

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 Highways Agency Design Manual for Roads and Bridges (DMRB) guidance (UK Highways Agency, 2019a), states that road links meeting one or more of the following criteria can be defined as being 'affected' by a Proposed Development and should be included in the local air quality assessment. The use of the UK guidance is recommended by 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.

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In addition, the impact of construction activities on vehicle movements shall be assessed where construction activities are programmed to last for more than 2 years (UK Highways Agency, 2019a). The construction phase of the Proposed Development will last for over 2 years, in addition, the traffic associated with the overall Dublin Central Masterplan will increase the construction phase HDV AADT by over 200 on certain roads.

As a result, the impact of construction phase traffic emissions on local air quality was investigated using the UK Highways Agency DMRB screening model (2007). Air dispersion modelling of NO<sub>2</sub> emissions was undertaken for the worst case construction year of 2025. Only modelling of NO<sub>2</sub> was undertaken in detail as per the UK Highways Agency guidance (2019a). The traffic data used in the modelling assessment was obtained from Waterman Moylan, the consulting engineers on this project and is detailed in Table 9.2 below. Modelling was undertaken at 2 worst-case sensitive receptors within 200m of the impacted road links as per the DMRB guidance (UK Highways Agency, 2019a). These receptors are the Rotunda Hospital (R1) and an apartment building on the corner of Moore Street and Parnell Street (R2).

| Road Name                             | Speed (kph) | % HGV | Do Nothing AADT        | Do Something AADT |
|---------------------------------------|-------------|-------|------------------------|-------------------|
|                                       |             |       | Construction Year 2025 |                   |
| Link 7 (Parnell St, east of Moore St) | 30          | 2%    | 13,309                 | 13,552            |
| Link 9 (Parnell St, west of Moore St) | 30          | 2%    | 13,309                 | 13,552            |

**Table 9.2:** Construction Phase Traffic Data used in Air Quality Assessment

### 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

Operational phase traffic has the potential to impact local air quality as a result of increased vehicle movements associated with the Proposed Development. The UK Highways Agency DMRB scoping criteria detailed in Section 9.2.2.1 was used to determine if any road links are affected by the Proposed Development and require inclusion in a detailed air dispersion modelling assessment. As there is minimal car parking associated with the Proposed Development it is not predicted to significantly change the existing traffic on the nearby road links. Therefore, according to the DMRB scoping criteria in section 9.2.2.1 none of the local road links can be classed as 'affected' and detailed air dispersion modelling of operational phase traffic emissions is not required as there is no potential for significant impacts to 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<sub>2</sub>) which will impact climate.

The UK Highways Agency has published an updated DMRB guidance document in relation to climate impact assessments *LA 114 Climate*. 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.
- A change in daily average speed of more than 20 km/hr.

The Proposed Development will not increase traffic by more than 10% AADT on any nearby road links, therefore, none of the above scoping criteria are met and a detailed climate assessment is not required as there is no potential for significant impacts to climate as a result of traffic emissions.

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. The Energy & Sustainability Statement, prepared by BDP in relation to the Proposed Development 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.

### 9.3 RECEIVING ENVIRONMENT

The receiving environment in terms of air quality and climate is the same for the Dublin Central Masterplan and each individual site of the development. Therefore, the following sections detail the existing air quality and climate environment and do not differentiate between the Dublin Central Masterplan or the individual sites of the Proposed Development being assessed within this EIAR chapter.

#### 9.3.1 Meteorological Conditions

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) (World Health Organisation, 2006). Wind is of key importance in dispersing air pollutants and for ground level sources, such as traffic emissions, pollutant concentrations are generally inversely related to wind speed. Thus, concentrations of pollutants derived from traffic sources will generally be greatest under very calm conditions and low wind speeds when the movement of air is restricted. In relation to PM<sub>10</sub>, the situation is more complex due to the range of sources of this pollutant. Smaller particles (less than PM<sub>2.5</sub>) from traffic sources will be dispersed more rapidly at higher wind speeds.

However, fugitive emissions of coarse particles (PM<sub>2.5</sub> - PM<sub>10</sub>) will actually increase at higher wind speeds. Thus, measured levels of PM<sub>10</sub> will be a non-linear function of wind speed.

The nearest representative weather station collating detailed weather records is Dublin Airport, 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 (2016 – 2020), the predominant wind direction is westerly to south-westerly with a mean wind speed of 5.5 m/s over the period 1981 - 2010 (Met Eireann, 2021).



Figure 9.1: Dublin Airport Windrose 2016 – 2020.

### 9.3.2 Baseline Air Quality

Air quality monitoring programs have been undertaken in recent years by the EPA and Local Authorities. The most recent annual report on air quality in Ireland is “Air Quality In Ireland 2019” (EPA, 2020a). 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, 2021).

As part of the implementation of the Air Quality Standards Regulations 2002 (S.I. No. 271 of 2002), four air quality zones have been defined in Ireland for air quality management and assessment purposes (EPA, 2020a). 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 is within Zone A (EPA, 2020a). 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.).

Long-term NO<sub>2</sub> monitoring was carried out at the Zone A suburban locations of Rathmines, Ballyfermot, Dun Laoghaire and Swords and the urban location of Winetavern Street for the period 2015 - 2019 (EPA, 2020a). Long term average concentrations are significantly below the annual average limit of 40 µg/m<sup>3</sup> for both the urban and suburban locations. Average results range from 13 – 22 µg/m<sup>3</sup> for the suburban background locations and from 27 – 37 µg/m<sup>3</sup> for the urban location of Winetavern Street. The NO<sub>2</sub> annual average for this five year period suggests an upper average limit of no more than 22 µg/m<sup>3</sup> (Table 9.3) as a background concentration for the suburban locations. Based on the above information and having regard to the Proposed Developments location within Dublin City Centre, a conservative estimate of the current background NO<sub>2</sub> concentration for the region of the Proposed Development is 25 µg/m<sup>3</sup>.

| Station           | Station Classification | Averaging Period <sup>Note 1</sup>                               | Year |      |      |      |      |
|-------------------|------------------------|--|------|------|------|------|------|
|                   |                        |  | 2015 | 2016 | 2017 | 2018 | 2019 |
| Rathmines         | Suburban Background    | Annual Mean NO <sub>2</sub> (µg/m <sup>3</sup> )                 | 18   | 20   | 17   | 20   | 22   |
|                   |                        | 99.8 <sup>th</sup> ile 1-hr NO <sub>2</sub> (µg/m <sup>3</sup> ) | 105  | 88   | 86   | 87   | 102  |
| Ballyfermot       | Suburban Background    | Annual Mean NO <sub>2</sub> (µg/m <sup>3</sup> )                 | 16   | 17   | 17   | 17   | 20   |
|                   |                        | 99.8 <sup>th</sup> ile 1-hr NO <sub>2</sub> (µg/m <sup>3</sup> ) | 127  | 90   | 112  | 101  | 101  |
| Dun Laoghaire     | Suburban Background    | Annual Mean NO <sub>2</sub> (µg/m <sup>3</sup> )                 | 16   | 19   | 17   | 19   | 15   |
|                   |                        | 99.8 <sup>th</sup> ile 1-hr NO <sub>2</sub> (µg/m <sup>3</sup> ) | 91   | 105  | 101  | 91   | 91   |
| Swords            | Suburban Background    | Annual Mean NO <sub>2</sub> (µg/m <sup>3</sup> )                 | 13   | 16   | 14   | 16   | 15   |
|                   |                        | 99.8 <sup>th</sup> ile 1-hr NO <sub>2</sub> (µg/m <sup>3</sup> ) | 93   | 96   | 79   | 85   | 80   |
| Winetavern Street | Urban Traffic          | Annual Mean NO <sub>2</sub> (µg/m <sup>3</sup> )                 | 31   | 37   | 27   | 29   | 28   |
|                   |                        | 99.8 <sup>th</sup> ile 1-hr NO <sub>2</sub> (µg/m <sup>3</sup> ) | 128  | 120  | 110  | 115  | 115  |

Note 1 Annual average limit value of 40 µg/m<sup>3</sup> and hourly limit value of 200 µg/m<sup>3</sup> (EU Council Directive 2008/50/EC & S.I. No. 180 of 2011).

**Table 9.3:** Trends in Zone A Air Quality – NO<sub>2</sub>

Continuous PM<sub>10</sub> monitoring was carried out at the Zone A locations of Winetavern Street, Rathmines, Dun Laoghaire, Ballyfermot and Phoenix Park from 2015 – 2019. These showed an upper average limit of no more than 15 µg/m<sup>3</sup> (Table 9.4). Levels range from 9 – 16 µg/m<sup>3</sup> over the five year period with at most 9 exceedances of the 24-hour limit value of 50 µg/m<sup>3</sup> in Rathmines and Winetavern Street in 2019 (35 exceedances are permitted per year) (EPA, 2020a). Sufficient data is available for the urban background location in the Phoenix Park to observe long-term trends in the data. Data from 2015 – 2019 suggests an upper average annual mean value of at most 12 µg/m<sup>3</sup> as a background concentration at the Phoenix Park location. Based on the EPA data, a conservative estimate of the current background PM<sub>10</sub> concentration in the region of the Proposed Development is 15 µg/m<sup>3</sup>.

| Station           | Station Classification | Averaging Period                                  | Year |      |      |      |      |
|-------------------|------------------------|---|------|------|------|------|------|
|                   |                        |   | 2015 | 2016 | 2017 | 2018 | 2019 |
| Ballyfermot       | Suburban Background    | Annual Mean PM <sub>10</sub> (µg/m <sup>3</sup> ) | 12   | 11   | 12   | 16   | 14   |
|                   |                        | 24-hr Mean > 50 µg/m <sup>3</sup> (days)          | 3    | 0    | 1    | 0    | 7    |
| Dún Laoghaire     | Suburban Background    | Annual Mean PM <sub>10</sub> (µg/m <sup>3</sup> ) | 13   | 13   | 12   | 13   | 12   |
|                   |                        | 24-hr Mean > 50 µg/m <sup>3</sup> (days)          | 3    | 0    | 2    | 0    | 2    |
| Winetavern Street | Urban Traffic          | Annual Mean PM <sub>10</sub> (µg/m <sup>3</sup> ) | 14   | 14   | 13   | 14   | 15   |
|                   |                        | 24-hr Mean > 50 µg/m <sup>3</sup> (days)          | 4    | 2    | 3    | 1    | 9    |
| Rathmines         | Suburban Background    | Annual Mean PM <sub>10</sub> (µg/m <sup>3</sup> ) | 15   | 15   | 13   | 15   | 15   |
|                   |                        | 24-hr Mean > 50 µg/m <sup>3</sup> (days)          | 5    | 3    | 5    | 2    | 9    |
| Phoenix Park      | Urban Background       | Annual Mean PM <sub>10</sub> (µg/m <sup>3</sup> ) | 12   | 11   | 9    | 11   | 11   |
|                   |                        | 24-hr Mean > 50 µg/m <sup>3</sup> (days)          | 2    | 0    | 1    | 0    | 2    |

Note 1 Annual average limit value of 40 µg/m<sup>3</sup> and 24-hour limit value of 50 µg/m<sup>3</sup> (EU Council Directive 2008/50/EC & S.I. No. 180 of 2011).

**Table 9.4:** Trends in Zone A Air Quality – PM<sub>10</sub>

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Monitoring of both PM<sub>10</sub> and PM<sub>2.5</sub> takes place at the station in Rathmines which allows for the PM<sub>2.5</sub>/PM<sub>10</sub> ratio to be calculated. Average PM<sub>2.5</sub> levels in Rathmines over the period 2015 – 2019 ranged from 9 – 10 µg/m<sup>3</sup>, with a PM<sub>2.5</sub>/PM<sub>10</sub> ratio ranging from 0.60 – 0.68 (EPA, 2020a). Based on this information, a conservative ratio of 0.7 was used to generate an existing PM<sub>2.5</sub> concentration in the region of the development of 10.5 µg/m<sup>3</sup>.

### 9.3.3 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 2019 (EPA, 2020b). The data published in 2020 states that Ireland will exceed its 2019 annual limit set under the EU's Effort Sharing Decision (ESD), 406/2009/EC1 by an estimated 6.98 Mt. For 2019, total national greenhouse gas emissions are estimated to be 59.90 million tonnes carbon dioxide equivalent (Mt CO<sub>2</sub>eq) with 45.71 MtCO<sub>2</sub>eq of emissions associated with the ESD sectors for which compliance with the EU targets must be met. Agriculture is the largest contributor in 2019 at 35.3% of the total, with the transport sector accounting for 20.3% of emissions of CO<sub>2</sub>.

GHG emissions for 2019 are estimated to be 4.5% lower than those recorded in 2018. Emission reductions have been recorded in 6 of the last 10 years. However, compliance with the annual EU targets has not been met for four years in a row. Emissions from 2016 – 2019 exceeded the annual EU targets by 0.29 MtCO<sub>2</sub>eq, 2.94 MtCO<sub>2</sub>eq, 5.57 MtCO<sub>2</sub>eq and 6.98 MtCO<sub>2</sub>eq 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 2020 GHG Emissions Projections Report for 2019 – 2040 (EPA 2020c) notes that there is a long-term projected decrease in greenhouse gas emissions as a result of inclusion of new climate mitigation policies and measures that formed part of the National Development Plan (NDP) which was published in 2018 and the Climate Action Plan (CAP) published in 2019. Implementation of these are classed as a “*With Additional Measures scenario*” for future scenarios. A change from generating electricity using coal and peat to wind power and diesel vehicle engines to electric vehicle engines are envisaged under this scenario. While emissions are projected to decrease in these areas, emissions from agriculture are projected to grow steadily due to an increase in animal numbers. However, over the period 2013 – 2020 Ireland is projected to cumulatively exceed its compliance obligations with the EU’s Effort Sharing Decision (Decision No. 406/2009/EC) 2020 targets by approximately 13.4 Mt CO<sub>2</sub>eq under the “*With Existing Measures*” scenario and 12.6 Mt CO<sub>2</sub>eq under the “*With Additional Measures*” scenario (EPA, 2020c).

### 9.3.4 Sensitivity of the Receiving Environment

In line with the UK Institute of Air Quality Management (IAQM) guidance document ‘*Guidance on the Assessment of Dust from Demolition and Construction*’ (2014) prior to assessing the 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 or areas where users would expect a high level of amenity. Commercial properties, parks 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. Figure 9.2 shows the sensitive receptors within 50m of the Dublin Central Masterplan area.

The surrounding land use in the vicinity of the Proposed Development site is predominantly commercial in nature which would typically be considered of medium sensitivity in terms of dust emissions. However, due to the location of the Proposed Development in the O’Connell Street area and the high level of tourism in the area, users would typically expect a high level of amenity. Therefore, the surrounding area would be considered high sensitivity in terms of dust soiling. It is estimated that there are over 100 receptors within 50m of the site due to the presence of a number of hotels, an apartment block, the Rotunda Hospital, and numerous commercial premises. Based on the IAQM criteria outlined in Table 9.5, the worst case sensitivity of the area to dust soiling is considered to be high.

| 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  |

**Table 9.5:** Sensitivity of the Area to Dust Soiling Effects on People and Property

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<sub>10</sub> concentration, receptor sensitivity and the number of receptors affected within various distance bands from the construction works.

In terms of receptor sensitivity to human health impacts, the IAQM guidance defines high sensitivity receptors as “locations where members of the public are exposed over a time period relevant to the air quality objective for PM<sub>10</sub> (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day)” (IAQM, 2014). Examples include residential properties, schools and hospitals. Office and shop workers are considered of medium sensitivity. Low sensitivity receptors are areas where exposure is transient such as public footpaths and shopping streets.

There are high, medium and low sensitivity receptors within close proximity to the Proposed Development site. However, for the purposes of this assessment the worst-case sensitivity has been used. It is estimated that there are between 10-100 high sensitivity receptors within 50m of the Proposed Development site, this includes the Rotunda Hospital and an apartment building on Moore Street. A conservative estimate of the current annual mean PM<sub>10</sub> concentration in the vicinity of the Proposed Development is 15 µg/m<sup>3</sup> (see Section 9.3.2). Based on the IAQM criteria outlined in Table 9.6, the worst case sensitivity of the area to human health is considered to be low.

| Receptor Sensitivity | Annual Mean PM <sub>10</sub> Concentration | Number Of Receptors | Distance from source (m) |     |      |      |      |
|----------------------|--|---------------------|--------------------------|-----|------|------|------|
|                      |  |                     | <20                      | <50 | <100 | <200 | <350 |
| High                 | < 24 µg/m <sup>3</sup>                     | >100                | Medium                   | Low | Low  | Low  | Low  |
|                      |  | 10-100              | Low                      | Low | Low  | Low  | Low  |
|                      |  | 1-10                | Low                      | Low | Low  | Low  | Low  |
| Medium               | < 24 µg/m <sup>3</sup>                     | >10                 | Low                      | Low | Low  | Low  | Low  |
|                      |  | 1-10                | Low                      | Low | Low  | Low  | Low  |
| Low                  | < 24 µg/m <sup>3</sup>                     | >1                  | Low                      | Low | Low  | Low  | Low  |

Table 9.6: Sensitivity of the Area to Human Health Impacts.

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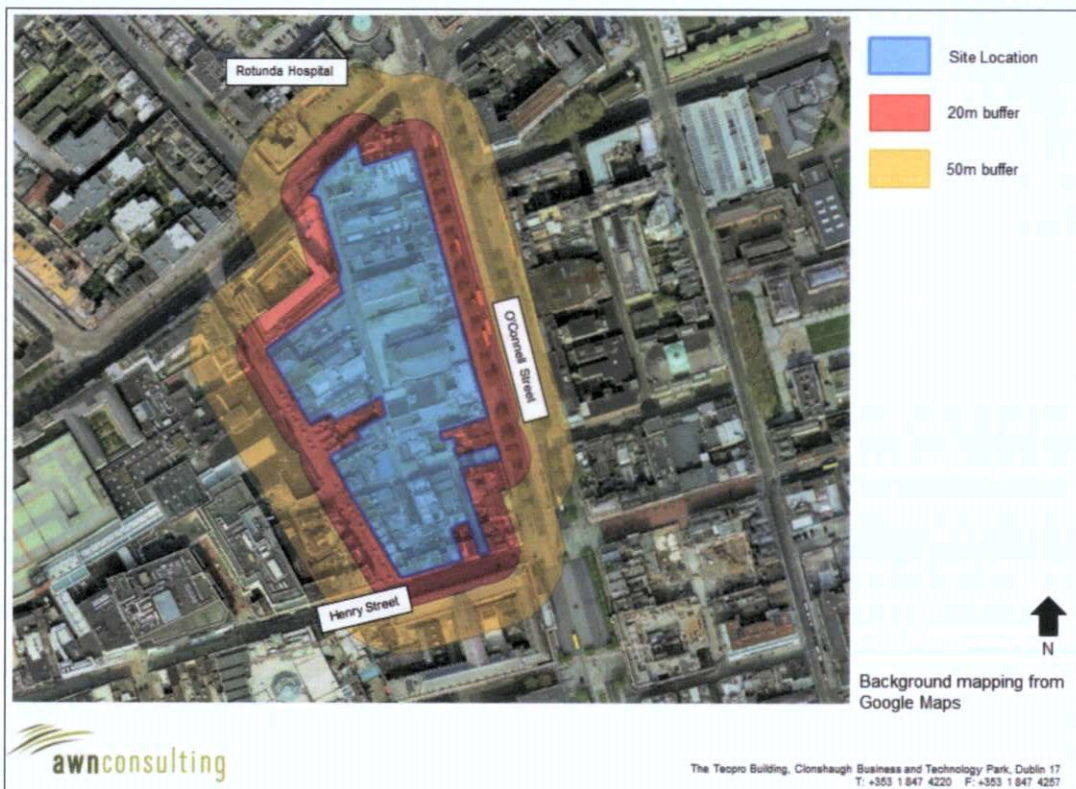


Figure 9.2: Sensitive Receptors within 50m of Dublin Central Masterplan area.

## 9.4 CHARACTERISTICS OF PROPOSED DEVELOPMENT

### 9.4.1 Dublin Central Masterplan

The Dublin Central Masterplan site is located within Dublin City Centre, it is bounded by O'Connell St. to the east, Parnell St. to the north, Moore St. to the west and Henry St. to the south. A full description of the development is provided in Chapter 3 – Description of Proposed Development.

Air quality and climate impacts have been considered for both the construction and operational phases of the Dublin Central Masterplan. During the demolition and construction phase of the Dublin Central Masterplan (which includes Site 3, Site 4 and Site 5) there will be different sources of potential air quality impacts, primarily construction dust emissions. Construction plant, machinery and site vehicles are a source of GHG emissions which have the potential to impact climate. The primary sources of air and climatic emissions in the operational context are deemed long term and will involve the change in traffic flows in the local areas which are associated with the development.

### 9.4.2 Proposed Development Site 3, 4 & 5

The Dublin Central Masterplan development is comprised of a number of individual sites (Site 1 – 5). Concurrent planning applications on Site 3, Site 4 and Site 5 are now being made. A full description of the development is provided in Chapter 3: Description of Proposed Development, a brief description is provided below.

The **Site 3** development comprises a mixed-use scheme in 2no. blocks ranging in height from one to nine storeys (over single storey basement) incorporating café / restaurant, retail, hotel, gallery / cultural and residential uses including the creation of a new street from Henry Street to Moore Lane.

The **Site 4** development comprises a mixed-use scheme ranging in height from one to three storeys (over single storey partial basement) incorporating café / restaurant, cultural, retail and residential uses and a new civic plaza (part).

The **Site 5** development comprises a mixed-use scheme ranging in height from three to six (over single storey partial basement) incorporating café / restaurant and office uses and a new civic plaza (part).

The potential air quality and climate impacts identified in Section 9.4 for the Dublin Central Masterplan area is also applicable to the Proposed Development (i.e. Site 3, Site 4 and Site 5). These include construction dust emissions and traffic and plant emissions associated with the proposed works.

## 9.5 POTENTIAL IMPACTS

### 9.5.1 Dublin Central Masterplan

#### 9.5.1.1 Construction Stage

##### 9.5.1.1.1 Air Quality

The greatest potential impact on air quality during the demolition and construction phase of the implementation of the Dublin Central Masterplan is from 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 9.3.1) 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, 2021) 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 9.3.4). The magnitude of each of the four dust generating activities: demolition, earthworks, construction and trackout has been determined below based on the Small, Medium or Large classifications outlined in Section 9.2.2.1.

### Demolition

There is an amount of demolition work required for the implementation of the Dublin Central Masterplan with significantly greater than 50,000m<sup>3</sup> of buildings to be demolished. Therefore, the demolition works can be classified as large as per the criteria in Section 9.2.2.1. As the overall sensitivity of the area to dust soiling impacts is high there is a high risk of dust soiling impacts from the proposed demolition activities according to the IAQM guidance (see Table 9.7). There is an overall medium 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 9.3.4).

| 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  |

**Table 9.7:** Risk of Dust Impacts - Demolition – Dublin Central Masterplan.

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### Earthworks

Under the IAQM guidance (2014) the proposed earthworks can be classified as large as the total site area is greater than 10,000m<sup>2</sup> and there will be a large volume of material involved in infill and excavation works (see Section 9.2.2.1). The excavation of the Metro Enabling Works in Site 2AB and Site 2C in particular and basements will be the primary sources of excavated materials. This results in an overall high risk of dust soiling impacts and a low risk of human health impacts as a result of earthworks activities (see Table 9.8).

| 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 |

**Table 9.8:** Risk of Dust Impacts - Earthworks – Dublin Central Masterplan.

### Construction

The dust emission magnitude from construction associated with the Dublin Central Masterplan works can be classified as large due to the total building volume involved exceeding 100,000m<sup>3</sup> as per the criteria in Section 9.2.2.1. Therefore, there is an overall high risk of dust soiling impacts and a low risk of human health impacts as a result of the proposed construction activities (Table 9.9).

| 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 |

**Table 9.9:** Risk of Dust Impacts – Construction – Dublin Central Masterplan.

### Trackout

Dust emission magnitude from trackout can be classified as large under IAQM guidance as there are predicted to be 95 outward HGV movements per day during the worst-case construction phase (see Section 9.2.2.1). This results in an overall high risk of dust soiling impacts and a low risk of human health impacts as a result of the proposed trackout activities (see Table 9.10).

| 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 |

**Table 9.10:** Risk of Dust Impacts – Trackout – Dublin Central Masterplan.

### Summary of Dust Emission Risk

The risk of dust impacts as a result of the implementation of the Dublin Central Masterplan are summarised in Table 9.11 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 demolition, earthworks, construction and trackout activities, a range of dust mitigation measures associated with a high risk of dust impacts must be implemented. In the absence of mitigation there is the potential for **short-term, localised, significant** dust related impacts to air quality as a result of the implementation of the Dublin Central Masterplan.

| Potential Impact        | Dust Emission Magnitude |            |              |           |
|-------------------------|-------------------------|------------|--------------|-----------|
|                         | Demolition              | Earthworks | Construction | Trackout  |
| Dust Emission Magnitude | Large                   | Large      | Large        | Large     |
| Dust Soiling Risk       | High Risk               | High Risk  | High Risk    | High Risk |
| Human Health Risk       | Medium Risk             | Low Risk   | Low Risk     | Low Risk  |

**Table 9.11:** Summary of Dust Impact Risk used to Define Site-Specific Mitigation – Dublin Central Masterplan.

### Construction Phase Traffic Emissions

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 an air quality assessment using the UK Highways Agency DMRB screening model was undertaken (UK Highways Agency, 2007). The air quality assessment focussed on the worst-case construction period in 2025 when the greatest number of HGV movements will likely be taking place.

This period was assessed as a worst-case scenario and traffic emissions associated with individual phases of development will likely be lower than those predicted here. Modelling was undertaken at 2no. worst-case sensitive receptors within 200m of the impacted road links, these include the Rotunda Hospital (R1) and an apartment building on the corner of Moore Street and Parnell Street (R2). Results are compared against the 'Do-Nothing' scenario, which assumes that the implementation of the Dublin Central Masterplan is not in place in future years, in order to determine the degree of impact.

NO<sub>2</sub> emissions as a result of the worst-case construction phase of the implementation of the Dublin Central Masterplan are in compliance with the ambient air quality standards for NO<sub>2</sub> set out in Table 9.1. Concentrations of NO<sub>2</sub> are at most 71% of the annual limit value during the worst-case construction period in 2025. In addition, the maximum 1-hour NO<sub>2</sub> concentration is not predicted to be exceeded at the receptors modelled. Compared to 'Do Nothing' levels, concentrations of NO<sub>2</sub> will increase by 0.1% of the annual limit value at receptor R1 and by 0.2% of the limit value at receptor R2 (see Table 9.12). As per the TII assessment criteria outlined in Appendix 10 of the TII guidance document "Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes" (2011) the changes in NO<sub>2</sub> concentrations as a result of the construction phase of the implementation of the Dublin Central Masterplan are considered negligible. Therefore, the impact of construction traffic emissions on air quality is predicted to be **short-term, localised, negative and imperceptible.**

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| Receptor                              | Impact Construction Year 2025 |      |         |               |                     |
|---------------------------------------|-------------------------------|------|---------|---------------|---------------------|
|                                       | DN                            | DS   | DS – DN | Magnitude     | Description         |
| R1: Rotunda Hospital                  | 27.4                          | 27.4 | 0.06    | Imperceptible | Negligible Increase |
| R2: Parnell Street Apartment Building | 28.2                          | 28.3 | 0.08    | Imperceptible | Negligible Increase |

Note 1 Calculated using UK DEFRA guidance IAN 170/12 V3 Long Term NO<sub>2</sub> Trend Projections Technique.

**Table 9.12:** Predicted Annual Mean NO<sub>2</sub> Concentrations – Construction Year 2025 (µg/m<sup>3</sup>).

#### 9.5.1.1.2 Climate

There is the potential for a number of greenhouse gas emissions to atmosphere during the demolition and construction phase of the implementation of the Dublin Central Masterplan. Construction vehicles, generators etc., may give rise to CO<sub>2</sub> and N<sub>2</sub>O emissions. The Institute of Air Quality Management document *Guidance on the Assessment of Dust from Demolition and Construction* (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 and short-term.**

### 9.5.1.1.3 Human Health

Dust emissions from the demolition and construction phase of the implementation of the Dublin Central Masterplan have the potential to impact human health through the release of PM<sub>10</sub> and PM<sub>2.5</sub> emissions. As per Table 9.6 the surrounding area is considered of low sensitivity to significant dust related human health impacts. Therefore, in the absence of mitigation there is the potential for **slight, negative, short-term** impacts to human health as a result of the implementation of the Dublin Central Masterplan.

Traffic emissions from construction vehicles also have the potential to impact human health. However, as per section 9.4.2.1.1 the change in local air quality as a result of construction traffic is considered **short-term, localised, negative and imperceptible**.

## 9.5.1.2 Operational Stage

### 9.5.1.2.1 Air Quality

Operational phase traffic has the potential to impact local air quality as a result of increased vehicle movements associated with the implementation of the Dublin Central Masterplan. However, as there is minimal car parking (33no. in total) associated with the Dublin Central Masterplan it is not predicted to significantly change the existing traffic on the nearby road links. Therefore, according to the DMRB scoping criteria in section 9.2.2.1 none of the local road links can be classed as 'affected'. The potential impact to air quality during the operational phase is considered **long-term, neutral and imperceptible**.

### 9.5.1.2.2 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, adequate attenuation and drainage have been provided for to account for increased rainfall in future years as part of the design of Dublin Central. Therefore, the impact will be **long-term, localised, 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<sub>2</sub> and N<sub>2</sub>O emissions during the operational phase are **long-term, localised, neutral and imperceptible**.

- In addition, the Dublin Central Masterplan has been designed to minimise the impact to climate where possible during operation. The Energy & Sustainability Statement prepared in relation to the development details the incorporated design measures which will reduce climatic impacts. As per the Energy & Sustainability Statement the following key performance targets have been set for the Dublin Central Masterplan development: The buildings are aspiring to meet a Net Zero Carbon strategy to align with the aspirations set out by Dublin City Council within Section 16.2 (Design, Principles & Standards) of the DCC Development Plan.
- The design intent at present for the developments hot water, heating and cooling system designs are based on a combination of highly efficient air source and water to water heat pumps with no fossil fuels being consumed throughout the entire project, avoiding the production of large amounts of local pollution within an urban environment.
- The buildings will meet and exceed the new NZEB (Nearly Zero Energy Buildings) requirements set out in the revised Part L document.
- The development will achieve an "A" rated energy certificate for all buildings.
- The development will target a reduction in mains water consumption of more than 60% when compared to similar developments and this will be further explored post planning.

- The development has set progressive targets for embodied carbon in its brief, based on recently published LETI (London Energy Transformation Initiative) targets for 2030.
- The development has benchmarked itself against up to planning against Sustainability Assessments including; BREEAM, LEED, WELL Building Standard, WIRED Score and Passive House. As a minimum, the scheme will adopt the principles of all and pursuing the formal rating and certification will be subject to cost/benefit feasibility post planning.

Due to the location of the development within Dublin City Centre the site has a number of sustainable travel options such as bus, LUAS and cycling. Sustainable travel modes will be encouraged within the Dublin Central through support facilities for cycling, minimal onsite parking and infrastructure for electrical vehicle charging points. It is also proposed to retain high quality buildings and facades to reduce the environmental impact and embodied carbon of the development. With the inclusion of these sustainability measures the impact to climate during the operational phase will be reduced.

#### 9.5.1.2.3 Human Health

Traffic related air emissions have the potential to impact human health if they do not comply with the ambient Air Quality Standards detailed in Table 9.1. However, as there is minimal car parking associated with the Dublin Central Masterplan, the traffic generated does not satisfy the assessment criteria to require an air modelling assessment as outlined in Section 9.2.3.1 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, long-term and imperceptible.

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#### 9.5.1.3 Do-Nothing Impact

The Do Nothing scenario includes retention of the current site without the Dublin Central Masterplan in place. In this scenario, ambient air quality at the site will remain as per the baseline and will change in accordance with trends within the wider area (including influences from potential new developments in the surrounding area, changes in road traffic, etc).

As the Dublin Central Masterplan site is zoned for development, in the absence of the Proposed Development it is likely that a development of a similar nature would be constructed in the future in line with national policy and the development plan objectives. Therefore, the construction and operational phase impacts outlined in this assessment are likely to occur in the future even in the absence of the implementation of the Dublin Central Masterplan.

### 9.5.2 Proposed Development – Site 3, 4 & 5

#### 9.5.2.1 Construction Stage

##### 9.5.2.1.1 Air Quality

As with the implementation of the Dublin Central Masterplan, the greatest potential impact on air quality during the demolition and construction phase of the Proposed Development (i.e. Site 3, Site 4 and Site 5) is from construction dust emissions and the potential for nuisance dust.

In order to determine the risk of dust impacts in the absence of mitigation 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 9.3.4). The magnitude of each of the four dust generating activities: demolition, earthworks, construction and trackout has been determined below based on the Small, Medium or Large classifications outlined in Section 9.2.2.1 for the Proposed Development.

## Demolition

The dust emission magnitude for the Site 3 development can be classified as small as per the criteria in Section 9.2.2.1. There will be less than 20,000m<sup>3</sup> of buildings to be demolished (approximately 16,753m<sup>3</sup>) as part of the Site 3 works. This results in an overall medium risk of dust soiling impacts and a negligible risk of human health impacts as a result of the Site 3 demolition activities (see Table 9.13).

For the Site 4 development there is the requirement for approximately 11,300m<sup>3</sup> of buildings to be demolished. As a result, the proposed demolition activities can be categorised as small as per the IAQM criteria in Section 9.2.2.1. This results in an overall medium risk of dust soiling impacts and a negligible risk of human health impacts as a result of the Site 4 demolition activities.

For the Site 5 development there is the requirement for approximately 5,781m<sup>3</sup> of buildings to be demolished. As a result, the proposed demolition activities can be categorised as small as per the IAQM criteria in Section 9.2.2.1. This results in an overall medium risk of dust soiling impacts and a negligible risk of human health impacts as a result of the Site 5 demolition activities.

| 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  |

**Table 9.13:** Risk of Dust Impacts - Demolition – Proposed Development.

## Earthworks

Under the IAQM guidance (2014) (see Section 9.2.2.1) the proposed earthworks for the Site 3 development can be classified as medium as the total site area is less than 10,000m<sup>2</sup> and there will be approximately 25,780 tonnes of material involved in infill and excavation works. This results in an overall medium risk of dust soiling impacts and a low risk of human health impacts as a result of the Site 3 earthworks activities (see Table 9.14).

The site area for Site 4 is slightly above 2,500m<sup>2</sup> and there will be approximately 224 tonnes of material involved in infill and excavation works. As a worst-case the earthworks magnitude has been classified as medium as per the criteria in Section 9.2.2.1. This results in an overall medium risk of dust soiling impacts and a low risk of human health impacts as a result of the Site 4 earthworks activities.

The site area for Site 5 is less than 2,500m<sup>2</sup>, however there will be approximately 9,500 tonnes of material involved in infill and excavation works and therefore the magnitude has been classed as medium. This results in a medium risk of dust soiling impacts and a low risk of human health impacts as a result of the Site 5 earthworks activities when combined with the previously established sensitivity of the area (see Section 9.3.4).

| 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 |

**Table 9.14:** Risk of Dust Impacts - Earthworks – Proposed Development.

### Construction

The dust emission magnitude from construction associated with the proposed Site 3 development works can be classified as large due to the total building volume involved exceeding 100,000m<sup>3</sup> over one to nine storeys as per the criteria in Section 9.2.2.1. Therefore, there is an overall high risk of dust soiling impacts and a low risk of human health impacts as a result of the proposed construction activities (Table 9.15).

The dust emission magnitude for Site 4 construction can be categorised as medium as the total building volume is less than 100,000m<sup>3</sup> over one to three storeys. Therefore, there is a medium risk of dust soiling impacts and a low risk of human health impacts as a result of the Site 4 construction works.

The dust emission magnitude for the Site 5 construction can be categorised as large as the total building volume will exceed 100,000m<sup>3</sup>. This results in a high risk of dust soiling impacts and a low risk of human health impacts from the Site 5 construction works.

| 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 |

**Table 9.15:** Risk of Dust Impacts – Construction – Proposed Development.

### Trackout

The construction stages of the individual sites of the development will overlap and therefore HGVs associated with various sites will access the site simultaneously. For the purposes of this assessment worst-case construction phase traffic figures have been used to determine the dust emission potential from trackout.

The dust emission magnitude from trackout can be classified as large under IAQM guidance as there are likely to be over 50 outward HGV movements per day during worst-case stages of the development (see Section 9.2.2.1). This results in an overall high risk of dust soiling impacts and a low risk of human health impacts as a result of the proposed trackout activities (see Table 9.16).

| 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 |

**Table 9.16:** Risk of Dust Impacts – Trackout – Proposed Development.

### Summary of Dust Emission Risk

The risk of dust impacts as a result of the Proposed Development are summarised in Table 9.17 for each activity for the Site 3, Site 4 and Site 5 developments. In the absence of mitigation there is the potential for **short-term, localised, significant** dust related impacts to air quality as a result of the Proposed Development.

As the Proposed Development is part of a wider Dublin Central Masterplan development as per Section 9.4, the level of mitigation required for the masterplan development will be applied to each individual site of the development to ensure the highest level of dust mitigation is employed. Therefore, a high level of dust control will be required across the site.

| Potential Impact        | Dust Emission Category |             |              |           |
|-------------------------|------------------------|-------------|--------------|-----------|
|                         | Demolition             | Earthworks  | Construction | Trackout  |
| <b>Site 3</b>           |                        |             |              |           |
| Dust Emission Magnitude | Small                  | Medium      | Large        | Large     |
| Dust Soiling Risk       | Medium Risk            | Medium Risk | High Risk    | High Risk |
| Human Health Risk       | Negligible Risk        | Low Risk    | Low Risk     | Low Risk  |
| <b>Site 4</b>           |                        |             |              |           |
| Dust Emission Magnitude | Small                  | Medium      | Medium       | Large     |
| Dust Soiling Risk       | Medium Risk            | Medium Risk | Medium Risk  | High Risk |
| Human Health Risk       | Negligible Risk        | Low Risk    | Low Risk     | Low Risk  |
| <b>Site 5</b>           |                        |             |              |           |
| Dust Emission Magnitude | Small                  | Medium      | Large        | Large     |
| Dust Soiling Risk       | Medium Risk            | Medium Risk | High Risk    | High Risk |
| Human Health Risk       | Negligible Risk        | Low Risk    | Low Risk     | Low Risk  |

**Table 9.17:** Summary of Dust Impact Risk used to Define Site-Specific Mitigation – Proposed Development

#### Construction Phase Traffic Emissions

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. A detailed air dispersion model of worst-case construction stage traffic emissions was conducted (see Section 9.5.1.11.). This included traffic associated with the worst-case construction phase of the development and traffic emissions during individual phases of the development will be lesser than predicted within this assessment. It was determined that the impact to air quality is **short-term, localised, negative and imperceptible**.

#### 9.5.2.1.2 Climate

As per the IAQM guidance, site traffic and machinery are unlikely to have a significant impact on climate. Therefore, the potential impact on climate is considered to be **imperceptible and short-term**.

#### 9.5.2.1.3 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<sub>10</sub> and PM<sub>2.5</sub> emissions. As per Table 9.6 the surrounding area is considered of low sensitivity to significant dust related human health impacts. There is an overall low risk of significant human health impacts as a result of the demolition and construction works from the Proposed Development (see Table 9.17). Therefore, in the absence of mitigation there is the potential for slight, negative, short-term impacts to human health as a result of the Proposed Development.

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



## 9.5.2.2 Operational Stage

### 9.5.2.2.1 Air Quality

As per section 9.5.1.2.1, a detailed air dispersion model of operational traffic emissions has been scoped out of this assessment as the traffic generated by the Proposed Development does not meet the assessment criteria. The cumulative traffic data for the full Dublin Central Masterplan development was assessed as a worst-case scenario, this also included traffic for existing and permitted developments within the area where available. The operational phase impact to air quality is deemed **long-term, localised, neutral and imperceptible**.

### 9.5.2.2.2 Climate

As per Section 9.5.1.2.2, the traffic generated by the Proposed Development did not meet the screening criteria requiring a detailed modelling assessment of CO<sub>2</sub> emissions. Operational traffic impacts to climate are considered **long-term, neutral and imperceptible**.

As per Section 9.5.1.2.2 a number of sustainable design measures have been incorporated into the Proposed Development in order to reduce the impact to climate during operation. These measures will be incorporated throughout each Site within the Dublin Central Masterplan in order to ameliorate potential operational phase climate impacts.

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### 9.5.2.2.3 Human Health

Traffic related air emissions have the potential to impact human health if they do not comply with the ambient Air Quality Standards detailed in Table 9.1. However, as mentioned above the traffic generated by the development does not satisfy the assessment criteria to require an air modelling assessment as outlined in Section 9.2.3.1 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, long-term and imperceptible**.

## 9.5.2.3 Do-Nothing Impact

The Do Nothing impact outlined in Section 9.5.1.3 for the proposed Dublin Central Masterplan development is also applicable to the Proposed Development.

## 9.6 MITIGATION MEASURES (AMELIORATIVE, REMEDIAL OR REDUCTIVE MEASURES)

### 9.6.1 Dublin Central Masterplan

#### 9.6.1.1 Construction Stage

A detailed dust minimisation plan associated with a high level risk of dust impacts is outlined in Appendix 9.2. This plan draws on best practice mitigation measures from Ireland, the UK and the USA in order to ensure the highest level of mitigation possible. 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*".

In summary some of the measures which will be implemented will include: -

- 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.

- 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 where appropriate, prior to entering onto public roads.
- Vehicles using site roads will have their speed restricted, and this speed restriction will be enforced rigidly. On any un-surfaced site road, this will be 20 kph, and on hard surfaced roads as site management dictates.
- Public roads and footpaths outside the site will be regularly inspected for cleanliness and cleaned as necessary. 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.
- 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.
- Hoarding or screens shall be erected around works areas to reduce visual impact. This will also have an added benefit of preventing larger particles of dust from travelling off-site and impacting receptors.

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 Operational Stage**

The impact of the Proposed Development on air quality and climate is predicted to be imperceptible with respect to the operational phase in the long term. Therefore, no additional site specific mitigation measures are required beyond the incorporated design mitigation as described in Section 9.5.1.2.2 and 9.5.2.2.2.

### **9.6.2 Proposed Development Site 3, 4 & 5**

#### **9.6.2.1 Construction Stage**

The mitigation measures outlined in Section 9.6.1.1 and Appendix 9.2 will be applied across the site for each phase of the development.

#### **9.6.2.2 Operational Stage**

No mitigation is required for the operational phase of the development as no significant impacts to air quality or climate are predicted.

## 9.7 RESIDUAL IMPACT

### 9.7.1 Dublin Central Masterplan

#### 9.7.1.1 Construction Stage

##### 9.7.1.1.1 Air Quality

In order to minimise dust emissions during construction, a series of mitigation measures have been prepared in the form of a dust minimisation plan which will be incorporated into the construction environmental management plan (CEMP) for the site. Provided the dust minimisation measures outlined in the plan (see Appendix 9.2 and Section 9.6.1.1) are adhered to, the air quality impacts during the construction phase will be short-term, negative, localised and imperceptible.

Construction traffic emissions will have a **long-term, localised, negative and imperceptible** impact on air quality as per Section 9.5.1.1.1.

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##### 9.7.1.1.2 Climate

According to the IAQM guidance (2014) site traffic and plant are unlikely to make a significant impact on climate during the construction phase. Therefore, the potential impact on climate is considered to be **imperceptible** and **short-term**.

##### 9.7.1.1.3 Human Health

Best practice mitigation measures are proposed for the 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 (see Table 9.1). Therefore, the impact of construction of the Proposed Development is likely to be **negative, short-term and imperceptible** with respect to human health.

#### 9.7.1.2 Operational Stage

##### 9.7.1.2.1 Air Quality

As the traffic generated by the Proposed Development does not meet the criteria detailed in Section 9.2.2.1 for requiring a detailed air quality assessment the impact to air quality from traffic emissions during the operational stage is **neutral, long-term and imperceptible**.

##### 9.7.1.2.2 Climate

The traffic associated with the operational phase of the Proposed Development is below the criteria requiring a detailed climate assessment. The impact to climate as a result of traffic emissions is predicted to be **long-term, neutral and imperceptible**.

In addition, the Proposed Development has been designed to reduce the impact to climate where possible through incorporated design measures. Full details of all measures included are outlined within the Energy & Sustainability Statement submitted as part of the concurrent planning applications.

##### 9.7.1.2.3 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, impacts to human health are **long-term, neutral and imperceptible**.

### 9.7.1.3 Worst Case Impact

In terms of construction phase impacts, worst-case assumptions regarding volumes of excavation materials and number of vehicle movements have been used in order to determine the highest level of mitigation required in relation to potential dust impacts (see Section 9.5.1.1). The Dublin Central Masterplan development is the worst-case scenario in terms of dust emissions, emissions from each individual phase will be lower than the cumulative Dublin Central Masterplan.

Worst-case traffic data was used in the assessment of construction and operational phase impacts. In addition, conservative background concentrations were used in order to ensure a robust assessment. Thus, the predicted results of the construction and operational stage assessment are worst-case and the significance of effects is most likely overestimated.

## 9.7.2 Proposed Development Site 3, 4 & 5

### 9.7.2.1 Construction Stage

#### 9.7.2.1.1 Air Quality

Once the dust minimisation measures outlined in Section 9.6.1.1 and Appendix 9.2 are adhered to, the air quality impacts during the construction phase will be **short-term, negative, localised and imperceptible**.

#### 9.7.2.1.2 Climate

According to the IAQM guidance (2014) site traffic and plant are unlikely to make a significant impact on climate during the construction phase. Therefore, the potential impact on climate is considered to be **imperceptible and short-term**.

#### 9.7.2.1.3 Human Health

Best practice mitigation measures are proposed for the 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 (see Table 9.1). Therefore, the impact of construction of the Proposed Development is likely to be **negative, short-term and imperceptible** with respect to human health.

### 9.7.2.2 Operational Stage

#### 9.7.2.2.1 Air Quality

As the traffic generated by the Proposed Development does not meet the criteria detailed in Section 9.2.2.1 for requiring a detailed air quality assessment the impact to air quality from traffic emissions during the operational stage is **neutral, long-term and imperceptible**.

#### 9.7.2.2.2 Climate

The traffic associated with the operational phase of the Proposed Development is below the criteria requiring a detailed climate assessment. The impact to climate as a result of traffic emissions is predicted to be **long-term, neutral and imperceptible**.

In addition, the Proposed Development has been designed to reduce the impact to climate where possible through incorporated design measures. Full details of all measures included are outlined within the Energy & Sustainability Statement submitted as part of the concurrent planning applications.

### 9.7.2.2.3 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, impacts to human health are **long-term, neutral** and **imperceptible**.

### 9.7.2.3 Worst Case Impact

The worst case impact described in Section 9.7.1.3 for the implementation of the Dublin Central Masterplan is also applicable to the Proposed Development.

## 9.7.3 Cumulative

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### 9.7.3.1 Construction Stage

The proposed Dublin Central Masterplan development will be constructed in a number of sites (Site 1 – 5), the construction stage for the individual phases will overlap with each other thus leading to cumulative construction dust emissions. However, a high level of dust control will be implemented across the full Dublin Central Masterplan site which will control dust emissions from each phase of the development. Therefore, cumulative dust emissions associated with the full Dublin Central Masterplan development will be **short-term, localised, negative** and **imperceptible**.

According to the IAQM guidance (2014) should the construction phase of the Proposed Development or Dublin Central Masterplan development coincide with the construction phase of any other development within 350m then there is the potential for cumulative construction dust impacts. However, as stated above a high level of dust control will be implemented across the full Dublin Central Masterplan site which will avoid significant dust emissions. Provided these mitigation measures are in place for the duration of the demolition and construction phase cumulative dust related impacts to nearby sensitive receptors are not predicted to be significant. Cumulative impacts to air quality will be **short-term, localised, negative** and **imperceptible**.

Due to the short-term duration of the construction phase and the low potential for significant CO<sub>2</sub> and N<sub>2</sub>O emissions cumulative impacts to climate are considered neutral.

There are no significant cumulative impacts to air quality or climate predicted for the construction phase.

### 9.7.3.2 Operational Stage

The traffic data reviewed for the operational stage impacts to air quality and climate included the cumulative traffic associated with other existing and permitted developments in the local area as well as traffic associated with the full Dublin Central Masterplan development. Therefore, the cumulative impact is included within the operational stage impact for the Proposed Development. The impact is predicted to be **long-term, neutral** and **imperceptible** with regards to air quality and climate.

In addition, the proposed Dublin Central Masterplan development will facilitate the development of the proposed Metrolink with a station located within the development. The development of the Metrolink, if permitted, will provide for an alternative, more sustainable method of transport in comparison to personal passenger cars. This will result in a positive impact to air quality and climate by reducing emissions associated with cars.

### 9.7.3.3 Worst Case Impact

The worst case impact described in Section 9.7.1.3 for the development of the Dublin Central Masterplan is also applicable to the cumulative development.

## **9.8 MONITORING**

### **9.8.1 Dublin Central Masterplan**

#### **9.8.1.1 Construction Stage**

Monitoring of construction dust deposition along the site boundary to nearby sensitive receptors during the 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<sup>2</sup>\*day) during the monitoring period between 28 - 32 days. Monitoring shall ensure that all sites within the Dublin Central Masterplan are adequately covered as demolition and construction works progress

#### **9.8.1.2 Operational Stage**

There is no monitoring recommended for the operational phase of the development as impacts to air quality and climate are predicted to be imperceptible.

### **9.8.2 Proposed Development Site 3, 4 & 5**

#### **9.8.2.1 Construction Stage**

The monitoring set out in Section 9.8.1.1 for the proposed Dublin Central Masterplan development will ensure that each Site is adequately monitored to ensure dust emissions are not causing nuisance at nearby sensitive receptors.

#### **9.8.2.2 Operational Stage**

No monitoring is proposed for the operational phase as impacts will be imperceptible.

## **9.9 REINSTATEMENT**

### **9.9.1 Dublin Central Masterplan**

Not applicable to air quality and climate.

### **9.9.2 Proposed Development Site 3, 4 & 5**

Not applicable to air quality and climate.

## **9.10 DIFFICULTIES ENCOUNTERED**

There were no difficulties encountered when undertaking this assessment.

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## 10 CLIMATE (DAYLIGHT & SUNLIGHT)

### 10.1 INTRODUCTION

This chapter of the Environmental Impact Assessment Report (EIAR) provides an assessment of the impact on the surrounding environment in relation to daylight, sunlight and overshadowing of the Proposed Development. The Proposed Development which is the subject of these 3no. concurrent planning applications consists of Site 3, Site 4 and Site 5. Dublin Central is underpinned by a Masterplan (refer to Figure 10.1 below indicating the Dublin Central Masterplan area) which will be assessed also.

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

This chapter was completed by Patrick Kavanagh of Building Design Partnership. Patrick is a Chartered Engineer with a BE Hons degree in Building Services Engineering. Patrick is an SEAI Energy Auditor, BER Assessor, LEED Green Associate, BREEAM and WELL Accredited Professional.

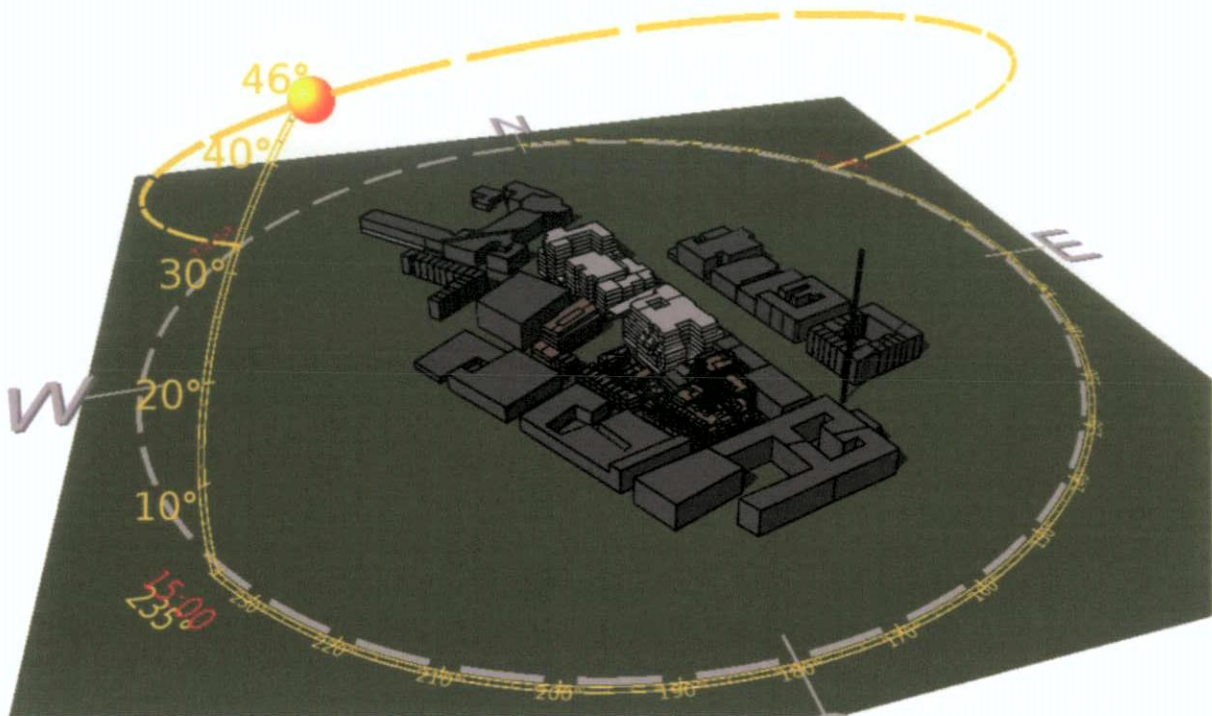
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### 10.2 ASSESSMENT METHODOLOGY

The assessment of daylight was prepared using the methodology outlined in BS 8206-2: 2008 '*Lighting for Buildings Part 2*', whilst the impact of overshadowing was prepared using the methodology set out in BRE 209, '*Site Layout Planning for Daylight and Sunlight: A Guide to Good Practice*', Second Edition 2011, by P. J. Littlefair. This is the non-statutory guide referred to in the Dublin City Council Development Plan 2016 – 2022, and sets out guidelines that are most commonly used in Ireland and the UK to assess the impacts of development on daylight, sunlight and overshadowing.

The BRE 209 guide provides advisory numerical targets that represent good practice; however, the location specific characteristics of each site must also be taken into account. It should be noted that the BRE 209 guidance document is for guidance only and not standards that a development must achieve in order to receive development consent.

The daylight modelling and shadow assessment were assessed and created using Integrated Environmental Solutions (IES). IES is a software package that dynamically calculates environmental conditions within a defined space. The software uses 3D geometry to represent the building design, configuration and external shading provisions, as well as the shape and form of any surrounding buildings that could have an influence on the solar access of the building. IES is certified in accordance with the ANSI/ASHRAE Standard 140-2007 "Standard Method of Test for Evaluation of Building Energy Analysis Computer Programs" (*Grey buildings modelled below are existing neighbours*).



**Figure 10.1:** IES Geometric Model of Dublin Central Masterplan and surrounding context.

A Daylight Sunlight and Overshadowing assessment is normally carried out with particular regard to potential impacts on the living spaces and private open spaces of neighbouring residential properties both within the site curtilage itself and neighbouring properties. In the case of the Proposed Development the assessment will look at neighbouring residential units at first floor level on Moore Street and the bedrooms and open plan living / kitchen spaces within the new apartments. Furthermore, it will verify the sites amenity space receives levels of sunlight meeting BRE 209 recommendations.

IES VE Simulation software uses an application called SunCast (based on Sunpath diagram) which calculates the position of the sun in the sky, tracks solar penetration through the building interior and calculates shadows. The software was therefore used to plot the direction and altitude of the sun for every two minutes and every day of the year and checks whether any elements of the 3D model obstruct the line of sight from the sun to particular reference points. It then calculates the total number of hours of daylight during which sun obstruction will occur.

The guidance documents, referenced above, indicate that site specific characteristics be taken into account when carrying out assessments. As such, the locations of the spaces assessed in this report are provided below in Section 10.3.

### 10.2.1 Daylight

The BRE Report recommends that loss of daylight and sunlight should be checked for main living rooms of dwellings, where they have a window facing within 90° of due south.

The Sunlight will be quantified in terms of the Annual Probable Sunlight Hours (APSH) for any given location. Annual Probable Sunlight Hours is the total number of hours in the year that the sun is expected to shine on unobstructed ground while allowing for average monthly levels of cloud cover for the specific location.

The APSH for any given location depends on its latitude and longitude which determines the number of daylight hours for any particular location, but also on statistical records for that location which indicates the number of daylight hours that are likely to experience sunshine.

The BRE Report recommends that the centre of the window in a dwelling living space; a point 1.6m above floor level, should receive at least 25% of the APSH, including at least 5% of the APSH from 21<sup>st</sup> September to 21<sup>st</sup> March. If the available sunlight hours become less than this, and less than 0.8 times their former value, either over the whole year or just in the winter months, then a noticeable loss of sunlight can occur.

IES VE Simulation software uses an application called SunCast (based on Sunpath diagram) which calculates the position of the sun in the sky, tracks solar penetration through the building interior and calculates shadows. The software was therefore used to plot the direction and altitude of the sun for every two minutes and every day of the year and checks whether any elements of the 3D model obstruct the line of sight from the sun to particular reference points. It then calculates the total number of hours of daylight during which sun obstruction will occur.

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### 10.2.2 Sunlight & Overshadowing Impact

The BRE Report acknowledges the value of sunlight in external spaces in enhancing their overall appearance, ambience and amenity. Relevant spaces noted in the report include private gardens of dwellings, amenity spaces such as parks, playing fields and playgrounds, and also public spaces between non-domestic buildings and in streetscapes.

The BRE report recommends that at least half of the area of relevant spaces should receive at least two hours of sunlight on 21<sup>st</sup> March. The 21<sup>st</sup> March (Spring Equinox) is used for overshadowing analysis as this date illustrates an average level of shadowing for the year.

In the context of the Proposed Development, the areas of interest are as follows: -

- New landscaped amenity spaces for Site 3 residents.
- New landscaped amenity spaces for Site 4 residents.
- New public spaces with the Dublin Central Masterplan in front of Site 5.
- New public square created south of Site 2AB at the rear of No. 59 O'Connell Street

Sunlight Exposure Plans and Shadow Plans are provided to show the effect of overshadowing of the Proposed Development on the adjoining public spaces and properties, using 3D digital models of existing buildings and structures in and around the site and of the Proposed Development.

Shadow plans are prepared for 09:00am, 12:00 noon, and 03:00pm on the 21<sup>st</sup> March (equinox).

### 10.3 RECEIVING ENVIRONMENT

A Sunlight and Overshadowing assessment is normally carried out with particular regard to potential impacts on the living spaces and private open spaces of residential properties. In the case of the Proposed Development, there are no existing residential properties impacted by overshadowing due to the site location and orientation to other existing buildings. This is illustrated in the shadow plans appended to this report.

Whilst it should be noted there are apartments on the north end of Moore Street that face the existing Jurys Inn, Parnell Street; Sunlight analysis completed by BDP shows the roof top amenity space is not affected by the new development at Site 5 due to the orientation and height relative to the building. The apartment windows are facing North East and therefore are overshadowed by the existing Jurys Inn and as the elevation angle is more than 90 degrees from due south the impact on sunlight is not significant or considered relevant under BRE 209 guidance.

## 10.4 CHARACTERISTICS OF PROPOSED DEVELOPMENT

### 10.4.1 Dublin Central Masterplan

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

Sites 3, 4 & 5 for which this EIAR chapter is detailed around are 3 of the 5 Sites associated with the Dublin Central Masterplan. For this reason the cumulative impact of the new Dublin Central Masterplan massing is added to each individual Daylight, Sunlight and Overshadowing Assessment. This ensures the Dublin Central development itself does not reduce the access to Daylight and Sunlight for the Site 3 & 4 apartments, Site 3 hotel bedrooms, Site 5 office space and all amenity space results noted within this report.



Figure 10.2: The Dublin Central Masterplan & Phasing Identification.

The analysis notes the low density of the site at present and therefore it should be noted that this will exaggerate the impact of the Proposed Development on the surrounding area.

## 10.4.2 Proposed Development – Site 3, 4 & 5

### 10.4.2.1 Site 3 – Hotel and Residential Development

The Proposed Development comprises a mixed-use scheme accommodating a hotel, residential units and associated amenities, cultural, retail and café / restaurant uses (c. 15,842 sq. m gross floor area) in 2no. Blocks ranging in height from 1 – 9 storeys over 2no. new independent single storey basements. Provision of a new street/laneway linking Henry Street with Henry Place / Moore Lane.

The proposed Site 3 is indicated in red on Figure 10.3 below.



Figure 10.3: Location of Proposed Development (within red line).

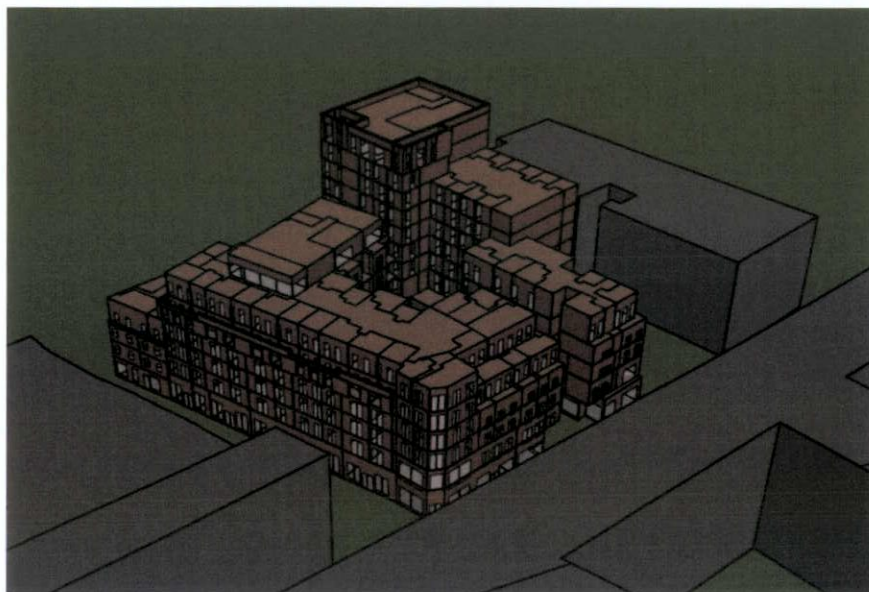


Figure 10.4: IES Geometric Model with Site 3 Highlighted.

#### 10.4.2.2 Site 4 – Residential Development

The proposed Site 4 is indicated in white on Figure 10.5 below. The Proposed Development comprises a mixed-use scheme accommodating residential units and associated amenities, retail and café / restaurant uses (c. 3,290 sq. m gross floor area) in 2no. parts located north and south of the Nos. 14 – 17 Moore Street (National Monument/Protected Structures) ranging in height from 1 – 3 storeys including retained independent single storey basements. Provision of a part of the new public plaza and archway onto new public plaza.



Figure 10.5: Location of Proposed Development (within solid white line).

**10.4.2.3 Site 5 – Office Development**

The proposed site 5 is indicated in white on Figure 10.6 below. The Proposed Development comprises a mixed-use scheme accommodating office and café / restaurant uses (c. 6,478 sq. m gross floor area) in a single building ranging in height from 2 – 6 storeys (top floor set back) over new single storey localised basement. Provision of a part of the new public plaza.

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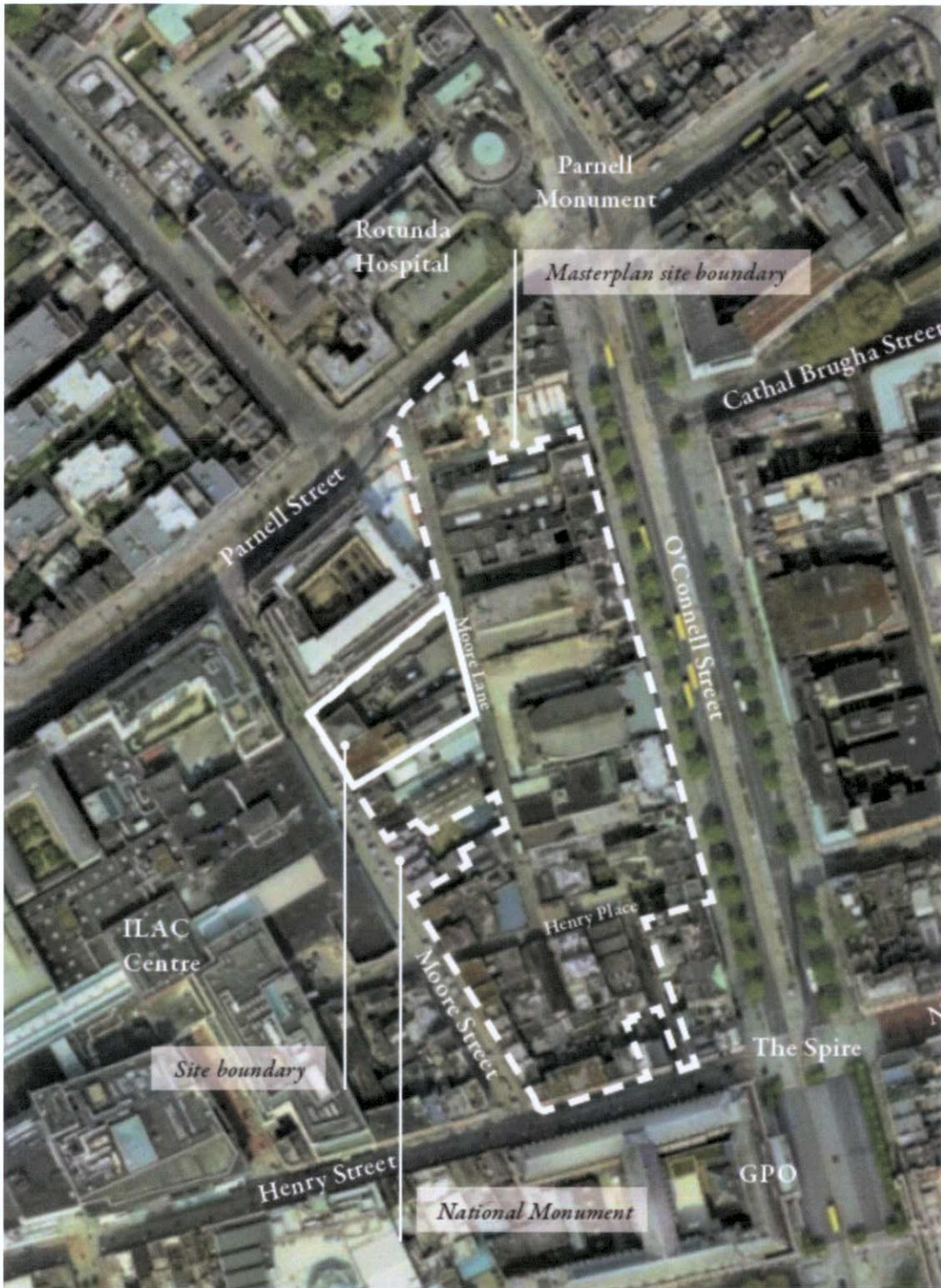


Figure 10.6: Location of Proposed Development (within solid white line)

## 10.5 POTENTIAL IMPACTS

### 10.5.1 Dublin Central Masterplan

Following a site survey and shadow assessment it was determined that there are no existing residential properties impacted by the Proposed Dublin Central Masterplan Development. The extent of the impact of a development is usually proportional to the extent to which that development is large in scale and/or height and its proximity to the location. This proportionality may be modified by the extent to which the development is seen as culturally or socially acceptable, and on the interaction between the Proposed Development, the character of the existing shadow environment and the land use pattern of the receiving environment.

The impact of the Proposed Development on sunlight access to the adjacent properties is therefore defined as **Not Significant**: *An effect which causes noticeable changes in the character of the environment but without significant consequences.* This is the second lowest definition of impact taken from the *Guidelines on the Information to be Contained in Environmental Impact Statements prepared by the Environmental Protection Agency (2017 Draft)*.

The definition is chosen because the scale of the Dublin Central Masterplan development will have a minor impact on the shadow environment but the consequences of this will not be noticeable due to the site orientation and existing urban density of the area.

#### 10.5.1.1 Construction Stage

The potential impact of the construction phase of the Proposed Dublin Central Masterplan Development on daylight and sunlight is likely to be, initially, lesser than the potential impact of the completed development. As the Proposed Development nears completion, the potential impact of the emerging development is likely to be similar in all material respects to that of the completed development. It is noted that temporary structures and machinery (e.g. hoarding, scaffolding, cranes, etc.) have the potential to result in changes in daylight access in buildings, although any additional impacts arising from temporary structures or machinery are likely to be **temporary** and **minor**.

#### 10.5.1.2 Operational Stage

A Sunlight and Overshadowing assessment is normally carried out with particular regard to potential impacts on the living spaces and private open spaces of residential properties. In the case of the Proposed Dublin Central Masterplan Development, there are no existing residential properties impacted by overshadowing due to the site location and orientation to other existing buildings. This is illustrated in the shadow plans appended to this report.

#### 10.5.1.3 Do-Nothing Impact

In a 'do-nothing' scenario, the daylight and sunlight environment within existing buildings will remain unchanged.



## 10.5.2 Proposed Development Site 3, 4 & 5

### 10.5.2.1 Construction Stage

The potential impact of the construction phase of the Proposed Development on daylight and sunlight is likely to be, initially, lesser than the potential impact of the completed development. As the Proposed Development nears completion, the potential impact of the emerging development is likely to be similar in all material respects to that of the completed development. It is noted that temporary structures and machinery (e.g. hoarding, scaffolding, cranes, etc.) have the potential to result in changes in daylight access in buildings, although any additional impacts arising from temporary structures or machinery are likely to be **temporary and minor**.

### 10.5.2.2 Operational Stage

#### 10.5.2.2.1 Impact on Sunlight from Proposed Development

A Sunlight and Overshadowing assessment is normally carried out with particular regard to potential impacts on the living spaces and private open spaces of residential properties. In the case of the Proposed Development, there are no existing residential properties impacted by overshadowing due to the site location and orientation to other existing buildings. This is illustrated in the shadow plans appended to this report.

Whilst it should be noted there are apartments on the North of Moore Street that face the existing Jurys Inn, Parnell Street; Sunlight analysis completed by shows the roof top amenity space is not affected by the new development at site 5 due to the orientation and height relative to the building. The apartment windows are facing North East and therefore are overshadowed by the existing Jurys Inn and as the elevation angle is more than 90 degrees from due south the impact on sunlight is **not significant or considered relevant** under BRE 209 guidance.

However for completeness BDP did carry out a detailed assessment on the residential properties within the vicinity of Site 3 which appear to be at 1<sup>st</sup> floor level of No. 62 Moore Street (above FX Buckley's). A review of the DCC Planning Portal and granted / refused permissions showed us that Permission (DCC Reg. Ref. 3908/19 – No. 62 Moore Street) was sought for the construction of a pitched roofed structure to accommodate additional living space and refurbishment/improvements to the upper floors. It appears from looking at the planning documentation that there are 4no. Bedrooms already above the shop with no living areas. The proposed additional floor would have created a 5th bedroom however DCC refused permission on 25 Oct 2019 and was subject to a First party appeal. ABP upheld DCC's decision and Refused Permission on 20 March 2020. To ensure an accurate input to the Shadow Analysis model and to verify that Site 3 would have no significant impact on the existing bedrooms, a detailed survey was carried out by Murphy Surveys.



Figure 10.7: No. 62 Moore Street Survey.

The orientation of the No.62 Moore Street 1st & 2nd Floor Bedroom windows is North East. The morning sun rises from either North East, East or South East depending on the time of the year.

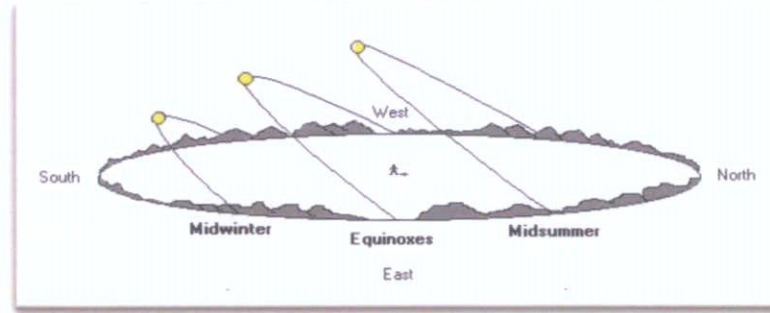


Figure 10.8: Sun Path.

The existing 3 storey buildings on the Site 3 site at present already block this view to the east horizon which is not unusual in a city centre environment. As the sun's altitude increases throughout the day the orientation of the sun is also moving to the South and therefore the building's shadow is moving to the North away from the bedrooms at No. 62 Moore Street.

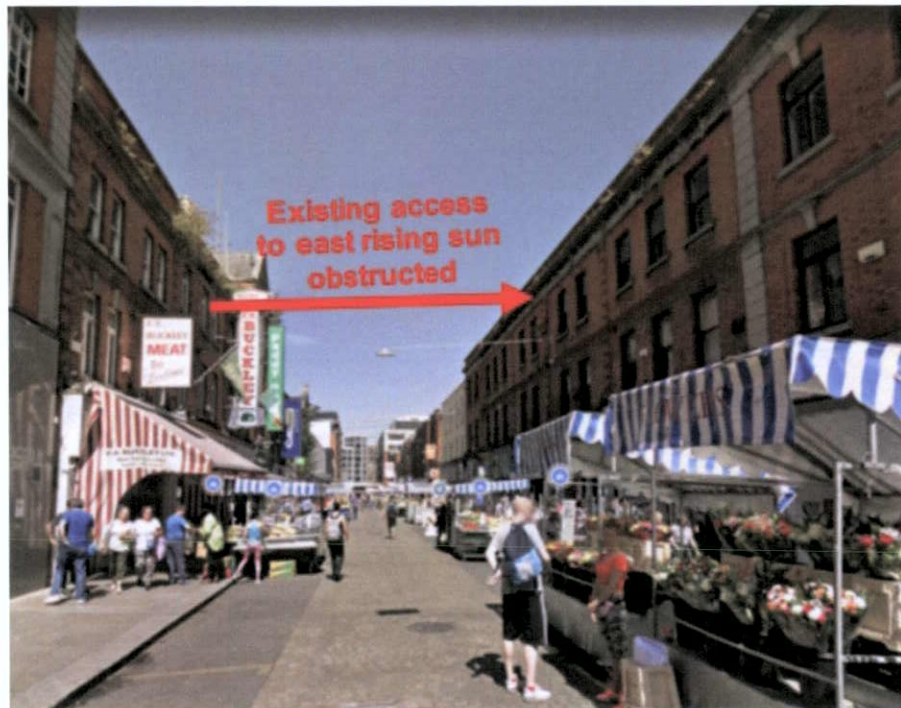


Figure 10.9: Existing Context adjacent Site 3.

Following detailed analysis there was a negligible difference in the number of sunlight hours the existing bedroom windows achieved. This study demonstrates that the building height has **no impact** on the access to daylight for the bedroom windows at No. 62 Moore Street and the existing north easterly orientation of the windows has the highest impact. It can therefore be concluded that any development of reasonable height (3 storeys or more) would maintain the same number of sunlight hours as the morning sun's low altitude is blocked to the East.

#### 10.5.2.2.2 Overshadowing Impact on Sunlight from Proposed Development

The BRE 209 guide recommends that in all relevant amenity spaces; at least half of the area should receive at least two hours of sunlight on 21<sup>st</sup> March.

The amenity space within Site 3 is at roof level and receives well in excess of 2 hours of direct sunlight on over 50% of the area. In fact the space receives almost 6 hours on 80% of the amenity space on the 21<sup>st</sup> March. It is therefore clear that residents will receive high levels of sunlight and the BRE 209 guidelines are met.



Figure 10.10: Site 3 Amenity Space.

The Proposed Development will have a slight overshadowing impact on the new Dublin Central Site 4 amenity space. The residential amenity space within Site 4 is at 1<sup>st</sup> floor level in a courtyard and receives at least 2 hours of direct sunlight on over 80% of the designated amenity area for residents (see Figure 10.12 overleaf). It is clear that residents will receive high levels of sunlight and the BRE 209 guidelines are met.



Figure 10.11: Site 4 Amenity Space.



Figure 10.12: Site 4 Amenity Space Sunlight Exposure.

The new public square created in Dublin Central also receives high levels of sunlight throughout the year with over 90% of the space achieving 2 hours of direct sunlight on the 21<sup>st</sup> March (see figure 10.14 overleaf).



Figure 10.13: Site 4 Public Amenity Space & New Public Square for Dublin Central.

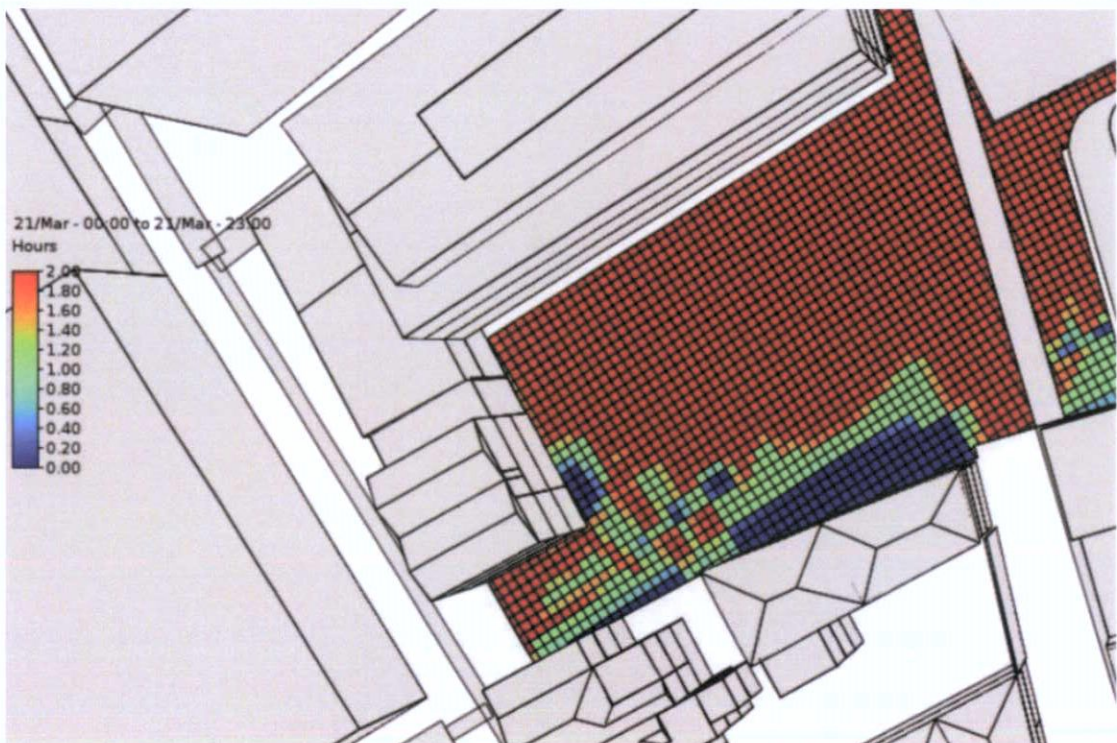
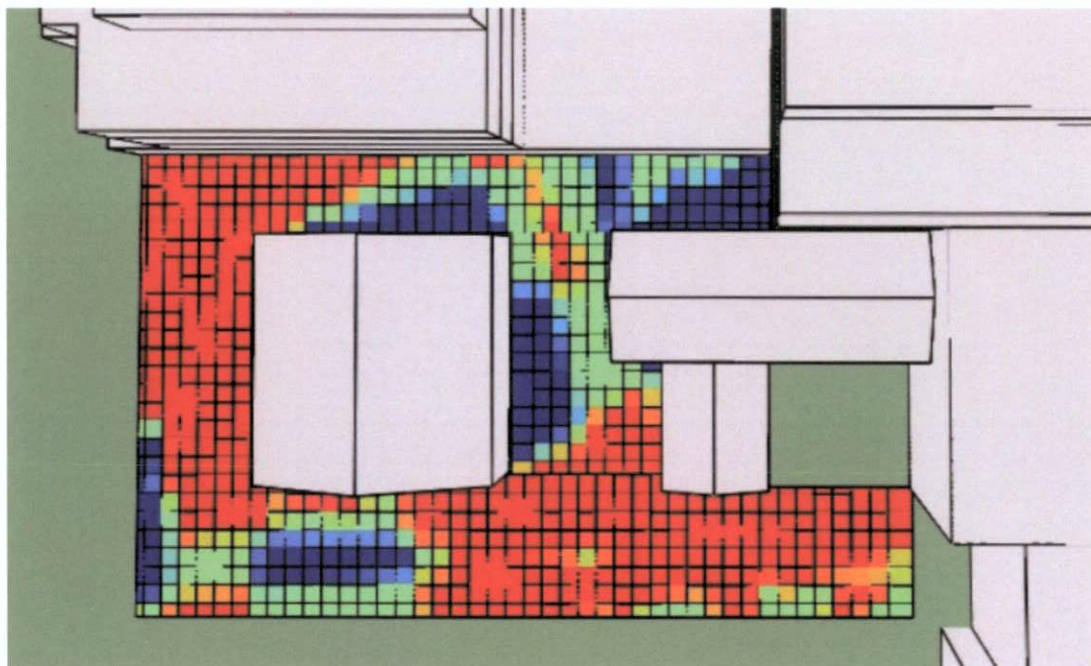


Figure 10.14: Site 4 Public Amenity Space & New Public Square for Dublin Central

The new public square created in the southern portion of Site 2AB at the back of No. 59 O'Connell Street in Dublin Central also receives high levels of sunlight throughout the year with over 70% of the space achieving 2 hours of direct sunlight on the 21<sup>st</sup> March (see figure 10.14 overleaf).



**Figure 10.15:** Site 4 Public Amenity Space & New Public Square for Dublin Central.



**Figure 10.16:** Site 2AB Public Amenity Space Sunlight Exposure.

The analysis demonstrates that the design of Dublin Central Masterplan maximises access to sunlight in amenity spaces for both residents and the public and so the BRE 209 guidelines are easily achieved.

### 10.5.2.2.3 Summary of Development Impact

To conclude this study a 'Definition of Impacts on Sunlight Access' is given below. The list of definitions given below is taken from the *Guidelines on the Information to be Contained in Environmental Impact Statements prepared by the Environmental Protection Agency (2017 Draft)*.

- **Imperceptible Impact:** An effect capable of measurement but without significant consequences.
- **Not Significant:** An effect which causes noticeable changes in the character of the environment but without significant consequences.
- **Slight Effects:** An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
- **Moderate Effects:** An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends
- **Significant Effects:** An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
- **Very Significant:** An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.
- **Profound Impact:** An impact which obliterates sensitive characteristics.

The extent of the impact of a development is usually proportional to the extent to which that development is large in scale and/or height and its proximity to the location. This proportionality may be modified by the extent to which the development is seen as culturally or socially acceptable, and on the interaction between the Proposed Development, the character of the existing shadow environment and the land use pattern of the receiving environment.

The impact of the Proposed Development on sunlight access to the adjacent properties is therefore defined as **Not Significant:** *An effect which causes noticeable changes in the character of the environment but without significant consequences.* This is the second lowest definition of impact taken from the *Guidelines on the Information to be Contained in Environmental Impact Statements prepared by the Environmental Protection Agency (2017 Draft)*.

The definition is chosen because the scale of the development at Sites 3, 4 & 5 will have a minor impact on the shadow environment but the consequences of this will not be noticeable due to the site orientation and existing urban density of the area.

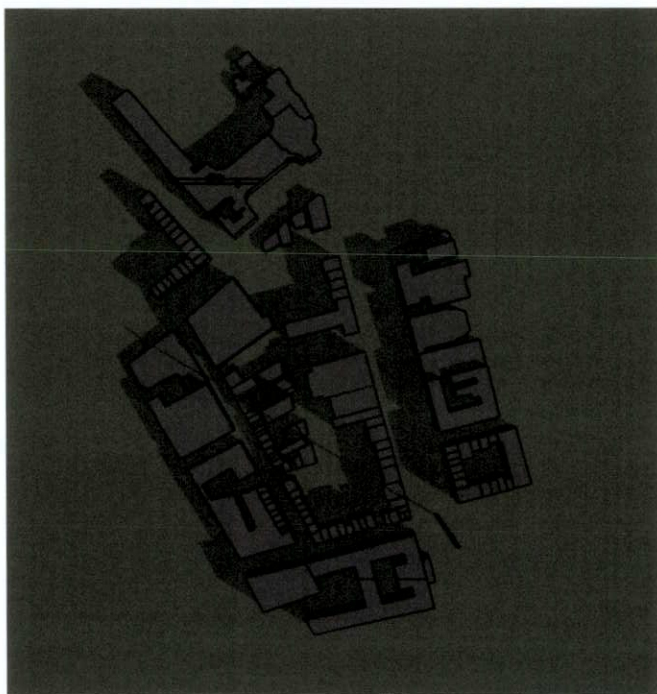
### 10.5.2.3 Overshadowing Impact on Sunlight from Proposed Development

The shadow plans are prepared for 09:00am, 12:00 noon, 3:00pm and 5:00pm on the 21<sup>st</sup> March (equinox), 21<sup>st</sup> June (summer solstice) and 21<sup>st</sup> December (winter solstice) for reference. The dark grey massing is the existing context. The light grey massing is the Proposed Masterplan for Dublin Central future planning permission (Sites 1, 2AB and 2C). The brown massing are the Proposed Developments for Site 3, 4 & 5 of the Dublin Central Masterplan.

#### 9am – 21<sup>st</sup> March



Proposed



Existing