6. Water & Wastewater

6.1 Introduction

This chapter describes the likely significant effects of the proposed development in relation to surface water, water quality, the existing hydrological regime and flood risk, both during the construction and operational phases, where relevant. Mitigation measures are also identified and described in order to minimise effects, where required.

Groundwater features of relevance and hydrogeology have been considered in more detail in Chapter 5 (Land & Soils).

6.2 Methodology

This assessment complies with the requirements for an EIAR and has been prepared taking cognisance of the EPA Guidelines on the information to be contained in Environmental Impact Assessment Reports, May 2022.

The appraisal of the potential effects of the proposed development on the surrounding hydrological environment included the following:

- Review of the proposed development layout;
- Review of existing topographical survey information and LiDAR mapping;
- Review of information available on relevant water features in the EPA online mapping service (www.catchments.ie);
- Review of Office of Public Works (OPW) National Flood Hazard Mapping and Catchment Flood Risk Assessment and Management Studies (CFRAM Studies) to identify the potential for flood risk and any history of flooding at or adjacent to the site in the OPW website (www.floodinfo.ie);
- Review of the National Parks and Wildlife Service (NPWS) website and online mapping (www.npws.ie) for sites designated for conservation in proximity to the site of the proposed development.
- Review of SDCC Development Plan 2016-2022;
- Review of SDCC Development Plan 2022-2028 (made in June 2022, effective from August 2022);
- Review of SDCC Strategic Flood Risk Assessment (SFRA) 2022-2028;
- Review of utility records for the site of the proposed development.

6.2.1 Data Sources

The following online resources were used to inform the description of the likely significant effects for Water:

- EPA Online Mapping Service: https://gis.epa.ie/EPAMaps/Water and www.catchments.ie (accessed 2nd May 2022)
- GSI Open Topographic Data Viewer for LiDAR data https://dcenr.maps.arcgis.com/apps/webappviewer/index.html?id=b7c4b0e763964070ad69bf8c1572c9f5 (accessed 3rd June 2022)
- Geological Survey of Ireland (GSI) Public Data Viewer https://www.gsi.ie/en-ie/data-and-maps/Pages/default.aspx (accessed 2nd May 2022)
- Geological Survey of Ireland (GSI) Public Data Viewer for Groundwater Flooding https://dcenr.maps.arcgis.com/apps/webappviewer/index.html?id=848f83c85799436b808652f9c735b1cc (accessed 2nd May 2022)
- National Parks and Wildlife Services (NPWS) GIS dataset: www.npws.ie (accessed 3rd May 2022)
- Office of Public Works (OPW) flood mapping data www.floodinfo.ie (accessed 3rd May 2022)

6.2.2 Consultation

Consultation was carried out with the following statutory bodies with relevance to this chapter. The status of consultation and any feedback provided is noted below:

- South Dublin County Council – A pre-planning consultation meeting was held with SDCC on 30 May 2022 (SDCC ref. PP039/22);
- Inland Fisheries Ireland – no response received;
- Irish Water – GSI mapping data returned showing Irish Water mains and sewer networks in the area;
- Health Service Executive – Environmental Health raised the following in relation to water and wastewater:
  - Potential impacts on surface water quality to be addressed as part of EIAR (refer to Sections 6.6.2, 6.6.3, 6.7 and 6.8);
  - All drinking water sources must be identified and any measures required to protect sources of drinking water (refer to Section 6.3.1.2);
  - Any potential significant impacts to drinking water sources should be assessed and proposed mitigation measures described in the EIAR (refer to Section 6.6.4.1).

6.2.3 Existing Mapping and Surveys

Discovery series mapping from the Eastern Catchment Flood Risk and Management (CFRAM) Study and Topographical Survey (LiDAR) mapping were examined to identify water features at or near the site and to provide information on the hydrological regime for the existing site.

6.2.3.1 Discovery Series Mapping (Accessed 29th April 2022)

The site for the proposed development is outlined on Discovery Series mapping in Figure 6.1. The Discovery Series mapping shows the outline of the Greenogue Business Park . As part of an extension to the Park in 2003, the River Griffeen and its tributaries were partially realigned as can be seen in Figure 6.2. The Baldonnel Watercourse now runs northwards, along Grant's Rise Road to the west of the site for the proposed development and the River Griffeen runs westwards along the south of Greenogue Business Park. The Baldonnel Watercourse joins the Griffeen River at Blundelstown, to the northwest of Greenogue Business Park. The Baldonnel Aerodrome is located to the northeast of the business park.

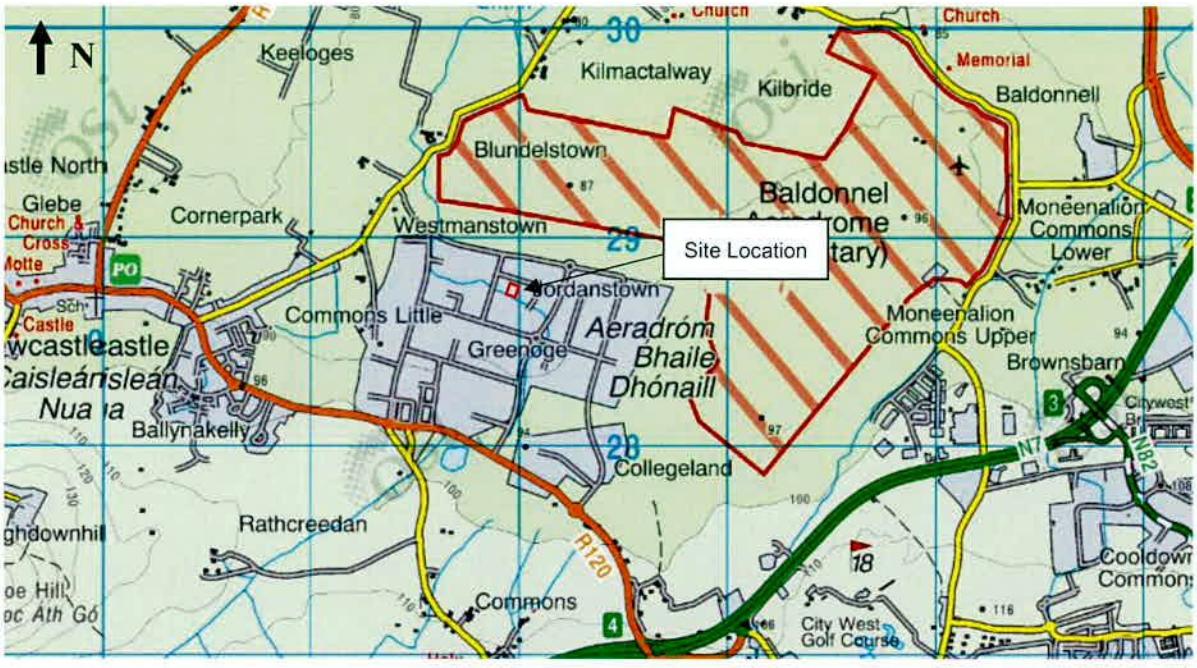


Figure 6.1: Site Location on Discovery Series mapping

6.2.3.2 *Eastern CFRAM Study 2016*

The Hydraulics Report (HA09) for the Baldonnel Model in the Eastern CFRAM Study 2016[34] outlines the current alignment of the Baldonnel Watercourse and tributaries of the River Griffeen.

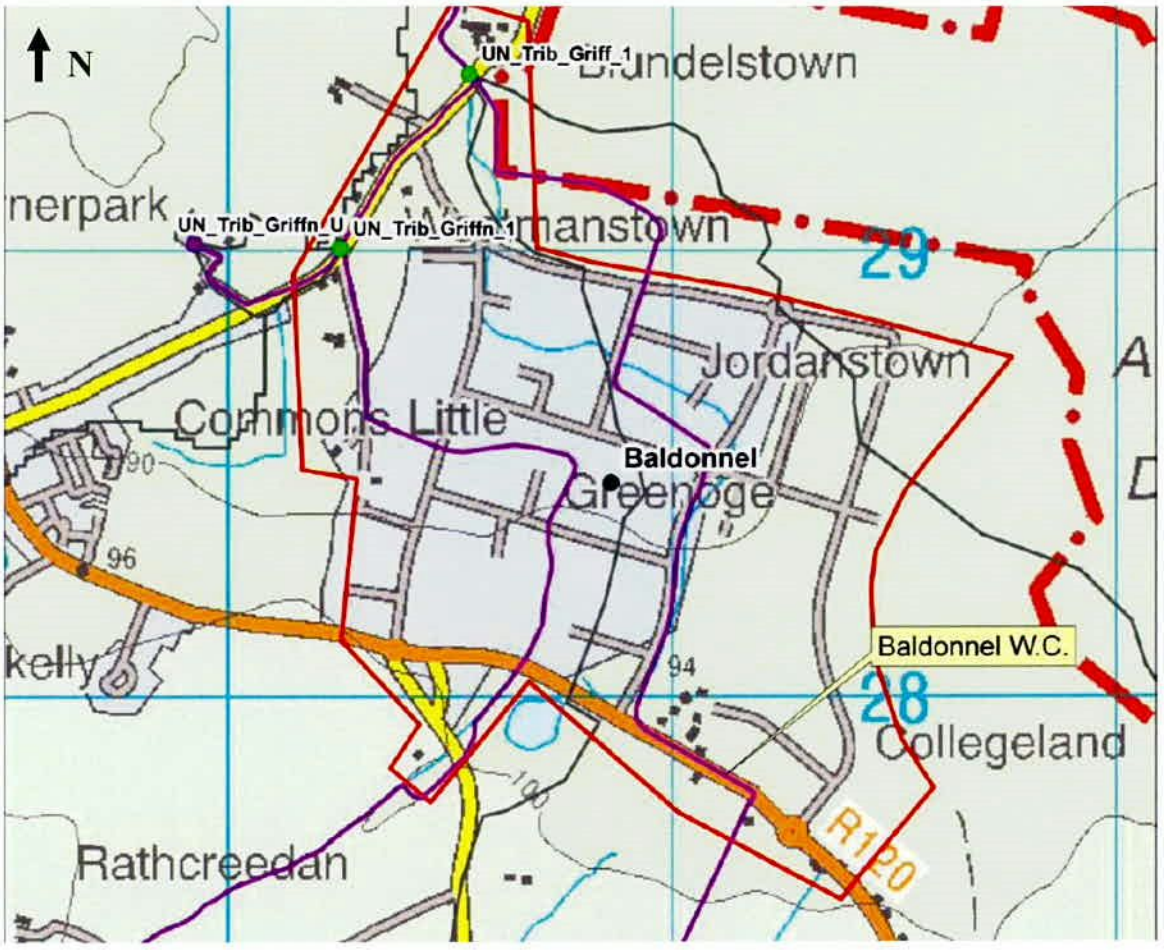


Figure 6.2: Existing route of streams (shown in purple) in the vicinity of Greenogue Business Park

6.2.3.3 *Topographical Survey and LiDAR (Accessed 3rd June 2022)*

The GSI Open Topographic Data Viewer provides access to processed LiDAR data in raster format. The data has been downloaded and mapped as illustrated in Figure 6.3. The LiDAR data (captured in 2011) indicates that the levels in the Greenogue Business Park vary from approximately 85 m to 90 m, rising in a west-east direction. At the site for the proposed development the levels, rise up from the south and west sides with the highest levels being to the east of the unit.

Within the site boundary, a topographical survey was carried out in February 2022 to verify existing site plans and drawings. The site is generally level between a low point of approx. 87.5 mAOD close to the site entrance along the northern site boundary and a high point of approx. 87.8 mAOD close to the southern site boundary (rear of the site). There are minor, localised changes in site levels associated with slight surface gradients for rainwater runoff / drainage falls.

[34] Source: Extract from HA09 Hydraulics Report Baldonnel Model, Eastern CFRAM Study, 2016

Figure 6.3: Topographic Data from LiDAR

6.2.4 Constraints Encountered

There were no particular constraints encountered for the appraisal of the site of the proposed development for effects on hydrology, water quality and flooding.

6.3 Receiving Environment

6.3.1 Existing Hydrological Environment

The site is located within Hydrometric Area 09 (known as Liffey and Dublin Bay). The proposed development at the site in Unit 518B at Greenogue Business Park is located in the Liffey_SC_090 sub-catchment, which covers an area of 136.56 km^2.

The Baldonnel watercourse runs to the south and west of the site. It flows in a northerly direction to meet the Griffeen River (code: IE_EA_09L012100), a tributary of the River Liffey. The Griffeen River continues northwards to meet the River Liffey at Lucan, approximately 8.5 km downstream of the proposed development site.

The watercourse in the vicinity of the site for the proposed development is not subject to tidal influences.

6.3.1.1 Existing Site Drainage

An existing underground storm water sewer system at the site drains the surface water from the existing building roofs and external yard and car park areas. Surface water is routed through aco drains and gullies via an attenuation tank and a petrol interceptor to the existing public storm water network on Grants Crescent to the north of the site.

6.3.1.2 Existing Water Supply

The site of the proposed development is served by an existing connection to the watermain in the public road (Grants Crescent) along the site's northern boundary. There is no abstraction of

groundwater to serve the existing facility. A review of nearby groundwater wells, springs and group water schemes in the area of the site has been completed as part of the hydrogeological assessment and is further described in Chapter 5 (Land & Soils).

There are no mapped group water scheme abstraction points/wells, public supply Source Protection Areas or other known abstraction points for groundwater within 2 km of the site of the proposed development.

6.3.2 Existing Water Quality Environment

The most recent ecological assessment for the Griffeen River was in 2019, which resulted in a Q-value of 3 (Poor ecological conditions). The sampling locations for the Griffeen River are outlined in Table 6.1 and the corresponding Q-values are outlined in Table 6.2. Poor ecological conditions were recorded in Lucan (Station Code 0600) in August 2019.

The Water Framework Directive (WFD) 2013-2018 Status for the Griffeen River is 'Moderate'.

Table 6.1: Sampling Locations on the Griffeen River

Station Code	Station Location	WFD Waterbody Code	Easting	Northing	Local Authority
RS09G010100	College Rd	IE_EA_09L012100	301865	228043	South Dublin County Council
RS09G010200	GRIFFEEN – First Bridge E. of Milltown	IE_EA_09L012100	302760	230973	South Dublin County Council
RS09G010500	GRIFFEEN – Esker Br	IE_EA_09L012100	303951	234305	South Dublin County Council
RS09G010600	GRIFFEEN – In Lucan Village (Gauging Station)	IE_EA_09L012100	303248	235201	South Dublin County Council

Table 6.2: Q-Values for each Sampling Location

Station Code	1984	1988	1991	2019
RS09G010100	-	-	2-3	-
RS09G010200	3-4	2-3	3	-
RS09G010500	2-3	2-3	3	-
RS09G010600	3-4	3	2-3	3

There are no EPA designated drinking water river sources in the immediate vicinity of the site.

6.3.3 Existing Site Hydrogeology and Geology

The GS) website provides information on their public online mapping service on aquifer vulnerability and subsoils. These aspects are discussed in the following sections. The hydrogeological environment is also further assessed in Chapter 5 (Land & Soils).

6.3.3.1 *Aquifer Vulnerability*

Groundwater Vulnerability is a term used to represent the natural ground characteristics that determine the ease with which groundwater may be contaminated by human activities. GSI classifies the vulnerability of the aquifer at the proposed development site as extreme, as shown in Figure 6.4 below.

Figure 6.4: Aquifer Vulnerability Mapping

6.3.3.2 *Subsoils*

GSI classifies the subsoil of the proposed development site as till derived from limestones, as shown in Figure 6.5. There is no evidence of alluvium which might indicate historic flooding on the site.

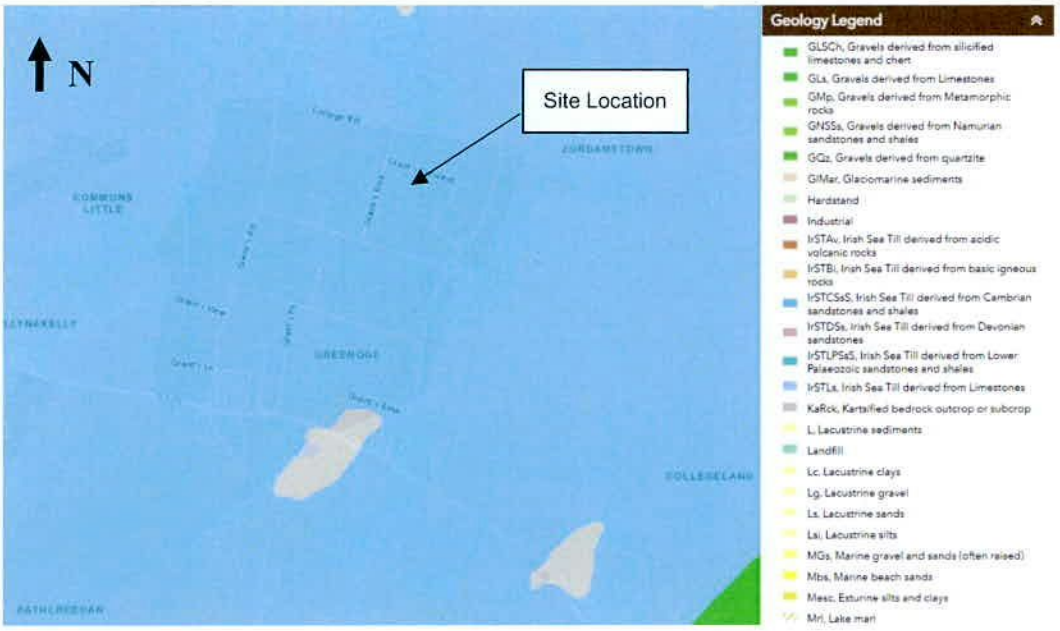


Figure 6.5: Subsoil Mapping

6.3.4 Existing Protected Areas

Section 4.3 of Chapter 4 (Biodiversity) confirms that there are no Natura 2000 sites within the zone of influence of the proposed development. There is also no ecological or hydrological connectivity between the proposed development and any Natura 2000 sites.

Similarly, there are no Proposed Natural Heritage Areas (pNHAs) / Natural Heritage Areas (NHAs) within the zone of influence of the proposed development.

6.4 Flood Risk Identification

The Planning System and Flood Risk Management: Guidelines for Planning Authorities, published in November 2009, have been used to assess flood risk at the site.

Flood zones are a key tool in flood risk management, these zones are geographical areas within which the likelihood of flooding is in a particular range. There are three types or levels of flood zones defined for the purposes of these Guidelines:

- *"Flood Zone A – where the probability of flooding from rivers and the sea is highest (greater than 1% or 1 in 100 for river flooding or 0.5% or 1 in 200 for coastal flooding);*
- *Flood Zone B – where the probability of flooding from rivers and the sea is moderate (between 0.1% or 1 in 1000 and 1% or 1 in 100 for river flooding and between 0.1% or 1 in 1000 year and 0.5% or 1 in 200 for coastal flooding); and*
- *Flood Zone C – where the probability of flooding from rivers and the sea is low (less than 0.1% or 1 in 1000 for both river and coastal flooding). Flood Zone C covers all areas of the plan which are not in zones A or B."*

The OPW has produced indicative flood mapping to assist in flood risk identification, this information is available on their website (www.floodinfo.ie). This mapping was produced from a number of sources and was used, in conjunction with the aforementioned Guidelines, to examine flood risk as reported in the sections below.

6.4.1 Existing Flood History

As shown in Figure 6.6, there is no history of flooding recorded by the OPW at the site of the proposed development. There was an instance of flooding (Flood ID 11710) approximately 320m to the north-west of the site in the Greenogue Business Park, at Unit 525, Grants Place. This

flooding event took place from the 24th -25th October 2011, with the majority of the flooding occurring at 10 pm on the 24th October. The flooding was the result of water collecting in a surface depression after heavy rainfall. Heavy overland flow accumulated on the site of Unit 525, flooding the property. The area drains to the upper reaches of the Griffeen River. Significant road flooding from open channel watercourses was reported a short distance downstream of Unit 525 at Aylmer Road during the reported event. Flood depths were recorded between 0.3-0.6 m. There were impacts to property as a result of this flood event. The extent of the flooding recorded by OPW is shown in Figure 6.7.

Recurring flooding is reported in the Newcastle Greenogue area (Flood ID 1215) and at Aylmer Road, Newcastle (Flood ID 1223) to the south and west of the site of the proposed development, as shown in Figure 6.6. These locations were identified in the minutes of a meeting by SDCC in 2005[35] as being prone to flooding.

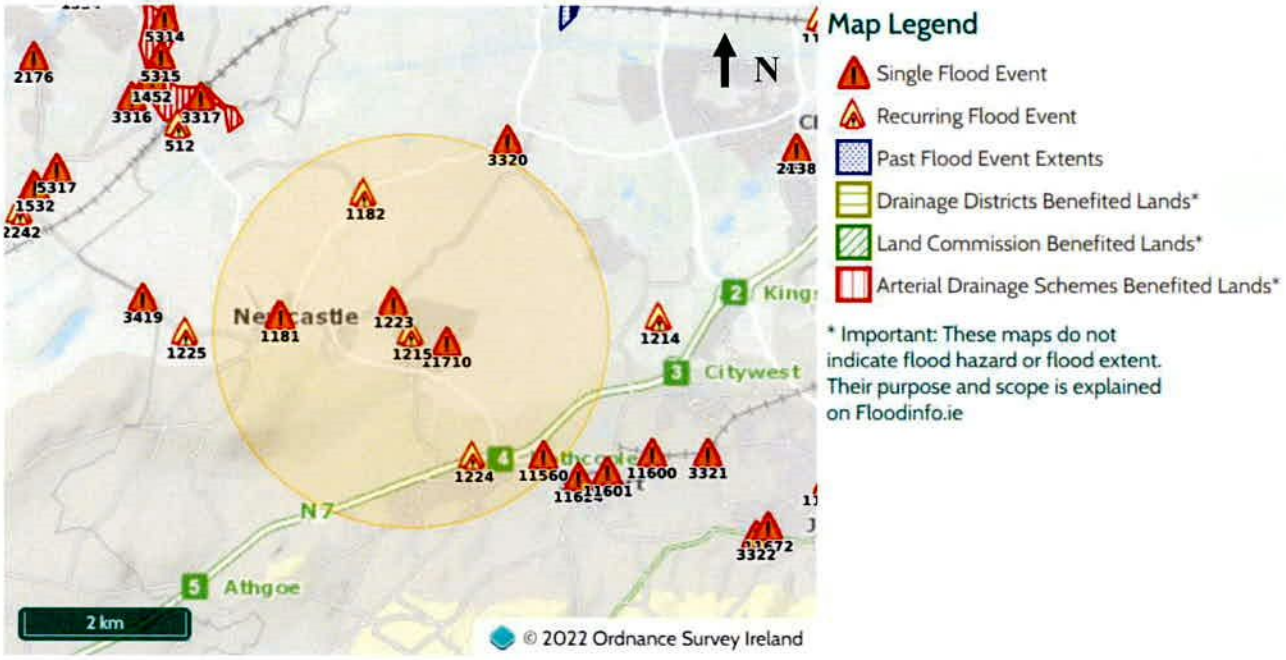


Figure 6.6: OPW Flood Map

[35] Document Reference: P4D403A – F310 – 030 – 004 in Past Flood Events records in www.floodinfo.ie

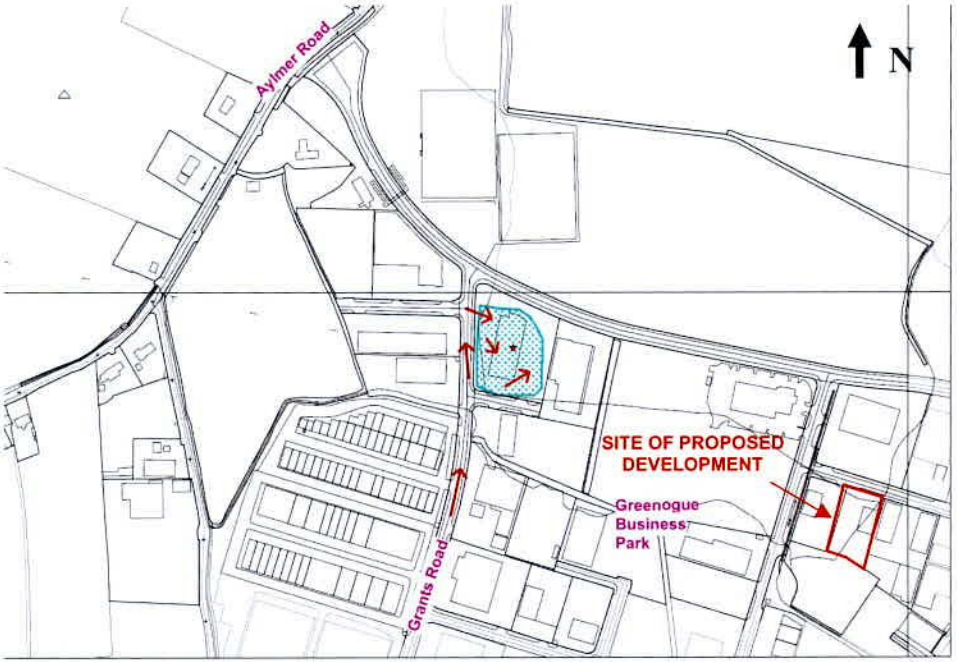


Figure 6.7: Flood extent (shown in blue) at Unit 525 recorded by OPW in October 2011 (Flood ID 11710)

Direction of flood flow indicated by red arrows.

6.4.2 OPW Arterial Drainage

There are no Arterial Drainage Schemes with Benefitting Lands, Drainage Districts, Land Commission areas or flood defences in the vicinity of the location of the site for the proposed development as can be seen in the records kept by the OPW in their website (https://www.floodinfo.ie/map/drainage_map/).

6.4.3 OPW Predictive Mapping

The OPW predictive flood mapping for the site is shown in Figure 6.8 for the 1 in 1,000 year (0.1% Annual Exceedance Probability (AEP)), a 1 in 100 year (1% AEP), and 1 in 10 year (10% AEP) event. This was sourced from the National Catchment-based Flood Risk Assessment and Management (CFRAM) mapping (www.floodmaps.ie).

There is no tidal flood risk at the site.

The flood map included in Figure 6.8 is the predicted flood mapping from the Mid-Range Future Scenario (MRFS) which includes for Climate Change (accessed on 10th June 2022).

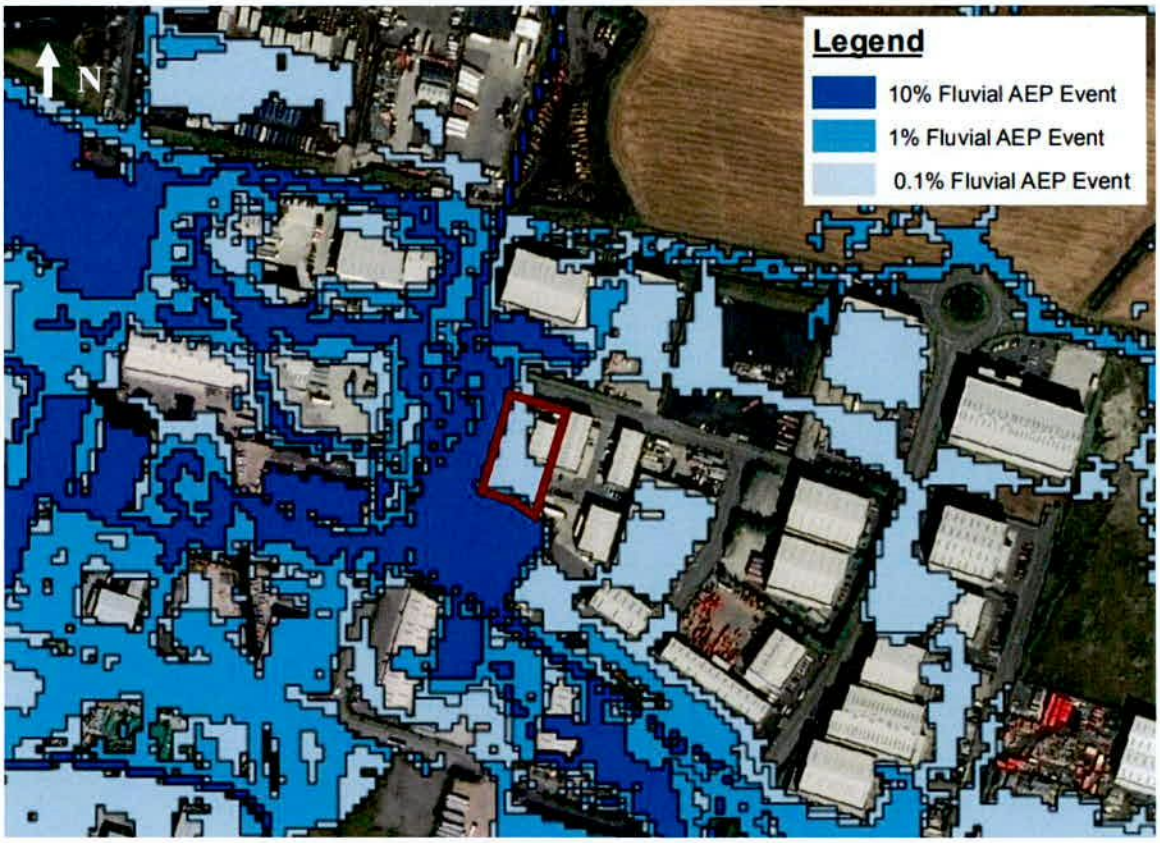


Figure 6.8: Predictive Fluvial Flooding in the Mid-Range Future Scenario (MRFS)

As shown in Figure 6.8, almost three quarters of Unit 518B is at risk of flooding in a 1-in-1,000-year flood event (0.1% AEP) when Climate Change is taken into account, mainly along the west and south sides of the site. There is a slight predicted risk of flooding in a 1-in-100 return period flood event at the southern boundary of the site.

6.4.3.1 *Fluvial Flooding*

The Baldonnel Watercourse was modelled in the Eastern CFRAMS study as shown in Figure 6.9. The southern extent of the site of the proposed development of Unit 518B is shown on this mapping to be just within the 10% Fluvial Annual Exceedance Probability (AEP) and the 1% fluvial AEP flood zones. No new construction is proposed at this location at the southern boundary.

The 0.1% fluvial AEP flood zone (Flood Zone B) extends further within the site of the proposed development and encroaches on the location of the proposed new waste handling, material storage and transfer building. It can be seen in the associated fluvial flood depth map (modelled for the Eastern CFRAMS) in Figure 6.10 that the 0.1% AEP flood depth predicted is up to a maximum of 250 mm.

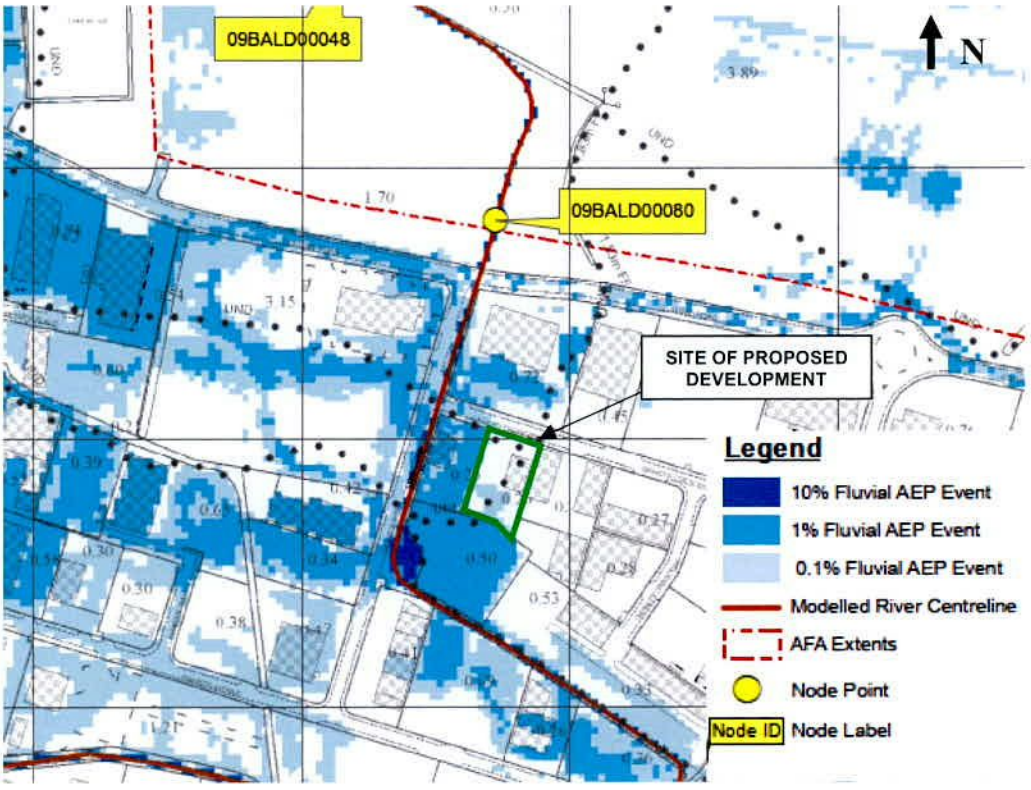


Figure 6.9: OPW Baldonnel Fluvial Flood Extents

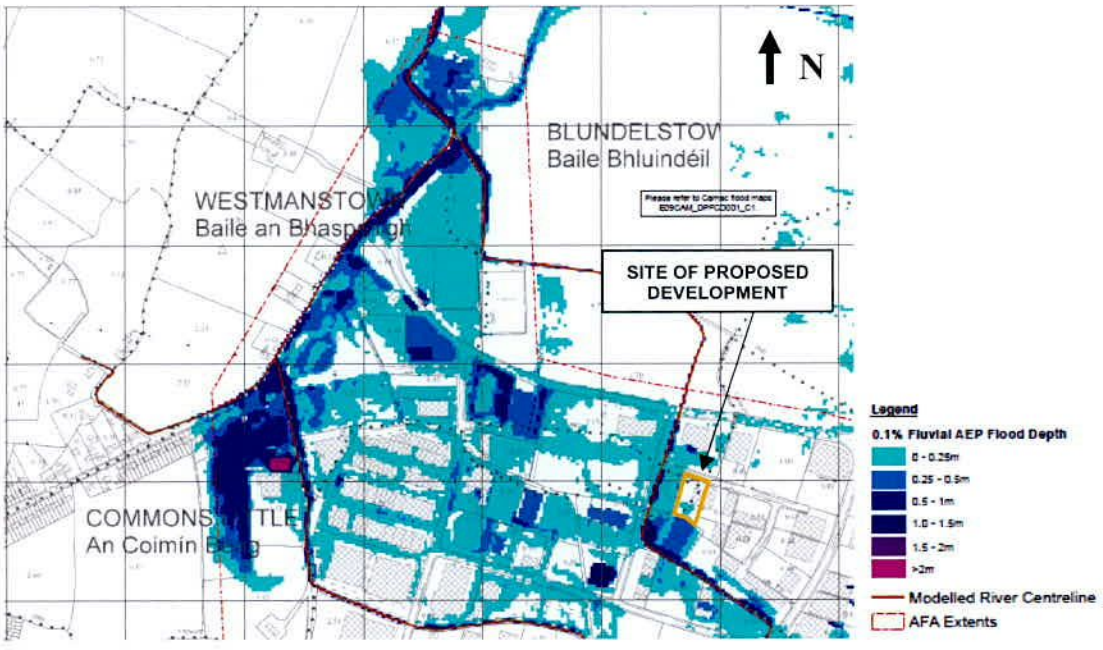


Figure 6.10: OPW Baldonnel Fluvial Flood Depth

6.4.3.2 Pluvial Flooding

Pluvial or surface water flooding is the result of rainfall generated flows that arise before runoff can enter a watercourse or sewer. In undeveloped land, overland flow occurs when the amount of rainfall exceeds the infiltration capacity of the ground to absorb it. This excess water flows overland forming ponds in natural hollows.

Generally, in order for a site to be considered at risk from overland flooding, it would require steep gradients within or surrounding the site and a reasonably large catchment area. In this case the surrounding areas are relatively flat.

Based on flood risk mapping contained in the SDCC Development Plan SFRA 2022-2028[36], as shown in Figure 6.11 below, the site of the proposed development is not at risk of pluvial flooding.

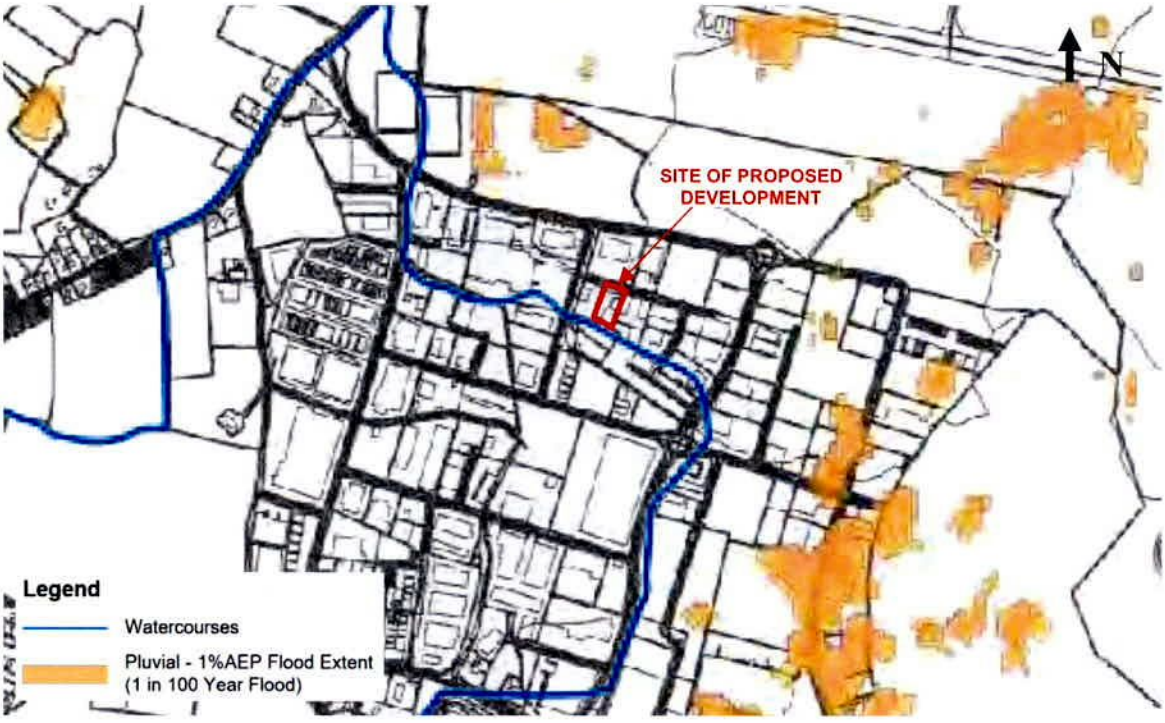


Figure 6.11: Predicted Pluvial Flooding

6.4.3.3 *Tidal Flooding*

The site for the proposed development is not located in an area which is influenced by tidal flooding.

6.4.4 GSI Flood Mapping

Groundwater flooding occurs when the level of water stored in the ground rises, as a result of prolonged rainfall, to meet the ground surface and flows out over it. Groundwater flooding tends to be very local and results from site specific factors such as tidal and aquifer variations.

The site is not subject to groundwater flooding and the risk can be considered low.

6.4.4.1 *GSI Historic Surface Water Flooding*

GSI online mapping provides groundwater flooding data, published in July 2020. The most recent groundwater flooding maps and data are results of the 2016-2019 'GWFlood' project which was established in the aftermath of the serious groundwater flooding event of winter 2015/2016. The Winter 2015/2016 Surface Water Flooding map produced by GSI shows fluvial and pluvial floods, excluding urban areas, during the winter 2015/2016 flood event, and was developed as a by-product of the historic groundwater flood map. There was no surface water flooding recorded at the site during the 2015/2016 flood event.

[36] https://www.sdcc.ie/en/devplan2022/stage-3-material-amendments/environmental-reports/plan-making-justification-test-as-part-of-the-sfra.pdf

6.4.4.2 *GSI Predictive Groundwater Flooding*

According to the GSI Groundwater Flood Probability and Historic Flood Maps[37], there is no predicted groundwater flooding identified for the site or the surrounding areas.

6.4.5 Flooding from Artificial Drainage Systems

Another potential source of flooding is the inundation of manmade drainage systems, when the flow entering a drainage system exceeds its discharge capacity and the system becomes blocked and/or cannot discharge due to a high water level in the receiving watercourse or outfall.

There are no records of this type of flooding in the vicinity of the site of the proposed development.

6.4.6 Flooding from Upland Overland Flows

As discussed in Section 6.4.1, flooding from overland flows occurred at another site within the Greenogue Business Park (Unit 525).

There are no records of this type of flooding occurring in close proximity to the site of the proposed development.

6.4.7 Existing Flood Relief Schemes and Defences

The SDCC SFRA indicates that the Griffeen River has a retention pond embankment (Figure 6.12). The retention pond is to the south of the site. According to the SFRA, a catastrophic failure of the retention pond is considered to be extremely unlikely and any overflows from the pond would be more likely to enter the Griffeen River and not the Baldonnel Watercourse.

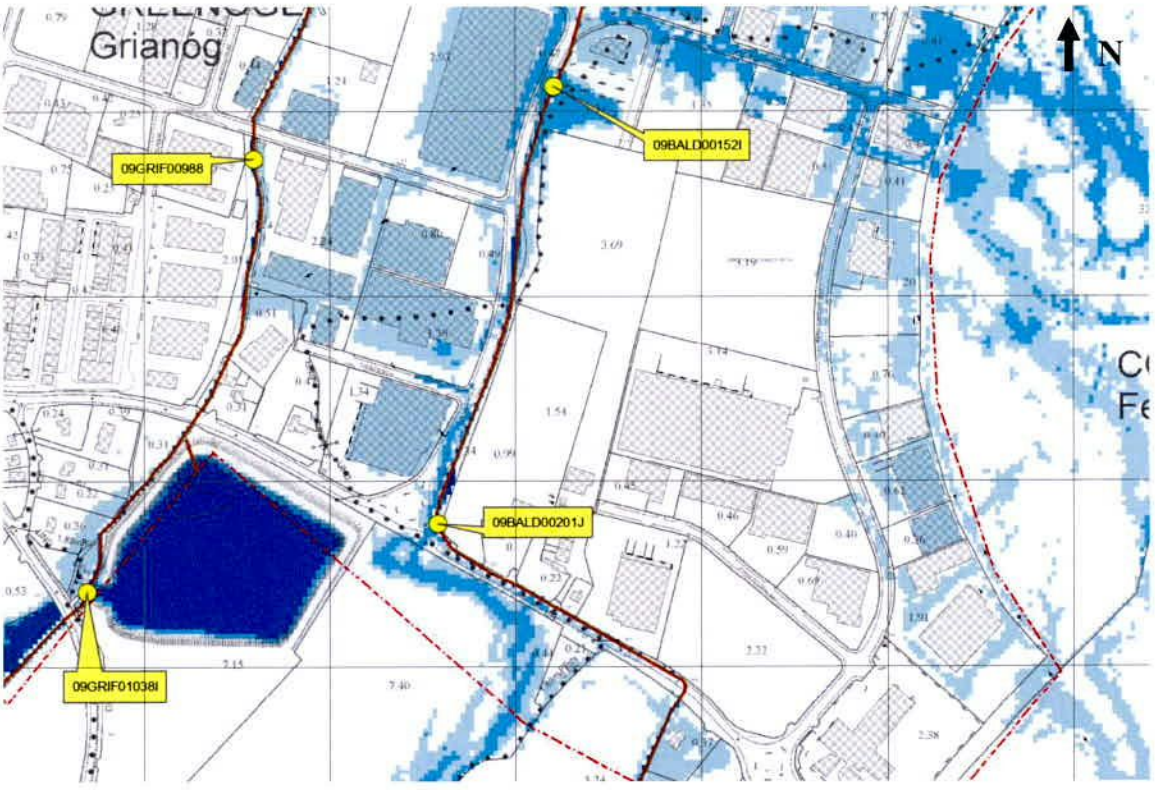


Figure 6.12: Griffeen River retention pond embankment adjacent to Node 09GRIF01038I[38]

[37] https://dcenr.maps.arcgis.com/apps/webappviewer/index.html?id=848f83c85799436b808652f9c735b1cc

[38] Source: www.floodinfo.ie, Eastern CFRAMS, Baldonnel Fluvial Flood Extents, July 2016, Map No.: E09BAL_EXFCD_F0_07

6.4.8 Flood Zone Mapping

As shown in Figure 6.9 previously, the southern extent of the site lies within Flood Zone B.

6.4.9 Vulnerability of Personnel

The site is within a Flood Zone B area but the access and egress at the site is not impeded for emergency scenarios. Maximum predicted depths of flooding within the site are in the range of 0-250 mm deep.

6.4.10 Conclusion on Flood Risk

The proposed development is rated as a 'less vulnerable' development by the Flood Management Guidelines under the Category 'Commercial/Industrial' and would therefore be classed as appropriate development within a Flood Zone B area. The proposed new building will not be constructed over the site boundary area which has been identified as an area with a slight risk of inundation in a 1 in 100-year return period flood event (Flood Zone A), therefore there are no flood risks to consider for that event.

There is a risk of flooding elsewhere in the 0.1% AEP flood event due to the proposed location of the new building within the flow path of flooding in this event. This may lead to a negative effect on property in an adjacent unit at the Greenogue Business Park if no mitigation measures are implemented. Mitigation measures are identified in Section 6.7.

6.5 Characteristics of the Proposed Development

A description of the proposed development is provided in Chapter 2 of this EIAR. Specifically, it is noted that there will be no additional water demand or wastewater generation above what is already provided in the existing facility. As the area of construction for the new building comprises a paved yard (i.e. no development on greenfield lands), there will be no increase in surface water runoff.

6.5.1 Surface Water Management Strategy

The surface water management at the site of the proposed development involves the relocation of an Aco Drain, two new gullies and new branches of the storm water sewer to pick up the rainwater downpipes from the proposed new building. These new branches of storm sewer will connect to the existing storm drainage network. There will be no increase in impermeable surface area as the location of the new building sits on a concrete yard which was previously drained into the storm sewer network and the sizing of the existing attenuation tank and petrol interceptor has already allowed for this area.

The new building will be equipped with a rainwater harvesting system to store and collect rainwater runoff from the new roof. This rainwater will be used both for maintenance of perimeter landscaping and also during dry weather conditions for dust suppression (if required). Calculations for the sizing of the rainwater harvesting tank are included in Appendix F. The model calculations for the proposed new branches of the onsite storm sewer network are included in Appendix G.

A review was undertaken on the sizing of the existing attenuation tank to include for Climate Change and the existing tank was found to be adequately sized to account for 20% Climate Change. The associated calculations for the existing attenuation tank are included in Appendix H.

6.5.2 Foul Water Management Strategy

The existing sanitary facilities at the site will suffice to service the proposed development. No diversions of the existing foul sewer system are required. The existing sanitary facilities will also be used during the construction phase of the proposed development.

6.6 Potential Effects

6.6.1 Do Nothing Scenario

The current baseline as described in Section 6.3 would represent the 'Do Nothing' scenario. The existing site may continue to operate as a waste management facility in accordance with the current conditions of the existing planning permission and waste facility permit. The impact on the hydrological regime and water quality would remain unchanged.

The future operation of the existing waste recovery facility in the 'Do Nothing' scenario is uncertain.

6.6.2 Construction Phase Effects

The construction activities have been summarised in Chapter 2 (Description of Proposed Development) and will primarily comprise the construction of the new waste handling building located to the south (rear) of the site. The existing yard slab will be retained as the floor for the new building. As such foundation works will be confined to limited excavation in the area of the building perimeter. Limited shallow excavation works will also be required for the reconfiguration of the surface water drainage system.

There are substances on a construction site that are potential pollutants to surface water if not managed correctly and may result in short term significant negative effects. Potential sources of sediment laden water and other pollutants include:

- Drainage and seepage water resulting from excavations;
- Stockpiled excavated material providing a point source of exposed sediment;
- Construction of the drainage trenches resulting in entrainment of sediment from the excavations during construction;
- Cleaning of concrete mixers and storage of concrete products used in construction can result in the pollution of surface water running off the site;
- Silt carried on the wheels of vehicles leaving the site being deposited onto the public road and conveyed into existing drainage systems;
- Fuel and oil spills infiltrating through the ground or conveyed elsewhere by surface water flows during a rainfall event.

The above activities could result in the release of suspended solids and other pollutants to water bodies. The mobilisation of potential pollutants would be exacerbated during an extreme flood event. The introduction of excessive suspended solids in a water body may result in interference with fish navigation and feeding, while also affecting populations of aquatic invertebrates, on which the fish diet is based. When excess amount of silt is deposited it can affect bottom-dwelling aquatic invertebrates and damage nursery habitat for young fish. The potential for effects on areas designated for conservation downstream of the site are considered further in Chapter 4 (Biodiversity).

All of the above would be likely temporary significant negative effects in the absence of mitigation and existing controls (including the on-site surface water management system). Mitigation measures are described in Section 6.7.

6.6.3 Operational Phase Effects

The new waste handling building will provide an extension of the existing waste operations area. There will be no offices or staff welfare facilities within the new building.

The existing storm sewer system and the new pipework proposed for connection to the existing storm sewer at the site have been modelled to ensure that the storm sewer has capacity to include

an allowance for Climate Change of 20%. It was found to have adequate capacity and the output from the calculations can be seen in Appendix G. The design of the attenuation tank was also checked (Appendix H) to ensure there was adequate capacity to include an allowance for Climate Change of 20%. It was found that the water stored would not exceed the cover of the attenuation tank.

There are no proposed infiltration systems such as soakaways or septic tanks for foul sewage. There will be no new connections to the existing foul sewer network on site.

The surface water drainage will be collected and connected into an existing drainage system which has capacity and leads to an existing main surface water sewer on Grant's Crescent.

Potential effects are rated as neutral and imperceptible in the absence of mitigation measures. Any effects would be considered to last for only a brief duration.

6.6.4 Potential Risks to Human Health

No significant risks to human health in terms of water resources are predicted to occur as a result of the proposed development.

6.6.4.1 Impacts to Drinking Water Sources

As described in Section 6.3.1.2, the existing site is served by an existing mains water supply. No changes or modifications to the existing water mains network are required to serve the proposed development.

There is no abstraction of groundwater to serve the existing facility and no proposals for abstraction of groundwater as part of the proposed development. There are no mapped group water scheme abstraction points/wells, public supply Source Protection Areas or other known abstraction points for groundwater within 2 km of the site of the proposed development.

As described in Section 6.3.2, there are no EPA designated drinking water river sources in the vicinity of the site.

Based on the foregoing, there will be no impacts to drinking water sources as a result of the proposed development.

6.6.5 Cumulative Effects

In terms of the volume of expected run-off from the site together with adjacent sites, the existing drainage system has capacity to take the flows from the proposed development and this will drain to a public surface water drainage network, therefore no cumulative impact for surface water discharges is anticipated with adjacent properties.

The planned third party developments in the vicinity of the site of the proposed development have been identified and are detailed further in Chapter 13 (Interactions & Cumulative Effects).

From this review, no other projects have been identified which may contribute to cumulative effects together with the proposed development on the hydrological environment.

6.7 Mitigation Measures

Mitigation measures for the site of the proposed development include best practice mitigation measures for construction and standard maintenance practice measures during the operation / phases as outlined below.

6.7.1 Construction Phase

The following mitigation measures are proposed:

- Materials brought on site will be suitably covered where there is a risk of wind-blown sediments escaping from imported or exported material;

- Parking of vehicles will be limited to a designated area;
- Any fuels or oils stored on site will be bunded;
- Any stockpiled material will be covered;
- Construction personnel will use the existing sanitary facilities on site;
- Construction works will be suspended in an extreme flood event.

Any entrainment of suspended solids in surface water runoff will be captured in the existing underground attenuation tank which would act as a catchpit, thereby avoiding any silt-laden runoff continuing on into the main drainage storm system along Grants Crescent which in turn discharges to the culverted Baldonnell Stream. The existing petrol interceptor would capture hydrocarbons arising in the event of accidental spills of fuels and oils thus avoiding such pollutants being conveyed into the main drainage storm system.

The attenuation tank will be required to be inspected and cleaned out before the operational phase if it is found that accumulations of silt have built up within the tank. The petrol interceptor shall be maintained in accordance with the manufacturer's instructions.

With the above mitigation measures, the potential effects during the construction phase on the receiving water environment are reduced to neutral for quality, not significant and of brief duration.

6.7.2 Operational Phase

As part of the design for surface water management on the site of the proposed development, it is proposed to provide a channelled pathway, kerbed along the east side of the site adjacent to the proposed new material storage building, which would channel any extreme floodwaters northwards to the front yard. Some floodwaters would drain into the main drainage system and some would pond locally in the yard, receding back to the Baldonnel Stream after the flood event. This is what would happen in the current scenario – so the status quo would remain.

In addition, to cater for an extreme event in the MRFS which includes for Climate Change (where inundation of a large portion of the site is predicted), weep holes will be provided in the push walls of the new building with inverts at a height of 0.15 m above ground level to allow seepage of any floodwater into the building and flowing through the two main open entrances on the north side of the new building. This would allow the same flood storage at the site as would be available in the existing scenario. There would be no risk of property damage from flood waters as the building contents will be limited to inert waste streams stored on the concrete floor surface.

During an extreme flood event (i.e. greater than a 1% AEP flood event), the facility can be shut down and staff and any vehicles can vacate the site.

The proposed development will not impede access to any surface water bodies, floodplains or flood protection facilities.

Monitoring of surface water discharge will continue to be monitored as required by the waste facility permit.

6.8 Residual Effects

The potential effects on the water environment from the proposed development are of low significance when normal best practice mitigation is applied during the construction and operation of the proposed development.

Flood risk to the proposed development or flood risk from the proposed development has been designed out with the proposed channelling of flood flows past and through the new building, along the natural path predicted for the flow and storage of extreme flood waters.

There are no residual effects foreseen for the proposed development.

6.8.1 Worst Case Scenario

The worst-case scenario would be a major fluvial flood event at the site. In this instance, the facility's employees will shut down any plant or machinery and vacate the site. The site will remain accessible from the road.

It is not anticipated that a worst-case scenario would impact on the water quality being conveyed to the outfall at Baldonnell Stream by the main drainage system, therefore no negative effects are expected in the receiving aquatic environment as a result of the construction or operation of the proposed development. Quantities of pollutants held onsite (e.g. fuel, chemicals) are expected to be low and managed in accordance with best practice during both the construction and operational phases.

7. Noise and Vibration

7.1 Introduction

This chapter of the EIAR considers the noise and vibration effects of the proposed development on the nearest noise sensitive properties, during the construction of the new waste handling building and operational phase of the waste recovery facility.

In the context of this study, noise is defined as unwanted or undesirable sound derived from sources such as road traffic, air traffic or construction works that interfere with normal activities, including conversation, sleep or recreation. Vibration is defined as the transmission of energy through the medium of ground or air resulting in small movements of the transmitting medium, such as a building, which can cause discomfort to people or even damage to structures if the movements are large enough.

In order to assist the assessment, a detailed environmental noise survey was undertaken at the existing site and at the nearest noise sensitive receptors.

In summary, the chapter addresses the potential impacts of:

- Noise and vibration on existing sensitive receptors during the construction works; and
- Noise during operation of the proposed development on existing and sensitive receptors.

7.2 Methodology

7.2.1 General

The following sections detail the standards and guidance documents and the subsequent noise and vibration criteria used to assess noise and vibration impacts of the proposed development on the surrounding area.

It is expected that the following noise and vibration impacts have the potential to impact on the nearest sensitive locations:

Construction Phase

- Foundation and ground works
- General construction activities

Operational Phase

- Increase in traffic movements on surrounding roads
- Site operations

7.2.2 Standards and Guidance

The assessment methodology has been formulated in consideration of the following standards and guidance:

- EPA Guidelines on the information to be contained in Environmental Impact Assessment Reports 2022;
- EPA Guidance Note for Noise Action Planning 2018;
- EPA Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4);
- BS 5228-1:2009+A1: 2014 Code of practice for noise and vibration control on construction and open sites: Part 1 – Noise (BS 5228-1), 2014;
- BS 5228-2:2009+A1:2014 Code of Practice for Noise and Vibration Control on Open Construction Sites – Part 2: Vibration (BS 5228-2), 2014;
- TII document Guidelines for the Treatment of Noise and Vibration in National Road Schemes - 2004 ;
- Highways Agency Design Manual for Roads and Bridges (DMRB): 2008;

- World Health Organisation (WHO) Community Guidelines 1999;
- WHO Night Guidelines for Europe 2009;
- WHO Environmental Noise Guidelines for the European Region 2018;
- BS 8233: 2014 Guidance on sound insulation and noise reduction for buildings, 2014;
- Calculation of Road Traffic Noise (CRTN), 1988;
- ISO 1996-2:2017 Acoustics — Description, measurement and assessment of environmental noise — Part 2: Determination of sound pressure levels;
- ISO 9613-2:1996 Acoustics — Attenuation of sound during propagation outdoors — Part 2: General method of calculation.

7.2.3 Construction Phase Criteria

7.2.3.1 Construction Phase Criteria – Noise

British Standard 5228:PT1 Code of practice for noise and vibration control on construction and open sites provides guidance on methods for predicting and measuring noise from construction sites and assessing the impact on those exposed to it.

The 'ABC' method detailed in Annex E.3.2 of BS 5228 is generally used to set site-appropriate noise limits for the control of construction noise having regard to ambient noise levels. Table E.1 of BS 5228 summarises the ABC method and is reproduced in Figure 7.1 below.

Table E.1 **Example threshold of significant effect at dwellings**

Assessment category and threshold value period (L_{Aeq})	**Threshold value, in decibels (dB)**		
	Category A [A]	**Category B** [B]	**Category C** [C]
Night-time (23.00–07.00)	45	50	55
Evenings and weekends [D]	55	60	65
Daytime (07.00–19.00) and Saturdays (07.00–13.00)	65	70	75

NOTE 1 A significant effect has been deemed to occur if the total L_{Aeq} noise level, including construction, exceeds the threshold level for the Category appropriate to the ambient noise level.

NOTE 2 If the ambient noise level exceeds the threshold values given in the table (i.e. the ambient noise level is higher than the above values), then a significant effect is deemed to occur if the total L_{Aeq} noise level for the period increases by more than 3 dB due to construction activity.

NOTE 3 Applied to residential receptors only.

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

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

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

[D] 19.00–23.00 weekdays, 13.00–23.00 Saturdays and 07.00–23.00 Sundays.

Figure 7.1: Table E.1 from BS 5228 detailing ABC method

The ABC method has been applied to determine noise threshold values for the site of the proposed development. The noise threshold values applied are detailed within Section 7.5.

7.2.3.2 Construction Phase Criteria – Vibration

Vibration criteria have been developed based on the guidance contained within TII document *Guidelines for the Treatment of Noise and Vibration in National road Schemes - 2004* which makes reference to the following vibration limits to avoid the risk of cosmetic damage to buildings:

Table 7.1: Vibration limits at nearest noise sensitive receptor

Type of Building	Allowable vibration (PPV) at the nearest noise sensitive building		
	Less than 10 Hz	10 Hz to 50 Hz	50 Hz to 100 Hz and above
Structurally sound and non-protected buildings (TII Guidance)	8 mm/s	12.5 mm/s	20 mm/s

In terms of human tolerance the guidance suggests PPV limit values of up to 12mm/s for blasting and 2.5mm/s for piling.

7.2.4 Operational Phase Criteria

7.2.4.1 Increase in traffic movements

The impact of any changes in road traffic noise levels due to the increase in traffic movements from and to the completed development were assessed in accordance with the principles and guidance presented within the Highways Agency Design Manual for Roads and Bridges (DMRB): 2008.

A comparison of the increase in traffic flows has been undertaken and quantified based on a percentage change. DMRB Volume 11, Section 3, Part 7 states that an increase by at least 25% or a decrease by 20% in traffic volumes is equivalent to a 1 dB(A) change in noise level (i.e. 10*log(125/100)=1 dB).

The DMRB presents a significance matrix for assessing the magnitude of changes in noise level, which is reproduced in Table 7.2 below and has been utilised in this assessment to consider the effect of any changes in road traffic noise levels. The descriptors have been modified to suit this assessment and enable comparison to the descriptors used in the EPA Guidelines on the Environmental Impact Assessment Reports 2022 for significance of effect.

Table 7.2: Road Traffic Noise Increase Magnitude of Change

Change in Noise Level	Magnitude of Change	Significance Of Effect
0.0	No Change	Imperceptible
0.1 - 0.9	Negligible	Imperceptible
1.0 - 2.9	Low	Imperceptible
3.0 - 4.9	Medium	Slight
>5.0	High	Moderate to Profound

A change in traffic noise of less than 2 dBA is generally not noticeable to the human ear whilst a change of 3 dBA is generally considered to be just perceptible. Changes in noise levels of 3 to 4.9 dBA would however be noticeable but considered slight, while changes above 5 dB are likely to be moderate to profound depending on the final noise level.

7.2.4.2 Site Operations

Noise limits for developments are based on the guidance and procedures of:

- BS 4142:2014 Methods for rating and assessing industrial and commercial sound; and
- EPA Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4).

BS 4142:2014 describes a method for assessing industrial, commercial and background noise levels in order to assess the likely effects on people who might be inside or outside a dwelling or premises used for residential purposes. BS 4142 is referred to within EPA NG4 Guidance Note for Noise as the appropriate method to be adopted for complaints investigation. Notably, the standard

outlines subjective and objective methods for assessing tonal and impulsive audibility. This involves applying a correction to the measured noise level of the source (L_{Aeq}) to give the rating level ($L_{Ar,T}$).

In addition, BS 4142 states that the significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs. Put simply, if the rated source noise level exceeds the existing background level by +10 dB a significant adverse impact is likely. The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact.

Typically, this is enforced by planning authorities in the following form (or similar condition of planning permission):

"Noise created due to the operation of a premises/facility shall not cause a noise nuisance to nearby noise sensitive locations and should not exceed the background level by 10 dB(A) or more or exceed the typical NG4 limits outlined below - whichever is the lesser."

- Daytime (07:00 to 19:00 hrs) – 55 dB $L_{Ar,T}$
- Evening (19:00 to 23:00 hrs) – 50 dB $L_{Ar,T}$
- Night-time (23:00 to 07:00 hrs) – 45 dB $L_{Aeq,T}$

Where tonal noise is objectively assessed to be present, either using the method contained in Section 5.1 of NG4 or BS 4142: 2014[39], NG4 specifies penalties which should be applied during the daytime and evening, while also stating that tonal noise detectable by these objective methods should not be present during the night-time at any noise sensitive location (NSL). Similarly, NG4 specifies penalties for impulsive noise during the daytime and evening, and states that impulsive characteristics should not be present during the night-time at any NSL.

As the operational phase of the proposed development has potential to generate noise between 23:00 to 07:00 hrs (night-time), a limit of 45 dB L_{Aeq} or 10 dB above Background is adopted as the project specific noise limit for the purposes of this assessment.

7.3 Receiving Environment

7.3.1 Study Area

The site is located within Greenogue Business Park which consists of industrial and commercial warehouses southwest of Casement Aerodrome. The surrounding land use is predominantly commercial, with light industrial, and waste management facilities within the wider business park. The site is bounded to the north by Grants Crescent, an internal access road within the business park with commercial premises beyond. The site is bounded to the west, south and east by neighbouring businesses engaged in light industry.

The nearest noise sensitive locations are considered to be the residential properties located on the boundary of the Greenogue Business Park. The adjacent industrial units are not considered to be noise sensitive locations (NSL). NG4 defines a NSL as:

NSL – any dwelling house, hotel or hostel, health building, educational establishment, place of worship or entertainment, or any other facility or other area of high amenity which for its proper enjoyment requires the absence of noise at nuisance levels.

The nearest NSL is noted as being the residential property (NSL1) northwest of the site approximately 630m from the site. This location and the remaining nearest NSLs are described below:

- NSL1 – Located west of the site along Aylmer Road. The single storey residential building is located approximately 630m away for the site.

[39] Annex D (normative): Objective method for assessing the audibility of tones in sound: Reference method

- NSL2 – Located west of the site off Grants View. This residential building is located approximately 725m away for the site.
- NSL3 – Located south of the site along the R120. This residential building is located approximately 720m away for the site.

Figure 7.2 below present the site location and the surrounding areas and identifies the nearest NSLs.

Figure 7.2: Site location and nearest noise sensitive properties

7.3.2 Baseline Noise Survey

In order to quantify the existing noise climate at the development and surrounding area both attended and unattended noise surveys were undertaken. The surveys were undertaken between Monday 30th May and Friday 3rd June 2022.

7.3.2.1 Instrumentation

Class 1 sound level meters/noise loggers in accordance with IEC 61672-1:2013 were used for all measurements. Table 7.3 below summarises the measurement equipment used.

Table 7.3: Measurement Equipment

Description	Manufacturer	Model	Serial Number	Calibration Cert No.	Calibration Due Date
Sound Level Meter	Svantek	971	77789	1502560-1	18 May 2024
Sound Logger	Sonitus	EM2030	01323	210323	4 June 2023
Calibrator	Larson Davies	Cal 200	18194	213893	20 September 2022

All equipment has calibration certificates traceable back to the relevant Standard. Copies of the calibration certificates are provided in Appendix J. A calibration check of the sound level meter was conducted prior to and following the assessment using an external acoustic calibrator, with no significant drift in calibration measured.

The microphones were fitted with a protective windshield, with appropriate corrections applied on the sound level meters.

7.3.2.2 *Weather Conditions*

The weather conditions were predominantly dry and calm with wind speeds typically below 5 m/s with occasional gusts above 7 m/s. Some light rainfall (<2.5 mm/h) was noted during the attended survey on Monday 30th May and on review of Casement Weather Station on Thursday evening, however, this was not considered to be of sufficient magnitude to affect the noise from road traffic.

Moderate rainfall (2.8 mm/h) was recorded on Thursday night 2nd June and this period has been excluded from the assessment.

7.3.2.3 *Noise Monitoring Locations*

Noise measurements were undertaken at a total of three locations, one unattended and two attended. The measurement locations are shown in Figure 7.3 and described below:

- MP1 – Unattended measurement location, located onsite at the western boundary. The microphone was attached to a pole, fixed to the stair rail of the existing onsite security hut. This location was selected in order to determine the ambient noise levels at the development site.
- MP2 – Attended measurement location (NSL1), located at the nearest noise sensitive location northwest of the site. The location was situated in the car park of Peamount United FC in line with nearest façade facing the site. The microphone was attached to a tripod at an approximate height of 1.5 m from ground level.
- MP3 – Attended measurement location, located at the service access road leading to a residential dwelling south of the site. The microphone was attached to a tripod at an approximate height of 1.5 m from ground level.

All measurement locations were free-field.

Figure 7.3: Noise measurement locations

7.3.2.4 *Noise Survey Methodology*

As detailed above, the noise survey comprised both attended and unattended measurements. For the unattended measurements, noise monitoring was undertaken over sequential 15-minute periods for the duration of the survey. For the attended measurements a 15-minute sample was taken at each location for a total period of three hours.

The sound indices measured during the survey are shown below:

- $L_{Aeq,T}$ – The A-weighted equivalent continuous sound pressure level over a period of time, T.
- $L_{Amax,T}$ – The A-weighted maximum sound pressure level that occurred during a given measurement period; Measured using the fast time weighting in accordance with the requirements of BS 8233:2014.
- $L_{A10,T}$ – The A-weighted sound pressure level exceeded for 10% of the measurement period.
- $L_{A90,T}$ – The A-weighted sound pressure level exceeded for 90% of the measurement period, indicative of the background sound level.

7.3.2.5 *Noise Monitoring Results*

Unattended Measurements

Table 7.4 presents a summary of the measured day, evening and night-time log average $L_{Aeq,}$ arithmetic average L_{A90} and L_{Amax} noise levels. Appendix K provides Time History Graphs detailing the measured levels for the duration of the survey.

Table 7.4: Measured noise levels at unattended measurement location MP1

Date	Sound Pressure Levels dB Daytime (07:00-19:00)			Sound Pressure Levels dB Evening time (19:00-23:00)			Sound Pressure Levels dB Night-time (23:00-07:00)		
	L_{Aeq}	L_{A90}	L_{Amax}	L_{Aeq}	L_{A90}	L_{Amax}	L_{Aeq}	L_{A90}	L_{Amax}
Monday 30/05/22	58	48	93	50	41	83	49	37	81
Tuesday 31/05/22	57	47	87	51	42	84	49	41	78
Wednesday 01/06/2022	56	45	89	50	40	87	49	43	78
Thursday 02/06/22	55	46	89	51	46	67	*51**	*42**	*81**
Friday 03/06/22*	57	47	86	-	-	-	-	-	-

*Measurements effected by rainfall

Attended

Table 7.5 presents a summary of the measured noise levels at each attended location.

Table 7.5: Measured noise levels at each attended measurement location

Location	Measurement Period	Sound Pressure Levels dB		
		L_{Aeq}	L_{A90}	L_{Amax}
MP2	30/05/22 11:00 – 11:15	49	38	65
MP2	30/05/22 12:05 – 12:20	52	43	70
MP2	30/05/22 13:00 – 13:15	49	40	70
MP3	30/05/22 11:35 – 11:50	52	46	69
MP3	30/05/22 12:35 – 12:50	53	49	65
MP3	30/05/22 13:30 – 13:45	52	48	65

7.3.2.6 Subjective Noise Climate

- MP1 – The subjective noise climate at the time of installation and collection of the sound level meter was noted as being from local road traffic and activities from the adjacent industrial unit.
- MP2 – During the measurement periods the noise climate was noted to be dominated by road traffic movements accessing Greenogue Business Park, to a lesser extent birdsong, tractor activities within a local field and the occasional plane flying overhead.
- MP3 – During the measurement periods the noise climate was noted to be dominated by road traffic movements along the R102, to a lesser extent birdsong and plane flyovers.

No tonal or impulsive noise sources were noted during the attended measurements.

7.4 Characteristics of Proposed Development

The proposed development comprises the construction of a new waste handling building, which is in addition to the use of two existing buildings onsite and associated infrastructure. On completion of the proposed new building, the overall Unit 518B will continue to be operated as a waste recovery facility. The waste activities to be undertaken at the site will remain consistent with those pre-treatment activities (sorting and bulking) permitted at the site since 2006. The proposed development provides for an increase in the annual waste intake to 20,000 t.

The types of waste currently accepted under permit at the site comprise bulk non-hazardous, inert waste streams collected in skips from commercial, industrial and domestic sources. No significant changes in the types of waste accepted are proposed. No changes are proposed to the classes of waste disposal and recovery activities permitted in the current waste facility permit.

The proposed facility comprises three buildings, Buildings A and B are existing, and Building C is proposed in order to facilitate the increase in waste intake. Figure 7.4 below presents the site layout and buildings.

Figure 7.4: Site Layout

All of the above Buildings A, B and C will be used for waste handling with the existing office area within Building A to be retained. Waste activities include waste unloading and sorting/segregation. No new office accommodation is proposed.

Other areas of note within the site of the proposed development include a weigh bridge and external yard, where waste vehicles will operate.

7.5 Potential Effects

7.5.1 Do Nothing Scenario

In the 'Do Nothing' scenario the site may revert to operational levels associated with the conditions of the planning permission and waste facility permit for the existing facility. In this scenario, the noise emissions would revert back to similar levels as the previous operations carried out between 2006-2021.

The future operation of the existing waste recovery facility in the 'Do Nothing' scenario is uncertain.

7.5.2 Construction Phase Effects

Noise and vibration levels generated by construction activities have the potential to impact upon nearby noise-sensitive receptors; however, the magnitude of the potential impact depends upon a number of variables, including: type of activity; periods of operation; source to receiver distance; ground absorption and reflections.

The potential exists for adverse noise and vibration effects from construction works on sensitive receptors in the surrounding area and therefore the levels of expected construction noise are further assessed below.

7.5.2.1 Assessment of Construction Noise and Vibration

Assessment of the construction noise impacts has been based on the onsite activities divided into two stages. With reference to BS 5228, typical equipment and the documented noise levels given within the document have been used. Piling is not expected to be required for the construction of Building C and as such vibration impacts are not expected to be of significance.

The construction stages with assumed plant items and their corresponding BS 5228 reference numbers are given in Table 7.6 below. Further details are given in Appendix L.

Table 7.6: Construction activities and assumed plant

Foundation and Ground Works	General Construction Activities
C2.26 Wheeled loader	C2.42 Hydraulic Vibratory Compactor
C2.8 Wheeled Backhoe Loader	C3.35 Hand-held gas cutter
C2.30 Dump truck (tipping fill)	C4.78 Diesel generator
C1.3 Pulveriser mounted on material handler	C4.22 Large concrete mixer
C1.20 Lump hammer	C4.26 Concrete pump + mixer
	C2.26 Wheeled loader
	C2.8 Wheeled Backhoe Loader
	C4.72 Hand-held circular saw (petrol-cutting concrete blocks)
	C4.93 Angle grinder (grinding steel)

Based on the measured noise levels at the nearest sensitive receptors and the 'ABC' Method set out in BS 5228, the construction noise limit shall be 65 dB $L_{Aeq,T}$ for residential properties.

Noise predictions have been undertaken to provide an estimate of the noise emissions from the site of the proposed development during the construction works at the nearest receptors. From these predictions it has been possible to determine whether the adopted target noise criteria are likely to be met during the noisiest stages of the works. The magnitude of any impact has then been determined and the requirement for further mitigation measures considered.

Construction noise predictions have been based on the construction noise assumptions on the plant to be used and the source noise data provided in BS 5228. These are provided in detail in Appendix L.

Predicted noise levels have been based on an average scenario where the noisiest item of construction plant is located within the development site at a distance of 620 m from the nearest residential receptor NSL1. The predicted noise levels are based on a typical daytime period of 10 hours. The predictions assume hard ground and no screening between the source and receiver, as a worst case.

The results of the noise predictions are presented in Table 7.7 below.

Table 7.7: Construction predicted noise Levels

Site Clearance and Excavation	Construction
51 dB L_{Aeq} dB	50 dB L_{Aeq} dB

The predictions presented in Table 7.7 identify that, noise levels are expected to be within the adopted criteria. As noted above, the predicted levels are conservative and do not take account of the attenuation provided by the intervening buildings located between the site of the proposed development and the receptor sites. Based on the results of the assessment and due to the expected duration of construction (8 no. weeks), the effect of construction phase noise on the nearest noise sensitive receptors is considered to be not significant and temporary.

7.5.3 Operational Phase Effects

7.5.3.1 Potential Effects due to Additional Road Traffic Vehicle Movements

This assessment has been based on a comparison of the following scenarios:

- Peak hour traffic junction data for 2038 without development
- Peak hour traffic junction data for 2038 with development

The traffic data used in the assessment has been provided by the applicant's transport consultant. It is assumed that the percentage of HGVs along the routes will remain the same. Further details on the traffic movements and traffic impact assessment are included in Chapter 3 (Traffic & Transportation).

The likely change in road traffic noise levels as a direct result of the proposed development has been determined by comparing determining the ratio of change as dB level. The calculations reflect the predicted change in traffic flows on the assessed junctions.

The predicted changes in noise level are presented in Table 7.8 below.

Table 7.8: Predicted changes in road traffic noise

Junction	Peak Hour traffic Flows 2038 Do Nothing	Peak Hour traffic Flows 2038 Do Something	Predicted Change in Road Traffic Noise – dB	Significance of Effect
Grant Crescent and Grant Rise Junction	151	161	0.28	Imperceptible
Grants Rise and Grant Avenue Junction	239	251	0.21	Imperceptible
Jordanstown Drive and College Road	512	555	0.35	Imperceptible
College Road and R120	1676	1687	0.03	Imperceptible
R120 and Jordanstown Road	1974	1979	0.01	Imperceptible

Junction	Peak Hour traffic Flows 2038 Do Nothing	Peak Hour traffic Flows 2038 Do Something	Predicted Change in Road Traffic Noise – dB	Significance of Effect
R120 and N7	2743	2753	0.02	Imperceptible
Grant Crescent and Grant Rise Junction	151	161	0.28	Imperceptible

The predicted significance of change in effect due to the increase of traffic movements associated with the site is deemed to be imperceptible.

7.5.3.2 Potential Effects due to Site Operations

It is understood that the waste activities during the operational phase will typically include the sorting of the waste categories listed in Table 7.9.

Table 7.9: Waste Categories –Proposed Development

LoW Code	Description
15 01 01	Paper and cardboard packaging
15 01 02	Plastic packaging
15 01 03	Wooden packaging
15 01 04	Metallic packaging
15 01 05	Composite packaging
15 01 06	Mixed packaging
16 01 03	End of life tyres
16 02 14	Non-hazardous ELVs
17 01 01	Concrete
17 01 07	Concrete, bricks, tiles and ceramics
17 02 01	Wood
17 02 02	Glass
17 02 03	Plastics
17 04 07	Mixed metals
17 05 04	Soil & stones
17 08 02	Gypsum based construction materials (plasterboard)
17 09 04	Mixed C&D
20 01 01	Paper & cardboard
20 01 02	Glass
20 01 10	Clothes
20 01 11	Textiles
20 01 23*	CFCs
20 01 36	Municipal EEE
20 01 38	Wood
20 01 39	Plastics
20 01 40	Metals (cans)
20 02 01	Biodegradable garden waste
20 03 01	Mixed municipal waste
20 03 03	Street cleaning residue

LoW Code	Description
20 03 07	Bulky waste

The waste will be delivered by 3-tonne skips which are larger than the previous operations at the existing waste recovery facility (2.1 tonne skips) and as such fewer waste deliveries will be required on a daily basis. Further details on the quantities of waste to be handled are included in Section 2.3.4, Chapter 2 (Description of Proposed Development). The process requires the skips to be delivered via skip loaders. The incoming waste will be weighed on the existing weighbridge before the driver is directed to an internal waste hall within one of the waste handling buildings. It is understood that the waste material will be tipped into the relevant waste handling area and the operator will remove any non-conforming materials. Using a material handler and loading shovel, waste will then be sorted and segregated for bulking with other waste loads received and processed in the same way. These operations will be undertaken internally within the buildings. The enclosure of operations within these buildings will provide some acoustic screening to the external environment.

When a sufficient quantity of sorted waste is bulked up, the material will then be collected and transported by articulated truck from the site for further treatment.

It is understood that the following quantity of skips will be received per day:

- Monday to Friday – 23 no.
- Saturday – 12 no.

It is understood that the following waste consignments from the site will occur per day:

- Monday to Friday – 5 no.
- Saturday – 3 no.

Hours of operation are provided below:

Waste Acceptance (i.e. deliveries)

- 07:00-19:00 (Mon-Fri)
- 07:00-13:00 (Sat)

Waste Sorting:

- 24-hours/7 days per week excluding Public Holidays

Prediction calculations of the expected noise emissions have been undertaken based on the operational scenarios and assumed noise sources expected to be in operation at any one time set out in Table 7.10.

Table 7.10: Site operation and activities

Scenario	Description
Daytime **Mon-Friday (07:00 – 19:00)** **Saturday (07:00 – 13:00)**	Skip delivery movements on-site
	Skip unloading
	Manual waste sorting
	Material handler
	Wheeled Loader/Shovel
Evening/Night-time (19:00 – 07:00)	Manual waste sorting
	Material handler
	Wheeled Loader/Shovel

Prediction calculations have been undertaken using SoundPLAN 8.2 suite of noise modelling software, which utilises standard acoustic principles in accordance with the ISO 9613 prediction methodology.

Within the model the following sound power data used for the assessment has been sourced from BS 5228 Part 1 and library noise source data within SoundPlan.

Table 7.11: Site operation activities

Description	Sound Power Levels (dB) at Octave Band Centre Frequencies (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
C8.21 Skip Wagon Movements[40]	110	112	106	103	99	98	93	87	115
Skip Unloading[41]	110	107	101	101	101	100	96	87	106
Manual Sorting of Waste[41]	67	69	75	62	64	67	71	68	75
C.4.10 Wheeled Material Handler[40]	92	88	91	92	90	85	79	73	94
C.4.13 Wheeled Loader[40]	111	100	98	97	93	92	85	77	99

The predicted noise levels at the nearest noise sensitive locations are presented below alongside the applied criteria from NG4. Appendix M presents the grid noise maps of the site for both scenarios, grid heights are taken at 1.5 m. The predicted levels do not account for any acoustic screening achieved due to operations being undertaken within the buildings thereby providing a robust and conservative assessment.

Table 7.12: Site operation activities predicted noise levels at nearest NSLs

NSL	Predicted Daytime Noise Levels (07:00 – 19:00) $L_{Ar,T}$ dB	Daytime Criteria $L_{Ar,T}$ dB	Predicted Evening (19:00 – 23:00) / Night-time (07:00 – 23:00) L_{Aeq} Noise Levels	Evening (19:00 – 23:00) / Night-time (07:00 – 23:00) Criteria dB
NSL 1	28*	55	28*/23	50 $L_{Ar,T}$ / 45 dB $L_{Aeq,T}$
NSL 2	39*	55	39*/34	50 $L_{Ar,T}$ / 45 dB $L_{Aeq,T}$
NSL 3	35*	55	35*/31	50 $L_{Ar,T}$ / 45 dB $L_{Aeq,T}$

* For daytime and evening levels NG4 recommends that a correction of +5 dB be applied for impulsive characteristics.

It can be seen that the predicted daytime and evening time noise levels are well within the NG4 noise limit criteria.

Predicted night-time noise levels are also well below the night-time noise limit criterion of 45 dB $L_{Aeq,T}$. NG4 states that impulsive noise should not be audible at any NSL. Inaudibility is subjective, but typically a level of 10 dB below the prevailing ambient noise level is considered inaudible.

7.5.4 Cumulative Effects

The planned third party developments in the vicinity of the site of the proposed development have been identified and are detailed further in Chapter 13 (Interactions & Cumulative Effects).

[40] BS 5228-1:2009+A1: 2014 Code of practice for noise and vibration control on construction and open sites: Part 1 – Noise (BS 5228-1), 2014

[41] Sound Plan internal noise source data library

From this review, taken together with the predicted noise levels arising due to the proposed development, no other projects have been identified which may contribute to cumulative noise or vibration effects.

7.6 Mitigation Measures

7.6.1.1 Construction Phase

The assessment has shown that no significant impact will occur at the nearest noise sensitive locations due to the noise sources associated with the construction phase of the proposed development. The following recommendations should be implemented where possible as it is best practice to do so.

Effective co-ordination and time management of construction operations would be important in avoiding noise and vibration nuisance to surrounding uses. Early communications with the surrounding and on-site receptors would assist in minimising the potential for any complaints arising during the construction of the proposed development.

The proposals in regard to general noise mitigation would be in accordance with Best Practicable Means (BPM) as specified in BS 5228 and would comprise the following, where practicable:

- Using 'silenced' plant and equipment;
- Switching off engines where vehicles are standing for a significant period of time;
- Fitting of acoustic enclosures to suppress noisy equipment as appropriate;
- Operating plant at low speeds and incorporating of automatic low speed idling;
- Selecting electrically driven equipment in preference to internal combustion powered, hydraulic power in preference to pneumatic and wheeled in lieu of tracked plant;
- Properly maintaining all plant (greased, blown silencers replaced, saws kept sharpened, teeth set and blades flat, worn bearings replaced, etc.);
- Considering the use of temporary screening or enclosures for static noisy plant to reduce noise emissions as appropriate; and
- Certifying plant to meet any relevant EC Directive standards.

Should any non-routine activities be identified, that would make it impracticable to work to the target criterion, provisions would be set out in advance and with the agreement of the Local Authority, to reduce the effect.

For any proposed construction works to be undertaken outside of the permitted working day, particularly at night, prior consent would be sought from the Local Authority. Dispensation procedures for works would be agreed in advance with the local authority and included within Construction Method Statements.

Deliveries and removal of material off-site, would be subject to the following controls:

- Ensuring that construction traffic is parked off the public road;
- Controlling the departure of trucks from site to avoid congestion; and
- Implementing traffic management systems at the entrance to the site of the proposed development at all times to control the traffic into and out of the site.

7.6.1.2 Operational Phase

The assessment of operational activities has shown that mitigation measures are not required for the control or reduction of noise. Night-time activities are unlikely to have a significant impact on the nearest noise sensitive locations given that all waste sorting activities will be undertaken within the buildings. A noise survey will be undertaken on completion of the facility to verify that noise levels are in line with the predicted levels identified and comply with the relevant condition(s) of planning permission (if granted).

7.7 Residual Effects

Based on the predicted noise levels and subject to the implementation of the mitigation measures above (Section 7.6), the residual effects on the surrounding noise environment from daytime, evening and night-time operations associated with the proposed development are deemed to be neutral and not significant.

8. Air Quality and Climate

8.1 Introduction

This chapter describes the likely effects of the proposed development on ambient air quality and climate during its construction and operational phases. Mitigation measures are also detailed that minimise effects on air quality and climate, where required.

A detailed description of the proposed development, including the construction activities associated with the new building, is provided in Chapter 2 (Description of Proposed Development).

8.1.1 Guidance and Legislation

8.1.1.1 Air Quality

The Air Quality Standards (AQS) Regulations 2011 (S.I. No. 180 of 2011) transposed EU Directive 2008/50/EC (EC, 2008) of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe into Irish law. The limit values established under the AQS Regulations relevant to this appraisal are summarised in Table 8.1.

Table 8.1: Limit Values in the Air Quality Standard Regulations

Pollutant	Limit value for the protection of	Averaging period	Limit value ($\mu g/m^3$)	Basis of application of limit value
NO_2	Human Health	1-hour	200	≤ 18 exceedances p.a. (99.79%ile)
		Calendar year	40	Annual mean
NO_x	Vegetation	Calendar year	30	Annual mean
PM_{10}	Human Health	24-hours	50	≤ 35 exceedances p.a. (90%ile)
		Calendar year	40	Annual mean
$PM_{2.5}$	Human Health	Calendar year	25	Annual mean
		3 year average	20	Annual mean

While there are no national or EU limits for dust deposition, the TA Luft Technical Instructions on Air Quality Control (TA Luft, 2002) sets a maximum permissible level for dust deposition of 350 $mg/m^2/day$ averaged over a one-year period at a receptor outside the site boundary.

8.1.1.2 Climate

Climate Action and Low Carbon Act

In July 2021, the Climate Action and Low Carbon (Amendment) Act 2021 was passed into Irish legislation. This act commits Ireland to meet the following targets:

- Reduce Greenhouse Gas (GHG) emissions by 51% by 2030 (compared to 2018 levels);
- Achieve net zero GHG emissions by 2050 (the national climate objective).

The national climate objective is to become a climate neutral economy or carbon neutrality. The national objectives are aligned with Ireland's obligations under the Paris Agreement, and also the EU Green Deal with objectives to reduce GHG emissions by at least 55% by 2030 (compared to 1990 levels) and for the EU to achieve climate neutrality by 2050.

Climate Action Plan

The roadmap to achieving Ireland's climate targets is outlined in the Climate Action Plan 2021. The climate action plan outlines the following measures which are required to meet the objectives outlined in the Climate Action and Low Carbon Act 2021:

- Achieve 70% electricity sourced from renewable energy sources;
- Retrofit 500,000 homes to a B2 equivalent BER standard;
- Achieve an increase in electric vehicles to 1 million.

The sectors have been assigned specific targets under the Climate Action Plan include; Electricity, Transport, Buildings, Enterprise, Agriculture, Carbon pricing, Public Sector and Circular economy.

The core measures for industry outlined in the Climate Action Plan include accelerating uptake of carbon-neutral heating in industry and decrease embodied carbon in construction materials. The targets for Irish industry include reducing enterprise emissions by approximately 40% by 2030.

8.2 Methodology

8.2.1 Air Quality

Air quality assessments are concerned with the presence of airborne pollutants in the atmosphere and their potential effects from a human health and ecological perspective. The likely significant effects of the proposed development on air quality have been assessed by considering the background concentrations of pollutants in the atmosphere and the potential effects from the construction and operational phases of the proposed development.

This assessment has been undertaken with regard to the following:

- Guidelines for the Treatment of Air Quality during the Planning and Construction of National Road Schemes, NRA (now TII), 2011;
- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports, EPA, May 2022;
- Guidance on the Assessment of Dust from Demolition and Construction, IAQM, 2014;
- Online Air Quality Index Regions Map, EPA (https://gis.epa.ie/EPAMaps/default).

The effects of the proposed development on air quality are assessed for both the construction and operational phases by considering the following parameters which are relevant to the proposed development:

- The pollutant background concentrations recorded at EPA air quality monitoring stations;
- Emissions from traffic associated with the construction and operation of the facility; and
- The potential for construction dust.

Predicted concentrations associated with the proposed development are then compared to the relevant air quality standards (AQS) or limit values (as described in Section 8.1.1 to determine likely significant effects.

Dust

The Institute for Air Quality Management (IAQM) has developed comprehensive guidance for the assessment of risk associated '*Guidance on the Assessment of Dust from Demolition and Construction*', 2014 (herby referred to as 'the guidance'). The IAQM methodology has been applied to the construction phase of the proposed development in order to predict the likely magnitude of the dust impacts in the absence of mitigation measures. Full details of the steps taken in the assessment are included in Appendix N.

In line with the IAQM guidance, both receptor sensitivity and proximity to the proposed works are taken into consideration as well as the potential magnitude of the emissions to determine the level of risk. This along with professional judgment allows for the most appropriate mitigation measures to be identified.

The assessment considers the risk of impact for:

- Dust soiling;
- Human health effects;
- Ecological receptors.

For the purposes of the assessment of dust soiling and human health, high sensitivity receptors are regarded as residential properties where people are likely to spend the majority of their time.

Commercial properties and places of work are regarded as medium sensitivity while low sensitivity receptors are places where people are present for short periods or do not expect a high level of amenity.

Traffic Emissions

The TII Guidelines for the Treatment of Air Quality during the Planning and Construction of National Road Schemes (TII, 2011) specify that the changes in pollutant concentrations alongside roads with a significant change in traffic should be assessed for the following:

- **Construction:** Emissions from construction vehicles are assessed where construction traffic results in a significant (>10%) increase in AADT flows near sensitive receptors in accordance with the TII guidance;
- **Operation:** Receptors should be considered at all road links where a greater than 5% change in flows or speeds is predicted for the "Do-Something" option.

8.2.2 Climate

The emissions from the construction and operational phases of the proposed development have been assessed in the context of Ireland's annual greenhouse gas emissions and carbon reduction obligations.

8.3 Receiving Environment

8.3.1 Existing Air Quality

There are four air quality zones in Ireland, as defined in the Air Quality Standards Regulations (S.I. 180 of 2011). The zones were amended in 2013, to take account of the population counts from the 2011 Census and to align with the coal restricted areas defined in the Air Pollution Act Regulations of 2012[42]. These zones are reviewed regularly by the EPA and amended where necessary. The four zones are as follows:

- Zone A: Dublin
- Zone B: Cork
- Zone C: Other cities and large towns comprising Limerick, Galway, Waterford, Drogheda, Dundalk, Bray, Navan, Ennis, Tralee, Kilkenny, Carlow, Naas, Sligo, Newbridge, Mullingar, Wexford, Letterkenny, Athlone, Celbridge, Clonmel, Balbriggan, Greystones, Leixlip and Portlaoise
- Zone D: Rural Ireland, i.e., the remainder of the State excluding Zones A, B and C.

The site of the proposed development is located in Zone A: Dublin. The air quality levels for Zone A in 2020 as reported by the EPA are shown in Table 8.2.

[42] Air Pollution Act (Marketing, Sale, Distribution and Burning of Specified Fuels) Regulations 2012, S.I. No. 326 of 2012.

Table 8.2: Summary Statistics for Ambient Air Monitoring Data (Zone A) - 2020[43]

Parameter	Measurement	Winetavern St.	Davitt Road	DAA	St. Johns Road	Rathmines	Dun Laoghaire	Ballyfermot	Blanchardstown	Swords	Dublin Port	Pearse St.	Tallaght	Ringsend
2020														
NO_2 (µg/m³)	Hourly Max	121.5	108.3	88.8	130.1	170	92.1	107.7	164.6	83.7	117.3	142.3	100.8	123.8
	Annual Mean	15	14	23	30	13	14	12	12	11	23	27	14	18
NO_x (µg/m³)	Hourly Max	883.0	800.9	327.4	1153.1	794.6	462	930.2	1405.4	504.8	641.6	1053.6	437.0	835.8
	Annual Mean	25.8	27.5	37.5	82.0	21.4	21.7	17.1	62.4	15.5	58	78.7	27.3	32.4
SO_2 (µg/m³)	Hourly Max	62.5		20.2		14.6					84.3			18.4
	Annual Mean	5.2		3.8		1.4					2.4			2.1
CO (mg/m³)	Max 8 hr	3.6		3.7										
	Annual Mean	0.3		0.3										
Ozone (µg/m³)	Annual Mean					48				53		36		
PM_{10}	Daily Max	49	113		47	73	46	63	62		77		41	67
	Annual Mean	13	15		13	11	12	12	15		20		10	17
$PM_{2.5}$	Daily Max		59		43	67	40	58	28		69	44	34	67
	Annual Mean		9		7	8	8	8	7		9	8	7	8

[43] Source: Air Quality in Ireland 2020, EPA (https://www.epa.ie/publications/monitoring--assessment/air/Summary-Data-Tables---2020.pdf)

The EPA operates several monitoring stations across Dublin with the purpose of monitoring compliance with air quality standards. The nearest monitoring station to the proposed development site is Station 44, Tallaght, Dublin 24 which is approximately 7.8 km southeast of the site. The Tallaght station did not monitor NO_2, NO_x, or $PM_{2.5}$ between 2018 and June 2020. Therefore, data has been taken from the Ballyfermot monitoring station for 2019 and 2020, which is located approximately 9 km northeast of the proposed development. The Ballyfermot monitoring station is located closer to the city than the site of the proposed development, and with likely higher traffic levels at this location, it can be assumed that air quality at the Ballyfermot location is of lower quality than the proposed development. Annual mean air quality data for 2019 and 2020 is shown in Table 8.3.

Table 8.3: Annual Mean Data for Ballyfermot Monitoring Station 2019-2020 (Source: EPA)

Parameter (µg/m³)	2019	2020
NO_2 Annual Mean	20	12
NO_x Annual Mean	28.1	17.1
PM_{10} Annual Mean	14	12
$PM_{2.5}$ Annual Mean	10	8

8.3.2 Existing Climate

The nearest representative meteorological station to the site of the proposed development is the Casement Aerodrome Station, located approximately 2 km to the northeast. The Met Eireann 1981-2010 average weather data for the Casement Aerodrome location is summarised in Table 8.4.

Table 8.4: Casement 1981-2010 Averages[44]

Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Mean Temperature (°C)	5.1	5.1	6.8	8.2	10.9	13.6	15.7	15.4	13.3	10.3	7.2	5.4
Rainfall Mean Monthly Total (mm)	63.8	48.5	50.7	51.9	59.1	62.5	54.2	72.3	60.3	81.6	73.7	75.7
Mean Monthly Wind Speed (knots)	13.6	12.9	12.4	9.8	9.1	8.6	8.8	9.0	9.6	11.1	11.6	12.3

All climate data cited below is taken from the 3-year averages reported for the period 2019-2021.

The annual mean temperature is 9.06 °C.

The annual mean rainfall is 66.17 mm.

The annual mean 10 cm soil temperature is 9.93 °C.

[44] Source: Met Eireann https://www.met.ie/climate-ireland/1981-2010/casement.html)

8.4 Potential Effects

8.4.1 Do Nothing Scenario

Under the 'do-nothing' scenario, the baseline environment, as described above in Section 8.3, would remain the same. The existing facility at the site of the proposed development may be operated under the conditions of the current planning permission and WFP.

The future operation of the existing waste recovery facility in the 'Do Nothing' scenario is uncertain.

8.4.2 Construction Phase Effects

8.4.2.1 Air Quality

While construction dust tends to be deposited within 200 m of a construction site, the majority of the deposition occurs within the first 50 m. The extent of any dust generation depends on the nature of the dust, the nature of the construction activity and local meteorological conditions.

Any additional airborne concentrations of particulate matter arising from construction would be small and very local to the construction site (minimising human exposure). Particles generated by most construction activities tend to be larger than 10 µm in diameter which are too large to enter the human lung.

The construction phase of the proposed development is of a minor scale and the potential for significant dust emissions will only arise in respect of works in dry weather and during such activities the levels of dust are likely to be small. The potential sources of dust emissions during the construction phase include:

- Foundation works within the existing hardstand for the proposed new building;
- Handling of excavated material (albeit limited) in addition to construction materials;
- Construction traffic movements; and
- Landscaping works.

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 sensitivity of the area. The major dust generating activities are divided into four types within the IAQM guidance (i.e. Demolition, Earthworks; Construction; Trackout - movement of heavy vehicles) to reflect their different potential impacts, with each of these discussed hereunder:

1. **Demolition** – There is no demolition required as part of the proposed development.
2. **Earthworks** –There will be limited excavations associated with the establishment of the foundations for the new building. This will involve breaking the existing concrete hardstand and removal of excavated material. In addition, limited shallow excavation works will also be required for the reconfiguration of the surface water drainage in accordance with the site drainage plan submitted as part of the planning application. Re-surfacing of the hardstand will then occur.
3. **Construction** – Using the IAQM guidance, the dust emission magnitude for the proposed construction activities is classified as small[45]
4. **Trackout** – The dust emission magnitude for the proposed trackout can be classified as small as worst-case as there are likely to be less than 10 HGV movements per day[46]

In summary, the predicted magnitude of dust impact is summarised in Table 8.5 below.

[45] Small: Total building volume < 25,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber)

[46] Small: < 10 HGV (> 3.5 t) outward movements in any one day, surface material with low potential for dust release, unpaved road length < 50 m.

Table 8.5: Magnitude of Dust Emissions

Activity	Dust Emission Magnitude
Demolition	N/A
Earthworks	Small
Construction	Small
Trackout	Small

There are no residential dwellings (high sensitivity) within 350 m of the site, or 50 m of a route that will be used by construction vehicles within 500 m of the site.

As the site is within the Greenogue Business Park, there are various commercial/industrial (medium sensitivity) within 350 m as set out in Table 8.6.

Based on the IAQM criteria outlined in Table 8.6, the worst case sensitivity of the area to dust soiling is considered to be medium.

Table 8.6: Sensitivity of the Area to Dust Soiling Effects on People and Property

Receptor Sensitivity	Number of Receptors	Distance from the Source (m)			
		<20	<50	<100	<350
Number of identified Medium Sensitivity receptors		2	2	10	60-70
High	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

In addition to sensitivity to dust soiling, the IAQM guidelines outline the assessment criteria for determining the sensitivity of the area to human health impacts. The criteria take into consideration the current annual mean PM_{10} concentration (taken from the EPA Ballyfermot Monitoring station 2020, refer to Table 8.2), receptor sensitivity based on type and the number of receptors affected within various distance bands from the construction works area. An estimate of the current annual mean PM_{10} concentration in the vicinity of the proposed development is estimated to be 12 $\mu g/m^3$. There are two medium sensitive receptors located within 20 m of the site, and there are no ecological receptors (based on the IAQM definition) within 350 m of the proposed development. Based on the IAQM criteria outlined in Table 8.7, the sensitivity of the area to human health impacts is considered to be low.

Table 8.7: Sensitivity of the Area to Human Health Impacts

Receptor Sensitivity	Annual Mean PM_{10} Conc.	Number of Receptors	Distance from the Source (m)				
			<20	<50	<100	<200	<350
Proposed Development	**10 $\mu g/m^3$**	**Number of identified Medium Sensitivity Receptors**	2	2	10	10-100	10-100
High	>32 $\mu g/m^3$	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	28-32 $\mu g/m^3$	>100	High	High	Medium	Low	Low

Receptor Sensitivity	Annual Mean PM_{10} Conc.	Number of Receptors	Distance from the Source (m)				
			<20	<50	<100	<200	<350
Proposed Development	10 µg/m³	Number of identified Medium Sensitivity Receptors	2	2	10	10-100	10-100
Medium	24-28 µg/m³	10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
		>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<24 µg/m³	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	>32 µg/m³	>10	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	28-32 µg/m³	>10	Medium	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	24-28 µg/m³	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	<24 µg/m³	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low	Low

Based on the magnitude of emissions and the assessment of local receptor sensitivity, the risk of significant dust emissions for each construction activity relative to the site is outlined in Table 8.8.

Table 8.8: Summary of Potential Risk

Potential Impact	Risk			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	N/A	Low	Low	Negligible
Human Health	N/A	Low	Low	Low

In summary, the risk of significant impact due to dust arising from the construction site is considered to be low.

8.4.2.2 *Ecological Receptors*

There are no designated areas (Special Areas of Conservation, Special Protection Areas, Natural Heritage Areas or proposed Natural Heritage Areas) within 350 m of the site. Therefore the impact of dust on ecological receptors has been screened out from further assessment.

Further details on the nearest sites designated for ecological conservation are included in Chapter 4 of the EIAR (Biodiversity).

8.4.2.3 *Construction Traffic*

As outlined in Section 8.2, emissions from construction vehicles are assessed where construction traffic results in a significant (>10%) increase in AADT (annual average daily traffic) flows near sensitive receptors.

The traffic impact assessment completed in respect of the proposed development is set out in Chapter 3 (Traffic & Transportation). The traffic increase during the construction phase will not exceed 10% on any existing roads for any prolonged period. A temporary, imperceptible effect on air quality is therefore predicted.

8.4.2.4 *Climate*

Given the scale of the proposed works, and their temporary nature, CO_2 emissions predicted to arise during the construction phase of the proposed development are not considered to be significant, and a temporary, imperceptible effect on climate is predicted.

8.4.3 Operational Phase Effects

8.4.3.1 *Air Quality*

Operational effects on air quality will be solely generated from potential dust emissions associated with the unloading, handling and loading of waste at the site. Given that these operations will take place within the new and existing buildings, any emissions associated with these activities will be minor and therefore result in a long term, imperceptible effect on air quality.

The waste types accepted at the existing waste facility and to be accepted as part of the proposed development are described in detail in Chapter 2 (Description of Proposed Development). The waste types are limited to dry, non-hazardous (inert) waste streams delivered in skips from domestic, commercial and industrial sources. There will be no mixed municipal or 'wet' waste streams accepted at the facility. There are no sources of odour associated with the waste types to be accepted.

8.4.3.2 *Operational Traffic*

As outlined Chapter 3 (Traffic & Transportation), Thorntons Recycling propose to increase the size of the skips used for waste management in an attempt to improve the overall efficiency of operations at the site. This is expected to lead to a slight reduction in HGV vehicle movements to site, from the existing 66 (33 arrivals and 33 departures) weekday movements, to 56 (28 arrivals and 28 departures). Consequently, as the change in traffic flows falls below the assessment criteria of a >5% increase, no further assessment of the operational phase road traffic emissions is required. Therefore, a medium-term to long-term, imperceptible effect on air quality is predicted.

8.4.3.3 *Climate*

The impact of the proposed development on climate will be imperceptible. No further mitigation measures are required for the proposed development.

8.4.4 Cumulative Effects

The planned third party developments in the vicinity of the site of the proposed development have been identified and are detailed further in Chapter 13 (Interactions & Cumulative Effects).

A number of developments are progressing through the final stages of construction or initial operations within and south of the Greenogue Business Park. Assuming routine site control and good practice environmental measures for the control of dust are implemented, no cumulative effects are anticipated during the construction and operational phases of the proposed development.

8.5 Mitigation Measures

8.5.1 Construction Phase

The potential dust effects relating to the proposed development are considered to be negligible. Nonetheless, best practice procedures will be implemented at the site during construction to include:

- Truck loads covered when carrying material likely to generate dust;
- Excavated material deposited directly into a skip and covered;
- Control of vehicle speeds, speed restrictions and vehicle access;
- Sweeping of hard surface roads and yard area;
- Water bowser to be held on-site and haul roads regularly sprayed;
- Public roads in the vicinity of the proposed development to be inspected and cleaned when necessary.

The following mitigation measures will be implemented during the construction phase of the development to minimise CO_2 emissions:

- A Construction Traffic Management Plan (CTMP) has been prepared and submitted in support of the planning application. This CTMP will be finalised by the contractor appointed for the works (subject to grant of planning permission) in advance of commencement and the CTMP will be implemented in full. This will minimise trip generation and encourage car sharing and the use of public transport, insofar as practicable;
- Materials will be handled efficiently on site to minimise the waiting time for loading and unloading, thereby reducing potential emissions;
- Engines will be turned off when machinery is not in use; and
- The regular maintenance of plant and equipment will be carried out.

8.5.2 Operational Phase

The following measures to prevent and minimise emissions to air will be implemented at the site:

- All yard areas will be maintained as hardstand;
- All waste handling activities will occur within the buildings;
- A 20 km/h speed limit applicable to all vehicle movements within the site boundary.

8.6 Residual Effects

Following the implementation of the mitigation measures identified in this chapter, no significant residual effects on air quality or climate are envisaged during the construction or operational phases of the proposed development.

9. Landscape & Visual Impact

9.1 Introduction

This chapter provides an assessment of the effects of the proposed development on the landscape and visual amenity. It identifies the design and mitigation measures that are and will be implemented to reduce the significance of the effects identified and assesses the residual effects.

A detailed description of the existing facility and the proposed development is set out in Chapter 2 (Description of Proposed Development).

Detailed plan and elevation drawings of the proposed development are included as part of the planning application and should be read together with this Chapter.

9.2 Methodology

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

- Landscape and Landscape Assessment – Consultation Draft of Guidelines for Planning Authorities
- Landscape Character Assessment of South Dublin County 2015
- Draft Landscape Character Assessment of South Dublin County, May 2021
- South Dublin County Council Development Plan 2016-2022
- South Dublin County Council Development Plan 2022-2028 (made in June 2022, effective from August 2022)
- Guidelines on the Information to be Contained in Environmental Impacts Assessment Reports, EPA (2022).

The methodology used for the landscape and visual assessment included:

- A desktop study of the site in relation to its overall context locally, regionally and nationally.
- Visiting the site and its environs in May 2022 to assess the existing buildings and site setting in the context of the wider Greenogue Business Park

Pertinent landscape planning designations, including County Development Plan designations or listings were identified. These designated landscapes were assessed for direct and indirect landscape effects. The relevant Landscape Planning designations within the study area as outlined in the current South Dublin County Development Plan are identified where relevant.

The character and quality of the surrounding landscape were assessed in relation to the receiving environment. Contiguous site elevations were produced for the proposed new building following pre-application consultation with SDCC.

Finally the appraisal of potential likely significant landscape and visual effects, including cumulative effects was conducted.

9.2.1 Landscape and Visual Effects

Landscape and visual impact assessment has two separate (but closely related) aspects. The first is visual impact, i.e. the extent to which a new development can be seen in the landscape. The second is impact on landscape character.

Visual Impact - Visual impacts are defined under visual intrusion and/or visual obstruction where visual intrusion involves impact on a view but avoiding blocking thereof; and visual obstruction involves impact on a view with some degree of blocking.

Landscape Character Impact - The impact on the character of the existing landscape setting is evaluated taking account of the various natural and man-made features, such as topography,

landform, land-use, vegetation, built environment etc. together with the visibility of and the views to and from the landscape. The sensitivity and significance of the landscape in evaluating the effects is also considered, as are the aspects relating to the landscape planning environment on a regional and local basis.

9.2.2 Assessment Criteria

The terminology used to define the likely significant effects is outlined in Table 9.1. These have been taken from the EPA Guidance[47] and are determined by assessing the sensitivity of the landscape/visual receptor against, the magnitude/nature of the effect.

Table 9.1: Significance of Effects Terminology

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

In accordance with the EPA Guidelines, visual effects can be considered negative/adverse, neutral, or positive in effect. Effects are considered where they may be direct, indirect, and/or cumulative as appropriate.

Effect duration is considered as being Momentary (effects lasting seconds to minutes), Brief (less than a day), Temporary (for up to one year), Short-term (from 1 to 7 years), Medium-term (7 to 15 years), Long-term (from 15 to 60 years) or Permanent (in excess of 60 years).

9.2.3 Consultation

A pre-application meeting was held with SDCC on 30 May 2022 during which the following relevant aspects were raised:

- SDCC noted that the new Development Plan 2022-2028 was due for adoption in July 2022 – this Plan 2022-2028 was subsequently made in July 2022 and will be effective from August 2022. It is noted that land use zoning for the site of the proposed development is unchanged;
- Design and details of building finishes, boundary/landscaping treatment and indoor storage of waste;
- Contiguous elevations for the new buildings in the context of adjoining facilities.

[47] Guidelines on the Information to be Contained in an EIAR, EPA, 2022.

9.3 Receiving Environment

9.3.1 Site Context

The site of the proposed development is located within the Greenogue Business Park, which consists of approximately 350 acres of light industrial and commercial premises on lands zoned as 'Enterprise and Employment (EE)' in the SDCC Development Plan 2016-2022. This zoning is unchanged in the SDCC Development Plan 2022-2028. The objective of the zoning is 'to provide for enterprise and employment related uses'. The main features of the site and surrounding area include large functional buildings set back from the street, extensive areas of hard surfacing and security fencing.

The setting of the existing site within the wider Greenogue Business Park is shown in Figure 9.1. The landscape character of the area can be broadly described as comprising of built features with natural elements beyond the boundary of the Business Park and adjacent Aerodrome Business Park. Casement Aerodrome to the north-east forms a large open area in the landscape.

Figure 9.1: Location of Proposed Development within the Greenogue Business Park

The existing facility is surrounded to the south, east and west by commercial and light industrial units and associated yard areas. The site is bounded to the north by Grants Crescent, an internal access road within the Greenogue Business Park with commercial premises beyond. The majority of the site comprises hardstanding with the exception of cherry laurel hedgerow areas along the northern boundary (front entrance) and smaller unmanaged landscaping strips along the eastern and western boundaries. The ecological value of the landscaped areas is further addressed in Chapter 4 (Biodiversity).

The site is generally flat, sloping from a low point of 87.5 mAOD close to the site entrance, to a high point of approximately 87.8 mAOD close to the southern site boundary.

As outlined in Chapter 12 (Population and Human Health), there are no residential properties within 500 m of the existing site. The Grian na nÓg playschool is located approx. 800 m south of the site of the proposed development, adjacent to the R120 roadway opposite the Greenogue Business Park. Beyond 1 km, the nearest schools to the site of the proposed development are the

Rocking Horse Creche & Montessori School and St. Finian's National School, located approximately 1.4 km and 1.8 km to the west in Newcastle.

The grounds of Peamount United FC adjoin the Greenogue Business Park and are located approx. 470 m northwest of the site of the proposed development. An equestrian centre and livery yard, Greenogue Equestrian, is also located south of the R120, approx. 950 m southwest of the site.

No holiday accommodation (e.g. hotel, hostel, B&B etc.) was identified within 1 km of the proposed development site at the time of preparing this EIAR.

The existing buildings (A and B) are located to the front (north) of the site and range in height from 7.3-8.1 m as shown in Figure 9.2.

Figure 9.2: Site overview

9.3.2 Landscape Character

The current Landscape Character Assessment of South Dublin County describes the site as being within the landscape Character Area 2 (LCA) - Newcastle Lowlands as shown in Figure 9.3. The Landscape Character Assessment describes the key characteristics as:

- Low-lying and gently undulating agricultural lands over limestone;
- Established communication corridors included the Grand Canal and railway corridor travers east to west and two aerodromes at Weston and Baldonnell;
- Agricultural land use primarily pasture and tillage;
- Increasing influence of urban activities close to the motorways, national roads and regional roads;
- Long history of historic settlement and human activity with medieval landscape complex associated with Newcastle village and surrounds; and
- Number of demesnes.

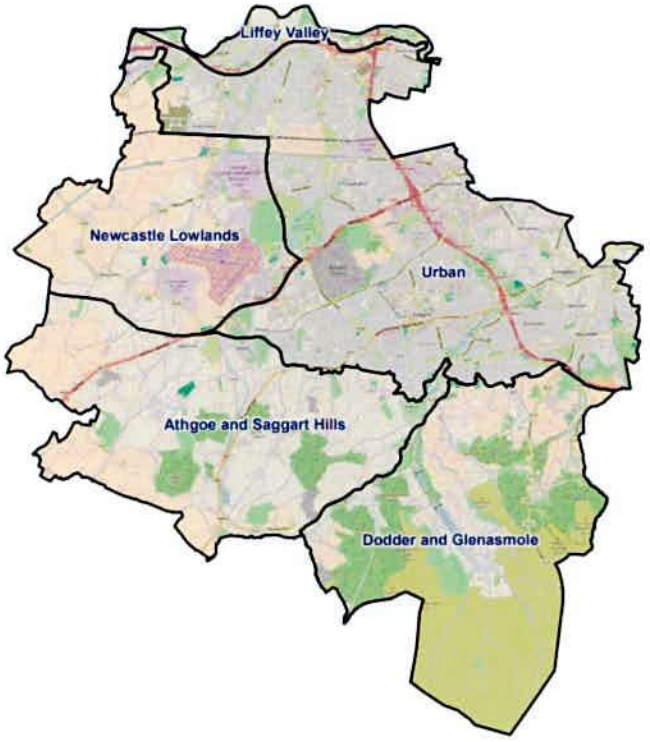


Figure 9.3: Landscape Character Areas of South Dublin (2015)

The key characteristics of this LCA are summarised in Table 9.2.

Table 9.2: Characteristics of the Newcastle Lowlands LCA

Parameter	Description
Geology	Area is underlain by Lower Carboniferous Calp limestone, and is a low-lying, gently undulating landscape. The area consists mainly of rich agricultural lands. The embankment of the Grand Canal has resulted in a minor elevated feature. The area is largely flat, with an elevation of is between 60 m to 90 m OD.
Landcover and Ecology	As the area contains rich agricultural soils which allows for arable and pastural lands. The fields in the area reflect the 18th or 19th Century agricultural practices of rectangular fields bounded by walls or hedgerows. The most significant ecological feature in the Newcastle Lowlands is the Grand Canal.
Historical and Human Influences	Evidence of historical human activity and settlement, including a Mesolithic flake found near Belgard Road in Tallaght and medieval landscapes including Newcastle village and surrounds. There are a number of demesnes associated with former country houses and institutions.
Landscape Values	The landscapes of value in the LCA are: • pNHA designation of Grand Canal • Designed lands and former estates • Newcastle – significance of archaeological resources present.
Forces for Change	• Increasing urban influences that impact on the rural landscape character • Fragmentation of agriculture-related habitats through piecemeal development • Rural housing pressures • Loss of separation distance between established urban and rural character • The relatively flat and open landscape is vulnerable to adverse visual and landscape impacts of development.

Parameter	Description
Landscape Condition	LCA has a wide range of conditions: • Areas of hard engineering/infrastructure that have not benefitted from planting programs that would aid in absorbing them into the surrounding landscape. • Vertical structures such as pylons can be seen over great distances as the environment is typically flat. • Character of the western section of this LCA, which is typically rural agricultural land, is more intact than the east due to the distance from main transport routes and bigger metropolitan areas. • Settlement is generally dispersed, with growth along main and regional roads. Newcastle's centre is historically significant and attractive. • Rural character of the remainder of the LCA serves both landscape and ecological, and economic functions and it deserves careful consideration.

The proposed development is located within the 'Limestone Farmlands' Landscape Character Type (LCT). Limestone Farmlands are described in the 2015 Landscape Character Assessment of South Dublin County as 'gently undulating low-lying (generally below 100 m) with limestone bedrock. Land use includes tillage and pasture'. The landscape character type generally has a dispersed settlement pattern. The existing landscape character types of South Dublin County are shown in Figure 9.4.

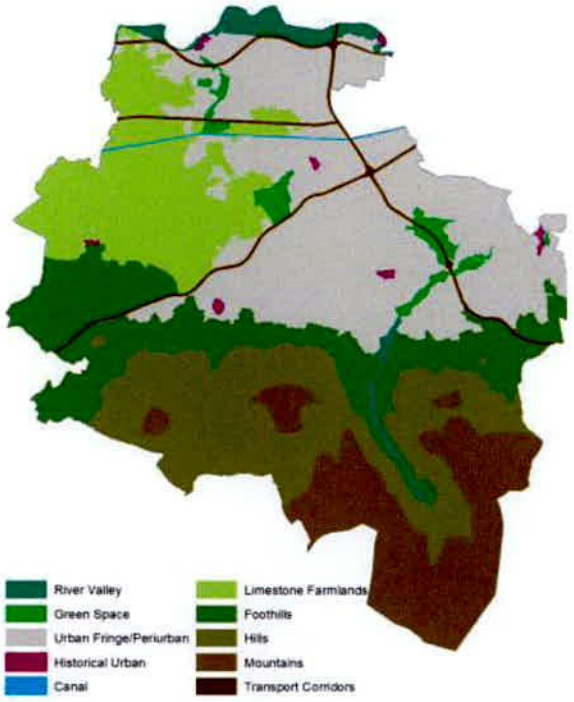


Figure 9.4: Landscape Character Types (LCT) of South Dublin County (Source: Landscape Character Assessment of South Dublin County 2015)

9.3.3 Landscape Value and Sensitivity

The 2015 Landscape Character Assessment has been reviewed and updated in the Draft Landscape Character Assessment of South Dublin County 2021. The LCA classification and sensitivity remains unchanged with Figure 9.5 outlining the landscape character types and sensitives as per the Draft Landscape Character Assessment.

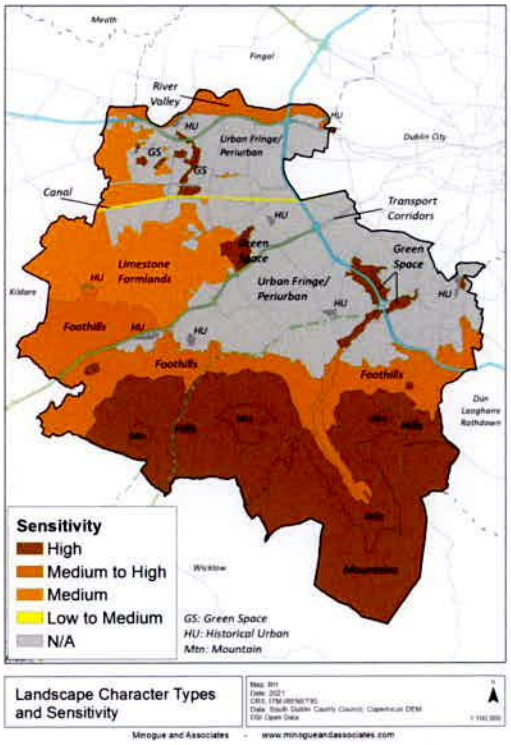


Figure 9.5: Landscape Character Types and Sensitivity
(Source: Draft Landscape Character Assessment of South Dublin County 2021)

The forces for change in the agricultural lowlands landscape character type include infrastructure and development pressures. The recommendations for this LCT are good farming practices and screening of infrastructure and discrete low signage.

In terms of Sensitivity and Capacity, the Newcastle LCA is described as being of 'Medium' for landscape and visual sensitivity and Medium to High in terms of landscape value. The landscape capacity of the LCA is described as being Low. These classifications remain unchanged in the Draft Landscape Character Assessment of 2021.

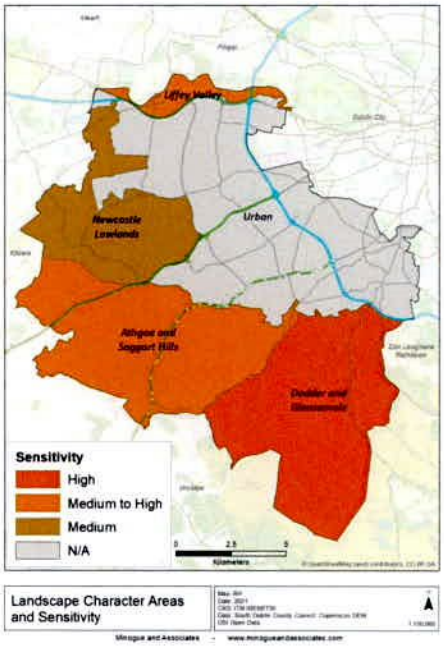


Figure 9.6: Landscape Character Areas and Sensitivity
(Source: Draft Landscape Character Assessment of South Dublin County 2021)

In terms of Sensitivity and Capacity, the Newcastle LCA is described as being of 'Medium' for landscape and Visual Sensitivity and Medium to High in terms of Landscape Value. The landscape capacity of the LCA is described as being Low. These classifications remain unchanged in the Draft Landscape Character Assessment of 2021.

9.3.4 Designated Views & Scenic Routes

According to the current SDCC Development Plan, there are no significant views or protected prospects relevant to the site of the proposed development. The closest prospect to the site is Athgoe Hill which is approx. 3 km southwest. The site is not overlooked by any significant views with the closest being approx. 2 km southeast of the site, off the N7 national road.

9.4 Characteristics of Proposed Development

As set out in Chapter 2 (Description of Proposed Development), Thorntons Recycling is proposing the construction of a new waste handling building and the use of two existing buildings onsite for waste handling. The new building will allow for the recovery of all waste indoors, thus eliminating previous practices at the existing facility in Unit 518B of the temporary storage of waste within the yard area.

From a landscape and visual amenity perspective, the proposed building will be located to the south (rear) of the site on existing hardstand, set back 47 m from the Grants Crescent roadway and with a maximum height of 12 m. The building will comprise of a single storey with a gross floor area of approx. 561 m^2 and will be a simple steel portal framed structure with metal cladding which will be largely in keeping with the visual appearance of similar structures in the vicinity. No additional hardstand areas will be established beyond those existing. The existing security fencing will be maintained.

The existing northern perimeter landscaping along Grants Crescent will be retained and enhanced which will continue to provide a visual buffer along Grants Crescent as shown in Figure 9.7.

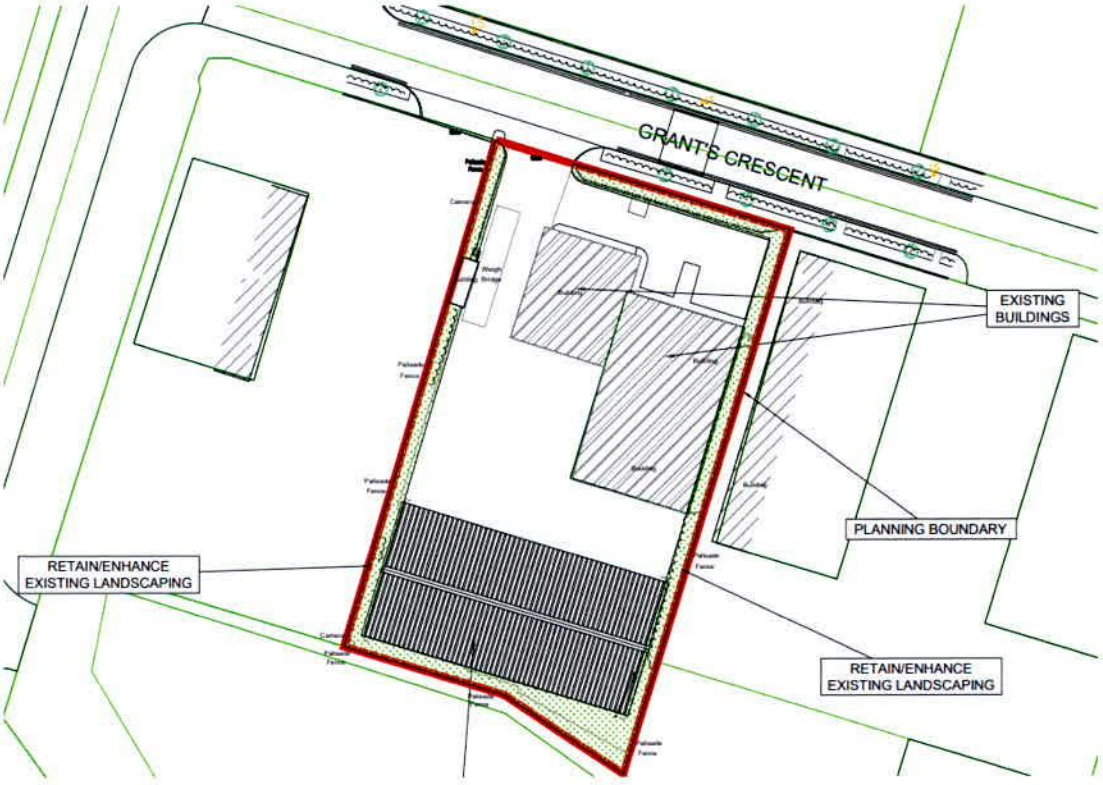


Figure 9.7: Landscape Plan

Elevational treatment of the existing building (Building 'B' as shown Figure 9.2) will also be carried out consistent with Condition 5 of the grant of retention permission SD22A/0100. Proposals include cladding of the part open façade of the retained structure using materials and a finish consistent with the existing buildings onsite and neighbouring units. Signage reflecting the company logo of the applicant (Thorntons Recycling) is also proposed as part of the elevational treatment to enhance and distinguish the identity of Unit 518B.

These proposed improvements to the elevational treatment of the retained structure are reflected in the contiguous elevation drawings for the site including as part of the planning application. Selected extracts of the elevation drawings are shown in Figure 9.8, 9.9 and 9.10.

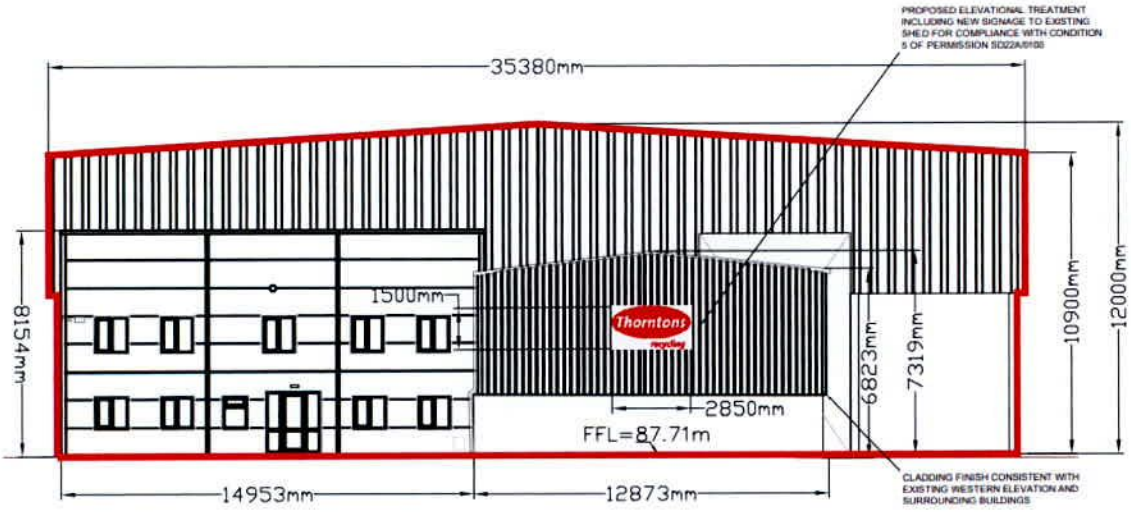


Figure 9.8: North Elevation – Existing and Proposed Development at Unit 518B (not to scale) (Outline of new building in red)

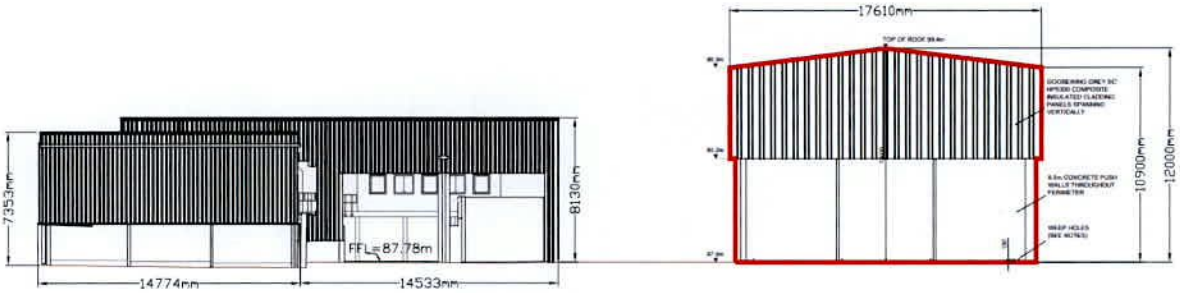


Figure 9.9: West Elevation – Existing and Proposed Development at Unit 518B (not to scale) (Outline of new building in red)

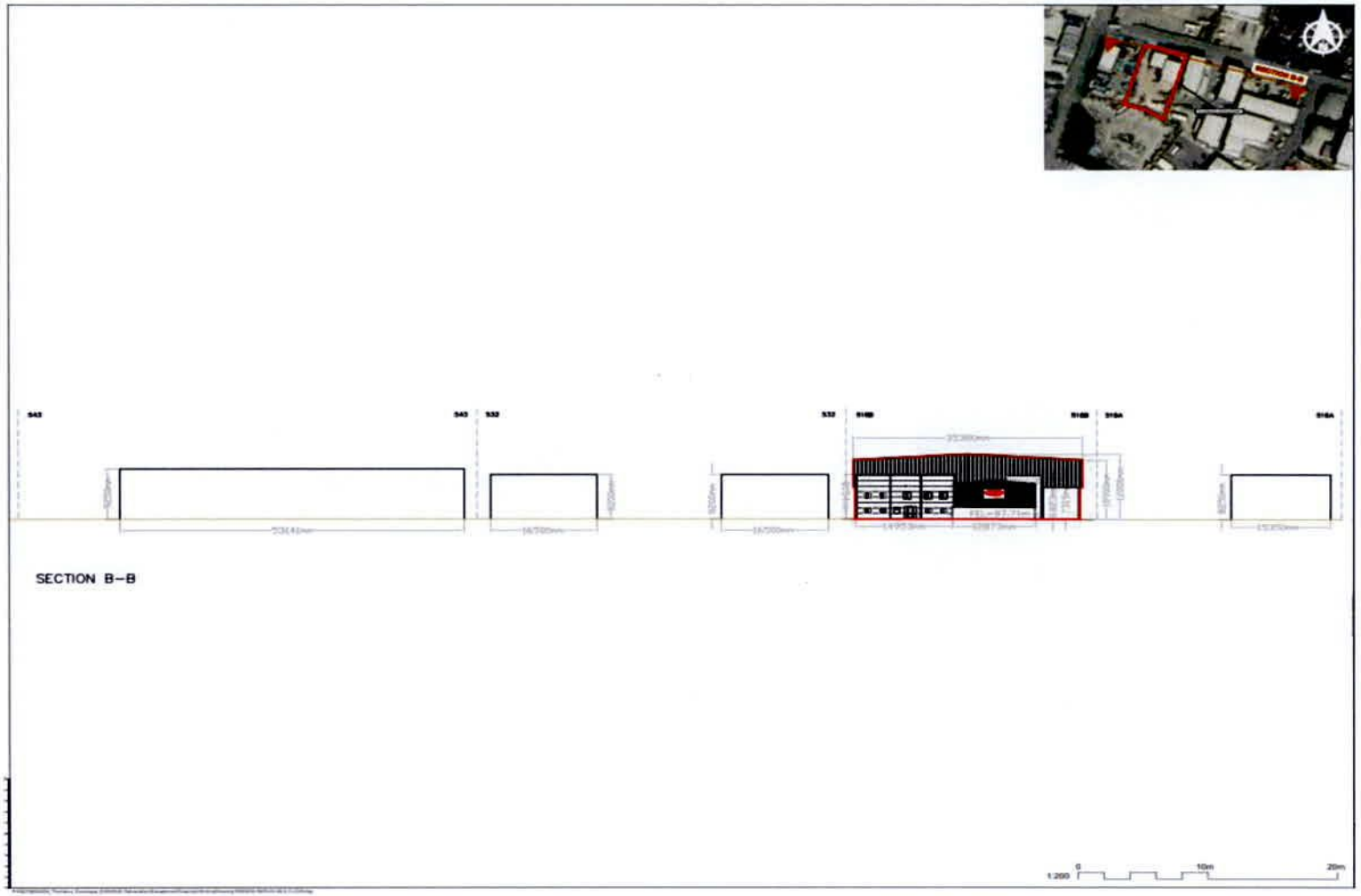


Figure 9.10: Contiguous Elevation of the Proposed Development with Adjoining Sites (Grants Crescent) (not to scale)

9.5 Potential Effects

9.5.1 Do Nothing Scenario

Under the 'Do Nothing' scenario, the landscape character and visual amenity of the area would be unchanged. The site and existing building may continue to be operated as a waste recovery facility based on the conditions of the existing planning permission and waste facility permit. Visual impacts would be limited to those associated with the existing site and surrounding land use.

The future operation of the existing waste recovery facility in the 'Do Nothing' scenario is uncertain.

9.5.2 Construction Effects

While the proposed new waste handling building is located to the rear of the site and immediately adjacent to other buildings of a similar scale and height as shown in Figure 9.10, its construction and associated ancillary infrastructure will have a slight, negative temporary effect on the immediate landscape.

The intermittent but temporary introduction of prominent tall features such as a crane (if required) and erection of the new building's steel frame will have some temporary visual effects on the visual amenity of both nearby and (to a lesser degree) more remote receptors.

Additional temporary visual effects would be caused as a result of construction vehicle movements to and from the site and for general construction operations. During the construction phase some temporary lighting may be required to ensure safe working particularly during winter months. The visual effects are considered to be slight, negative and temporary in nature.

9.5.3 Operational Effects

The proposed increase in annual waste intake to 20,000 t will not impact on the landscape and visual environment. A positive effect arising from the proposed development will be the slight reduction in operational traffic in addition to the streamlining of recovery operations to ensure that all waste is handled internally within the buildings. This will eliminate previous practices which involved temporary storage of waste externally within the existing yard area.

The proposed new building will be constructed of similar materials and in a style compatible with the existing buildings on-site and the neighbouring properties. The height of the building will be slightly higher than adjacent and neighbouring buildings, however the building will be afforded a significant setback (47 m) from the nearest external roadway (Grants Crescent). The visual effect arising is predicted to be not significant and long term.

The proposed new building will represent a minor new feature within the wider landscape, leading to a slight, neutral and long-term landscape character effect.

9.5.4 Cumulative Effects

In terms of likely landscape effects and visual impact, the most likely cumulative impact in relation to this development is the further development of units within the Greenogue Business Park (with recently permitted developments listed in Chapter 13 (Interactions & Cumulative Effects)). However, given that the sites in the immediate vicinity of the proposed development are already established with varying commercial and light industrial uses, no further cumulative impacts are expected.

9.6 Mitigation Measures

The following landscape and visual enhancements are proposed:

- Elevational treatment on the northern façade of the existing retained building (Building marked 'B', Figure 9.2) for consistency with the existing building finishes;
- Perimeter landscaping will be retained and enhanced. Specifically, the cherry laurel and *Griselinia* will be supplemented by native hedgerow species such as hawthorn (*Crataegus monogyna*), blackthorn (*Prunus Spinosa*) or hazel (*Corylus avellana*). This will not only represent an enhancement of the biodiversity value of the site of the proposed development but also continue to provide screening of the overall site from Grants Crescent.
- Security lighting shall be suitably cowled to minimise night-time glare.
- Housekeeping at the site will be kept at a high standard to include:
    - Inspection for litter as necessary;
    - Road sweeping (if required);
    - Handling and storage of waste internally within the buildings.

9.7 Residual Effects

The residual landscape effect, following application of the above mitigation measures, remains slight and neutral in quality. Effects on the wider landscape are considered not significant.

10. Archaeology, Architectural and Cultural Heritage

10.1 Introduction

This archaeological, architectural, and cultural heritage chapter was prepared by Tobar Archaeological Services Ltd. It presents the results of an archaeological, architectural and cultural heritage impact assessment for a proposed recycling facility at Greenogue Business Park, Rathcoole, County Dublin. The development area comprises an existing waste recovery facility.

The purpose of this chapter is to assess the potential direct and indirect effects of the proposed development on the surrounding archaeological, architectural and cultural heritage landscape. The assessment is based on a desktop review of the available cultural heritage and archaeological data. This desktop review was carried out to identify areas of archaeological/ architectural/ cultural significance or potential, likely to be impacted either directly or indirectly by the proposed development. An assessment of potential effects, including cumulative effects, is presented. The visual effect of the proposed development on any newly discovered monuments/sites of significance as well as known recorded monuments is also assessed.

10.1.1 Legislation and Guidelines

The chapter has been prepared in compliance with relevant EIA legislation and guidance as set out in Chapter 1 (Introduction) and further detailed below.

10.1.1.1 Current Legislation

Archaeological monuments are safeguarded through national and international policy, which is designed to secure the protection of the cultural heritage resource. This is undertaken in accordance with the provisions of the European Convention on the Protection of the Archaeological Heritage (Valletta Convention). This was ratified by Ireland in 1997.

Both the National Monuments Acts 1930 to 2004 and relevant provisions of the Cultural Institutions Act 1997 are the primary means of ensuring protection of archaeological monuments, the latter of which includes all man-made structures of whatever form or date. There are a number of provisions under the National Monuments Acts which ensure protection of the archaeological resource. These include the Register of Historic Monuments (1997 Act) which means that any interference to a monument is illegal under that Act. All registered monuments are included on the Record of Monuments and Places (RMP).

The Record of Monuments and Places (RMP) was established under Section 12 (1) of the National Monuments (Amendment) Act 1994 and consists of a list of known archaeological monuments and accompanying maps. The Record of Monuments and Places affords some protection to the monuments entered therein. Section 12 (3) of the 1994 Amendment Act states that any person proposing to carry out work at or in relation to a recorded monument must give notice in writing to the Minister (Environment, Heritage and Local Government) and shall not commence the work for a period of two months after having given the notice. All proposed works, therefore, within or around any archaeological monument are subject to statutory protection and legislation (National Monuments Acts 1930-2004).

The term 'national monument' as defined in Section 2 of the National Monuments Act 1930 means a monument 'the preservation of which is a matter of national importance by reason of the historical, architectural, traditional, artistic or archaeological interest attaching thereto'. National monuments in State care include those which are in the ownership or guardianship of the Minister for Housing, Local Government and Heritage. Section 5 of the National Monuments Act (1930) allows owners of other national monuments to appoint the Minister for Housing, Local Government and Heritage or the relevant local authority as guardian of such monuments, subject to their consent. This means in effect that while the property of such a monument remains vested in the owner, its maintenance and upkeep are the responsibility of the State. Some monuments are also protected by Preservation Orders and are also regarded as National Monuments. National Monuments also includes (but not so as to limit, extend or otherwise influence the construction of the foregoing general definition) every monument in Saorstát Éireann to which the Ancient Monuments Protection Act, 1882, applied immediately before the passing of this Act, and the said

expression shall be construed as including, in addition to the monument itself, the site of the monument and the means of access thereto and also such portion of land adjoining such site as may be required to fence, cover in, or otherwise preserve from injury the monument or to preserve the amenities thereof.

Under the Heritage Act (1995) architectural heritage is defined to include 'all structures, buildings, traditional and designed, and groups of buildings including street-scapes and urban vistas, which are of historical, archaeological, artistic, engineering, scientific, social or technical interest, together with their setting, attendant grounds, fixtures, fittings and contents…'. A heritage building is also defined to include 'any building, or part thereof, which is of significance because of its intrinsic architectural or artistic quality or its setting or because of its association with the commercial, cultural, economic, industrial, military, political, social or religious history of the place where it is situated or of the country or generally'.

10.1.1.2 Granada Convention

The Council of Europe, in Article 2 of the 1985 Convention for the Protection of the Architectural Heritage of Europe (Granada Convention), states that 'for the purpose of precise identification of the monuments, groups of structures and sites to be protected, each member State will undertake to maintain inventories of that architectural heritage'. The Granada Convention emphasises the importance of inventories in underpinning conservation policies.

The National Inventory of Architectural Heritage (NIAH) was established in 1990 to fulfil Ireland's obligations under the Granada Convention, through the establishment and maintenance of a central record, documenting and evaluating the architectural heritage of Ireland. Article 1 of the Granada Convention establishes the parameters of this work by defining 'architectural heritage' under three broad categories of Monument, Groups of Buildings, and Sites:

- **Monument:** all buildings and structures of conspicuous historical, archaeological, artistic, scientific, social or technical interest, including their fixtures and fittings;
- **Group of buildings:** homogeneous groups of urban or rural buildings conspicuous for their historical, archaeological, artistic, scientific, social or technical interest, which are sufficiently coherent to form topographically definable units;
- **Sites:** the combined works of man and nature, being areas which are partially built upon and sufficiently distinctive and homogenous to be topographically definable, and are of conspicuous historical, archaeological, artistic, scientific, social or technical interest.

The Council of Europe's definition of architectural heritage allows for the inclusion of structures, groups of structures and sites which are considered to be of significance in their own right, or which are of significance in their local context and environment. The NIAH believes it is important to consider the architectural heritage as encompassing a wide variety of structures and sites as diverse as post boxes, grand country houses, mill complexes and vernacular farmhouses.

10.1.1.3 South Dublin County Development Plan 2016-2022

Archaeology

HCL Policy 1 - Overarching: It is the policy of the Council to protect, conserve and enhance natural, built and cultural heritage features, and to support the objectives and actions of the County Heritage Plan.

HCL1 Objective 1: To protect, conserve and enhance natural, built and cultural heritage features and restrict development that would have a significant negative impact on these assets.

HCL1 Objective 2: To support the objectives and actions of the County Heritage Plan, including the preparation of a County Biodiversity Plan.

HCL Policy 2 - Archaeological Heritage: It is the policy of the Council to manage development in a manner that protects and conserves the Archaeological Heritage of the County and avoids adverse impacts on sites, monuments, features or objects of significant historical or archaeological interest.

HCL2 Objective 1: To favour the preservation in-situ of all sites, monuments and features of significant historical or archaeological interest in accordance with the recommendations of the

Framework and Principles for the Protection of Archaeological Heritage, DAHGI (1999), or any superseding national policy document.

HCL2 Objective 2: To ensure that development is designed to avoid impacting on archaeological heritage that is of significant interest including previously unknown sites, features and objects.

HCL2 Objective 3: To protect and enhance sites listed in the Record of Monuments and Places and ensure that development in the vicinity of a Recorded Monument or Area of Archaeological Potential does not detract from the setting of the site, monument, feature or object and is sited and designed appropriately.

HCL2 Objective 4: To protect and preserve the archaeological value of underwater archaeological sites including associated features and any discovered battlefield sites of significant archaeological potential within the County.

HCL2 Objective 5: To protect historical burial grounds within South Dublin County and encourage their maintenance in accordance with conservation principles.

Features of Interest

HCL Policy 6 - Features of Interest: It is the policy of the Council to secure the identification, protection and conservation of historic items and features of interest throughout the County including street furniture, surface finishes, roadside installations, items of industrial heritage and other stand alone features of interest. Promote the County's industrial heritage.

HCL6 Objective 1: To ensure that development within the County including Council development seeks to retain, refurbish and incorporate historic items and features of interest.

HCL6 Objective 2: To protect, preserve and maintain industrial heritage features including weirs, millraces, and mills along the River Dodder and River Liffey.

Protected Structures

HCL Policy 3 - Protected Structures: It is the policy of the Council to conserve and protect buildings, structures and sites contained in the Record of Protected Structures and to carefully consider any proposals for development that would affect the special character or appearance of a Protected Structure including its historic curtilage, both directly and indirectly.

HCL3 Objective 1: To ensure the protection of all structures (or parts of structures) and the immediate surroundings including the curtilage and attendant grounds of structures contained in the Record of Protected Structures.

HCL3 Objective 2: To ensure that all development proposals that affect a Protected Structure and its setting including proposals to extend, alter or refurbish any Protected Structure are sympathetic to its special character and integrity and are appropriate in terms of architectural treatment, character, scale and form. All such proposals shall be consistent with the Architectural Heritage Guidelines for Planning Authorities, DAHG (2011) including the principles of conservation.

HCL3 Objective 3: To address dereliction and encourage the rehabilitation, renovation, appropriate use and re-use of Protected Structures.

HCL3 Objective 4: To prevent demolition and inappropriate alteration of Protected Structures.

HCL3 SLO 1: To support and facilitate the refurbishment of the Metal Bridge in Palmerstown (RPS Ref 006).

HCL3 SLO 2: To support and facilitate the refurbishment of the Ballymount Complex Gatehouse in Ballymount Park (RPS Ref. 175) and its inclusion as part of a heritage trail.

HCL3 SLO 3: To secure the preservation of Windmill Hill, Rathcoole (RPS Ref. 358).

10.1.1.4 South Dublin County Development Plan 2022-2028

The South Dublin County Development Plan was made in June 2022 and will be effective from August 2022.

Archaeology

Policy NCBH13 - Archaeological Heritage: Manage development in a manner that protects and conserves the Archaeological Heritage of the County and avoids adverse impacts on sites, monuments, features or objects of significant historical or archaeological interest.

NCBH13 Objective 1: To favour the preservation in-situ of all sites, monuments and features of significant historical or archaeological interest in accordance with the recommendations of the Framework and Principles for the Protection of Archaeological Heritage, DAHGI (1999), or any superseding national policy document.

NCB13 Objective 2: To ensure that development is designed to avoid impacting on archaeological heritage including previously unknown sites, features and objects.

NCBH13 Objective 3: To protect and enhance sites listed in the Record of Monuments and Places and ensure that development in the vicinity of a Recorded Monument or Area of Archaeological Potential does not detract from the setting of the site, monument, feature or object and is sited and designed appropriately.

NCBH13 Objective 4: To protect and preserve the archaeological value of underwater archaeological sites including associated features and any discovered battlefield sites of significant archaeological potential within the County.

NCBH13 Objective 5: To protect historical burial grounds within South Dublin County and encourage their maintenance in accordance with conservation principles.

Industrial Heritage

Policy NCBH16 - Industrial Heritage: Promote the County's industrial heritage.

NCBH16 Objective 1: To promote and encourage the sensitive and adaptive reuse of industrial heritage structures where appropriate, ensuring that any change does not seriously impact on the intrinsic character of the structure and that all works are carried out in accordance with best practice conservation, consistent with RPO 9.27 of the RSES.

NCBH16 Objective 2: To conduct a field survey of sites of industrial heritage within the County to identify structures, features and their related artefacts and plant, and to actively seek the addition of industrial heritage structures or complexes, or elements of significance, to the Record of Protected Structures.

NCBH16 Objective 3: To have regard to those items identified in the South Dublin County Industrial Heritage Survey (2012) and any subsequent surveys when assessing any relevant development proposals.

NCBH16 Objective 4: To support the preparation and implementation of any updated County Heritage Plan incorporating the promotion and protection of the County's Cultural Heritage.

NCBH16 Objective 5: To preserve and develop the Fairview Oil Mills at Cherrywood Crescent in Clondalkin as the remains of the mill are a good example of functional industrial architecture and are an important reminder of the industrial heritage of the Clondalkin area.

NCBH16 Objective 6: To support the investigation of an appropriate location for the Joe Williams archive.

Protected Structures

Policy NCBH19 - Protected Structures: Conserve and protect buildings, structures and sites contained in the Record of Protected Structures and carefully consider any proposals for development that would affect the setting, special character or appearance of a Protected Structure including its historic curtilage, both directly and indirectly.

NCBH19 Objective 1: To ensure the protection of all structures (or parts of structures) and their immediate surroundings including the curtilage and attendant grounds of structures identified in the Record of Protected Structures.

NCBH19 Objective 2: To ensure that all development proposals that affect a Protected Structure and its setting including proposals to extend, alter or refurbish any Protected Structure are

sympathetic to its special character and integrity and are appropriate in terms of architectural treatment, character, scale and form. All such proposals shall be consistent with the Architectural Heritage Protection Guidelines for Planning Authorities, DAHG (2011 or any superseding documents) including the principles of conservation.

NCBH19 Objective 3: To address dereliction and to welcome, encourage and support the rehabilitation, renovation, appropriate use and sensitive re-use of Protected Structures consistent with RPO 9.30 of the RSES.

NCBH19 Objective 4: To support alternative uses for Protected Structures including former institutional sites in order to provide continued security of the heritage value of these buildings, attendant grounds and associated landscape features. To this end, the relaxation of site zoning restrictions may be considered in order to secure the preservation and conservation of the protected structure where the use proposed is compatible with the existing structure and where the proposed development is consistent with best practice conservation policies and the proper planning and sustainable development of the area.

NCBH19 Objective 5: To prohibit demolition and inappropriate alterations of Protected Structures unless in very exceptional circumstances.

NCBH19 Objective 6: To ensure that any works to upgrade the energy efficiency of Protected Structures and historic buildings are sensitive to traditional construction methods and materials and do not have a detrimental physical or visual impact on the structure. Regard should be had to the DAHG publication 'Energy Efficiency in Traditional Buildings' 2010.

NCBH19 Objective 7: To review the National Inventory of Architectural Heritage (NIAH) and update the Record of Protected Structures in accordance with any direct Ministerial recommendations.

NCBH19 Objective 8: To support the restoration of the Mill Race (RPS Ref. 007), recognising that it is in private ownership, from where it leaves the Liffey to where it enters the Mills area at Palmerstown having regard to the potential for biodiversity enhancements.

NCBH19 SLO 1: To pursue the development of an inter-county greenway through support for the refurbishment and re-use of the metal (silver) bridge in Palmerstown (the Lower Road, RPS ref. 006) which is in the ownership of Fingal County Council and to promote its usage into the sustainable movement infrastructure of the County through the Council actively seeking direct access to and enhanced enjoyment of this structure through the acquisition of lands in private ownership within South Dublin to facilitate public use and enable connections between Fingal and South Dublin and Dublin City.

NCBH19 SLO 2: To investigate the merit of including in the Record of Protected Structures the bridge located in the SIAC Quarry, Monastery Road, Clondalkin.

NCBH19 SLO 3: To investigate the merit of including in the Record of Protected Structures the old Mile Stone on Templeogue Road, near the junction of Fortfield Road.

NCBH19 SLO 4: To investigate the merit of including Callaghan's Bridge in the Record of Protected Structures.

NCBH19 SLO 5: To investigate the merit of including in the Record of Protected Structures the cottages on Main Street, Clondalkin.

NCBH19 SLO 6: To prepare a Design Plan for St Cuthbert's Park and to make provision for St. Cuthbert's Church.

10.1.2 Consultation

The Department of Housing, Local Government and Heritage was consulted as part of the preparation of the EIAR. An e-mail response (dated 21 June 2022) was received from the National Monuments Service (NMS) within the Department which stated as follows:

"It is recommended that a Cultural Heritage / Archaeological chapter be included within any Environmental Impact Assessment Report (EIAR) to be carried out by a suitably qualified Archaeological Consultant."

The inclusion of this Chapter within the EIAR is consistent with the advice of the NMS.

10.1.3 Location and Topography

The site of the proposed development is Unit 518B within the Greenogue Business Park, located approximately 14.5 km southwest of Dublin City Centre, 2 km north of Rathcoole and 2 km east of Newcastle. Greenogue Business Park consists of industrial and commercial warehouses and encompasses approximately 350 acres along with the Aerodrome Business Park.

Unit 518B is a 0.26 ha site located to the north of the Greenogue Business Park. The site is generally level between a low point of approx. 87.5 mAOD close to the site entrance along the northern site boundary and a high point of approx. 87.8 mAOD close to the southern site boundary (rear of the site). There are minor, localised changes in site levels associated with slight surface gradients for rainwater runoff and drainage.

The surrounding land use is predominantly commercial, with light industrial, commercial and waste management facilities within the wider business park. The site is bounded to the north by Grants Crescent, an internal access road within the business park with commercial premises beyond. The site is bounded to the west, south and east by neighbouring businesses engaged in light industry.

Within the site, the new building will be sited to the southern end of Unit 518B, behind two existing buildings as shown and further described in Chapter 2 (see Figure 2.3, Chapter 2).

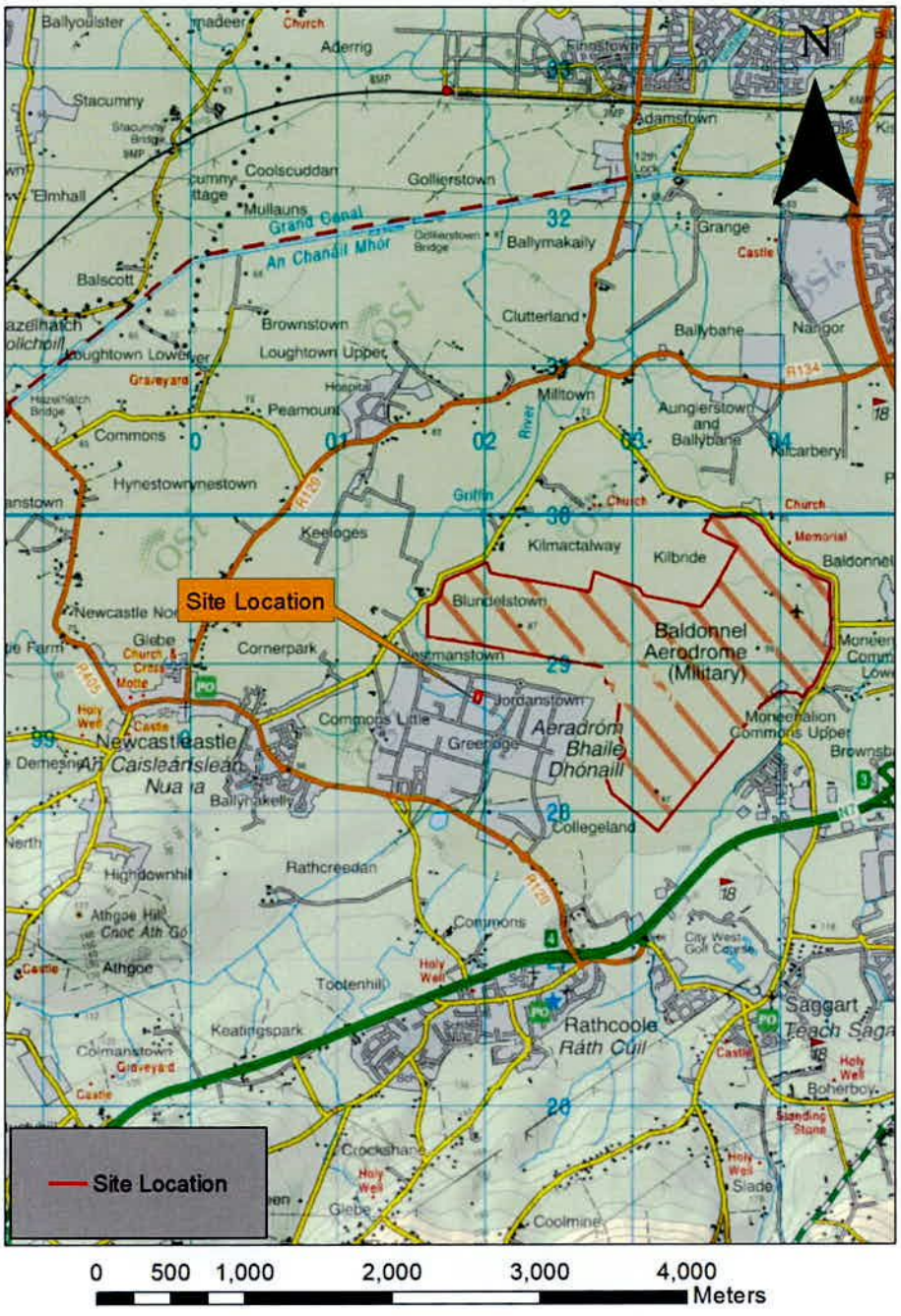


Figure 10.1: Site location map

10.2 Methodology

10.2.1 Assessment Methodology

The assessment of the archaeological, architectural and cultural heritage of the proposed development area included GIS mapping and desk-based research. A desk-based study of the proposed development site was initially undertaken in order to assess the archaeological, architectural and cultural heritage potential of the area and to identify constraints or features of archaeological/cultural heritage significance within or near to the proposed development site.

10.2.2 Geographical Information Systems

GIS (Geographic Information Systems) is a computer database which captures, stores, analyses, manages and presents data that is linked to location. GIS includes mapping software and its application with remote sensing, land surveying, aerial photography, mathematics, photogrammetry, geography and tools that can be implemented with GIS software. GIS was used to manage the datasets relevant to the archaeological and architectural heritage assessment and for the creation of all the maps in this section of the report. This involved the overlaying of the relevant archaeological and architectural datasets on georeferenced aerial photographs and road maps (ESRI), where available. The integration of this spatial information allows for the accurate measurement of distances of a proposed development from archaeological and cultural heritage sites and the extraction of information on 'monument types' from the datasets. Areas of archaeological or architectural sensitivity may then be highlighted in order to mitigate the potential negative effects of a development on archaeological, architectural and cultural heritage.

ArcGIS online viewshed analysis can also be used where necessary to assess effects on setting of archaeological and architectural heritage monuments. The Viewshed tool uses the ESRI Elevation Analysis service to determine which areas are visible from specified observer points (the observer points being the monuments). The results show the worst-case scenario since the model does not take trees, vegetation or other buildings into consideration.

10.2.3 Desktop Assessment

The following sources were consulted as part of the desktop assessment for the proposed development:

- The Record of Monuments and Places (RMP)
- The Sites and Monuments Record (SMR)
- National Monuments in State Care County Dublin
- The Topographical Files of the National Museum of Ireland
- First edition Ordnance Survey maps (OSI)
- Second edition Ordnance Survey maps (OSI)
- Third edition Ordnance Survey Map (Record of Monuments and Places)
- Down Survey maps (www.downsurvey.tcd.ie)
- Aerial photographs (copyright of Ordnance Survey Ireland (OSI)
- Excavations Database
- National Inventory of Architectural Heritage (NIAH)
- Record of Protected Structures (current Dublin County Development Plans)
- Previous archaeological surveys and assessments carried out on or near to the proposed development site (various)
- Archaeological Inventory of County Dublin

Each of these are discussed in the following sections.

10.2.3.1 Record of Monuments and Places, Sites and Monuments Record and National Monuments

A primary cartographic source and base-line data for the assessment was the consultation of the Sites and Monuments Record (SMR) and Record of Monuments and Places (RMP) for County Dublin. All known recorded archaeological monuments are indicated on 6-inch Ordnance Survey (OS) maps and are listed in these records. The SMR/RMP is not a complete record of all monuments as newly discovered sites may not appear in the list or accompanying maps. In conjunction with the consultation of the SMR and RMP the electronic database of recorded monuments and SMRs which may be accessed at www.webgis.archaeology.ie/historicenvironment.

A review of all National Monuments in State care was undertaken as part of the assessment in order to ascertain any potential impacts on their setting as a result of the proposed development.

10.2.3.2 Cartographic Sources and Aerial Photography

The 1st (1840s) and 2nd (1900s) edition OS maps for the area were consulted, where available, as was OSI aerial photography.

10.2.3.3 Topographical Files - National Museum of Ireland

Details relating to finds of archaeological material and monuments in numerous townlands in the country are contained in the topographical files held in the National Museum of Ireland. In order to establish if any new or previously unrecorded finds had been recovered from the study area these files were consulted on www.heritagemaps.ie.

10.2.3.4 Archaeological Inventory Series

Further information on archaeological sites may be obtained in the published County Archaeological Inventory series prepared by the Department of Housing, Local Government and Heritage. The archaeological inventories present summarised information on sites listed in the SMR/RMP and include detail such as the size and location of particular monuments as well as any associated folklore or local information pertaining to each site. The inventories, however, do not account for all sites or items of cultural heritage interest which are undiscovered at the time of their publication. Many sites have been discovered since the publication of the Inventory Series which have now been added to the Sites and Monuments Record.

10.2.3.5 Record of Protected Structures

The Record of Protected Structures for County Dublin was consulted for the schedule of buildings and items of cultural, historical or archaeological interest which may be affected by the proposed development. The current SDCC Development Plan 2016-2022 and replacement Plan 2022-2028 also outline policies and objectives relating to the protection of the archaeological, historical and architectural heritage landscape of the county.

10.2.3.6 Excavations Database

The Excavations Database is an annual account of all excavations carried out under licence. The database is available online at www.excavations.ie and includes excavations from 1985 to 2022. This database was consulted as part of the desktop research for this assessment to establish if any archaeological excavations had been carried out within or near to the proposed development area.

10.2.3.7 National Inventory of Architectural Heritage (NIAH)

This source lists some of the architecturally significant buildings and items of cultural heritage and is compiled on a county by county basis by the Department of Housing, Local Government and Heritage. The NIAH database was consulted for all townlands within and adjacent to the study area. The NIAH survey for Dublin has been published and was downloaded on to the base mapping for the proposed development (www.buildingsofireland.ie). The National Inventory of Architectural Heritage (NIAH) is a state initiative under the administration of the Department of Housing, Local Government and Heritage and established on a statutory basis under the provisions of the Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act 1999.

The purpose of the NIAH is to identify, record, and evaluate the post-1700 architectural heritage of Ireland, uniformly and consistently as an aid in the protection and conservation of the built heritage. NIAH surveys provide the basis for the recommendations of the Minister for Housing, Local Government and Heritage to the planning authorities for the inclusion of particular structures in their Record of Protected Structures (RPS). The published surveys are a source of information on the selected structures for relevant planning authorities. They are also a research and educational resource. It is hoped that the work of the NIAH will increase public awareness and appreciation of Ireland's architectural heritage.

10.2.4 Previous Surveys and Assessments

An Environmental Impact Statement (EIS) was prepared in 2002 for the Phase 5 Greenogue Industrial Development. This report was consulted as part of this assessment to ascertain if any sites or monuments of note were recorded as part of the previous archaeological site inspection.

10.2.5 Field Inspection

A site inspection was not deemed necessary as part of the overall assessment given the brownfield nature of the site and the largely developed and industrial surrounds of the site in question. Detailed photographs of the site were reviewed however.

10.2.6 Assessment of Likely Significant Effects

The likely effects on the existing archaeological, architectural and cultural heritage environment are assessed using the criteria as set out in the Guidelines on the Information to be contained in Environmental Impact Assessment Reports (EPA, 2022). The following terminology is used when describing the likely effects of the proposed development from a Cultural Heritage perspective.

10.2.6.1 Types of Effect

Direct effects arise where an archaeological heritage feature or site is physically located within the footprint of the development whereby the removal of part, or all of the feature or site is thus required.

Indirect effects may arise as a result of subsurface works undertaken outside the footprint of the development, secondary environmental change such as a reduction in water levels and visual impacts.

Cumulative effects arise when the addition of many effects create a larger, more significant effect.

Residual effects are the degree of environmental changes that will occur after the proposed mitigation measures have been implemented.

10.2.6.2 Magnitude of Effects (Significance)

Profound: Applies where mitigation would be unlikely to remove adverse effects. Reserved for adverse, negative effects only. These effects arise where an archaeological site is completely and irreversibly destroyed.

Very Significant: An effect which by its character, magnitude, duration or intensity significantly alters most of the sensitive aspect of the environment.

Significant: An effect which by its character, magnitude, duration or intensity alters a sensitive aspect of the environment. An effect like this would be where part of a site would be permanently impacted upon, leading to a loss of character, integrity and data about an archaeological site.

Moderate: A moderate effect arises where a change to an archaeological site is proposed which though noticeable, is not such that the integrity of the site is compromised and which is reversible. This arises where an archaeological site can be incorporated into a modern day development without damage and that all procedures used to facilitate this are reversible.

Slight: An effect which causes changes in the character of the environment which are not high or very high and do not directly impact or affect an archaeological site.

Not Significant: An effect which causes noticeable changes in the character of the environment but without significant consequences.

Imperceptible: An effect on an archaeological site capable of measurement but without noticeable consequences.

10.2.6.3 Methodology for the assessment of impacts on visual setting (indirect effects)

While direct physical impacts to a site or monument can easily be assessed in quantitative terms, the assessment of impacts on setting can be subjective and as such is a matter of qualitative, professional judgement and experience. The distances in Table 10.1 below used in the assessment of impacts on setting are regarded as appropriate and are based on professional judgement.

Table 10.1: Cultural Heritage Assets considered according to sensitivity

Cultural Heritage Asset	Distance Considered
UNESCO World Heritage Sites (including tentative sites)	10 km
National Monuments (State Ownership and Preservation Order Sites)	5 km
Recorded Monuments, RPS and NIAH	1 km
Undesignated sites, if relevant	500 m

10.3 Receiving Environment

10.3.1 UNESCO World Heritage Sites

There are no monuments with UNESCO world heritage status located either within or close to the proposed development site. The nearest UNESCO monument is located 43 km to the north and consists of the Brú na Bóinne site. The World Heritage Site of Brú na Bóinne is Ireland's richest archaeological landscape and is situated within a bend in the River Boyne. Brú na Bóinne is famous for the spectacular prehistoric passage tombs of Knowth, Newgrange and Dowth which were built circa 3200 BC. These ceremonial structures are among the most important Neolithic sites in the world and contain the largest collection of megalithic art in Western Europe.

At this distance and given the nature of the proposed development as described in Section 10.4 negative effects on setting will not occur.

10.3.2 National Monuments in State Care

There are no National Monuments in State Care / Ownership / Guardianship within the 5 km study area surrounding the site of the proposed development. The nearest structures are located to the east/northeast and consist of Tullys Castle and Clondalkin Tower.

Tullys Castle (DU017-041006-) is located on the S side of Monastery Road where the land falls away to the W and NW. Known as 'Tully's Castle', this is National Monument No. 285 and is in state care. The remains comprise a well preserved, square tower which is offset off the corner of a hall house. This service tower rises to three storeys with crenellations and is attached to the NE corner of the two storey dwelling. At the parapet level of the tower there are stepped crenellations with a drip-stone ledge and gutter. Its interior is not accessible and the S face has been rebuilt to secure the building. It is built of coursed stonework with hammer dressing on the quoins (ext. dims. 3.3m NW-SE; 3.45m SW-NE). Lit by plain rectangular opes, some with dressed jambs all on the roadside frontage. On the upper storey is a projecting boulder which is probably the 'carved head' identified by Ball (1899, 97). Access to the tower was originally from the S side. There are two large rectangular openings on this side, the upper is a doorway. A gable scar on the S side indicates the presence of a later building up against this side. Attached to W wall is a dwelling with remains of a stairwell in the NW corner. Possible gunloops are present on the ground floor and a chimney breast with a flue on the first floor level (Ua Broin 1944, 212; MC Dix 1898, XXXX, 57).

Clondalkin Round Tower (DU017-041005-) is located on the W side of Tower Road opposite St. John's Church and is a round tower. Originally it stood five storeys high with a conical cap (dims. H 26m, int. diam 2.20m, wall Wth 0.86m). Built of coursed calp limestone with a granite finish on the

door and window jambs. The base of tower was cased in the 18th-century (Sherlock 1906, 10; Barrow 1975, 61-64). Access to first floor is from external steps through a lintelled doorway in the E face. Floors are lit by small square-headed opes and four larger rectangular windows facing the cardinal points on the top floor. Pre-development testing near the round tower in 2003 produced one sherd of medieval cooking ware in a disturbed context (Opie, H 2006, 113).

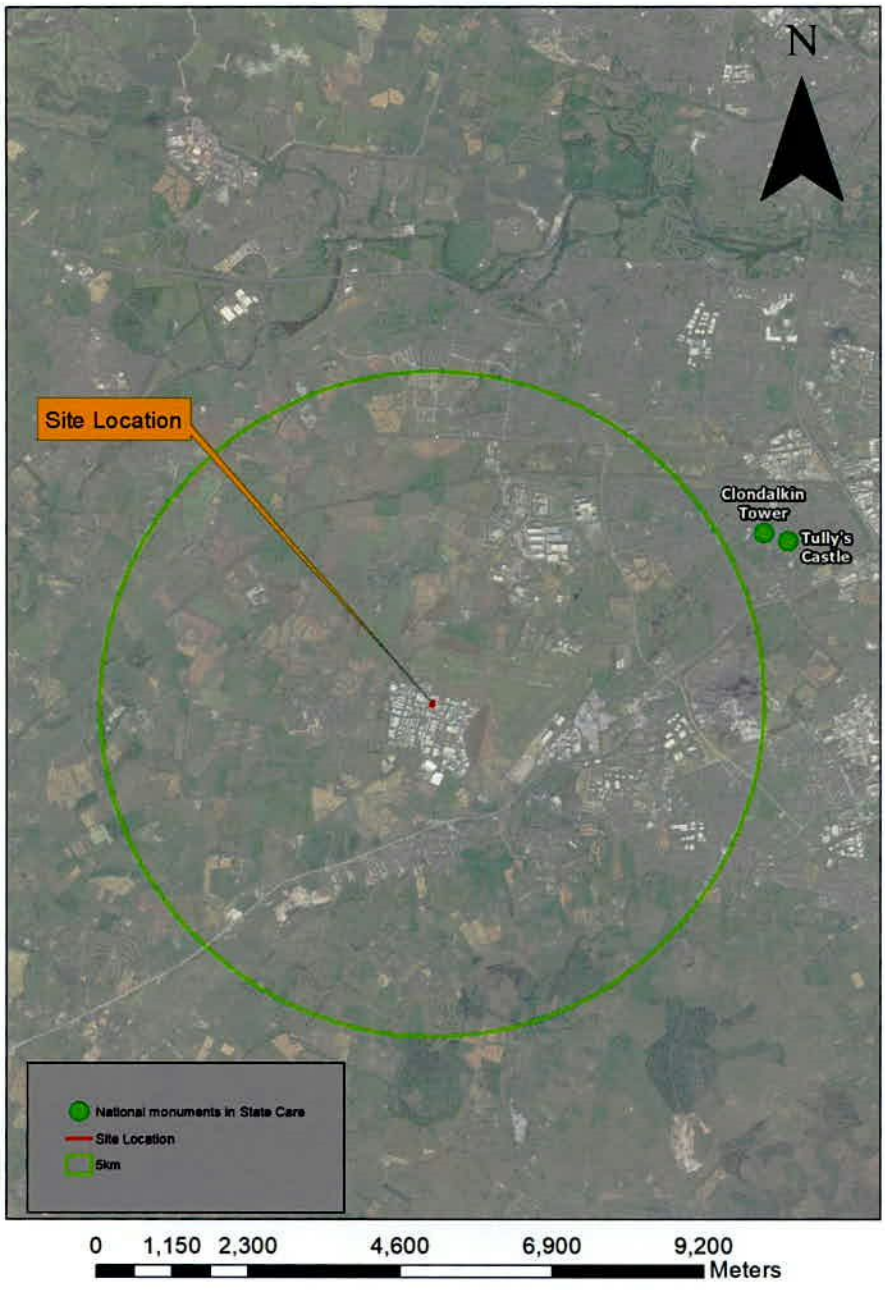


Figure 10.2: National Monuments in State care (5 km search radius)

10.3.3 Recorded Monuments / Site and Monuments Record

Only one recorded monument is present within 1 km of the proposed development site and is situated within an area now occupied by the Aerodrome Business Park. It is located 934 m to the south-east of the proposed development site.

A review of all excavation records (www.excavations.ie) has not revealed any detail regarding the resolution of the monument. This section of the Aerodrome Business Park appears to have been constructed between 2012 and 2018 (Geohive Map viewer Aerial Photographs 2005-2012 and 2013-2018). The monument may be marked in the incorrect location however.

DU021-103

The description of the monument on the Historic Environment Viewer is as follows:

'*First recorded as a positive cropmark in July 1991. Located just south of Casement Airfield, Baldonnel. Aerial photograph (GB91. DV.11) shows cropmark of a ring-ditch (Gillian Barrett)*'.

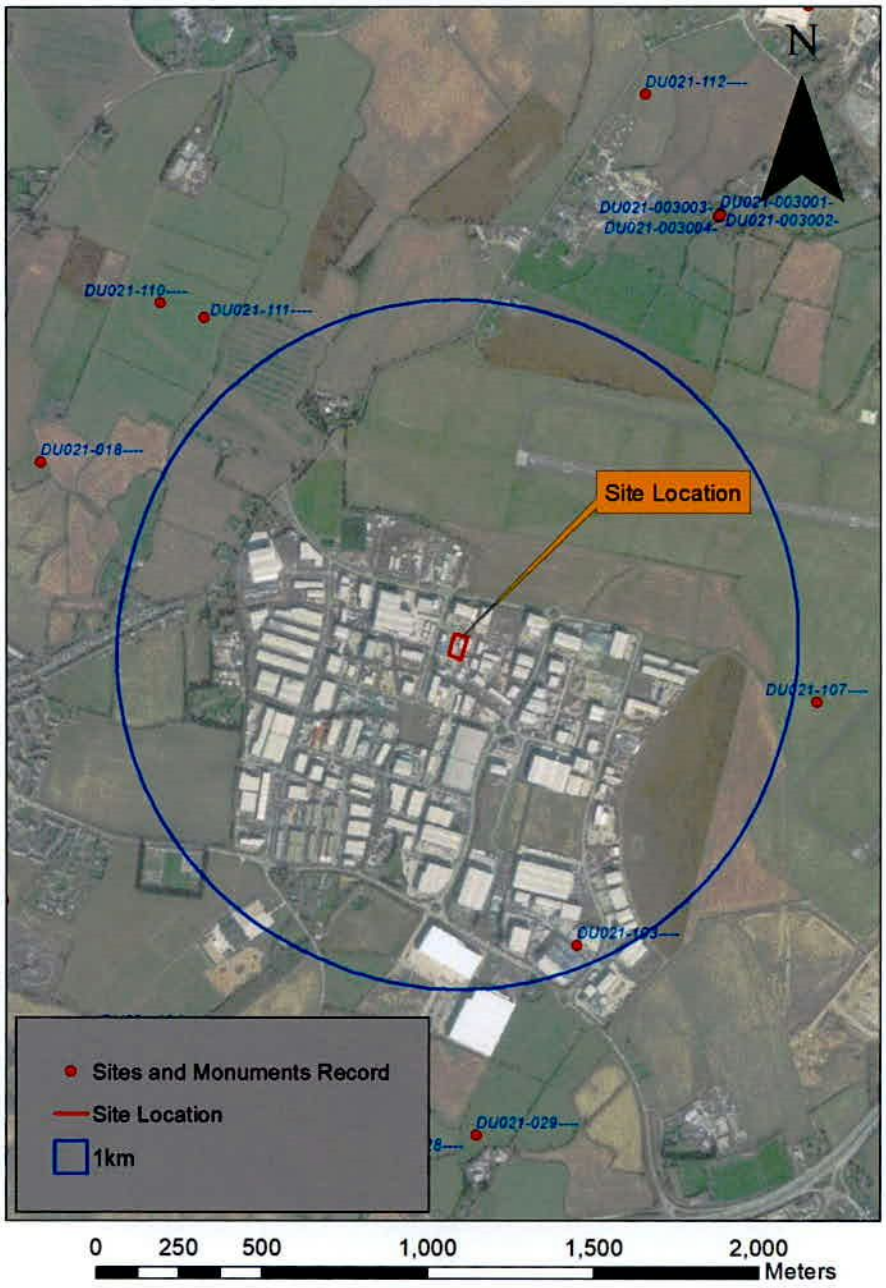


Figure 10.3: SMR DU021-193 (1 km search radius)

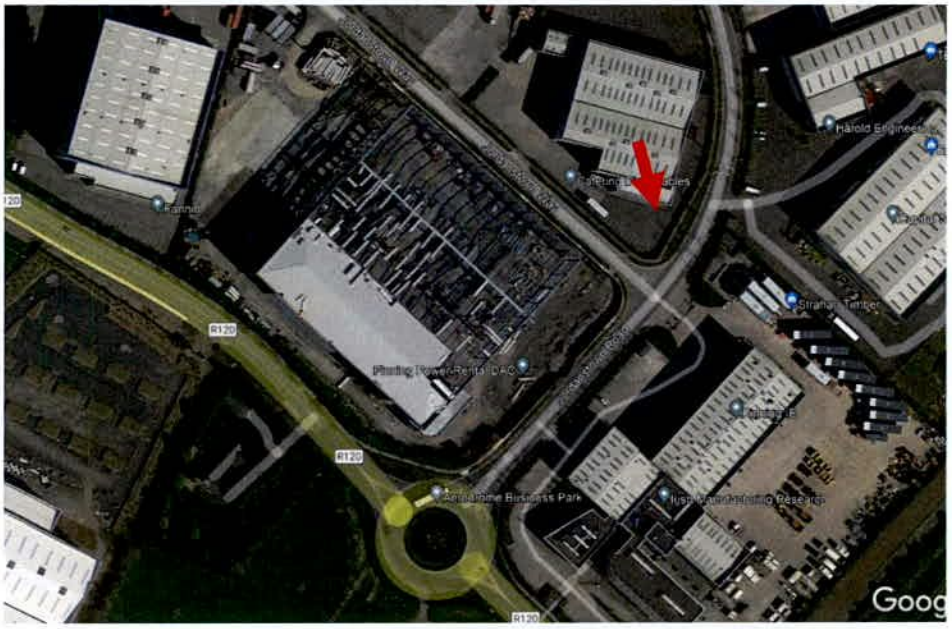


Figure 10.4: Aerial View – Location of monument DU021-093 (Google Earth Pro, April 2021)

10.3.4 Protected Structures and NIAH sites

10.3.4.1 Protected structures

There are no protected structures located within 1 km of the proposed development site, as shown in Figure 10.5. The nearest protected structure is located 1.75 km to the west.

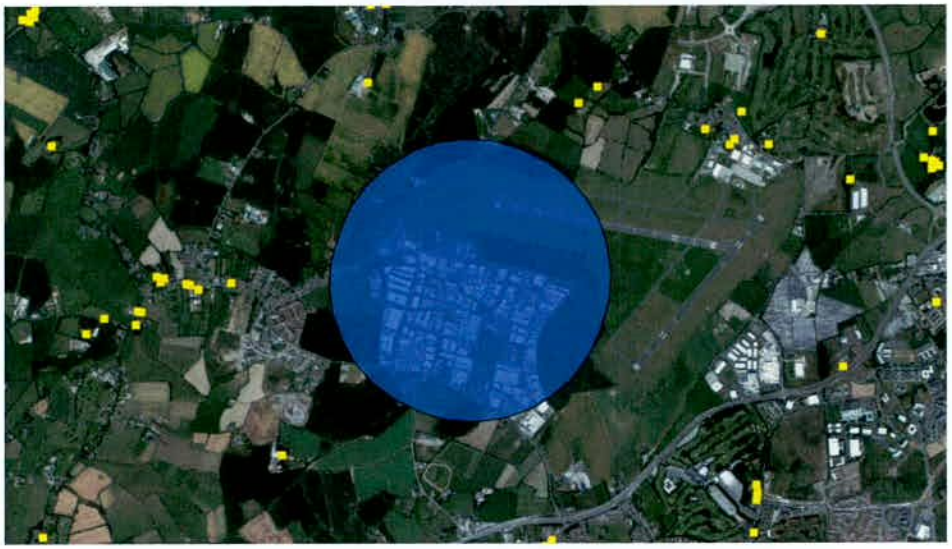


Figure 10.5: Extract from Heritage Maps – Protected Structures (1 km search radius highlighted in blue)

10.3.4.2 National Inventory of Architectural Heritage (NIAH)

Two houses listed in the NIAH, namely Blundelstown House and Westmanstown House, are located within 1 km of the site of the proposed development. Both houses are over 700 m to the northwest of Unit 518B.

Reg. No 11208011 Blundelstown House

This is located 750 m to the northwest and is described in the NIAH (www.buildingsofireland.ie) as follows: '*Detached three-bay two-storey L-plan farm house, c.1800. Originally three-storey, now reduced. Roughcast rendered walls with shallow projection to south west corner. Glazed timber door with timber pilaster surround and plain fanlight, set within modern conservatory. Timber casement windows. Pitched slate roof with rendered chimney stacks to gable ends. Twentieth-century extension to rear corner. Simple wrought-iron gates. Single-storey rubble stone outbuildings with pitched tile and slate roofs. An unusual and stimulating building, the alterations to which having only served to enrich its already varied history. Retains an attractive doorcase and simple wrought-iron farm gates*'.

Figure 10.6: Blundelstown House (photo courtesy of the NIAH)

Reg. No 11208012 Westmanstown House

This is located 875 m to the northwest and is described in the NIAH (www.buildingsofireland.ie) as follows: '*Detached two-storey former farmhouse, built c.1850, now disused. Single-storey extension to east. Casement windows in east elevation. Rendered chimneystack to gable. Pitched slate roof, possibly truncated about its axis. Single-storey rubble stone byre to south. Rendered gate piers and stone arched bridge over stream at entrance. Ancillary buildings around courtyard include barns, stables and workshops. This former farm house preserves old field boundaries and older agricultural features on its approach track, and may mark the site of an older farmstead*'.

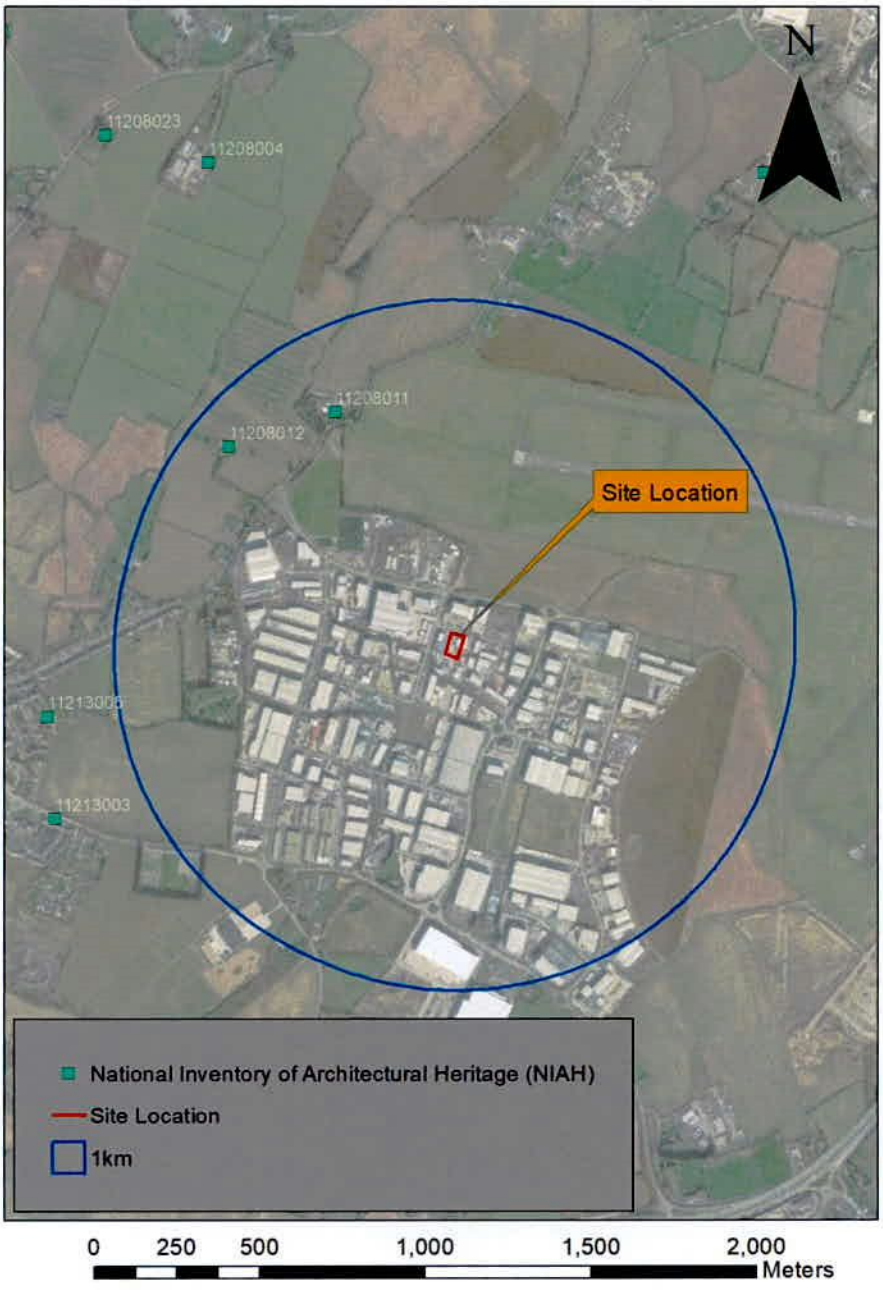


Figure 10.7: NIAH structures (1 km search radius)

10.3.5 Nearby Excavations

The database of Irish excavations on www.excavations.ie was consulted for any such investigations which took place in the vicinity of the proposed development site. Two excavations are recorded within the vicinity of the Greenogue Business Park and are summarised on www.excavations.ie as follows:

10.3.5.1 2002:0604 - Jordanstown (BGE 6/12/1), Dublin

During topsoil-stripping for the Bord Gáis Éireann Pipeline to the West project (Section 6: Gormanston to Ballough), a series of archaeological features became apparent north-east of Road-crossing 6/13 on the N1. They extended for 37–40m along the pipeline corridor but were

concentrated on the northern side. At their widest point the features were only 8m from the northern baulk of the wayleave. Subsequent cleaning revealed a series of stratified features including five cereal-drying kilns and areas of oxidised clay associated with a linear, ditch-like feature. All of these features contained charcoal-rich fills and were delimited by oxidised clay. They were cut by later ditches crossing from north to south. The features are situated on gently east–west-sloping pastureland; the land is quite unencumbered, affording good views in all directions, particularly to the north and west.

The kilns (F2, F9, F13, F19, F23)

The kilns were all variations of the classic figure-of-eight plan. In most cases the fire-pit of the kiln was ringed with a 'halo' of reddened, oxidised clay. This clay formed the lining of the kiln and the flue. In most cases the kilns were 2m long and 0.8–1m wide across the bowl. Their alignment was quite unusual in that two were oriented north-west/south-east (F2, F13) and the remaining three were aligned west–east (F9, F19, F23). The kilns had single, uniform fills, charcoal-rich with visible environmental remains. These fills have been extensively sampled.

F2: Kiln 1

F2 lay 0.5m south of the linear feature (F5), almost at the eastern edge of the archaeological area. The other kilns of this group lay west-north-west of F5. F2 was oriented almost due north–south, similar to F13 (Kiln 2). The fire-pit was to the north.

The kiln was roughly figure-of-eight- to keyhole-shaped, with an overall length of 2m. The fire-pit was subcircular and 0.9m wide, narrowing to 0.54m at the location of the flue. The kiln area widened to a maximum of 0.8m. The southern edge of the kiln was flattened, giving a keyhole plan. The fire-pit was lined with fire-reddened clay (F3) to a depth of 0.06–0.08m. This lining did not extend to the kiln pit. The overall cut was filled with black peaty clay, containing a considerable amount of charcoal. This formed a single, homogeneous fill over F2 and F3. The depth of F2 fluctuated from its shallowest, at 0.1m to the south, to 0.16m, sloping down to the north. There was no distinct change in slope to reflect the location of the flue. The sides of F2 were quite steep, opening onto a flat base.

This kiln was well constructed and beautifully lined. The fill was homogeneous and uniform throughout. This suggests that the kiln functioned effectively and was deliberately backfilled after use. The fill was deliberately placed, as there was no evidence of oxidisation in the kiln pit to the south.

F13: Kiln 2

F13 (Kiln 2) was 2.5m north of the linear feature (F5); it encroached and abutted an area of burning (F15), and was cut by a later ditch (F16). Kiln 1 (F2) was c. 12m to the south-east. F13 lay within the main concentration of kilns including F9, F19 and F23. It was aligned roughly north-west/south-east. The fire-pit was to the north.

The kiln was roughly figure-of-eight in plan, with an overall length of 2.3m. The fire-pit was subcircular and 1m wide, narrowing to 0.16m at the location of the flue forming the confluence between the fire-pit and the kiln. The kiln area widened to a maximum of 1m. There were patches of fire-reddened clay in the base of the fire-pit and kiln, indicative of in situ burning, but no formal lining. F13 had a shallow, obtuse profile, with both fire-pit and kiln barely 0.1m deep, rising to 0.02m at the flue. The overall cut was filled with a material of loose compaction with silt, clay and peat as components. This contained a considerable amount of charcoal. It formed a single, homogeneous fill over F13. F13 abutted a layer of oxidised natural. This material may relate to the operation of the kiln. The kiln was also cut by F16, one of the two ditches that constitute the stratigraphically latest features on the site.

This was a fine example of a kiln, with a rather unusual plan. Oxidisation in both pits of the kiln may indicate that it functioned in two directions. The remains of the kiln were very shallow, probably much truncated by agricultural practices.

F19: Kiln 3

F19 was 4m west of F13 (Kiln 2) and 3.5m north of the linear feature (F5). As with F13, F19 was cut by one of the later ditches, F21. F2 (Kiln 1) was c. 16.5m to the east. F19 lay within the main concentration of kilns including F9, F13 and F23. It was aligned roughly north-north-east/south-south-west. The fire-pit appeared to be to the north-north-east.

The kiln was roughly figure-of-eight in plan, with an overall length of 2m. The fire-pit was subcircular and 1m wide, narrowing to 0.48m at the location of the flue forming the confluence between the fire-pit and the kiln. The kiln area widened to a maximum of 0.68m, but the full extent could not be determined as F21 cut the kiln here. There were patches of fire-reddened clay in the base of the fire-pit, indicative of in situ burning, but no formal lining. F19 displayed a stepped profile. The fire-pit was 0.34m deep, rising to 0.18m in the kiln. The flue was defined at the step between the fire-pit and the kiln. It incorporated the rise from 0.34m to 0.18m, and at its base it was 0.1m wide, widening to a maximum of 0.48m.

The cut was filled with a loose, dark brown to black soil, with a large amount of charcoal throughout. It was quite uniform, but the visible quantity of charcoal diminished from the base to the surface.

This was a fine example of a kiln, in good condition. Unfortunately the kiln pit had been cut by the later ditch (F21), which makes full interpretation of the kiln difficult.

F23: Kiln 4

F23 was 1.3m north of the linear feature (F5) and 0.3m west of the later ditch (F21). F19 (Kiln 3) was c. 5.5m to the north-east; F13 (Kiln 2) was c. 10m to the north-east; and F2 (Kiln 1) was 21m to the south (south of F5). F23 lay securely within the main concentration of kilns including F9, F19 and F13.

The kiln was aligned roughly west-south-west/east-north-east. The fire-pit was to the west-south-west.

The kiln was roughly figure-of-eight- to keyhole-shaped, with an overall length of 1.85m. The fire-pit was subcircular and 0.83m wide, narrowing to 0.52m at the location of the flue forming the confluence between the fire-pit and the kiln. The kiln area did not widen in this case but extended a further 0.9m retaining the same width of 0.52m. In profile this kiln was quite different from the others, with a gradual, stepped descent to the base of the fire-pit. At the centre of the pit was a steep-sided socket with a V-shaped profile. This feature was contemporary with the kiln, as the kiln fill was uniform from the base of this V-shaped cut to present ground level. This feature in the base of the fire-pit was lined with fire-reddened clay, indicative of in situ burning, but there was no formal lining. It appeared that this feature contained the combustible material in the fire-pit. On the west-north-west side of F23, where it narrowed for the flue, was a stone placement that forcibly narrowed the flue and appeared to be a deliberate feature. The overall depth of F23 varied from 0.32m at the centre of the fire-pit to 0.04m at the east-north-east. The overall cut was filled with a material of loose compaction, with silt, clay and peat as components. It contained a considerable amount of charcoal. This formed a single, homogeneous fill over F23.

This was a fine example of a kiln, a rather unusual variant that involved the excavation of a

central pit within the fire-pit to accommodate the fire setting. Oxidised clay within this context defined the extent of burning but did not represent a formal liner.

F9: Kiln 5

F9 was north of the linear feature (F5) that cut the edge of F9. F13 (Kiln 2), F19 (Kiln 3) and F23 (Kiln 4) were grouped to the west of F9, and F2 (Kiln 1) lay due west.

This kiln did not display a clear alignment, as it did not physically resemble any of the typical kiln forms.

Kiln 5 may in fact be a misnomer for the feature. It was cut into the natural and did not follow any of the recognised kiln forms, being rather amorphous to subcircular, with an overall length of 1.2m. During excavation it was revealed as a shallow fire-pit with a maximum depth of 0.2m. The base was heavily oxidised, indicative of in situ burning, but there was no formal lining. It was joined by two possible flues, F28–9 from the north and F30–1 from the south. A similar kiln type and flue arrangement were recorded at Flemingtown, excavated by Emmet Byrnes (No. 592 above, 02E0296). Flemingtown is tentatively dated as Bronze Age and is similar in plan to a site excavated at Doonmoon, Co. Limerick (Gowen 1988), which was also ascribed to the Bronze Age. The form of the other kilns on this site appears to be early historic and is similar to that of kilns excavated at Corbally, Co. Kildare. The environmental samples from these kilns date them to the early historic period. It may be necessary to reassess F28–9 and F30–1. These may not be flues but rather components of a curvilinear trench cut by F9. The fills in all cases were loose and friable, and differentiation was almost impossible. The only evidence of burning was in the fire-pit. A charcoal spread to the south may have originated from this group of features, but this is not clear.

The F9 cut was filled with a loose, dark brown to black soil, with a moderate amount of charcoal and inclusions of burnt bone throughout the fill. The fill also yielded a copper-alloy artefact. This object was recovered in two pieces, though originally formed from a single sheet of metal wrapped around to form a cylinder. The exterior surface was decorated with a criss-cross pattern and bands of incised parallel lines. The object has been conserved.

This feature may indeed be a kiln, but the evidence is inconclusive. The plan of F9 was partially obscured, as it lay at the juncture with F5, F28 and F30. Environmental analysis may clarify what the feature is and allow dates to be determined for it.

F5: linear trench

The three east–west-oriented kilns appeared to be associated with a linear, charcoal-rich slot-trench (F5). This feature was recorded as crossing the site from south-west to north-east over a distance of 37m and was 0.5–0.8m wide and 0.18–0.25m deep. The fill was quite uniform and had no evidence of a built structure. The absence of structural features like post- or stake-holes may suggest that the slot-trench supported a temporary screen. The fill was grey/black with a high proportion of peat. It yielded considerable amounts of charcoal and rotted vegetation. The vegetation was unlikely to be contemporary with the trench but was later growth following the line of loose fill. The series of possible hearths (F15, F18, F25) was directly associated with the linear ditch and in some places had been partially encircled by extensions to F5. F26 was one such extension, 6.2m long and 0.6m wide. Its plan and profile were in keeping with those of F5, and the fill was indistinguishable from that of F5. Although these features are obviously truncated, their survival must be attributed to the quality of the grassland, which prevents it from being ploughed.

F15, F18, F25: possible hearths

F15 was a layer of oxidised natural clay measuring c. 2m by 1.5m and localised to the surface, being only millimetres deep. It was close to F13 (Kiln 2) and may be the result of burning within the kiln or perhaps a hearth associated with the kiln.

F18 was an elongated oval of red, oxidised natural, 2.3m long and 0.6m wide. Again, this appeared to have been the result of localised burning on the natural and was only millimetres deep. F18 was in the same group of features as the kilns and may be associated with them.

F25 was a subcircular patch of oxidised natural clay, 0.8m long and 0.6m wide. This deposit was partially enclosed by an extension of F5 but was open to the east. This feature had more substance than the others, being almost 0.04m deep. It was probably a hearth.

F7, F11, F32: linear features

F7 was a small linear cut in the natural, 1.7m long and 0.4m wide. It was oriented east–west and survived to a maximum depth of 0.4m. It had a U-shaped profile, gradually sloping to a flat base. The grey/brown, dry fill had a high organic content and charcoal flecking throughout.

F11 was a linear cut, 1.1m long, 0.4m wide and 0.28m deep. The profile was U-shaped, with gradually sloping sides giving way to a concave base. It had a homogeneous organic fill (with charcoal), moderate in compaction with some pebbles throughout.

F32 was a linear cut, 1.4m long and 0.71m wide. It survived to a depth of 0.12m. It was cut into the natural and was in turn cut by the later ditch feature (F21). The cut had a concave profile, springing sharply from ground level but sloping gradually down to a shallow, concave base. The fill was largely silt, with a small amount of pebble inclusions and a low clay content. The high silt content may suggest that this feature was associated with drainage or remained open for an extended period, allowing it to silt up naturally.

F16, F21: later ditches

Both of these features crossed the site from north to south and clearly represented the latest phase of activity before the Pipeline to the West project. They entered the pipeline corridor from the northern pastureland.

These ditches were almost identical in form. Both features were very shallow, with maximum depths of 0.06–0.07m. The width of both ditches was between 1.8m and 2m, and they followed the same alignment. The fill in both cases consisted of redeposited topsoil, which had accumulated naturally within the cut of the ditches. This fill was very low in charcoal content. These ditches cut two kilns, F13 (Kiln 2) and F19 (Kiln 3), and crossed the F5 ditch in two places. F21 also cut F26 and F32.

These ditches have cut through all of the major features of this site, which clearly defines them as the latest features.

Conclusions

All of these features have been directly cut into the natural, which suggests short-term usage; there was no recorded depth of stratigraphy, at least at this location. In general the excavated information suggests an area of intensive agricultural activity, largely comprising crop husbandry and cereal processing.

This land is mature pasture, almost permanent grassland. Low earthworks are visible in the pasture field to the north. The earthworks do not suggest a particular plan, but extensive geophysics would prove productive. The extent of the excavated features suggests the

presence of a habitation site in the immediate environs. The nature of the features indicates an area of agricultural industrial activity. The antiquity of these features remains uncertain until the results of environmental sampling are known.

10.3.5.22000:0301 - GREENOGE, Dublin

Testing was undertaken on behalf of E.G. Petitt Consulting Engineers for South Dublin County Council in advance of construction of the Saggart/Rathcoole and Newcastle Drainage Scheme. A single trench, 35 m long and 2 m wide, was excavated in an area where a spread of possible burnt stone and ash had been identified during field-walking of the pipeline route. Excavations revealed the deposits to represent a pale yellow, mineral-depleted clay horizon within the soil profile, sandwiched between the topsoil and gravel subsoil. No archaeological features or artefacts were recovered within this area during excavations, reinforcing the interpretation of the deposit as a natural soil horizon.

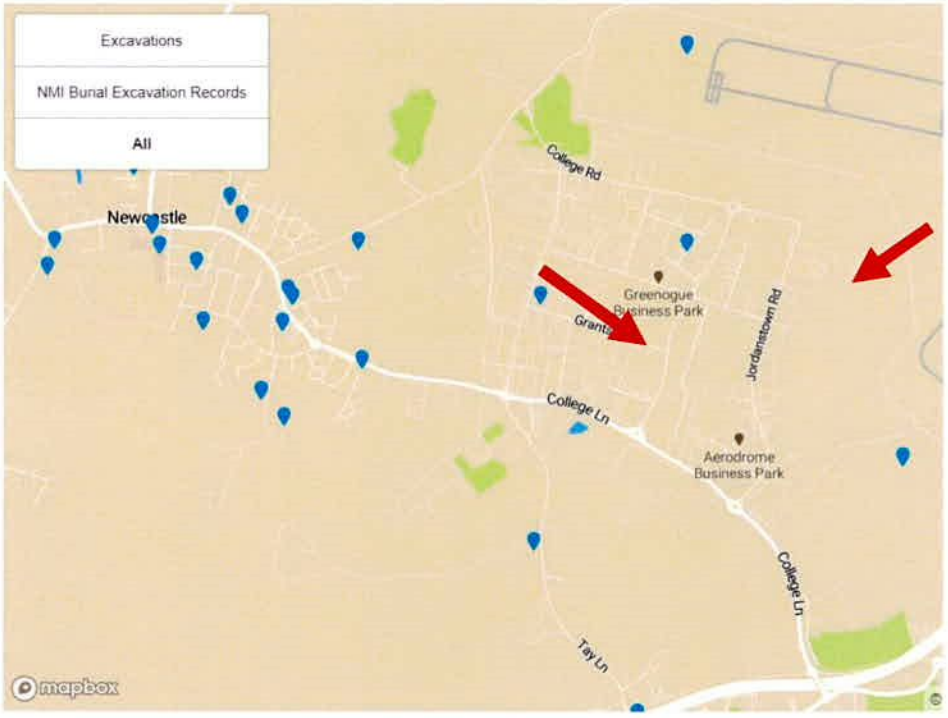


Figure 10.8: Mapped excavation locations (Section 10.3.5.1-10.3.5.2)

10.3.6 Cartographic Evidence

Rocques map of 1760 (Figure 10.9) shows Greenogue townland as open farmland. The mill buildings at Greenogue are not named as such, although they are shown next to the stream. This stream eventually joins the river Camac further downstream and is also indicated albeit following a slightly more meandering channel around Greenogue on the earlier Down survey map.

On Taylor's map of 1816 (Figure 10.10), the townland of Greenogue is characterised by its mill buildings, the aforementioned stream and predominantly woodland which appears to cover a large area of the townland.

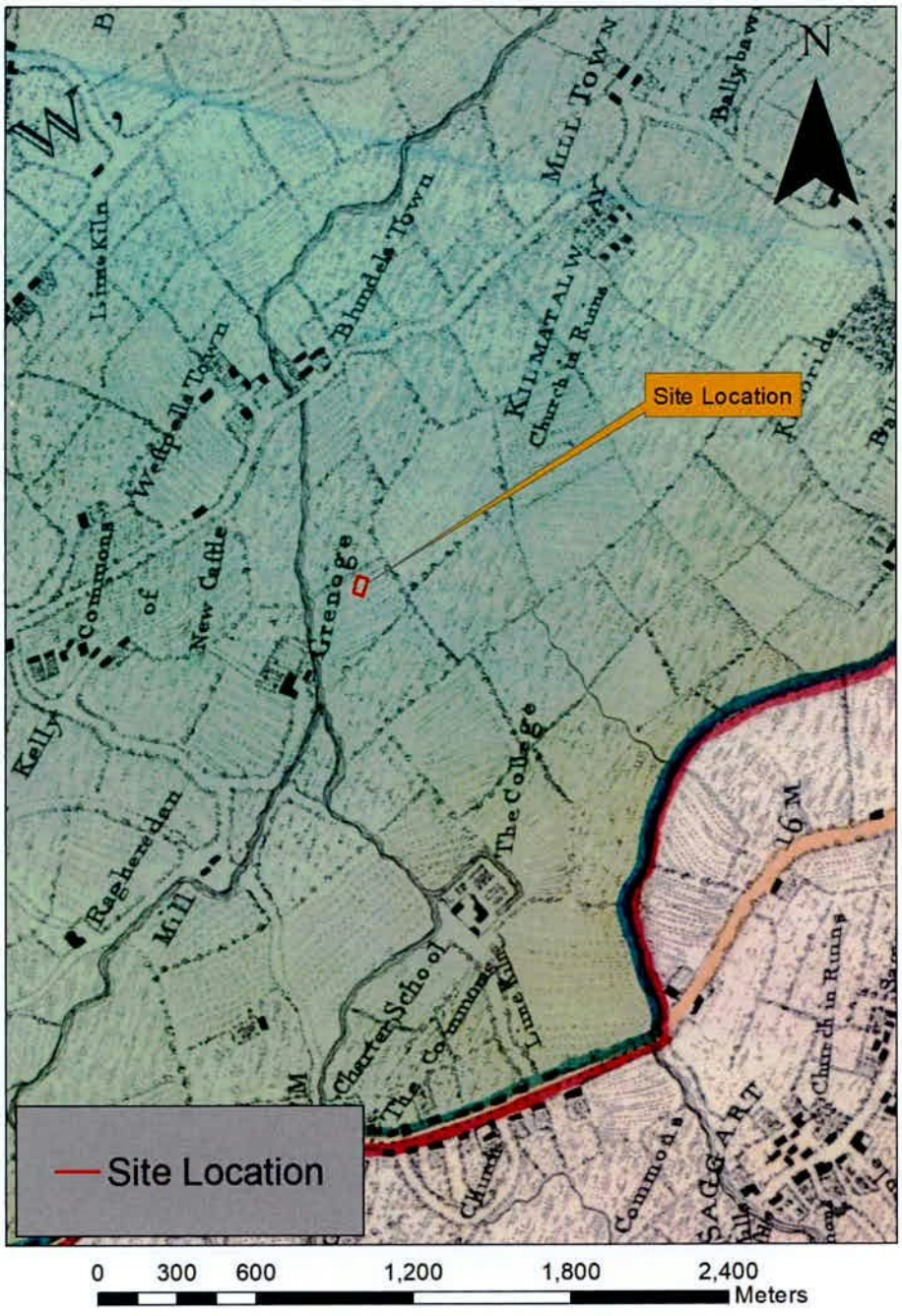


Figure 10.9: Rocque's map of 1760 showing open farmland in the vicinity of Greenogue Td.

Figure 10.10: Taylor's Map of 1816

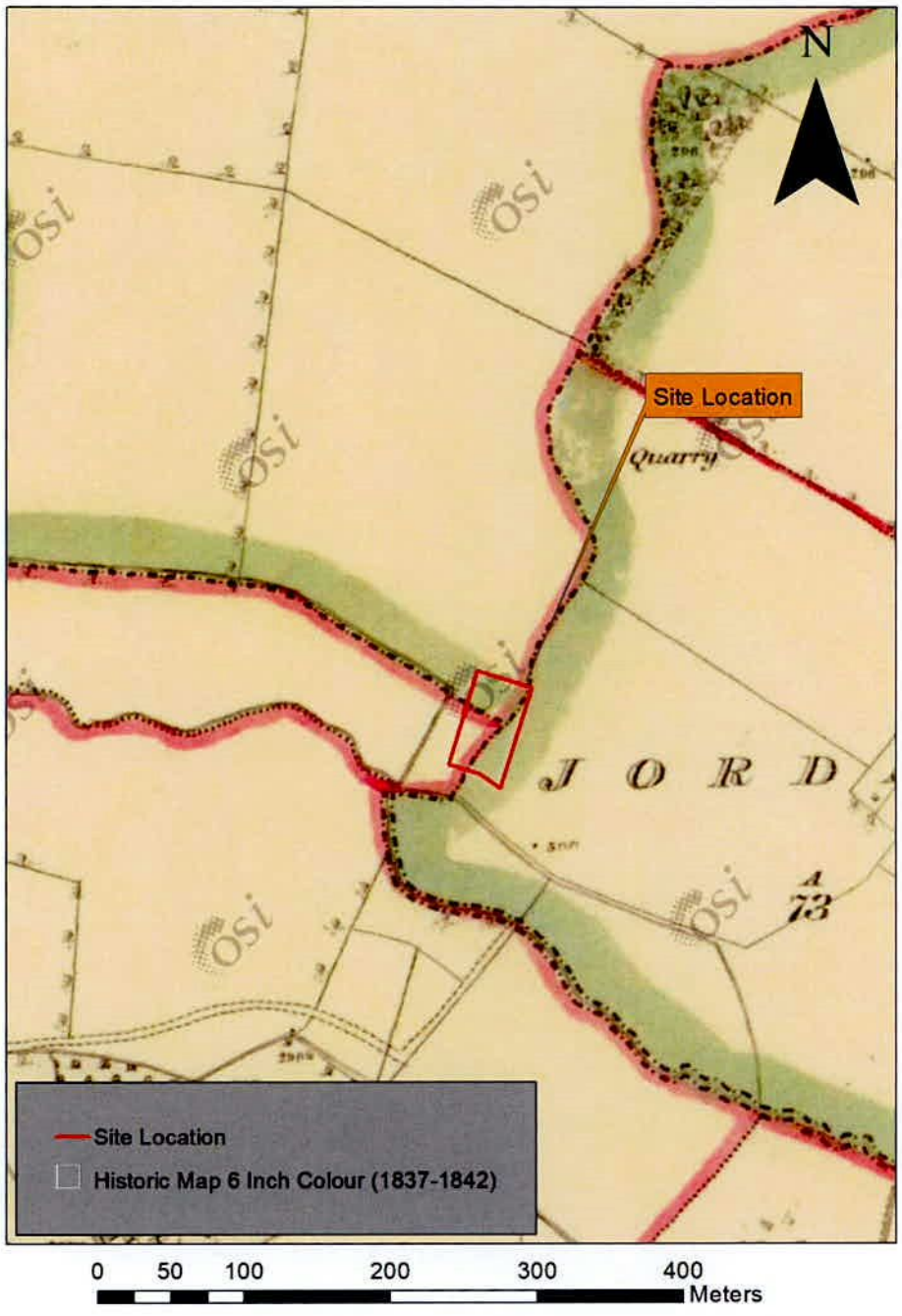


Figure 10.11: 1st Edition OS Historic map

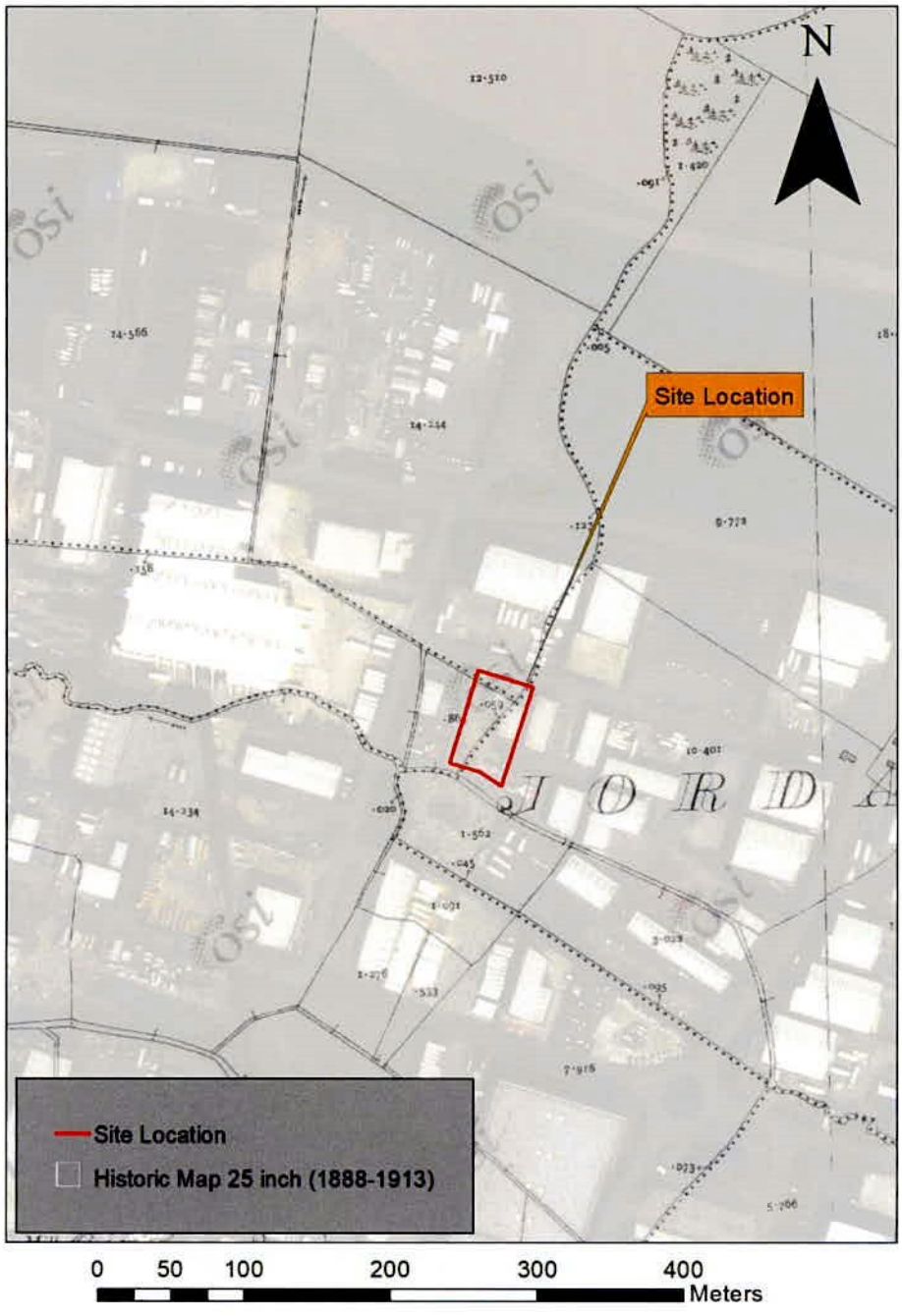


Figure 10.12: 25 inch Historic map with modern aerial image overlay

10.4 Characteristics of Proposed Development

The proposed development is described in detail in Chapter 2 (Description of Proposed Development) and includes the construction of a new waste handling building in addition to the use of two existing buildings onsite and associated infrastructure.

The existing concrete yard surface is to be retained for use as the floor of the new building with only limited / shallow excavations required for the foundations of the new steel frame structure and

groundworks including modification and extension of the underground surface water drainage pipelines.

No offsite construction activities are required as part of the proposed development.

The setting of the proposed development within the wider Greenogue Business Park has been reviewed with reference to the site photographs included in Figures 10.13-10.18 below.

Figure 10.13: Existing buildings (view from site entrance facing southeast)

Figure 10.14: Existing buildings (view from site entrance along northern boundary towards neighbouring Unit 532)

Figure 10.15: Existing buildings (view from Grants Crescent facing south)

Figure 10.16: Existing buildings (view from Grants Crescent facing west/southwest)

Figure 10.17: Rear of existing buildings (view from yard area facing east)

Figure 10.18: Rear of existing buildings (view from yard area facing south)

10.5 Potential Effects

10.5.1 Do Nothing Scenario

The do-nothing scenario seeks to describe the consequences that are reasonably likely to occur without the proposed project. Since the proposed development is an existing industrial site within a

wider Business Park, if the development were not to proceed, the site is likely to continue to be utilised as an industrial unit.

In the 'Do nothing' scenario the site may revert to operational levels associated with the conditions of the planning permission and waste facility permit for the existing facility. The future operation of the existing waste recovery facility in the 'Do Nothing' scenario is uncertain.

10.5.2 Construction Phase

10.5.2.1 Construction Phase Potential Effects – Direct

Direct effects arise due to a 'physical impact' on a monument or site, or indeed sub-surface archaeological finds, features or deposits. The construction phase of the development includes limited excavation activities associated with a new building on a brownfield site. The existing yard slab is to be retained as the floor of the new building and excavation will be limited to groundworks for the installation of shallow foundations and extension of the underground surface water drainage network to serve the new building. The entire site is devoid of topsoil and therefore the sub-surface archaeological potential of the site is considered to be low.

The impacts on the known and potential archaeological, architectural and cultural heritage of the area (as described in Section 10.3 above) are outlined below. The impacts are described according to each element of the Existing Environment (National Monuments, SMRs, Sub-surface archaeology etc).

Impacts to UNESCO, National Monuments, RMPS, RPS and NIAH

No direct effects will occur to UNESCO sites, National Monuments in State Care, Recorded Monuments, Protected Structures or NIAH sites since all are located significant distances away from the site of the proposed development and all construction activities will be confined to within the site boundary.

Impacts to sub-surface archaeology

Since the proposed development is located on a brownfield site (already constructed) with the site devoid of topsoil, the sub-surface archaeological potential is considered to be low to negligible, with a corresponding low potential for effects on the archaeological environment associated with the construction works. Furthermore, the necessary excavation required during construction phase will be limited in its extent as described previously and is likely to only involve excavation in ground previously disturbed during the original development of the existing facility.

10.5.2.2 Construction Phase Potential Effects – Indirect

Indirect effects, in terms of archaeology, architectural and cultural heritage are considered to be those effects which happen away from the site of the proposed development. This includes effects associated with impacts on the visual setting of any cultural heritage asset in the wider landscape. Since these effects are only possible once the proposed development is completed, they are considered operational effects and are therefore discussed in Section 10.5.3 below. No indirect effects were identified which would occur as a result of the construction phase of the proposed development.

10.5.3 Operational Phase

10.5.3.1 Operational Phase Potential Effects - Direct

In terms of archaeological, architectural and cultural heritage, no direct effects will occur at the operational stage as all intrusive groundworks will be complete.

10.5.3.2 Operational Phase Potential Effects - Indirect

Indirect effects are mainly associated with impacts on setting. Impacts on the setting of sites may arise when a development is proposed immediately adjacent to a recorded monument or cluster of

monuments or any cultural heritage asset. While the proposed development may not physically impact on a site, it may alter the setting of a monument or group of monuments.

Potential impacts on the visual amenity of a site or area and the significance of such impacts is dependent on a number of factors including the sensitivity of the location or 'receptor' and the scale or magnitude of the proposed development.

The proposed development is described in Chapter 2 (Description of Proposed Development) and comprises the use of existing and new buildings within the Greenogue Business Park. In this regard the wider landscape will not be altered as a result of the proposed development.

No impacts on setting will occur since the nearest recorded monument is located at a significant remove from the development site and furthermore this monument has no surviving physical surface trace.

10.5.4 Cumulative Effects

Cumulative effect is defined as "*The addition of many minor or insignificant effects, including effects of other projects, to create larger, more significant effects*" (EPA, 2022). Cumulative effects encompass the combined effects of multiple developments or activities on a range of receptors.

In this case, the receptors are the archaeological monuments and architectural/cultural heritage sites in the immediate vicinity of the proposed development. No other significant projects have been identified which may contribute to cumulative effects together with the proposed development.

10.6 Mitigation Measures

Since no negative effects were identified (either direct, indirect or cumulative), no mitigation measures are required or proposed.

10.7 Residual Effects

Residual effects are the degree of environmental changes that will occur after the proposed mitigation measures have been implemented. Since no negative effects were identified and no mitigation measures are required, there will be no residual effects.

11. Material Assets

11.1 Introduction

Material assets comprise the physical resources in the environment, which may be of human or natural origin that are valued and intrinsic to specific places. The objective of the assessment is to ensure that these assets are used in a sustainable manner with respect to the proposed development.

The material assets, which have been identified as being within and adjacent to the site of the proposed development and which may be directly affected by the proposed development, are addressed in this chapter and in other chapters of this EIAR where relevant, in terms of existing environment, potential impacts and environmental effects of the proposed development and mitigation measures. Any material assets addressed elsewhere in this EIAR are listed below in Section 11.2 for cross-referencing purposes.

Information already gathered from the planning, design, construction and operation of the existing facility has been incorporated and updated to inform the extent of services and the consideration of potential impacts on material assets from the proposed development.

11.2 Methodology

11.2.1 Guidance Documents

This Chapter was prepared noting relevant EPA and EU guidance documents (listed below) to assess the impacts of the proposed development at the site of the proposed development on the material assets of the area.

- Guidelines on the information to be contained in Environmental Impact Assessment Reports, EPA, 2022;
- Advice Notes on Current Practice (in the preparation of Environmental Impact Statements), EPA, 2003;
- Environmental Impact Assessment of Projects, Guidance on the Preparation of the Environmental Impact Assessment Report, EU, 2017.

Further to EU Directive 2014/52/EU, the EPA Guidelines of 2022 state that material assets *"can now be taken to mean built services and infrastructure"*. This includes:

- Built Services;
  - Electricity;
  - Telecommunications;
  - Gas;
  - Water Supply Infrastructure;
  - Sewerage;
- Roads and Traffic;
- Waste Management.

Material assets of human origin which have been considered elsewhere in this EIAR include:

- Water and wastewater infrastructure is also described in the context of the receiving water environment in Chapter 6 (Water and Wastewater);
- Transport infrastructure is also described in the context of the assessment of Traffic and Transportation addressed in Chapter 3 (Traffic and Transportation).

This chapter should be read in conjunction with the above chapters.

11.2.2 Sources of Baseline Information

A desk study was carried out on the existing material assets associated with the site of the proposed development. Current and proposed usage of material assets was assessed.

Irish Water, Gas Networks Ireland and ESB Networks were also consulted regarding available data for key utilities in the area of the site of the proposed development and its environs. Asset mapping data returned by all three of these main utility providers was reviewed as part of the assessment of material assets.

In terms of waste management infrastructure, the online databases of the EPA and National Waste Collection Permit Office (NWCPO) were also reviewed.

11.3 Receiving Environment

11.3.1 Electricity

Individual units and premises within the Greenogue Business Park are supplied with electricity through an underground medium voltage supply via the Grange Castle 110 kV substation.

11.3.2 Energy

The site of the proposed development and neighbouring units within the Greenogue Business Park are served by an underground medium pressure natural gas distribution pipeline (4 bar, 125 mm diameter polyethylene), which runs along Grants Crescent to the north of the site boundary.

11.3.3 Water Supply

The site of the proposed development is served by an existing connection to the underground watermain in the public road (Grants Crescent) along the site's northern boundary.

11.3.4 Wastewater

There are underground surface water and foul sewer networks within Greenogue Business Park for the separate collection of surface water runoff and foul effluent arising from the units (individual premises) within the Business Park. The site of the proposed development is served by existing connections to both the surface water and foul sewers running along Grants Crescent to the north of the site boundary.

The surface water sewer along Grants Crescent discharges to the culverted Baldonnell Stream which flows in a northerly direction to the west of the site of the proposed development along the western boundary of the neighbouring Unit 518A. The receiving hydrological environment is further described in Chapter 6 (Water & Wastewater).

The foul sewer network within the Greenogue Business Park connects to the downstream Newcastle pumping station, which is part of the Irish Water foul sewer network. From this pumping station, foul water is pumped to a gravity foul sewer at the Rathcoole Interchange which ultimately discharges to the municipal wastewater treatment plant at Ringsend.

Further details in relation to water resources are provided in Chapter 6 (Water & Wastewater).

11.3.5 Telecommunications

The site is currently well serviced for telephone and broadband communications with an existing connection to the wider network within the Greenogue Business Park.

11.3.6 Waste Management

The national, regional and local waste policy currently in place is described previously in Section 1.5.3, Chapter 1 (Introduction).

The infrastructure of the existing permitted waste recovery facility, previously operated by SkipTrans, forms part of the wider regional network of public and private waste management facilities which collectively serve the waste management requirements of householders, businesses and all public facilities within South Dublin and the wider Eastern and Midlands Region. A review of the waste facility permit register[48] and EPA licence databases[49] (Industrial Emissions / Waste Licence) on 17 June 2022 for the South Dublin County area identified a total of 62 waste management facilities with a valid licence, permit or certificate of registration for waste treatment activities.

The existing waste recovery facility at the site of the proposed development has planning permission for an annual waste intake of 5,000 t. This was temporarily increased to 16,000 t for a period of five years between February 2016 and February 2021 further to the grant of planning permission SD15A/0074 which has since expired. The existing facility is subject to operation under the conditions of an existing waste facility permit issued in May 2021 (permit no. WFP-DS-11-0002-06).

11.4 Characteristics of Proposed Development

11.4.1 Construction Phase

Electricity

The construction phase of the proposed development is expected to be eight weeks in duration and all works will be carried out during daytime hours with the majority of activities required to construct the proposed new building to be complete outdoors up to the installation of the roof. Temporary lighting may be required for the safety of personnel onsite during winter months. As such, no significant new electrical demand will arise during the construction phase.

The site is served by an existing connection to the electricity network serving the Greenogue Business Park. No new connections or connection modifications are required to support the construction phase of the proposed development.

Energy

There will be no significant increase in natural gas demand as a result of the construction phase.

Construction plant and machinery will be powered by diesel and smaller items of equipment including hand-held power tools operated by battery or via connection to the existing power supply.

Water Supply

There will be no significant increase in potable water demand as a result of the construction phase. The existing mains water supply and connection will be sufficient to support the construction phase of the proposed development.

Wastewater

Based on the maximum number of construction personnel expected onsite (approx. 10), the existing toilet, shower and welfare facilities onsite will provide sufficient capacity for the welfare of construction personnel. No significant increase in foul water generation will arise as a result of the construction phase.

[48] Waste Facility Permit Register, National Waste Collection Permit Office (NWCPO), www.nwcpo.ie, accessed 17 June 2022

[49] EPA licensing databases, www.epa.ie, accessed 17 June 2022

Telecommunications

Construction phase communications will be primarily facilitated by means of mobile phone. No significant onsite IT (Information Technology) facilities are required to support the construction phase. The existing site has a fixed telephone and broadband internet connection.

Waste

The proposed development is described in Chapter 2 (Description of Proposed Development). The construction phase will include the construction of a new waste handling building (561 m^2).

The main types of waste materials will include excavated material (broken concrete and soil), plastic, packaging, canteen (kitchenette) waste, and small quantities of hazardous waste (e.g. resins, adhesives, waste oils and their containers).

As the existing concrete yard will be retained for the floor of the new building, foundation works will be limited to the perimeter areas of the new building. The steel frame structure will be supported by shallow foundations. As such, the proposed new building will not require any significant earthwork excavations. Additional excavations will be limited to local digs required for foundations and trenches for underground services, including stormwater and power.

All construction waste will be stored in bins and skips in a dedicated area of the site.

The waste types expected to arise from the proposed development during the construction phase and measures for the management of each waste type are summarised in Table 11.1.

Table 11.1: Waste Types and Management – Construction Phase

Waste Type	Waste Management
NON-HAZARDOUS	
Broken concrete	Waste concrete removed from the yard area for the construction of the new building and service trenches is expected to be clean, inert material. As the quantities arising will be relatively limited, waste concrete will be sent for appropriate recovery, recycling or disposal.
Soil and stone	Excavated soil and stone will arise in limited quantities during the foundation works for the new waste handling building and service trenches. Where excavated material is not required for use as backfill, residual material will only be transported offsite to a suitably authorised waste recovery/disposal facility as appropriate.
Plastic	Plastic generated will be primarily from packaging and material off-cuts including piping and ducting. All recyclable plastic will be segregated at source and stored in a dedicated recycling skip/ bin.
Cardboard	Excess cardboard will be generated from boxes, packing material, packaging etc. Cardboard will be flattened and placed in a designated bin on site for recycling.
Metal	Metals will be segregated at source from other waste streams and stored in a dedicated skip for recycling.
Canteen (kitchenette) waste	Mixed municipal waste will include canteen (kitchenette) waste and general office refuse (e.g. paperwork): These streams will be segregated and recycled where possible. Where recycling is not possible, waste will be transported off-site for recovery/disposal as appropriate. Food and biodegradable waste from the kitchenette will be segregated at source and will be sent offsite for recovery or disposal in compliance with the Waste Management (Food Waste) Regulations 2009 (S.I. No. 508 of 2009), as amended. A designated bin will be provided for any waste glass and collected waste glass sent for recycling.
Waste Electrical and Electronic Equipment (WEEE)	Minor items of electrical equipment may arise during the construction phase including worn or broken equipment/plant, batteries for power tools etc. Any electrical or electronic equipment will be returned to the suppliers or sent for appropriate recycling. A receptacle will be available for WEEE.

Waste Type	Waste Management
	HAZARDOUS
Hydraulic oils Engine, gear and lubricating oils Liquid fuels Oil waste not otherwise specified	Fuels and oils arising will be collected in a drum(s) in a designated bunded area of the site. Waste oil and fuels will be sent for recovery or disposal as appropriate.
Paints, adhesives, resin	Hazardous paints, adhesives, resins and any contaminated containers will be held in a designated waste receptacle/bin and sent for recovery or disposal, as appropriate.

11.4.2 Operational Phase

Electricity

The new electrical demand associated with the proposed development will be limited to lighting of the new waste handling building. There will be no new heating or cooling demand. The proposed development will be served by the existing electricity connection to the site.

Energy

There will be no significant increase in energy demand associated with the proposed development with no increase in natural gas usage.

Water Supply

There will be no increase in the site employee headcount and no increase in potable water demand associated with the operational phase. The proposed development will be served by the existing mains water supply connection to the site.

The underground water main pipework onsite will be extended to provide fire hydrant supply to serve the proposed new waste handling building.

Wastewater

There will be no increase in the site employee headcount and no increase in foul effluent generation associated with the operational phase. The proposed development will be served by the existing connection to the external foul sewer network within the Greenogue Business Park.

Further details in relation to water resources are provided in Chapter 6 (Water & Wastewater).

Telecommunications

The new building proposed will be serviced from the existing communications assets on site and no additional telecommunication lines are proposed.

Waste

The operational phase of the proposed development includes for an increase in the proposed annual waste intake to 20,000 t from 5,000 t (and the previously permitted increased intake of 16,000 t between 2016-2021).

Since commencement of waste operations at the site, the existing facility has accepted skip waste from commercial, industrial and domestic sources. The main types of waste permitted and accepted to date include non-hazardous mixed bulky waste in skips from households and commercial premises and construction and demolition (C&D) waste from building and development projects. There will be no changes to the above sources of waste or main categories of waste accepted as part of the proposed development.

The complete list of waste categories to be accepted onsite during the operational phase are detailed in Table 2.3, Chapter 2 (Description of Proposed Development). The types of construction and demolition (C&D) waste currently permitted by the existing WFP include concrete, bricks, tiles and ceramics (List of Waste code 17 01 07) wood (17 02 01), glass (17 02 02), plastics (17 02 03), mixed metals (17 04 07), soil and stone (17 05 04), gypsum based construction materials e.g.

plasterboard (17 08 02) and mixed C&D waste (17 09 04). As part of the proposed development, one new C&D List of Waste (LoW) entry is proposed for inclusion, namely concrete (17 01 07). No other changes to the types of waste accepted are proposed. The final list of LoW categories for waste acceptance will be formally agreed with SDCC as part of the application for a review of the existing WFP.

In summary, the key changes in the use of the overall site and onsite operations compared to the existing facility relate to:

- Increase in annual waste intake supported by the construction of the new waste handling building;
- Increase in size of typical skip size used for incoming waste loads;
- Simplification of waste pre-treatment process carried out.

Further details of the waste operations to be carried out during the operational phase of the proposed development are included in Section 2.3, Chapter 2 (Description of Proposed Development).

11.5 Potential Effects

11.5.1 Do Nothing Scenario

In the event of the proposed development not proceeding, there would be no change in demand for electricity, energy, water supply, wastewater services or telecommunications services when compared to the demand associated with the operations currently permitted at the existing waste recovery facility.

The future operation of the existing facility in the 'Do Nothing' scenario is uncertain.

11.5.2 Construction Phase Effects

The potential impacts associated with the construction phase of the proposed development on the material assets of the area are summarised in Table 11.2.

Table 11.2: Potential Effects – Construction Phase

Potential Effect	Quality	Significance	Duration / Frequency	Likelihood
Natural Resource Use – Soil / Stone The existing concrete yard is to be retained for use as the floor of the new waste handling building. Material excavated during foundations can be reused as backfill with limited or negligible quantities of soil and stone material required.	Neutral	Imperceptible	Permanent / once-off	Unlikely
Natural Resource Use – Water Demand There will be no significant potable water demand associated with construction activities	Neutral	Imperceptible	Temporary / occasional	Likely
Energy Demand – Electricity There will be no significant increase in electricity demand to support the construction works	Neutral	Imperceptible	Temporary / occasional	Likely
Energy Demand – Fuel Use There will be an increase in fuel consumption for site machinery and generator(s) however the quantities of fuel involved over the 8-week construction programme will not be significant	Neutral	Imperceptible	Temporary / occasional	Likely
Energy Demand – Natural Gas There will be no significant increase in natural gas demand as a result of the construction phase.	Neutral	Imperceptible	Temporary / occasional	Unlikely

Potential Effect	Quality	Significance	Duration / Frequency	Likelihood
Wastewater Treatment No significant increase in foul water generation will arise as a result of the construction phase.	Neutral	Imperceptible	Temporary / continuous	Unlikely
Waste Management An increase in waste generation will occur during the construction works however any effect will be temporary and slight based on the 8-week duration and limited nature of works required to erect the steel frame structure with retained concrete floor. The new building will comprise an open hall space with no significant internal fit-out works required.	Negative	Slight	Temporary / weekly	Likely

11.5.3 Operational Phase Effects

The potential effects associated with the operational phase of the proposed development on the material assets of the area are summarised in Table 11.3.

Table 11.3: Potential Effects – Operational Phase

Potential Effect	Quality	Significance	Duration / Frequency	Likelihood
Natural Resources – Water Demand There will be no increase in the site employee headcount and no increase in potable water demand.	Neutral	Imperceptible	Long-term / continuous	Unlikely
Use of Natural Resources – Wastewater Treatment There will be no increase in the site employee headcount and no increase in foul effluent generation.	Neutral	Imperceptible	Long-term / continuous	Unlikely
Use of Natural Resources / Energy Demand – Electricity The operation of the new waste handling building will require electricity for lighting only with no heating/cooling demand – a limited increase above the site's current electricity demand will arise.	Negative	Imperceptible	Long-term / continuous	Likely
Use of Natural Resources / Energy Demand – Diesel No significant increase in the site's energy demand will arise with no increase in natural gas usage. Compared to current operations, the typical size of skip accepted onsite will be increased with fewer overall trips to/from the site associated with waste intake and transport offsite (see Chapter 3 – Traffic & Transportation). Accordingly, no significant increase in diesel fuel use will occur. The transport of waste to/from the site will continue to require the daily use of fuels (including diesel) for waste vehicles.	Negative	Slight	Long-term / daily	Likely
Waste Management The increase in waste intake at the site will provide for enhanced waste management services in the South Dublin area and increased capacity for the pre-treatment of waste. This will maximise the (downstream) recycling of waste streams consistent with the waste hierarchy.	Positive	Moderate	Long-term / continuous	Likely

11.5.4 Cumulative Effects

The future growth of the Greenogue Business Park and adjacent Aerodrome Business Park may result in addition demand on local infrastructure and built services. However, the lands in question are subject to appropriate zoning (Enterprise and Employment) and future third party developments will be subject to the necessary service connection agreements and consultation with service providers. The proposed development will occur within an existing Unit of the established Greenogue Business Park with no requirement for additional third party built services / infrastructure.

The planned third party developments in the vicinity of the site of the proposed development have also been identified and are detailed further in Chapter 13 (Interactions & Cumulative Effects).

From this review, no other projects have been identified which may contribute to cumulative effects together with the proposed development on the material assets of the local area.

11.6 Mitigation Measures

11.6.1 Construction Phase

For the construction phase the main focus will be on the management of waste consistent with the waste hierarchy (i.e. to manage waste in the order of prevention, preparing for reuse, recycling and recovery with disposal as a last option only where no preceding option is feasible).

On-site segregation of all waste materials will take place. It will be a priority to source materials from locations close to the site, where possible, in order to reduce transport distances.

A Construction Environmental Management Plan (CEMP) has been prepared and is included as part of the planning application, including measures for waste management consistent with the EPA's *'Best practice guidelines for the preparation of resource & waste management plans for construction & demolition projects'* of 2021. Subject to grant of planning permission, this CEMP will be finalised prior to commencement of construction by the appointed contractor for the construction phase.

With its existing network of licensed and permitted waste management facilities (Section 1.1, Chapter 1), Thorntons Recycling is positioned to directly manage all waste streams associated with the construction phase of the proposed development and maximise recycling rates.

11.6.2 Operational Phase

New lighting installed to serve the proposed waste handling building will be energy-efficient using low energy LEDs or lighting of similar efficiency.

A revised waste facility permit will be required for the operation of the proposed development and an application will be submitted to SDCC.

All waste management operations at the site will be carried out in accordance with the conditions of the latest waste facility permit for the facility.

11.7 Residual Effects

Following implementation of the mitigation measures described above (Section 11.6), no significant negative residual effects on the material assets of the area are likely as a result of the proposed development.

The increase in the annual waste intake at the site is predicted to have a moderate, positive, long-term effect in terms of waste management infrastructure as it will provide increased waste pre-treatment capacity to meet current and future demand. This in turn will support the downstream recycling of waste materials in preference to disposal or less favourable recovery options.

12. Population & Human Health

12.1 Introduction

This chapter describes the likely effects of the proposed development on the human aspects of the environment, including those associated with potential human health and population impacts. Population effects can be explored in terms of potential impacts on local residences and businesses, employment, community, local amenities and tourism. The impacts on population are interrelated to other environmental impacts. Visual impacts on the landscape can affect local populations. Impacts on archaeology or cultural heritage may have significance in terms of local amenity and value. Due to the broad scope of population-related factors, these environmental factors are evaluated where appropriate in separate chapters of the EIAR as listed below. These chapters should be read in conjunction with this chapter:

- Chapter 9 - Landscape and Visual;
- Chapter 10 - Archaeological, Architectural and Cultural Heritage.

Environmental factors that have potential to impact human health include noise (noise nuisance), vibration, air quality, traffic congestion in terms of air quality, noise, and nuisance, water quality, waste and wastewater. These environmental factors are considered in more detail within the relevant EIAR chapters listed below. These chapters should be read in conjunction with this chapter:

- Chapter 3 - Traffic and Transportation;
- Chapter 5 - Land & Soils;
- Chapter 6 - Water and Wastewater;
- Chapter 7 - Noise and Vibration;
- Chapter 8 - Air Quality and Climate;
- Chapter 11 - Material Assets.

12.2 Methodology

12.2.1 Guidance Documents

This Chapter was prepared having regard to appropriate EU and national guidance documents (listed below) to assess the likely effects of the proposed development on the local population and their human health.

- Guidelines on the information to be contained in Environmental Impact Statements (EPA, 2022);
- Advice Notes on Current Practice (in the preparation of Environmental Impact Statements) (EPA, 2003);
- Environmental Impact Assessment of Projects, Guidance on the Preparation of the Environmental Impact Assessment Report (EU, 2017); and
- Health Impact Assessment Guidance: A Manual. Standalone Health Impact Assessment and health in environmental assessment (Institute of Public Health, 2021).

The EPA Advice Notes of 2003 recognised the following topics as those that may be examined for 'human beings', now considered under the heading of 'Population and Human Health':

- Economic Activity;
- Social Consideration;
- Land-use;
- Health and Safety.

The EPA Guidelines of 2022 list the following topics under the Population and Human Health section:

- Employment;
- Settlement patterns;
- Land use patterns;

- Baseline population;
- Demographic trends;
- Human health (considered with reference to other headings such as water and air);
- Amenity (e.g. effects on amenity uses of a site or of other areas in the vicinity may be addressed under the factor of Landscape).

The EPA guidelines of 2022 also note that the 'legislation does not require assessment of land-use planning, demographic issues or detailed socio-economic analysis.'

As recommended by the EPA Advice Notes of 2003, this Chapter considers the presence of any sensitive neighbouring locations likely to be impacted by the proposed development, along with areas elsewhere that may be subject to secondary impacts of the development such as alterations in traffic flows or urban development. These premises include dwellings, hospitals, hotels and holiday accommodation, educational facilities and commercial premises.

In line with the EPA Advice Notes, before assessing the effects on the human environment, the principal receptors that may be impacted by the proposed development are identified as:

- Residential Receptors
  - Residential properties within 1 km of the site;
  - Residential properties adjacent to the primary transport routes;
  - Residential properties in the wider context;
  - Land zoned for residential development;
- Direct Economic Receptors
  - Commercial and Industrial premises in close proximity to the site;
  - Zoned commercial lands in close proximity to the site;
  - Operational and construction related employment;
- Indirect Economic Receptors
  - Suppliers of construction materials;
  - Spin off employment and economic activity;
- Social and Community Facilities
  - Schools and community facilities within the vicinity of the site;
  - Lands zoned for social and community facilities within 1 km of the site.

The EPA Advice Notes also recommend that impacts on the transient population be considered, such as drivers, tourists and walkers.[50]

As described in Chapter 2 (Description of the Proposed Development), the existing and proposed waste recycling operations at the Thorntons Greenogue site do not involve the use of dangerous substances (excluding minor quantities for cleaning and maintenance purposes e.g. oils / lubricants, cleaning chemicals). Both current operations and operations on completion of the proposed development will not be subject to COMAH regulation[51]. The potential risks to human health, cultural heritage or the environment due to accidents or disasters as foreseen are considered throughout this report.

12.2.2 Sources of Baseline Information

Baseline information was sourced mainly from open-source, public databases using the most recent data available at the time of report preparation. In considering the development context, the Project Ireland 2040 National Planning Framework, Regional Spatial & Economic Strategy for the Eastern & Midlands Region, SDCC Development Plan 2016-2022 (and the replacement

[50] Transient populations being those who would be impacted for a short, impermanent amount of time.

[51] EU (Control of Major Accident Hazards Involving Dangerous Substances) Regulations, S.I. 209 of 2015

Development Plan 2022-2028) were referenced. Population and employment statistics were gathered from the CSO StatBank (accessed on 23/06/2022).

Amenity information was gathered using open source mapping (including Google Maps and OSI Geohive), the SDCC Development Plan 2016-2022 and replacement Development Plan 2022-2028 (made in June 2022, effective from August 2022). Tourism data was obtained from statistics published by Fáilte Ireland and relevant tourism information was also sourced from the SDCC Development Plan 2016-2022, replacement Development Plan 2022-2028 and South Dublin Tourism Strategy 2015.

Information in relation to public health was also reviewed based on the following main sources:

- Healthy Ireland – A Framework for Improved Health and Wellbeing 2013-2015 (Government of Ireland, 2013);
- HSE Community Healthcare: Dublin South, Kildare & West Wicklow Healthy Ireland Implementation Plan 2018-2022 (HSE, 2018);
- A Strategy for a Health South Dublin 2019-2022 (South Dublin County joint LCDC & CYPSC Healthy South Dublin County Strategy & Implementation Group, 2019)
- Health Profile 2015 – Dublin South (HSE, 2015)
- Get Ireland Active – National Physical Activity Plan for Ireland (Government of Ireland, 2016)

12.2.3 Determinants of Health

The Healthy Ireland framework identifies that there are many factors, or determinants, which can influence a person's health and wellbeing, and acknowledges that good health is not evenly distributed across Irish society. The strategy affirms that the circumstances in which people are born, grow, live, work and age all impact on their health, in addition to the individual choices people make about how to live. Analysing health needs from a social determinants perspective means mapping the relationship between the individual, their environment and their health. Three layers are commonly considered as social determinants and, according to Dahlgren & Whitehead[52], can be described as follows:

1. The first layer is personal behaviour / ways of living that can promote or damage health;
2. The second layer is social or community influences, which provide mutual support for members of the community in unfavourable conditions (these influences can also provide no support or have a negative effect);
3. The third layer includes structural factors: housing, working conditions, access to services and provision of essential facilities. In this respect, the environment in which people live has been evidenced to be a major determinant of health and well-being[53].

The social determinants of health model (Figure 12.1) requires a strategy to be considered in light of its potential impact on communities that experience the greatest disadvantages in health.

[52] Social Determinants of Health adapted from Dahlgren and Whitehead (1991).

[53] Barton, H. and Grant, M., (2006) A health map for the local human habitat, Journal of the Royal Society for the Promotion of Public Health, 126 (6) pp252-261.

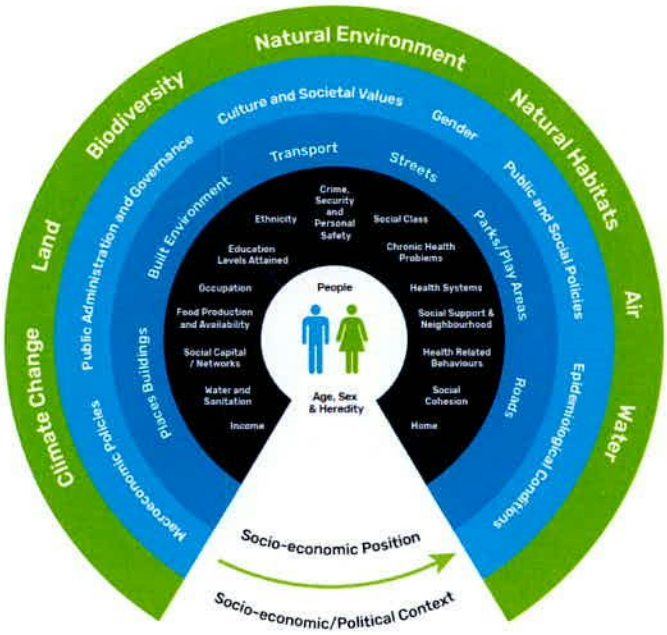


Figure 12.1: Social Determinants of Health (Source: Healthy Ireland)

12.3 Receiving Environment

12.3.1 Development Context and Land Use Zoning

The development context for the area of the proposed development is set out by way of the national, regional and local area planning policy and development strategies relevant to the Eastern region, South Dublin and the populations situated within these areas. The sources of baseline information consulted (Section 12.2.2) provide key information for the assessment of population and human health, including projected figures on employment, population growth and expected future development. These offer context for the receiving environment.

Project Ireland 2040 National Planning Framework (NPF)

Under current 'business as usual' population growth trends, Ireland's total population is estimated to grow by just under 900,000 people, to a total population of roughly 5.7 million by 2040. The area of Greenogue in South Dublin is situated in the Eastern and Midlands Region (EMR) of Ireland – a region where approximately 490,000-540,000 of this population growth is predicted to occur (National Policy Objective 1b). This will require approximately 320,000 additional people in employment (National Policy Objective 1c), bringing employment in the EMR to 1.34 million people in total. Supporting the *"future growth and success of Dublin as Ireland's leading global city of scale"* forms part of the strategy of the NPF, which also seeks to enable *"significant population and jobs growth in the Dublin metropolitan area"*.

Regional Spatial & Economic Strategy (RSES) for the Eastern & Midlands Region (EMR)

The Greenogue Business Park is situated within the Dublin Metropolitan Area, the boundary which was established in the *Regional Planning Guidelines (RPGs) for the Greater Dublin Area (GDA) 2010-2022*. Replacing the RPGs, the publication of the RSES for the EMR 2019-2031 was accompanied by the Dublin Metropolitan Area Strategic Plan (MASP). The MASP envisages a population of 1.65 million in the Dublin Metropolitan Area by 2031, an increase of 250,000 people or 18% from 2016 (1.4 million people).

The MASP contains 'guiding principles' for the sustainable development of the Dublin Metropolitan Area, which include:

- *Increased employment density in the right places* – increased employment densities are foreseen in Dublin city and its suburbs with less intensive employment uses located outside the M50 ring and existing built-up areas;
- *Alignment of growth with enabling infrastructure* – to promote quality infrastructure provision and capacity improvement, in tandem with new development and aligned with national projects and improvements in water and wastewater, sustainable energy, waste management and resource efficiency.

South Dublin County Council (SDCC) Development Plan 2016-2022

The SDCC Development Plan 2016-2022 recognises the Greenogue and Aerodrome Business Parks as an 'identifiable economic cluster'. The Development Plan's 'Strategic Policy for Employment' aims to *"strengthen existing employment centres"* and *"facilitate economic growth by consolidating existing industrial and commercial areas"*, while seeking to *"provide for a range of business accommodation types"*. The Greenogue Business Park is located in an area zoned 'EE' (Enterprise & Employment) within the Development Plan.

Section 4.3.1 of the Development Plan sets out the overarching Economic and Tourism (ET) Policy 1, which contains among its objectives:

"To support the continued development of economic clusters to the west of the County by prioritising compatible and complementary enterprise and employment uses that would not undermine the established character of these areas."

The site of the proposed development, within the Greenogue Business Park, is zoned 'Enterprise & Employment' (EE) within the SDCC Development Plan 2016-2022 as indicated by the purple shading in Figure 12.2. This zoning is unchanged in the SDCC Development Plan 2022-2028. As described in Chapter 1 (Introduction), waste recycling facilities are among the permitted uses identified for 'EE' zoned lands (both within the current and replacement Development Plans).

The lands surrounding the Greenogue and Aerodrome Business Parks are zoned 'RU' (Rural) for rural amenity and agriculture. The nearest lands zoned for residential development are approx. 0.8 km to the west, along Aylmer Road and extending east from the town of Newcastle.

Figure 12.2: Land Use Zoning Map (myplan.ie / SDCC Development Plan 2016-2022)

12.3.2 Population

In the Census of 2016, a population of 278,767 people was recorded for the administrative area of SDCC, an increase of 5.1% on the 2011 population. The nearest main settlements to the site of the proposed development include the small towns of Rathcoole (approx. 2 km south; 2016 population = 4,351) and Newcastle (approx. 1.3 km west; 2016 population = 3,093).

Sensitive Receptor Populations

The site of the proposed development is located in the Greenogue Business Park. There are no residential properties within 500 m of the site. A total of 40 residential properties are located within 1 km of the site, with a majority of these at least 750 m from the site as shown in Figure 12.3 below. Significant residential populations are largely distant from the Thorntons Greenogue site due to the presence of the surrounding Business Parks, Casement Aerodrome and agricultural lands. As identified in Figure 12.2 previously, the nearest lands zoned for future new residential development are centred around the town of Newcastle.

Figure 12.3 highlights the existing local receptors within a 1 km radius of the Thorntons Greenogue site, including residential, commercial/industrial, educational/childcare and leisure/amenity facilities.

Figure 12.3: Receptor Map – 1 km radius from site of proposed development

The site is surrounded by numerous commercial and light industrial premises within the Greenogue and Aerodrome Business Parks.

The Grian na nÓg playschool is located approx. 800 m south of the site of the proposed development, adjacent to the R120 roadway opposite the Greenogue Business Park. Beyond 1 km, the nearest schools to the site of the proposed development are the Rocking Horse Creche & Montessori School and St. Finian's National School, located approximately 1.4 km and 1.8 km to the west in Newcastle.

The grounds of Peamount United FC adjoin the Greenogue Business Park and are located approx. 470 m northwest of the site of the proposed development. Along the R120 road south of the Greenogue Business Park, Newcastle Graveyard is located just over 1 km southwest of the site.

An equestrian centre and livery yard, Greenogue Equestrian, is also located south of the R120, approx. 950 m southwest of the site.

The nearest hospital to the Thorntons Greenogue site is the Peamount Hospital, located approximately 1.8 km to the north.

No holiday accommodation (e.g. hotel, hostel, B&B etc.) was identified within 1 km of the proposed development site at the time of preparing this EIAR. Holiday accommodation is offered in proximity to Rathcoole and further north at locations several kilometres away close to the N7 dual carriageway.

Beyond the above populated areas and potential receptors there is a transient population i.e. those people who happen to be close the site of the proposed development who are not permanently based in the area. This transient population includes employees, customers, visitors and those carrying out business within the Greenogue Business Park.

12.3.3 Employment

The Census of 2016 (CSO Workplace Zone Data) recorded 84,627 jobs in the county area of South Dublin. The SDCC County Development Plan 2016-2022 identifies retail, transportation and distribution, industry and manufacturing, professional and financial services, medical and pharmaceuticals as the county's key economic sectors.

As described previously, the Greenogue and Aerodrome Business Parks are recognised within the SDCC County Development Plan 2016-2022 as economic clusters comprising large industrial campuses. As part of the county policy for Economic Development and Employment (EDE), the Development Plan seeks to support the growth of business in the green and circular economy (EDE2 Objective 2).

12.3.4 Human Health and Safety

Baseline conditions relating to the environmental factors that may affect human health are provided in the relevant chapters of the EIAR as described previously. These include baseline information on traffic and transportation, noise and vibration, water and wastewater, air quality and climate change, waste management and major accidents and hazards.

12.3.4.1 Demographics & Health Profile

The population of the South Dublin area and sensitive receptors are described previously in Section 12.3.2. As noted by the *Strategy for a Health South Dublin 2019-2022*[54], the relationship between health and demographics is complex however the Strategy provides useful baseline data for human health in the area of the proposed development.

Based on the Census of 2016, South Dublin County had a marginally younger age profile compared to most other local authorities in the country. In 2016, the average age of people in South Dublin was 35.5 years compared to the Irish average of 37.4 years. South Dublin also had the 16th highest youth dependency ratio[55] (34.9%) and the fourth lowest old age dependency ratio[56] (16.8%) in Ireland in 2016, which indicates a relatively young population. South Dublin County also has slightly smaller elderly population than is average in Ireland. 11% of South Dublin County's residents are 65 years old or over compared with 13% of the population in Ireland. A graphic representation of these demographics is included in Figure 12.4 below.

With half of the population aged under 34, and over a third (35%) under 24 years of age, the '*Strategy for a Healthy South Dublin'* identifies a priority to ensure services and supports for this age group are optimised in line with the national strategy, '*Better Outcomes, Brighter*

[54] South Dublin County joint LCDC & CYPSC Healthy South Dublin County Strategy & Implementation Group, 2019.

[55] The young dependency ratio is the number of young people of 0-14 years of age as a % of the population of working age (15-64 years of age).

[56] The old age dependency ratio is the number of people aged years 65 and over as a % of the population of working age (15-64 years of age).

Futures'[57]. Among other priority areas, this includes interventions at the earliest stage. Public health interventions to be considered for young people and their families are identified as including parental supports, supports to engage in active lifestyles and formal / informal education, whole population wellbeing programmes, targeted mental health services and accessible, age appropriate sexual health services.

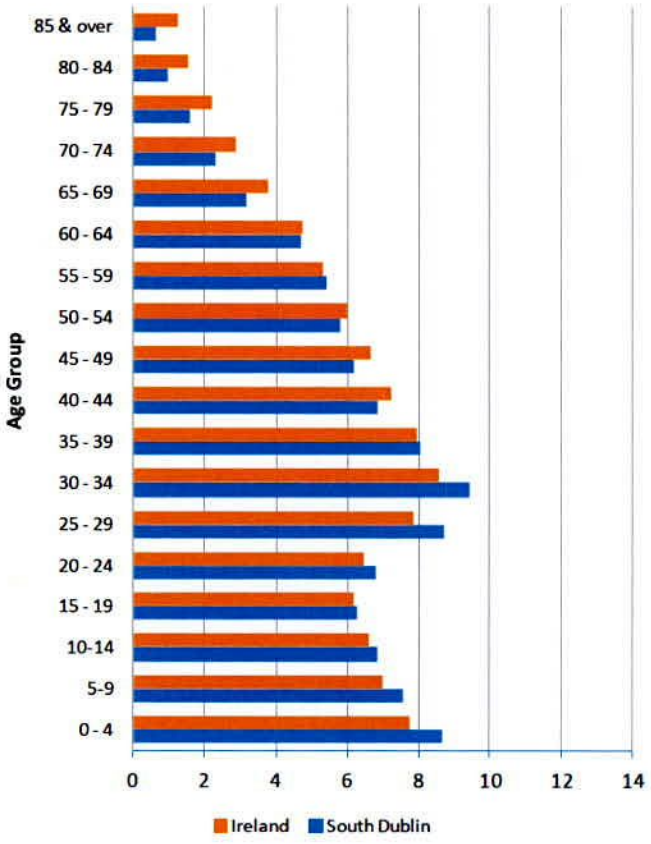


Figure 12.4: South Dublin County Age Comparison % of Population (2016)

12.3.4.2 Physical Health

The HSE provides a health profile for each county area. These profiles were most recently published in 2015 with key statistical indicators. The HSE profile for South Dublin shows that the 5-year standardised death rate (all deaths, all ages) for South Dublin county (city and county area) was slightly lower than the national average. Death rates attributed to cancer and respiratory diseases were higher for South Dublin compared to the national average. Immunisation uptake (reported for 2012) was lower for South Dublin (averaged Dublin City and County rate) compared to the national average. Overall in-patient discharge rates were also slightly lower in South Dublin compared to the national average.

As reported in the *'Strategy for a Healthy South Dublin'*, South Dublin County is part of the commuter belt to Dublin city, with many residents commuting on a daily basis. South Dublin County is generally similar to the national average in its resident's preference for commuting to work, school or college. Three quarters of residents use some form of motorised vehicle on their commute, almost one in five residents walks or cycles while fewer than one in ten people work from home. South Dublin County's high level of motorised transportation to work puts the health of commuters at higher risk of mortality, this risk increases the longer the commute[58]. According to

[57] Better Outcomes, Brighter Futures: The National Policy Framework for Children and Young People, 2014-2020, Department of Children & Youth Affairs / Government of Ireland, 2014

[58] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3226527/, accessed 9 June 2022

the Strategy, initiatives to encourage active commuting may play a role in reducing the risk of death and the burden of chronic conditions.

12.3.4.3 Health Inequalities

There are a number of social determinants that influence health among local communities including personal behaviour, social and community influences and structural factors such as housing, working conditions, access to essential facilities etc. South Dublin was ranked the 10th most affluent of 31 local authority areas in Ireland in 2016 according to the Pobal Deprivation Index though significant pockets of disadvantage are scattered throughout the county area. The '*Strategy for a Healthy South Dublin*' notes that extreme and very disadvantaged areas are clustered in the areas of Clondalkin, Tallaght and Greenhills/Walkinstown. Deprivation is frequently associated with poor health and health inequalities i.e. unequal access and outcomes for those of lower socio-economic status.

The '*Strategy for a Healthy South Dublin*' also highlights a number of local concerns in relation to physical activity, which may in turn contribute to health inequality in the county area. These include affordability (i.e. a lack of free or affordable gym or sports groups), lack of information, transport (challenges in getting to and from activities) and conflicting needs (people with mental health, addiction issues or living in poverty, are often less motivated in relation to their physical health and les able to access services).

12.3.4.4 Major Accident Hazards

The Thorntons Recycling site is not designated as a COMAH (Seveso) site under the EU (Control of Major Accident Hazards Involving Dangerous Substances) Regulations, S.I. 209 of 2015 (COMAH Regulations).

There is one Lower Tier COMAH site located within the Greenogue Business Park, namely Brenntag Chemicals, located approx. 260 m south of the site of the proposed development.

12.3.5 Amenities & Tourism

Amenities

The site of the proposed development is approximately 1.3 km west of Newcastle and 2 km north of Rathcoole. The proximity of educational and healthcare facilities is described previously in Section 12.3.2.

The small town of Newcastle is the centre of key local amenities including a post office, churches, and a bank.

Similarly, the small town of Rathcoole is the centre for a Garda Station, post office, churches, banks and a credit union.

There are several commercial and retail amenities located in both Newcastle and Rathcoole. These include retail and grocery stores, cafes and restaurants, electrical stores, mechanical stores, mechanics, motor trade and service, clothing stores, laundry services and service stations.

Amenities for sport and leisure in the areas of Newcastle and Rathcoole include GAA, soccer, rugby and golf clubs and equestrian centres.

Popular outdoor and nature amenities for recreation include the Grand Canal corridor (approx. 3.6 km northwest of the site of the proposed development) and the Dublin Mountains (approx. 10 km southeast of the site of the proposed development), which may be accessed via the Slade Valley corridor linking Rathcoole, Saggart and Brittas.

Tourism

Fáilte Ireland tourism statistics for 2019 shows 11,536 registered assets in its databases for tourism infrastructure within Ireland, with 130 (1.1%) of these assets located within South Dublin County. Prior to the onset of the COVID-19 pandemic, Fáilte Ireland reports for 2019 show that the Dublin region earned €2.6 billion in tourist revenue from 8.69 million tourist visits from Irish, Northern Irish and overseas tourists. The SDCC Development Plan 2016-2022 highlights that

South Dublin County can develop a distinctive range of tourism products that will complement those of other parts of Dublin.

The South Dublin Tourism Strategy published in 2015 identified the key areas of tourist amenity and developments proposed to further enhance amenities and the tourist experience. These include the Dublin Mountains Park and key tourism clusters namely Liffey Valley (centred around Lucan and Palmerstown), Tallaght and Rathfarnam Marley (centred around Templeogue and Rathfarnam). Proposed enhancements include the Slade Valley Trail to improve the walking route linking Rathcoole to the Dublin Mountains.

12.4 Characteristics of Proposed Development

Thorntons Recycling is proposing development at the site of the existing waste recovery facility at Unit 518B, Greenogue Business Park, Rathcoole including the construction of a new waste handling building and the use of two existing buildings onsite for waste handling. The proposed development includes an increase in annual waste intake to 20,000 tonnes. Further details are included in Chapter 2 (Description of the Proposed Development).

The assessment of potential emissions including aqueous emissions (surface and foul water), noise and emissions to air are addressed in Chapter 6 (Water & Wastewater), Chapter 7 (Noise & Vibration) and Chapter 8 (Air Quality & Climate) respectively.

12.4.1 Construction Phase

The duration of the construction phase of the proposed development is estimated to be 8 weeks. All construction works will take place within the site boundary of the existing waste recovery facility (Unit 518B). The construction phase will result in a temporary increase in employment for construction workers. Based on the small number of construction personnel required, no significant effect on local population is considered likely.

12.4.2 Operational Phase

The operational phase of the development will comprise permanent, long-term waste management operations consistent with the use of the site since 2007. The operational phase will support continued employment at the facility however no increase in the number of personnel employed in support of the facility's operation will be required when compared to the operation of the existing facility.

New bicycle parking facilities for employees and visitors to site are proposed as part of the proposed development (further details included in Chapter 3 – Traffic & Transportation).

12.5 Potential Effects

12.5.1 Do Nothing Scenario

If the proposed development does not proceed, there will be no change arising with potential for impact on population or human health. Any increase in economic activity for local businesses arising from the proposed development will not occur. There will be no change as a result of potential impacts to human health and safety. There will be no change in effects on local amenities or tourism.

The future operation of the existing waste recovery facility in the 'Do Nothing' scenario is uncertain.

12.5.2 Construction Phase

Effects on Developmental Context and Land-use Zoning

The proposed development aligns with the land use zoning for the site (EE – Enterprise and Employment) as set out in the SDCC Development Plan 2016-2022. All construction works will be

accommodated within the existing site boundary with no negative effects such as severance, loss of rights of way, disruption to adjacent landowners or temporary traffic diversions.

Effects on Population

It is estimated that a maximum of 10 no. construction personnel will be required to support the proposed development. Given the relatively small number and temporary duration of the construction works required, no significant effects are foreseen regarding residential amenity (e.g. availability of accommodation). The temporary use of local businesses by construction personnel will positively affect economic activity at a local level. Other possible impacts on population caused by the construction phase, such as noise, vibration, air and climate, and traffic and transport are discussed within the corresponding chapters of the EIAR.

Effects on Employment

There will be a temporary increase in employment for the duration of the construction phase for construction personnel on site (max. 10 no personnel). This increase in employment during the construction phase will have a temporary, positive effect.

The temporary increase in employment is likely to support limited economic activity in local businesses with the potential for temporary positive secondary effects (e.g. demand for local retail and food business etc.).

Effects on Human Health and Safety

The construction phase of the development has the potential to impact human health and safety. Environmental factors that affect human health such as traffic and transportation, noise and vibration, water and wastewater, air quality and climate change are discussed within the corresponding chapters of the EIAR. In the absence of appropriate management and controls, the construction phase of the proposed development may pose health and safety risks to construction personnel and visitors who enter site. There is a risk to human health and safety if the site is not properly secured from members of the general public. However, construction risks are common to all development projects and can be readily mitigated using best practice safety protocols and ensuring compliance with legislative requirements for employee welfare.

Effects on Amenities and Tourism

There are no expected significant negative effects on the amenities and tourism in the area arising from the construction phase of the development. There will be a temporary positive effect on local amenities and businesses due to their increased use by construction personnel from the construction phase.

Any effects on local tourism during the construction phase are expected to be neutral owing to the distance of the Thorntons Greenogue site from the main tourist attractions/amenities and the relatively limited scale and nature of construction works proposed.

Table 12.1 summarises the potential impacts of the construction phase of the proposed development using the above categories to describe population and human health.

Table 12.1: Summary of the potential impacts of the construction phase by category

Potential Effect	Quality	Significance	Duration / Frequency	Likelihood
Development Context and Land Use Zoning	Neutral	Imperceptible	Temporary / daily	Likely
Population	Positive	Not significant	Temporary / daily	Likely
Employment	Positive	Slight	Temporary / daily	Likely
Human Health & Safety	Negative	Slight	Temporary / daily	Unlikely
Amenities & Tourism	Neutral	Imperceptible	Temporary / daily	Likely

12.5.3 Operational Phase

Effects on Development Context and Land-use Zoning

There will be no negative effects arising from the operational phase in terms of land use zoning, as the proposed development will be located within appropriately zoned lands (as described in Section 12.3.1).

Effects on Population

The operation of the proposed development will not result in an increase in employment during the operational phase compared to previously permitted operations. Rather, existing employment levels will be sustained. No increase in local population is therefore likely to arise and the associated effect of the operational phase of the proposed development is therefore considered to be long term and neutral.

Effects on Employment

As above and similar to population effects, the maintenance of existing employment levels as a result of the operational phase of the proposed development is predicted to have a long term, neutral effect on employment. At a local level, the continued operation of the facility at the Unit 518B site will contribute to the ongoing economic activity within the wider Greenogue Business Park with potential for slight positive secondary effects in terms of demand for local services.

Effects on Human Health and Safety

The operational phase of the development has the potential to impact human health and safety. Environmental factors that affect human health such as traffic and transportation, noise and vibration, water and wastewater, air quality and climate change are discussed within the corresponding chapters of the EIAR. Occupational health and safety risks to employees during facility operation are possible (e.g. workplace accident) with associated negative effects. Similar to construction safety risks, occupational safety risks can also be readily mitigated using best practice safety protocols and ensuring compliance with legislative requirements for employee welfare.

The existing and proposed waste management operations at the Thorntons Greenogue site do not involve the use of dangerous substances. The proposed waste management process is described in further detail in Chapter 2 (Description of Proposed Development) and involves the gross pick and bulking of non-hazardous waste received in skips. As such, the operations are limited to waste pre-treatment using a material handler and loading shovel. No other mechanical sorting equipment such as hoppers, trommels or screens are required.

Physical Activity

The provision of new bicycle parking facilities will support the promotion of the active commuting and increasing the physical activity of employees and visitors to the site, consistent with the objectives of the Healthy Ireland framework and '*Strategy for a Healthy South Dublin*'. In terms of broader public health, this represents a minor contribution limited to the local, site level and therefore the associated effect is likely to be imperceptible, though positive and long term.

Effects on Amenities and Tourism

The operational phase of the development is unlikely to have significant negative effects on local amenities or tourism, having regard to the distance of the site from local and tourist amenities identified (Section 12.3.5).

Table 12.2 summarises the potential impacts of the operational phase of the proposed development using the above categories to describe population and human health.

Table 12.2: Summary of the potential impacts of the construction phase by category

Potential Effect	Quality	Significance	Duration / Frequency	Likelihood
Development Context and Land Use Zoning	Neutral	Imperceptible	Long term / constant	Likely
Population	Neutral	Imperceptible	Long term / constant	Likely
Employment	Neutral	Imperceptible	Long term / constant	Likely
Occupational Health & Safety	Negative	Slight	Long term / intermittent	Unlikely
Physical Activity	Positive	Imperceptible	Long term / occasionally or frequenly	Likely
Amenities & Tourism	Neutral	Imperceptible	Long term / intermittent	Likely

12.5.4 Cumulative Effects

The potential cumulative effects of the operation of the existing waste recovery facility and the proposed development with relevance to human health impacts such as traffic and transportation, noise and vibration, water and wastewater, air quality and climate change are discussed within the corresponding chapters of the EIAR.

The cumulative impacts of the proposed development on the local population are predicted to have a slight positive effect, owing to the benefits of employment and economic activity that will be sustained by the facility over the long term, in addition to the temporary increase in employment during the construction phase. At the local site level, improved bicycle parking facilities will promote active commuting and physical activity.

12.6 Mitigation Measures

Mitigation measures in relation to environmental factors that affect population and human health such as landscape, visual impacts, archaeology, cultural heritage, traffic and transportation, noise and vibration, water and wastewater, air quality and climate are discussed within the corresponding chapters of the EIAR.

Of the remaining potential impacts related to population and human health, only those concerning human health and safety require mitigation measures.

12.6.1 Construction Phase

While under construction, there will be potential risks to the health and safety of construction personnel. A comprehensive Health and Safety programme will be put in place on the site prior to commencement of construction to minimise any risks to site personnel and visitors. The requirements of the Safety, Health and Welfare at Work (Construction) Regulations 2013 to 2021 will be complied with at all times.

The construction site will also be operated in compliance with a Construction Traffic Management Plan (CTMP) and Construction Environmental Plan (CEMP) that will ensure the appropriate control of traffic, dust and waste generated as a result of the construction works. These Plans have been prepared and submitted as part of the planning application. Subject to grant of planning

permission, both the CEMP and CTMP will be finalised by the contractor appointed for the construction works.

The following mitigation measures have been identified:

- During the construction phase, safety will be managed in accordance with the Safety, Health and Welfare at Work (Construction) Regulations 2013 to 2021. A Project Supervisor Construction Stage (PSCS) will be appointed in advance of commencement of construction works.
- A contractor safety management programme will be implemented in order to identify and control potential hazards associated with the proposed works, including a permit to work system, risk assessment and preparation of method statements.
- The detailed design of the new building will be subject to formal safety design reviews to ensure that all requirements of the project are safe. A Project Supervisor for the Design Process (PSDP) will be appointed as part of this process.
- Temporary contractor facilities and areas under construction will be appropriately secured and fenced off from the public with suitable warning signs.
- Entry to the site during the construction phase will be restricted and the site entrance will be kept securely locked outside of construction phase working hours.
- Dust control measures will be implemented including sweeping of hard road surfaces, provision of a water bowser onsite, use of covered / enclosed delivery trucks, inspection and cleaning of the public road outside the site entrance, regular construction vehicle / plant inspection and maintenance.

Measures to ensure public safety, with respect to construction traffic, are detailed in Chapter 3 (Traffic and Transportation).

12.6.2 Operational Phase

The operation of the proposed development will be carried out in strict accordance with all Irish and European regulations governing safety in the workplace and in particular, the regulations implemented under the Safety, Health and Welfare at Work Acts, 2005 to 2014.

The operation of the proposed development will require a review of the existing waste facility permit and the implementation of site management measures to ensure compliance with the conditions attached to this permit.

All relevant facility employees will be fully trained in the operating procedures for equipment and processes, with particular emphasis on related health and safety issues.

12.7 Residual Effects

Subject to the mitigation measures described in Section 12.6, there will be no negative residual effects on the environment in terms of population and human health.

The residual effects of the environmental factors that affect population such as landscape, visual impacts, archaeological, architectural and cultural heritage are discussed separately in the corresponding chapters of the EIAR.

The residual effects of the environmental factors that affect human health such as traffic and transportation, noise and vibration, water and wastewater, air quality and climate change are discussed separately in the corresponding chapters within the EIAR.

In overall population terms, it is considered that there will be a slight, long-term, positive residual effect on the local community as a result of the continued employment and economic activity sustained as a result of the proposed development. This increased employment will also benefit economic activity in the area, with potential for slight, positive secondary residual effects associated with the demand arising for local businesses to support site operations. Increased physical activity and active commuting will also be facilitated and encouraged by the provision of new bicycle parking facilities which will be introduced as a result of the proposed development.

13. Interactions & Cumulative Effects

13.1 Introduction

An important aspect of assessing the environmental effects associated with any development is to consider how potential effects identified under each of the subject headings might interact to cause a cumulative effect. Consideration must also be given to the cumulative effects arising from of the interaction of the project with impacts resulting from current and known future developments in the area.

This chapter considers the effects that may occur as a result of cumulative or indirect impacts or through the interaction of impacts.

The examination of these impacts is important, as an impact that directly affects one environmental medium may also have an indirect impact on other media (sometimes referred to as cross-media impacts). This indirect effect can sometimes be more significant that the direct effect.

- Cumulative effects are defined by the EPA guidelines[59] as *"the addition of many minor or insignificant effects, including effects of other projects, to create larger, more significant effects"*
- Indirect impacts are impacts on the environment that are not a direct result of the project, often produced away from (the site) or as a result of a complex pathway.
- Impact inter-relationships or interactions are the reactions between impacts within a project and the inter-relationship between impacts identified under one environmental topic with impacts identified under another environmental topic.

Having completed the EIAR in accordance with the requirements of the EIA Directives 2011/92/EU 2014/52/EU, it can be concluded that there is no potential for significant cumulative effects to arise from multiple non-significant effects on this particular project, from other projects on site or from other approved planned or existing developments in the vicinity of the site. Furthermore, there are no negative cumulative effects arising from the mitigation measures as proposed within this EIAR.

13.2 Methodology

This section of the EIAR has been prepared in accordance with the aforementioned EPA guidelines on the information to be contained in an EIAR.

The following guidance is also noted from the EIA guidelines[60] of 2018 published by the Department of Housing, Planning and Local Government (now the Department of Housing, Local Government and Heritage).

"Effects are not to be considered in isolation but cumulatively, i.e. when they are added to other effects. A single effect on its own may not be significant in terms of impact on the environment, but, when considered together with other effects, may have a significant impact on the environment.

Also, a single effect which may, on its own, have a significant effect, may have a reduced and insignificant impact when combined with other effects."

"The EIA Directive requires that the EIAR describes the cumulation of effects. Cumulative effects may arise from:

- *The interaction between the various impacts within a single project;*
- *The interaction between all of the different existing and/or approved projects in the same area as the proposed project."*

[59] Guidelines on in the Information to be included in an Environmental Impact Assessment Report, EPA, 2022

[60] Department of Housing, Planning and Local Government (2018). "Guidelines for Planning Authorities and An Bord Pleanála on Carrying out Environmental Impact Assessment".

The interaction of effects along with cumulative effects are addressed in the respective chapters of this EIAR. This Chapter presents a summary of these effects between the various environmental factors.

In assessing the cumulative effects associated with the proposed development the following were considered:

- Other recently permitted development on the site of the proposed development;
- Recently approved developments as listed on SDCC online planning database;
- The list of Strategic Housing Developments granted permission by An Bord Pleanála[61].
- The lists of Strategic Infrastructure Developments granted permission by An Bord Pleanála[62]. No such development with consent was found to be of relevance.
- EIA Portal maintained by the Department of Housing, Planning and Local Government.

Article 5(1) and Annex IV of the EIA Directive set out the information to be contained in an EIAR. These information requirements are also reflected in Article 94 and Schedule 6 of the Planning & Development Regulations 2000 to 2021. Regarding cumulative effects, the legislation limits the consideration of other projects to those which are *"existing and/or approved"* for the purposes of EIA. Third party projects which are at the proposal stage (i.e. without consent such as grant of planning permission) are therefore excluded from the consideration of cumulative effects.

13.3 Receiving Environment

Details of existing development on the site of the proposed development are included in Chapter 2 (Description of the Proposed Development) and the site's development history is outlined within Chapter 1 (Introduction).

13.3.1 Existing Waste Recovery Facility – Unit 518B

The proposed new waste building will be located in the southern portion of the existing Unit 518B, which is currently an extended concrete yard area to the rear of two existing buildings within the site boundary.

The existing main building on the site has been operated previously as the main facility for waste handling further to grant of planning permission in 2007 (SDCC ref. SD06A/1097) with supporting operations also carried out in external areas of the site.

A smaller adjacent shed building was subsequently constructed by the previous operator of the site. In July 2022, final grant of planning permission was received for the retention of this existing shed building (SDCC ref. SD22A/0100). No use was assigned to this structure as part of the application for retention. The proposed development includes the assignation of use to this building for waste handling.

Cumulatively, the proposed development includes the use of the newly proposed building to the south of the site together with the two existing buildings onsite for waste handling operations.

There are no other permitted developments within the site of the proposed development.

13.3.2 Nearby Developments

A review of planning applications with grant of planning permission from SDCC and/or An Bord Pleanála over the previous five years (July 2017-June 2022 inclusive), within a distance of 2 km from the site of the proposed development, was carried out. The locations of these developments are shown in Figure 13.1.

[61] Strategic Housing Development Applications – Decided SID Cases, An Bord Pleanála, 2022 (https://www.pleanala.ie/en-ie/lists), accessed June 2022

[62] Strategic Infrastructure Development Applications – Decided SID Cases, An Bord Pleanála, 2022 (https://www.pleanala.ie/en-ie/lists), accessed June 2022

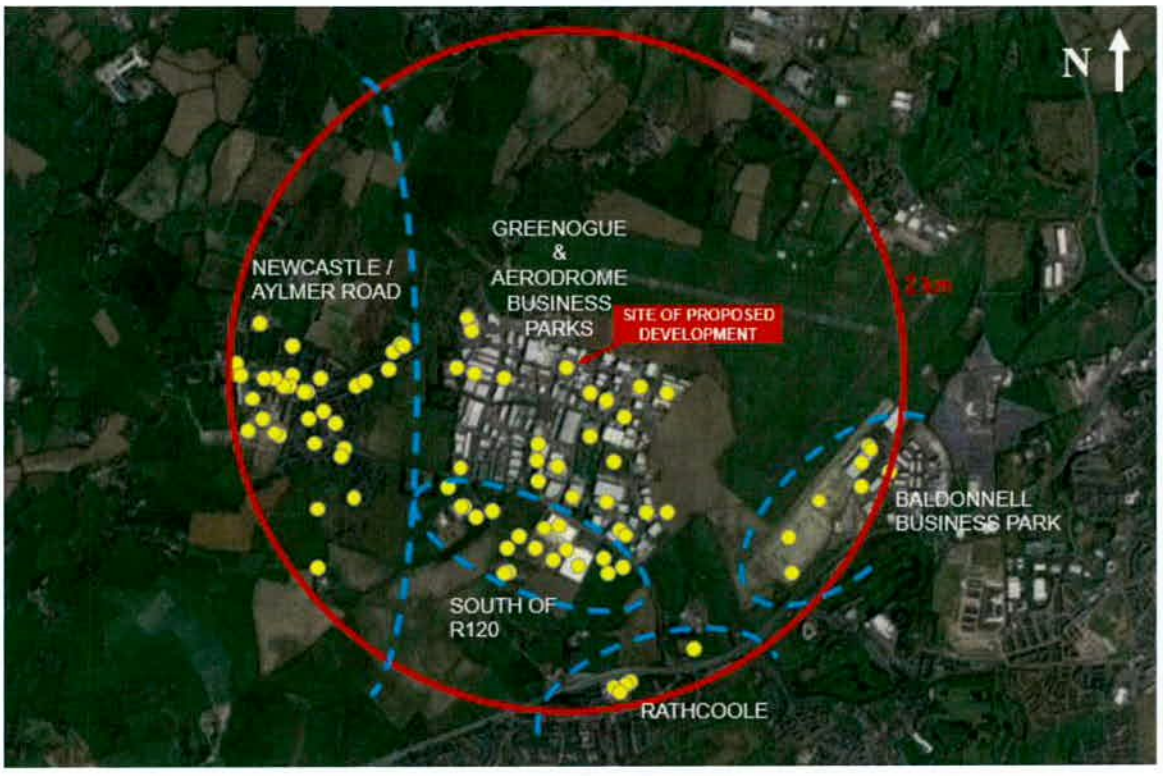


Figure 13.1: Permitted Developments within 2 km of the site of the proposed development (Jul 2017-Jun 2022)

As shown in Figure 13.1, newly permitted development since 2017 within 2 km of the site of the proposed development is largely concentrated in and around the following areas:

- Greenogue & Aerodrome Business Parks;
- South of R120 regional road;
- Newcastle town centre / Aylmer Road;
- Baldonnell Business Park;
- Rathcoole town centre.

The location of Casement Aerodrome and agricultural lands to the north has resulted in limited or no development to the north and east of the Greenogue and Aerodrome Business Parks.

The nearby permitted developments in each of above the listed areas are further described in the following sections.

13.3.2.1 Greenogue & Aerodrome Business Parks

The adjacent Greenogue and Aerodrome Business Parks are well established areas of light industrial and commercial development with most units (premises) in each Business Park in operation for several years.

The main developments granted permission in the past five years are listed in Table 13.1 (developments listed in order of the date of receipt of the original planning application by SDCC). Smaller developments including minor extensions/alterations, signage, plant/equipment and changes of use are excluded.

Table 13.1: Main Permitted Developments – Greenogue & Aerodrome Business Parks (2017-2022)

Planning Reference	Description of Development	Status
SD17A/0195 (amended under SD17A/0467)	**Applicant:** Nocsy Ltd. **Location:** Units 1-5, Site 662, Jordanstown View, Greenogue Industrial Estate. **Development:** 5 warehousing units (1,660sq.m in total) 12.90m high incorporating ancillary offices in 1 block which includes: 1240sq.m warehousing area, 420sq.m ancillary office/staff facility areas on 2 floors, including site access, parking, landscaping and drainage including surface water attenuation, locally reconfiguring the Baldonnel Stream watercourse bank to provide flood attenuation and all site development works. (SD17A/0467 – reconfigured from five warehouse units to one)	Construction complete, warehouse facility operational
SD18A/0036	**Applicant:** Nocsy Ltd. **Location:** Unit 527, Grants Hill, Greenogue Business Park. **Development:** Warehouse unit 6,461sq.m, 17.40m high with 568sq.m integrated ancillary offices/staff facilities on 3 floors plus 763sq.m mezzanine storage area to warehouse totalling 7,792sq.m. The development will also include: (a) Site access from Grants Hill, (b) On-site security hut 14.50sq.m, 3m high, (c) Ancillary car parking, (d) HGV marshalling yard & HGV parking facility for 12 vehicles 816sq.m, (e) Site landscaping, (f) Flood management measures, (g) Drainage works including underground surface water attenuation facility, (h) all services & utilities including ESB sub-station 9sq.m, 3m high, (i) Plus all associated site development works.	Complete, warehouse operational
SD19A/0171 (amended under SD20A/0270)	**Applicant:** Nocsy Ltd. **Location:** Units 601 & 605, Greenogue Business Park, Jordanstown Road & Jordanstown Avenue. **Development:** 2 warehouses with ancillary three storey office and staff facilities and associated development. Unit 601 will have a maximum height of 16.1 metres with a gross floor area of 4,922sq.m including a warehouse area (4,224sq.m); ancillary office areas (322sq.m) and staff facilities (376sq.m). Unit 605 will have a maximum height of 15.7 metres with a gross floor area of 8,036sq.m including a warehouse area (7,032sq.m); ancillary office areas (568sq.m) and staff facilities (437sq.m); provision of new vehicular accesses/egresses to the sites with HGV access and egress to both units proposed via Jordanstown Avenue and car access and egress to both units proposed via Jordanstown Road; internal roadways; pedestrian access; 105 ancillary car parking spaces; bicycle parking; HGV yards; level access goods doors; dock levellers; hard and soft landscaping; boundary treatments; associated site development works above and below ground.	Partly completed / construction ongoing 2021-2022
SD19A/0263	**Applicant:** IPUT plc **Location:** Lands at Site G, Aerodrome Business Park, Jordanstown Road & Jordanstown Way. **Development:** Warehouse with ancillary three storey office and staff facilities and associated development. The warehouse will have a parapet height of 17 metres with a gross floor area of 11,012sq.m including a warehouse area (10,079sq.m), ancillary office areas (877sq.m) and staff facilities (56sq.m); provision of a new vehicular access/egress onto the Jordanstown Road, and the relocation of the entrance/exit on Jordanstown Way slightly to the west for HGV access; internal roadways; pedestrian access; 108 ancillary car parking spaces; bicycle parking; HGV yard including 13 HGV parking stands and 14 loading docks; hard and soft landscaping including green walls; lighting; photo-voltaic panels; ESB substation and switch room; plant; boundary treatments and associated development works above and below ground.	Complete / operational
SD19A/0264 (amended under SD21A/0276)	**Applicant:** IPUT plc **Location:** Site Q2, Aerodrome Business Park, Jordanstown Road. **Development:** Warehouse with ancillary three storey office and staff facilities and associated development. The warehouse will have a parapet height of 17 metres with a gross floor area of 14,649sq.m including a warehouse area (13,494sq.m), ancillary office areas (1099sq.m) and staff facilities (56sq.m); provision of a new vehicular access/egress onto the Jordanstown Road; internal roadways; pedestrian access; 152 ancillary car parking spaces; bicycle parking; HGV yard including 26 HGV parking stands and 18 loading docks; hard and soft landscaping including green walls; lighting; photo-voltaic panels; ESB substation and switch room; plant; boundary treatments and associated development works above and below ground.	Construction commencing 2022

Planning Reference	Description of Development	Status
SD21A/0111	**Applicant:** Crean & McHugh Holdings Unlimited Company **Location:** Block 509, Grants Avenue, Greenogue Business Park. **Development:** Construction of a double height (8.5m high) industrial warehouse building for plant machinery maintenance and storage purposes; associated ancillary two storey office and staff welfare accommodation (c.501sqm Total GFA); 9 car parking spaces, 3 bicycle parking spaces and all associated site ancillary development works and drainage connections.	Construction commencing 2022
SD21A/0140	**Applicant:** Exeter Ireland Property IV C Ltd. **Location:** Block R, Jordanstown Road, Aerodrome Buisness Park. **Development:** Construction of 1 warehouse with ancillary office and staff facilities and associated development. The warehouse will have a maximum height of 16 meters with a gross floor area of 22,966sq.m including a warehouse area (21,113sq.m), ancillary office areas (1,163sq.m) and staff facilities (690sq.m); the provision of a new vehicular access to the site from Jordanstown Road including 2 additional access gates from this new road to the existing Site E to the north; pedestrian access; 210 ancillary car parking spaces; bicycle parking; HGV yards; level access goods doors; dock levellers; access gates; hard and soft landscaping; lighting; boundary treatments; ESB substation; plant; extinguishment of the existing vehicular access (farm gate) in lieu of a proposed pedestrian access gate at the southern portion of the site from the R120; and all associated development works above and below ground; all on a site of 5.67 on lands that are bounded to the west by Blocks A - D Jordanstown Road, to the south and east by greenfield lands and to the north by greenfield lands and Block E. The site abuts the R120 Newcastle Village to Rathcoole Road to the south.	Construction commencing 2022

13.3.2.2 South of R120 – Opposite Greenogue Business Park

The established Greenogue and Aerodrome Business Parks have developed north of the R120 between the N7 (Junction 4) to the east and Newcastle town to the west. More recently, commercial and industrial development has extended south of the R120 with a number of developments granted planning permission in the past five years (2017-2022).

Excluding more minor applications relating to signage, plant/equipment and domestic/commercial alterations, the main developments granted permission in the past five years are listed in Table 13.2 (developments listed in order of the date of receipt of the original planning application by SDCC).

Table 13.2: Main Permitted Developments – South of R120 (2017-2022)

Planning Reference	Description of Development	Status
SD18A/0265 (amended under SD21A/0168; SD21A/0234)	**Applicant:** Jordanstown Properties Ltd. **Location:** College Lane, Greenogue, Rathcoole. **Development:** Provision of 2 warehouses with ancillary three storey office and staff facilities and associated development. Building A will have a maximum height of 18.3m with a gross floor area of 15,286sq.m including a warehouse area (14,267sq.m), ancillary office area (413sq.m) and staff facilities (606sq.m). Building B will have a maximum height of 17.4m with a gross floor area of 26,384sq.m including a warehouse area (23,421sq.m), ancillary office areas (1,870sq.m) and staff facilities (1,093sq.m). The development will also include the provision of a new vehicular access to the site via the Greenogue Roundabout; internal roadways; pedestrian access; 422 ancillary car parking spaces; bicycle parking; HGV yards; level access goods doors; dock levellers; hard and soft landscaping; 2 ESB substations (18sq.m); lighting; boundary treatments; and associated site development works above and below ground.	Construction completed 2022

Planning Reference	Description of Development	Status
SD19A/0065 (amended under SD21A/0305)	**Applicant:** Electrical Waste Management Ltd. **Location:** Tay Lane, Greenogue, Rathcoole. **Development:** Waste metal facility including waste electrical and electronic equipment (WEEE) and will include the provision of 1 light industrial unit with ancillary office and staff facilities (3,802sq.m with a maximum height of 12.4 metres); screened outdoor storage area (970sq.m) incorporating walls 4.2 metres in height; vehicular access to the site via the Greenogue Roundabout; pedestrian access; 29 ancillary car parking spaces; HGV yard; 10 HGV parking spaces; HGV weight bridge; brush wash and steam wash; hard and soft landscaping; access gate; ESB substation; lighting; cycle parking; boundary treatments; associated site development works above and below ground incorporating an access road on lands at College Lane;; Electrical Waste Management Limited currently have a waste permit (WFP-DS-11-0014-05) with a permitted volume of 82,833 tonnes per annum; an Environmental Impact Assessment Report has been prepared in respect of the proposed development.	Construction 2021-2022
SD19A/0407 (amended under SD21A/0200; SD22A/0092)	**Applicant:** Jordanstown Properties Ltd. **Location:** College Lane, Greenogue, Rathcoole. **Development:** Provision of a warehouse unit with ancillary three storey office and staff facilities and associated development; the building will have a maximum height of 23.7m with a gross floor area of 13,959sq.m including a warehouse area (12,369sq.m); staff facilities (548sq.m) and ancillary office area (1,042sq.m); provision of one new vehicular access/egress point at the northern corner of the subject site and one HGV access/egress point at the southern corner of the subject site which connects onto the internal access road for two adjacent permitted warehouses (Reg. Ref. SD18A/0265) and permitted waste metal facility (Reg. Ref. SD19A/0065) which links to the Greenogue Roundabout on the R120; 119 ancillary car parking spaces; bicycle parking; HGV yard with 12 loading bays; level access goods doors; dock levellers; hard and soft landscaping; ESB substation (9sq.m); boundary treatments and associated site development works above and below ground.	Construction ongoing 2022
SD20A/0258 (amended under SD21A/0168; SD22A/0234)	**Applicant:** Nocsy 2 Ltd. **Location:** College Lane, Greenogue, Rathcoole. **Development:** Demolition of the existing dwelling (252sq.m) and associated domestic garage (49sq.m) and shed (12sq.m) located towards the north-west of the site and the construction of 3 warehouses with ancillary office and staff facilities and associated development as follows: Unit 1 will have a maximum height of 15.75 metres with a gross floor area of 5,619sq.m including a warehouse area (5,041sq.m), ancillary office areas (182sq.m) and staff facilities (396sq.m); Unit 2 will have a maximum height of 16.35 metres with a gross floor area of 6,724sq.m including a warehouse area (6,135sq.m), ancillary office areas (275sq.m) and staff facilities (314sq.m); and Unit 3 will have a maximum height of 18.9 metres with a gross floor area of 10,095sq.m including a warehouse area (9,335sq.m), ancillary office areas (399sq.m) and staff facilities (361sq.m); the development will also include the provision of a new vehicular access to the site from the Aerodrome Roundabout in lieu of the extinguishment of existing multiple access points from the R120 Newcastle to Rathcoole Road; internal roundabout; pedestrian access; 187 ancillary car parking spaces; bicycle parking; HGV yards; level access goods doors; dock levellers; access gates; signage; hard and soft landscaping; lighting; boundary treatments; ESB substations; sprinkler tanks; pump houses and all associated site development works above and below ground.	Construction commenced 2021, ongoing 2022

Planning Reference	Description of Development	Status
SD21A/0067	**Applicant:** Horse Sport Ireland **Location:** College Lane, Greenogue, Rathcoole. **Development:** Provision of additional facilities at the existing Greenogue Equestrian Centre (permitted under SDCC Reg. Ref. SD16A/0417 and as amended under Reg. Ref. SD18A/0035) to create a sport horse Centre of Excellence comprising a new indoor sand arena (3,759sq.m); the extension of the existing main outdoor jumping sand arena 800sq.m (resulting in a total of 4,000sq.m); the extension of the existing indoor sand arena by 250sq.m (resulting in a total of 1,625sq.m); a 2 storey training and administration facility (1,300sq.m); a veterinary shed (572sq.m); a hay shed (1,209sq.m); a 2 storey visitor toilets, lockers and storage facility (200sq.m) and a single storey building (673sq.m) to accommodate a laboratory for an Assisted Reproduction Programme. The proposed development also includes the provision of 50 car parking spaces within the existing yard; 20 bicycle parking spaces; plant; hard and soft landscaping; boundary treatments; increased hard standing areas for parking and turning of horse boxes and lorries; and all associated site development works above and below ground at this 7.88 Ha (c.78,800sqm) site.	Construction ongoing 2022

13.3.2.3 Newcastle Town Centre / Aylmer Road

In the town of Newcastle and further east along Aylmer Road, the majority of planning applications with grant of permission since 2017 relate to typical town centre development including residential development proposals, minor dwelling extensions/alterations, new signage and changes of use of existing buildings.

In December 2019, one significant new Strategic Housing Development (SHD) was granted permission by An Bord Pleanála on lands in Newcastle South and Ballynakelly, south of Newcastle town centre. This included 377 no. residential units comprising 255 no. houses and 122 no. apartments/duplex units with road access from the R120 via the existing Newcastle Boulevard and from the Main Street of Newcastle via Burgage Street and Graydon Road. The initial phase of this development (65 no. units) was completed in September 2020 and the remaining development is in the final stages with completed residential units on sale at the time of preparing this report.

13.3.2.4 Baldonnell Business Park

A number of commercial developments, including new warehouse/logistics units, have been granted planning permission since 2017 to the southwest of the Baldonnell Business Park. These business and commercial premises are accessed primarily from the N7 via the Baldonnell exit (located between N7 Junctions 3 and 4).

13.3.2.5 Rathcoole Town / South of N7

South of the N7 dual carriageway, the northern extent of Rathcoole town centre is approx. 1.8 km from the site of the proposed development. In this area, planning permission has been granted for extensions to a primary school, Scoil Chrónáin, between 2017 and 2022.

13.3.2.6 Withdrawn Proposals

The review of nearby permitted developments also identified one significant licensed waste facility where plans to modify the waste activities carried out at the site have been discontinued and are no longer proceeding.

In July 2017, Rilta Environmental Limited (RILTA) applied to the EPA for a review of its Industrial Emissions Licence (Register Number: W0185-01) for its existing Hazardous Waste Transfer Station at Site No 14 A1, Greenogue Business Park. The licence review application was for the purposes of accepting hazardous flue gas treatment residues prior to transfer of the material abroad for disposal/recovery. An EIAR for the waste activities subject to the Industrial Emissions licence review application was submitted by RILTA to the EPA in June 2019. In May 2022, the EPA confirmed the formal withdrawal of the licence review application following a request by RILTA.

13.4 Potential Effects

13.4.1 Cumulative Effects

Potential cumulative effects have been examined where relevant in the individual chapters of this EIAR and have factored in the potential projects identified above in Section 13.3.

Chapters 3-12 of the EIAR contain specific sections on the cumulative effects associated with each environmental topic. The key potential cumulative effects, and associated mitigation measures, can be summarised as follows;

- The construction and operational phase impact assessments in relation to traffic and transportation are discussed within Chapter 3, Sections 3.6.2 and 3.6.3 respectively with cumulative effects considered in Section 3.6.4. Having considered the potential for cumulative effects, mitigation measures proposed for the construction phase include construction workers arriving on site before the morning peak traffic hour. A Construction Traffic Management Plan (CTMP) has been prepared in support of the planning application and this will be finalised upon appointment of the works contractor subject to grant of planning permission.

  In terms of the operational phase, Thorntons Recycling will operate shift start times outside the peak hour (07:45-08:45) with waste delivery times scheduled to avoid the peak period insofar as possible. The Traffic Impact Assessment (TIA) for the proposed development, detailed in Chapter 3, has utilised annual growth rates taken from TII PAG Unit 5.3. For the future year scenarios, these growth rates have been applied to the base traffic flows. The growth rates reflect predicted demographic and economic projections across Ireland and for the 2038 Future Year scenario outlined in the report, predict an approximate increase in flows of 15% compared to 2022. This increase is sufficient to capture the expansion of businesses within and close to the Greenogue Business Park and residential developments in the surrounding area, including those identified in Tables 13.1 and 13.2 above. As identified in Chapter 3, the potential cumulative effects on the local road network will be neutral, imperceptible and long term.

- As identified in Chapter 4 (Biodiversity), there will be no impacts from either the construction or operational phases of the proposed development on the ecology of the site, with no potential for cumulative effects taking into account any other developments or activities in the surrounding area.

- As outlined in Chapter 6 (Water & Wastewater), the existing drainage system has capacity for the surface water flows from the proposed development and this will drain to an existing public surface water drainage network with no cumulative impact for surface water discharges anticipated with adjacent properties. There will be no increase in surface water flows, no additional foul water generation and no additional potable water demand as a result of the proposed development. No other projects have been identified which may contribute to cumulative effects together with the proposed development on the hydrological environment. Similarly, as described in Chapter 5 (Land & Soils), no cumulative effects on the geological or hydrogeological environment are predicted as a result of the proposed development and other nearby developments.

- The assessment of cumulative effects in relation to noise and vibration is discussed within Chapter 7 (Noise & Vibration). All of the predicted construction and operational phase noise emissions are below the applicable criteria at the nearest noise sensitive receptors during all time periods. The noise emissions associated with existing operational development neighbouring the site of the proposed development have been measured and assessed as part of the baseline noise survey. No other projects have been identified which may contribute to cumulative noise or vibration effects together with the proposed development.

- The cumulative construction and operational phase impact assessments in relation to air quality and climate are discussed within Section 8.4.4, Chapter 8 (Air Quality & Climate). The

nearest permitted developments with the greatest potential to cumulatively add to the potential emissions associated with the construction phase of the proposed development have been assessed and on the basis that appropriate dust mitigation measures would be applied, no cumulative effects are anticipated.

- The assessment of cumulative effects in relation to landscape character and the visual environment as a result of the proposed development are discussed within Section 9.5.4, Chapter 9 (Landscape & Visual Impact). Mitigation measures proposed including the retention and enhancement of the site perimeter landscaping will serve to ameliorate the cumulative impact in relation to landscape character and the visual environment. Consistent with Condition 5 of the recent grant of retention permission for the existing northern building onsite, elevational treatment is proposed along the northern façade of this existing shed structure to improve the visual amenity from the external roadway (Grants Crescent).

  The most likely cumulative impact in relation to the proposed development is the further development of nearby units within the Greenogue Business Park (with recently permitted developments listed in Tables 13.1 and 13.2 above). However, given that the sites in the immediate vicinity of the proposed development are already established with varying commercial and light industrial uses, no cumulative impacts are foreseen.

- In terms of built heritage, Chapter 10 (Archaeological, Architectural and Cultural Heritage) evaluates the local receptors including known archaeological monuments and architectural/cultural heritage sites in the area of the proposed development. No other significant projects have been identified which may contribute to cumulative effects on built heritage together with the proposed development.

- The proposed development will occur within an existing Unit of the established Greenogue Business Park (Unit 518B) with no requirement for additional third party built services / infrastructure. No other projects have been identified which may contribute to cumulative effects together with the proposed development on the material assets of the local area.

- The main cumulative effect of the proposed development on the local population as per outlined in Chapter 12 will be a positive economic and employment effect, by way of contribution to the local economy. In terms of human health, the cumulative effects in terms of traffic and transportation, noise and vibration, water and wastewater, and air quality and climate change are as outlined above and in the respective chapters of this EIAR.

13.4.2 Indirect Effects

A number of indirect cumulative effects are likely to arise, including;

- The proposed development will support indirect employment opportunities through local contractors, service providers and suppliers.
- Off-site treatment and recovery/disposal of sorted waste materials could have a potential indirect negative impact on air, soil, surface water, and groundwater quality at the off-site treatment/disposal sites. However, all waste consigned from the site will be transferred by authorised waste hauliers to suitably licensed / permitted facilities in accordance with the conditions of the site waste facility permit (subject to review). Furthermore, all waste accepted and consigned from the site will remain limited to non-hazardous, dry materials consistent with operations currently operated at the existing waste recovery facility. There any such indirect effect, while long term, will be at most imperceptible.

13.4.3 Interactions between Effects

This section addresses potential interactions between the various effects identified in the individual chapters of the EIAR. Table 13.3 shows a matrix where interactions between effects on different environmental factors have been addressed. These interactions between environmental topics have been examined within the individual Chapter headings of the EIAR.

It is concluded that there are no significant interactive impacts identified for any environmental media. This conclusion is based on the nature of the proposed project and the successful implementation of all construction and operational mitigation measures detailed within each chapter of the EIAR.

Table 13.3: Matrix of Environmental Factors & Interactions (✓ = Interaction; C = Construction Phase; O = Operational Phase)

Interaction	Population & Human Health	Landscape & Visual	Traffic & Transportation	Land & Soils	Biodiversity	Noise & Vibration	Water & Wastewater	Air Quality & Climate	Material Assets	Archaeological, Architectural & Cultural Heritage
Population & Human Health		✓ C & O	✓ C & O	✓ C		✓ C & O	✓ C & O	✓ C & O	✓ C & O	✓ C
Landscape & Visual			✓ C		✓ C & O					
Traffic & Transportation					✓ C & O	✓ C & O		✓ C & O	✓ C & O	
Land & Soils					✓ C & O		✓ C & O	✓ C & O	✓ C & O	
Biodiversity						✓ C & O	✓ C & O	✓ C & O		
Noise & Vibration									✓ C & O	
Water & Wastewater										
Air Quality & Climate									✓ C & O	
Material Assets										
Archaeological, Architectural & Cultural Heritage										

13.5 Mitigation Measures

Chapters 3 to 12 have identified mitigation measures relevant to the various environmental factors assessed as part of the EIAR. A number of potential effects arising from the proposed development and other known projects, both on and off-site, relate to the construction phase. Key to the successful management of all environmental mitigation measures identified is an overall plan, namely the Construction Environmental Management Plan (CEMP) and a Construction Traffic Management Plan (CTMP) to ensure all mitigation measures are implemented in a co-ordinated manner.

A CEMP and CTMP have been prepared and are included as part of the planning application for the proposed development. Prior to the commencement of construction activities, the CEMP and CTMP will be updated to incorporate all mitigation measures identified within this EIAR and any subsequent planning conditions (subject to grant of permission). Subject to grant of planning permission, the contractor appointed for the construction works will be assigned overall responsibility for the implementation of these plans.

The CEMP and CTMP will be maintained as 'live' documents which can respond to external influences outside of the control of the site construction management team. In particular, potential cumulative impacts arising from other projects commencing construction in parallel with the proposed works, will need to be considered in the context of interaction with the proposed development. The need (if any) to update the CEMP and/or CTMP in response to these interactions will be considered by the construction management team, in consultation with SDCC and other relevant local stakeholders.

13.6 Residual Effects

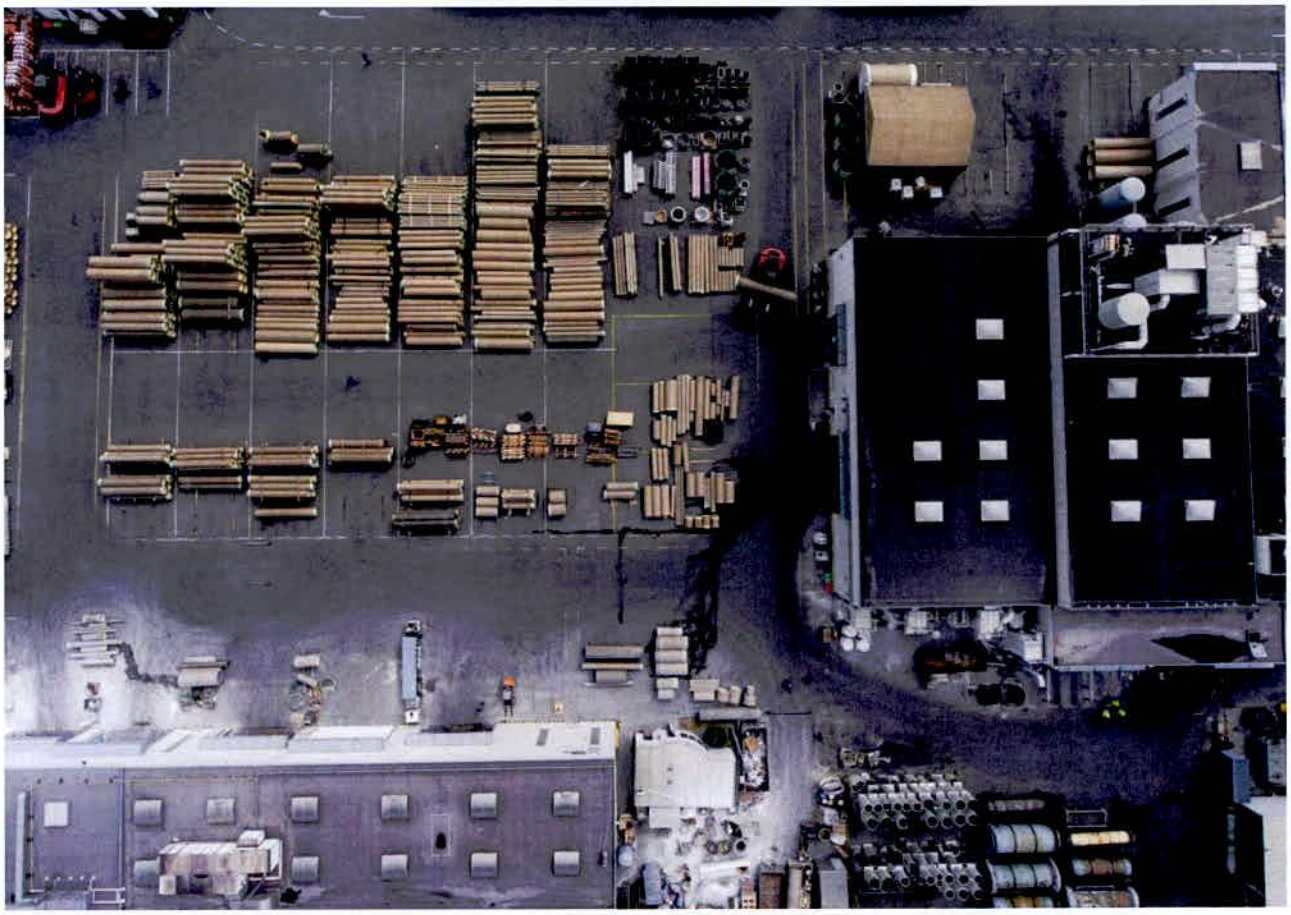
Based on the implementation of the CEMP and CTMP and all mitigation measures outlined in the EIAR, there are no significant residual cumulative effects foreseen as a result of the proposed development together with nearby permitted development.

Appendix A

Traffic Survey Specification

Survey Specification

For the Intensification of Waste Recovery Facility at 518B, Grants Crescent, Greenogue Business Park, Rathcoole, Co. Dublin
Padraig Thornton Waste Disposal Ltd. t/a Thorntons Recycling



SWECO

Change list

Ver:	Date:	Description of the change	Reviewed	Approved by

Project Name:	Thorntons Greenogue
Project Number:	66500234
Client:	Thorntons Recycling
Ver:	P01
Date:	28/04/2022
Author:	Anxhela Dhana
Document Reference:	p:\6527\66500234_thorntons_greenogue_eia\000\04 deliverables management\reports & presentations\working\traffic\66500234-swe-xx-xx-t-h-0001-surveyspec.docx

Table of contents

1. Introduction

This survey specification sets out the detail for the provision of traffic surveys required to inform a Transport Assessment to be conducted for a planning application for the Thorntons Recycling site in the Greenogue Business Park. It comprises Junction Turning Counts (JTCs) to be conducted on a neutral weekday between 07:00 – 19:00, with survey conducted over a neutral week.

1.1 Required Surveys

1.1.1 Junction Turning Counts (JTCs) and Queue Length Surveys

JTC's will be undertaken over a 12-hour period and in 15-minute intervals, and will use the following classification, as specified in TII Project Appraisal Guidelines for National Roads Unit 5.2 – Data Collection:

1) Motorbike;
2) Cars;
3) LGV;
4) Bus;
5) OGV1;
6) OGV2;
7) Caravans;
8) Bicycle.

JTC's can be undertaken automatically using a video camera with post-production analysis to provide each turning movement in the 15-minute interval, as specified in TII Project Appraisal Guidelines for National Roads Unit 5.2 – Data Collection, Section 4.2.

The results of the survey are to be provided in both Vehicle and Passenger Car Unit (PCU) values. PCU values for each vehicle classification are as follows:

- Motorbike = 0.4 PCU
- Car / LGV = 1 PCU
- Bus = 2 PCU
- OGV1 = 1.5 PCU
- OGV2 = 2.3 PCU

Queues will be recorded in 5-minute intervals based on length in meters per lane.

All surveys will be undertaken on the same weekday to be agreed with the Client.

1.2 Survey Sites

1.2.1 Junction Turning Counts (JTCs)

The proposed JTCs locations are shown in **Figure 1-1** and **Table 1-1** below:

Figure 1-1: Proposed JTC Locations

Table 1-1:Proposed JTC Locations

Site Ref	Location	X	Y
1	Jordanstown Road/College Road (Jordanstown Rdbt)	702171	728890
2	College Road/Grants Rise	701852	728948
3	Grants Rise/Grants Cres	701827	728855
4	Grants Rise/Grants Avenue	701752	728625
5	College Road/ Grants Ave/ Jordanstown Drive (Plaza Rdbt)	702013	728542
6	R120/ College Road (Greenogue Rdbt)	701816	728000
7	R120/ Jordanstown Road (Aerodrome Rdbt)	702198	727721
8	R120/Naas Road - North	702517	727089
9	R120/Beechwood Lawns - South	702577	726992
10	R120/Mill Road	703004	727139

1.3 Additional Information

1.3.1 GIS

GIS compatible files outlining all of the surveys are available on request to ensure the accuracy of the locations of sites listed.

1.3.2 Survey Dates

Surveys will ideally be undertaken during neutral months on average weekdays. Neutral periods are listed below:

- late March and April – excluding the period surrounding St. Patrick's Day and Easter,
- May – excluding the Thursday before and all of the week of the Bank Holiday,
- September – excluding school holidays and the return to school weeks,
- October – excluding the Thursday before and all of the week of the Bank Holiday, and
- All of November.

1.3.3 Survey Mobilisation

Surveys are required to be mobilised within three weeks of the request. The relevant Local Authorities and, when necessary, TII, should be engaged prior to commencement to ensure that all necessary approvals have been sought in advance of the surveys.

1.3.4 Format Required

All data is to be presented in MS Excel or compatible format.

1.3.5 Data Return

Data is to be made available within three weeks of the survey being carried out.

1.3.6 Data Controller

The collection, processing and retention of data will be carried out in accordance with GDPR requirements. The successful supplier shall be the Data Controller for the purposes of this contract. Under the GDPR, the data controller is responsible for, and must be able to demonstrate compliance with, the principles relating to processing of personal data. This is known as the "accountability principle". In short, this means the data controller is responsible for, and must ensure, its processing of personal data is undertaken in a manner which (amongst other things) is lawful, fair and transparent.

1.3.7 Health and Safety

The successful supplier shall comply with the Safety Health and Welfare at Work Act 2005 (Nr 10 of 2005). The supplier is responsible for any temporary traffic management in accordance with Chapter 8 of the Traffic Signs Manual required for the safe installation, monitoring and decommissioning of survey equipment. Site specific method statements including risk assessments and Temporary Traffic Management Plans shall be prepared in advance and submitted to the Client for review. The supplier shall notify the relevant parties (Gardai, Local Authorities & TII etc.) in advance of surveys.

1.3.8 Additional Information

It is the supplier's responsibility to ensure continuous data collection in accordance with this specification. Any omission may require all the surveys to be undertaken again.

Should there be any item in this specification that is unclear, the client should be contacted as soon as possible to provide clarification. It is the responsibility of the survey contractor to ensure that the survey is undertaken to the requirements of this specification, and a discussion with the design team is strongly recommended.

Any notable events or conditions during the survey period should be noted and reported.

1.3.9 Project Details

The project consists of the Intensification of Waste Recovery Facility at 518B, Grants Crescent, Greenogue Business Park, Rathcoole, Co. Dublin, Padraig Thornton Waste Disposal Ltd. t/a Thorntons Recycling

Thorntons Recycling is currently in the process of evaluating the future use of the overall Unit 518B for the purposes of waste management operations. The future use of the building is intended to support waste recycling operations which are among the uses consistent with the 'Enterprise & Employment' zoning for the site as set out in both the current SDCC Development Plan 2016-2022 and draft SDCC Development Plan 2022-2028.

Appendix B

Traffic Modelling Outputs

Junctions 10

ARCADY 10 - Roundabout Module

Version: 10.0.3.1598

For sales and distribution information, program advice and maintenance, contact TRL Software:
+44 (0)1344 379777 software@trl.co.uk trlsoftware.com

Filename: Junction 10 site 1.j10
Path: F:\U2012\nonproj\K Milne\Thorntons
Report generation date: 21/07/2022 08:25:18

«2038, AM
- **»Junction Network**
- **»Arms**
- **»Traffic Demand**
- **»Origin-Destination Data**
- **»Vehicle Mix**
- **»Results**

Summary of junction performance

	AM							
	Set ID	Queue (Veh)	Delay (s)	RFC	LOS	Junction Delay (s)	Junction LOS	Network Residual Capacity
	2022							
1 - College Road North	D1	0.2	3.78	0.15	A	4.61	A	63 % [4 - R120 West]
2 - R120 East		1.0	4.06	0.49	A			
3 - Greenogue Access South		0.0	1.64	0.00	A			
4 - R120 West		1.0	5.64	0.49	A			
	2023							
1 - College Road North	D2	0.2	3.84	0.15	A	4.71	A	60 % [4 - R120 West]
2 - R120 East		1.0	4.14	0.50	A			
3 - Greenogue Access South		0.0	1.65	0.00	A			
4 - R120 West		1.0	5.79	0.50	A			
	2038							
1 - College Road North	D3	0.2	4.17	0.19	A	5.46	A	43 % [4 - R120 West]
2 - R120 East		1.3	4.72	0.56	A			
3 - Greenogue Access South		0.0	1.74	0.01	A			
4 - R120 West		1.3	6.93	0.57	A			

Values shown are the highest values encountered over all time segments. Delay is the maximum value of average delay per arriving vehicle. Junction LOS and Junction Delay are demand-weighted averages. Network Residual Capacity indicates the amount by which network flow could be increased before a user-definable threshold (see Analysis Options) is met.

File summary

File Description

Title	
Location	
Site number	
Date	29/06/2022
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	

Enumerator	SWECO\GBKEMR
Description	

Units

Distance units	Speed units	Traffic units input	Traffic units results	Flow units	Average delay units	Total delay units	Rate of delay units
m	kph	Veh	Veh	perHour	s	-Min	perMin

Analysis Options

Calculate Queue Percentiles	Calculate residual capacity	Residual capacity criteria type	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
	✓	Delay	0.85	36.00	20.00

Analysis Set Details

ID	Network flow scaling factor (%)
A1	100.000

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D3	2038	AM	ONE HOUR	07:30	09:00	15

2038, AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3, 4	5.46	A

Junction Network

Driving side	Lighting	Network residual capacity (%)	First arm reaching threshold	Network delay (s)	Network LOS
Left	Normal/unknown	43	4 - R120 West	5.46	A

Arms

Arms

Arm	Name	Description	No give-way line
1	College Road North		
2	R120 East		
3	Greenogue Access South		
4	R120 West		

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Entry only	Exit only
1 - College Road North	4.30	5.00	5.0	22.0	45.0	0.0		
2 - R120 East	5.40	5.80	5.0	21.0	45.0	0.0		
3 - Greenogue Access South	8.00	12.00	12.0	18.0	45.0	0.0		
4 - R120 West	4.10	5.20	9.0	22.0	45.0	0.0		

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
1 - College Road North	0.642	1607
2 - R120 East	0.702	1917
3 - Greenogue Access South	0.971	3307
4 - R120 West	0.649	1643

The slope and intercept shown above include any corrections and adjustments.

Traffic Demand

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
1 - College Road North		✓	185	100.000
2 - R120 East		✓	889	100.000

3 - Greenogue Access South		✓	10	100.000
4 - R120 West		✓	635	100.000

Origin-Destination Data

Demand (Veh/hr)

		To			
		1 - College Road North	2 - R120 East	3 - Greenogue Access South	4 - R120 West
From	1 - College Road North	0	163	5	17
	2 - R120 East	394	0	17	478
	3 - Greenogue Access South	2	8	0	0
	4 - R120 West	66	569	0	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1 - College Road North	2 - R120 East	3 - Greenogue Access South	4 - R120 West
From	1 - College Road North	0	9	9	9
	2 - R120 East	9	0	9	9
	3 - Greenogue Access South	9	9	0	9
	4 - R120 West	9	9	9	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS
1 - College Road North	0.19	4.17	0.2	A
2 - R120 East	0.56	4.72	1.3	A
3 - Greenogue Access South	0.01	1.74	0.0	A
4 - R120 West	0.57	6.93	1.3	A

Main Results for each time segment

07:30 - 07:45

Arm	Total Demand (Veh/hr)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
1 - College Road North	139	432	1197	0.116	139	0.1	3.401	A
2 - R120 East	669	17	1747	0.383	667	0.6	3.325	A
3 - Greenogue Access South	8	667	2387	0.003	8	0.0	1.512	A
4 - R120 West	478	303	1311	0.365	476	0.6	4.302	A

07:45 - 08:00

Arm	Total Demand (Veh/hr)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
1 - College Road North	166	518	1142	0.146	166	0.2	3.689	A
2 - R120 East	799	20	1745	0.458	798	0.8	3.799	A
3 - Greenogue Access South	9	798	2259	0.004	9	0.0	1.599	A
4 - R120 West	571	363	1272	0.449	570	0.8	5.123	A

08:00 - 08:15

Arm	Total Demand (Veh/hr)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
1 - College Road North	204	633	1068	0.191	203	0.2	4.165	A
2 - R120 East	979	24	1742	0.562	977	1.3	4.697	A
3 - Greenogue Access South	11	977	2086	0.005	11	0.0	1.734	A
4 - R120 West	699	444	1219	0.574	697	1.3	6.869	A

08:15 - 08:30

Arm	Total Demand (Veh/hr)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
1 - College Road North	204	635	1066	0.191	204	0.2	4.172	A
2 - R120 East	979	24	1742	0.562	979	1.3	4.717	A
3 - Greenogue Access South	11	979	2084	0.005	11	0.0	1.735	A
4 - R120 West	699	445	1219	0.574	699	1.3	6.930	A

08:30 - 08:45

Arm	Total Demand (Veh/hr)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
1 - College Road North	166	521	1140	0.146	167	0.2	3.698	A
2 - R120 East	799	20	1745	0.458	801	0.9	3.819	A
3 - Greenogue Access South	9	801	2257	0.004	9	0.0	1.600	A
4 - R120 West	571	364	1271	0.449	573	0.8	5.173	A

08:45 - 09:00

Arm	Total Demand (Veh/hr)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
1 - College Road North	139	435	1195	0.117	139	0.1	3.411	A
2 - R120 East	669	17	1747	0.383	670	0.6	3.344	A
3 - Greenogue Access South	8	670	2384	0.003	8	0.0	1.516	A
4 - R120 West	478	305	1310	0.365	479	0.6	4.339	A

Junctions 10

ARCADY 10 - Roundabout Module

Version: 10.0.3.1598

Filename: Junction 10 site 2.j10
Path: F:\U2012\nonproj\K Milne\Thorntons
Report generation date: 21/07/2022 08:29:15

Summary of junction performance

	AM							
	Set ID	Queue (Veh)	Delay (s)	RFC	LOS	Junction Delay (s)	Junction LOS	Network Residual Capacity
	2022							
1 - R120 West	D1	1.1	6.13	0.52	A	7.45	A	30 % [3 - R120 East]
2 - Jordanstown Road		0.1	4.04	0.11	A			
3 - R120 East		2.6	8.57	0.73	A			
	2023							
1 - R120 West	D2	1.2	6.34	0.54	A	7.71	A	28 % [3 - R120 East]
2 - Jordanstown Road		0.1	4.09	0.12	A			
3 - R120 East		2.7	8.89	0.74	A			
	2038							
1 - R120 West	D3	2.5	11.59	0.72	B	18.23	C	4 % [3 - R120 East]
2 - Jordanstown Road		0.2	5.22	0.16	A			
3 - R120 East		7.8	23.71	0.90	C			

There are warnings associated with one or more model runs - see the 'Data Errors and Warnings' tables for each Analysis or Demand Set.

Values shown are the highest values encountered over all time segments. Delay is the maximum value of average delay per arriving vehicle. Junction LOS and Junction Delay are demand-weighted averages. Network Residual Capacity indicates the amount by which network flow could be increased before a user-definable threshold (see Analysis Options) is met.

File summary

File Description

Title	
Location	
Site number	
Date	29/06/2022
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	SWECO\GBKEMR
Description	

Units

Distance	Speed	Traffic units	Traffic units	Flow	Average delay	Total delay	Rate of delay

units	units	input	results	units	units	units	units
m	kph	Veh	Veh	perHour	s	-Min	perMin

Analysis Options

Calculate Queue Percentiles	Calculate residual capacity	Residual capacity criteria type	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
	✓	Delay	0.85	36.00	20.00

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D1	2022	AM	ONE HOUR	07:30	09:00	15
D2	2023	AM	ONE HOUR	07:30	09:00	15
D3	2038	AM	ONE HOUR	07:30	09:00	15

Analysis Set Details

ID	Network flow scaling factor (%)
A1	100.000

2022, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3	7.45	A

Junction Network

Driving side	Lighting	Network residual capacity (%)	First arm reaching threshold	Network delay (s)	Network LOS
Left	Normal/unknown	30	3 - R120 East	7.45	A

Arms

Arms

Arm	Name	Description	No give-way line
1	R120 West		
2	Jordanstown Road		
3	R120 East		

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Entry only	Exit only
1 - R120 West	4.10	4.10	0.0	25.0	47.0	0.0		
2 - Jordanstown Road	4.00	4.00	0.0	20.0	47.0	0.0		
3 - R120 East	4.60	4.60	0.0	21.0	47.0	0.0		

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
1 - R120 West	0.593	1384
2 - Jordanstown Road	0.581	1338
3 - R120 East	0.621	1542

The slope and intercept shown above include any corrections and adjustments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D1	2022	AM	ONE HOUR	07:30	09:00	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
1 - R120 West		✓	585	100.000
2 - Jordanstown Road		✓	104	100.000
3 - R120 East		✓	1012	100.000

Origin-Destination Data

Demand (Veh/hr)

		To		
		1 - R120 West	2 - Jordanstown Road	3 - R120 East
From	1 - R120 West	0	64	521
	2 - Jordanstown Road	12	0	92
	3 - R120 East	778	234	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		1 - R120 West	2 - Jordanstown Road	3 - R120 East
From	1 - R120 West	0	0	0
	2 - Jordanstown Road	0	0	0
	3 - R120 East	0	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS
1 - R120 West	0.52	6.13	1.1	A
2 - Jordanstown Road	0.11	4.04	0.1	A
3 - R120 East	0.73	8.57	2.6	A

Main Results for each time segment

07:30 - 07:45

Arm	Total Demand (Veh/hr)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
1 - R120 West	440	175	1280	0.344	438	0.5	4.268	A
2 - Jordanstown Road	78	390	1111	0.070	78	0.1	3.484	A
3 - R120 East	762	9	1537	0.496	758	1.0	4.601	A

07:45 - 08:00

Arm	Total Demand (Veh/hr)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
1 - R120 West	526	210	1259	0.418	525	0.7	4.898	A
2 - Jordanstown Road	93	468	1066	0.088	93	0.1	3.699	A
3 - R120 East	910	11	1535	0.593	908	1.4	5.719	A

08:00 - 08:15

Arm	Total Demand (Veh/hr)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
1 - R120 West	644	257	1232	0.523	643	1.1	6.095	A

2 - Jordanstown Road	115	572	1005	0.114	114	0.1	4.040	A
3 - R120 East	1114	13	1534	0.726	1110	2.6	8.394	A

08:15 - 08:30

Arm	Total Demand (Veh/hr)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
1 - R120 West	644	258	1231	0.523	644	1.1	6.133	A
2 - Jordanstown Road	115	574	1005	0.114	115	0.1	4.043	A
3 - R120 East	1114	13	1534	0.726	1114	2.6	8.565	A

08:30 - 08:45

Arm	Total Demand (Veh/hr)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
1 - R120 West	526	211	1258	0.418	527	0.7	4.935	A
2 - Jordanstown Road	93	470	1065	0.088	94	0.1	3.705	A
3 - R120 East	910	11	1535	0.593	914	1.5	5.839	A

08:45 - 09:00

Arm	Total Demand (Veh/hr)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
1 - R120 West	440	177	1279	0.344	441	0.5	4.302	A
2 - Jordanstown Road	78	393	1110	0.071	78	0.1	3.489	A
3 - R120 East	762	9	1537	0.496	764	1.0	4.670	A

2023, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3	7.71	A

Junction Network

Driving side	Lighting	Network residual capacity (%)	First arm reaching threshold	Network delay (s)	Network LOS
Left	Normal/unknown	28	3 - R120 East	7.71	A

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D2	2023	AM	ONE HOUR	07:30	09:00	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
1 - R120 West		✓	601	100.000
2 - Jordanstown Road		✓	105	100.000
3 - R120 East		✓	1026	100.000

Origin-Destination Data

Demand (Veh/hr)

		To		
		1 - R120 West	2 - Jordanstown Road	3 - R120 East
From	1 - R120 West	0	65	536
	2 - Jordanstown Road	12	0	93
	3 - R120 East	789	237	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		1 - R120 West	2 - Jordanstown Road	3 - R120 East
From	1 - R120 West	0	0	0
	2 - Jordanstown Road	0	0	0
	3 - R120 East	0	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS
1 - R120 West	0.54	6.34	1.2	A
2 - Jordanstown Road	0.12	4.09	0.1	A
3 - R120 East	0.74	8.89	2.7	A

Main Results for each time segment

07:30 - 07:45

Arm	Total Demand (Veh/hr)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
1 - R120 West	452	178	1279	0.354	450	0.5	4.335	A
2 - Jordanstown Road	79	402	1105	0.072	79	0.1	3.509	A
3 - R120 East	772	9	1537	0.503	768	1.0	4.663	A

07:45 - 08:00

Arm	Total Demand (Veh/hr)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
1 - R120 West	540	213	1258	0.430	539	0.7	5.007	A
2 - Jordanstown Road	94	481	1058	0.089	94	0.1	3.733	A
3 - R120 East	922	11	1535	0.601	920	1.5	5.834	A

08:00 - 08:15

Arm	Total Demand (Veh/hr)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
1 - R120 West	662	260	1230	0.538	660	1.1	6.302	A
2 - Jordanstown Road	116	589	996	0.116	115	0.1	4.089	A
3 - R120 East	1130	13	1534	0.736	1125	2.7	8.693	A

08:15 - 08:30

Arm	Total Demand (Veh/hr)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
1 - R120 West	662	261	1229	0.538	662	1.2	6.344	A
2 - Jordanstown Road	116	590	995	0.116	116	0.1	4.092	A
3 - R120 East	1130	13	1534	0.736	1129	2.7	8.888	A

08:30 - 08:45

Arm	Total Demand (Veh/hr)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
1 - R120 West	540	214	1257	0.430	542	0.8	5.048	A
2 - Jordanstown Road	94	483	1057	0.089	95	0.1	3.739	A
3 - R120 East	922	11	1535	0.601	927	1.5	5.964	A

08:45 - 09:00

Arm	Total Demand (Veh/hr)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
1 - R120 West	452	179	1278	0.354	453	0.6	4.370	A
2 - Jordanstown Road	79	404	1103	0.072	79	0.1	3.517	A
3 - R120 East	772	9	1537	0.503	774	1.0	4.736	A

2038, AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3	18.23	C

Junction Network

Driving side	Lighting	Network residual capacity (%)	First arm reaching threshold	Network delay (s)	Network LOS
Left	Normal/unknown	4	3 - R120 East	18.23	C

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D3	2038	AM	ONE HOUR	07:30	09:00	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
1 - R120 West		✓	715	100.000
2 - Jordanstown Road		✓	118	100.000
3 - R120 East		✓	1146	100.000

Origin-Destination Data

Demand (Veh/hr)

		To		
		1 - R120 West	2 - Jordanstown Road	3 - R120 East
From	1 - R120 West	0	78	637
	2 - Jordanstown Road	14	0	104
	3 - R120 East	881	265	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		1 - R120 West	2 - Jordanstown Road	3 - R120 East
From	1 - R120 West	9	9	9
	2 - Jordanstown Road	9	9	9
	3 - R120 East	9	9	9

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS
1 - R120 West	0.72	11.59	2.5	B
2 - Jordanstown Road	0.16	5.22	0.2	A
3 - R120 East	0.90	23.71	7.8	C

Main Results for each time segment

07:30 - 07:45

Arm	Total Demand (Veh/hr)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
1 - R120 West	538	198	1152	0.467	535	0.9	5.800	A
2 - Jordanstown Road	89	476	951	0.093	88	0.1	4.173	A
3 - R120 East	863	10	1408	0.613	857	1.6	6.445	A

07:45 - 08:00

Arm	Total Demand (Veh/hr)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
1 - R120 West	643	237	1129	0.569	641	1.3	7.353	A
2 - Jordanstown Road	106	571	896	0.118	106	0.1	4.558	A
3 - R120 East	1030	13	1407	0.732	1026	2.6	9.338	A

08:00 - 08:15

Arm	Total Demand (Veh/hr)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
1 - R120 West	787	288	1099	0.716	783	2.4	11.223	B
2 - Jordanstown Road	130	697	822	0.158	130	0.2	5.196	A
3 - R120 East	1262	15	1405	0.898	1243	7.2	20.263	C

08:15 - 08:30

Arm	Total Demand (Veh/hr)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
1 - R120 West	787	291	1097	0.718	787	2.5	11.594	B
2 - Jordanstown Road	130	701	820	0.158	130	0.2	5.215	A
3 - R120 East	1262	15	1405	0.898	1259	7.8	23.713	C

08:30 - 08:45

Arm	Total Demand (Veh/hr)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
1 - R120 West	643	243	1126	0.571	647	1.4	7.599	A
2 - Jordanstown Road	106	577	892	0.119	106	0.1	4.580	A
3 - R120 East	1030	13	1407	0.732	1050	2.8	10.614	B

08:45 - 09:00

Arm	Total Demand (Veh/hr)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
1 - R120 West	538	201	1151	0.468	540	0.9	5.917	A
2 - Jordanstown Road	89	481	948	0.094	89	0.1	4.193	A
3 - R120 East	863	11	1408	0.613	868	1.6	6.720	A

Junctions 10

ARCADY 10 - Roundabout Module

Version: 10.0.3.1598

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+44 (0)1344 379777 software@trl.co.uk trlsoftware.com

Filename: Junction 10 Site 3.j10
Path: F:\U2012\nonproj\K Milne\Thorntons
Report generation date: 21/07/2022 08:30:42

Summary of junction performance

	AM							
	Set ID	Queue (Veh)	Delay (s)	RFC	LOS	Junction Delay (s)	Junction LOS	Network Residual Capacity
	2022							
1 - R120 North	D1	1.7	7.81	0.63	A	11.10	B	12 % [3 - R120 South]
3 - R120 South		5.4	14.24	0.85	B			
4 - R120 Slip East		0.8	6.63	0.43	A			
	2023							
1 - R120 North	D2	1.8	8.03	0.64	A	11.52	B	11 % [3 - R120 South]
3 - R120 South		5.7	14.87	0.86	B			
4 - R120 Slip East		0.8	6.74	0.44	A			
	2038							
1 - R120 North	D3	4.1	15.94	0.81	C	28.35	D	-2 % [3 - R120 South]
3 - R120 South		17.3	40.96	0.97	E			
4 - R120 Slip East		1.3	10.42	0.58	B			

Values shown are the highest values encountered over all time segments. Delay is the maximum value of average delay per arriving vehicle. Junction LOS and Junction Delay are demand-weighted averages. Network Residual Capacity indicates the amount by which network flow could be increased before a user-definable threshold (see Analysis Options) is met.

File summary

File Description

Title	
Location	
Site number	
Date	29/06/2022
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	SWECO\GBKEMR
Description	

Units

Distance units	Speed units	Traffic units input	Traffic units results	Flow units	Average delay units	Total delay units	Rate of delay units
m	kph	Veh	Veh	perHour	s	-Min	perMin

Analysis Options

Calculate Queue Percentiles	Calculate residual capacity	Residual capacity criteria type	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
	✓	Delay	0.85	36.00	20.00

Analysis Set Details

ID	Network flow scaling factor (%)
A1	100.000

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D2	2023	AM	ONE HOUR	07:30	09:00	15

2023, AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3, 4	11.52	B

Junction Network

Driving side	Lighting	Network residual capacity (%)	First arm reaching threshold	Network delay (s)	Network LOS
Left	Normal/unknown	11	3 - R120 South	11.52	B

Arms

Arms

Arm	Name	Description	No give-way line
1	R120 North		
2	Naas Road Slip East		
3	R120 South		
4	R120 Slip East		

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Entry only	Exit only
1 - R120 North	5.00	6.50	5.0	24.0	35.0	0.0		
2 - Naas Road Slip East								✓
3 - R120 South	4.30	6.30	9.0	20.0	35.0	0.0		
4 - R120 Slip East	6.80	7.00	3.0	15.0	35.0	0.0	✓	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
1 - R120 North	0.735	1943
2 - Naas Road Slip East		
3 - R120 South	0.710	1830
4 - R120 Slip East	0.799	2296

The slope and intercept shown above include any corrections and adjustments.

Traffic Demand

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
1 - R120 North		✓	730	100.000
2 - Naas Road Slip East				

3 - R120 South		✓	1308	100.000
4 - R120 Slip East		✓	383	100.000

Origin-Destination Data

Demand (Veh/hr)

		To			
		1 - R120 North	2 - Naas Road Slip East	3 - R120 South	4 - R120 Slip East
From	1 - R120 North	0	473	257	0
	2 - Naas Road Slip East	0	0	0	0
	3 - R120 South	817	491	0	0
	4 - R120 Slip East	218	40	125	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1 - R120 North	2 - Naas Road Slip East	3 - R120 South	4 - R120 Slip East
From	1 - R120 North	0	9	9	9
	2 - Naas Road Slip East	9	0	9	9
	3 - R120 South	9	9	0	9
	4 - R120 Slip East	9	9	9	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS
1 - R120 North	0.64	8.03	1.8	A
2 - Naas Road Slip East				
3 - R120 South	0.86	14.87	5.7	B
4 - R120 Slip East	0.44	6.74	0.8	A

Main Results for each time segment

07:30 - 07:45

Arm	Total Demand (Veh/hr)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
1 - R120 North	550	491	1421	0.387	547	0.6	4.106	A
2 - Naas Road Slip East		286						
3 - R120 South	985	0	1678	0.587	979	1.4	5.107	A
4 - R120 Slip East	288	979	1324	0.218	287	0.3	3.471	A

07:45 - 08:00

Arm	Total Demand (Veh/hr)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
1 - R120 North	656	588	1350	0.486	655	0.9	5.169	A
2 - Naas Road Slip East		343						
3 - R120 South	1176	0	1678	0.701	1172	2.3	7.063	A
4 - R120 Slip East	344	1172	1169	0.295	344	0.4	4.359	A

08:00 - 08:15

Arm	Total Demand	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue	Delay (s)	Unsignalised level of

	(Veh/hr)					(Veh)		service
1 - R120 North	804	717	1255	0.640	801	1.7	7.859	A
2 - Naas Road Slip East		419						
3 - R120 South	1440	0	1678	0.858	1427	5.5	13.680	B
4 - R120 Slip East	422	1427	965	0.437	420	0.8	6.588	A

08:15 - 08:30

Arm	Total Demand (Veh/hr)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
1 - R120 North	804	722	1252	0.642	804	1.8	8.028	A
2 - Naas Road Slip East		421						
3 - R120 South	1440	0	1678	0.858	1439	5.7	14.872	B
4 - R120 Slip East	422	1439	956	0.441	422	0.8	6.738	A

08:30 - 08:45

Arm	Total Demand (Veh/hr)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
1 - R120 North	656	595	1345	0.488	659	1.0	5.278	A
2 - Naas Road Slip East		345						
3 - R120 South	1176	0	1678	0.701	1189	2.4	7.549	A
4 - R120 Slip East	344	1189	1156	0.298	346	0.4	4.452	A

08:45 - 09:00

Arm	Total Demand (Veh/hr)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
1 - R120 North	550	496	1418	0.388	551	0.6	4.156	A
2 - Naas Road Slip East		288						
3 - R120 South	985	0	1678	0.587	989	1.4	5.246	A
4 - R120 Slip East	288	989	1316	0.219	289	0.3	3.509	A

Junctions 10

ARCADY 10 - Roundabout Module

Version: 10.0.3.1598

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Filename: Junction 10 site 4.j10
Path: F:\U2012\nonproj\K Milne\Thorntons
Report generation date: 21/07/2022 08:34:03

«2038, AM

- »Junction Network
- »Arms
- »Traffic Demand
- »Origin-Destination Data
- »Vehicle Mix
- »Results

Summary of junction performance

	AM							
	Set ID	Queue (Veh)	Delay (s)	RFC	LOS	Junction Delay (s)	Junction LOS	Network Residual Capacity
	2022							
1 - R120 North	D1	0.3	2.83	0.25	A	7.39	A	27 % [2 - R120 East]
2 - R120 East		2.6	9.26	0.73	A			
3 - Main Street West		1.3	7.37	0.58	A			
	2023							
1 - R120 North	D2	0.3	2.85	0.25	A	7.78	A	25 % [2 - R120 East]
2 - R120 East		2.8	9.82	0.74	A			
3 - Main Street West		1.4	7.73	0.59	A			
	2038							
1 - R120 North	D3	0.5	3.52	0.33	A	22.05	C	1 % [2 - R120 East]
2 - R120 East		9.5	31.06	0.92	D			
3 - Main Street West		4.1	20.58	0.81	C			

There are warnings associated with one or more model runs - see the 'Data Errors and Warnings' tables for each Analysis or Demand Set.

Values shown are the highest values encountered over all time segments. Delay is the maximum value of average delay per arriving vehicle. Junction LOS and Junction Delay are demand-weighted averages. Network Residual Capacity indicates the amount by which network flow could be increased before a user-definable threshold (see Analysis Options) is met.

File summary

File Description

Title	
Location	
Site number	
Date	29/06/2022
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	SWECO\GBKEMR

Description	

Units

Distance units	Speed units	Traffic units input	Traffic units results	Flow units	Average delay units	Total delay units	Rate of delay units
m	kph	Veh	Veh	perHour	s	-Min	perMin

Analysis Options

Calculate Queue Percentiles	Calculate residual capacity	Residual capacity criteria type	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
	✓	Delay	0.85	36.00	20.00

Analysis Set Details

ID	Network flow scaling factor (%)
A1	100.000

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D3	2038	AM	ONE HOUR	07:30	09:00	15

2038, AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3	22.05	C

Junction Network

Driving side	Lighting	Network residual capacity (%)	First arm reaching threshold	Network delay (s)	Network LOS
Left	Normal/unknown	1	2 - R120 East	22.05	C

Arms

Arms

Arm	Name	Description	No give-way line
1	R120 North		
2	R120 East		
3	Main Street West		

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Entry only	Exit only
1 - R120 North	5.00	5.40	9.0	17.0	35.0	0.0		
2 - R120 East	4.40	4.50	9.0	20.0	35.0	0.0		
3 - Main Street West	5.00	5.40	9.0	17.0	35.0	0.0		

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
1 - R120 North	0.696	1776
2 - R120 East	0.644	1504
3 - Main Street West	0.696	1776

The slope and intercept shown above include any corrections and adjustments.

Traffic Demand

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
1 - R120 North		✓	465	100.000
2 - R120 East		✓	1069	100.000
3 - Main Street West		✓	683	100.000

Origin-Destination Data

Demand (Veh/hr)

		To		
		1 - R120 North	2 - R120 East	3 - Main Street West
From	1 - R120 North	0	324	141
	2 - R120 East	925	0	144
	3 - Main Street West	560	123	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		1 - R120 North	2 - R120 East	3 - Main Street West
From	1 - R120 North	0	9	9
	2 - R120 East	9	0	9
	3 - Main Street West	9	9	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS
1 - R120 North	0.33	3.52	0.5	A
2 - R120 East	0.92	31.06	9.5	D
3 - Main Street West	0.81	20.58	4.1	C

Main Results for each time segment

07:30 - 07:45

Arm	Total Demand (Veh/hr)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
1 - R120 North	350	92	1565	0.224	349	0.3	2.957	A
2 - R120 East	805	106	1312	0.613	799	1.6	6.931	A
3 - Main Street West	514	691	1148	0.448	511	0.8	5.622	A

07:45 - 08:00

Arm	Total Demand (Veh/hr)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
1 - R120 North	418	110	1553	0.269	418	0.4	3.172	A
2 - R120 East	961	127	1299	0.740	956	2.7	10.373	B
3 - Main Street West	614	827	1053	0.583	612	1.4	8.114	A

08:00 - 08:15

Arm	Total Demand (Veh/hr)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
1 - R120 North	512	134	1536	0.333	511	0.5	3.511	A
2 - R120 East	1177	155	1280	0.919	1154	8.4	24.940	C
3 - Main Street West	752	999	934	0.805	742	3.8	17.975	C

08:15 - 08:30

Arm	Total Demand	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of

	(Veh/hr)							service
1 - R120 North	512	135	1535	0.334	512	0.5	3.517	A
2 - R120 East	1177	155	1280	0.919	1173	9.5	31.055	D
3 - Main Street West	752	1015	923	0.815	751	4.1	20.580	C

08:30 - 08:45

Arm	Total Demand (Veh/hr)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
1 - R120 North	418	112	1551	0.270	419	0.4	3.182	A
2 - R120 East	961	127	1298	0.740	987	3.0	12.450	B
3 - Main Street West	614	854	1035	0.594	624	1.5	8.991	A

08:45 - 09:00

Arm	Total Demand (Veh/hr)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
1 - R120 North	350	93	1564	0.224	350	0.3	2.967	A
2 - R120 East	805	106	1312	0.614	810	1.6	7.254	A
3 - Main Street West	514	701	1141	0.451	517	0.8	5.790	A

Junctions 10

ARCADY 10 - Roundabout Module

Version: 10.0.3.1598

For sales and distribution information, program advice and maintenance, contact TRL Software:
+44 (0)1344 379777 software@trl.co.uk trlsoftware.com

Filename: Junction 10 site 5.j10
Path: F:\U2012\nonproj\K Milne\Thorntons
Report generation date: 21/07/2022 08:35:10

«2022, AM

- »Junction Network
- »Arms
- »Traffic Demand
- »Origin-Destination Data
- »Vehicle Mix
- »Results

Summary of junction performance

	AM							
	Set ID	Queue (Veh)	Delay (s)	RFC	LOS	Junction Delay (s)	Junction LOS	Network Residual Capacity
	2022							
1 - Naas Road Slip North	D1	1.0	4.52	0.49	A	4.19	A	71 % [1 - Naas Road Slip North]
2 - Mill Road East		0.5	4.89	0.34	A			
3 - R120 South		0.3	2.95	0.25	A			
	2023							
1 - Naas Road Slip North	D2	1.0	4.65	0.50	A	4.28	A	68 % [1 - Naas Road Slip North]
2 - Mill Road East		0.5	5.00	0.34	A			
3 - R120 South		0.4	2.97	0.26	A			
	2038							
1 - Naas Road Slip North	D3	1.1	4.49	0.52	A	4.08	A	62 % [1 - Naas Road Slip North]
2 - Mill Road East		0.6	4.73	0.36	A			
3 - R120 South		0.4	2.81	0.28	A			

There are warnings associated with one or more model runs - see the 'Data Errors and Warnings' tables for each Analysis or Demand Set.

Values shown are the highest values encountered over all time segments. Delay is the maximum value of average delay per arriving vehicle. Junction LOS and Junction Delay are demand-weighted averages. Network Residual Capacity indicates the amount by which network flow could be increased before a user-definable threshold (see Analysis Options) is met.

File summary

File Description

Title	
Location	
Site number	
Date	29/06/2022
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	SWECO\GBKEMR

Description	

Units

Distance units	Speed units	Traffic units input	Traffic units results	Flow units	Average delay units	Total delay units	Rate of delay units
m	kph	Veh	Veh	perHour	s	-Min	perMin

Analysis Options

Calculate Queue Percentiles	Calculate residual capacity	Residual capacity criteria type	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
	✓	Delay	0.85	36.00	20.00

Analysis Set Details

ID	Network flow scaling factor (%)
A1	100.000

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D1	2022	AM	ONE HOUR	07:30	09:00	15

2022, AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3, 4	4.19	A

Junction Network

Driving side	Lighting	Network residual capacity (%)	First arm reaching threshold	Network delay (s)	Network LOS
Left	Normal/unknown	71	1 - Naas Road Slip North	4.19	A

Arms

Arms

Arm	Name	Description	No give-way line
1	Naas Road Slip North		
2	Mill Road East		
3	R120 South		
4	Naas Road Slip West		

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Entry only	Exit only
1 - Naas Road Slip North	5.60	6.00	10.0	14.0	38.0	0.0	✓	
2 - Mill Road East	5.00	5.40	5.0	20.0	38.0	0.0		
3 - R120 South	5.40	5.50	5.0	18.0	38.0	0.0		
4 - Naas Road Slip West								✓

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
1 - Naas Road Slip North	0.723	1954
2 - Mill Road East	0.694	1779
3 - R120 South	0.702	1829
4 - Naas Road Slip West		

The slope and intercept shown above include any corrections and adjustments.

Traffic Demand

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
1 - Naas Road Slip North		✓	701	100.000
2 - Mill Road East		✓	338	100.000

3 - R120 South		✓	379	100.000
4 - Naas Road Slip West				

Origin-Destination Data

Demand (Veh/hr)

		To			
		1 - Naas Road Slip North	2 - Mill Road East	3 - R120 South	4 - Naas Road Slip West
From	1 - Naas Road Slip North	0	15	686	0
	2 - Mill Road East	0	0	287	51
	3 - R120 South	0	283	0	96
	4 - Naas Road Slip West	0	0	0	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1 - Naas Road Slip North	2 - Mill Road East	3 - R120 South	4 - Naas Road Slip West
From	1 - Naas Road Slip North	0	9	9	9
	2 - Mill Road East	0	0	9	9
	3 - R120 South	0	9	0	9
	4 - Naas Road Slip West	0	0	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS
1 - Naas Road Slip North	0.49	4.52	1.0	A
2 - Mill Road East	0.34	4.89	0.5	A
3 - R120 South	0.25	2.95	0.3	A
4 - Naas Road Slip West				

Main Results for each time segment

07:30 - 07:45

Arm	Total Demand (Veh/hr)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
1 - Naas Road Slip North	528	212	1639	0.322	526	0.5	3.227	A
2 - Mill Road East	254	515	1275	0.200	253	0.2	3.520	A
3 - R120 South	285	38	1651	0.173	284	0.2	2.633	A
4 - Naas Road Slip West		212						

07:45 - 08:00

Arm	Total Demand (Veh/hr)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
1 - Naas Road Slip North	630	254	1609	0.392	630	0.6	3.673	A
2 - Mill Road East	304	616	1205	0.252	304	0.3	3.991	A
3 - R120 South	341	46	1646	0.207	341	0.3	2.757	A
4 - Naas Road Slip West		254						

08:00 - 08:15

Arm	Total Demand (Veh/hr)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
1 - Naas Road Slip North	772	311	1568	0.492	771	1.0	4.507	A
2 - Mill Road East	372	754	1109	0.336	371	0.5	4.876	A
3 - R120 South	417	56	1639	0.255	417	0.3	2.947	A
4 - Naas Road Slip West		311						

08:15 - 08:30

Arm	Total Demand (Veh/hr)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
1 - Naas Road Slip North	772	312	1568	0.492	772	1.0	4.522	A
2 - Mill Road East	372	755	1108	0.336	372	0.5	4.889	A
3 - R120 South	417	56	1638	0.255	417	0.3	2.947	A
4 - Naas Road Slip West		312						

08:30 - 08:45

Arm	Total Demand (Veh/hr)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
1 - Naas Road Slip North	630	255	1609	0.392	631	0.6	3.689	A
2 - Mill Road East	304	618	1204	0.252	305	0.3	4.006	A
3 - R120 South	341	46	1646	0.207	341	0.3	2.759	A
4 - Naas Road Slip West		255						

08:45 - 09:00

Arm	Total Demand (Veh/hr)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	End queue (Veh)	Delay (s)	Unsignalised level of service
1 - Naas Road Slip North	528	213	1639	0.322	528	0.5	3.245	A
2 - Mill Road East	254	517	1274	0.200	255	0.3	3.537	A
3 - R120 South	285	38	1651	0.173	286	0.2	2.636	A
4 - Naas Road Slip West		213						

Appendix C

Relevant Legislation and Policy

Habitats and Birds Directives

The Habitats Directive ensures the conservation of a wide range of rare, threatened or endemic animal and plant species. Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora was adopted in 1992 and aims to promote the maintenance of biodiversity, taking account of economic, social, cultural and regional requirements. It forms the cornerstone of Europe's nature conservation policy with the Birds Directive and establishes the EU wide Natura 2000 ecological network of protected areas, safeguarded against potentially damaging developments.

The Natura 2000 network of protected areas is known as Special Areas of Conservation (SAC) and Special Protection Areas (SPA). In general terms, they are considered to be of exceptional importance in terms of rare, endangered or vulnerable habitats and species within the European Community. The requirements of the Habitats Directive have been transposed into Irish law through the European Communities (Birds and Natural Habitats) Regulations 2011 [S.I. No. 477of 2011]. This legislation affords protection to both Special Protection Areas and Special Areas of Conservation.

Special Areas of Conservation (SAC) are designated under the Conservation of Natural Habitats and of Wild Fauna and Flora Directive 92/43/EEC (Habitats Directive) which is transposed into Irish law by the EC (Birds and Natural Habitats) Regulations 2011 (S.I. 477 of 2011). Special Protection Areas (SPA) are classified under the Birds Directive (2009/147/EC on the Conservation of Wild Birds). Article 6(3) of the Habitats Directive requires an 'appropriate assessment' to be undertaken for any plan or project that is likely to have a significant effect on the conservation objectives of a Natura 2000 site. An 'appropriate assessment' is an evaluation of the potential impacts of a plan or project on the integrity of a Natura 2000 site, and the incorporation, where necessary, of measures to mitigate or avoid negative effects.

The European Communities (Birds & Natural Habitats) Regulations 2011 – 2021 restrict the importation, distribution, sale or release of approximately 70 species of plants and animals considered to be the most harmful Invasive Alien Species. Japanese knotweed is one of the plant species listed in Part 2 of the Third Schedule of the 2011 regulations and it is also listed as a vector material in Part 3 of the Third Schedule.

Regulation 49 (2) states the following:

> *"Save in accordance with a licence granted under paragraph (7), any person who plants, disperses, allows or causes to disperse, spreads or otherwise causes to grow in any place specified in relation to such plant in the third column of Part 1 of the Third Schedule, any plant which is included in Part 1 of the Third Schedule, shall be guilty of an offence."*

Regulation 50 (1) states the following:

> *"Save in accordance with a licence granted under paragraph (7), and subject to Regulation 74, a person shall be guilty of an offence if he or she has in his or her possession for sale, or for the purposes of breeding, reproduction or propagation, or offers or exposes for sale, transportation, distribution, introduction or release—*
>
> *a) an animal or plant listed in Part 1 or Part 2 of the Third Schedule,*
>
> *b) anything from which an animal or plant referred to in subparagraph (a) can be reproduced or propagated,*
>
> *c) a vector material listed in Part 3 of the Third Schedule,*
>
> *in any place in the State specified in the third column of the Third Schedule in relation to such an animal, plant or vector material.*

Regulation 50 (2) states the following:

> *"(2) Save in accordance with a licence granted under paragraph (7), a person shall be guilty of an offence if he or she imports or transports—*

a) an animal or plant listed in Part 1 or Part 2 of the Third Schedule,

b) anything from which an animal or plant referred to in Part 2 of the Third Schedule can be reproduced or propagated, or

c) a vector material listed in Part 3 of the Third Schedule,

into or in or to any place in the State specified in relation to such an animal or plant or vector material in relation to that animal or plant or vector material in the third column of the Third Schedule.

It is also an offence under the Wildlife Acts 1976 to 2021 to plant or otherwise cause to grow in a wild state in any place in the State any species of (exotic) flora, or the flowers, roots, seeds or spores of (exotic) flora

National Legislation

Flora and fauna in Ireland are protected at a national level by the Wildlife Acts 1976 to 2021 and the Flora (Protection) Order 2015. Natural Heritage Areas (NHAs) are areas that are considered to be important for the habitats present or for the species of plants and animals supported by those habitats. Under the Wildlife Amendment Act 2000, NHAs are legally protected from damage from the date they were formally proposed for designation. Section 19(1) of the Act states that 'Where there is a subsisting natural heritage area order in respect of any land, no person shall carry out, or cause or permit to be carried out, on that land any works specified in the order or any works which are liable to destroy or to significantly alter, damage or interfere with the features by reason of which the designation order was made'.

In addition, a list of proposed NHAs (pNHAs) was published in 1995 but to date these have not had their status confirmed. Prior to statutory designation, pNHAs are subject to limited protection under various agri-environment and forestry schemes and under local authority planning strategies such as County Development Plans.

Relevant Planning Policy

The planning policy and legislation that is relevant to the proposed development is set out in the following section.

County Planning Policies

The relevant local planning policies have been extracted from the draft South Dublin County Development Plan 2022 - 2028 (Chapter 4: Green Infrastructure).

4.2 Strategic Themes

4.2.1 Biodiversity

Biodiversity encompasses all of the different kinds of life on earth and the various ways these lifeforms interact with each other and their environment. The complex interactions that occur between different species and organisms are essential to support and sustain human life. Clean air and water, food, medicine and other natural resources that are essential to everyday life are all dependant on the protection and development of healthy, biodiverse habitats and ecosystems. Healthy biodiversity is at the core of the ecosystem services approach to development. Ecosystems and biodiversity help mitigate climate change impacts, by absorbing excess flood water or buffering us against extreme weather events. Forests, peatlands and other habitats are major stores of carbon. Protecting them can also help us limit atmospheric greenhouse gas concentrations. This Plan adopts a proactive approach to the preservation and enhancement of biodiversity in South Dublin County by promoting the protection of existing and the restoration of degraded habitats in the County and combating habitat fragmentation through the recognition within the GI strategy of the contribution of biodiversity to the enhancement of existing and creation of new linkages and corridors as part of the County's GI network.

"Biodiversity is the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes genetic diversity within species, between species and of ecosystems." United Nations Convention on Biological Diversity"

From the foothills of the Dublin Mountains to the Liffey Valley and the local and regional parks in between, South Dublin County contains a wide range of biodiversity-rich areas. Several of these habitats are protected at the European level under the Birds and Habitats Directives and are designated as part of the Europewide Natura 2000 network. The three Natura 2000 sites in South Dublin County are Glenasmole Valley SAC, and the Dublin/Wicklow Mountains SAC and SPA (refer to Chapter 3 Natural, Cultural and Built Heritage).

Seven sites of special ecological interest in the County are designated as proposed Natural Heritage Areas, including the Dodder Valley, Liffey Valley and Lugmore Glen. The Plan promotes the full utilisation of local planning powers to minimise the risk of degradation to these areas. The regional and local parks and public open spaces within the County serve as home to various native plant, animal and bird species and are important areas of biodiversity in their own right. The Plan aims to enhance the biodiversity of these existing public open spaces and promote the development of new local parks and spaces, to protect and promote biodiversity across the County.

Native pollinator species, such as the bumblebee and honeybee perform a vital role in preserving Ireland's biodiversity by pollinating crops, plants and flowers. The All-Ireland Pollinator Plan aims to provide for the protection of pollinators, many of which have suffered decline in recent years due to habitat fragmentation and the use of pesticides. The National Plan contains a variety of measures aimed at supporting pollinator species, such as reducing use of pesticides, creating wildflower meadows and reducing the frequency of mowing on publicly owned green spaces. The Council has incorporated these suggestions into this GI Strategy to help protect South Dublin County's biodiversity.

Policy GI2: Biodiversity
Strengthen the existing GI network and ensure all new developments contribute towards GI, in order to protect and enhance biodiversity across the County as part of South Dublin County Council's commitment to the National Biodiversity Action Plan 2021- 2025 and the South Dublin County Council Biodiversity Action Plan, 2020-2026, the National Planning Framework (NPF)and the East Region Spatial and Economic Strategy (RSES).
GI2 Objective 1: To reduce fragmentation and enhance South Dublin County's GI network by strengthening ecological links between urban areas, Natura 2000 sites, proposed Natural Heritage Areas, parks and open spaces and the wider regional network by connecting all new developments into the wider GI Network.
GI2 Objective 2: To protect and enhance the biodiversity and ecological value of the existing GI network by protecting where feasible (and mitigating where removal is unavoidable) existing ecological features including tree stands, woodlands, hedgerows and watercourses in all new developments as an essential part of the design and construction process.
GI2 Objective 3: To retrospectively repair habitat fragmentation and provide for regeneration of flora and fauna where weaknesses are identified in the network through the implementation of new GI interventions.
GI2 Objective 4: Integrate GI, and include areas to be managed for biodiversity, as an essential component of all new developments in accordance with the requirements set out in Chapter 13 Implementation and the policies and objectives of this chapter.
GI2 Objective 5: To protect and enhance the County's hedgerow network, in particular hedgerows that form townland, parish and barony boundaries recognising their historic and cultural importance in addition to their ecological importance and increase hedgerow coverage using locally native species including a commitment for no net loss of hedgerows on any development site and to take a proactive approach to protection and enforcement.
GI2 Objective 6: To continue to support and expand the County Pollinator Plan through the management and monitoring of the County's pollinator protection sites as part of the Council's commitment to the provisions of the National Pollinator Plan 2021-2025.

GI2 Objective 7: To enhance the biodiversity value of publicly owned hard infrastructure areas by incorporating the planting of new trees, grasses and other species, thereby integrating this infrastructure into the overall GI network.
GI2 Objective 8: To take all possible steps to mitigate the impacts on biodiversity of increased recreation within the GI network, bearing in mind the effects of scramblers, dogs, drones, littering and illegal dumping.
GI2 Objective 9: To exploit the full potential of existing underutilised perimeter and border park spaces through the augmentation of wild grasses and other naturally occurring vegetation that enhance local area biodiversity and habitats in support of the National Pollinator Plan and to consider wildflower meadows where beneficial to biodiversity.
GI2 Objective 10: To enhance biodiversity and the health of pollinator species by banning the use of glyphosphate in or close to public parks, public playgrounds, community gardens/allotments and within residential estates, whether by directly employed Local Authority staff or private contractors.

4.2.3 Climate Resilience

'Resilience' is the ability to react and recover from external shocks and disruptions, as well as the foresight to anticipate and proactively prepare for future challenges. Climate change is recognised as a global source of disruption, one that will influence Ireland's spatial and economic growth and development over the next several decades. The Plan rises to this challenge and promotes a GI approach which frontloads South Dublin County's response to ensure a county which is resilient to current and future climate change impacts.

The impacts of a changing climate include fluctuations in seasonal temperatures, greater rainfall intensity and more frequent storm events, leading to an increased likelihood of flooding. Urban areas are particularly susceptible to these impacts. Built-up, three dimensional landscapes absorb and retain larger amounts of sunlight, contributing to higher localised temperatures compared to rural areas. This is known as the 'Urban Heat Island' effect, and can lead to higher cooling costs for buildings, as well as cause discomfort for residents and visitors. Urban areas are also more susceptible to intense rainfall and storm events which can overwhelm stormwater drainage systems.

GI will play a key role in combating climate change and mitigating against its impacts. The County's trees, forest and park areas provide valuable carbon sequestration services, absorbing CO2 from the atmosphere and storing it in the soil. In urban areas tree planting and other local GI interventions provide cooling and shade, ensuring a liveable and comfortable environment for residents and visitors. GI planting and SuDS can also play a significant role in stormwater runoff.

Urban Greening

Interventions which modify the quality, quantity and accessibility of urban green spaces is described as Urban Greening. Urban Greening can be achieved by establishing new urban spaces or by changing the characteristics of existing ones. The process can refer to a broad spectrum of measures which can be implemented at different scales in private or public spaces. These can include, pocket parks, urban gardens, green roofs/walls, recreational and urban/community gardening and may include facilitated access to urban woodlands, forests and natural wildlife areas. Urban greening helps combat air and noise pollution, soaks up rainwater that may otherwise create flooding, creates a habitat for local wildlife, and has shown to lift morale in the people who see it, calming traffic and there is some evidence that it can lessen urban crime.

Urban Greening is often implemented through the development of an Urban Greening Factor (UGF). This is a tool that evaluates and quantifies the amount and quality of urban greening that a scheme provides to inform decisions about appropriate levels of greening in new developments. It should be based on a range of agreed factors which contribute to greening of an area for example green roof/wall, tree planting, provision of semi-natural vegetation, provision of wildflower meadows, water features, hedge and tree planting etc. The output for a particular development would be the achievement of a target score based on assigned scores to agreed interventions.

Tree Planting

The value of trees in delivering carbon sequestration is undisputed. Tree canopy cover in the County has been assessed based on data provided by UCD. It is highly desirable that the extent of this canopy should be extended during the lifetime of the Development Plan. Where considered appropriate objectives supporting additional planting are included in the relevant neighbourhood areas (refer to Chapter 12, Our Neighbourhoods).

Policy GI5: Climate Resilience
Strengthen the County's GI in both urban and rural areas to improve resilience against future shocks and disruptions arising from a changing climate.
GI5 Objective 1: Protect and enhance the rich biodiversity and ecosystems in accordance with the ecosystem services approach to development enabling mitigation of climate change impacts, by absorbing excess flood water, providing a buffer against extreme weather events, absorbing carbon emissions and filtering pollution
GI5 Objective 2: To protect and enhance the natural regime of the watercourses of the County to more efficiently capture their flood resilience value.
GI5 Objective 3: To ensure compliance with the South Dublin Climate Change Action Plan and the provisions of the Council's Tree Management Strategy. → Increase the County's tree canopy cover by promoting annual planting, maintenance preservation and enhancement of trees, woodlands and hedgerows within the County using locally native species and supporting their integration into new development. → Identify suitable sites for new urban trees including Miyawaki style mini woodlands, where feasible. → Support the implementation of a co-ordinated regional approach to the maintenance of trees and support the work of the Regional Steering Group on Tree Management to which South Dublin County Council is a participant. → Promote the establishment of tree trails in public parks across the County. → Promote the planting of new woodlands and forestry within appropriate open space and park locations within the County. → To plant "pocket forests" in tracts of open grassland to act as an oasis for biodiversity. → The Council recognises the value of mature trees in terms of carbon sequestration and amenity over saplings.
GI5 Objective 4: To implement an urban greening factor for all new developments subject to an appropriate scoring mechanism being developed for the County based on best international standards and its appropriate application to the unique features of the County. Developers will be required to demonstrate how they have achieved urban greening targets based on the scoring mechanism developed through relevant interventions as part of the proposed development. (See Chapter 13 Implementation and Monitoring).
GI5 Objective 5: To promote positive land and soil protection measures to avoid degradation or loss of natural soil resources, to minimise sealing of soils and to remediate contaminated land.
GI5 Objective 6: To provide more tree cover across the county, in particular to areas that are lacking trees.
GI5 Objective 7: Require the provision of green roofs and green walls, providing benefits for biodiversity and as an integrated part of Sustainable Drainage Systems (SuDS) and Green Infrastructure, in apartment, commercial, leisure and educational buildings, wherever possible and develop an evidence base for specific green roof requirements as part of the Council's ongoing SuDs strategy development.

Appendix D

Site Photographs

Plate 1: Site from the access gate

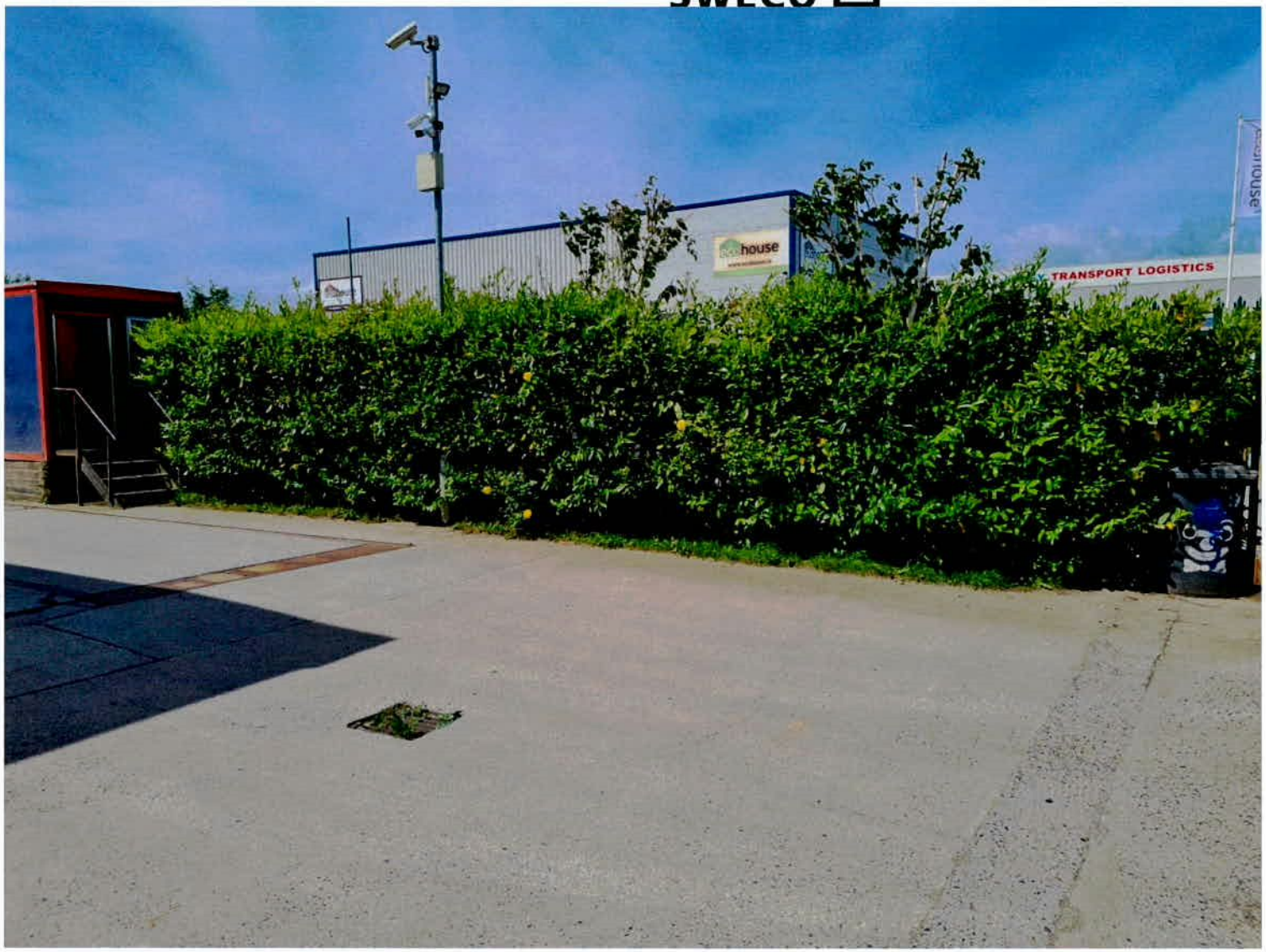

Plate 2: Cherry laurel hedgerow (western site boundary)

Plate 3: Mixed cherry laurel and *Griselinia littoralis* hedgerow along northern site boundary

Plate 4: Concrete yard behind existing buildings (view facing north)

Plate 5: Concrete yard skip storage (view facing east)

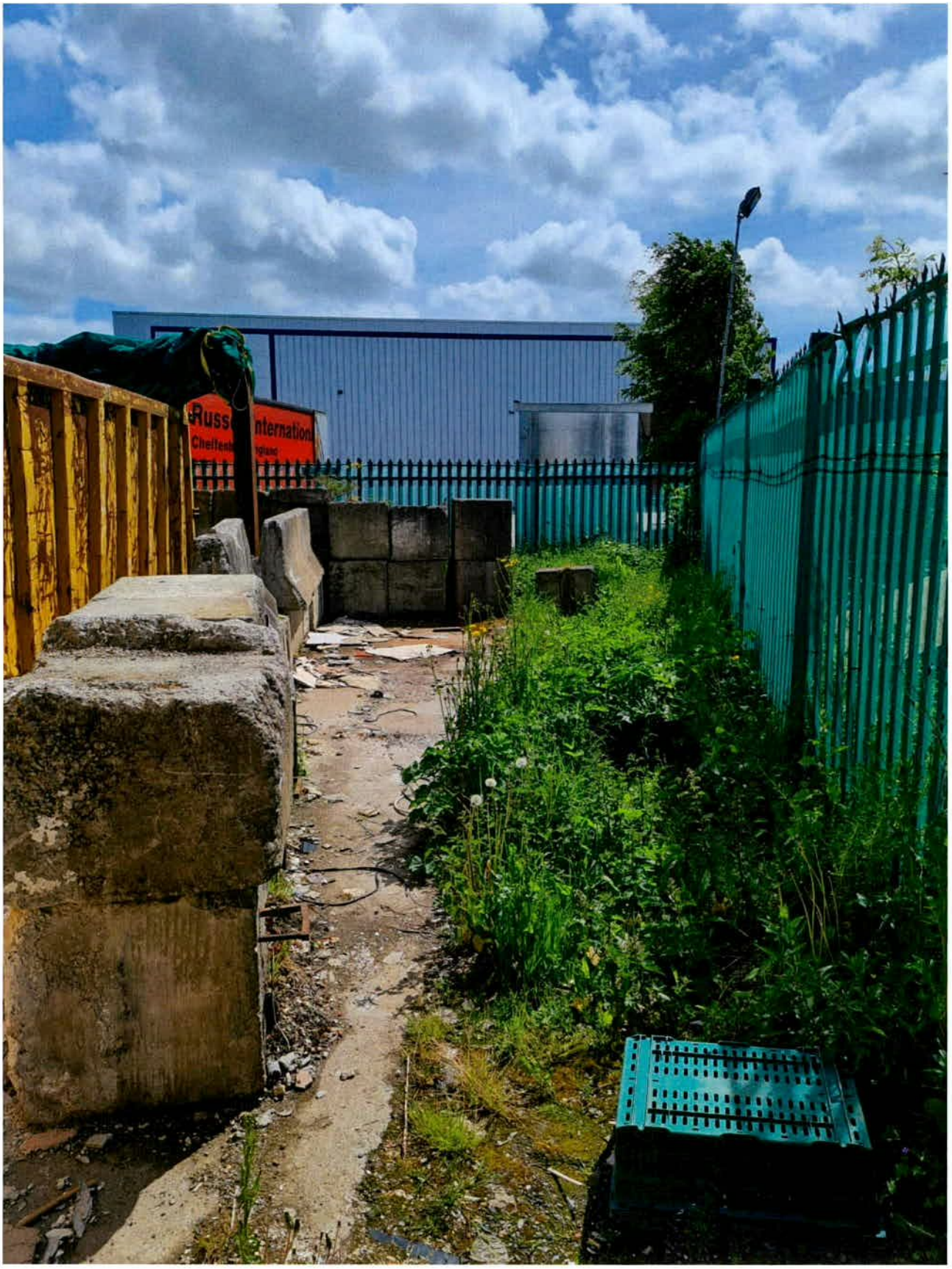

Plate 6: Section of recolonised bare ground habitat at southern end of the site (view facing east)

Plate 7: Section of recolonised bare ground habitat at south east side of the site

Plate 8: Section of grassy verge habitat in front of existing buildings (view facing west)

Appendix E

Historic Land Use

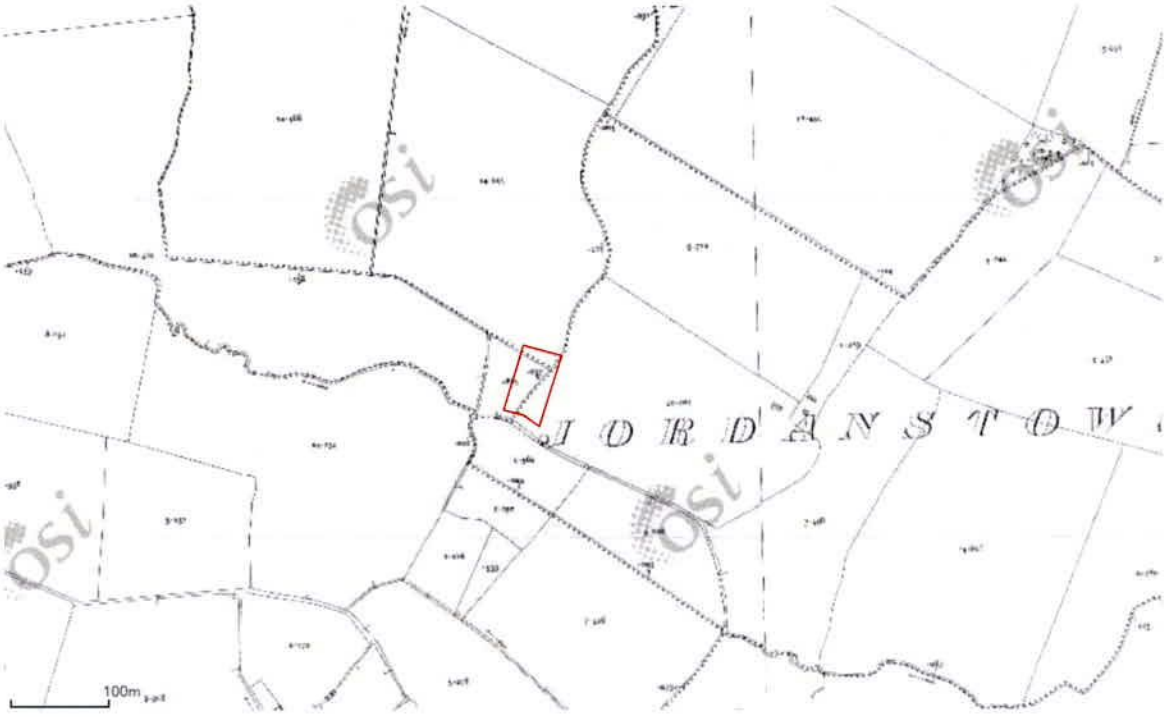

Figure E.1: Historic 25" (1888 – 1913)

Figure E.2: Aerial Photograph 2000

Appendix F

Rainwater Harvesting Tank Calculations Title

Rainwater Harvesting Potential Calculations

Proposed Material Storage Building - Pitched Roof

Description	Plan Area (One Side of pitched roof only)A_h	Half Maximum Area in Elevation $A_v/2$	Effective Area $A_e = A_h + A_v/2$	Annual Rainfall (Source: Met Eireann Coordinates E 301942.4281, N 228762.3690 Irish Grid Co-ordinates)	Annual Rainfall Yield for this roof	5% of Annual Yield for Overground Tank sizing
	m^2	m^2	m^2	mm	m^3	m^3
Roof of Material Storage Building	311.73	19.48	331.2	775	256.69	12.83

Therefore the maximum capacity of the underground storage tank = 12.83 m^3

Expected use for maintenance of perimeter landscaping and dust suppression. Recommended tank capacity to be provided = 10,000 litres

07/07/2022

Appendix G

Stormwater Sewer Calculations

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - Scotland and Ireland

Return Period (years)	1	PIMP (%)	100
M5-60 (mm)	16.500	Add Flow / Climate Change (%)	20
Ratio R	0.283	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	27.000	0.216	125.0	0.034	4.00	0.0	0.600	o	225	Pipe/Conduit	
1.001	18.500	0.148	125.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
2.000	20.000	0.100	200.0	0.017	4.00	0.0	0.600	o	225	Pipe/Conduit	
2.001	8.700	0.044	200.0	0.017	0.00	0.0	0.600	o	225	Pipe/Conduit	
2.002	14.000	0.248	56.6	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.002	28.000	0.156	179.5	0.131	0.00	0.0	0.600	o	225	Pipe/Conduit	
3.000	14.200	0.237	59.9	0.022	4.00	0.0	0.600	o	225	Pipe/Conduit	
1.003	1.900	0.079	24.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	43.13	4.39	86.426	0.034	0.0	0.0	0.8	1.17	46.4	4.8
1.001	42.24	4.65	86.210	0.034	0.0	0.0	0.8	1.17	46.4	4.8
2.000	43.21	4.36	86.453	0.017	0.0	0.0	0.4	0.92	36.6	2.4
2.001	42.67	4.52	86.353	0.034	0.0	0.0	0.8	0.92	36.6	4.7
2.002	42.23	4.65	86.310	0.034	0.0	0.0	0.8	1.74	69.3	4.7
1.002	40.75	5.13	86.062	0.199	0.0	0.0	4.4	0.97	38.7	26.4
3.000	44.00	4.14	86.143	0.022	0.0	0.0	0.5	1.69	67.3	3.1
1.003	40.72	5.14	85.906	0.221	0.0	0.0	4.9	2.68	106.6	29.2

Appendix H

Stormwater Attenuation Tank Calculations