BSI 2014a) states that on level sites the screen should be placed as close as possible to either the source or the receiver. The construction of the barrier will be such that there are no gaps or openings at joints in the screen material.

10.108 Erection of localised demountable enclosures or screens will be used around breakers or drill bits, as required, when in operation in proximity to NSLs with the potential to exceed the construction noise thresholds. Annex B of BS 5228–1 (Figures B1, B2 and B3) provide typical details for temporary and mobile acoustic screens, sheds and enclosures that can be constructed on-site from standard materials. A well placed and designed mobile temporary screen around a breaker or excavation can effectively reduce noise emissions by 10 dB(A).

10.109 In addition, careful planning of the construction site layout will also be considered. The placement of site buildings such as offices and stores between the site and sensitive locations can provide a good level of noise screening.

Hours of Work

10.110 Standard working hours for construction will be 7.00am to 7.00pm Monday to Friday and 7.00am to 14.00pm on Saturday (if required), with no works on Sundays or Bank Holidays except in exceptional circumstances or in the event of an emergency.

Liaison with the Public

10.111 For the proposed development, the duration of excavation, breaking and other high noise or vibration activities is usually short in relation to the length of construction work as a whole, and the amount of time spent working near to sensitive areas can represent only a part of the overall period.

10.112 The contractor will establish clear forms of communication that will involve the appointed contractor to NSLs in proximity to the works, so that residents or building occupants are aware of the likely duration of activities likely to generate noise or vibration that are potentially significant.

Monitoring

10.113 During the construction phase the contractor will carry out noise monitoring at representative NSLs to evaluate and inform the requirement and / or implementation of noise management measures. Noise monitoring will be conducted in accordance with ISO 1996–1 (ISO 2016) and ISO 1996–2 (ISO 2017).

Vibration Control

10.114 On review of the likely vibration levels associated with demolition/construction activities, construction activities associated with the proposed development are not expected to give rise to vibration that is either significantly intrusive or capable of giving rise to structural or cosmetic damage to buildings.

10.115 Vibration from demolition/construction activities will be limited to the values set out in Table 10.3 to avoid any form of potential cosmetic damage to buildings and structures. Monitoring will be undertaken at identified sensitive buildings, where proposed works have the potential to be at or exceed the vibration limit values in Table 10.3.

10.116 In the case of vibration levels giving rise to human discomfort, in order to minimise such impacts, the following measures shall be implemented during the Construction Phase

- A clear communication programme will be established by contractor to inform adjacent building occupants in advance of any potential intrusive works which may give rise to vibration levels likely to result in significant effects as per Table 10.4. The nature and duration of the works will be clearly set out in all communication circulars as necessary; and
- Appropriate vibration isolation shall be applied to plant (such as resilient mounts to pumps and generators), where required and where feasible.

10.6.2 Operational Phase

Building Services Noise

10.117 At the detailed design stage, best practice measures relating to building services plant will be taken to ensure there is no significant noise impact on NSLs adjacent to the development. Best practice measures in this context include the following:

- The selection and design of operational plant items with potential to emit noise to atmosphere will be designed to comply with the noise control guidance from BS 4142 (BSI 2014) as discussed in Section 10.2.1.
- Where ventilation is required for plant rooms, consideration will be given to acoustic louvers or attenuated acoustic vents, where required, to reduce noise breakout;
- Ventilation plant serving plant rooms and car parks will be fitted with effective acoustic attenuators to reduce noise emissions to the external environment;
- The use of perimeter plant screens will be used, where required, for roof-top plant areas to screen noise sources;
- The use of attenuators or silencers will be installed on external air-handling plant;
- All mechanical plant items, e.g. fans, pumps etc., shall be regularly maintained to ensure that excessive noise generated by worn or rattling components is minimised;
- Any new or replacement mechanical plant items, including plant located inside new or existing buildings, shall be designed so that all noise emissions from site do not exceed the noise limits outlined in this document; and
- Installed plant will have no tonal or impulsive characteristics when in operation.

Traffic Along Surrounding Road Network

10.118 Changes to traffic flows will not result in a perceptible increase in noise level in the surrounding environment. Therefore, no mitigation measures are necessary in this case.

10.119 The loading bay for service/maintenance vehicles along Gloucester Street South shall be operated that does not result in significant noise impacts at NSLs to the south. Where required, this would include limiting deliveries during hours, and ensuring vehicles are loaded / unloaded within the building.

10.7 RESIDUAL IMPACTS OF THE PROPOSED DEVELOPMENT

10.7.1 Demolition/Construction Phase

10.120 The use of best practice noise control measures, hours of operation, scheduling of works within appropriate time periods, and noise monitoring during this phase will be implemented. With the inclusion of the various noise and vibration control measures on site discussed in Section 10.6.1, it is expected that calculated noise levels in Table 10.11 and Table 10.12 can be reduced by at least 10 dB.

10.121 With the inclusion of the various available noise and vibration control measures, noise levels can be controlled to within the CNTs at the closest NSLs for the majority of the Construction Phases, thus resulting in a negative, moderate, short term impact (Reference to Table 10.2).

10.122 There is potential for residual demolition/construction noise levels to be up to 5 dB above the lower CNT of 70 dB $L_{Aeq,T}$ during intrusive activities close to the eastern site boundary for intermittent periods of time. Referring to Table 10.2, there is therefore potential for a residual, negative, moderate to significant and temporary impact at NSLs along this boundary at upper floor levels. The majority of residual construction noise impacts during the remaining work phases, are however expected to be controlled to within the CNT, thus resulting in a negative, moderate, short term impact.

10.123 There are no residual significant vibration impacts associated with the demolition/construction phase.

10.7.2 Operational Phase

10.124 Once operational, residual noise levels associated with building services plant from the proposed development will be designed to not increase the prevailing background noise environment by more than 5 dB. The residual effect is neutral, not significant and long-term.

10.125 Traffic along the surrounding road network will not lead to a change in noise level that would pose any significant effect. The resultant impact is negative, not significant, and long-term.

10.8 MONITORING OR REINSTATEMENT

10.8.1 Demolition/Construction Phase

10.126 During the demolition/construction phase the contractor will carry out noise monitoring at representative NSLs to evaluate and inform the requirement and / or implementation of noise management measures. Noise monitoring will be conducted in accordance with ISO 1996–1 (ISO 2016) and ISO 1996–2 (ISO 2017).

10.8.2 Operational Phase

10.127 There are no proposed monitoring requirements associated with the operational phase of the proposed Development.

10.9 CUMULATIVE IMPACTS OF THE PROPOSED DEVELOPMENT

10.9.1 Demolition/Construction Phase

10.128 A full list of developments that are currently permitted or under construction within the surrounding area are identified and described in Chapter 2 (Project Description) and illustrated in Figure 2.16 of Chapter 2.

10.129 In the event that demolition/construction activities at nearby sites are taking place concurrently with the demolition/construction of the proposed development, there is potential for cumulative noise impacts to occur. Due to the nature of demolition/construction works associated with the proposed development, noise levels from this site will dominate the noise environment when occurring in proximity to the noise sensitive locations along its immediate boundary. The noise contribution from other construction sites would need be equal to those associated with the proposed development in order to result in any cumulative effect.

10.130 The closest identified permitted development is located along Georges Quay, (Block B development) located approximately 100m east of the proposed development which is under construction or nearing completion. This site is significantly screened from the closest NSLs to the proposed development under consideration here by multi-storey buildings. The combination of attenuation with distance and the significant screening affect from intervening buildings is such that any construction noise emissions from the closest site will be at a very minimum, 10dB below those associated with the proposed development and therefore will not result in any cumulative noise effect.

10.131 A permitted but not yet constructed development to the south of the site approximately 100m south of the proposed development. This site is also screened from the closest NSLs to the proposed development under consideration here by multi-storey buildings. The combination of attenuation with distance and the screening affect from intervening buildings is such that any construction noise emissions from the closest site will be at a very minimum, 10dB below those associated with the proposed development and therefore will not result in any cumulative noise effect.

10.132 The remaining identified developments in the surrounding area are in excess of 200m from the proposed development and screened by multiple high-storey buildings. The resultant cumulative noise impact from these development sites is not significant.

10.133 The demolition/construction noise levels discussed in Table 10.11 and Table 10.12 and those discussed in Section 10.13.1 remain a representation of a worst case analysis of potential construction noise impacts at the most impacted NSLs.

10.9.2 Operational Phase

10.134 There are no cumulative noise impacts associated with the proposed development and other developments in the areas. The noise limits set for off-site noise sensitive locations are designed to avoid any significant increase in the prevailing background noise environment. Operational noise limits included in this report refer to cumulative noise from all fixed installations on site. The design of plant and other fixed installations will be progressed during the design stage to ensure the noise limits at off-site noise sensitive locations are not exceeded.

CHAPTER 11

LANDSCAPE AND VISUAL IMPACT

awnconsulting
A Trinity Consultants Company

11.0 LANDSCAPE AND VISUAL IMPACT

11.1 INTRODUCTION

11.1 This chapter represents an assessment of the impacts of the proposed development on the townscape character and visual amenity of the site and its environs. It describes the townscape character of the subject site and its hinterland, together with the visibility of the site from significant viewpoints in the locality. It includes an outline of the methodology utilised to assess the impacts, a description of the receiving environment (baseline) and of the potential impacts of the development upon it. Mitigation measures introduced to ameliorate or offset impacts are outlined and the resultant predicted (residual) impacts are assessed.

11.2 METHODOLOGY

11.2 The assessment was carried out between January and July 2022 with reference to:

- Guidelines for Landscape and Visual Impact Assessment, 3rd edition, 2013 (GLVIA), published by the Landscape Institute;
- Technical Information Note on Townscape Character Assessment, 2016, published by the Landscape Institute;
- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports, 2022, published by the EPA;
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment, 2018, published by the Department of Housing, Planning and Local Government.

11.3 The EPA guidelines provide a general methodology and impact ratings for all types of specialist assessments. The GLVIA provides specific guidelines for landscape and visual impact assessment. Therefore, a combination of the EPA guidelines, the GLVIA and professional experience has informed the methodology for this assessment.

11.2.1 Key Principles of the GLVIA

Use of the Word 'Townscape'

11.4 The GLVIA recommends that the word 'townscape' be used (instead of landscape) where a proposed development's receiving environment is dominated by built elements. The GLVIA defines townscape as *"the landscape within the built-up area, including the buildings, the relationships between them, the different types of urban spaces, including green spaces and the relationship between buildings and open spaces"*. As the subject site is located in the urban environment, the word townscape is used in this chapter. The word landscape is used in reference to green spaces or vegetation within the townscape.

Assessment of Both Townscape and Visual Effects

11.5 The GLVIA requires that effects on views and visual amenity be assessed separately from the effects on townscape, although the two topics are inherently linked.

- 'Townscape' results from the interplay between the physical, natural and cultural components of our surroundings. Different combinations and spatial

distribution of these elements create variations in townscape character. Townscape impact assessment identifies the changes to this character which would result from the proposed development, and assesses the significance of those effects on the townscape as a resource.

- Visual impact assessment is concerned with changes that arise in the composition of views, the response of people to those changes and the overall effects on the area's visual amenity - with particular focus on public views and public visual amenity.

11.2.2 Methodology for Assessment of Townscape Effects

11.6 The assessment of potential townscape effects involves (a) classifying the sensitivity of the townscape receptors (the main elements, features, characteristics and character areas of the townscape), (b) classifying the potential magnitude of change to each receptor, and (c) combining these factors to arrive at an assessment of the significance of the effects on each receptor - and the quality of the effects (positive, neutral or negative).

Townscape Sensitivity

11.7 The sensitivity of the townscape is a function of its character, which may be determined by its land use pattern, urban grain, building typologies and architecture, cultural and natural heritage elements, and the quality of the public realm. These factors determine the value that is placed on the townscape. The nature and scale of the proposed development is also taken into account (a particular townscape can have varying sensitivity to different development types), as are any trends of change, and relevant policy. Five categories are used to classify sensitivity, as set out in Table 11.1.

Table 11.1 *Categories of townscape sensitivity*

Sensitivity	Description
Very High	Areas where the townscape exhibits very strong, positive character with valued elements, features and characteristics that combine to give an experience of unity, richness and harmony. The townscape character is such that its capacity to accommodate change is very low. These attributes are recognised in policy or designations as being of national or international value and the principle management objective for the area is protection of the existing character from change.
High	Areas where the townscape exhibits strong, positive character with valued elements, features and characteristics. The townscape character is such that it has limited/low capacity to accommodate change. These attributes are recognised in policy or designations as being of national, regional or county value and the principle management objective for the area is the conservation of existing character.
Medium	Areas where the townscape has certain valued elements, features or characteristics but where the character is mixed or not particularly strong, or has evidence of alteration, degradation or erosion of elements and characteristics. The townscape character is such that there is some capacity for change. These areas may be recognised in policy at local or county level and the principle management objective may be to consolidate townscape character or facilitate appropriate, necessary change.
Low	Areas where the townscape has few valued elements, features or characteristics and the character is weak. The character is such that it has capacity for change; where development would make no significant change or would make a positive change. Such townscapes are generally unrecognised in policy and the principle management objective may be to facilitate change through development, repair, restoration or enhancement.
Negligible	Areas where the townscape exhibits negative character, with no valued elements, features or characteristics. The character is such that its capacity to accommodate change is high; where development would make no significant change or would make a

	positive change. Such townscapes include derelict industrial lands, as well as sites or areas that are designated for a particular type of development. The principle management objective for the area is to facilitate change in the townscape through development, repair or restoration.

Note on definitions used in this assessment

11.8 The definitions in Table 11.1 (townscape sensitivity), 11.2 (magnitude of townscape change), 11.4 (viewpoint sensitivity) and 11.5 (magnitude of visual change) are not taken from either the GLVIA or the EPA Guidelines on the Information to be Contained in Environmental Impact Assessment Reports, 2022. Both of these guidance documents require that classifications of sensitivity and magnitude of change (such as high, medium, low, etc.) be used in the assessment process (see EPA Guidelines Figure 3.4 and GLVIA Box 3.1, Paragraph 3.26 and Figure 3.5) but neither guidance document provides definitions for such classifications.

11.9 The GLVIA specifically avoids being prescriptive in this this regard (GLVIA paragraph 1.20): *"The guidance concentrates on principles... It is not intended to be prescriptive, in that it does not provide a detailed 'recipe' that can be followed in every situation. It is always the primary responsibility of any landscape professional carrying out an assessment to ensure that the approach and methodology adopted are appropriate to the particular circumstances."* (emphasis added)

11.10 The EPA Guidelines state (in Section 3, p.49): *"While guidelines and standards help ensure consistency, the professional judgement of competent experts can play an important role in the determination of significance. These experts may place different emphases on the factors involved. As this can lead to differences of opinion, the EIAR sets out the basis of these judgements so that the varying degrees of significance attributed to different factors can be understood."* (emphasis added)

11.11 The GLVIA and EPA Guidelines thus require that the factors used in arriving at significance conclusions (i.e. classifications of sensitivity and magnitude) should be explained in the EIAR, but the guidelines do not provide the explanations themselves. The EPA guidelines state:

> *"Some uncertainty is unavoidable in EIA, especially about matters that involve an element of judgement, such as assigning a level of significance to an effect. Such judgements should be explicit and substantiated rather than presented as objective fact. This is best done using agreed referable approaches, e.g. the Guidelines on Landscape and Visual Impacts Assessment provide guidance on what constitutes a severe visual effect. (See also section 2.4.2 Maintaining Objectivity.)".*

11.12 It is for this reason that the definitions in Tables 11.1, 11.2, 11.4 and 11.5 are provided in this section. These definitions have been developed and refined by LVIA practitioners in Ireland and the UK, including the chapter author, over decades of practice. They are not standard, i.e. the classifications/definitions used in this assessment may differ from those used by other practitioners. However, the author considers them to be reasonable and appropriate for the purpose of classifying the significance of landscape/townscape and visual effects and the same definitions have been used in many previous LVIA reports/chapters prepared by the author and accepted by the planning authorities.

Magnitude of Townscape Change

11.13 Magnitude of change is a factor of the scale, extent or degree of change imposed on the townscape by a development, with reference to its key elements, features, characteristics and character areas (collectively termed 'townscape receptors'). Five categories are used to classify magnitude of change, as set out in Table 11.2.

Table 11.2 *Categories of magnitude of townscape change*

Sensitivity	Description
Very High	Change that is large in extent, resulting in the loss of or major alteration to key elements, features or characteristics of the townscape, and/or introduction of large elements considered totally uncharacteristic in the context. Such development results in fundamental change in the character of the townscape.
High	Change that is moderate to large in extent, resulting in major alteration to key elements, features or characteristics of the townscape, and/or introduction of large elements considered uncharacteristic in the context. Such development results in change to the character of the townscape.
Medium	Change that is moderate in extent, resulting in partial loss or alteration to key elements, features or characteristics of the townscape, and/or introduction of elements that may be prominent but not necessarily substantially uncharacteristic in the context. Such development results in change to the character of the landscape.
Low	Change that is moderate or limited in scale, resulting in minor alteration to key elements, features or characteristics of the townscape, and/or introduction of elements that are not uncharacteristic in the context. Such development results in minor change to the character of the landscape.
Negligible	Change that is limited in scale, resulting in no alteration to key elements features or characteristics of the townscape, and/or introduction of elements that are characteristic of the context. Such development results in no change to the townscape character.

Significance of Effects

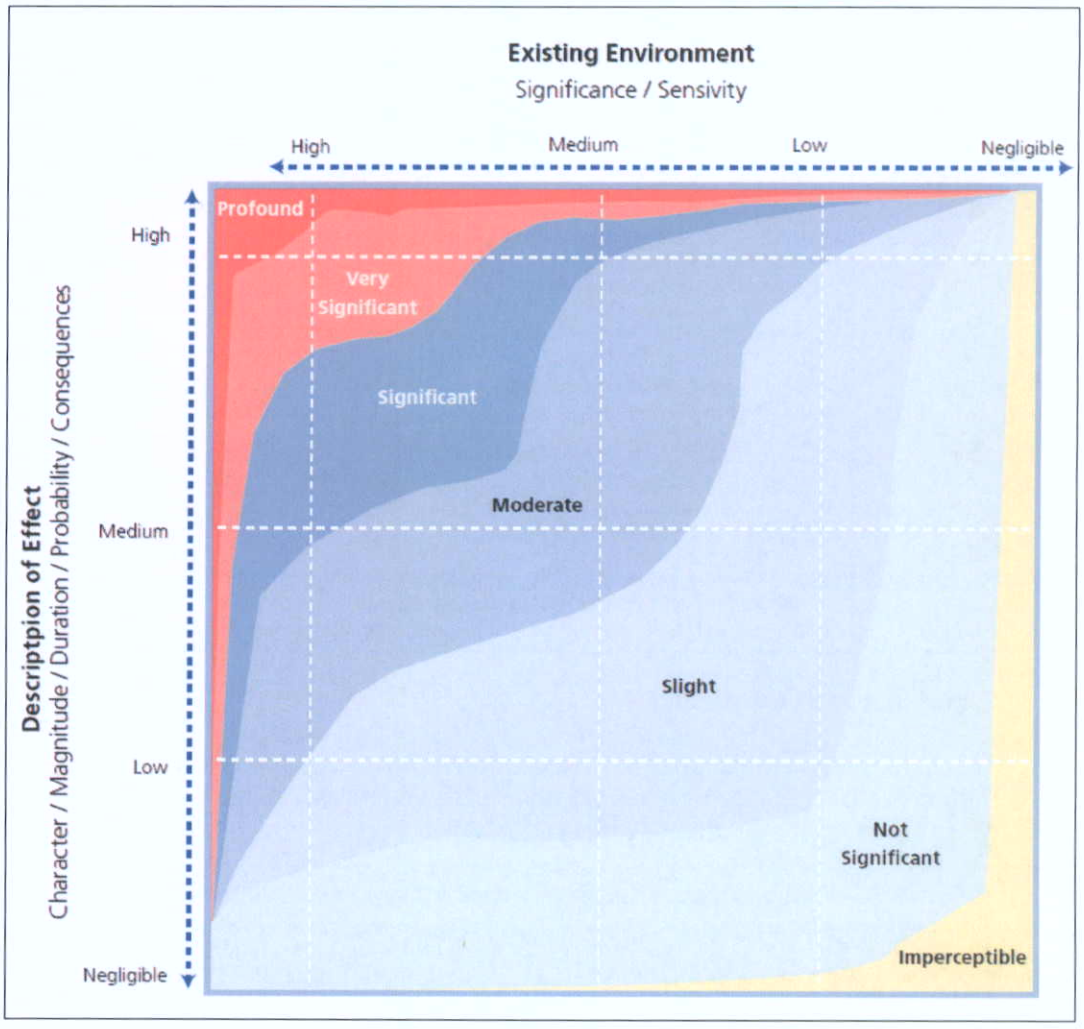
11.14 To classify the significance of effects (for both townscape and visual impacts) the magnitude of change is measured against the sensitivity of the receiving environment/ receptor using the guide in Table 13.3.

Table 11.3 *Guide to Classification of Significance of Landscape and Visual Effects*

		Sensitivity of the Landscape/View				
		Very High	**High**	**Medium**	**Low**	**Negligible**
Magnitude of Landscape/Visual Change	**Very High**	Profound	Profound to V. Significant	V. Significant to Significant	Moderate	Slight
	High	Profound to V. Significant	V. Significant	Significant	Moderate to Slight	Slight to Not Significant
	Medium	V. Significant to Significant	Significant	Moderate	Slight	Not Significant
	Low	Moderate	Moderate to Slight	Slight	Not significant	Imperceptible
	Negligible	Slight	Slight to Not Significant	Not significant	Imperceptible	Imperceptible

11.15 The matrix above is derived from the EPA Guidelines (specifically Figure 3.4 of the Guidelines – see below).

Figure 11.1 *'Chart showing typical classifications of the significance of impacts' (Source: Figure 3.4 of the EPA Guidelines on the Information to be Contained in Environmental Impact Assessment Reports, 2022)*



11.16 The matrix (Table 11.3) and the EPA chart (Figure 11.1) are only a guide to the classification of impact significance. As the assessor I have used professional judgement informed by their expertise, experience and common sense to arrive at a classification that is reasonable and justifiable. (In the EPA guidelines the chart above is accompanied by a footnote that states: *"The depiction of significance classifications is indicative and should not be relied on as being definitive. It is provided for general guidance purposes"* (EPA guidelines Section 3, page 53)). For example, according to the EPA chart a change of high magnitude affecting a receptor of medium sensitivity could be classified as either 'significant' *or* 'moderate'. That judgement must be made by the assessor.

11.2.3 Methodology for Assessment of Visual Effects

11.17 Assessment of visual effects involves identifying a number of key/representative viewpoints in the site's receiving environment, and for each one of these: (a) classifying the viewpoint sensitivity, and (b) classifying the magnitude of change which would result in the view (informed by photomontages of the proposed development), and (c) combining these factors to arrive at a classification of significance of the effects on each viewpoint.

Sensitivity of the Viewpoint/Visual Receptor

11.18 Viewpoint sensitivity is a function of two main considerations:

- Susceptibility of the visual receptor to change. This depends on the occupation or activity of the people experiencing the view, and the extent to which their attention is focused on the views or visual amenity they experience at that location. Visual receptors most susceptible to change include residents at home, people engaged in outdoor recreation focused on the landscape (e.g. trail users), and visitors to heritage attractions and places of congregation where the setting contributes to the experience. Visual receptors less sensitive to change include travellers on road, rail and other transport routes (unless on recognised scenic routes), people engaged in outdoor recreation where the surrounding landscape does not influence the experience, and people in their place of work or shopping.
- Value attached to the view. This depends to a large extent on the subjective opinion of the visual receptor but also on factors such as policy and designations (e.g. scenic routes, protected views), or the view or setting being associated with a heritage asset, visitor attraction or having some other cultural status (e.g. appearing in arts).

11.19 Five categories are used to classify a viewpoint's sensitivity, as set out in Table 11.4.

Table 11.4 *Categories of viewpoint sensitivity*

Sensitivity	Description
Very High	Iconic viewpoints (views towards or from a landscape feature or area) that are recognised in policy or otherwise designated as being of national value. The composition, character and quality of the view are such that its capacity for change is very low. The principle management objective for the view is its protection from change.
High	Viewpoints that are recognised in policy or otherwise designated as being of value, or viewpoints that are highly valued by people that experience them regularly (e.g. views from houses or outdoor recreation amenities focused on the landscape). The composition, character and quality of the view may be such that its capacity to accommodate change may or may not be low. The principle management objective for the view is its protection from change that reduces visual amenity.
Medium	Views that may not have features or characteristics that are of particular value, but have no major detracting elements, and which thus provide some visual amenity. These views may have capacity for appropriate change and the principle management objective is to facilitate change to the composition that does not detract from visual amenity, or which enhances it.
Low	Views that have no valued feature or characteristic, and where the composition and character are such that there is capacity for change. This category includes views experienced by people involved in activities with no particular focus on the landscape. For such views the principle management objective is to facilitate change that does not detract from visual amenity or enhances it.

Negligible	Views that have no valued feature or characteristic, or in which the composition may be unsightly (e.g. in derelict landscapes). For such views the principle management objective is to facilitate change that repairs, restores or enhances visual amenity.

Magnitude of Change to the View

11.20 Classification of the magnitude of change takes into account the size or scale of the intrusion of development into the view (relative to the other elements and features in the composition, i.e. its relative visual dominance), the degree to which it contrasts or integrates with the other elements and the general character of the view, and the way in which the change will be experienced (e.g. in full view, partial or peripheral view, or in glimpses). It also takes into account the geographical extent of the change, as well as the duration and reversibility of the visual effects. Five categories are used to classify magnitude of visual change to a view, as set out in Table 11.5.

Table 11.5 *Categories of magnitude of visual change*

Sensitivity	Description
Very High	Full or extensive intrusion of the development in the view, or partial intrusion that obstructs valued features or characteristics, or introduction of elements that are completely out of character in the context, to the extent that the development becomes dominant in the composition and defines the character of the view and the visual amenity.
High	Extensive intrusion of the development in the view, or partial intrusion that obstructs valued features, or introduction of elements that may be considered uncharacteristic in the context, to the extent that the development becomes co-dominant with other elements in the composition and affects the character of the view and the visual amenity.
Medium	Partial intrusion of the development in the view, or introduction of elements that may be prominent but not necessarily uncharacteristic in the context, resulting in change to the composition but not necessarily the character of the view or the visual amenity.
Low	Minor intrusion of the development into the view, or introduction of elements that are not uncharacteristic in the context, resulting in minor alteration to the composition and character of the view but no change to visual amenity.
Negligible	Barely discernible intrusion of the development into the view, or introduction of elements that are characteristic in the context, resulting in slight change to the composition of the view and no change in visual amenity.

Significance of Visual Effects

11.21 As for townscape effects, to classify the significance of visual effects the magnitude of change to the view is measured against the sensitivity of the viewpoint, using the guidance in Table 11.3 and Figure 11.1 above.

11.2.4 Quality of Effects

11.22 In addition to predicting the significance of the effects, EIA methodology requires that the quality of the effects be classified as positive/ beneficial, neutral, or negative/ adverse. For townscape to a degree, but particularly for visual effects, this is an inherently subjective exercise. This is because townscape and visual amenity are *perceived* by people and are therefore subject to variations in the attitude and values - including aesthetic preferences - of the receptor. One person's attitude to a development may differ from another person's, and thus their response to the effects of a development on a townscape or view may vary.

11.23 Additionally, in certain situations there might be policy encouraging a particular development in an area, in which case the policy is effectively prescribing townscape and visual change. If a development achieves the objective of the policy the resulting effect might be considered positive, even if the townscape character or views are profoundly changed. The classification of quality of townscape and visual effects should seek to take these variables into account and provide a reasonable and robust assessment.

11.3 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

11.24 Refer to Chapter 2 of the EIAR and to the Architect's Statement and Tall Building Statement submitted with the planning application for detailed explanation of the development proposal, including the design considerations and objectives, and the alternatives considered (Chapter 3), in the preparation that led to the proposal.

11.4 RECEIVING ENVIRONMENT

11.4.1 The Site

11.25 The site is a 0.22 ha brownfield land parcel defined by City Quay to the north, Moss Street to the west and Gloucester Street South to the south. It is roughly rectangular in shape, with a boundary of c. 31m along City Quay and c. 71m along Moss Street.

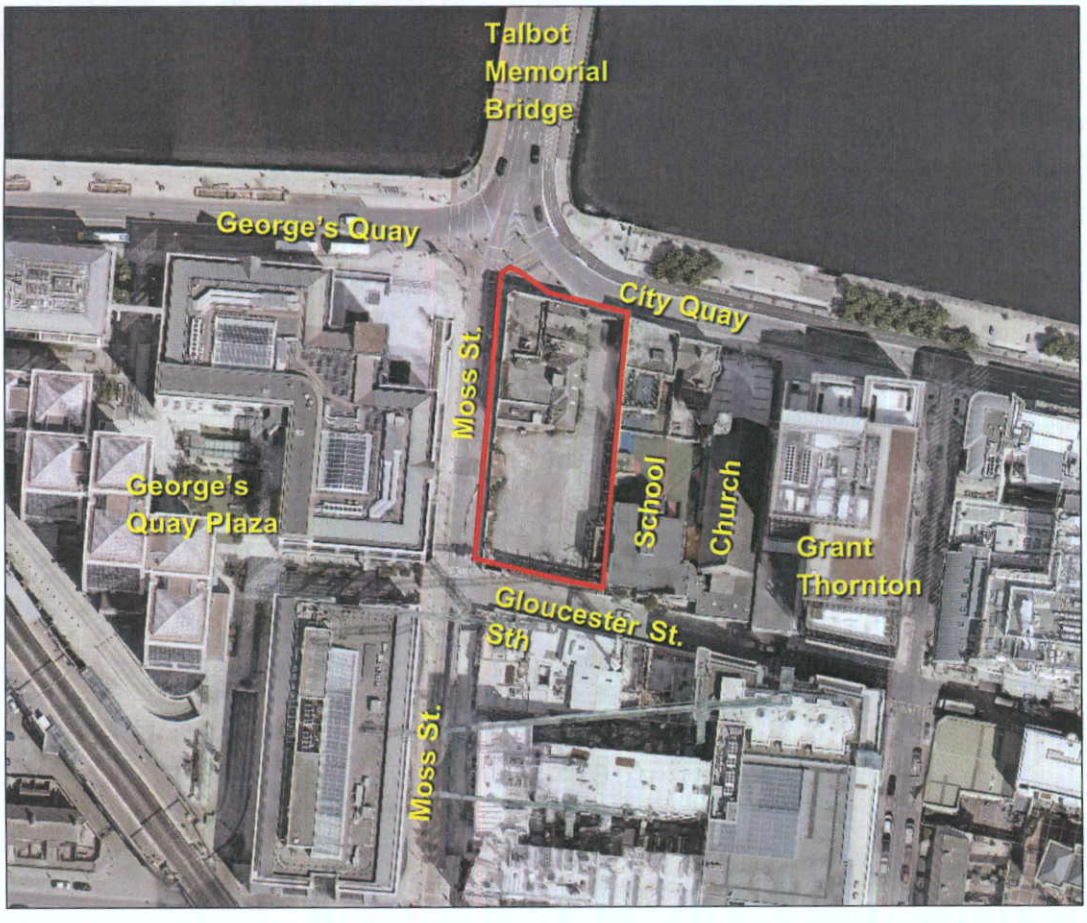


Figure 11.2 *The site and immediate context*