# 6 Land, Soils, Geology, Hydrogeology and Utilities

## 6.1 Introduction

This section of the Environmental Impact Assessment Report (EIAR), prepared by JJ Campbell and Associates Consulting Engineers and O'Connor Sutton Cronin Consulting Engineers (OCSC), assesses and evaluates the impact of the proposed development in terms of land, soils, geology, hydrogeology and utilities during the construction and operational phases of the proposed development. It also identifies the characteristics, predicted potential impacts, mitigation measures and residual impacts arising from the proposed development.

## 6.2 Study Methodology

The methodology followed is in accordance with the European Commission "Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report" (2017) and EPA "Guidelines on the Information to be contained in Environmental Impact Assessment Reports" 2017. Information on soils,

Geology, hydrogeology and utilities of the subject site and surrounding area was assembled from the following sources:

- Site investigation Reports including results from trial pits, bore holes undertaken by Ground Investigations Ireland Ltd.
- Geological Survey of Ireland (GSI) interactive mapping, borehole information and geo-hazard database
- Environmental Protection Agency (EPA) interactive mapping
- Teagasc soil sub-soil database
- Ordnance Survey Ireland (OSI) mapping
- Topographical survey
- Dublin City Development Plan – SDRA 12 – Development Framework For St. Theresa's Gardens and Environs. March 2017 – DRAFT
- Greater Dublin Area Regional Code of Practice for Drainage Works
- Greater Dublin Strategic Drainage Study (GDSDS)
- Site Visit (OCSC)
- Geological Survey of Ireland (GSI) online maps and databases
- Correspondence and meetings with Dublin City Council.
- Irish Water Code of Practice for Wastewater Infrastructure
- Irish Water Code of Practice for Water Infrastructure
- Utility Network Maps as follows:
- Public Water Mains (Irish Water)
- Public Stormwater Drainage (Dublin City Council)
- Public Foul Drainage (Irish Water)
- Electricity Supply Networks (ESB Networks)
- Gas Supply (Gas Networks Ireland)
- Telecommunications (eir)

In the EIAR assessment, consideration is given to both the importance of an attribute and the magnitude of the potential environmental impacts of the proposed activities on that attribute.

The principal attributes (and impacts) to be assessed include the following:

- Geological heritage sites in the vicinity of the perimeter of the subject site
- Quarries or mines in the vicinity, the potential implications (if any) for existing activities and extractable reserves
- The extent of topsoil and subsoil cover and the potential use of this material on site as well of requirement to remove it off-site as waste for disposal or recovery
- High-yielding water supply springs/ wells in the vicinity of the site to within a 2 km radius and the potential for increased risk presented by the proposed development
- Classification (regionally important, locally important etc.) and extent of aquifers underlying the site perimeter area and increased risks presented to them by the proposed development associated with aspects such as for example removal of subsoil cover, removal of aquifer (in whole or part), drawdown in water levels, alteration in established flow regimes, change in groundwater quality
- Natural hydrogeological/ karst features in the area and potential for increased risk presented by the activities at the site
- Groundwater-fed ecosystems and the increased risk presented by operations both spatially and temporally
- Loss of agricultural and amenity lands

## 6.3 The Existing Receiving Environment (Baseline)

**Site Description, Topography & Land Use**

The site of the proposed St. Teresa's SHD extends to c. 3.9 ha with 3 no. Protected Structures in a mature landscaped setting adjoining Rockfield Park. The site is bounded to the north by Temple Road, with mature residential development to the East and the Alzheimer's Society of Ireland to the West. The site is within 1km of Blackrock Village and has high accessibility to public transport. The N31 (Temple Road) is designated as a proposed QBC and both Blackrock and Seapoint DART stations are within easy walking distance.

The buildings on site consist of St Teresa's (A Protected Structure), which is a 3 storey Victorian House with associated Gate Lodge (Protected Structure) and Entrance Gates (Protected Structure) at the main entrance to the site off Temple Road. There are a number of ancillary buildings linked to St Teresa's, which are later additions of no particular architectural character or merit in this case. The portion of the site within the applicants control extends to c. 3.9 ha (the main site area) is the main development site. The remainder of the lands are controlled by:

- Dún Laoghaire-Rathdown County Council i.e., lands along Temple Hill and at St Vincent's Park.
- Lands at the 'Alzheimer's Society of Ireland' i.e., a building bounding the shared boundary.

The topography of the site and general area slopes from south to north. There is approximately 5m of a fall through the site which has ground levels of 21m on the southern boundary, down to 16m on the northern boundary along Temple Road.

The existing site is approximately 90% parkland with 10% building / roads / hardstanding. All existing buildings are to be demolished apart from St Teresa's House which is a protected structure and the Gate Lodge at the entrance from Temple Road which is to be dismantled and rebuilt at a different location within the proposed development.

**Historical Land Use**

Historic OSI 6" and 25" 1831 to 1836 mapping indicates that the site was previously undeveloped.

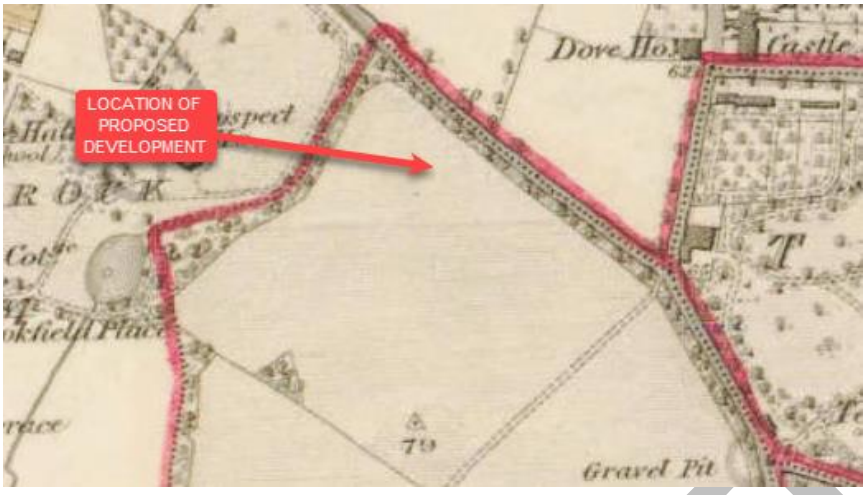


Figure 7.1: OSI Historic 6" 1831 to 1836 map

**Geology**

Three site investigations were commissioned to investigate subsurface conditions utilising a variety of investigations methods such as trial pits, slit trenches, cable percussion boreholes and rotary core boreholes. Ground Investigations Ireland Limited carried out the site investigations in January 2018, December 2018 and December 2020. Results indicate that the site is underlain by coarse grained granite bedrock. Depth to this bedrock varies across the site but it is generally at depths of between 2.1 to 8 metres, generally following the topography of the site. The bedrock is generally partially to distinctly weathered at the top and is weak to medium strong becoming strong and very strong with depth. GSI bedrock mapping for the area confirms the investigation results and identifies the bedrock geology underlying the site and immediate area as dominated by Granite with microcline phenocrysts from the Caledonian period, refer to figure 7.2.

A desktop study did not identify any designated protection or conservation areas, karst features, geological heritage areas, geo-hazards, mines/mineral extract or quarries in the immediate area. No rock outcrops were noted during the site visit.

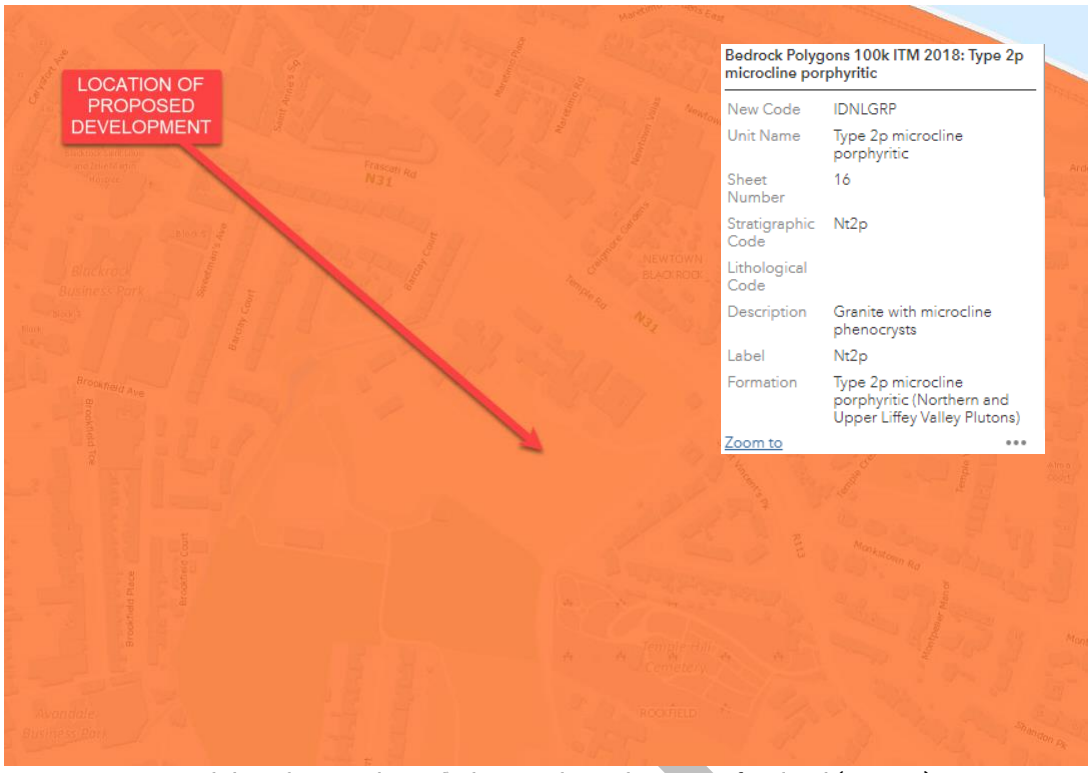


Figure 7.2: 100K solid geology and Boreholes, Geological Survey of Ireland (15.12.21)

**Soils and Subsoil (Quaternary) Geology**

The quaternary period is the most recent stage of the geological time period including the Ice Age and the postglacial period which extends to the present day. Most surface deposits were deposited in the Quaternary Period and provide the parent materials for soils. Most sediments of the Quaternary period were deposited during the Ice Age itself either directly from the huge ice sheets or by meltwater from sheets as they melted. Ice sheets slowly eroded the underlying bedrock producing sediment of all sizes ranging from clay to boulder. When spread over surface by glacial ice it takes the form of till (boulder clay). Alternatively, sediment may be carried and sorted by meltwater and deposited as sand and gravel, with silt and clay deposited separately in lake systems or carried away to the sea. Glacial deposits therefore contain fragments of the type of bedrock over which the ice originally passed.

The GSI quaternary geology mapping identifies the sub-soil for the site as mainly glacial granite till derived from the parent granite bedrock with gravels derived from limestone, refer to figure 7.3. Investigation of the Teagasc soil map and EPA soil and sub-soil interactive mapping indicated only made ground at the site while the generalised soil map identifies brown and grey podzolics principal soils of the area.

The site investigation identified the ground conditions for the site to be either made ground or topsoil in the green-field areas. These were underlain by cohesive soft to firm light brown slightly sandy gravelly clay deposits. Secondary sand and gravel constituents of these deposits varied with location and depth and cobbles and/or boulders were present. The bore holes identified that the top of the bedrock was weathered in places forming granular/weathered rock deposits of light brownish grey coarsely crystalline Granite. However, in some locations the top of the bedrock was only partially weathered with coarsely crystalline granular deposits.

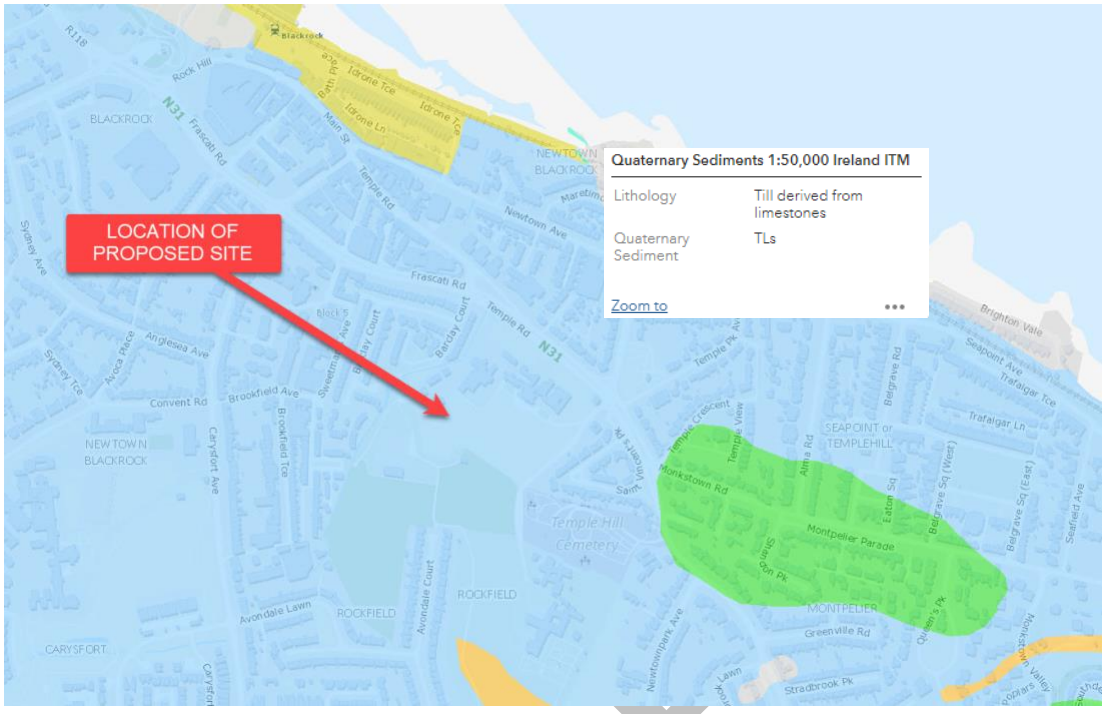


Figure 7.3: Quaternary Geology mapping Sandyford, Geological Survey Ireland (15.12.21)

## Hydrogeology: Groundwater & Aquifer Classification/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. More scientifically, groundwater vulnerability embodies the characteristics of the intrinsic geological and hydrogeological features at a site that determine the ease of contamination of groundwater.

GSI interactive mapping classifies the bedrock in the Temple Hill area at the site as" High Vulnerability" on the eastern side of the site and "Moderate Vulnerability" on the western side of site. This correlates with the type of bedrock underlying the site which is low permeability typical of granite. There are no regionally or locally important aquifers in the immediate area. It is noted from the site investigation that the top of bedrock was partially to distinctly weathered and rotary coring at one borehole confirmed that the site's bedrock may have local areas of fissured rock within the upper section of weathered bedrock which could act to increase permeability and groundwater storage within these local zones.

The December 2018 site investigation identified the water table at 1.02m BGL at borehole location A on the south east corner of the site and 3.74m BGL at borehole location B on the north west corner of the site. Both observed groundwater ingresses were above the bedrock in the gravelly cobbly CLAY. This difference in groundwater indicates that groundwater levels are not constant through the site. Ground water strikes were not observed in any of the deep slit trenches or later 2020 site investigation.

**Groundwater flow** was not measured but it is expected to follow the topography and flow generally from south to north.

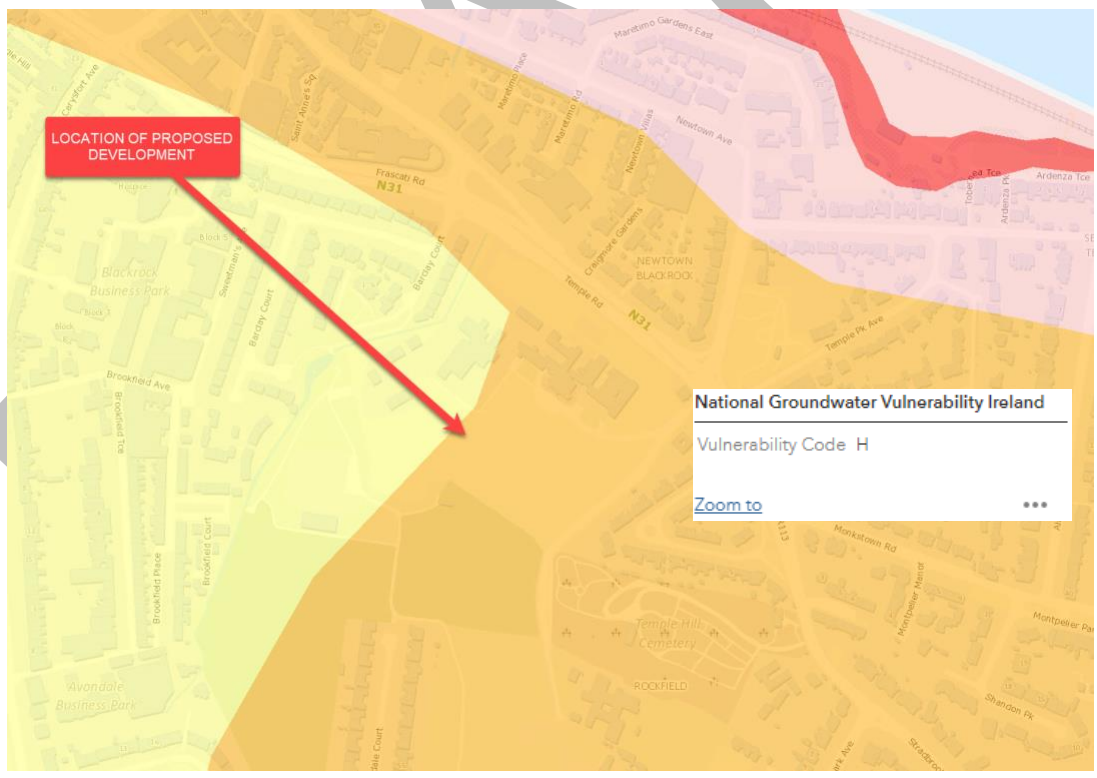


Figure 7.4: Groundwater Vulnerability, Geological Survey Ireland (15.12.21)

Due to the depth of the sub-soil overburden for the site, typically 2 to 5 metres, the vulnerability of the groundwater is classified as "high" by the adopted criteria. However this should be considered in the context that the bedrock is generally unproductive and has low permeability, except in localised weathered bedrock zones.

### Groundwater Wells

The EPA mapping identified no wells within 3 kilometres of the site. Also, it appears that groundwater from the area may extend to a European site, i.e., South Dublin Bay SAC, which is approximately 300m distant at its nearest point.

**Hydrogeology: Groundwater & Soil Quality**

EPA mapping identifies that status of the groundwater body for the wider area as "at risk of not achieving good status". This status is related to the land use above the groundwater zone and activities in the much wider area which could impact groundwater quality from their diffuse run-off. The status does not relate to this site which is parkland and proposed residential which is low risk.

No Environmental testing was undertaken at this stage. EPA and historic maps were examined for evidence of previous use, no evidence that the site has been used for the disposal of waste or industrial activities.

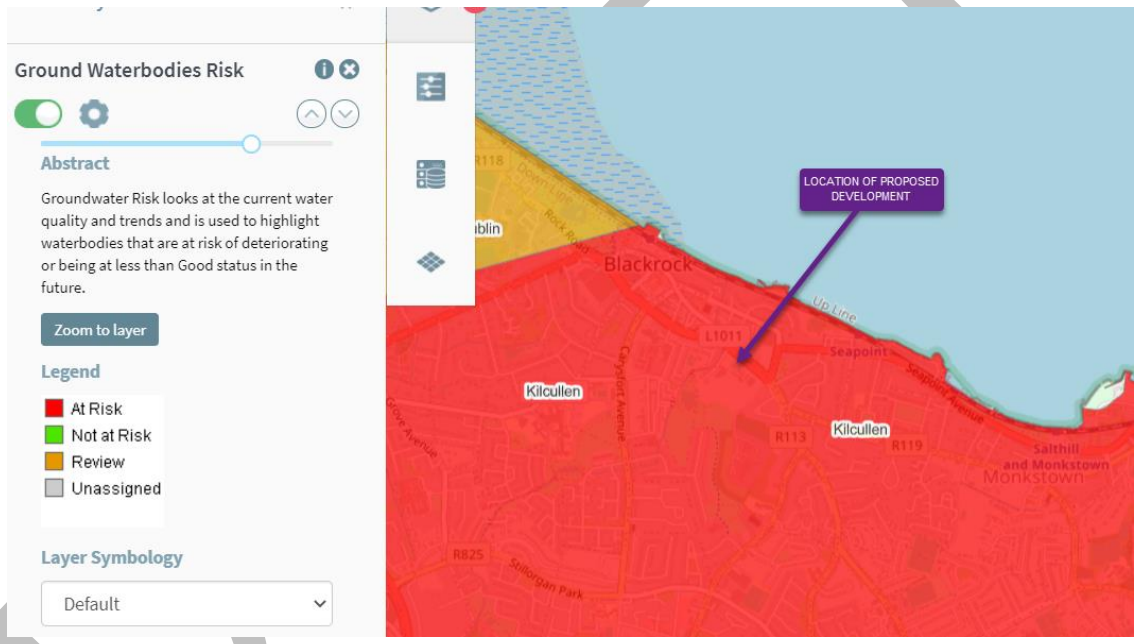


Figure 7.5: EPA - Ground Water Bodies Risk (15.12.21)

**Radon**

Based on the National Reference level of 200 Becquerel (BQ)/m3, radon concentration for the area around the proposed development are considered medium with 5%-10% of homes in exceedance, e.g. between five and ten per cent of the homes in this 10km grid square are estimated to be above Reference Level.


Figure 7.6: Radon Map (15.12.21)

**Electricity**

Consultation has taken place with the ESB Networks with regard to the availability of electrical power. 1 no. new double Sub-Station and 1no. Single Sub-Station is proposed to service the development.
It will be necessary to divert HV and MV lines which traverse the development site and consultations are ongoing with ESB Networks in this respect.
Electrical cables have been surveyed by Murphy Surveys using GPS, see JJ Campbell and Associates drawings C1.


Drawing 01 – Extract from OCSC Planning Drawing DR-E-0002 showing services, (See planning drawing DR-E-0002 for full scale drawing)

**Gas**

Gas network has been mapped by Murphy Surveys using Ground Penetrating Radar (GPR) and existing maps. See JJ Campbell and Associates planning "Existing Services " Drawing, C1.

**Telecommunications**

Existing records adjacent the site have been received from Eir for the area adjacent the site.

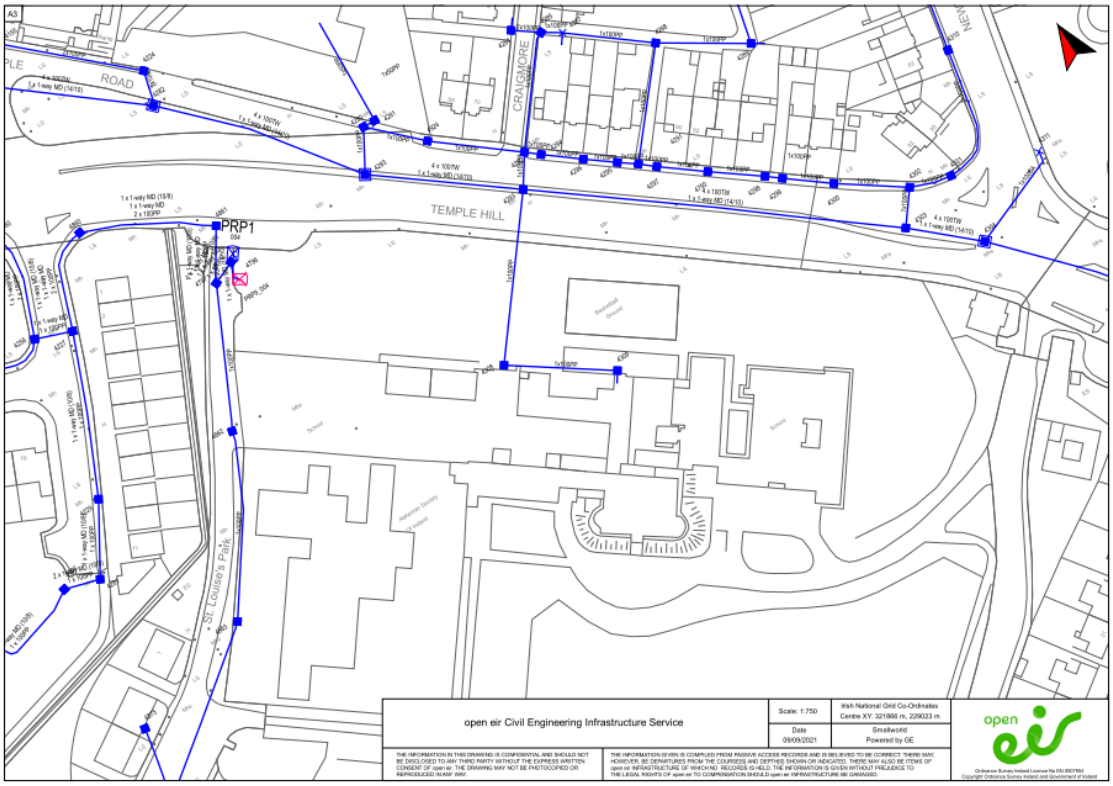


Figure 7.7 Existing Eir Telecoms Infrastructure

## 6.4 Characteristics of the Proposed Development

The proposed development comprises 493 residential units delivered in a combination of new apartment buildings (ranging in height from 3- 10 storeys overall in height) and a relocated St. Teresa's Lodge.

St. Teresa's House provides for 6 apartments, comprising 5 no. 2-bed units and 1 no. 3-bed unit. The new build element of 487 units is set out in 11 no. residential development blocks (Blocks A1-C2 and D1 – E2) ranging in height from 3-10 storeys over basement comprising:

- Block A1 (5 storeys) comprising 37 no. apartments (33 no. 1 bed units and 4 no. 2 bed units)

- Block B1 (10 storeys) comprising 55 no. apartments (37 no. 1 bed units, 10 no. 2 bed units and 8no. 3 bed units)

- Block B2 (8 storeys) comprising 42 no. apartments (28 no. 1 beds, 9 no. 2 beds and 5 no. 3 beds)

- Block B3 (8 storeys) comprising 42 no. apartments (28 no. 1 beds, 9 no. 2 beds and 5 no. 3 beds)

- Block B4 (5 storeys) comprising 41 no. apartments (4 no. studio units, 4 no. 1 bed units, 27 no. 2 bed units and 6 no. 3 bed units).

- Block C1 (3 storeys) comprising 10 no. apartments (1 no. studio unit, 3 no. 1 bed units and 6 no. 2 bed units).

- Block C2 (3 storeys) comprising 6 no. apartments (2 no. 1 bed units, 4 no. 2 bed units,) together with a

creche facility of 392 sq. m at ground floor level and outdoor play area space of 302sq.m

- Block C3 (1 storey plus basement level) comprising residential amenity space of 451 sq. m.

- Block D1 (6 storeys) comprising 134 no. apartments (12 no. studio units, 22 no. 1 bed units, 90 no. 2 bed units and 10 no. 3 bed units).

- Block E1 (6 storeys) comprising 70 apartment units (34 no. 1 bed units, 26 no. 2 bed units and 10 no. 3 bed units).

- Block E2 (6 storeys) comprising 50 units (1 no. studio unit, 29 no. 1 bed units, 18 no. 2 bed units and 2 no. 3 bed units).

Each residential unit has associated private open space in the form of a terrace/balcony.

Resident amenity space c. 451 sq. m. accommodating a gym and studio space at basement level; residents'

lounge/café, work booths/meeting room and reception/foyer/parcel store at ground floor. Crèche facility of 392. sq. m.

252 no. residential car parking spaces (161 no. at basement level and 91 no. at surface level) and 20 motorcycle spaces at basement level are proposed. 8 no. car parking spaces for creche use are proposed at surface level.

1056 no. bicycle parking spaces (656 no. at basement level and 400 no. at surface level).

15,099.7 sq. m. public open space in the form of a central parkland, garden link, woodland parkland (incorporating an existing folly), a tree belt, entrance gardens, plazas, terraces, gardens, and roof terraces for Blocks B2 and B3.

The development will be constructed in a phased manner. It is anticipated that the main construction activity impacting the soils, geology and hydrogeology will comprise the following main elements:

- Removal of topsoil, made ground, fill, soil, sub-soil and clay just above the weathered rock for the construction of basements. Approximate quantity of material to be excavated for the basements at Blocks A1 to B4 is 34,000m³ and 11,000m³ for Block D1.
- Approximately, 1500m3 of top-soil would be reused throughout the site, including on the basement podium deck.
- Construction of the roads / paths around the development;
- Installation of main services and utilities to serve the site;
- Provision of large underground surface water attenuation storage areas;
- General landscaping
- Extensive type green roofs to be provided on all proposed residential blocks.

It is anticipated that the basements will be excavated in clay about 0.5m to 2m above the weathered bedrock and that the development will create additional impermeable surface areas. There will be no direct discharges to ground for the developments operation due to low infiltration rates of the soil.

## 6.5 Potential Impact of the Proposed Development

The potential impacts of the proposed development with regard to the soil, bedrock environment and utilities are set out below for construction and operational phases.

**Construction Stage**

The development works and related excavations, especially those required to provide the development's basement, will not be deep enough to impact the underlying bedrock. Construction activities will therefore impact the soils/sub-soils but not bedrock within the site.

Removal of trees, as identified, will follow along with stripping off the existing topsoil from the site at the proposed building and road locations but excluding existing green-field and open space areas. This would involve removing approximately the upper 600mm of natural top-soil locally. The majority of this top-soil will be removed off site: however, the proposed development's landscaped and grassed areas will require a quantum of top soil to be re-used.

The main volume of excavation will comprise of excavated material for the basements, Blocks A1 to B4: 34,000m³ and 11,000m³ for Block D1.

Significant volumes will have to be removed to provide the depths required. Excavation will be above the granite bedrock.

It is not envisaged that anticipated groundwater qualities would require significant dewatering during construction over above normal levels, as waterproof interlocking secant piling and concrete trench fill will be used to allow excavation of the basements.

The previous use of the site does not present a risk of contaminated soil/water. But if localised contaminates are identified, they shall be monitored during exaction phase to ensure that the extents of contamination are identified and removed separately and under license as required.

The main access road, footpath/cycle-path links etc are limited in size and depth such that they would be confined to the upper 0.6 metres of the soil layer

There is a risk that earthworks and the removal of topsoil could expose some remaining subsoil layers and may result in local erosion of soil, particularly in times of adverse weather conditions during the construction phase. However, the excavations will be blinded immediately after excavation to protect the sub soil under. Also, the depth of overburden is quite shallow which will reduce the area of soil at risk.

Increased traffic associated with the construction works and the removal of the large volumes of material would have the effect of compacting existing subsoil layers in places within the site. The regular movement of heavy machinery and plant to and from the site would also result in an increased risk to the integrity of the surrounding access routes.

During construction, in the absence of mitigation, there is increased risk of accidental pollution and contamination of soils and groundwater from spills relating to re-fuelling, oils from construction machinery/vehicles and construction materials e.g. concrete/cement.

High voltage underground cables running through the site have been identified on ESB maps, the underground cables will have to be relocated by the ESB without disruption to its users.
A 150Ø foul sewer was identified coming from the Rockfield direction, the pipe will have to be investigated further and diverted if required.

Services within the site boundary were serving building which are now vacant and not in use, there will be no disturbance to services. When the high voltage cables are to be relocated, a new cable and chambers will be installed first which will minimise disturbance if any during changeover.

**Operational Stage**

Electricity
The Proposed Development will require electricity supplies during the operational phase of the scheme and these will be provided by the installation of new sub-stations within the development and the decommissioning of the existing two sub-station based on its current location all in agreement with ESB Networks and the new cable services will be located underground.

Gas
The Proposed Development will require gas supplies during the operational phase of the scheme and these will be provided by the installation of new connections to the development site. As the new services will be located underground this will result in a permanent but imperceptible effect.

The operational impact of the proposed development is considered to be neutral, imperceptible, and long-term.

The additional demand on the gas network will have an imperceptible impact of long term and neutral effect on the surrounding area as there is sufficient capacity in the gas network system to manage the additional demand created by the development. It should be noted that the apartments will utilise exhaust air heat pumps for heating (i.e. gas not required in apartments). The gas load for the development is primarily for the retail units.

Telecommunications
The Proposed Development will require telecommunication connections during the operational phase of the scheme and given the number of telecommunication providers with infrastructure available within the area, this will provide the building users with a greater choice of service and will result in a positive effect for the end users. As the new services will be located underground this will result in an imperceptible impact of long term and positive effect.

The additional demand on the telecoms network is not deemed to have any material impact on the surrounding area as there is sufficient capacity in the telecoms network system to manage the additional demand created by the development. The likely impact from the operational phase on the telecoms network is likely to be imperceptible impact of long term and neutral effect

On completion of the construction phase, it is not envisaged that there would be further direct impacts on the soil or geology structure from the low-risk type of residential development proposed. Appropriately designed and constructed gas, electricity, water, telecom will protect the soils and geology from potential contamination risks from operation of the residential developments or from surface water run-off. Only a small proportion of the development will have a basement and basement gullies will discharge to a light liquid separator which will then discharge to the foul sewer network, together with the proposed type of use, there is a low risk of contamination. The impact of the operational phase is therefore considered imperceptible.

## 6.6 Do Nothing Scenario

The baseline is set out in chapter 7.3, "The Existing Receiving Environment".

In the short term if the proposed development did not proceed, the baseline will not change and there would be no additional impact on the existing soils, geology or hydrogeology of the site as the land use would remain unchanged being mostly green-field with some existing buildings and hard standing.

Over time if the development did not proceed, the geology including the soils and sub soils would not change. Other proposed developments identified with planning in the area which are yet to be built will have to apply with stringent planning regulations and are located far enough away so not to affect the Lands at St Teresa's. The do nothing scenario is a feasible option for the long term. But there is always the possibility that the ground may become contaminated by future human activities or the existing oil tanks at St Catherine's House leaking.

In terms of utilities if the proposed development was not to proceed, there would be no increase in the demand on the existing networks. However, the site is zoned for development and it is likely that in the absence of this subject proposal that a development of a similar nature, with similar demand requirements, would be progressed on the site that accords with National policy for compact growth on brownfield sites.

## 6.7 Mitigation Measures

**Construction Stage**

In order to minimise the impact of construction on the site's soils, geology and hydrogeology the following mitigation measures will be implemented:

- Contractor to implement best practice construction methods and practices complying with Building Control Act 1990 – 2017, building regulations 1997 - 2017, Safety Health and Welfare at Work Regulations 2019.
- Existing topsoil and sub-soil shall be retained on site to be used for the future development to reduce the volumes removed, to reduce the construction phase trip generation, to retain the existing natural type of topsoil from the site for the future development.
- Topsoil shall be stored in an appropriate manner on site for the duration of the constructions works and protected for re-use on completion of the main site works.
- Top-soiling and landscaping shall take place as soon as finished levels are achieved in order to reduce weathering and erosion and to retain soil properties;
- Wheel wash facilities shall be provided close to the site entrance to reduce the deposition of mud, soils and other substances on the surrounding road network;

- The construction phase shall be monitored, in particular in relation to the following:
  - Protection of topsoil stockpiled for re-use and to prevent degradation;
  - Adequate protection from contamination of soils for removal;
  - Cleanliness of adjoining road network
  - Prevention of oil and petrol spillages; and
  - Dust control
- Extent of excavation works and depths for basement and roads shall be limited through design to minimise disturbance of the original soil and subsoil formations and to retain soil structure also to reduce bulk volume excavation which is just above the rock;
- Construction traffic shall be excluded from areas of soil to be retained to reduce its degradation;
- Extent of excavation works and depths for basement and roads shall be limited through design to minimize disturbance of the original soil and subsoil formations and to retain soil structure also to reduce bulk volume excavation. This will also help to reduce the volumes of material off-site and backfill material;
- Reusable excavated gravels, sands or rock shall be retained on-site for backfilling or use in landscaped areas or drainage purposes to reduce the total volume of imported material;
- Any soil/subsoil that is deemed to be contaminated will be stored separately to the clean and inert soil/subsoil. The material will be appropriately tested and classified as either non-hazardous or hazardous in accordance with the EPA publication 'Waste Classification: List of Waste & Determining if Waste is Hazardous or Non-Hazardous' using the HazWasteOnline application (or similar approved classification method). The material will then need to be classified as clean, inert, non-hazardous or hazardous in accordance with the EC Council Decision 2003/33/EC.
- The appointed waste contractor will collect and transfer the unsuitable material and waste material as receptacles are filled. Any waste removed off-site will be carried by contractors licensed under the Waste Management Acts 1996 - 2008, the Waste Management (Collection Permit) Regulations 2007(as amended) and Amendments and the Waste Management (Facility Permit & Registration) Regulations 2007 (as amended).
- Oil and fuel stored on site for construction shall be stored in designated areas within the site compound which shall be located in the open space immediately to the south west of St Catherine's House. The oil and fuel storage tanks shall be proprietary self-bunded tanks.
- Refuelling of construction machinery shall be undertaken in designated areas located away from surface water drainage in order to minimise potential contamination impacts on remaining soils, geology and hydrogeology. Spill kits shall be kept in these areas in the event of spillages;

- Pouring of concrete including wash down and washout of concrete from delivery vehicles to shall be controlled in an appropriate facility located within the site compound which will be located in the open space immediately south west of St Catherine's House.
- Surface water runoff during the construction works that may become contaminated with silt or other materials shall be treated/separated in a silt trap before disposal: and
- Surplus subsoil from excavations shall be properly stockpiled when being re-used or else taken off-site.

- Water Supply
  Appropriate construction methodology as outlined in Irish Water – Code of Practice for Water Infrastructure (IW-CDS-5020-03) which is available to download at www.water.ie/iw-documents/connections/Water-Code-of-Practice.pdf will be employed to ensure against contamination risk of the local water supply and all watermain connection works shall be carried out by the Irish Water accredited regional contractor.

  To avoid contamination of the local water supply and leaks in the system, all watermains shall be tested in accordance with Irish Water Code of Practice for Water Infrastructure.

- Wastewater Drainage
  To prevent the potential ingress of ground water, all new sewers shall be tested and surveyed and, where necessary, repaired in accordance with Irish Water Code of Practice for Wastewater prior to connection to the public system.

  Any leakage from foul sewers shall be cordoned off and contaminated effluent and soil collect and disposed of by a licenced contractor.

  The connection of the new foul sewer to the public combined sewer network shall be carried out by the Irish Water Regional Contractor.

- Surface Water Drainage
  Temporary dewatering measures shall only be employed where necessary and shall discharge to the surface sewer network only, to prevent untreated ground water discharge to the surface sewer system during construction of the basement, an on-site treatment system / silt trap shall be used to treat ground water as necessary to meet Irish Water or Dublin City Council temporary discharge licence

  To prevent the potential ingress of ground water, all new sewers shall be tested and surveyed and, where necessary, repaired in accordance with the Greater Dublin Area Regional Code of Practice for Drainage Works prior to connection to the public surface water system

  Road sweeping facilities shall be provided during the construction phase on a daily basis or more frequently if required.

  All oils/diesel stored on site for construction equipment shall be located within the site compound which will be located in the green area immediately south west of St Catherine's House. The oil and fuel storage tanks shall be proprietary self bunded tanks.

- Gas Supply
  The locations of the gas network infrastructure is shown on JJ Campbell and Associates Existing Site Plan Drawing C1, location for the Gas infrastructure within the site was taken from Gas Networks records and a GPR survey by Murphy Surveys, to help mitigate the risk of a gas main hit before construction starts. Prior to excavation, additional site investigations, including slit trenches, shall be carried out as a mitigation, in order to determine the exact location of the gas network in close proximity to the works area. This will ensure that the underground gas network will not be damaged during the construction phase.

The following measures will be put in place to ensure that there are no interruptions to existing services and all services and utilities are maintained, unless agreed in advance with Gas Networks Ireland (GNI).

All works in the vicinity of GNI infrastructure will be carried out in ongoing consultation with GNI and will be in compliance with all requirements GNI has, including procedures to ensure safe working practices are implemented when working near live gas mains.

- Telecommunication
  The locations of the telecommunication network infrastructure is shown on JJ Campbell and Associates Existing Services Drawing C1, location of the telecommunication infrastructure within the site was taken from the by Murphy Surveys Utility Survey drawings which will help mitigate the risk of a telecommunications cable hit before construction starts. Prior to excavation additional site investigations, including slit trenches, shall be carried out in order to determine the exact location of the telecommunications network in close proximity to the works area. This will ensure that the underground telecommunications network will not be damaged during the construction phase.

  The following measures will be put in place to ensure that there are no interruptions to existing services and all services and utilities are maintained unless agreed in advance with the relevant telecommunication provider.

  All works in the vicinity of the telecommunications providers' infrastructure will be carried out in ongoing consultation with the relevant provider and will be in compliance with all relevant requirements or guidelines.

  Where new services are required, application shall be made to the relevant provider for a connection permit where appropriate and will adhere to their requirements to ensure safety of installation.

  It is considered that any likely impacts to overhead cables in the vicinity will be mitigated by.

- Electricity
  The locations of the high and low voltage ESB infrastructure is shown on JJ Campbell and Associates Existing Services Drawing C1, location of the telecommunication infrastructure within the site was taken from the by Murphy Surveys Utility Survey drawings which will mitigate the risk of damage to the electricity infrastructure before construction starts. Prior to excavation the Contractor will carry out additional site investigation, including slit trenches, in order to determine the exact location of the electricity network in close proximity to the works area. This will ensure that the underground electricity network will not be damaged during the construction phase

  The Contractor will be obliged to put measures in place to ensure that there are no interruptions to existing services and all services and utilities are maintained unless this has been agreed in advance with ESB Networks.

  All works in the vicinity of ESB Networks infrastructure will be carried out in ongoing consultation with ESB Networks and will be in compliance with any requirements or guidelines they may have including procedures to ensure safe working practices are implemented when working near live overhead/underground electrical lines.

**Operational Stage**

In order to minimise the impact of the development's operational phase on the site's soils, geology and hydrogeology, the following mitigation measures should be implemented:

All waste generated by the everyday operation of the development should be securely stored within designated collection areas with positive drainage collection systems to collect potential run off. Operational waste should be removed from site using licensed waste management contractors; A project specific OWMP has been prepared and is included in Chapter 13, Waste Management.
The Operator / Buildings Manager of the Site during the operational phase will be responsible for ensuring – allocating personnel and resources, as needed – the ongoing implementation of the OWMP, ensuring a high level of recycling, reuse, and recovery at the Site of the proposed Development.
In addition, the following mitigation measures will be implemented:
The Operator / Buildings Manager will ensure on-Site segregation of all waste materials into appropriate categories, including (but not limited to):
Organic waste;
Dry Mixed Recyclables;
Mixed Non-Recyclable Waste;
Glass;
Waste electrical and electronic equipment (WEEE);
Batteries (non-hazardous and hazardous);
Cooking oil;
Light bulbs;
Cleaning chemicals (pesticides, paints, adhesives, resins, detergents, etc.);
Furniture (and from time-to-time other bulky waste); and
Abandoned bicycles.
The Operator / Buildings Manager will ensure that all waste materials will be stored in colour coded bins or other suitable receptacles in designated, easily accessible locations. Bins will be clearly identified with the approved waste type to ensure there is no cross contamination of waste materials;
The Operator / Buildings Manager will ensure that all waste collected from the Site of the proposed Development will be reused, recycled, or recovered, where possible, with the exception of those waste streams where appropriate facilities are currently not available; and
The Operator / Buildings Manager will ensure that all waste leaving the Site will be transported by suitable permitted contractors and taken to suitably registered, permitted, or licensed facilities.
The effective implementation of these mitigation measures will ensure the waste arising from the proposed development during the operational phase is dealt with in compliance with the provisions of the Waste Management Act 1996, as amended, and Regulations made thereunder, the Litter Pollution Act 1997, the EMR Waste Management Plan 2015 – 2021 and the DLRCC waste bye-laws. It will also ensure optimum levels of waste reduction, reuse, recycling and recovery are achieved.

- Fuel storage areas, if required, should be within secured, self bunded designated areas.

- <u>Water Supply</u>
  A water audit will be carried out by Irish Water to ensure the construction is fully in compliance with Irish Water Code of Practice and standard details prior to taking in charge. The site watermain system will be metered as directed by Irish Water to facilitate detection of leakage and prevent ongoing water loss.

- <u>Wastewater Drainage</u>
  A wastewater audit will be carried out by Irish Water to ensure the construction is fully in compliance with Irish Water Code of Practice and standard details prior to taking in charge. Areas to remain in the charge of the applicant (private side drainage) will be maintained on a scheduled basis as part of the building management plan.

- <u>Surface Water Drainage</u>
  The development has been designed in accordance with Dublin City Council Drainage Department's guidelines for planning applications, the recommendations of the Greater Dublin Regional Drainage Study (GDSDS) and Ciria Guide C753 – The SUDS Manual, to incorporate best practice Sustainable Drainage Systems. Sustainable Drainage Systems are a collection of water management practices that aim to align modern drainage systems with natural water processes. Integration of SuDS make urban drainage systems more

compatible with components of the natural water cycle such as storm surge overflows, soil percolation, and bio-filtration, mitigating the effect human development may have on the natural water cycle, particularly surface runoff and water pollution trends.
In the context of this site, the provision of the sustainable drainage systems including, green and blue roofs to intercept, filter and attenuate surface water at roof level, tree pits to intercept, filter and attenuate surface water at grade and attenuation storage devices to limit peak discharge rates to the public surface water sewer to pre-development flows, as well as eliminate surface water discharge to the combined sewer network, will result in a significant improvement on the public drainage system, from existing conditions. This will constitute a positive, imperceptible and permanent impact.

All sustainable drainage systems will be either maintained by the applicant or, where taken in charge, by the local authority. Regular maintenance of the SuDS systems will maintain their function of treating surface water prior to discharge. This will prevent silt build-up and other contaminant discharge to the surface water network. Regular maintenance of the attenuation storage and flow control device will maintain controlled discharge of stormwater in rainfall events and prevent inundation of the surface water system.

- Gas Supply
  The gas demands during the operational phase on the existing gas network are considered to be low due to the NZEB energy efficient design, thermal performance of the buildings and the use of renewable technology to reduce the heating demand. The apartment heating system is proposed to be exhaust air heat pump which does not require gas. The gas demand will be in the form of the ground floor retail units and it is predicted that this gas demand will be small.

- Telecommunication
  The design and construction of the required Telecommunication services infrastructure in accordance with the relevant guidelines and codes of practice will mitigate any potential service outage impacts during the operational phase of the development, with the exception of any routine maintenance of the site services.

- Electricity
  The power demands during the operational phase on the existing electricity network are considered to be imperceptible due to the energy efficient design including LED lighting, high performance heating equipment.

  The design and construction of the required electrical services infrastructure in accordance with the relevant guidelines and codes of practice will mitigate any potential impacts during the operational phase of the development, with the exception of any routine maintenance of the site services.

  The likely impact from the operational phase on the electricity supply network is likely, of long term and positive effect as key infrastructure is provided to the neighbourhood.

  The indirect impact will allow ESB Networks to provide additional resilience in their network through the provision of new Sub-Stations (Assuming agreement with ESB Networks) which in turn should have a slight permanent impact of positive effect on the wider area's electrical infrastructure.

**Impact Categorisation**

A summary of the predicted impacts and their impact levels and significance are outlined in table 7.1 below.

| Nature of Impact | Impact Level | Significance Criteria |
|---|---|---|
| **Construction** | | |
| C1 – Removal of significant volume of existing top-soil from site. | Moderate | Direct |
| C2 – Removal of significant volume of sub-soils from site. | Moderate | Direct |
| C3 – Removal of upper fragmented/weathered layer of drainable bedrock from site, SI indicates basement will be above rock. | Imperceptible | Direct |
| C4- Removal of large volume of bedrock from site including rock splitting/breaking, SI indicates basement will be above rock | Imperceptible | Direct |
| C5 – Exposure of remaining perimeter subsoil layer to the effects of weathering/erosion. | Slight | Direct |
| C6 – Increased traffic compacting existing subsoil layers | Slight | Secondary |
| C7 – Increased risk to the integrity of the surrounding access routes. | Slight | Secondary |
| C8 – Transfer of mud and dust to surrounding access routes. | Slight | Secondary |
| C9 – Large volumes of soil to be removed with heavy machinery with associated noise impacts. | Slight | Secondary |
| C10 – Removal of recharge to ground facility. | Imperceptible | Direct |
| C11 – Potential existing contaminated ground on site spreads to good ground/contaminates groundwater. | Slight | Direct |
| C24 - Increased electrical demand over existing | Likely | Direct |
| C25 - Increased telecommunication demand over existing | Unlikely | Direct |
| **Operational**<br>01 – Contamination risks arising from development use/leaking pipes./contaminated surface water run-off | Imperceptible | Direct |
| 09 - Increased Electrical Demand | Likely | Direct |
| 10 - Increased Gas Demand | Likely | Direct |
| 11 - Increased telecommunication demand | Likely | Direct |
| 12 - Cumulative increase in Electrical demand from Masterplan and other nearby developments | Likely | Cumulative |
| 13 - Cumulative increase in Gas Demand from Masterplan and other nearby developments | Likely | Cumulative |
| 14 - Cumulative increase in telecommunication demand from Masterplan and other nearby developments | Likely | Cumulative |

***Table 7.1: Impact Characterisation Table***

## 6.8 Monitoring

**Construction Stage**

Regular inspection of surface water run-off and sediments controls e.g. silt traps will be carried during the construction phase. Regular inspection of the implementation of construction mitigation measures will be undertaken e.g. concrete pouring, refuelling etc. as part of implementation of the site CEMP.

**Operational Stage**

Storm water from the development will discharge to the dedicated public storm water system and Foul effluent will discharge to the dedicated Irish Water foul water system. Groundwater monitoring will not be required at operational stage.

## 6.9 Interactions

**Hydrogeology**

As outlined in the receiving environment, there is an inter-relationship between hydrology and soils, geology and hydrogeology. Surface water run-off may have the potential to enter soil and shallow groundwater. Implementation of appropriate mitigation measures as outlined in the CEMP will eliminate the potential for the influx of surface contaminants into the underlying geology and hydrogeology which would otherwise affect its quality:

- Control of Water Pollution from construction Sites, Guidance for consultants and contractors (C532); and
- Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (2016).
- Environmental Good Practice on Site (3rd edition) (C692).

Surface water discharge from the site will be managed and controlled for the duration of the construction works until the permanently attenuated surface water drainage system of the proposed site is complete. A temporary drainage system shall be installed prior to the commencement of the construction works to collect surface water runoff by the site during construction.

It is envisaged that a number of geotextile lined settling basins or a proprietary silt collector and temporary mounding's and/or silt fences will be installed to ensure silts do not flow off site during the construction stage. This temporary surface water management facility will throttle runoff and allow suspended solids to be settled out and removed. All inlets to the settling basins will be 'riprapped' to prevent scour and erosion in the vicinity of the inlet.

**Air Quality**

There is a potential for soil excavation activity to impact on air quality in terms of dust generated but the implementation of suitable mitigation will ensure a neutral impact, mitigation measures are set out in the CEMP:

Site Management:

- Complaint registers will be kept detailing all telephone calls and letters of complaint received in connection with construction activities, together with details of any remedial actions carried out;
- Equipment and vehicles used on site will be in good condition such that emissions from diesel engines etc. are not excessive; and

- Pre-start checks will be carried out on equipment to ensure they are operating efficiently and that emission controls installed as part of the equipment are functional.

Dust deposition levels will be monitored on a regular basis in order to assess the impact that site activities may have on the local ambient air quality. The following procedure will be implemented:

- The dust deposition rate will be measured by positioning Bergerhoff Dust Deposit Gauges at strategic locations near the boundaries of the site for a period of 30 (+/- 2) days if required. Monitoring should be conducted as required during periods when the highest levels of dust are expected to be generated i.e., during site preparation works and soil stripping activities.
- The exact locations will be determined after consideration of the requirements of Method VDI 2119 with respect to the location of the samplers relative to obstructions, height above ground and sample collection and analysis procedures.
- After each 30 (+/- 2 days) exposure period, the gauges will be removed from the sampling location, sealed and the dust deposits in each gauge will be determined gravimetrically by an accredited laboratory and expressed as a dust deposition rate in mg/m2/day in accordance with the relevant standards.
- Technical monitoring reports detailing all measurement results, methodologies and assessment of results shall be subsequently prepared and maintained by the Site Manager.

Dust Control Measures:
The aim is to ensure good site management by avoiding dust becoming airborne at source. This will be done through good design, planning and effective control strategies. The siting of construction activities and the limiting of stockpiling will take note of the location of sensitive receptors and prevailing wind directions in order to minimise the potential for significant dust nuisance. In addition, good site management will include the ability to respond to adverse weather conditions by either restricting operations on-site or using effective control measures quickly before the potential for nuisance occurs.

- During working hours, technical staff will be available to monitor dust levels as appropriate; and
- At all times, the dust management procedures put in place will be strictly monitored and assessed.

Site Routes:

- A speed restriction of 20 km/h will be applied as an effective control measure for dust for on-site vehicles or delivery vehicles within the vicinity of the site;
- Bowsers will be available during periods of dry weather throughout the construction period. Research shown found that the effect of surface watering is to reduce dust emissions by 50% 6. The bowser will operate during dry periods to ensure that unpaved areas are kept moist. The required application frequency will vary according to soil type, weather conditions and vehicular use; and
- Any hard surface roads will be swept to remove mud and aggregate materials from their surface while any unsurfaced areas shall be restricted to essential site traffic only.

Demolition/Excavation:

- During dry and windy periods, and when there is a likelihood of dust nuisance, watering shall be conducted to ensure moisture content of materials being moved is high enough to increase the stability of the soil and thus suppress dust;
- During periods of very high winds (gales), activities likely to generate significant dust emissions should be postponed until the gale has subsided.

The movement of truck containing materials with a potential for dust generation to an off-site location will be enclosed or covered.

Stockpiling

- Overburden material will be protected from exposure to wind by storing the material in sheltered parts of the site, where possible;
- Regular watering will take place during dry/windy periods to ensure the moisture content is high enough to increase the stability of the soil and suppress dust;

Site Traffic on Public Roads

- Vehicles delivering material with potential for dust emissions to an off-site location shall be enclosed or covered at all times to restrict the escape of dust;
- Any hard surface site roads will be swept to remove mud and aggregate materials from their surface while any unsurfaced roads shall be restricted to essential site traffic only.
- A power washing facility or wheel cleaning facility will be installed near to the site compound for use by vehicles exiting the site when appropriate, and an example of the washing equipment can be seen in insert 7.1 ; and
- Road sweepers will be employed to clean the site access route as required.

**Waste**

There is a requirement to dispose of soil excavated on the site and other waste building materials. Appropriate sampling and disposal will be undertaken as outlined in the outline CEMP.

In the event that Asbestos containing materials (ACMs) are found, the removal will only be carried out by a suitably permitted waste contractor, in accordance with S.I. No. 386 of 2006 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006 - 2010. All asbestos will be taken to a suitably licensed or permitted facility.

In the event that hazardous soil, or historically deposited waste is encountered during the construction phase, the contractor will notify Dún Laoghaire-Rathdown County Council (DLRCC) and provide a Hazardous/Contaminated Soil Management Plan, to include estimated tonnages, description of location, any relevant mitigation, destination for disposal/treatment, in addition to information on the authorised waste collector(s).

**Electrical Supply**

All works shall be carried out in accordance with ESB code of Practice for electrical Infrastructure. Laying of cables and testing of same will be in accordance with ESB standard details. The works shall be inspected on an ongoing basis during construction by both the applicant's engineers and ESB site Engineer. Applicable testing shall be carried out prior to connection to the electrical Grid.

**Gas**

All works shall be carried out in accordance with GNI code of Practice for gas Infrastructure. Laying of gas main and testing of same will be in accordance with GNI's standard details. The works shall be inspected on an ongoing basis during construction by both the applicant's engineers and the GNI's Area Engineer. Applicable testing shall be carried out prior to connection to the public network.

**Telecommunication**

All works shall be carried out in accordance with the relevant telecoms providers' code of Practice. Laying of ducts and cables and testing of same will be in accordance with their standard details. The

works shall be inspected on an ongoing basis during construction by both the applicant's engineers and relevant telecommunication provider. Applicable testing shall be carried out prior to connection to the network.

## 6.10 Potential Cumulative Impacts

**Introduction:**
Potential cumulative impacts consider the potential cumulative impacts on the environment of the proposed development with other existing or planned developments, with which the project could have cumulative effects.

**Existing buildings within the site boundary:**
Existing school and accommodation buildings within the site boundary have been demolished. The only building to be retained within the site boundary is St Catherine's House, which is vacant. The Gate Lodge which is also vacant is to be dismantled, stored on site and re assemble at a new location.

**Existing buildings / developments outside the site boundary:**
The Alzheimer Society of Ireland is located on the western boundary, the Alzheimer building is located 15m to the west of the boundary line.

St Vincent's Park housing estate is located on the eastern boundary, rear gardens of the houses back onto the eastern boundary.

Rockfield Park which is a green space is located on the southern boundary.

Avondale Crescent housing estate is located 130m from the south west boundary and Daughter of Charity complex is located 140m from the south east boundary.

Carraig Tennis Club is located 25m from the south west boundary.

Houses on the opposite side of Temple Road are located 30m from the northern boundary line.

**Planned developments outside the site boundary:**
A planning search for developments in proximity to our proposed development:
D21A/0958 91 Residential Units 0.49Ha 150m from northern boundary
No other large planned developments were identified in the vicinity.

**Hydrogeology:**
Storm water from the development incorporates a number of SuDS measure including green roofs, permeable paving and swales. Storm water discharge for the whole site is limited to 8.17 l/s and the 1:100 year storm event is attenuated. The cumulative impact is considered to be neutral and of an imperceptible significance.
Overall, the impact on hydrogeology environment as a result of the wider developments in the area are considered to be long term and imperceptible. Provided mitigation measures are in place at each of the development, the overall impact is expected to be neutral.

**Land, Soils and Geology:**
Existing buildings have already been demolished. The Construction Environmental Management Plan (CEMP) will be implemented for the construction phase.

Any potential impacts on the soil environment will be within the confines of the site boundary and with the implementation of the measures highlighted this chapter and, in the CEMP, the cumulative effect on the land, soils, geology and local environment with any adjacent developments is deemed to be imperceptible and neutral.

## 6.11 Residual Impacts

The greatest potential impact on the soils, geology and hydrogeology are from the basements to be provided to service the buildings. Basement formation level is above the granite bedrock. The removal of the overburden from the site will increase only slightly the risk of contamination as the bedrock will not be exposed. Risk of contamination of the bedrock and groundwater will there be higher until the final basement extents are constructed which will then protect the underlying bedrock and groundwater from future vulnerability. It is anticipated this will have a neutral impact on the wider area and no impact on existing geological features.

The basement dig will involve the excavation of large quantities of overburden to get to the required construction depths. Excavation, construction works and roads will remove the existing top soil and sub-soil at these locations, although a small portion of this can be retained to complete proposed landscaping.

There are no likely significant impacts on the land, geological or hydrogeological environment associated with the proposed operational development of the site with mitigation in place. As such the impact is considered to have a long term, imperceptible significance with a neutral impact on quality i.e. an impact capable of measurement but without noticeable consequences.



Electricity

Taking into account the above-mentioned mitigation measures which are designed to avoid and prevent any adverse issues arising during construction. Any residual impacts on the built services during the construction phase will be neutral, temporary in nature, and imperceptible, where service is unavoidably disrupted to facilitate the construction phase.

Gas Supply

Neutral Impact -Taking into account the above mentioned mitigation measures, there will be no residual impact to the gas mains following the construction phase. Any residual impacts on the built services during the construction phase is considered to be temporary in nature and imperceptible, where service is unavoidably disrupted to facilitate the construction phase

Telecommunications

Neutral Impact - Taking into account the above mentioned mitigation measures and difficulty encountered relating to obtaining infrastructure maps there will be no residual impact to the telecommunications infrastructure following the construction phase. Any residual impacts on the built services during the construction phase is considered to be temporary in nature and imperceptible, where service is unavoidably disrupted to facilitate the construction phase.