Dundrum Village Strategic Housing Development (SHD)

Main Street, Dundrum, Dublin 14.

Applicant:
Dundrum Retail GP DAC
(Acting for and on Behalf Of Dundrum Retail Limited Partnership)

ENVIRONMENTAL IMPACT ASSESSMENT REPORT (EIAR)

March 2022

BMA PLANNING

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Environmental Impact Assessment Report (EIAR) submitted to An Bord Pleanála with a Planning Application for a Strategic Housing Development (SHD)

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Contents

NON-TECHNICAL SUMMARY

This Environmental Impact Assessment Report (EIAR) has been prepared on behalf of the applicant, *Dundrum Retail GP DAC (acting for and on behalf of Dundrum Retail Limited Partnership)*, in association with the submission of a planning application to An Bord Pleanala, for a Strategic Housing Development. The proposed development site (c.3.5 ha) is located in Dundrum Village and includes the old Dundrum Shopping Centre known as Dundrum Village Centre (D14K3T7) and adjacent properties to the west of Main Street, Dundrum, Dublin 14 between the Old Shopping Centre and the Parochial House.

STRUCTURE

The overall structuring and scope of this EIAR has regard to the information requirements of the EC Directives, Irish Statutory Regulations and established best practice. It has been written and illustrated with figures in a manner which, insofar as possible, is intended to be understandable to the public generally.

The EIAR is presented in two volumes. Volume 1 contains the EIA Assessment and Appendices. Verified Views / photomontages of the proposed development are contained in Appendix 14A. This is presented as a separate A3 volume (Vol. 2).

Chapters 1-3 of the EIAR provides the context for the EIA assessment including details of the planning policy context, alternatives considered, a description of the site, the project (i.e. the proposed development) and the construction methodology. This is followed by each of the assessment chapters.

The structure used in this EIAR is a Grouped Format structure which examines each environmental topic in a separate chapter. Each chapter follows this structure and provides a description as it relates to that specific environmental topic:-

- Introduction – Details of the expert who prepared the chapter and their expertise / credentials on the topic being assessed.
- Assessment Methodology – a description of the methodology used by the expert in undertaking their assessment including details on the study area, sourcing baseline information and categorising impacts.
- Receiving Environment – a description of the baseline conditions within and surrounding the site.
- Characteristics of the Proposed Development – a description of the project, with specific reference to the environmental topic being assessed in the chapter.
- Construction Impacts - a description and assessment of how construction activities could potentially impact upon the existing environment. Mitigation and Monitoring measures are proposed where required to control and / or minimise the impact which the development may have on the receiving environment
- Operational Impacts - a description and assessment of how the operation of the development could potentially impact upon the existing environment. Again, mitigation and Monitoring measures are proposed where required to control and / or minimise the impact
- Other Effects – a description of the residual effects ie. the impacts after mitigation measures have been implemented; the 'do-nothing' effect ie. what the environment would be in the future if the development did not proceed; and any 'worst-case' effects i.e. the consequences of mitigation measures failing.
- Interactions– a description of the inter-relationships between the environmental topics.
- References– a list of the reports, documents etc. relied upon in the assessment undertaken.

A compendium of the mitigation and monitoring measures contained in each of the assessment chapters is included in Chapter 15. Chapter 15 also summarises the significant effects and addresses the interactions between impacts on different factors.

The Appendices contain background and technical details relating to the project and are referred to in the relevant Chapters.

POLICY CONTEXT

The current application has been prepared in the context of a range of national, regional and local planning policy sources. These are reviewed and commented on in detail in the *Statement of Consistency*, prepared by BMA Planning and submitted with this application and the main sources are summarised below.

The *Dun Laoghaire Rathdown Development Plan 2016 – 2022* (DLRDP) is the statutory development plan for the area. The Draft *Dun Laoghaire Rathdown Development Plan 2022 – 2028 is currently in the final stages of the review process and is due to be adopted in early 2022*

The Core strategy of the Development Plan is that high density urban development is prioritised within the Major Town Centres and along public transport corridors making Dundrum a favoured location for such development. The application site is designated as *"Major Town Centre"* which permits a wide range of uses including all uses proposed in this application.

Development Standards included in the Development Plan have been considered and the development has incorporated these principles and standards insofar as they are relevant to the proposals.

The proposed development is a Material Contravention of the *Dun Laoghaire Rathdown Development Plan 2016-2022*, however, as detailed in the Material Contravention Statement the proposals are consistent with Section 28 Guidelines and the forthcoming DLR County Development Plan 2022-2028 support the development.

The following national and regional policy documents are also relevant to this project: -

- *Project Ireland 2040 - The National Planning Framework*
- *Housing for All – A New Housing Plan for Ireland (2021)*
- *Regional Spatial and Economic Strategy (RSES) 2019-2031 for the Eastern and Midland Region*

The project will deliver a high-density scheme of modern and adaptable new homes, within an existing *"Major Town Centre"* in close proximity to existing public transport and local service provision. This is in accordance with the principles and vision of the above national and regional plans.

In terms of Section 28 Ministerial Guidelines, the proposed development is conceived to comply with these Government Guidelines and, in particular, is consistent with two important Guidelines that have issued on foot of the *Project Ireland 2040 - The National Planning Framework* (NPF), namely the *Sustainable Urban Housing: Design Standards for New Apartments – Guidelines for Planning Authorities* (As Amended 2020) and *Urban Development and Building Heights Guidelines for Planning Authorities* (2018).

In summary, therefore, the proposed development is set against a very favourable policy background which supports the development of the Dundrum Village site for high density residential and mixed use scheme as proposed.

THE SITE

The current application relates to the lands north of Ballinteer Road / Dom Marmion Bridge, west of Main Street and east of the Dundrum By-pass and are referred to as the "Dundrum Village SHD" for short in this application.

The site (c.3.5ha) comprises the Old Dundrum Shopping Centre, a 1970's 3-storey 'L' shaped building and car park (known as Dundrum Village Centre (D14K3T7) and adjacent properties to the west of Main Street, Dundrum, Dublin 14, excluding No.'s 11 and 16/17 Main Street.

The properties on Main Street include properties between the Old Shopping Centre and the Parochial House, namely Former Mulvey's Hardware (D14A250), 8 Main Street (D14W2W1), 15A Main Street (D14YP78), 15 Main Street (D14T3K2), 13 Main Street (D14P2X8), 13A Main Street (D14A0Y0), 4 Glenville Terrace (D14E261), 3 Glenville Terrace (D14N6P0), 2 Glenville Terrace (D14E6N3), 1 Glenville Terrace (D14KF67) and former Post Office/ Joe Daly Cycles (D14V8K8 - property to North of 1 Glenville Terrace)). The site excludes 16/17 Main Street (D14H0C9) 11 Main Street (D14Y2N6). All existing structures on the site are to be demolished, with the exception of No's 1 – 3 Glenville Terrace. No.'s 16/17 Main Street (Mulvey's Pharmacy) and No.11 Main Street (Lisney) are not included in the overall site.

The subject lands are zoned MTC - 'Major Town Centre' uses – *'to protect, provide for and/ or improve major town centre facilities'* under the current *Dun Laoghaire Rathdown County Development Plan 2016- 2022.* This zoning also applies under the *Draft Dun Laoghaire Rathdown County Development Plan 2022- 2028* . Residential use is permitted in principle in the MTC zone.

DESCRIPTION OF PROJECT AND ALTERNATIVES

The proposed development retains the Main Street active frontage approach of the previously permitted developments (2003-2009) and replaces the shopping centre building with a series of apartment buildings arranged around a series of interconnected courtyards. The buildings range in height from 4-5 storeys on Main Street to 9-12 storeys to the Dundrum Bypass, rising to 16 storeys at the northern end – Block 1A is the landmark building.

881 apartments are proposed, and the non-residential uses include a foodstore and a series of retail and café / restaurant units on Main Street and fronting a new square to the rear of Holy Cross Church. A crèche is also proposed. The total gross floor area of the development is 88,442 square metres. This application falls under the definition of Strategic Housing Development (SHD) as set out under Section 3 of the Planning and Development (Housing) and Residential Tenancies Act 2016 on the basis that the development includes '*the development of 100 or more houses on land zoned for residential use or for a mixture of residential and other uses'.* The cumulative gross floor area of the residential development (83,983.3 square metres) comprises not less than 85 per cent of the total gross floor area and the development does not exceed the maximum of 4,500 square metres gross floor space for non-residential uses.

The parking and service areas will be accessed from Dundrum Bypass and the closure of the Main Street entrance is provided for in accordance with the Council's previously expressed wish to remove traffic from Main Street. The application includes a new pedestrian / cyclist bridge over Dundrum Bypass, Sweetmount Park bridge, linking Main Street to the residential communities to the west.

This EIAR contains a description of the construction process as it is known at this pre-consent stage and ahead of detailed design development and the details are based on the *Outline Construction Management Plan (OCMP)* [TJ O'Connor & Associates] which has also been prepared and is submitted with the planning application documentation. In the event of a grant of permission, the appointed contractor(s) will update the OCMP to comply with and implement the requirements and mitigation and monitoring measures set out in this EIAR and any conditions imposed as part of the granted planning approval. The Contractor's Construction and Environmental Management Plan (CEMP) will be submitted to the Planning Authority prior to commencement.

The construction of the project will take up to 8 years to complete. The development is intended to commence at the northern end of the site (Zone 1 - Blocks 1A, 1B and 1C) and be developed sequentially southwards. Works to Dundrum Bypass and the proposed new access road to the development site will be constructed as part of the first tranche of works; Sweetmount Bridge will be completed with Zone 2; and areas of open space will be completed as part of each zone of works.

The following are some of the main features of the construction programme:-

- The proposed vehicle site entrances will be located along the Dundrum Bypass with no access for construction vehicles from Main Street.
- Hoarding will be erected around the perimeter of the construction zone, including site compound and storage areas, as part of the site establishment works.
- On-site facilities will include site office and staff welfare facilities (e.g. toilets, drying room, canteen, etc.).
- Vehicle parking for construction personnel will be accommodated within the development site. To the extent possible, personnel will also be encouraged to use public transport, and information on local transportation will be published on site.
- Site development and building works are proposed to follow standard hours but some construction works may be undertaken outside the prescribed times subject to agreement with the Planning Authority.
- The proposed site excavation will result in a surplus of "cut" material which will be exported of site for reuse or disposed to suitable licensed landfill facilities.
- Piling will be required for a portion of the foundations of the apartment blocks.
- It is envisaged that two or more tower cranes will be temporarily erected in each zone.
- Deliveries to the site, include Concrete deliveries for the foundation construction will be managed by the Contractor in accordance with a traffic management plan.
- The construction works include the erection of a new pedestrian bridge from Sweetmount Park. This element of the proposed works will require a section of Sweetmount Park to be hoarded off during construction and night time closures of the Bypass to facilitate the bridge being lifted into place.

The consideration of "alternatives" was an integral part of the design process through numerous iterations of the site layout and the design of the buildings in their external manifestation. The iterative design process also involved alternative internal layouts of the buildings based on input from technical experts relating to topics such as mechanical and electrical engineering, structural engineering, fire and daylight/ sunlight. As the project is supported by the Development Plan, no other alternative locations were considered. On this basis, all reasonable alternatives to the project are considered and no alternatives have been overlooked which would significantly reduce or further minimise environmental effects.

POPULATION AND HUMAN HEALTH

During construction, the main likely significant effects are a positive impact on employment with c.200-300 direct jobs created and indirect employment generated in the local economy as a result of the multiplier effect.

During construction, the proposed development will cause loss of amenity, disruption and inconvenience to local residents, particularly the nearest receptors. However, this impact will be temporary and mitigated insofar as practicable through the Contractor's Construction and Environmental Management Plan (CEMP).

The CEMP will implement the requirements and mitigation and monitoring measures set out in this EIAR and any relevant conditions attached to a grant of planning. A Community Liaison Officer (CLO) will be appointed and will inform the public of site operations and be available to local residents / members of the public with concerns / complaints.

The level of disturbance and impacts to human health are predicted to be commensurate with the normal disturbance associated with the construction industry where a site is efficiently and properly managed having regard to neighbouring activities. These negative impacts will be, cumulatively, significant but short term. Measures to address such human health considerations will be mitigated through the implementation of a Contractor's Construction and Environmental Management Plan (CEMP) and will be subject to Regulations and the relevant Health and Safety codes.

Overall, during the operational phase, the impact of the development on the wider population are considered to be significant and positive and the main impacts are :-

- an increase in population, a long term positive moderate effect which will accelerate the rate of population increase in the Dundrum area in accordance with local, regional and national policy;
- a permanent positive significant change in the landscape through the redevelopment and regeneration of this brownfield site to an urban landscape;
- positive long term impact on employment and the local economy through the creation of jobs and the associated multiplier effect;
- the commercial and community facilities in the proposed development will likely have a positive moderate impact on facilities in the area for existing and future populations.

Impacts of the proposed development in terms of daylight/ sunlight, overshadowing and wind effects have also been examined in detail in tandem with the scheme design and no significant impacts are anticipated.

In the operational stage, measures to address health and safety considerations, including risks of fire, flooding and universal access have been addressed as part of design mitigation and will be subject to the relevant regulations to ensure no significant adverse impacts on human health. No significant impacts are expected on human health as a result of the risk or vulnerability to major accidents or disasters.

BIODIVERSITY

The Biodiversity section of the EIAR was carried out by Bryan Deegan of Altemar Ltd. It assesses the potential impacts of the development on the ecology of the surrounding area

Surveys were undertaken to establish the existing baseline environment. The site is primarily Built land with small isolated areas of grassland, flower beds and borders and scrub but these are within an urban area, with poor connectivity to other areas of biodiversity and are of low biodiversity importance. The Slang River runs along the western boundary of the site from South to North in a concrete culvert and is open proximate to the site in Sweetmount Park. The watercourse would be sensitive to impact and would act as a vector for pollutants downstream and potentially to Natura 2000 sites. No other habitats of conservation significance were noted within the site outline.

No plant species that are rare, of conservation value or threatened were noted during the field assessment or recorded in the vicinity of the site. No invasive species; no terrestrial fauna of conservation importance; and no roosting bats were noted on site. Similarly, there were no trees of bat roosting potential on site. A single bat (soprano pipistrelle) was noted foraging briefly on site. The majority of the derelict buildings had numerous feral pigeons nesting internally. Several herring gull (Red listed) were noted on site but inspections of the roofs did not reveal nests.

The impact of the development during construction phase will be a loss of habitats and species on site. It would be expected that the avian fauna associated with these habitats would also be displaced. No flora, terrestrial mammals or habitats of conservation importance were noted during the surveys.

There is potential for negative impacts on aquatic biodiversity from surface water runoff, pollution and dust during the construction stage, and the proposed outfall of surface water drainage (after attenuation on-site) to the Slang River during operation, as there is a direct hydrological connection via the Slang River, River Dodder and the Liffey to designated conservation sites located within Dublin Bay including Special Area of Conservation, Special Protection Areas and proposed Natural Heritage Areas. During operation petrochemical runoff from the site and road could potentially negatively directly or indirectly impact the aquatic ecology. Petrochemical interception and attenuation measures are specifically proposed in the scheme to mitigate this impact.

As bats are not roosting on site, no specific mitigation measures are required and a derogation licence is also not required for the demolition of buildings or felling of trees. Light spill during construction has the potential to impact on foraging. However, the site is already brightly lit by streetlighting and foraging activity is very low.

No significant adverse impacts on biodiversity or designated sites are likely from the proposed works following the mitigation described above.

LAND AND SOILS

This Chapter is prepared by Thomas Griffin of T.J.O' Connor & Associates, who has carried out the assessment of the potential impacts on land and soils that the development may have on the receiving environment, during the construction and operational phases of the project.

The site slopes gently along the eastern boundary (Main Street) from the southern end, to a low point 8.5m below at the northern end. The western boundary (Dundrum Bypass) is flatter sloping from the southern end to a point 3.1m lower at the northern end. The site and the surrounding area generally consist of made ground underlain by deposits of brown boulder clay, sand and gravel, and weathered rock over granite bedrock.

Observations of groundwater monitoring over an extended period showed it to be closest to existing ground level at the northern end of the site and at the midpoint on the western boundary of the site. The site is situated adjacent to the route of the Slang River, which runs along the western boundary of the site from South to North in a concrete culvert. This comprises the main freshwater receiving environment in the vicinity of the proposed development.

The main impacts are associated with the Construction Phase of the proposed development. The assessment concluded that the residual impacts would be minor and short-term in nature and would not cause off site issues pertaining to the site geological setting. There is no predicted long-term impact on the soil, geology and hydrogeology environments associated with the operation phase of the proposed development.

WATER

T.J. O'Connor & Associates (Diarmuid Cahalane) assessed the impacts that the development may have on the receiving water environment. The existing site is fully developed with impermeable surfaces (roof and paved areas) covering almost the entire site. Surface runoff discharges freely at present and the majority of runoff discharges to a combined sewer which extends through the length of the site. Surface runoff from the proposed development will be restricted to the rate at which runoff would occur from an equivalent undeveloped (green field) site at this location. Discharges of runoff to the combined sewer will no longer occur. This will be a positive long term significant impact.

The site is underlain by made ground, clay tills, sand and gravels and granite bedrock which drops away steeply from east to west. Observations of groundwater over an extended period showed it to be closest to existing ground level at the northern end of the site and at the midpoint on the western boundary of the site. A Water Management System will be provided within the site boundary to avoid polluted or silt laden surface water runoff being discharged from the site during the construction stage. Any pumped flows from excavations will be adequately treated before being discharged from the site.

Specific mitigation measures will be applied during construction to mitigate impacts. Examples of these measures include:-

- implementing suitable runoff and sediment control measures including directing all groundwater collected on site to settlement tanks and silt bags prior to discharge at an agreed rate;
- providing suitable storage of fuel and waste materials, removed from watercourses and drains;
- implementing the measures outlined in the *Outline Construction Management Plan* (brought forward into the Contractor's Construction and Environmental Management Plan) to avoid discharge or runoff to watercourses and
- ensuring that any contamination or buried waste encountered is appropriately assessed and remediated to avoid potential issues to groundwater, surface water or human health.

Part of the northern extent of the site is located within Flood Zones B and C and is at risk of flooding from the Slang River. Flood risk during construction will be managed to avoid an increase in flood risk either within or outside the side. Compensatory flood storage, of a volume equivalent to or greater than the volume of flood water predicted to occur within the site boundary, will be provided within the site. This volume will be provided within the service road and below the lower ground floor slab and will mean that no additional properties will be flooded in such an event and that there will be no increase in the depth of flooding experienced by the Dundrum Bypass or at adjacent properties. Flood risk due to the proposed development will be mitigated by locating residential development at podium level and higher, above the predicted flood levels. Less vulnerable commercial development and associated ancillary uses will be located at Lower Ground Floor Level.

AIR AND CLIMATE

Byrne Environmental Consulting Ltd assessed the potential air quality and climatic impacts. In terms of the existing baseline air quality environment, site specific baseline data and published data available from similar environments indicates that levels of nitrogen dioxide (NO_2), carbon monoxide (CO), sulphur dioxide (SO_2) particulate matter less than 10 microns (PM_{10}) and less than 2.5 microns ($PM_{2.5}$) and benzene are well below the National and European Union ambient air quality standards.

The construction phase of the development has the potential to generate short term fugitive dust emissions and diesel engine exhaust emissions associated with construction vehicles and plant. However, these emissions will be controlled by appropriate mitigation techniques and the implementation of a construction phase air quality management and monitoring plan. The predicted construction phase residual impacts are not significant and brief to short-term.

The operational phase of the development will see the functioning of modern, well insulated thermally efficient buildings in which energy efficiency shall be achieved by implementing sustainable features into the design of the buildings and infrastructure. The design of the residential units will ensure their operation will have a minimum impact on the receiving climate and will withstand future potential extreme weather events associated with climate change.

The predicted impacts of domestic heating and traffic generated air pollutants associated with the development will not exceed the ambient air quality standards and the impact of the development on ambient air quality and climate been determined to be imperceptible, neutral and long-term.

NOISE AND VIBRATION

Byrne Environmental Consulting Ltd have assessed the potential noise and vibrational impacts. The existing baseline noise climate has been assessed at the site over the course of typical daytime and night time periods. The principal sources of existing noise experienced at the site include road traffic noise from the surrounding road network – Main Street and Dundrum Bypass.

Ambient noise levels in the vicinity of the site will temporarily increase during the construction phase, however noise levels will be controlled, minimised and managed through the implementation of best practice construction noise and vibration mitigation measures. This will include monitoring of the noise sensitive receptors located in the vicinity of the site. The operational phase of the development will not have an adverse or unacceptable outward noise impact on the receiving environment.

This Chapter has also assessed the inward noise impact of the surrounding environment on the proposed development and specifically the effects for the future residents to ensure that suitable internal noise levels can be achieved across the site within the apartment units. The Internal noise levels within the proposed apartments have been assessed with regard to the existing noise levels and future noise sources, in particular road traffic noise. Sound insulation performance values for glazing, walls, roofs and ventilation systems have been specified in order to ensure acceptable internal noise levels are achieved during both daytime and night time periods.

The impact assessment has concluded that the construction phase noise impacts with mitigation will be negative, slight to moderate and brief to short-term at existing local residential receptors and the operational phase noise impact will be neutral, imperceptible and long-term at local residential receptors. It is predicted that the inward noise impact with mitigation will be neutral, not significant and long-term.

MATERIAL ASSETS: BUILT SERVICES

T.J. O'Connor & Associates and BDP prepared this Chapter. Material Assets: Built Services include the existing underground services (Water, foul, surface water, gas, electricity and information and communications technology) within and adjacent to the site.

As part of the proposed development, the existing water, foul and surface water services connected to the site will be abandoned. This includes a combined foul and surface water sewer which runs the length of the site from north to south and extends north of the site through Taney Cross and alongside the Slang River to the west of the Dundrum Road. The cessation of surface water flows to this combined sewer will have a very significant positive impact on sewer capacity and a significant positive impact on sewer surcharge and flood risk downstream.

Irish Water have confirmed the feasibility of connections from the wastewater and water networks to serve the proposed development. A wastewater pumping station is proposed on site. This will balance the flows to the public network, in accordance with Irish Waters requirements. An odour control unit will be installed to mitigate the potential for odours generated within the pumping station. The pumping station will be used until Irish Water completes its sewer infrastructure upgrades in the area. During this time, it will be maintained by a specialist contractor. Potential failure of pumps or blockage at the wastewater pumping station will be mitigated by the provision of a balancing tank which will also serve as an emergency overflow holding tank. The Pumping station will not have an overflow to the nearby Slang River.

MATERIAL ASSETS: TRANSPORTATION

Systra Limited have assessed the potential traffic and transport impacts for the construction and operational phases. It relies upon the information contained in the *Transport Assessment* report, also prepared by Systra Limited, submitted with this planning application.

A full review of the site accessibility has been undertaken to understand the baseline conditions around the site. The site lies within a highly sustainable location with excellent walking and cycling links as well as convenient access to a range of bus services and the Luas Green line. New traffic surveys were completed for the junctions within the study area covering the network peak periods and the existing traffic movements on and off the proposed development site.

The impact of construction traffic has been assessed and it has been identified that the development would generate approximately 36 two-way HGV movements per day during the busiest period of the construction works. A construction stage traffic management plan (CTMP) will be put in place to help minimise and mitigate the impact of construction traffic. No significant residual effects from construction traffic are predicted to arise as a result of the proposed Development once mitigation is in place.

The impact of operational traffic has been considered taking account of a new access strategy for the site which relocates all vehicular access points onto the Dundrum Bypass. The trip generation for the proposed development has been calculated along with the distribution of trips onto the road network. Where the impact of development traffic exceeded 5%, a detailed junction modelling exercise was undertaken as well as modelling for the new access junctions. The assessment indicated that the impact of development traffic was initially significant at two locations but the modelling work confirmed that there is capacity available to accommodate the traffic associated with the proposed development. By way of mitigation aimed at minimising vehicular trips, it is proposed to implement a Mobility Management Plan for the development. The Mobility Management Plan, which will be implemented by a Mobility Manager, will seek to encourage travel by sustainable modes and will be monitored on a continuous basis to ensure that sustainable transport principles are embedded into the operation of the development.

With the mitigation measures in place, the impact of the proposed development on traffic and transport will not be significant. The proposed development site is ideally situated to have a low car mode share and with the supporting measures identified in the Mobility Management Plan in place, car traffic may be lower than that assumed in the modelling assessment. The delays for traffic on the local network are in general minor with no significant delays modelled as result of the additional development.

MATERIAL ASSETS: RESOURCE AND WASTE MANAGEMENT

Byrne Environmental Consulting Ltd have assessed the potential impact that construction phase and operational phase wastes associated with the development may have on the receiving environment and on local and regional waste management infrastructure. The assessment includes a description of the nature and quantities of wastes that will be generated during the construction and operational phases and a description of how wastes generated will be managed in accordance with Dun Laoghaire Rathdown County Development Plan 2016-2022 Waste Management Objectives and Waste Management Guidelines.

The *Site Specific Construction and Demolition Waste Management Plan* and *Operational Waste Management Plan* reports (prepared by Byrne Environmental and submitted with the application) have been designed to ensure that the construction and operational phases of the project will be managed to reduce the generation of unsegregated wastes, to maximise the potential for recycling, recovery and re-use and to demonstrate how the project will operate in a sustainable manner in terms of waste management and how the development will contribute to the achievement of the regions compliance with the waste reduction targets specified in the Eastern-Midlands Region Waste Management Plan 2015-2021.

The residual impact associated with the construction phase will generate a small quantity of unrecyclable and non-reusable construction wastes which will result in a neutral, not significant and short-term impact.

The residual impact associated with the operational phase will generate a small quantity of unrecyclable and non-reusable domestic and commercial waste which will result in a neutral, not significant and long-term impact.

CULTURAL HERITAGE

This Chapter, prepared by Courtney Deery Consultancy Ltd and Cathal Crimmins Architects, identifies the potential significance and the sensitivity of the existing archaeological, architectural and cultural heritage and in turn evaluates the likely impacts of the development on these features.

There are no recorded archaeological monuments and no stray artefacts were recorded by the National Museum of Ireland. The field inspection and desk study did not identify any features of an archaeological potential. No archaeological features were revealed from the site investigation test trenches, indeed the stratigraphy was found to be disturbed in many places with modern inclusions being revealed at a depth of 2m below present ground level. In line with these findings, no further site investigations are recommended, and archaeological monitoring by an experienced archaeologist will take place at the site preparation stage, prior to and during construction. This is to ensure that in the event that archaeological soils, features and/ or material is found, it will be identified and preserved by record to the satisfaction of the statutory authorities.

The subject site contains nine heritage buildings (former post office / Joe Daly cycles, 1 to 4 Glenville Terrace, 13 and 13a Main Street, 15A Main Street and the former Mulveys Hardware, including buildings to the rear of 16 and 17 Main Street) which form part of the Main Street. None of the existing identified heritage buildings within the site are currently protected and all have either been substantially altered internally, or lain vacant for over 15 years and are suffering from long term neglect. This has led to a significant loss of character, particularly internally so that their architectural heritage interest has been reduced. The former post office/Joe Daly cycles, 1 to 4 Glenville Terrace, and 13 and 13a Main Street are located within a proposed Architectural Conservation Area. The subject site also adjoins Holy Cross Roman Catholic Church, a protected structure (ref 1129) and Holy Cross Parochial House a proposed protected structure (ref 2095).

No.'s 1 to 3 Glenville Terrace are of architectural and artistic interest with respect to their contribution to the street scape and the architectural and decorative detailing of the interior. The works to No.'s 1 - 3 Glenville Terrace will result in a loss of original fabric. However, these units will be brought back in to use and this is a conservation gain.

It is proposed to remove the former Post Office, No. 4 Glenville Terrace, No.'s 8, 13/a, 15/15a, and former Mulvey's Hardware, Main Street. Although the proposed development will introduce a more active streetscape, the removal of buildings will have a Moderate Negative Permanent impact on the historic character of Main Street and the proposed ACA. It will also alter the architectural character of Dundrum Village and the proposed ACA and nearby Usher Monument (DLR RPS 934) during the Operation phase.

The proposed apartment blocks have been set back from the Catholic Church and Parochial House to reduce the visual impact. The proposals also include landscaping works to the north and west of the church which will enhance its setting. The project will have a moderate negative impact on the setting of the Church and Parochial House. During construction, there will be a negative, moderate, short term impact on the setting of the Church and Parochial House.

The proposed planting and landscaping will reduce the negative visual impact on the streetscape and in the vicinity of the Catholic Church and Parochial House and will provide amenity locally. The scale of the proposed development will be tempered by the fact that the site slopes behind the existing street frontage, thereby significantly reducing the perceived height of the development from Main Street. The street frontage from Glenville Terrace northwards will be reinstated, generating an urban character that the elevation of the existing shopping centre has never possessed. Overall, this will have a moderate positive permanent impact on the character of Main Street.

LANDSCAPE

The Landscape chapter, prepared by Richard Barker of Macroworks, assesses the potential effects of the proposed development on the landscape/ townscape character and views/ visual amenity in the receiving environment. It should be read in conjunction with the verified views and photomontages contained in Appendix 14A (Volume 2).

The degree of change to the townscape setting introduced by the proposed Dundrum Village development can only be considered to be of a High magnitude due to its scale and intensity relative to the undeveloped, underdeveloped nature of the existing site. However, the proposed development is a considerable improvement to the degraded and underutilised site in its current form and will satisfy planning objectives and policies to redevelop this site as part of the Dundrum 'Major Town Centre' zoning in the *Dun Laoghaire Rathdown County Development Plan* (current and proposed). Consequently, it is considered to make a positive contribution to the urban fabric of this area.

The visual impact assessment was undertaken using photomontages prepared from a total of 24 viewpoints within a 1km radius study area representing a range of viewing distances, directions and contexts. Whilst there will be some notable and negative visual impacts in localised areas surrounding the site, for the vast majority of viewing contexts, visual impacts will be modest in scale and/or positive in nature. It is not considered that there will be any significant townscape or visual impacts arising from the proposed development.

CONCLUSION

The EIAR has considered the likely, significant, adverse effects of the project on the receiving environment, including cumulative impacts and having regard to assessments under other European Directives. Cumulative impacts have been considered in this EIAR ie. the addition of many minor or significant effects which create larger more significant effects and / or effects in combination with other projects in the vicinity of the site, Environmental impacts from existing developments have been factored into the baseline case e.g. traffic volumes, noise, air quality, etc

Mitigation and monitoring measures (see Chapter 15) are included, to avoid and / or reduce impacts on the environment where considered necessary. This includes mitigation measures incorporated into the design of the proposed development. The EIAR concludes that there are no material or significant environmental issues arising from the project which would prohibit the competent authority from issuing consent for the development. The above summaries and measures outlined demonstrate the beneficial impact that the project will have for Dundrum Village and the wider area.

1.0 INTRODUCTION

1.1 PURPOSE OF REPORT

This Environmental Impact Assessment Report (EIAR) has been prepared on behalf of the applicant, Dundrum Retail GP DAC (acting for and on behalf of Dundrum Retail Limited Partnership) in association with the submission of a planning application to An Bord Pleanala, for Dundrum Village Strategic Housing Development (SHD).

The proposed development site (c.3.5 ha) includes the old Dundrum Shopping Centre, known as Dundrum Village Centre (D14K3T7), and adjacent properties to the west of Main Street, Dundrum, Dublin 14, between the Old Shopping Centre and the Parochial House, excluding No.'s 11 and 16/17 Main Street.

The EIA process, including the preparation of this EIAR, and the examination of the information presented, will inform the decision-making process. The purpose of this EIAR is to assist and inform the Competent Authority in undertaking an environmental assessment of this project.

Therefore, the objectives of this EIAR are summarised as follows:-

- To identify the significant environmental impacts of the project during the construction and operational phases having regard to the characteristics of the receiving environment.
- To evaluate the magnitude and significance of impacts and to propose appropriate measures to mitigate potential adverse impacts.
- To identify, where appropriate, monitoring measures to be implemented during the construction and operational phases.

The nature and extent of the development proposed, i.e. the project being assessed in this EIAR, is outlined in Chapter 3. This is prepared with reference to the plans and particulars submitted with the planning application.

Details of the project will be available online through the EIA Portal[1] and on the website of Competent Authority. A copy of the application, including this EIAR, will also be available on the project specific website for this SHD development – www.dundrumvillageshd.ie

1.2 STATUTORY REQUIREMENTS

The EIA Directive, Council Directive 85/337/EEC of 27 June 1985 *on the assessment of the effects of certain public and private projects on the environment*, is designed to ensure that projects likely to have significant effects on the environment are subject to a comprehensive assessment of environmental effects prior to development consent being given.

Council Directive 85/337/EEC has been amended by Council Directives 97/11/EC, 2003/35/EC and 2009/31/EC. These amendments were codified in Directive 2011/92/EU. In 2014, the Directive was further amended by Directive 2014/52/EU.

[1] The EIA Portal is accessible via the Department of Housing, Planning and Local Government website at https://www.housing.gov.ie/planning/environmental-assessment/environmental-impact-assessment-eia/eia-portal

1.2.1 Directive 2014/52/EU (Amendment of Directive 2011/92/EU)

Directive 2014/52/EU amending Directive 2011/92/EU *on the assessment of the effects of certain public and private projects on the environment* was adopted on 16 April 2014

The definition of the EIA process is redefined under Article 2(g) as follows:-

> *"Environmental impact assessment" means a process consisting of:*
> *(i) The preparation of an environmental impact assessment report by the developer, as referred to in Article 5(1) and (2);*
> *(ii) The carrying out of consultations as referred to in Article 6 and, where relevant, Article 7;*
> *(iii) the examination by the competent authority of the information presented in the environmental impact assessment report and any supplementary information provided, where necessary, by the developer in accordance with Article 5(3), and any relevant information received through the consultations under Articles 6 and 7;*
> *(iv) the reasoned conclusion by the competent authority on the significant effects of the project on the environment, taking into account the results of the examination referred to in point (iii) and, where appropriate, its own supplementary examination; and*
> *(v) The integration of the competent authority's reasoned conclusion into any of the decisions referred to in Article 8a."*

The content of an EIAR is included in Article 5(1) and expanded upon in Annex IV (See below):-

> *"Article 5*
> *1. Where an environmental impact assessment is required, the developer shall prepare and submit an environmental impact assessment report. The information to be provided by the developer shall include at least:*
> *(a) a description of the project comprising information on the site, design, size and other relevant features of the project;*
> *(b) a description of the likely significant effects of the project on the environment;*
> *(c) a description of the features of the project and/or measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment;*
> *(d) a description of the reasonable alternatives studied by the developer, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the project on the environment;*
> *(e) a non-technical summary of the information referred to in points (a) to (d); and*
> *(f) any additional information specified in Annex IV relevant to the specific characteristics of a particular project or type of project and to the environmental features likely to be affected."*

ANNEX IV: DIRECTIVE 2011/92/EU AS AMENDED BY DIRECTIVE 2014/52/EU *INFORMATION REFERRED TO IN ARTICLE 5(1)* *(INFORMATION FOR THE ENVIRONMENTAL IMPACT ASSESSMENT REPORT)* *1. A Description of the project, including in particular:*

(a) a description of the location of the project;
(b) a description of the physical characteristics of the whole project, including, where relevant, requisite demolition works, and the land-use requirements during the construction and operational phases;
(c) a description of the main characteristics of the operational phase of the project (in particular any production process), for instance, energy demand and energy used, nature and quantity of the materials and natural resources (including water, land, soil and biodiversity) used;
(d) an estimate, by type and quantity, of expected residues and emissions (such as water, air, soil and subsoil pollution, noise, vibration, light, heat, radiation and quantities and types of waste produced during the construction and operation phases.

2. *A description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.*
3. *A description of the relevant aspects of the current state of the environment (baseline scenario) and an outline of the likely evolution thereof without implementation of the project as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge.*
4. *A description of the factors specified in Article 3(1) likely to be significantly affected by the project: population, human health, biodiversity (for example fauna and flora), land (for example land take), soil (for example organic matter, erosion, compaction, sealing), water (for example hydromorphological changes, quantity and quality), air, climate (for example greenhouse gas emissions, impacts relevant to adaptation), material assets, cultural heritage, including architectural and archaeological aspects, and landscape.*
5. *A description of the likely significant effects of the project on the environment resulting from, inter alia:*
   (a) the construction and existence of the project, including, where relevant, demolition works;
   (b) the use of natural resources, in particular land, soil, water and biodiversity, considering as far as possible the sustainable availability of these resources;
   (c) the emission of pollutants, noise, vibration, light, heat and radiation, the creation of nuisances, and the disposal and recovery of waste;
   (d) the risks to human health, cultural heritage or the environment (for example due to accidents or disasters);
   (e) the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources;
   (f) the impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change;
   (g) the technologies and the substances used.
   The description of the likely significant effects on the factors specified in Article 3(1) should cover the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium- term and long-term, permanent and temporary, positive and negative effects of the project. This description should take into account the environmental protection objectives established at Union or Member State level which are relevant to the project.
6. *A description of the forecasting methods or evidence, used to identify and assess the significant effects on the environment, including details of difficulties (for example technical deficiencies or lack of knowledge) encountered compiling the required information and the main uncertainties involved.*
7. *A description of the measures envisaged to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment and, where appropriate, of any proposed monitoring arrangements (for example the preparation of a post-project*

analysis). That description should explain the extent, to which significant adverse effects on the environment are avoided, prevented, reduced or offset, and should cover both the construction and operational phases.

8. *A description of the expected significant adverse effects of the project on the environment deriving from the vulnerability of the project to risks of major accidents and/or disasters which are relevant to the project concerned. Relevant information available and obtained through risk assessments pursuant to Union legislation such as Directive 2012/18/EU of the European Parliament and of the Council or Council Directive 2009/71/Euratom or relevant assessments carried out pursuant to national legislation may be used for this purpose provided that the requirements of this Directive are met. Where appropriate, this description should include measures envisaged to prevent or mitigate the significant adverse effects of such events on the environment and details of the preparedness for and proposed response to such emergencies.*
9. *A non-technical summary of the information provided under points 1 to 8.*
10. *A reference list detailing the sources used for the descriptions and assessments included in the report.*

1.2.2 National EIA Legislation

The EIA Directive was first transposed into Irish law by the *European Communities (Environmental Impact Assessment) Regulations*, 1989 (S.I. No. 349 of 1989) which amended the *Local Government (Planning and Development) Act*, 1963 (and other legislation) to provide for environmental impact assessment. These Regulations, together with the *Local Government (Planning and Development) Regulations*, 1990 (S.I. No. 25 of 1990), which made more detailed provision in relation to planning consents, came into effect on 1 February 1990.

The 2014 EIA Directive has principally been transposed into national planning law by the *European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018* (S.I. No. 296 of 2018).

EIA provisions in relation to planning permissions are contained in the Part X of the *Planning and Development Act, 2000*, As Amended and Part 10 and Schedules 5, 6, 7 and 7A of the *Planning and Development Regulations*, 2001, As Amended.

1.2.3 National Guidance

The Department of Housing, Planning and Local Government (DHPLG) issued *Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment*, and the circular PL05/2018 - *Transposition into Planning Law of Directive 2014/52/EU amending Directive 2011/92/EU on the effects of certain public and private projects on the environment (the EIA Directive)* in August 2018. The footnote below contains a glossary of terms from these Guidelines and used in this EIAR[2].

[2] **Competent Authority** - The authority designated as responsible for performing the duties arising from the Directive. In this guidance competent authorities are planning authorities and An Bord Pleanála.
Development consent - The decision of the competent authority or authorities which entitles the developer to commence the project.
EIA - The process of carrying out environmental impact assessment as required by the EIA Directive.
EIA Report (EIAR) - The report prepared by the developer in accordance with the requirements of article 5 of the EIA Directive and submitted to the competent authority, together with the application documentation, for development consent.

The Environmental Protection Agency (EPA) prepared revised (draft) guidance to respond to the 2014 EIA Directive. The current Draft *Guidelines on the Information to be contained in Environmental Impact Assessment Reports* (2017) and Draft *Advice Notes for Preparing Environmental Impact Statements* (2015), have been referenced in the preparation of this EIAR.

1.3 THE NEED FOR AN EIAR – SCREENING

Environmental Impact Assessment (EIA) requirements derive from EU Directives. Council Directive 2014/52/EU amended Directive 2011/92/EU and is transposed into Irish Law by the Planning and Development Acts 2000, as amended, and the Planning and Development Regulations 2001, as amended. Proposed development which falls within one of the categories of development specified in Schedule 5 of the Planning and Development Regulations 2001, as amended, which equals or exceeds, a limit, quantity, or threshold prescribed for that class of development must be accompanied by an EIAR.

The subject development does not fall within development classes set out in Part 1 of Schedule 5. However it does exceed the thresholds applied for the type of development proposed as set out under Part 2 of Schedule 5, namely part 2(10) relating to 'Infrastructure Projects' and states as follows:-

> *10.Infrastructure projects*
> *(a) Industrial estate development, where the area would exceed 15 hectares.*
> *(b) (i) Construction of more than 500 dwelling units.*
> *(ii) Construction of car-parks providing more than 400 spaces, other than a car-park provided as part of, and incidental to the primary purpose of, a development.*
> *(iii) Construction of shopping centres with a gross floor space exceeding 10,000 square metres*
> *(iv) Urban development which would involve an area greater than 2 hectares in the case of a Business District, 10 hectares in the case of other parts of a built-up area, and 20 hectares elsewhere. (In this paragraph "business district" means a district within a city or town in which the predominant land use is retail or commercial use.)"*

The development proposed is above the relevant threshold for Part 10(b)(i) and therefore an EIAR is required for this project.

1.4 SCOPING OF EIAR

'Scoping' is a process to determine what information should be contained in an EIAR. It will also decide what methods should be used to gather and assess that information. The scope of this EIAR is informed by the requirements of the Directive 2014/52/EU and the transposing Regulations together with the Guidelines set out above.

Reasoned Conclusion - The statement made by the Competent Authority on the significant effects of the project on the environment, based on an examination of the EIA report and, where appropriate, the results of its own supplementary examination.

1.4.1 Statutory Instruments and Guidance

In the first instance, the scope of the EIAR has been determined with regard to the Statutory Instruments and Regulations relating to EIA and related guidance from the European Union, the Government and the EPA. These include the following:-

EU Directives / Legislation

- The EU Directives on Environmental Impact Assessment (85/337/EEC as amended by 97/11/EC, 2003/35/EC, 2009/31/EC, codified in 2011/92/EU and amended by 2014/52/EU)
- The Planning and Development Act, 2000 (as amended)
- The Planning and Development Regulations, 2001 (as amended)

EIA and related Guidance

- EPA (2002) *Guidelines on the Information to be contained in Environmental Impact Statements*
- EPA (2003) *Advice Notes on Current Practice in the preparation of Environmental Impact Statements*
- DEHLG (2003) *Environmental Impact Assessment (EIA) Guidance for Consent Authorities regarding Sub-threshold Development.*
- EPA (2015) *Advice Notes for preparing Environmental Impact Statements* (Draft)
- EPA (2017) *Guidelines on the Information to be contained in Environmental Impact Assessment Reports* (Draft)
- European Commission (2017) *Environmental Impact Assessment of Projects - Guidance on Scoping*
- European Commission (2017) *Environmental Impact Assessment of Projects - Guidance on the preparation of the Environmental Impact Assessment Report*
- DHPCLG (2018) *Circular* PL05/2018 – *Transposition into Planning Law of Directive 2014/52/EU amending Directive 2011/92/EU on the effects of certain public and private projects on the environment (the EIA Directive) and Revised Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment.*
- DHPCLG (2018) *Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment.*
- NRA (2009) *Guidelines for Assessment of Ecological Impacts of National Road Schemes.* National Roads Authority.

The scope of the study is also informed by the extent to which other assessments have addressed some types of effects adequately and appropriately. This includes other sources of relevance to the proper planning and sustainable development of the site. Chapter 2.0 contains an overview of the main planning policy sources relevant to the project.

1.4.2 Environmental Factors

The 2017 EPA Draft Guidelines recommend that the scoping process use 'likely' and 'significant' as the principal determining criteria for what should be assessed in the EIAR. Any issues which do not pass the test are omitted or 'scoped out' from further assessment.

A description of the likely significant effects of the project on the environmental factors listed in Article 3(1) of the 2014 Directive is included in this EIAR under the following headings:-

- Population and Human Health — Chapter 4
- Biodiversity — Chapter 5

• Land and Soils	Chapter 6
• Water	Chapter 7
• Air and Climate	Chapter 8
• Noise and Vibration	Chapter 9
• Material Assets: Built Services	Chapter 10
• Material Assets: Transportation	Chapter 11
• Material Assets: Resource and Waste Management	Chapter 12
• Cultural Heritage	Chapter 13
• Landscape	Chapter 14

The scope of this EIAR focuses on the effects at project level and does not re-assess the alternatives or effects on the environment already considered at the higher strategic level. This is in accordance with Section 3.3.5 of the 2017 EPA Draft *Guidelines*:- *The extent to which higher level considerations have already been assessed and so do not need to be assessed again should inform and be referred to in the EIA scoping process."*

1.4.3 Consultation

A formal scoping opinion was not sought from An Bord Pleanala (ABP) in relation to this EIAR. However, the Stage 2 Pre-application Consultation with ABP, as part of the Strategic Housing Development (SHD) process, noted that the final application would be accompanied by an EIAR. Issues raised in the context of this consultation have been taken on board in the compilation of this EIAR.

The application was also prepared following consultation with Dun Laoghaire Rathdown County Council Planning Department and the other departments responsible for roads, water services, parks and housing. This consultation took place at Stage 1 of the SHD process and continued between Stages 2 and 3. Consultation undertaken by the experts with other parties, i.e. Irish Water, utility providers and other prescribed bodies /consultees, are outlined in the experts relevant Chapter of this EIAR.

Scoping of individual chapters was undertaken as appropriate by the experts assigned to the topic. Where this involved scoping the assessment with the Local Authority, Irish Water, utility providers and other prescribed bodies /consultees, details are provided in the relevant Chapter.

1.4.4 Other Projects

The scoping of the assessment also considers other projects or activities (permitted or planned) that are not included in the project but which may result in cumulative impacts – i.e. '*The addition of many minor or significant effects, including effects of other projects, to create larger, more significant effects'.* (EPA, 2017 – Table 3.3).

By considering these projects, the EIAR allows the Competent Authority to form an overall understanding of the likely effects that will arise, including direct, indirect / secondary or cumulative impacts, if the current project proceeds. Other projects whose implementation may coincide with the project are identified in Chapter 3.

Plans and programmes relevant to the project are listed in Chapter 2. These plans have been subjected to a higher tier of environmental assessment through the Strategic Environmental Assessment (SEA) process and in line with Section 3.3.5 of the EPA Guidance (see above), the higher level considerations do not need to be assessed again. This EIAR however, has due regard to the policies and objectives in the relevant plans and programmes.

1.5 RISK OF MAJOR ACCIDENTS AND/ OR DISASTERS

In accordance with Article 3(2) and Annex IV of the 2014 EIA Directive, the vulnerability of the project to risks of major accidents and/or disasters is considered, and the implications for likely significant effects on the environment if it did occur.

Article 3(2) of the 2014 EIA Directive states that an EIAR shall consider:-

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

An EIAR should also contain the following information prescribed in 5(d) of Annex IV of the 2014 EIA Directive:-

> 5. *"A description of the likely significant effects of the project on the environment resulting from, inter alia:*
> *....*
> *(d) the risks to human health, cultural heritage or the environment (for example due to accidents or disasters);"*

The 2018 *Guidelines for Planning Authorities and An Bord Pleanala on carrying out Environmental Impact Assessment* sets out two key considerations to address this:-

- *"The potential of the project to cause accidents and/or disasters, including implications for human health, cultural heritage, and the environment;*
- *The vulnerability of the project to potential disasters/accidents, including the risk to the project of both natural disasters (e.g. flooding) and man-made disasters (e.g. technological disasters)."*

(Source: Page 31, Section 4.29)

During the construction phase the risk of accidents and/ or disasters arising from the potential for construction accidents are addressed under Health and Safety Regulations and other codes. Insofar as they are relevant to the planning and EIA process, mitigation measures that will prevent and/ or mitigate the significant effects are identified in each of the assessment chapters of this EIAR (ie. Chapters 4.0 - 14.0) A compendium of the measures are included in Chapter 15.0.

During the operational phase the risk of fire related accidents is similarly addressed through the Building Regulations (Fire Safety) and is therefore addressed through primary mitigation in the design process. Residual risks of fire and road traffic accidents will be managed by emergency services as per their standard procedures.

The risk of flooding and vulnerability of the project is addressed in the Site Specific Flood Risk Assessment (SSFRA) submitted with the planning application documentation. Adherence to best practice and "proper planning and sustainable development" principles means these risks are reduced to an acceptable level whereby the risk is unlikely and unexpected as a result and further assessments within the EIA process are not necessary.

Otherwise, in terms of the project, no other major accidents or disasters are considered to give rise to effects that are 'likely' and 'significant'.

1.6 STRUCTURE/ METHODOLOGY

1.6.1 Structure of EIAR

The overall structuring and scope of this EIAR has regard to the information requirements of the EC Directives, Irish Statutory Regulations and established best practice.

The EIAR has been written and illustrated with figures in a manner which, insofar as possible, is intended to be understandable to the public generally.

In accordance with the statutory regulations, a Non-Technical Summary has been prepared and included in this EIAR.

Chapters 1-3 of the EIAR provides the context for the EIA assessment including details of the planning policy context, alternatives considered, a description of the site, the project (i.e. the proposed development) and the construction methodology.

This is followed by each of the assessment chapters. The structure used in this EIAR is a Grouped Format structure which examines each environmental topic in a separate chapter.

Chapter 15.0 summarises the significant effects, including cumulative effects (both the addition of many minor or significant effects and the effects of other projects), and addresses the interactions between impacts on different factors. A compendium of the mitigation and monitoring measures to be adopted during the construction and operational phases of the project, detailed within each chapter, are also included in Chapter 15.0.

The Appendices contain background and technical details relating to the project and are referred to in the relevant Chapters (numbered with the relevant Chapter number and followed by A, B, C etc.).

Appendix 14A contains the Landscape and Visual Assessment – Verified Views and CGI's - and is presented as a separate A3 volume (**Volume 2**).

1.6.2 Methodology

A systematic approach is employed using standard descriptive methods, replicable prediction techniques and standardised impact descriptions to provide an appropriate evaluation of each environmental topic under consideration.

An outline of the methodology employed to examine each environmental topic is provided below:

- Introduction: Provides an overview of the specialist area and identifies the specialist who prepared the assessment.
- Assessment Methodology: This subsection outlines the method by which the relevant impact assessment has been conducted within that chapter.
- The Existing Receiving Environment (Baseline Situation): In describing the receiving environment, the context, character, significance and sensitivity of the baseline receiving environment into which the project will fit is assessed. This also takes account of any projects that are likely to proceed.
- Impacts and Mitigation: This section provides a description of the impacts that may arise

during the construction and operational phases of the project. Appropriate mitigation measures are included where required. A description of any Residual Impacts post implementation of the mitigation measures is given where they occur.
- The impacts will consider both 'Do-Nothing' (where the development does not proceed and the environment would not change as a result) and worst case scenarios.

Where necessary and appropriate the following are also considered:-
- Monitoring: This involves a description of monitoring in a post-development phase, if required. This section addresses the effects that require monitoring, along with the methods and the agencies that are responsible for such monitoring. The level of monitoring proposed is proportionate to the nature, location and size of the project and the significance of its effects.
- Reinstatement: While not applicable to every aspect of the environment considered within the EIAR, certain measures need to be proposed to ensure that in the event of the proposal being discontinued, there will be minimal impact to the environment.
- Interactions: Where applicable, the assessment refers to impact interactions, including potential indirect, secondary and cumulative impacts.

1.6.3 Forecasting Methods

The individual forecasting methods used to assess the various effects of the project on the environment are outlined in the relevant Chapters of this EIAR in the 'Methodology' section.

1.6.4 Difficulties Encountered

Some details of the project and the construction methodology / programme are matters which may be subject to change depending on the contractor(s) appointed and other considerations which are not finalised at this stage, and which cannot be finalised until a grant of planning permission for the project has been issued. These are matters which can be addressed prior to commencement of development in consultation with the planning authority and other relevant stakeholders.

Apart from programme delays, Covid-19 restrictions did not impose particular difficulties in terms of surveys and much of the early survey work was undertaken following the Covid-19 restrictions being lifted and those that were not could be undertaken within the restrictions. The data gathered by the experts remains representative, or where indicated in the experts specific assessment methodology (subsection 2 of the assessment chapters) reflects the worst case scenario, and is therefore robust and relevant for the purposes of EIA.

No other significant difficulties were encountered in the preparation of the EIAR. Any limitations or technical difficulties associated with assessment of an environmental topic are detailed in the relevant chapter.

1.6.5 Reference List

The list of The EU Directives, Legislation and guidance documents in Section 1.4.1 references the sources of the descriptions and assessments included in the EIAR.

At the end of each assessment chapter, a reference list of additional resources relied on in that Chapter is provided.

1.6.6 List of Abbreviations

The following abbreviations are used in this EIAR:-

AA	Appropriate Assessment
CA	Competent Authority
EIA	Environmental Impact Assessment
EIA Directive	Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment, as amended by Directive 2014/52/EU
EIAR	Environmental Impact Assessment Report
EPA	Environmental Protection Agency
NTS	Non Technical Summary

Other abbreviations which are specific to a description / an environmental topic are clarified in the relevant chapters.

1.7 TERMINOLOGY

The descriptions used to describe the effects on the environment in this EIAR are listed below. These descriptions are taken from the Draft *Guidelines on the Information to be contained in Environmental Impact Assessment Reports* (2017) Table 3.3:-

Quality of Effects It is important to inform the non-specialist reader whether an effect is positive, negative or neutral	*Positive Effects* A change which improves the quality of the environment (for example, by increasing species diversity; or the improving reproductive capacity of an ecosystem, or by removing nuisances or improving amenities). *Neutral Effects* No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error. *Negative/adverse Effects* A change which reduces the quality of the environment (for example, lessening species diversity or diminishing the reproductive capacity of an ecosystem; or damaging health or property or by causing nuisance). *Positive Effects* A change which improves the quality of the environment (for example, by increasing species diversity; or the improving reproductive capacity of an ecosystem, or by removing nuisances or improving amenities).
Describing the Significance of Effects ‘’Significance’ is a concept that can have different meanings for different topics – in the absence of specific definitions for different topics the following definitions may be useful (also see *Determining Significance* below.).	*Imperceptible* An effect capable of measurement but without significant consequences. *Not significant* An effect which causes noticeable changes in the character of the environment but without significant consequences. *Slight Effects* An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.

Moderate Effects
An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
Significant Effects
An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
Very Significant
An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.
Profound Effects
An effect which obliterates sensitive characteristics

Describing the Extent and Context of Effects
Context can affect the perception of significance. It is important to establish if the effect is unique or, perhaps, commonly or increasingly experienced.

Extent
Describe the size of the area, the number of sites, and the proportion of a population affected by an effect.
Context
Describe whether the extent, duration, or frequency will conform or contrast with established (baseline) conditions (is it the biggest, longest effect ever?)

Describing the Probability of Effects
Descriptions of effects should establish how likely it is that the predicted effects will occur – so that the CA can take a view of the balance of risk over advantage when making a decision.

Likely Effects
The effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented.
Unlikely Effects
The effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented.

Describing the Duration and Frequency of Effects
'Duration' is a concept that can have different meanings for different topics – in the absence of specific definitions for different topics the following definitions may be useful.

Momentary Effects
Effects lasting from seconds to minutes
Brief Effects
Effects lasting less than a day
Temporary Effects
Effects lasting less than a year
Short-term Effects
Effects lasting one to seven years.
Medium-term Effects
Effects lasting seven to fifteen years.
Long-term Effects
Effects lasting fifteen to sixty years.
Permanent Effects
Effects lasting over sixty years
Reversible Effects
Effects that can be undone, for example through remediation or restoration
Frequency of Effects
Describe how often the effect will occur. ((once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually))

Describing the Types of Effects

Indirect Effects (or. Secondary Effects)
Impacts on the environment, which are not a

direct result of the project, often produced away from the project site or because of a complex pathway.

Cumulative Effects
The addition of many minor or significant effects, including effects of other projects, to create larger, more significant effects.

'Do-Nothing Effects'
The environment as it would be in the future should the subject project not be carried out.

`Worst case' Effects
The effects arising from a project in the case where mitigation measures substantially fail.

Indeterminable Effects
When the full consequences of a change in the environment cannot be described.

Irreversible Effects
When the character, distinctiveness, diversity or reproductive capacity of an environment is permanently lost.

Residual Effects
The degree of environmental change that will occur after the proposed mitigation measures have taken effect.

Synergistic Effects
Where the resultant effect is of greater significance than the sum of its constituents, (e.g. combination of SOx and NOx to produce smog).

1.8 PROJECT TEAM / CONTRIBUTORS

This EIAR has been prepared on behalf of the developer by a team of qualified experts under the direction of BMA Planning who were responsible for the overall coordination of the Report. The other expert contributors involved in the preparation of this EIAR are identified in Table 1.1.

Table 1.1 : EIA Team

Chapter	Company	Expert Contributor
Non-Technical Summary	Input from Contributors of each of the assessment chapters listed below.	All
Introduction	**BMA Planning,** Planning and Development Consultants, Taney Hall, Eglington Terrace, Dundrum, Dublin 14.	**Louise O'Leary** BA, MRUP, Dip EIA Management, MIPI
Planning Policy Context	**BMA Planning (A**	**Louise O'Leary** BA, MRUP, Dip EIA Management, MIPI
Description of Project and Alternatives	**BMA Planning,** Planning and Development Consultants, Taney Hall, Eglington Terrace, Dundrum, Dublin 14. **TJ O'Connor & Associates,** Corrig House, Corrig Road, Sandyford, Dublin 18	**Louise O'Leary** BA, MRUP, Dip EIA Management, MIPI **Thomas Griffin** BSc(Eng), Dip Eng, Dip Proj Mgmt, CEng, MIEI, MIStructE, MSc Const. Info. **Kate FitzGerald** BSc Eng (Struct), ME

		(Structural Engineering), CEng, MIEI
Population and Human Health	**BMA Planning,** Planning and Development Consultants, Taney Hall, Eglington Terrace, Dundrum, Dublin 14.	**Louise O'Leary** BA, MRUP, Dip EIA Management, MIPI
Biodiversity	**Altemar Environmental Consultants,** Lower Windgates, Rathdown Lower, Greystones, Co. Wicklow	**Bryan Deegan** MCIEEM, Msc. Environmental Science, Bsc (Hons) in Applied Marine Biology, National Dip in Applied Aquatic Science, National Cert. in Science (Aquaculture)
Land and Soils	**TJ O'Connor & Associates,** Corrig House, Corrig Road, Sandyford, Dublin 18	**Diarmuid Cahalane** BE, M Eng Sc, Dip Const Law, CEng, CWEM, FIEI, MCIWEM. **Thomas Griffin** BSc(Eng), Dip Eng, Dip Proj Mgmt, CEng, MIEI, MIStructE, MSc Const. Info.
Water	**TJ O'Connor & Associates,** Corrig House, Corrig Road, Sandyford, Dublin 18	**Diarmuid Cahalane** BE, M Eng Sc, Dip Const Law, CEng, CWEM, FIEI, MCIWEM
Air and Climate	**Byrne Environmental Consulting Ltd.,** Red Bog Skryne Road Dunshaughlin Co. Meath	**Ian Byrne** MSc Environmental Protection, Dip Environmental and Planning Law, Member of the Institute of Acoustics.
Noise and Vibration	**Byrne Environmental Consulting Ltd.,** Red Bog Skryne Road Dunshaughlin Co. Meath	**Ian Byrne** MSc Environmental Protection, Dip Environmental and Planning Law, Member of the Institute of Acoustics.
Material Assets: Built Services	**TJ O'Connor & Associates**, Corrig House, Corrig Road, Sandyford, Dublin 18	**Diarmuid Cahalane** BE, M Eng Sc, Dip Const Law, CEng, CWEM, FIEI, MCIWEM **Kate FitzGerald** BSc Eng (Struct), ME (Structural Engineering), CEng, MIEI.
Material Assets: Transportation	**Systra,** Centrum House, 38 Queen Street, Glasgow, United Kingdom.	**Alan DeVenny** BEng (Hons), PhD (Civil Eng), CEng, MICE
Material Assets: Resource and Waste Management	**Byrne Environmental Consulting Ltd.,** Red Bog Skryne Road Dunshaughlin Co. Meath	**Ian Byrne** MSc Environmental Protection, Dip Environmental and Planning Law, Member of the Institute of Acoustics.
Cultural Heritage	**Courtney Deery Heritage Consultancy Ltd.**, Lynwood House, Ballinteer Road, Dublin 16 **Cathal Crimmins Architects**, The Courtyard, 40 Main St. Blackrock, Co. Dublin	**Lisa Courtney** BA (Hons) MSc (Ag) Dipl. Bus. Mgt., Adv. Dipl. In Planning & Env. Law, MIAI. **Cathal Crimmins** BArch MArchSc FRIAI, RIAI Grade 1 Conservation Architect **Julia Crimmins** BA, HDip (Archgy), MUBC, MSc.SP. MIAI, MIPI. **Sinead Flynn** BArch MUBC MRIAI
Landscape	**Macro Works**, Hibernia House, Cherrywood Business Park, Loughlinstown, Dublin 18.	**Richard Barker,** Principal Landscape Architect at Macro Works Ltd., MLA, PG Dip Forestry, BA Environmental, MILI
Summary of Significant Effects, Interactions and Mitigation / Monitoring Measures	**BMA Planning**, Planning and Development Consultants, Taney Hall, Eglington Terrace, Dundrum, Dublin 14.	**Louise O'Leary** BA, MRUP, Dip EIA Management, MIPI

2.0 PLANNING POLICY CONTEXT

2.1 INTRODUCTION

The current application has been prepared in the context of a range of national, regional and local planning policy sources. These are reviewed and commented on in detail in the *Statements of Consistency*, prepared by BMA Planning and submitted with this application. It is not proposed to repeat these provisions in this document. The following is a summary of the most relevant plans to the current application.

2.2 DEVELOPMENT PLAN

The *Dun Laoghaire Rathdown County Development Plan 2016 – 2022* (the "Development Plan" or "DLRCDP") is the current statutory development plan for the area.

The *Statement of Consistency and Material Contravention Statement* (BMA Planning) contains a detailed review of all national, regional, ministerial and local policy sources relevant to the assessment of the current application. It demonstrates substantial compliance with the policies objectives and specific development standards outlined in the DLRCDP 2016-2022.

The section containing the *Material Contravention Statement* notes that the application is contrary to the Development Plan and sets out the basis on which the Board may grant permission for the proposed development in accordance with Section 37(2)(b) of the *Planning and Development Act 2000 (as amended)*.

The *Dun Laoghaire Rathdown County Draft Development Plan 2022-2028* is also published and has been reviewed and taken into consideration in the preparation of this application so that the development can be considered against any emerging policy changes[3].

2.3 NATIONAL AND REGIONAL POLICY

The following national and regional policy documents are relevant to this project: -

- *Project Ireland 2040 - The National Planning Framework*
- *Housing For All – A New Housing Plan For Ireland (2021)*
- *Regional Spatial and Economic Strategy (RSES) 2019-2031 for the Eastern and Midland Region*

Project Ireland 2040 – National Planning Framework

The National Planning Framework (NPF) is the Government's high-level strategic plan for shaping the future growth and development of the Country out to the year 2040. A key

[3] The draft plan was adopted at a meeting of the Council on 10 March 2022. The plan becomes operative on 21 April 2022. Although strictly not a relevant consideration until that date, it is expected that the Draft will be operative and in force at the time the Board makes its decision on this application. After this application is made, we will not have a further opportunity to address the Board on the adopted plan. For this reason, we address the new plan by reference to the published draft and approved amendments. These remarks are only relevant considerations for the Board where the new plan is in force at the time the Board is making a decision on this application.

element of the NPF's strategy is compact growth with the key features being: -

- *Targeting a greater proportion (40%) of future housing development to be within and close to the existing 'footprint' of built-up areas.*
- *Making better use of under-utilised land and buildings, including 'infill', 'brownfield' and publicly owned sites and vacant and under-occupied buildings, with higher housing and jobs densities, better serviced by existing facilities and public transport.*
- *Supporting both urban regeneration and rural rejuvenation through a €3 Billion Regeneration and Development Fund and the establishment of a National Regeneration and Development Agency.*
  (Page 22)

In accordance with the National Policy Objectives of the NPF, the current application will deliver a high-density development of modern and adaptable new homes within an existing urban area in close proximity to existing public transport and local service provision.

One of the key future growth enablers for Dublin in Page 37 of the NPF include "*Identifying a number of ambitious large- scale regeneration areas for the provision of new housing and employment throughout the city and metropolitan area and the measures required to facilitate them as integrated, sustainable development projects".*

The project will provide new housing and will act as a catalyst for future development and regeneration of the area.

Housing for All – A New Housing Plan for Ireland (2021)

The Government issued a policy document entitled 'Housing For All – A New Housing Plan for Ireland' in September 2021 and this Plan contains a number of pathways to increase private and public housing supply.

Pathway 3 is focused on how to move from building approximately 20,000 homes a year to an average of 33,000 homes per annum between now and 2030.

The Plan proposed broad reforms of planning and regulatory frameworks, as well as strengthening the capacity of delivery partners, which will enable supply to reach the levels required. Many of the challenges sought to be addressed in the new Plan are consistent with the proposed development and, in particular, the emphasis on high density apartment development on public transport nodes and the new "Town Centres First" policy is a characteristic of this development at Dundrum.

Regional Spatial and Economic Strategy 2019-2031

The *Eastern and Midlands Regional Assembly Regional Spatial and Economic Strategy, 2019-2031* (RSES) is a strategic plan which provides a multifaceted approach to regional development. The Strategy is based upon the 3 key Principles and 16 Regional Strategic Outcomes.

The *Dublin Metropolitan Area Strategic Plan* (MASP) is a land use and transportation strategy contained within the RSES. Consolidation of Dublin City and its suburbs is part of the vision of the MASP.

The project will deliver a high-density scheme of modern and adaptable new homes, within an existing urban area, in close proximity to existing public transport and local service provision. This is in accordance with the principles and vision of the Metropolitan Area Strategic Plan (MASP).

2.4 SECTION 28 MINISTERIAL GUIDELINES

Guidelines for Planning Authorities on Sustainable Residential Development in Urban Areas (2009) and Associated Urban Design Manual Best Practice Guidelines (2009)

The key principles for new residential developments in urban areas are contained in these Guidelines and translated into practice in the accompanying design manual. They generally relate to a plan led / sequential approach to development, densities and location, sustainable neighbourhoods and better design / urban design.

These are incorporated at a local level in the relevant development plan, local area plan or SDZ planning scheme and at project stage, to be considered in the preparation and assessment of planning applications.

Sustainable Urban Housing: Design Standards for New Apartments – Guidelines for Planning Authorities (As Amended 2020)

These Guidelines, hereafter referred to as the 'Apartment Guidelines' contain qualitative and quantitative measures for the design of apartments and related facilities including storage areas, open spaces and communal facilities. *Specific Planning Policy Requirements* (SPPRs) included in the Guidelines take precedence over policies and objectives of development plans, local area plans or SDZ planning schemes.

Quality Housing for Sustainable Communities (2007)

The aim of these Guidelines is to identify principles and criteria that are important in the design of housing and to highlight specific design features, requirements and standards that have been found, from experience, to be particularly relevant. Guidance within this document is arranged under five headings :- Site Selection; Design Brief, Procurement and Cost Control; Urban Design Objectives in the Provision of Housing; Scheme Layout and Design; and Dwelling Design.

Urban Development and Building Heights Guidelines for Planning Authorities (2018)

The national planning policy guidance on building heights is set out in these Guidelines, building on the policies in the National Planning Framework (NPF). The Building Height Guidelines support, in principle, heights of 6 storeys at street level with scope to consider greater building heights in designated urban centres and on site located on public transport corridors.

The Planning System and Flood Risk Assessment - Guidelines for Planning Authorities (2009)

These Guidelines introduce comprehensive mechanisms for the incorporation of flood risk identification and management into the planning process. A Site-Specific Flood Risk Assessment (SSFRA) has been prepared in accordance with these Guidelines and is enclosed with the application.

3.0 DESCRIPTION OF PROJECT

3.1 INTRODUCTION

This Chapter provides a description of the project site in the context of its receiving environment and a description of the project and the main alternatives considered in so far as relevant from an environmental impact perspective.

The project description should be read in conjunction with the plans and particulars submitted with the planning application including the Planning Application Report, design statements and other technical studies. To avoid unnecessary repetition, it is not proposed to repeat the contents of these reports.

3.2 SITE AND SURROUNDINGS

Figure 3.1 shows the subject site (broken red line) in the context of the surrounding area. The current application site (red line) is larger and includes some areas of public realm and infrastructure in the immediate vicinity required to be upgraded or to tie the development into its surrounding context. Refer to the Site Location Plan submitted with the application for the full extent of the application site.

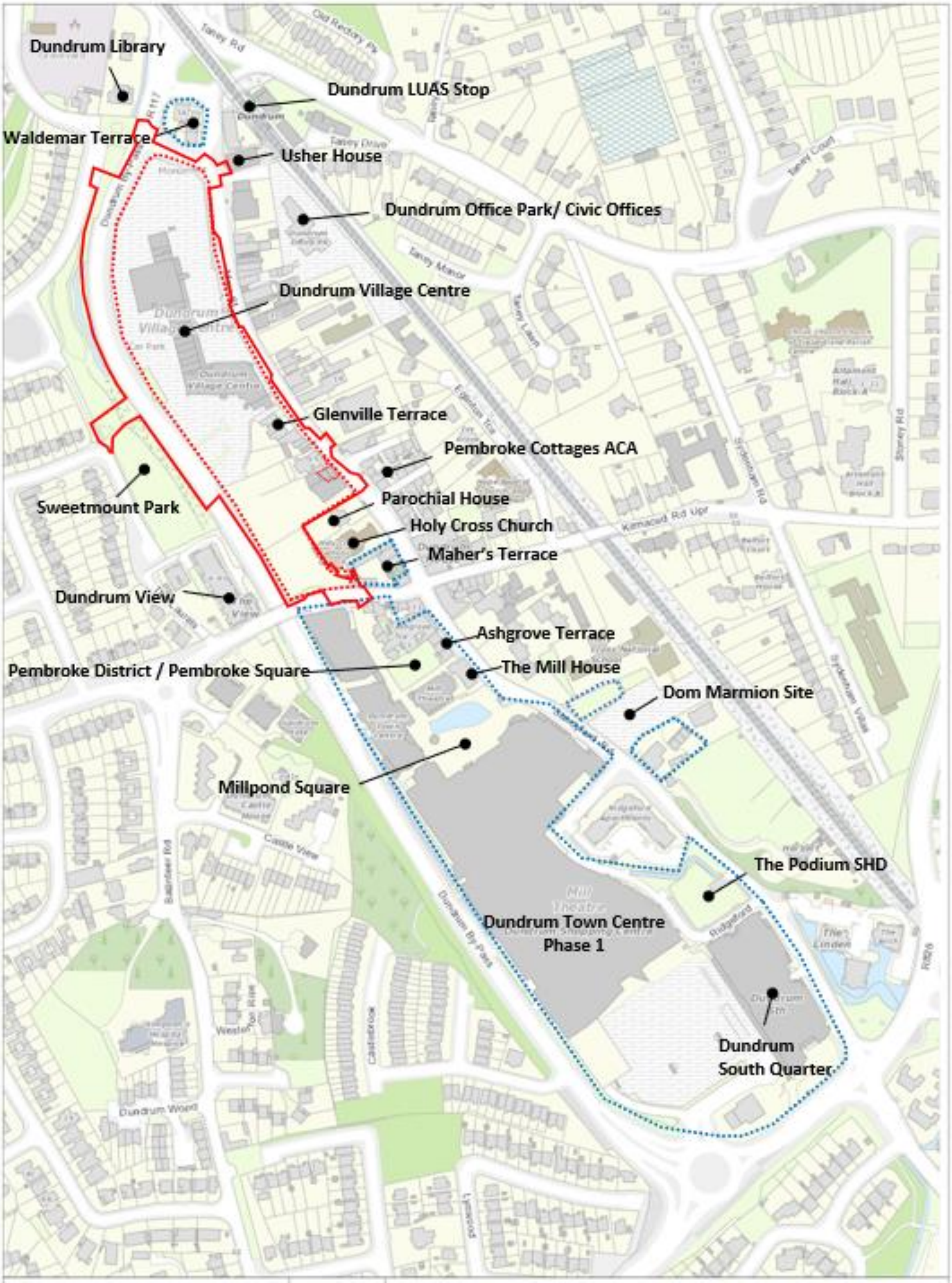
The site relates to the lands north of Ballinteer Road / Dom Marmion Bridge, west of Main Street and east of the Dundrum By-pass and are referred to as the “Dundrum Village SHD” for short in this application.

The site is adjoined to the east by the Main Street with the site comprising the length of Main Street from the north junction with the by-pass along the western boundary of the street to the Parochial House. To the south, the site bounded by Ballinteer Road / Dom Marmion Bridge and this boundary is a low stone wall with granite capping of modern construction and about 15 metres of railing part of the Dom Marmion bridge.

To the west, the site adjoins the by-pass from the Dom Marmion Bridge to the junction with Main Street, with residential apartments (Dundrum View) and suburban residential estates beyond. Sweetmount Park open space is located to the west of the by-pass.

The Slang River runs along the western boundary of the site from South to North in a concrete culvert. The entire length of the Slang, including the part which flowed within the site boundary, was diverted to facilitate the construction of the Dundrum Bypass in 2001.

The levels on the site vary rising from the northwest of the site towards the south and southeast varying from c. 30 metres AOD at the northwest up to 53 metres AOD close to the Main Street adjacent to the Parochial House.



BMA PLANNING
PLANNING AND DEVELOPMENT CONSULTANTS

Project:	*Dundrum Village SHD*
Title:	*Figure 3.1 : Site Location*

3.3 EXISTING STRUCTURES

The site comprises the Old Dundrum Shopping Centre and adjoining lands including a number of properties west of Main Street between the Old Shopping Centre and the Parochial House (including Glenville Terrace).

The Old Dundrum Shopping Centre is a 1970's 3-storey 'L' shaped building, known as Dundrum Village Centre, surrounded by a surface car park.

The properties on Main Street include the properties listed in the Table 3.1. Eircode details are provided to assist in identifying them. Photographs of each of the properties are also included.

No. 16/17 Main Street (Mulvey's Pharmacy - Eircode D14H0C9) and No.11 Main Street (Lisney Auctioneers – Eircode D14Y2N6) are not included in the current application site. Part of the building known as No. 16/17 Main Street is in the ownership of Dundrum Retail Limited Partnership (DRLP) and this includes accommodation at basement, ground and first floor levels which is currently vacant**.** The part of the building under separate ownership includes Mulvey's Pharmacy. The proposed development has been designed to allow for the redevelopment of these properties should they become available in the future.

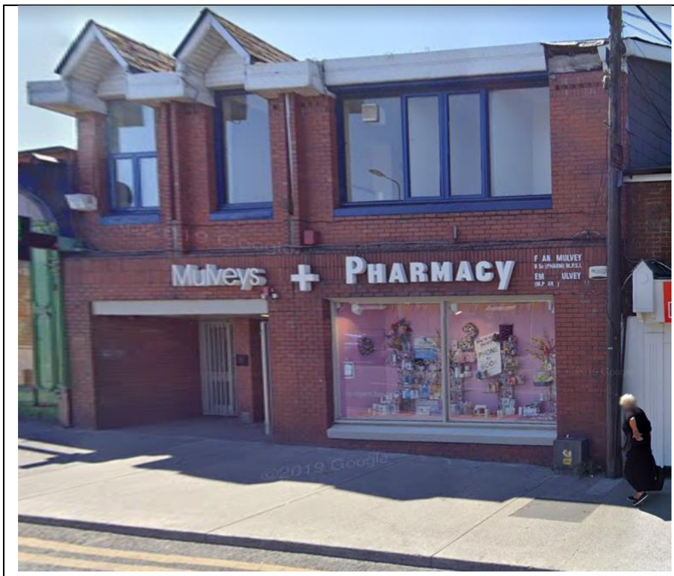
All existing structures on the site, with the exception of No.'s 1 – 3 Glenville Terrace, are to be demolished. The returns at the rear of No.'s 1 – 3 Glenville Terrace will be removed and re-built.

Table 3.1: Main Street Properties

Address	Description	Eircode
Main Street	IrishChristmasTrees.com (Former Mulvey's Hardware / builders yard)	D14A250
8 Main Street	Essence Cafe	D14W2W1
15A Main Street	Vacant	D14YP78
15 Main Street	The Best Barber	D14T3K2
13 Main Street	Havana	D14P2X8
13A Main Street	Irene's Flower Cabin	D14A0Y0
4 Glenville Terrace	XL	D14E261
3 Glenville Terrace	Vacant (Glenville House)	D14N6P0
2 Glenville Terrace	Vacant (Pembroke House)	D14E6N3
1 Glenville Terrace	Vacant	D14KF67
Main Street	Vacant (Former Post Office / Joe Daly Cycles)	D14V8K8
Dundrum Village Centre	Various[4]	D14K3T7

[4] Dundrum Village Centre Tenants (November 2021) - Lidl, Noel Reid Fashion, Eurofone, Diep, An Post, Insomnia, L'OmBre Hair Salon, The Good Neighbour, Relish, Dr Acupuncture, Mulvey's of Dundrum, Dealz, The Barber Cabin, Dundrum Veterinary Clinic, Matt Britton Carpets, Polonez Dundrum, Dominic Smyth, Churchtown School of Music

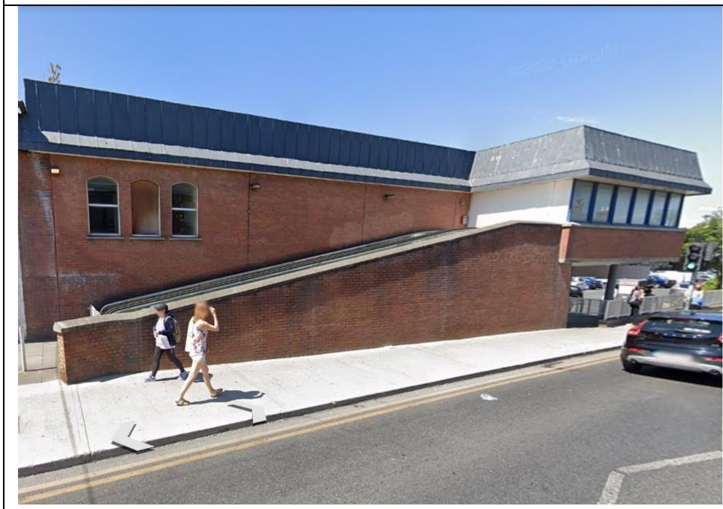
	***1. Mulvey's Hardware / Builders Yard (Former)***
	***2. Car Parking at Rear of Former Mulvey's Hardware***
	***3. Northern Boundary Wall with Parochial House***

	***4. 16/17 Main Street*** (not included in the application site)
	***5. 11 Main Street*** (not included in the application site)
	***6. 8 and 15 Main St (15A at rear)***

7. 13 and 13A Main Street

8. 4 Glenville Terrace

9. 1 – 3 Glenville Terrace

	***10. Main Street (Former Post Office / Joe Daly Cycles)***
	***11. Dundrum Village Centre, Main Street.***
	***12. View towards Lidl from carpark of Dundrum Village Centre***

	***13. View of Parade of Shops in Dundrum Village Centre***
	***14. View of Rear of Dundrum Village Centre from Bypass***
	***15. View of North End***

	***16. View of site Northwards from Bypass***
	***17. View of site Southwards from Bypass with the Church and parochial house in left middle and Dundrum Town Centre in background.***
	***18. View of site from Ballinteer Road / Dom Marmion Bridge, with rear of Church on right***

	***19. Rear of Holy Cross Church***

3.4 SITE ACCESS

Figure 3.2 below shows an aerial view of the site in the context of the existing road network and denoting existing vehicular and pedestrian access points.

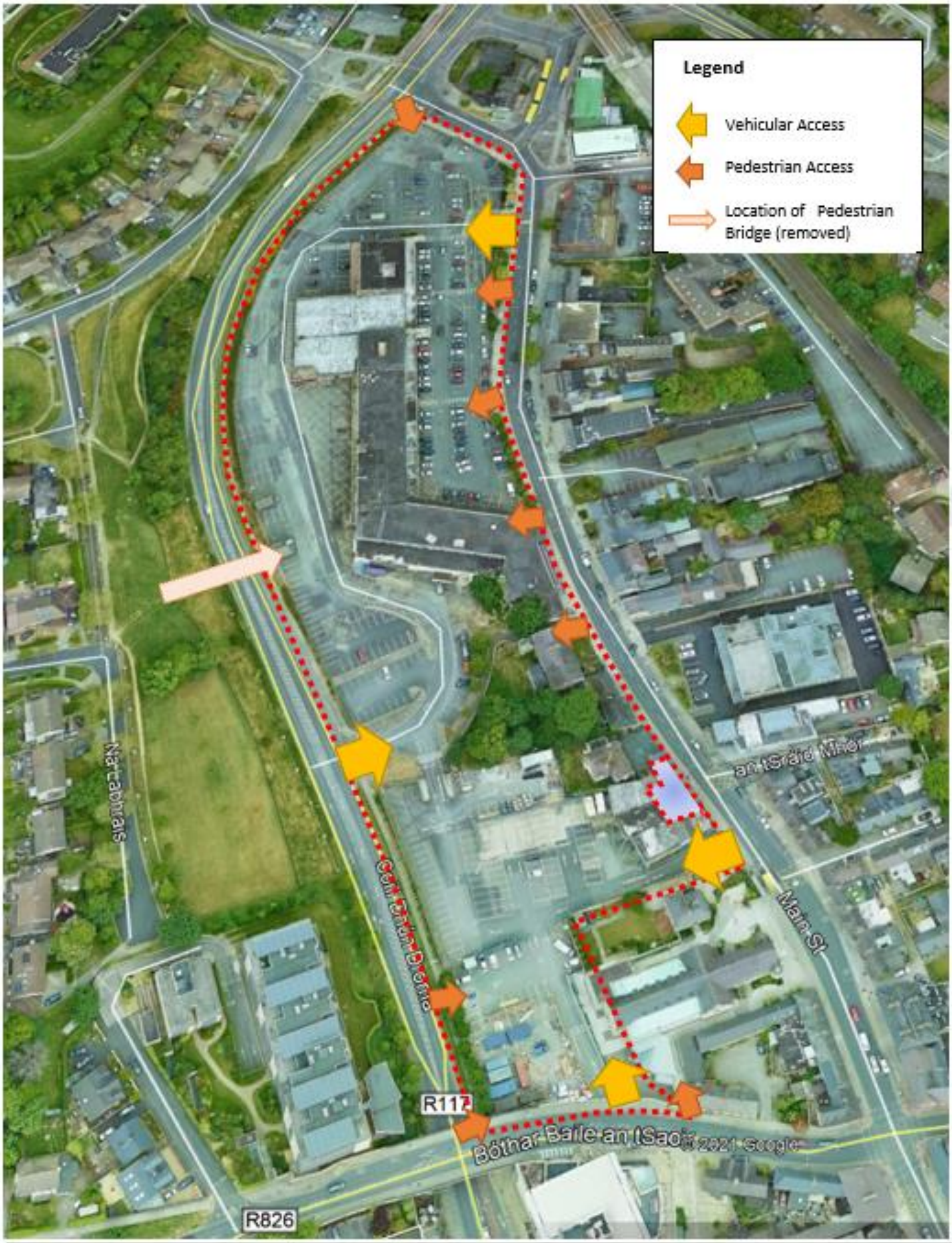
The old shopping centre is accessed from Main Street. There is also an access from the by-pass available which facilitates access to the shopping centre.

An access from Main Street adjacent to the former Mulvey's hardware store and builders yard immediately north of the Parochial House and this access now serves car parking areas to the rear of Main Street and to the rear of the Church.

There is a vehicular access beneath Dom Marmion Bridge connecting to Dundrum Town Centre (phase 1) car park.

There are a number of pedestrian accesses along the site perimeter.

The footings of a pedestrian bridge over the bypass which was removed in anticipation of the redevelopment of the site are located approximately half way along the bypass frontage.



BMAPLANNING PLANNING AND DEVELOPMENT CONSULTANTS	***Project:*** *Dundrum Village SHD*
	Title: *Figure 3.2 : Site Access*

3.5 SURROUNDING CONTEXT - OTHER LANDS IN APPLICANTS OWNERSHIP/ CONTROL

The following properties and sites are located in the vicinity of the application site and are also identified on Figure 3.1 above.

Maher's Terrace

The majority of Maher's Terrace is in the applicants' ownership and this area has potential to continue the regeneration and revitalisation of the crossroads in a similar vein to Ashgrove Terrace and will complete this important part of the Village crossroads and will retain the scale and character of old Dundrum. Proposals are being considered at present with a view to making a planning application.

16/17 Main Street

No's 16/17 Main Street (Eircode D14H0C9) and No.11 Main Street (Lisney Auctioneers – Eircode D14Y2N6) are not included in the current application site. Part of the building known as 16/17 Main Street is in the ownership of Dundrum Retail Limited Partnership (DRLP) and this includes accommodation at basement, ground and first floor levels which is currently vacant**.** The part of the building under separate ownership includes Mulvey's Pharmacy. The proposed development has been designed to allow for the redevelopment of 16/17 Main Street should this property become available in the future.

Waldemar Terrace Site

Waldemar Terrace is a small parcel of land located at the northernmost end of the village. The site, located adjacent to the by-pass, consists of a terrace of 3 houses and a number of modern extensions to the rear. Due to new road schemes in the area the site acts as a traffic island bound by busy roads and the bus interchange. Redevelopment proposals for this site, which could form part of a large scheme including the environs of William Dargan bridge, envisage the construction of a new building on this site.

Dundrum Town Centre (Phase 1)

To the south of Ballinteer Road / Dom Marmion Bridge is the Dundrum Town Centre development with a new street created in a north south axis. The Dundrum Town Centre development (Phase 1) is Ireland's largest shopping and leisure complex comprising over 120 stores, 45 cafes and restaurants, offices, a 12 screen cinema, a 200 seat theatre, a medical centre and radio studio. The Phase 1 Town Centre development was granted planning permission by DLRCC in 2000, opened in 2005 and the majority of the permitted development (Reg Ref D00A/0112) is now complete and operational.

The public realm centrepiece of the Phase I development is Millpond Square which has become a significant focal point for the Town Centre. The original Mill House has been restored and the Millpond itself has been integrated successfully into the new development.

Dundrum Town Centre - Millpond Square

Pembroke District/ Pembroke Square

The Pembroke District is located at the south western quadrant of the Dundrum crossroads and has become a successful focal point for restaurant and leisure uses. Building 13, formerly occupied by Hamleys, is currently transitioning from retail to food and beverage type uses. This is consistent with the Development Plan objective. Since the Centre was opened in 2005, the previous owners acquired most of the properties in this sector - including all 6 Pembroke Cottages and Ashgrove Terrace (1-5) which now accommodates Donnybrook Fair Retail Store and Restaurant. Pembroke Cottages have found suitable uses and have been sensitively restored.

Pembroke Square

The Podium SHD (Building 5)

The “Building 5” residential site was part of the original permission but which was only completed to podium. SHD granted (ABP-305261-19) for 107 apartments in a 10 storey (9 storeys over podium) building.

Dom Marmion Site

Dundrum Retail Limited Partnership has two sites on either side of the public car park at the Dom Marmion site (Sandyford Road) and these “Major Town Centre” zoned lands have potential to accommodate a range of uses either individually or as part of a larger integrated development including the car park lands.

3.6 OTHER ADJACENT LANDS

Holy Cross Church/ Parochial House

The site shares a boundary with the Holy Cross Church (A Protected Structure RPS No. 1129) and Parochial House (Proposed Protected Structure RPS No.2095). The Parochial house has an enclosed garden to the rear separated from the site by a high wall. The rear of the Church has a newly completed Pastoral Centre in the basement of the church building which opens onto the site at a level that is 4-5 metres below the Ballinteer Road level. The Pastoral Centre entrance is a contemporary stone clad architectural form which enters from the upper level pedestrian walkway on the southern side of the Church.

Holy Cross Church and Parochial House

Main Street (East)

Moving from Dundrum Crossroads northwards, the following properties or groups of properties are as follows

- Ladbrokes, 55 Main Street
- Haven Pharmacy, 56 Main Street
- Ryan’s Public House, 54-57 Main Street
- Pembroke Cottages
- Dundrum Credit Union, Pembroke Lodge, Main Street
- Permanent TSB, Main Street

- 18A-F Main Street
- 15 Main Street (Murray Mobile)
- 1-3 Pembroke Terrace, Main Street
- Dundrum College of Further Information, Main Street
- AIB, 10 Main Street
- EBS 9 Main Street/ Rear of 9 Main Street (k Nails and Namaste)
- 8 Main Street (2)
- 7 Main Street (Brian Matthews & Co/ McCanns Dry Cleaning)
- Stokes Court (Suites 1 – 3), Rear of 7 Main Street
- Carragh House, 6 Main Street
- 5 Main Street
- 4/4A Main Street
- 2/3 Main Street (Bank Of Ireland)
- 1 Main Street (McConagle and Mason Estates)
- Usher House
- EIR Telecom Exchange, Main Street

Ladbrokes/ Haven Pharmacy, Ryans Public House 54-57 Main Street

Pembroke Cottages

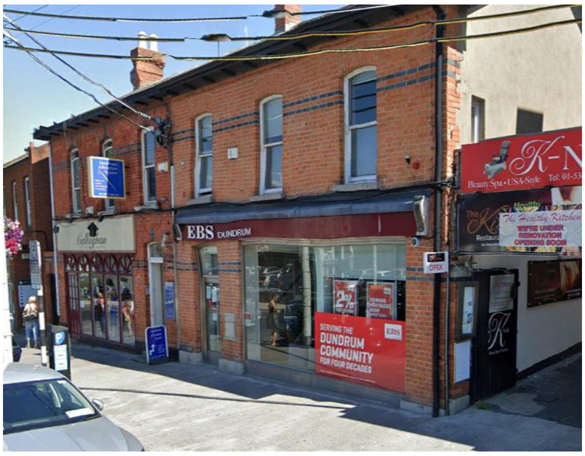
Dundrum Credit Union, Pembroke Lodge, Main Street

Permanent TSB, Main Street

18A-F Main Street

1-3 Pembroke Terrace, Main Street

AIB, 10 Main Street



EBS 9 Main Street/ Rear of 9 Main Street (k Nails and Namaste) 7 Main Street (Brian Matthews & Co/ McCanns Dry Cleaning)

4- 6 Main Street

2/3 Main Street (Bank Of Ireland)

Usher House

EIR Telecom Exchange, Main Street

Dundrum Library

Dundrum's Library, one of 8 libraries under DLRCC, is located on the western side of the Dundrum Bypass at the northern end of the site. The library was the last of the Carnegie libraries before the establishment of the Carnegie Trust and was opened on 12th August 1914. The building was designed by R.M. Butler who also designed Cabinteely, Glencullen, Sandyford and Shankill libraries. This building is a Protected Structure (RPS. No. 883).

Sweetmount Park

The existing land that now constitutes Sweetmount Park at Dundrum was formerly associated with the grounds of Laurel Lodge and Sweetmount. It comprises a small area of flat site that runs to an escarpment that is the western edge of the Slang river valley. This slope and the resultant twisting slopes are formed by the new river culvert and the insertion of the Dundrum Bypass along the valley floor. The lands provide open space for the Sweetmount housing areas but the space is severed from contact with the village core by the Slang and the By-pass and so remains peripheral to the housing and disconnected from Dundrum.

Sweetmount Park

Dundrum View

Dundrum View is a 7 storey apartment development located west of Dundrum Bypass, between Ballinteer Road and Sweetmount Park. This development which dates from c.2004 reflects the type of development that has been approved since the designation of Dundrum as a "*Major Town Centre*" and the arrival of Luas.

Dundrum View Apartments (Southern elevation). Views from Dom Marmion Bridge and car park of former Mulvey's hardware)

3.7 PLANNING HISTORY

The existing shopping centre dates from the 1970's and there have been numerous planning applications for minor works and changes of use since then. Otherwise, there have been no significant changes to the original shopping centre structure and car parking areas. There have also been a number of other minor planning permissions on the overall site.

The Main Street properties are mainly pre-63 and these have also been the subject of various planning applications over the years, however, there have been no significant extensions or redevelopment projects on the western side of Main Street.

Comprehensive development of the site has been permitted providing for a major redevelopment of the site between 2003 and 2009 and these permissions, now expired, were not implemented. The planning history summary is as follows:

Reg. Ref: D03A/0207 Bord Ref: PL 06D.204042

Permission was granted to Lenridge Properties Limited by An Bord Pleanála (Reg. Ref: D03A/0207 Bord Ref: PL 06D.204042) in 2002 for a mixed use development which would link to the phase 1 development across the Old Ballinteer Road and to the rear of Holy Cross Church. The original permitted Phase 2 development had 3 department stores, 1 supermarket and 76 retail units), restaurants/cafes/leisure units, 105 bedroom hotel, library, offices and residential uses as well as 1,550 underground car parking spaces.

Reg Ref: D04A/1456

A subsequent permission for amendments to the phase 2 (Reg. Ref: D04A/1456) secured permission for a scheme broadly similar to the original scheme (i.e.. hotel, library, offices and residential) on a site which included additional properties on Main Street.

Reg Ref: D06A/0506

Permission was granted under Reg. Ref: D06A/0506 for a reconfiguration of the development under an amendment application to accommodate a major anchor store at the northern end of the scheme. The retail and restaurant/ café content increased along with various other amendments, solely at the northern end of the site. The application provided for additional parking with a total of 1,783 spaces.

Reg Ref: D07A/0261 Sweetmount Park/ Underpass

Arising from detailed consultations with the Roads Department in the context of Reg Ref: D06A/0506, the revised phase 2 scheme was further redesigned to provide a tunnelled slip road from Dundrum by-pass (northbound) with underpass beneath the by-pass road to gain access to the site. This meant that the previously permitted entrance to the site from Main Street was eliminated from the scheme which had considerably traffic and civic benefits that were favoured by Dun Laoghaire Rathdown County Council (DLRCC). The change in ground levels arising from the above facilitated the laying out and improvement of Sweetmount Park resulting in the creation of a functional landscaped public park which was directly linked to the phase 2 site via the pedestrian bridge/ walkway which was approved in the original 2002 permission.

Reg Ref: D08A/0231; Bord Ref: PL06D.233317.

This development included all properties to the west of Main Street and included proposals for the tunnelled underpass and upgrading of Sweetmount Park. The overall development comprised 3 main elements as follows:-

1. Main Street Frontage: 14 no. retail/ commercial units, 40 no. apartment units and the refurbishment of No's 1-3 Glenville Terrace to create a single restaurant unit
2. Main Retail/ Centre: a retail / commercial centre arranged around a series of internalised streets/ malls and public spaces, with accommodation including a Major Department Store, 11 no. secondary anchor units (MSUs) and 66 no. retail/ non retail services units, 9 no. restaurant units, a public library, Crèche, leisure centre and associated ancillary areas.
3. Hotel: 96 bed hotel located at the northern end of the site.

The accommodation with a total gross floorspace of 106,618sqm (excluding Parking and service yards 70,344 sqm) was proposed over 4 underground levels accommodating parking (1900 spaces) and other accommodation including storage areas, circulation, and plant areas.

3.8 CHARACTERISTICS OF THE PROJECT

3.8.1 Development Overview

The description below outlines the development and its main characteristics and should be read in conjunction with the drawings and reports submitted with the planning application.

The development comprises 11no. urban blocks and is subdivided into four separate zones (Figure 3.3) and as detailed in the ***Schedule of Accommodation*** [GRID] included with this application.

The development will consist of 881no. residential units.

Non-residential uses include a foodstore, retail / non-retail services units, café and restaurant units and a creche, at ground floor level, fronting Main Street and Church Square.

The development will include the demolition of all existing structures on the site with the exception of No.'s 1-3 Glenville Terrace.

The following table includes the key characteristics of the development for which permission is now sought.

	No.	SQM	
Site Area			**3.5HA**
Site Coverage			33%
RESIDENTIAL			
No. of Apartments (11 Blocks)			**881 units**
Dwelling Mix: Studio	1 (0.1%)	45	
1 bed	335 (38%)	18,044.2	
2 bed	463 (52.5%)	36,347.2	
3 bed	82 (9.3%)	8,280.9	
Gross Floor Space Apartments		62,717.3	
Cumulative Residential Gross Floor Space			**83,983.3 sqm**
NON-RESIDENTIAL USES			
Retail		1,396.6	
Foodstore		2028.1	
Café/Restaurant		403.5	
Creche		523.1	
Commercial Plant		107.4	
Cumulative Non-Residential Gross Floor Space			**4,458.7 sqm**
TOTAL GROSS FLOOR SPACE			**88,442 sqm**
Total Non Residential Development as a % of Total GFA			**5%**
PARKING			
Car Park (Not GFA)			**10,861.7 sqm**
Car parking:			**373 no. spaces**
Residential	318		
Non-Residential	55		
Motorcycle Spaces			**17 no. spaces**
Cycle parking:			**1,750 no. spaces**
Residential	1,508		
Visitor (78 internally, 164 in public realm)	242		
BUILDING HEIGHTS			
Main Street			**3-5 storeys**
Dundrum Bypass			**8-12 storeys**
Landmark Building – Block 1A			**10 -16 storeys**
Dual Aspect			**60%**

Figure 3.3 Development Zones

Figure 3.4 Building Heights

3.8.2 Site Layout Concept

The urban structure is based on a series of 11no. building blocks arranged around the central pedestrian spine and a series of four courtyards corresponding to four separate "zones" or character areas.

At the northern end, where Main Street meets the Dundrum Bypass, Blocks 1A, 1B and 1C (Zone 1) sit at the apex of the site where the buildings are placed over a podium which covers the local supermarket unit and shop units at lower ground floor level.

Blocks 2A and 2B are residential blocks positioned along the Bypass and Block 2C steps down in height to Main Street where it accommodates ground floor shop units with apartments over (Zone 2).

In a similar configuration, Blocks 3A and 3B are also residential blocks positioned along the bypass and Block 3C on Main Street also accommodates ground floor shop units with apartments over (Zone 3).

Glenville Terrace is located between blocks 3C and 4B and will be used for resident services and amenities / resident support facilities associated with the overall apartment development (Zone 3).

Block 4A is positioned on the bypass side of the development and adjacent to the proposed Church Square which bookends the development at its southern end at Ballinteer Road. Church Square is shared with the Holy Cross Church and provides an important element of the new urban structure with the potential to accommodate a range of possible uses and activities.

Block 4B has a number of ground floor shop units and a creche with apartments over. The site excludes 16/17 Main Street (D14H0C9) and 11 Main Street (D14Y2N6) which are not within the applicants' control, however, the development is designed in a manner that assumes and enables the redevelopment of these properties in the future (Zone 4).

The Non-residential uses are proposed at ground floor level along Main Street, from the supermarket at the northern apex to the Parochial House. Glenville Terrace is to be used for resident amenity services. There is a total of 11no. retail / non-retail services units, 1 no. café / restaurant unit and a creche fronting Main Street. In addition, 3no. café / restaurant units are proposed fronting Church Square.

3.8.3 Public Realm / Open Space

The public realm strategy for the site involves creation of a strong north south spine stretching from Pembroke District behind Holy Cross Church and up through the centre of the site and with connections back to the existing Main Street. The central north-south spine meets the new east-west street that links Main Street to the new Sweetmount Bridge (shared pedestrian and cycle) which links the site to the existing public open space at Sweetmount Park and Finsbury Park beyond.

The core useable public open spaces focus on 4no. key nodes:

1. Usher Place
2. Sweetmount Place
3. Glenville Terrace Square and
4. Church Square

"Transitional space" comprising public paths and routes, linking core public open spaces to one another, provide a functioning part of public realm with the provision of incidental seating, opportunities to promote social interactions whilst walking / exercising and offer enhanced landscaped routes which are well planted and have a positive impact on users.
The proposed development will facilitate the widening and upgrading of the footpath on the eastern side of Main Street, complementing the recent upgrade by Dún Laoghaire-Rathdown County Council. The Dundrum By-pass verge will also be landscaped to soften the edge and this treatment will be consistent with the approach already taken to the Dundrum Town Centre (Phase 1) development further south along the bypass. Pedestrian and cycle

connections along the Dundrum Bypass will be improved and upgraded and the environment will be generally improved through landscaping and passive surveillance.

Communal Open Space is provided in accordance with the requirements of the *Design Standards for New Apartments – Guidelines for Planning Authorities, 2020* (Ref. section 4.10 and 4.11.). It is proposed to be delivered in the form of courtyard space and roof terraces across the 4 zones.

Figure 3.5 Public Open Space

3.8.4 Access and Parking

Vehicular access to serve the proposed development will be provided via Dundrum Bypass. The existing vehicular entrances on Main Street will be closed.

373no. parking spaces are provided in total with 55no. non-residential spaces below podium in Zone 1. The residential parking provision is 318 parking spaces which equates to almost 0.4 spaces per unit. 1,750 no. cycle parking spaces are provided.

Sustainable transportation measures include high quality cycle facilities, car sharing/ car club spaces and electric car facilities to encourage more sustainable modes of transport.

3.8.5 Building Conservation

There are no Protected Structures on the current application site. The current proposals address the rear of the Holy Cross Church (RPS: 1129) and, in particular, the development integrates with the lower ground floor level where the Church Square is now proposed.

The current proposals address the boundary treatment with the Parochial House (Proposed RPS: 1129) garden and will ensure that the structural integrity of the boundary wall is protected.

An assessment of the existing buildings on the site has been undertaken by Cathal Crimmins Conservation Architect. The Glenville Terrace building will be provided with an open setting following the removal of some of the adjacent buildings of lesser quality and the set-piece of the 3 house terrace will sit within the new public realm as a significant feature and a reference to the historical context of Dundrum village. The returns will be replaced as they are structurally unsuitable.

All other buildings on the site are to be removed to facilitate the new development.

A Proposed Candidate Architectural Conservation Areas was included in the *Dun Laoghaire Rathdown Draft County Development Plan* 2022-2028[5] and included buildings on Main Street within the subject site, including Glenville Terrace and properties either side (see list below).

8 Main Street	Essence Cafe	D14W2W1
15A / 15 Main Street	Vacant / The Best Barber	D14YP78 / D14T3K2
13/ 13A Main Street	Havana / Irene's Flower Cabin	D14P2X8 / D14A0Y0
4 Glenville Terrace	XL Convenience Store	D14E261
Main Street	Vacant (Former Post Office / Joe Daly Cycles)	D14V8K8

Permission was previously approved for the removal of these buildings.

The buildings have been surveyed by Cathal Crimmins, Conservation Architects and the details of the buildings and their current state and condition is detailed in Chapter 13.0 and Appendix 13A.

3.9 CONSTRUCTION DESCRIPTION

3.9.1 Introduction

This section contains a description of the construction process as it is known at this pre-consent stage and ahead of detailed design development. An ***Outline Construction Management Plan*** [TJ O'Connor & Associates] has also been prepared and is submitted with the planning application. The document sets out, on a preliminary basis, a framework of measures to address the implications of the construction works.

Certain assumptions are made in the ***Outline Construction Management Plan*** (OCMP) based on the information available at this time and, for the avoidance of doubt, it is not proposed or intended that the applicant / contractor(s) are bound by these proposals which may change depending on the timing and circumstances pertaining at the time of construction.

The description has considered the outermost or "not to exceed" parameters where full details of the construction process are not known or available at this stage. It is considered that the description of the construction phase activities provides a sufficient level of detail for planning permission / EIA purposes.

[5] In the course of the Development Plan review process, the Proposed Candidate ACA has been replaced with an ACA in the adopted version of the Plan.

On receipt of a grant of permission, the appointed contractor(s) will update the *OCMP* to comply with and implement the requirements and mitigation and monitoring measures set out in this EIAR and any conditions imposed as part of the granted planning approval. The Contractor's Construction and Environmental Management Plan (CEMP) will be prepared prior to works commencing on site.

3.9.2 Duration and Timing

It is envisaged that the proposed development will be constructed over a period of up to 8 years. An indicative construction phasing plan is described in the *OCMP* [prepared by TJ O'Connor and Associates]. The proposed development will be constructed in two phases, each comprising two zones:-

- Phase 1 – Zones 1 and 2
- Phase 2 – Zones 3 and 4

(Refer to Figure 3.3).

Each zone will take approximately 24 months to construct and will comprise the following main works elements –

- Earthworks, Foundation and Podium Structure Works
- Superstructure Works
- Façade & Fit-Out Works
- Landscaping Works

Works may be undertaken concurrently on two or more zones. The adjacent development zone will be utilised as a site compound.

Works are proposed to commence at the northern end in Zone 1 (Blocks 1A, 1B and 1C) and will be developed sequentially southwards. Landscaping, including public open spaces, will be completed as part of each development zone.

As part of the Zone 1 works, the following infrastructure will be constructed:-

- Access road and Dundrum Bypass relocated junction, slip lanes and cycle track upgrade
- New foul pumping station, compensatory flood storage, separate foul sewers and surface water outfall connections.

Sweetmount Bridge will be constructed and opened to the public as part of the Zone 2 works. In order to install the proposed new bridge, a temporary road closure would be required for a number of nights over a period of 2 to 3 weeks to allow the bridge to be lifted into position and secured. Access to Sweetmount Park will be maintained during construction.

Demolition will be undertaken on a phased basis, commencing with the demolition of Dundrum Village Centre (part of), facilitating the construction of the Zone 1 blocks and the associated site compounds and storage areas etc. All existing commercial uses on the site will cease, however, it is anticipated that commercial units will continue to trade (subject to market forces, leases etc.) until the demolition phase applies to that zone.

The public carparks located to the rear of the former Mulvey's Hardware and Holy Cross Church (151 spaces) will remain operational until works commence in Zone 3 . On occupation of Blocks 1A, 1B and 1C, and pending the parking spaces in Zone 2 becoming operational, 105 spaces will be reallocated for use by the tenants of Blocks 1A, 1B and 1C. The public car park at the existing Dundrum Bypass entrance (33 spaces) will be removed when works commence in Zone 2.

The phasing noted is indicative, and the final phasing, which will be subject to non-construction related matters (i.e. funding, market forces etc.) will be reviewed by the developer and the appointed Contractor, prior to commencement.

3.9.3 Site Set up and Accommodation

All lands that are required for the construction of the project are within the red line. The site establishment works, to be carried out by the appointed Contractor, will include the following:-

Hoarding - Perimeter hoardings will be erected around the zone of the site to be developed. The hoarding will be 2.4m high generally. In areas of sensitivity, i.e. adjoining Holy Cross Church and Parochial House, a 3.0m high hoarding will be provided. The hoarding will be painted, well maintained and may contain graphics portraying project information.

Compounds - Site compounds will be established by the main contractor(s). These will generally be established in the adjoining development zone. As the development progresses, the below podium space (future carpark areas) may be used. The extent of compounds and storage space required will be decided by the main contractor, upon appointment, and the details contained in the Contractors CEMP. Given the size and nature of the site, it is envisaged that there is adequate space on the site for the compounds.

Harmful material will be stored on site for use in connection with the construction works only. These materials will be stored in controlled manner. Where on site facilities are used, there will be a bunded filling area using double bunded steel tank at a minimum.

On completion of the works all construction materials, debris, temporary hardstands etc. from the site compound will be removed off site and the site compound area will be completed as per the permitted layout.

Staff **-** On-site facilities will include site offices and staff welfare facilities (e.g. toilets, drying room, canteen, secure bike storage, etc.). The number of workers on the site will vary throughout the construction programme. During peak construction the number of site operatives is likely to be 200-300 workers.

3.9.4 Site Clearance and Demolition

The existing land comprises of Dundrum Village Centre and associated surface car parking, a number of occupied and vacant buildings along Main Street and three surface car parks adjoining Dundrum Bypass. All existing buildings and associated surface car parking will be demolished, apart from No.'s 1-3 Glenville Terrace which are mostly retained – the returns to the rear will be removed and re-built.

Demolition will be undertaken on a phased basis, commencing at the northern end of the site to facilitate development in Zone 1. The demolition waste reuse, recycle and disposal worst case scenario quantum's are given in Table 3.2.

Table 3.2 – Demolition Waste, Recycle & Disposal

Waste Type	Predicted Tonnage to be Produced	Re-Use		Recyclable		Disposal	
		%	Tonnage	%	Tonnage	%	Tonnage
Mixed C&D	1654	10	165	80	1323	10	165
Timber	945	40	378	55	520	5	47
Plasterboard	709	30	213	60	425	10	71
Metals	236	5	12	90	213	5	12
Concrete	473	30	142	65	307	5	24
Mixed Waste	709	20	142	60	425	20	142
Total	**4725**		**1051**		**3213**		**461**

Concrete waste arising from the demolition will potentially be reused on site (subject to testing) as temporary hardcore fill material for the piling mat. This fill material would provide a stable and level mattress for the piling rigs. This crushed concrete material would be removed from the site on completion of the piling works and a portion of the material could be used as general fill material elsewhere.

Utilities- Service diversions and decommissioning works will be undertaken for existing utilities on site. This will include decommissioning of services for the Dundrum Village Centre and the combined sewer located in the surface car park. Service diversions are provided for existing third party connections to the combined sewer.

3.9.5 Excavation and Earthworks

The proposed site levels are determined by a combination of factors such as tie-ins with existing roads along the Dundrum Bypass and Main Street, the existing topography and Part M disabled access to ground floor levels.

Approximately 28,200m^3 of excavated material is anticipated to be removed from the site, which equates to approximately 2,400 truck movements departing the site. This is scheduled to take place over an estimated period of 60 days at the commencement of the construction of each zone, which equate to approximately 36 truck movements per day.

This material will be exported to suitably licensed landfill facilities. Ground Investigations identified that a significant proportion of the material consists of a mixture of builder's rubble and imported very soft to firm sandy gravelly clay (refer to Chapter 6 and Appendix 6A). the Waste Classification investigation carried out in 2005 and 2021 has highlighted a possibility that there are hazardous materials (hydrocarbons) in one location on the site.

Part of the "cut" into the site includes circa 1,200m^3 of granite rock removal along the Main Street. The removal of this rock will involve the use pre-drilling, splitting and breaking of the rock to form the Lower Ground Floor. It is proposed that this material would be crushed and screened on site for reuse as structural fill material, subject to obtaining a waste permit from DLRCC.

Table 3.3 – Excavation Volumes

Excavation material	Material Arising Volume (m^3)
Total Made Ground Volume	27,000

Total Rock Removal	1,200
Overall Arisings	**28,200**

3.9.6 Sub Structure and Superstructure

The current residential construction techniques provide for a number of options and these may not be fully decided until detailed design. The varying level of rock across the site will likely require the residential blocks along the Main Street to be founded on isolated concrete pad foundations with pile foundations for the residential blocks along the Dundrum Bypass and to the northern tip of the site.

The most likely option for the superstructure would be reinforced concrete and either in situ reinforced concrete frame and flat slab, precast reinforced concrete cross wall and precast slab or precast twin wall and precast slab. Retaining walls will be constructed along east of site (Main Street)

3.9.7 Access Road and Infrastructure

the existing junction into the site would be relocated to form the new main access junction into the site and additional access and egress points on the Bypass would be established.

New water, foul and surface water infrastructure will be provided within the proposed access road and under the Lower Ground Floor including sewers, pumping station, balancing tanks, outfall and attenuation. Drainage, surface water attenuation area and flood compensatory storage ~~stone~~ will be provided under the structural slab

Sweetmount Bridge (Zone 2): The new bridge will be prefabricated off site and will be delivered in a number of sections and craned into place. Access to Sweetmount Park will be maintained during the bridge construction works with only localised interruption in the proposed works area. Reinstatement of the park area local to the bridge will be completed on installation.

3.9.8 Construction – Quantity of Materials

The construction waste reuse, recycle and disposal worst case scenario quantum's are given in Table 3.4a. Table 3.4b includes a list of the materials and their predicted tonnage which are expected to be used in the construction of this project.

Table 3.4a Construction Waste, Recycle & Disposal

Waste Type	Predicted Tonnage to be Produced	Re-Use		Recyclable		Disposal	
		%	**Tonnage**	**%**	**Tonnage**	**%**	**Tonnage**
Mixed C&D	1997	10	200	80	1597	10	200
Timber	1694	40	678	55	932	5	85
Plasterboard	605	30	182	60	363	10	61
Metals	484	5	24	90	436	5	24
Concrete	363	30	109	65	236	5	18
Mixed Waste	908	20	182	60	545	20	182
Total	**6051**		**1374**		**4109**		**569**

Table 3.4b – Construction Materials

Element Type	Predicted Tonnage to be Produced	
Sub-Structure		
Imported Fill	960	m^3
Concrete Piling + Blinding + Foundations	18,420	m^3
Reinforcement	1,233	tonne
Tanking membrane	21,700	m^2
Primary Structure		
Concrete	92,720	m^3
Reinforcement	4,750	tonne
Concrete Precast Stairs	127	nr.
Walls		
Concrete	2100	m^3
Reinforcement	280	tonne
Membrane	1215	m^2
Brick	1180	m^2
Site Works		
Top Soil and Fill	18,210	m^2
Hard Landscaping: Paving + Roads	11,500	m^2
Façade & Envelope		
Brick	16,368	m^2
Insulation	33,710	m^2
Metal Cladding	5,715	m^2
Glazing (including insulated spandrels)	10,942	m^2
Internal Walls & Linings & Finishes		
Internal metal Stud Partitions	48,719	m^2
Wall Lining System	95,907	m^2
Plasterboard Ceilings	56,411	m^2
Floor Tiles	25,570	m^2
Floor Carpet + Vinyl	45,870	m^2

3.9.9 Major temporary Features

During the course of the initial work phases for each zone, there will be a requirement for major temporary features on the site to facilitate the construction form. These temporary features would be in the form of rock breakers; rock percussion drills; piling rigs; stone crusher; Holding ponds and settlement tanks; tower cranes; site cabins and storage compounds.

Erection and Operation of Cranes:- The exact number of cranes will be dictated by the programme and the specific construction requirements, but it is likely that that one or more tower cranes per residential block will be temporarily erected. To maximise efficiency, tower cranes will be supplemented by mobile cranes. No loads will be lifted over the public domain or adjacent properties. A “mast climber” may be installed at some local areas to facilitate façade features. Hoists and teleporters may also be used within the site and around its perimeter as required during the project.

3.9.10 Road closure / Diversions

Temporary lane closure, the introduction of a stop/go system and diversion of the road layout towards the site will be required on the Dundrum Bypass. A temporary road closure will also be required for a number of nights to allow the proposed bridge to be lifted into position and secured.

Drainage Works to Main Street will be carried out at night in order to mitigate disruption to the Main Street. Works to provide new drainage connections for surface water outfall to the Slang River and foul outfall to the Irish Water infrastructure will require temporary lane closures and the introduction of a stop/go system on the Dundrum Bypass.

3.9.11 Vehicular Access to Site

Construction access to the site will be via the Dundrum Bypass. The predominate direction of construction traffic entering and exiting the site will be from the south, travelling to and from the M50.

Pedestrian gates on Main Street will be provided to allow construction workers access the site directly from the Luas and Bus.

Vehicle parking for construction personnel will be accommodated within the development site (with overflow provision in the Dundrum Town Centre carpark). To the extent possible, personnel will be encouraged to use sustainable modes of transport – walking, cycling, public transport. Information on local transportation (i.e. Luas services via Dundrum luas stop and Dublin bus stops at Holy Cross Church and on Ballinteer Road) will be published on site.

Roadways are to be kept clean of muck and other debris. A road sweeping truck is to be provided if necessary, to ensure that the road network adjacent to the site is maintained in the clean state.

The Contractor will prepare a Construction Stage Traffic Management Plan (CTMP) prior to works commencing on site. This plan will take account of other projects under construction at the time using the same road network eg. The Central Mental Hospital, Dundrum.

3.9.12 Site Working Hours

The site will operate Monday to Friday 7am – 7pm and Saturday 8am – 2pm. It may be necessary to deviate from these times in exceptional circumstances, for example: service diversions and connections; concrete finishing and fit-out works; etc. There may also be occasions where it is necessary to make certain deliveries outside of these times, for example, where large loads are limited to road usage outside peak times.

3.9.13 Environmental Protection Measures

The contractor will establish guidelines and controls for all activities that may impact on the surrounding environment for the duration of the project and in particular will ensure that the mitigation and monitoring measures contained in this EIAR are implemented. The OCMP submitted with this application will be updated by the Main Contractor(s) and a CEMP prepared. The CEMP will address, inter alia, commitments made in relation to noise, air quality, dust suppression, management of waste, traffic, flooding etc. Particular focus will be given to the specific protection measures outlined for neighbouring properties and the Dundrum Slang i.e. proposals to prevent sediment or pollutants from leaving the construction site and entering the River and flood protection measures (including the provision of a compensatory flood storage area on site).

Monitoring & Protection of Neighbouring Properties:- Specific protection measures will be applied for No.'s 1-3 Glenville Terrace and adjacent properties including No.'s 11 and 16/17 Main Street and Holy Cross Church and Parochial House, particularly during demolition and excavation works. The Contractor will be responsible for preparing the preparation of condition surveys of surrounding buildings, walls, hardstanding area etc. prior to the carrying out of any works on the proposed development. The extent of surveys will be defined by the Developers Design Team members and agreed with Dun-Laoghaire Rathdown County Council if required.

3.10 OTHER PROJECTS

For the purpose of considering cumulative effects, in combination the following permitted projects in the vicinity of the site are noted and have been taken into consideration in the EIAR insofar as they may be relevant to the assessment of a particular topic

Project	Ref. No.
Dundrum Building 5 'The Podium'	ABP-305261-19
Greenacres, Upper Kilmacud Road	ABP-304469-19
Walled Garden, Gort Mhuire	ABP-304590-19
Marmalade Lane, Gort Mhuire	ABP-308157-20[6]

A project in the general area which is worthy of particular consideration in the context of the current project is the Dundrum Central Mental Hospital site (See Figure 3.6 – site 5) which is being promoted by the Land Development Agency (LDA).

The redevelopment of the Central Mental Hospital (11.3ha) will provide a mixed use neighbourhood, providing c.1,048 homes through a range of tenure. The development will also include supporting amenities. The LDA have noted on the project website that a SHD application is currently being finalised for the Central Mental Hospital site and for the purposes of this EIAR we have assumed that the construction phase of both projects will overlap.

It is possible that other projects will be under construction / completed in the area at the same time as the current project but these are not considered material to the assessment of the project.

[6] A revised SHD application (Ref. No. TA06D.312170) has been made seeking permission for 531 no. units. This is an increase of 65 units on the permitted scheme.

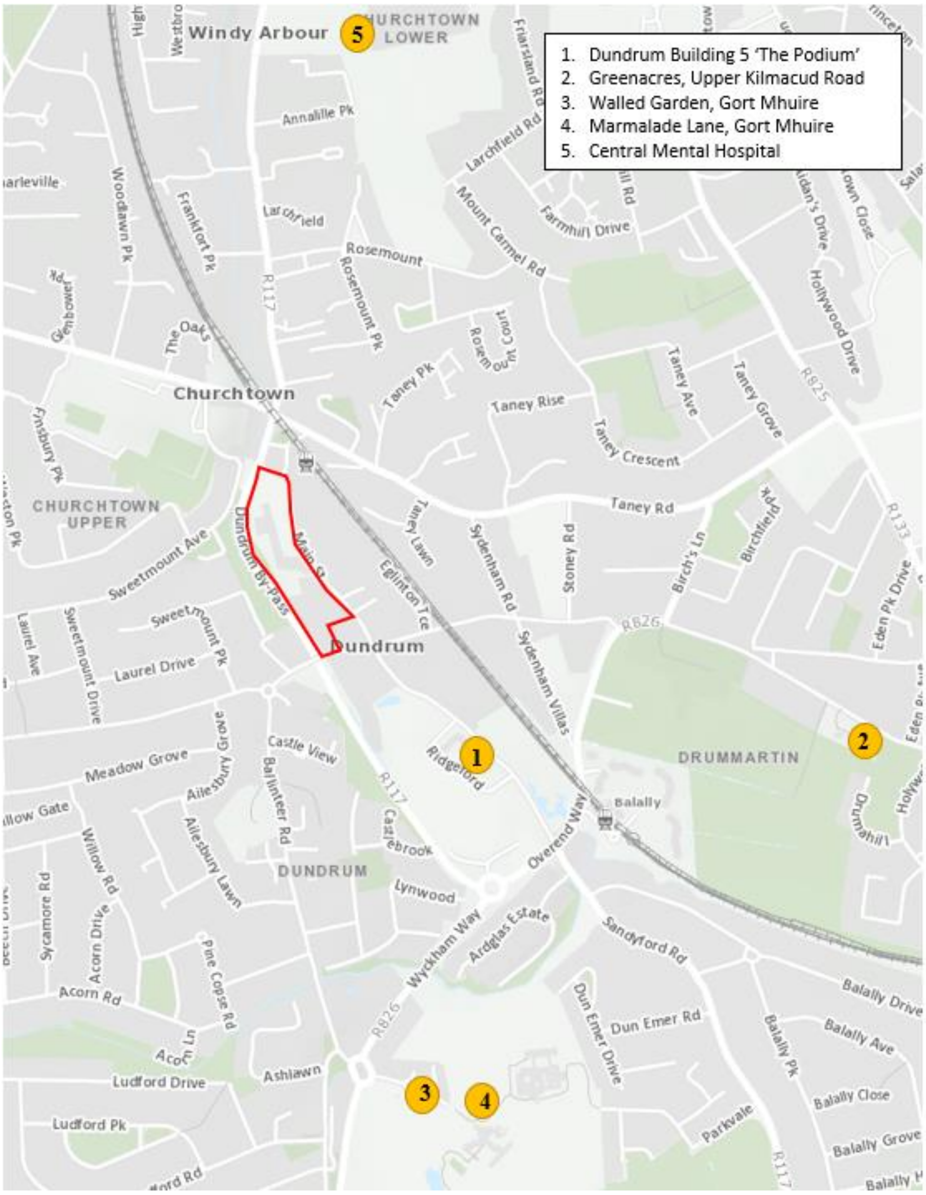


Figure 3.6 Other Projects in the vicinity

3.11 ALTERNATIVES EXAMINED

The consideration of "Alternatives" is requirement of the EIA process. By outlining alternatives considered, it is possible to reduce or minimise environmental impacts and ensure that better solutions are not overlooked.

3.11.1 Alternative Locations

The EPA Guidelines (2002 and 2017 Draft Guidelines) recognise that it is not always necessary or appropriate to consider alternative options for projects which have been previously determined in a higher plan.

> *"Hierarchy*
> *EIA is only concerned with projects. Many projects, especially in the area of public infrastructure, arise on account of plans, strategies and policies which have previously been decided upon. It is important to acknowledge that* ***in some***

> ***instances neither the applicant nor the competent authority can be realistically expected to examine options which have already been previously determined by a higher authority*** *(such as a national plan or regional programme for infrastructure or a spatial plan)."*
>
> (Source: EPA 2002 *Guidelines on the information to be contained in Environmental Impact Statements,* Section 2.4.3 Alternatives, page 12)

The location of the project has been determined by the designation of the area as a "Major Town Centre" which supports the development of a new residential and mixed-use development in place of the obsolete old Dundrum Shopping Centre. As the development of this site for the land uses proposed has been identified at a local / national scale in the County Development Plan, no alternative sites were considered in this EIAR.

3.11.2 Alternative Layout / Designs

Alternative designs for the different parts of the site were considered and developed by the Architects during the design process, with input from the overall project team. This involved a constantly evolving design whereby different solutions were constantly tested to establish the optimum design solution.

Insofar as effects on the environment are concerned, these issues were taken into consideration in arriving at the chosen scheme and, in that sense, the proposed development embodies these considerations.

The main alternatives considered in terms of layout, and the main reasons for the option chosen, included:-

- Basements were minimised due to the excessive cost of basement construction and the layout options considered all involved providing parking at grade. Various permutations were considered in relation to the ratio of residential parking provided.
- The height strategy has evolved throughout the design phase and was informed by the Landscape and Visual Impact Assessment and the Daylight / Sunlight / Shadow Studies which informed a decision on the capacity of the site and the impact of the proposed development on the immediate vicinity of the site and on views from the wider district. The northern end of Dundrum has consistently been identified in the previous planning applications[7] as the suitable location for a building of height to act as a "gateway" to the Town Centre. Having regard to the MTC zoning, the adjacent scale (e.g. Dundrum View), the distance from houses and position overlooking Sweetmount Park, Grid investigated a variety of options ranging from 12 to 24 storeys. The buildings range in height from 4-5 storeys on Main Street to 9-16 storeys to the Dundrum Bypass. This was chosen as a reasonable balance between the policy imperatives of density on a MTC site and the existing context.
- Various layout options were examined in order to facilitate vehicular access to the subject site. Following from the principles established in the context of previous permissions and taking in to account the aspirations of the Local Authority to remove car traffic from Main Street, it was decided to relocate access to the Bypass.
- The location of Sweetmount bridge was determined based on the reinstatement of an earlier pedestrian bridge and, apart from minor adjustment to suit the layout of the

[7] Reg. Ref. D03A/0207, D04A/1456, D06A/0506, and D08A/0231

blocks, no other alternatives were considered.

- Daylight/ sunlight analysis was undertaken as an iterative process during the course of the design of the apartment blocks and alternative layouts were examined. This gave rise to consideration of a range of alternative layout options and configurations to achieve the optimum balance in terms of density, height and amenity.
- Communal amenity space and roof gardens were chosen based on their location but also taking into account micro-climatic conditions based on advice from the relevant experts.

A synopsis of the environmental effects of the main alternative scenarios which have been dismissed in favour of the proposed development is summarised as follows with reference to the topics in the EIA Directive

Table 3.4 Synopsis of Comparison of the Environmental Effects of Alternatives Considered

EIA Topic	Environmental Effects of Alternatives
Population and Human Health	• A number of alternative proposals for the tower element on Blocks 1A were considered but were deemed to have a greater impact on the wider area in terms of the visual impacts experienced by the existing communities surrounding the site. • In relation to Sweetmount Bridge, a 'Do-Nothing' option involved not providing a pedestrian bridge at this location however this was discounted following consultation with the Local Authority and advice from the project team in relation to the planning merits of greater connectivity. • The possibility of locating a Library/ Civic Building within Church Square was considered but was discounted following discussions with DLRCC
Biodiversity	• None of the alternative layouts or designs had significantly different environmental effects to the proposed development insofar as biodiversity is concerned
Land and Soils	• None of the alternative layouts or designs had significantly different effects to the proposed development insofar as Land and Soils are concerned.
Water	• Alternative layouts and uses considered for the lower ground floor level of Block 1B were discounted having regard to the probability of flooding in this area and the extent of Flood Zone B. Less vulnerable uses are proposed, with the floorspace set above the recommended finished floor level (FFL) of 46.0m.OD.
Air and Climate	• None of the alternative layouts or designs had significantly different environmental effects to the proposed development insofar as Air and Climate are concerned
Noise and Vibration	• None of the alternative layouts or designs had significantly different environmental effects to the proposed development insofar as Noise and Vibration are concerned
Material Assets: Built Services	• None of the alternative layouts or designs had significantly different effects to the proposed development insofar as Material Assets: Built Services are concerned

Material Assets: Transportation	• The layout options considered included alternatives for greater parking provision which would have required up to c.900-1000 parking spaces. Providing this level of parking without basements would have had the dual effect of reducing development density and increasing the level of private car traffic on the adjoining road network. These alternatives were therefore not favoured due to their effects on the road network and variance with the current policy objectives for promotion of public transport, pedestrian and cycle modes
Material Assets: Resource and Waste Management	• None of the alternative layouts or designs had significantly different environmental effects to the proposed development insofar as Resource and Waste Management is concerned
Cultural Heritage	• A variety of alternative uses, including a creche, were considered for the renovated Glenville Terrace but were discounted because of the extent of interventions required to comply with user requirements, space ratios, fire and building regulations etc.
Landscape	• A number of alternative proposals for the tower element on Block 1A were considered but were deemed to have a greater impact on the wider area in terms of visual impacts.

3.11.3 Alternative Processes

This is an urban residential development and therefore the consideration of alternative processes to be considered relates to the methods of construction to be used in the development. The alternatives have been considered and the Outline Construction Management Plan (OCMP) details the construction processes likely to be employed and which have been assumed for the purposes of this EIAR.

3.11.4 Conclusion on Assessment of Alternatives

On the basis of the foregoing, it is considered that all reasonable alternatives to the project are considered and no alternatives have been overlooked which would significantly reduce or further minimise environmental effects.

Having considered all alternatives, the final design chosen by the developer, i.e.. the project as now submitted for consideration is deemed to be the most suitable project for the site.

4.0 POPULATION AND HUMAN HEALTH

4.1 INTRODUCTION

This chapter was prepared by Louise O'Leary BA MRUP, Dip EIA Management, MIPI of BMA Planning and addresses impacts on 'Population and Human Health' as required under the 2014 EIA Directive. Louise O'Leary is a Senior Planner with BMA Planning and has over 15 years' experience in planning and development projects including experience of directing and contributing to the preparation of environmental impact assessments for a variety of projects.

The 2014 EIA Directive updated the list of topics to be addressed in an EIAR and has replaced '*Human Beings*' with '*Population and Human Health'*.

The term '*human health'* is not defined in the 2014 EIA Directive; however, the European Commission (EC) *Guidance on the Preparation of the Environmental Impact Assessment Report (Directive 2011/92/EU as amended by 2014/52/EU)* (2017) states that:

> *"Human health is a very broad factor that would be highly Project dependent. The notion of human health should be considered in the context of other factors in Article 3(1) of the EIA Directive and thus environmentally related health issues (such as health effects caused by the release of toxic substances to the environment, health risks arising from major hazards associated with the Project, effects caused by changes in disease vectors caused by the Project, changes in living conditions, effects on vulnerable groups, exposure to traffic noise or air pollutants) are obvious aspects to study. In addition, these would concern the commissioning, operation, and decommissioning of a Project in relation to workers on the Project and surrounding population"* (p. 37).

The EPA *Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports* (2017) state that:

> *"In an EIAR, the assessment of impacts on population and human health should refer to the assessments of those factors under which human health effects might occur, as addressed elsewhere in this EIAR e.g. under the environmental factors of air, water, soil etc."* (EPA, 2017, Section 3, page 29).

This Chapter also meets the requirement for assessment of '*Human Beings'* as per Schedule 6 of the *Planning and Development Regulations 2001 – 2021.*

In this regard, potential impacts of this project on population and human health are also addressed in the following Chapters of this EIAR: - Air Quality and Climate (Chapter 8), Noise and Vibration (Chapter 9), Material Assets: Transportation (Chapter 11) and Landscape (Chapter 14).

4.2 ASSESSMENT METHODOLOGY

This chapter has been prepared in reference to the legislation and guidance outlined in Chapter 1. In addition, the following guidance were also reviewed in preparing this Chapter:-

- *Human Health: Ensuring a High Level of Protection* (European Public Health Association, 2020).
- *Health Impact Assessment in Planning* (Institute of Environmental Management and Assessment, 2020)
- *Healthy Ireland - A Framework for Improved Health and Wellbeing 2013 – 2025* (Department of Health, 2019);
- *Health in Ireland: Key Trends 2021* (Department of Health, 2021)
- *Health in Environmental Impact Assessment – A Primer for a Proportionate Approach* (Cave et al. on behalf of Institute of Environmental Management and Assessment 2017).
- *Health Impact Assessment Guidance* (Institute of Public Health in Ireland 2009)

4.2.1 Site Visit

Site visits were undertaken on May 5th, June 28th and August 14th 2021 of the proposed Dundrum Village development site and surrounding area. These visits were undertaken to examine the receiving environment insofar as people and communities are concerned and, in particular, to identify the people most likely to be affected by the project.

4.2.2 Desktop Assessment

The study area was identified and the nearest sensitive receptors were identified on a map, utilising information gathered during the site visits.

The presentation of the receiving environment is based on site visits and a desk-based study. The study area profile is based on official Census data by the Central Statistics Office (CSO) (www.cso.ie). Ordnance Survey maps and aerial photography were examined and the policy sources referred to in Chapter 3 were also consulted.

Existing social and community infrastructure in the vicinity is identified and the nearest sensitive receptors (individual or grouped) are listed in Section 4.3.4 to assist in the identification of people and communities who would be most affected by the project.

Based on this baseline presentation of the receiving environment, the likely significant adverse impacts on population and human health were considered and are presented in Sections 4.5 and 4.6 under the following headings: -

- Land Use
- Population
- Employment and Economic Activity
- Human Health

Human Health is considered in terms of the WHO definition of health i.e. health as *'a state of complete physical, mental and social wellbeing, not merely the absence of disease or infirmity'* (Institute of Public Health in Ireland 2009)

Mitigation and Monitoring Measures are proposed in respect of the above topics where appropriate.

The impact assessment section of this chapter follows the terminology (where applicable) used in the EPA Guidelines as set out in Chapter 1 of this EIAR. While perceptions of a project can be viewed somewhat subjectively by individuals and groups of people, it is considered that the impacts presented are broadly representative of the impacts on the population within the study area.

4.2.3 Consultation

Consultation with DLRCC was undertaken as part of this planning application and this informed the EIA by taking into consideration various issues raised by the various departments. While no specific consultation was undertaken with the general public, the DLRCC engagement did identify issues which arose from public consultation processes undertaken in the context of the Dundrum Local Area Plan (LAP) and the Dundrum Community, Civic and Cultural Action Plan (CCCAP) for example building heights, provision of community facilities, presentation / impacts to Main Street.

4.3 RECEIVING ENVIRONMENT

4.3.1 Study Area Profile

The principal study area has been determined as the project site (i.e. all areas within the planning application boundary for the project).

A wider study area is taken as the Dundrum LAP area (See Figure 4.1). The LAP area includes the Electoral Divisions of Dundrum – Sweetmount[8], Churchtown – Woodlawn and Clonskeagh – Windy Arbour`, Dundrum - Taney, Dundrum – Kilmacud and Dundrum – Sandyford. Dun Laoghaire Rathdown County Council have also identified the Electoral Divisions of Ballinteer – Ludford, Ballinteer – Meadowbroads, Churchtown – Orwell and Clonseagh – Farranboley in the wider LAP catchment area.

The study area will be examined in the context of the baseline environment, and with regard to the potential for significant effects on population and human health. The baseline environment of the study area is set against the Dun Laoghaire Rathdown County Administrative area to provide a context within which trends can be examined.

4.3.2 Population

Dublin's population continues to expand robustly, despite net outward migration during the economic downturn. According to CSO results in the ten years to 2016, Dublin's population grew by 13.5% to 1.35 million and in 2019 it is estimated to grow to over 1.38 million.

As set out in *Project Ireland 2040: National Planning Framework* (2018), Dublin's population is set to continue expanding due to natural growth and net inward migration, with 2.85 million people expected to live in the region by 2040.

According to The *Dundrum Local Area Plan Issues Paper* (DLRCC, 2018), there are approximately 5,500 persons recorded living within the Dundrum LAP area (Refer to Figure 4.1). If the wider hinterland were to be factored in, to include the surrounding 'Electoral Divisions' (also in Figure 4.1), the figure rises to approximately 27,000. These figures are counted from the 2016 Census.

[8] The site is located within the Dundrum-Sweetmount Electoral Division (ED).

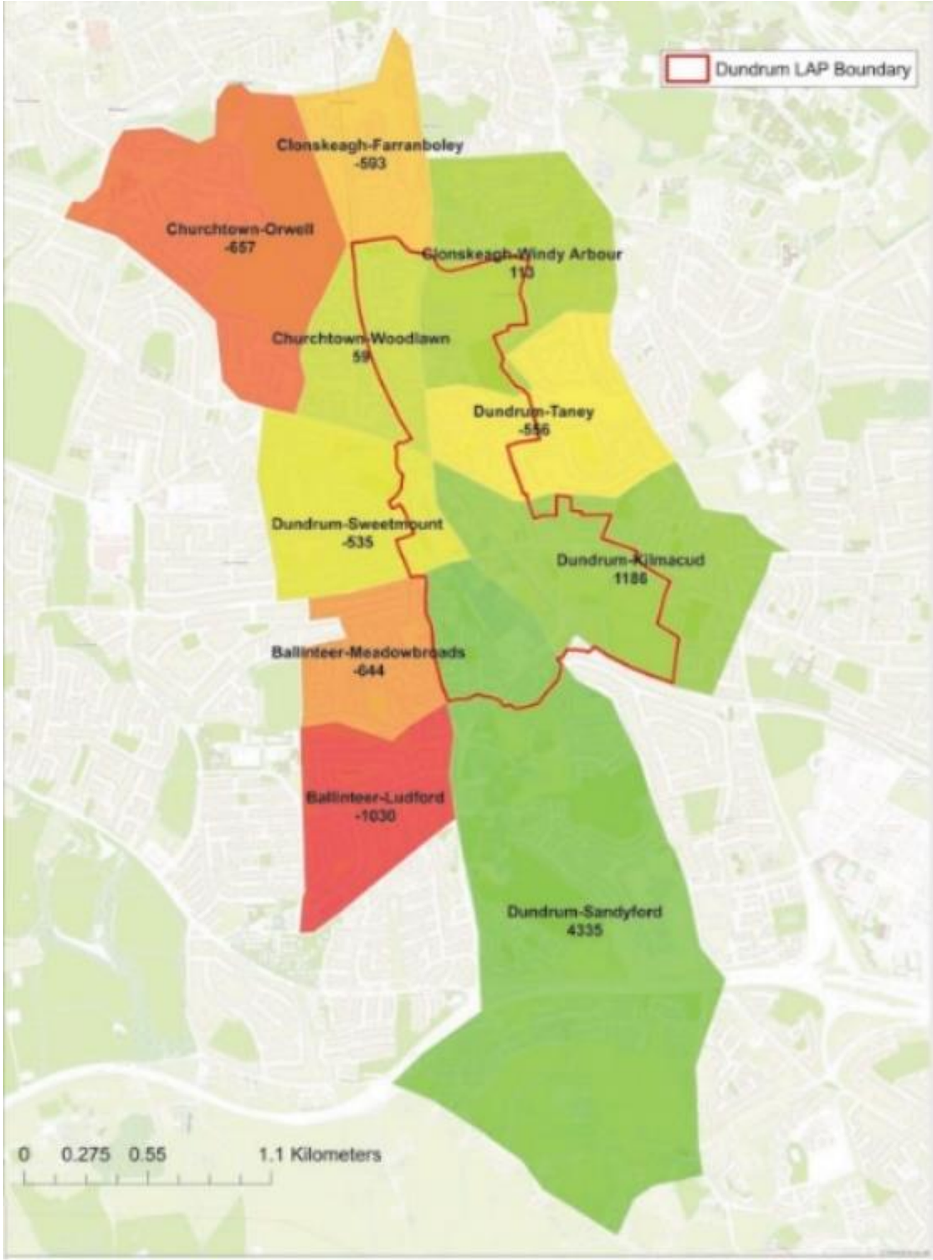


Figure 4.1 Study Area (Source: Dundrum Local Area Plan Issues Paper November 2018; Extract from *'Population Growth 1981-2016'* Map, page 5).

4.3.3 Demographic Profile

The *Dundrum Local Area Plan Issues Paper* (DLRCC, 2018) states the following:-

> *"The demographic profile within the core LAP area itself would, however, tend toward a younger population, for example, almost a quarter of the families in the area are at 'pre-family' stage compared to a State average of 10%. Within the defined LAP area, there is a higher proportion of apartment dwellers and renters, often associated with a younger age cohort*
>
> *….*
>
> *A review of Census 2016 data for the wider catchment area (the Electoral divisions shown on the map opposite) also shows that some of the Electoral Divisions in the hinterland have rates of up to 30% of the population in the 65 years or older cohort,*

compared to the national figure of 13.4%. Conversely, many of these EDs also have significantly lower rates of population in the childhood cohorts of 0-9 years old. Interestingly, the hinterland of Dundrum has the same proportion of one person households (22%) as the State and County rate, despite having a significantly older population."

The composition of Dublin households is also changing. There has also been a shift in household occupancy and composition within existing and new households. This situation represents something of a 'paradigm shift' as different housing profiles and needs have developed that were not historically present. The average household size in Dublin was 2.73 persons per household in 2016. This is down from 2.99 in 1996 and 3.94 in 1971. When isolating just those persons living in apartment units, the average household size is significantly lower at 2.2 persons per household in 2016. In line with this pattern, residential stock in Dublin has grown by approximately 14.0% since 2006 but the share of semi-detached houses of total has remained in and around 35% of stock, increasing in absolute terms by 7.8% on 2006 figures by 2016. Apartments were the highest growing housing type in that same period though, seeing an almost 39% increase on 2006 figures. They are presently just under 24.9% of the total residential stock share, reflecting the new demands of the population.

Occupancy within the housing market also shifted significantly in the last number of years, evidenced by the relative growth of the private rental sector from 14.5% of households in 2002 to account for 23.9% of households in 2016. This equates to over one in five households in Dublin now renting their home. Its absolute growth has been from nearly 55,000 to over 114,000; growth of 109% between 2002 and 2016. Consequently, there is now a greater level of competition amongst those households choosing privately rented housing.

Trends in household size are also influenced by trends in health, longevity and migration; cultural patterns surrounding intergenerational co-residence, home leaving, cohabitation, marriage and divorce, lower mortality; and socioeconomic factors that shape trends in education, employment and housing markets. For example, in 2016 there were 40,271 persons living alone in Dublin over the age of 65, accounting for over 1-in-4 (26.8%) of all persons over 65. This rate increases to 46.8% for persons over 80 years old. Taken as a whole, these trends mean that there is a need to plan for more homes, particularly to meet the accommodation needs of smaller families and single person households (including older people), both of which are likely to increase in number. In parallel with these social changes, the residential development sector has not functioned correctly over the past 10 years. The completion of just 12,596 units in 6 years between 2010 and 2015 (average at 2,099 units per year) was not sufficient to meet the needs of a growing/changing population.

4.3.4 Human Health

According to *Department of Health's latest policy report: Health in Ireland: Key Trends 2021,*

- 83.9% of Irish people rate their health as good or very good. This puts Ireland with the highest self-perceived health status in the EU.
- 25.8% of the population reported a chronic illness or health problem – this is also better than the EU average.

However, the Department of Health report found that health status was closely related to socio-economic factors '*with fewer low income earners reporting good health both in Ireland and across the EU'*

Potential effects on human health also relate water, air quality, traffic and the landscape. The relevant baseline data for each of these effects is included in the appropriate chapter of this EIAR for example water quality standards are presented in Chapter 7.0 Water and air quality standards are outlined in Chapter 8.0 Air and Climate.

4.3.5 Land Use and Receptors

This is an urban site comprising of the Old Dundrum Shopping centre / Dundrum Village Centre and adjacent properties west of Main Street. The buildings are used / were last used for retail / commercial uses. Some of the buildings along Main Street are unoccupied and have been vacant for up to 15 years (Refer to the description of the site and its context in Chapter 3).

There are a number of wayleaves on the site. These are indicated on Figure 4.3. The wayleave follows the line of the combined sewer through the site and includes a connection to properties outside the application site including Holy Cross Church, Parochial House and No.'s 11 + 16/17 Main Street. A wayleave is also shown on the pedestrian access to Holy Cross Church from Don Marmion Bridge / Ballinteer Road.

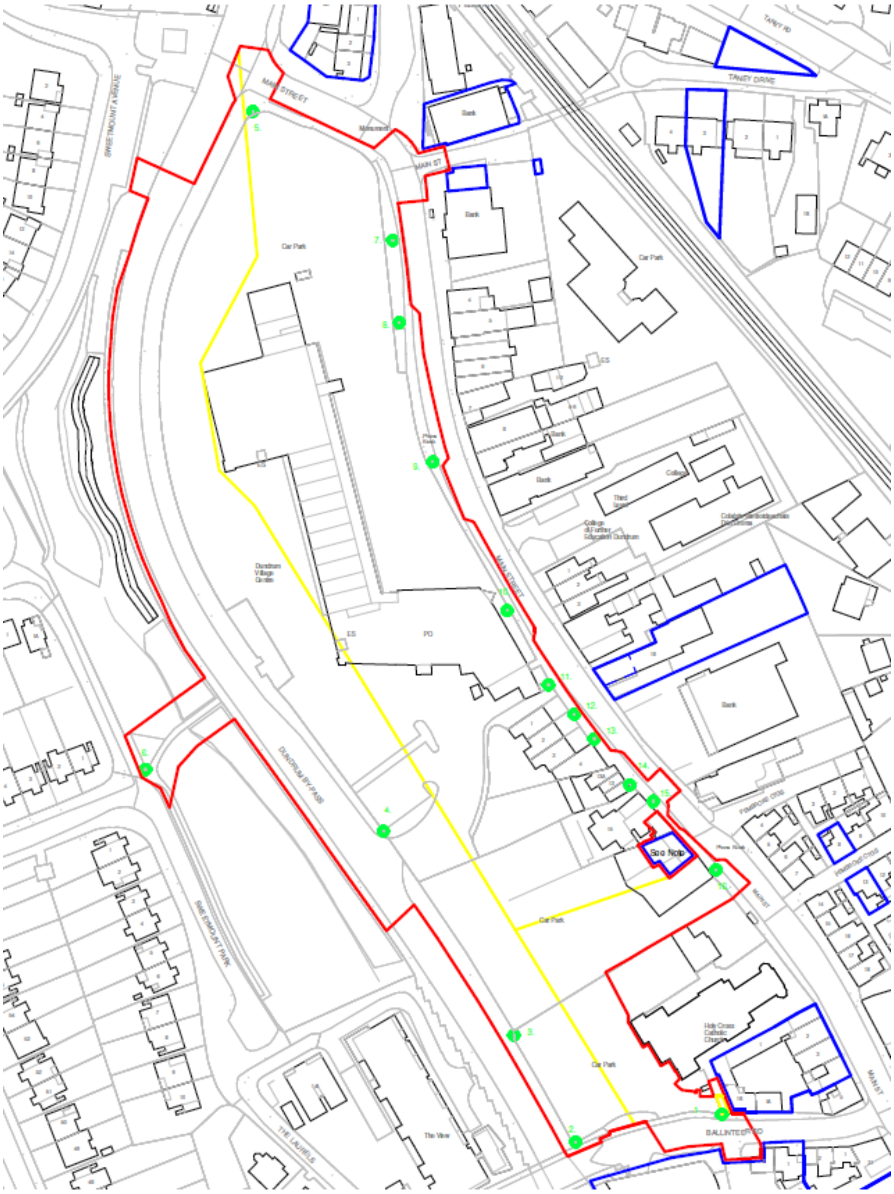


Figure 4.3 Existing Wayleaves shown yellow (Extract from Site Location Plan Drg. No. DD-GRID-00-ZZ-DR-A-PL001 submitted with this application)

The EPA Advice Notes (2015) identify receptors as neighbouring landowners, local communities and other parties which are likely to be directly affected by the project. The sensitive population receptors in the area are the communities and properties identified below, and geographically presented on Figure 4.4:-

- *R1* Dundrum View Apartments
- *R2* The Laurels/ Sweetmount Park / Sweetmount Avenue
- *R3* Sweetmount Avenue North / Dundrum Carnegie Library / St. Naithi's Church and Graveyard
- *R4* Waldemar Terrace / William Dargan Bridge undercroft environs/ Usher House
- *R5* East of Main Street
- *R6* No.'s 11 and 16/17 Main Street
- *R7* Holy Cross Church / Parochial House
- *R8* Maher's Terrace
- *R9* Dundrum Town Centre/ Pembroke District
- *R10* Sandyford Road East

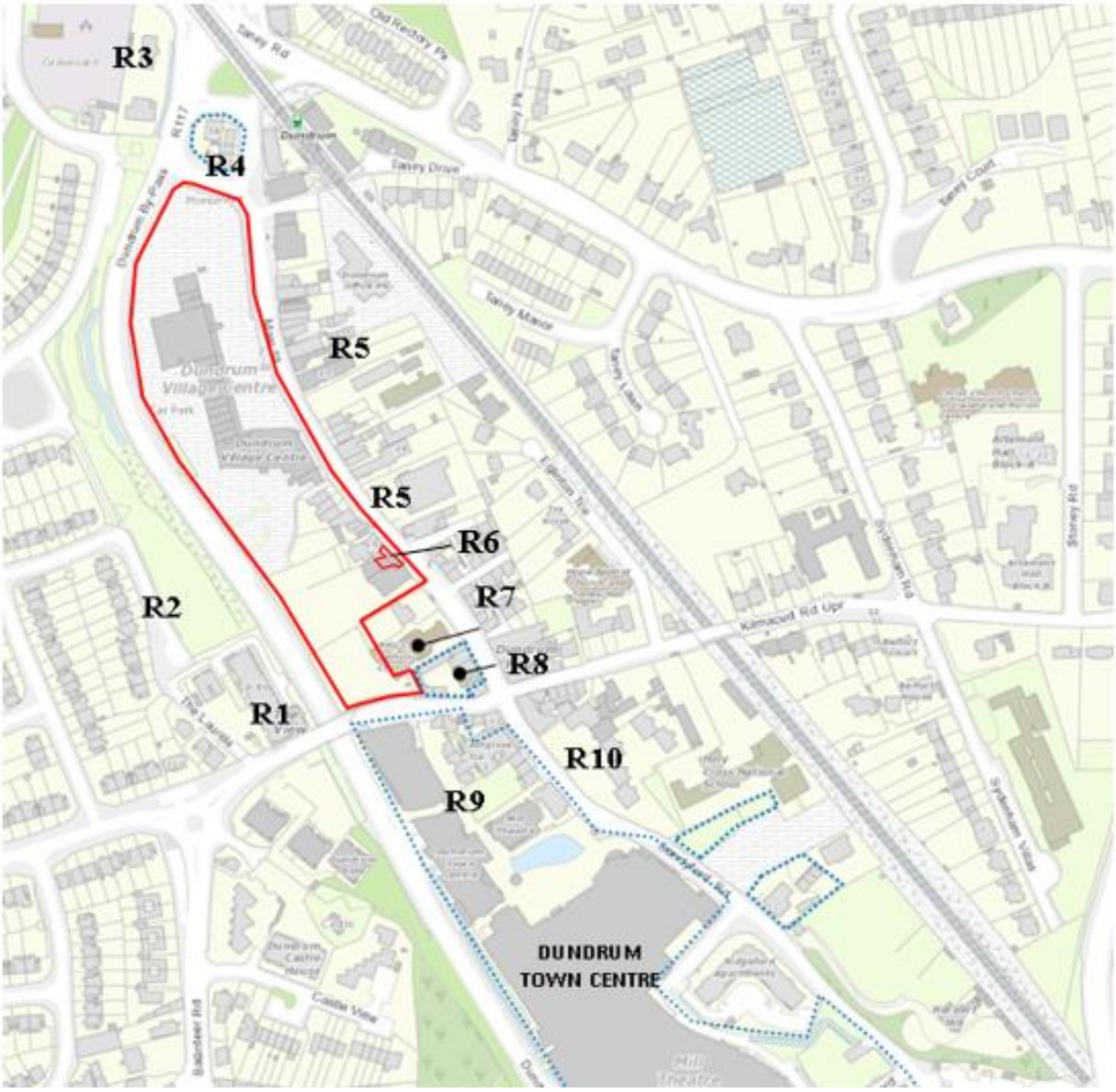


Figure 4.4 Sensitive Receptors

Beyond these immediate receptors, the impacts on the community are considered more generally with reference to :

- North – North of Taney Road
- South – South of Wyckham Bypass
- East – East of Luas line
- West – West of Bypass (except Dundrum View Apartments/ The Laurels/ Sweetmount Park)

4.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The project is described in Chapter 3. The following elements are relevant to the assessment of effects in this Chapter.

The characteristics of the development are typical of any new residential development in an existing urban context.

The development will involve the construction of 881 new apartments and other non-residential uses. This will transform the receiving retail/ commercial and car parking environment into a modern residential neighbourhood.

At an average occupancy of 2.5 persons per household, this would give a resident population for the proposed development in the order of approximately 2,200 people.

Construction activities will be generally confined to the site. The proposed development will be constructed in 2 phases with works commencing at the northern end. Lands under construction and those utilised for construction purposes e.g. compounds, storage etc. will be hoarded off and inaccessible to the public. Some level of construction activity is likely over a period of up to 8 years.

All existing buildings on site will be demolished, excluding No.'s 1-3 Glenville Terrace. Demolition will be undertaken on a phased basis, commencing with the existing village centre.

Possible impacts of such proposals include the creation of a strain on local, social, commercial and infrastructural services. On the other hand, such proposals can have the effect of providing a residential component into an otherwise predominantly retail/ commercial town centre.

4.5 CONSTRUCTION IMPACTS

The main likely significant effects of the project are as follows: -

4.5.1 Land Use

All existing commercial uses on the site will cease, however, these properties have been in the ownership of the applicants and their predecessors for some time and these commercial businesses are on short term leases with no expectation of a long term future on the site. It is expected that some of the existing business may be accommodated within the retail units proposed which will be of a much higher quality and which will provide a more sustainable long term built form for the town centre. The commercial units on Main Street will continue to trade, subject to market forces, leases etc. until their demolition is required to progress development on site. According to the indicative construction programme included in the *OCMP* [TJOC], this is not proposed until work commences in Zone 3.

The public carparks located to the rear of the former Mulvey's Hardware and Holy Cross Church (151 spaces) will remain operational until works commence in Zone 3. On occupation of Blocks 1A, 1B and 1C, and pending the parking spaces in Zone 2 becoming operational, 105 spaces will be reallocated for use by the tenants of Blocks 1A, 1B and 1C. The public car park at the existing Dundrum Bypass entrance (33 spaces) will be removed when works commence in Zone 2. The removal of public parking will be permanent and will have a negative effect on users, including church goers.

It is assumed that No.'s 11 and 16/17 Main Street will be trading during the construction period. The Contractor's Construction and Environmental Management Plan (CEMP) will therefore include specific measures to ensure the level of disruption to these businesses is minimised and that the structural integrity of these properties is maintained. The measures in the proposed CEMP will also address the diversion of existing wastewater connections from these premises, from the combined sewer within the site to the existing sewer in Main Street.

New arrangements are proposed to discharge surface and foul water from Holy Cross Church and the Parochial House, including discharging surface water to the Slang culvert, with foul water discharging to the new wastewater sewers for the development. In relation to population and human health, the revisions to the foul and surface water discharge arrangements will be moderate positive permanent effects.

Movements by the general public (vehicular, cycle or pedestrian) through the site will be affected during the construction phase resulting in a moderate short term negative impact. Sweetmount Bridge will be opened to the public following completion of Zone 2 works, providing a connection for the residential communities west of the Bypass (particularly Residents of The Laurels, Sweetmount Park and Sweetmount Avenue – R2) directly to Main Street via the proposed development. This is a significant positive permanent effect.

Access to the Main Street commercial properties will be maintained insofar as possible and so no major disruption to these premises is expected.

Sweetmount Bridge will be constructed as part of the Zone 2 works. Access to Sweetmount Park will be maintained during the construction of Sweetmount Bridge, with the bridge landing and construction working zone temporarily hoarded off for the period of works. The impact on park users will be slight, negative and temporary. The impact on park users will be slight, negative and temporary. The night-time closure of Dundrum Bypass, to facilitate the installation of the Bridge, will be brief, imperceptible and of neutral effect.

4.5.2 Population Change and Demographic Trends

Some increase in population may arise during the construction period related to construction workers seeking accommodation. However, the location of the project in this urban centre means that impacts in relation to population will be neutral, imperceptible and short – medium term.

4.5.3 Economy

The construction phase of the project will provide for the employment of a substantial number of construction workers over the construction programme with c.200-300 direct created. This will be a significant positive short – medium term impact in terms of employment and further indirect multiplier effects to the wider local economy.

4.5.4 Human Health

The construction phase of the project will cause a certain amount of loss of amenity, disruption, nuisance and inconvenience to the local community, particularly the residents who are located closest to the project. However, as the development will be undertaken in phases, each lasting approximately 2 years, the quality, significance and extent of the effects on the sensitive receptors will vary depending on their location relative to the active phase of construction.

Potential effects on human health relate generally to quality of life including air quality, climate, noise, water and hydrology, resource and waste management, potential disruption of services and the risk of major accidents/disasters. While the assessment of effects relating to each of these environmental factors are dealt with separately elsewhere in this EIAR (Refer to Chapters 7-11), this section provides a summary as to how these effects have the potential to give rise to human health effects.

- Traffic - The level of construction generated traffic is not expected to be significant. As outlined in Chapter 11.0 Materials Assets: Transportation, proposed access routes will keep trucks to the Bypass, minimising their impact on the main commercial activities on Main Street. The potential disturbance is likely to result in a slight negative short term impact on the local population.

- Water - As outlined in Chapter 7.0 Water, the construction phase of the project has the potential to alter the water quality and hydrological regime temporarily in the study area. Any effect on water quality has the potential to give rise to human health effects. Site flooding during construction is a potential impact. Subject to adherence to best practice and the mitigation measures outlined in Chapter 7.0, such impacts are not considered to be likely or significant in this instance.

- Air Quality - As outlined in Chapter 8.0 Air and Climate, the construction phase of the project has the potential to give rise to dust emissions from construction traffic, building demolition, excavation works, piling etc. Poor air quality has the potential to affect human health by increasing the risk of asthma and other respiratory diseases. There is therefore potential for short term air quality effects during construction to affect human health. the significance of the effect will be greatest for the phase of the development adjacent to the properties i.e. the impacts on Holy Cross Church will be significant during Zone 4 works only. Best practice mitigation measures for construction activities are proposed to ensure adverse air quality impacts are minimised. The likely impact will be negative, short-term and slight. Monitoring of air quality shall be carried out for the duration of the construction phase in accordance with the Chapter 8 recommendations

- Noise - The most common effects of excessive noise on people include annoyance, sleep disruption, health problems to vulnerable persons and general quality of life problems. As outlined in Chapter 9.0 Noise and Vibration, the assessment has determined that, during the construction phase, noise will be temporary and moderate to Significant and vibration emissions will be short-term and slight to moderate. The receptors affected will vary depending on the phase of development and the works being undertaken within close proximity. With the mitigation measures in place, and by complying with all relevant guidance, it is predicted that the guideline construction noise limit can be complied with. Monitoring of noise shall be carried out for the duration of the construction phase in accordance with the Chapter 9 recommendations.

- Waste – The potential effects on human health are considered in Chapter 12 Material Assets: Resource and Waste Management. Waste generated during the construction phase of the project will be segregated at source and disposed of in accordance with the *Site Specific Construction and Demolition Waste Management Plan* [prepared by Byrne Environmental and submitted with this application]. No potential effects on human health are likely where waste is managed correctly. Measures to address vermin and pest control shall be included in the Contractors CEMP.

- Accidents – The construction of any project of this nature has potential to give rise to unplanned events or accidents, including fire, which impact on health and safety of human beings if such activities are not managed appropriately. Subject to adherence to best practice construction measures, such impacts are not considered to be likely or significant in this instance. A 'worst-case' scenario resulting from the construction of the development would be an accident leading to serious injury or death to a worker. However, the mitigation measures outlined should ensure that this would not occur.

- Other - The population will also be affected by impacts associated with traffic disruption, utility and services disruptions and visual impacts. These effects are considered in the relevant chapters of this EIAR (namely Chapters 10.0 Materials Assets: Built Services, 11.0 Materials Assets: Transportation and 14.0 Landscape) and mitigation measures proposed to reduce the significance.

- Aviation **–** Cranes operating during the construction phase will not be of sufficient height to impact directly on aviation, however, lighting has the potential to impact on aviation if not properly installed and site the developer should notify and consult with the Irish Aviation Authority as a precaution prior to cranes being erected on the site.

The level of disturbance and impacts to human health are predicted to be commensurate with the normal disturbance associated with the construction industry where a site is efficiently and properly managed having regard to neighbouring activities. These negative impacts will be, cumulatively, significant but short term. Measures to address such human health considerations will be mitigated through the implementation of a Contractor's Construction and Environmental Management Plan (CEMP) and will be subject to Regulations and the relevant Health and Safety codes.

4.5.5 Mitigation Measures

PHH-C1	**Construction and Environmental Management Plan (CEMP)-** In order to mitigate potential temporary community disturbance during construction, an *Outline Construction Management Plan* (OCMP) has been prepared and is included with the application. If the project is approved and to be implemented, the appointed contractor will incorporate the environmental commitments contained in this EIAR and prepare a Construction and Environment Management Plan (CEMP) for the agreement of the Planning Authority prior to development commencing on site.
PHH-C2	**Liaison Officer** – The contractor(s) will appoint a liaison officer to ensure that any issues from the local community are dealt with promptly and efficiently during construction. These details will be included in the Contractor(s) CEMP prepared prior to construction commencing.

PHH-C3	**Working Hours –** Typically, construction working hours will be limited to 7am – 6pm Monday to Friday and 8am – 2pm on Saturday. It is anticipated that there will be times, due to exceptional circumstances, that construction work will be necessary outside these standard hours i.e. large concrete pours. Deviations from these standard times will be agreed in advance with the Planning Authority.
PHH-C4	Prior to the erection of cranes on the site the developer shall notify and consult with the Irish Aviation Authority.

4.5.6 Monitoring

Monitoring measures are identified in Chapters 8.0 Air and Climate, 9.0 Noise and Vibration and 11.0 Materials Assets: Transportation of this EIAR to monitor effects which may impact on Population and Human Health factors. Other than monitoring requirements outlined in those Chapters, no further monitoring is proposed with respect to Population and Human Health.

4.5.7 Cumulative Impacts

Cumulative impacts have been considered in the above assessment in respect of Other Projects listed in Section 3.10 of this EIAR.

4.6 OPERATIONAL IMPACTS

The main likely significant effects of the project are as follows:-

4.6.1 Land Use

The project will deliver a new residential community with supporting land uses for Dundrum which will change the character of the existing underutilised and outdated development to a vibrant and modern high density urban precinct. This project may also act as a catalyst for further development / investment in the area, particularly along the length of Main Street, and there is likely to be a positive impact on existing property and land values in the area. This effect will be moderate with the change consistent with planning policy. It will be a permanent positive effect.

The existing wayleave for the combined sewer, including the connections from Holy Cross Church, Parochial House and No.'s 11 +16/17 Main Street will be extinguished with the removal of the combined sewer. New connections are proposed to serve these premises with No.'s 11 +16/17 Main Street connecting to the public sewer on Main Street and Holy Cross Church and Parochial House connecting to the proposed foul sewer and surface water discharging to the Dundrum Slang.

4.6.2 Population

The residential population of the proposed housing units will be approximately 2,200 people. The impact on the population is considered to be a long term significant positive effect insofar as it reflects the emerging trend in the wider area. New residential units will contribute to the delivery of a critical mass of population which will support a wide range of additional local businesses, services, transport infrastructure and employment opportunities.

4.6.3 Economy

The project will have a slight to moderate positive impact on the local economy through the direct employment in the retail and non-retail services units and indirectly in relation to support services to the new residential population. The increased population will also have an indirect positive impact on the local economy through its spending power.

4.6.4 Amenity and Human Health

The proposed development will deliver purpose-built residential accommodation that is designed to accommodate all users, irrespective of age and will help to meet the demand for one, two and three bed units.

This development is of a very high quality design, with ready access to a variety of new and existing amenities within the development, along Main Street and in Dundrum Town Centre (e.g. resident lounges, entertainment space, gyms, theatre, cinema, cafes/ restaurants / bars etc.), while also being located close to good quality public transport.

For the future residents, the living environment was carefully considered in the design process to ensure a high quality scheme was designed in accordance with the relevant codes and guidance. The scheme meets all quantitative standards and the qualitative aspects of the scheme are demonstrated in the *Housing Quality Assessment* [Grid Architects] and other supporting documents submitted with the planning application such as the *Daylight Sunlight & Overshadowing Study* [BDP]. The iterative design process has included design mitigation measures to improve the quality of residential units. The overall impact is considered to be neutral/ positive.

The main impacts on human health, associated with air quality, noise, traffic and transportation and landscape, are considered elsewhere in this EIAR (Chapters 8.0 Air and Climate, 9.0 Noise and Vibration, 11.0 Materials Assets: Transportation and 14.0 Landscape including mitigation measures). This section provides a summary as to how these effects have the potential to give rise to human health effects:-

- Traffic - As outlined in Chapter 11.0 Materials Assets: Transportation, the impact of the proposed development on traffic and transport will not be significant given the level of traffic generated by the proposed development, the low car mode share and focus on cycling / walking. The development will not result in a significant increase in parking over the current level of parking on the site. Overall, the impact will be neutral and not significant.

  This development will also have a significant permanent positive impact on pedestrian and cyclist movement. permeability within the village of Dundrum is greatly improved with strong connections to Main Street and Dundrum Town Centre proposed. In addition, Sweetmount bridge will reconnect the residential communities to the west which have been cut off from the village by Dundrum Bypass. Finally existing and future residents of Dundrum Village will benefit from enhanced cycle facilities along Dundrum Bypass and the shared bridge from Sweetmount park.

- Noise - As outlined in Chapter 9.0 Noise and Vibration, operational noise levels will be managed to achieve the relevant noise limit values. The impacts, therefore, on human health will be neutral for the life of the development. Building façade sound insulation / acoustic design has been incorporated into the project to ensure that the proposed residential units comply with the recommended internal sound levels as specified in best practice.

- Air Quality - As outlined in Chapter 8.0 Air and Climate, the operational phase of the project will not generate air emissions that would have an adverse impact on local ambient air quality or local human health. The effect on air quality will be long-term, localised, neutral and imperceptible.

- Water - As outlined in Chapter 7.0 Water, the proposed development will connect to existing public water infrastructure in the area and will not give rise to any significant impacts on ground water. Flood Risk to property and human life is also a potential impact and this is addressed in the *Site Specific Flood Risk Assessment* (SSFR) undertaken for the proposed development by TJ O'Connor & Associates – the SSFRA contains details of flood management and mitigation measures which will reduce flood risk and associated damage to property and human life to an acceptable level.

- Landscape - As outlined in Chapter 14.0 The Landscape, the attractiveness of the proposed landscaping and open space proposals will have a positive impact on health for the new population, particularly when compared to the existing underutilised and outdated shopping centre and parking areas that characterise the site today. The impact of the insertion of the proposed development into the existing urban setting of the development is also addressed with reference to key views from the wider area. When taken in the context of current planning policies, the proposed impact is considered to be neutral and positive.

- Waste – No likely significant impacts on human health are predicted for the operational phase of the project. As outlined in Chapter 12.0 Material Assets: Resource and Waste Management, the residents and non-residential users will be provided with suitable waste management facilities to safely dispose of their recycling and waste materials.

- Accidents – The risk of accidents / unplanned events is addressed through the Building Regulations (Fire Safety) and is therefore addressed through primary mitigation in the design process. Residual risks of fire and road traffic accidents will be managed by emergency services as per their standard procedures.

- Aviation - The highest building on the site is 16 storeys (48 metres approx.). Under the Standardised European rules of the Air (SERA), it is not permissible to fly over built up areas at a height of less than 1000ft (approx. 304 metres). The proposed development does not impact on the standardised approaches/departures to Dublin airport, Casement aerodrome or Weston Airport. The proposed development does not impact on any of the Dublin hospitals where a helipad is used. Therefore, there are no long term impacts on aviation as a result of the development.

Subject to implementation of the mitigation measures below, the cumulative negative impacts of the development during the operational phase are considered to be slight to moderate long term. The effects are in keeping with those expected for an area transitioning to a more urban form as promoted in the Dun Laoghaire Rathdown Development Plan and the other planning sources described in Chapter 2.

4.6.5 Mitigation Measures

Mitigation measures relating to those factors under which population and human health effects might occur have been addressed elsewhere in this EIAR, under the relevant environmental factors (ie. Chapters 8.0 Air and Climate, 9.0 Noise and Vibration, 11.0 Materials Assets: Transportation and 14.0 Landscape). Other than the mitigation measures outlined in those Chapters, no further mitigation measures have been proposed with respect to Population and Human Health for the operational phase.

4.6.6 Monitoring

Where monitoring relating to other environmental factors related to population and human health effects is required, these are addressed in the relevant chapter of this EIAR (ie. Chapters 8.0 Air and Climate, 9.0 Noise and Vibration, 11.0 Materials Assets: Transportation and 14.0 Landscape). Other than monitoring requirements outlined in those Chapters, no monitoring is proposed with respect to Population and Human Health.

4.7 OTHER EFFECTS

4.7.1 Residual Effects

Following the implementation of the mitigation measures outlined above, and elsewhere in this EIAR relating to human health, no significant negative residual effects are identified in respect of the project.

4.7.2 'Do-nothing' Effect

In the event that the project does not proceed, the site would remain as it is currently in a underutilised state and an opportunity would be missed to consolidate and rejuvenate this town centre location in accordance with national, regional and local planning policy guidance.

4.7.3 Worst Case Effect

In the worst case scenario, the development would commence but not be completed.

4.8 INTERACTIONS

Population and Human Health interactions are primarily linked to the environmental factors listed below. These interactions, and the impacts being considered, are identified in the relevant Chapters.

- Air Quality and Climate (Chapter 8.0)
- Noise and Vibration (Chapter 9.0)
- Material Assets: Transportation (Chapter 11.0)
- Landscape (Chapter 14.0)

REFERENCES

- Cave et al. on behalf of Institute of Environmental Management and Assessment (2017) *Health in Environmental Impact Assessment – A Primer for a Proportionate Approach*.
- Census (2016) www.cso.ie (Date Accessed on 6th September 2021)
- Department of Health (2019) *Healthy Ireland - A Framework for Improved Health and Wellbeing 2013 – 2025*
- Department of Health (2021) *Health in Ireland: Key Trends 2021*
- Department of Housing Planning and Local Government, *Project Ireland 2040: National Planning Framework*

(2018)
- *Dun Laoghaire Rathdown County Council (2016) Dun Laoghaire Rathdown Development Plan 2016-2022*
- *Dun Laoghaire Rathdown County Council (2022) Dun Laoghaire Rathdown Draft Development Plan 2022-2028*
- *Dun Laoghaire Rathdown County Council (2018) Dun Laoghaire Rathdown Local Area Plan Issues Paper*
- European Public Health Association (2020) *Human Health: Ensuring a High Level of Protection*.
- Pobal (2020) https://maps.pobal.ie/ (Date Accessed - 14th February 2020)
- IAIP (Integrated Aeronautical Information Package), dated 22nd April 2021
- Institute of Environmental Management and Assessment (2020) *Health Impact Assessment in Planning*
- Institute of Public Health in Ireland (2009) *Health Impact Assessment Guidance*

5.0 BIODIVERSITY

5.1 INTRODUCTION

This section of the Environmental Impact Assessment Report (EIAR) was prepared by Bryan Deegan of Altemar Ltd. It assesses the biodiversity value of the proposed development area and the potential impacts of the development on the ecology of the surrounding area and within the potential zone of influence (ZOI). Altemar Ltd. is an established environmental consultancy based in Greystones, Co. Wicklow that has been in operating in Ireland since 2001. Bryan Deegan (MCIEEM) is the primary consultant. Bryan Deegan has 26 years' experience working in Irish terrestrial and aquatic environments, providing ecological consultancy. He has a Certificate in Science, Diploma in Applied Aquatic Science, BSc in Applies Marine Biology and a MSc in Environmental Science. Bryan has extensive aquatic and terrestrial fieldwork experience including flora and fauna (bird & mammal) surveys.

Hugh Delaney provided specialist support to Bryan Deegan in relation to birds. Hugh Delaney is an ecologist (ornithologist primarily) having completed work on numerous sites with ecological consultancies over 10+ years. Hugh is local to the Dun Laoghaire-Rathdown area in Dublin and is especially familiar with the bird life and its ecology in the environs going back over 30 years.

Under Article 6(3) of the Habitats Directive requires an 'appropriate assessment' of projects must be carried out to determine if significant effects are likely to arise to the integrity of Natura 2000 sites. ***An Appropriate Assessment Screening Report & Natura Impact Statement*** have been prepared by Altemar Ltd. as a separate stand-alone report with this planning application. There is a direct pathway from the site to Natura 2000 (European) sites[9] via the Slang River and the River Dodder. Construction and operational phase control measures, in addition to monitoring measures are proposed to minimise potential impacts and to improve the biodiversity potential of the proposed development site. These measures are considered mitigation measures that are necessary for the protection of Natura 2000 sites or their conservation objectives.

5.2 ASSESSMENT METHODOLOGY

This chapter has been prepared having regard to the legislation and EIA Guidelines outlined in Chapter 1.

A pre-survey biodiversity data search was carried out. This included examining records and data from the National Parks and Wildlife Service (NPWS), National Biological Data Centre (NBDC) and the Environmental Protection Agency (EPA), in addition to aerial, 6 inch maps and satellite imagery. A habitat survey of the site was undertaken within the appropriate seasonal timeframe for terrestrial fieldwork. Field surveys were carried out as outlined in Table 5.1.

Details of the proposed development are seen in Chapter 3 of this EIAR. The proposed layout,

[9] Special Areas of Conservation (SAC); Special Protection Areas (SPA)

drainage strategy and landscape design were reviewed to inform this assessment.

5.2.1 Zone of Influence

As outlined in CIEEM (2018) '*The 'zone of influence' for a project is the area over which ecological features may be affected by biophysical changes as a result of the proposed project and associated activities. This is likely to extend beyond the project site, for example where there are ecological or hydrological links beyond the site boundaries.'* In line with best practice guidance an initial zone of influence be set at a radius of 2km for non-linear projects (IEA, 1995).

The potential Zone of Influence (ZOI) extends beyond the 2km radius for this project via the hydrological pathways outlined below, with the potential for downstream impacts to extend beyond the proposed development area to the marine environment via the surface water/foul water network.

A culverted section of the Slang River traverses a southern portion of the subject site and continues along the western boundary of the subject site[10]. The Slang River outfalls to the River Dodder, which in turn outfalls to the marine environment at Dublin Bay. This is a direct hydrological connection to designated conservation sites located within Dublin Bay (namely, South Dublin Bay SAC & pNHA, South Dublin Bay and River Tolka Estuary SPA, Sandymount Strand/Tolka Estuary Ramsar site, North Dublin Bay SAC & pNHA, North Bull Island SPA & Ramsar site) during construction and operational phases of development.

Surface water will be attenuated on-site before being discharged to the Slang River at a greenfield runoff rate. Current storm water discharge will be removed from the combined network that traverses through the subject site.

Foul wastewater will connect to an existing Irish Water foul sewer network, which in turn discharges to Ringsend Wastewater Treatment Plant (WwTP). The existing 300mm diameter combined sewer through the development site will be abandoned.

5.2.2 Site Visits

Desk studies were carried out in July 2021 to obtain relevant existing biodiversity information within the ZOI. The assessment also extends beyond the immediate development area to include those species and habitats that are likely to be impacted upon by the proposed development. Field surveys were carried out as outlined in Table 5.1.

Table 5.1 – Field Surveys

Area	Surveyors	Survey Dates
Terrestrial Ecology	Bryan Deegan (Altemar)	17th Sept 2021
Bat Fauna Survey	Bryan Deegan (Altemar)	15th and 17th Sept 2021
Badger / Mammal Survey	Bryan Deegan (Altemar)	14th Nov 2021
Bird Flight lines Assessment	Hugh Delaney	12th and 19th January 2022

[10] It should be noted that the EPA water framework mapping of the Slang Stream is incorrect. The actual course of the river is seen in Figures 5.6 and Figure 5.7. Further details of the culverts proximate to the site are provided in Figure 7.2 and Table 7.1 of this EIAR.

5.2.3 Proximity to designated conservation sites and habitats or species of conservation interest

The designated conservation sites within 15km of the proposed combined development site were examined for potential source pathway receptor links. Sites beyond 15km have no direct or indirect pathways or are across the marine environment where significant dilution, mixing and settlement would occur and given the scale of the project, impacts on sites beyond 15km would be at negligible levels. This assessment included sites of international importance; Natura 2000 sites (SAC's and SPA's); Ramsar sites; and sites of National importance - Natural Heritage Areas (NHA) and proposed Natural Heritage Areas (pNHA). Up to date GIS data (NPWS data shapefiles) were acquired and plotted against 1, 5, 10 and 15km buffers from the site. Hydrological pathways were also detailed. A data search of rare and threatened species within 10km of the site (GIS shapefile) was provided by NPWS. Additional information on rare and threatened species was researched through the National Biodiversity Data Centre data.

5.2.4 Terrestrial and Avian Ecology

A pre-survey data search was carried out. This included a literature review to identify and collate relevant published information and ecological studies previously conducted and comprised of information from the following sources; the NPWS, NPWS Rare and Protected Species Database, NBDC, EPA WMS watercourses data, in addition to aerial, 6 inch, satellite imagery. Following the desktop study, walk-over assessments of the site were carried out (see Table 5.1). Habitat mapping was carried out according to Fossitt (2000) using AcrGIS 10.5 and displayed on Bing satellite imagery or street mapping based on the 15th September 2021 site visit. Any rare or protected species or habitats were noted. As part of the fieldwork an invasive species assessment was carried out.

The site consists primarily of (>90%) built ground. As a result, it would not be seen as a potential ex-situ foraging area for qualifying interests of SPA's within the potential ZoI. An assessment of the potential impact of the project on wintering bird flightlines was carried out by Hugh Delaney (ornithologist) during the wintering bird season (Appendix 5A) on January 12th 2022 and January 19th 2022.

A Badger/Mammal Survey was carried out on 14th November 2021 by Bryan Deegan (MCIEEM). The presence of mammals is indicated principally by their signs, such as resting areas, feeding signs or droppings - though direct observations are also occasionally made.

Birds noted on site were classed based on the Birds of Conservation Concern in Ireland classification of red, amber and green, which is based on an assessment of the conservation status of all regularly occurring birds on the island of Ireland.

5.2.5 Bat Fauna

Structures onsite were inspected internally and externally for bats and/or their signs. Emergent, hand held detector and statistic detector surveys were carried out and are outlined in Appendix 5B. The site survey was supplemented by a review of Bat Conservation Ireland's (BCIreland) National Bat Records Database. A bat detector and emergent survey that covered the entire application site was carried out on the 15th & 17th September 2021.

5.2.6 Describing the Effects

The terminology for rating impacts is derived from the EPA 2017 Guidelines and is included in Section 1.7 of this EIAR. The following criteria are applied as part of the ecological valuation to establish the receptor sensitivity / importance.

	Ecological Valuation
International	Sites, habitats or species protected under international legislation e.g. Habitats and Species Directive. These include, amongst others: SACs, SPAs, Ramsar sites, Biosphere Reserves, including sites proposed for designation, plus undesignated sites that support populations of internationally important species.
National	Sites, habitats or species protected under national legislation e.g. Wildlife Act 1976 and amendments. Sites include designated and proposed NHAs, Statutory Nature Reserves, National Parks, plus areas supporting resident or regularly occurring populations of species of national importance (e.g. 1% national population) protected under the Wildlife Acts, and rare (Red Data List) species.
Regional	Sites, habitats or species which may have regional importance, but which are not protected under legislation (although Local Plans may specifically identify them) e.g. viable areas or populations of Regional Biodiversity Action Plan habitats or species.
Local/County	Areas supporting resident or regularly occurring populations of protected and red data listed-species of county importance (e.g. 1% of county population), Areas containing Annex I habitats not of international/national importance, County important populations of species or habitats identified in county plans, Areas of special amenity or subject to tree protection constraints.
Local	Areas supporting resident or regularly occurring populations of protected and red data listed-species of local importance (e.g. 1% of local population), Undesignated sites or features which enhance or enrich the local area, sites containing viable area or populations of local Biodiversity Plan habitats or species, local Red Data List species etc.
Site	Very low importance and rarity. Ecological feature of no significant value beyond the site boundary

5.2.7 Difficulties Encountered

No difficulties were encountered in relation to the preparation of this chapter. The bat surveys were undertaken within the active bat period (April to September) and a detector survey was possible. The mammal survey was carried out during the active mammal survey season (November to March).

5.3 RECEIVING ENVIRONMENT

The application site, which consists primarily of (>90%) built ground, is shown in figure 5.1. There are small, isolated areas of grassland, flower beds and borders and scrub. These have poor connectivity to other areas of biodiversity. The Slang River runs along the western boundary of the site from South to North in a concrete culvert. The rerouted stream runs in a culvert downstream of the Dom Marmion Bridge and emerges on the west side of the Dundrum Bypass adjacent to Sweetmount Terrace where it runs in open channel before running in a second culvert as far as Waldemar Terrace where it re-joins the original route of the watercourse - the extent of the culverts and open channel are mapped in Figure 7.2 and detailed in Table 7.1.

5.3.1 Designated Sites

As can be seen from Figures 5.2 (SAC's within 15km), 5.3 (SPA's within 15km), 5.4 (NHA and pNHA within 15km), 5.5 (Watercourses proximate to the site), there are two Natura 2000 sites within 5km (South Dublin Bay SAC & South Dublin Bay and River Tolka Estuary SPA), and four National conservation sites (Grand Canal pNHA, Booterstown Marsh pNHA, South Dublin Bay pNHA, & Fitzsimon's Wood pNHA) within 5km of the site. There is one Ramsar site within 5km Sandymount Strand/Tolka Estuary). The distance and details of the conservation sites within 15km of the project are seen in Table 5.2 and Table 5.3.

Figures 5.6 – 5.11 demonstrate waterbodies proximate to the site (including the culverted section of the Slang River) and designated conservation sites with the potential for a hydrological pathway. It should be noted that the EPA water framework mapping of the Slang River is incorrect and the actual course of the river is seen in Figures 5.6 and Figure 5.7.

Table 5.2 – Natura 2000 sites within 15km (and outside 15km with potential for a pathway) of the proposed development

Natura 2000 Sites	Distance	Direct Hydrological / Biodiversity Connection
Special Areas of Conservation (SAC)		
South Dublin Bay SAC	3.8 km	Yes
Wicklow Mountains SAC	6.2 km	No
North Dublin Bay SAC	8.6 km	Yes
Glenasmole Valley SAC	8.7 km	No
Knocksink Wood SAC	8.7 km	No
Rockabill to Dalkey Island SAC	10.2 km	No
Ballyman Glen SAC	10.3 km	No
Howth Head SAC	13.1 km	No
Baldoyle Bay SAC	14 km	No
Bray Head SAC	14.5 km	No
Special Protection Areas (SPA)		
South Dublin Bay and River Tolka Estuary SPA	3.7 km	Yes
Wicklow Mountains SPA	6.4 km	No
North Bull Island	8.7 km	Yes
Dalkey Islands SPA	9.9 km	No
Baldoyle Bay SPA	14 km	No

Table 5.3 – National designated sites and Ramsar sites within 15km (and outside 15km with potential for a pathway) of the proposed development

Designation	Conservation Sites	Distance	Direct Hydrological / Biodiversity Connection
pNHA	Fitzsimon's Wood	2.2 km	No
pNHA	Booterstown Marsh	3.7 km	No
pNHA	South Dublin Bay	3.8 km	Yes
pNHA	Grand Canal	4.3 km	No
pNHA	Dodder Valley	5.5 km	No
pNHA	Royal Canal	6.2 km	No
pNHA	Dingle Glen	6.7 km	No
pNHA	North Dublin Bay	7.1 km	Yes
pNHA	Ballybetagh Bog	7.5 km	No

Designation	Conservation Sites	Distance	Direct Hydrological / Biodiversity Connection
pNHA	Dalkey Coastal Zone And Killiney Hill	7.6 km	No
pNHA	Loughlinstown Woods	8.6 km	No
pNHA	Knocksink Wood	8.7 km	No
pNHA	Glenasmole Valley	8.7 km	No
pNHA	Liffey Valley	9.7 km	No
pNHA	Ballyman Glen	10.3 km	No
pNHA	Lugmore Glen	10.8 km	No
pNHA	Glencree Valley	11.2 km	No
pNHA	Powerscourt Woodland	11.3 km	No
pNHA	Dargle River Valley	12.8 km	No
pNHA	Howth Head	13.1 km	No
pNHA	Slade of Saggart and Crooksling Glen	13.4 km	No
pNHA	Great Sugar Loaf	13.6 km	No
pNHA	Baldoyle Bay	14 km	No
pNHA	Bray Head	14.5 km	No
Ramsar	Sandymount Strand/Tolka Estuary	3.8 km	Yes
Ramsar	North Bull Island	8.7 km	Yes
Ramsar	Baldoyle Bay	14 km	No

5.3.2 Species Data

It should be noted that no species of conservation importance were noted on site, based on NPWS and NBDC records as fine resolution. Species recorded within two 2km^2 grids ((O12U & O12T) – both grids are examined as the entire subject site does not lie within one grid) are seen in Table 5.4.

Table 5.4 – National Biodiversity Data Centre Records within the 2km^2 grid (O12U & O12T)

Common Frog (Rana temporaria); Barn Swallow (Hirundo rustica); Black-headed Gull (Larus ridibundus); Common Kestrel (Falco tinnunculus); Common Kingfisher (Alcedo atthis); Common Pheasant (Phasianus colchicus); Common Starling (Sturnus vulgaris); Common Swift (Apus apus); Common Wood Pigeon (Columba palumbus); Eurasian Curlew (Numenius arquata); Eurasian Oystercatcher (Haematopus ostralegus); Great Cormorant (Phalacrocorax carbo); Herring Gull (Larus argentatus); House Martin (Delichon urbicum); House Sparrow (Passer domesticus); Lesser Black-backed Gull (Larus fuscus); Mallard (Anas platyrhynchos); Mew Gull (Larus canus); Mute Swan (Cygnus olor); Rock Pigeon (Columba livia); Sand Martin (Riparia riparia); Snowy Owl (Bubo scandiaca); Tufted Duck (Aythya fuligula); Butterfly-bush (Buddleja davidii); Indian Balsam (Impatiens glandulifera); Japanese Knotweed (Fallopia japonica); Sycamore (Acer pseudoplatanus); Donacia semicuprea; Limnebius nitidus; Large Red Tailed Bumble Bee (Bombus (Melanobombus) uratuses); Sand Feather-moss (Brachythecium mildeanum); Brown Rat (Rattus norvegicus); Eastern Grey Squirrel (Sciurus carolinensis); Eurasian Badger (Meles meles); European Otter (Lutra lutra); House Mouse (Mus musculus); Lesser Noctule (Nyctalus leisleri); Pipistrelle (Pipistrellus pipistrellus sensu lato); Soprano Pipistrelle (Pipistrellus pygmaeus); West European Hedgehog (Erinaceus europaeus); Common Frog (Rana temporaria); Smooth Newt (Lissotriton vulgaris); Barn Swallow (Hirundo rustica); Black-headed Gull (Larus ridibundus); Common Kingfisher (Alcedo atthis); Common Starling (Sturnus vulgaris); Common Swift (Apus apus); Common Wood Pigeon (Columba palumbus); Eurasian Curlew (Numenius arquata); Herring Gull (Larus argentatus); House Martin (Delichon urbicum); House Sparrow (Passer domesticus); Little Egret (Egretta garzetta); Mallard (Anas platyrhynchos); Rock Pigeon (Columba livia); Arthurdendyus triangulates; Cherry Laurel (Prunus laurocerasus); Nuttall's

Waterweed (Elodea nuttallii); Gooden's Nomad Bee (Nomada goodeniana); Large Red Tailed Bumble Bee (Bombus (Melanobombus) uratuses); Brown Long-eared Bat (Plecotus uratus); Brown Rat (Rattus norvegicus); Eastern Grey Squirrel (Sciurus carolinensis); Eurasian Badger (Meles meles); Eurasian Pygmy Shrew (Sorex minutus); Eurasian Red Squirrel (Sciurus vulgaris); European Rabbit (Oryctolagus cuniculus); House Mouse (Mus musculus); Lesser Noctule (Nyctalus leisleri); Pipistrelle (Pipistrellus pipistrellus sensu lato); Soprano Pipistrelle (Pipistrellus pygmaeus); West European Hedgehog (Erinaceus europaeus)

Table 5.5 – Species found by NPWS proximate to the subject site

West European Hedgehog (*Erinaceus europaeus*); Common Frog (*Rana temporaria*); Smooth Newt (*Triturus vulgaris*); Viviparous Lizard (*Lacerta vivipara*); Yellow Archangel (*Lamiastrum galeobdolon subsq. montanum*); Henbane (*Hyoscyamus niger*); Otter (*Lutra lutra*); Opposite-leaved Pondweed (*GroenlandiaDensa*); Irish Stoat (*Mustela erminea subsq. hibernice*);

Both Common Frog (*Rana temporaria*) and West European Hedgehog (*Erinaceus europaeus*) have been noted within the 1km^2 NPWS reference grids that encompass the subject site.

5.3.3 Habitats within the proposed development site

Habitats within the site were classified according to Fossitt (2000) (Figure 5.12) based on the 15th September 2021 site visit and the species noted within each habitat are described below.

BL3 – Built Land: The vast majority of the site comprises of built land (comprising of buildings and tarmacadam) i.e. Dundrum Village centre, roads, car parks and additional buildings along Main Street, access road to the site and hard standing area (See Figure 5.12).

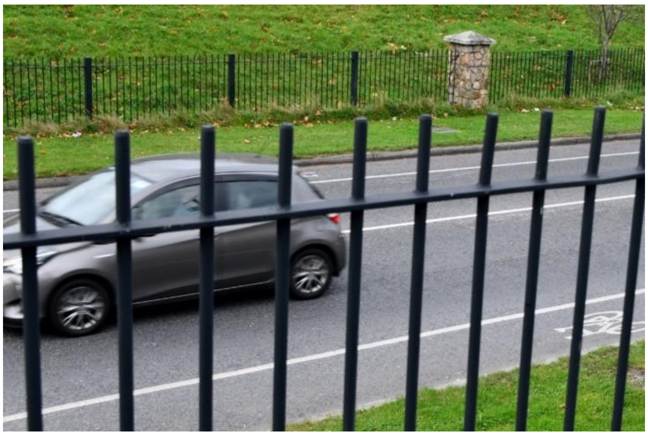
Species within this habitat included red valerian (*Centranthus ruber*), hoary willowherb (*Epilobium parviflorum*), pineappleweed (*Matricaria discoidea*), moss (Sphagnum sp.), ivy (*Hedera helix*), bramble (*Rubus fruticosus agg*.), daisy (*Bellis perennis*), dandelion (*Taraxacum spp*.) and Cat's-ear (*Hypochaeris radicata*).

An inspection of the buildings on site was carried out for bats. As outlined in the *Bat Fauna Survey* (Appendix 5B), no bat roosts were noted on site and no bats were observed emerging from the buildings on site.

WS1-Scrub: Scrub is located to the rear of several houses on Main Street (Figure 5.12). This area includes several large sycamore (*Acer pseudoplatanus*), Colt's Foot (Tussilago farfara), dandelion (Taraxacum spp.), butterfly-bush (Buddleja davidii), ivy (Hedera helix), nettle (Urtica dioica), dandelion (Taraxacum spp.), hedge bindweed

(Calystegia sepium), cow parsley (Anthriscus sylvestris), bramble (Rubus fruticosus agg.), scarlet pimpernel (Anagallis arvensis), rosebay willowherb (Chamaenerion angustifolium), clovers (Trifolium spp.), thistles (Cirsium arvense & C. vulgare), docks (Rumex spp.) greater plantain (Plantago major), hoary willowherb (*Epilobium parviflorum*), common ragwort (Jacobaea vulgaris), Wild Carrot (Daucus carota), winter heliotrope (*Petasites pyrenaicus*), docks (*Rumex spp*.), common mallow (*Malva sylvestris*), herb-robert (*Geranium robertianum*) and giant viper's-bugloss (*Echium pininana*).

GA2-Amenity grassland - Two areas of amenity grassland were noted. These were on the western portion of the site along both sides of the Dundrum bypass. These areas are regularly mown. Species included thistles (*Cirsium arvense, C. vulgare*), creeping buttercup (Ranunculus repens), dandelion (*Taraxacum spp*.), docks (*Rumex spp*.), daisy (*Bellis perennis*), clover (*Trifolium repens*), plantains (*Plantago spp.) and* nettle (*Urtica dioica*).



FW2- Depositing/lowland rivers - The Slang River passes through a culvert for much of the site (Figure 5.12). The flow within the stream was relatively strong (November 2021). The stream is heavily silted and no instream fauna or flora were noted. No species of conservation importance were noted. There is a overflow dam on the stream that would inhibit the passage of fish within the watercourse.

5.3.4 Flora

The plant species encountered at the various locations on site are detailed above. No plant species that are rare or are of conservation value were noted during the field assessment. Records of rare and threatened species from NBDC and NPWS were examined. No rare or threatened plant species were recorded in the vicinity of the proposed site. No invasive species listed on the third Schedule of regulation 49 & 50 in the European Communities (Birds and Natural Habitats) Regulations 2011 were noted on site.

5.3.5 Fauna

No terrestrial fauna of conservation importance were noted on site.

<u>*Amphibians/Reptiles*</u> - The common frog (*Rana temporaria*) was not observed on site. The common lizard (*Zootoca vivipara*) or smooth newt (*Lissotriton vulgaris*) were not recorded on site. The common frog has been proximate to the site and the predominantly culverted Slang River is open proximate to the site. Frogs are likely to occur in the vicinity of the project proximate to the Slang River.

Terrestrial Mammals - Badgers have been noted within the 10km^2 grid by the NPWS. No badgers or badger activity was noted on site. No protected terrestrial mammals were noted on site or in the immediate vicinity of the site. Significant numbers of brown rat (*Rattus norvegicus*) were noted in the derelict buildings on site. There are no protected mammal burrows on site.

Bats - As outlined in Appendix 5B, no bats were noted roosting and no trees of bat roosting potential were noted on site. A single soprano pipistrelle (*Pipistrellus pygmaeus*) was noted foraging briefly on site.

Birds - The following bird species were noted on site during surveys:

Table 5.6: Bird Species noted in the vicinity of the proposed development.

Common Name	*Scientific Name*
Feral pigeon	*Columba livia domestica*
Wren	*Troglodytes troglodytes*
Jackdaw	*Corvus monedula*
Herring gull	*Larus argentatus (amber) (not nesting and no juveniles noted)*
Robin	*Erithacus rubecula*
Blue tit	*Parus caeruleus*
Great tit	*Parus major*
Rook	*Corvus frugilegus*
Magpie	*Pica pica*
Jackdaw	*Corvus monedula*
Blackbird	*Turdus merula*
Starling	*Sturnus vulgaris (amber)*
Dunnock	*Prunella modularis*
Pied Wagtail	*Motacilla alba yarrellii*
Grey Wagtail	*Motacilla cinerea (red)*
Black-headed Gull	*Larus ridibundus (amber)*
Hooded Crow	*Corvus cornix*
Woodpigeon	*Columba palumbus*
Song Thrush	*Turdus philomelos*
Mistle Trush	*Turdus viscivorus*

The majority of the derelict buildings had numerous feral pigeons (*Columba livia domestica*) nesting internally within the buildings. Several herring gull (*Larus argentatus*) (amber listed) were noted on site. Inspections of the roofs of the shopping centre and the other buildings on site did not reveal herring gull nests. No juveniles were noted. However, as these are red listed species a preconstruction survey for herring gull will be carried out prior to demolition of structures in the event that circumstances changes prior to works commencing on site. If they are found to be nesting, consultation will be carried out with NPWS.

The *Winter Bird and Flightlines Survey* [Appendix 5A] completed for the project "*revealed that no significant target species such as Brent Geese would appear at least to pass over this site or nearby with any regularity.*" There are also no records on the database Irishbirding.com of a site with foraging Brent Geese in the immediate vicinity of the project.

5.3.6 Overall Evaluation of the Context, Character, Significance and Sensitivity of the Proposed Development Site

As seen in Figure 5.12, the proposed development site is primarily Built land (BL3). There are small isolated areas of grassland, flower beds and borders and scrub but these are within an urban area, with poor connectivity to other areas of biodiversity and are of low biodiversity importance. The Slang River is culverted at the western edge of the site and open proximate to the site. The watercourse would be sensitive to impact and would act as a vector for pollutants downstream and potentially to Natura 2000 sites. No other habitats of conservation significance were noted within the site.

5.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The development is described in Chapter 3. From a biodiversity perspective, the following characteristics of the project are relevant to:-

- The development involves removal of all existing buildings (excluding No.'s 1-3 Glenville Terrace) on the site and removal of any existing trees and vegetation. The proposed buildings will be arranged around landscaped courtyards and streets which will include new trees and planting.
- Some excavation will be required (including the removal of bedrock) however the level changes across the site and the level of parking required mean that level of excavation is limited.
- The development will connect to existing public services and utilities. Surface water drainage will be attenuated onsite through the implementation of SuDS measures such as green roofs, tree pits, and infiltration planters. Excess surface water drainage that cannot be retained on-site will be attenuated through the use of a Hydrobrake flow device before being discharged to the Slang River at a greenfield runoff rate. Current stormwater discharge will be removed from the combined sewer.
- Foul wastewater will be directed to a proposed trunk foul sewer within the proposed service road. This network will then connect to an existing Irish Water foul sewer network, which in turn discharges to Ringsend Wastewater Treatment Plant (WwTP). The existing 300mm diameter combined sewer through the development site will be abandoned as far as the proposed connection manhole.
- The proposed project will be on a phased basis, for a period of up to 8 years.

5.5 CONSTRUCTION IMPACTS

Potential construction impacts include impacts that may arise during the site clearance, re-profiling and the building phases of the proposed development. Construction phase mitigation measures are required on site particularly as significant reprofiling of the site is proposed which will remove all existing terrestrial habitats and can lead to silt laden and contaminated runoff in addition to dust entering the Slang River.

The potential impacts on biodiversity that could result from the project and the likely effects on the species and habitats that occur within the ZoI of the project are:-

Designated Conservation Sites

Given the proximity of the project to culverted and open sections of the Slang River, and the proposed outfall of surface water drainage (after attenuation on-site) to the Slang River during operation, there is a direct hydrological connection to designated conservation sites located within Dublin Bay via the Slang River, River Dodder and the River Liffey. In the absence of mitigation, runoff during site works, re-profiling, dust, and localised contamination on site could impact on designated conservation sites within Dublin Bay, with potential for water quality impacts. Mitigation measures are required to ensure that dust and contaminated surface water do not enter the Slang River. The *Natura Impact Statement* (NIS), prepared by Altemar Ltd., concludes that:

> "*Following the implementation of the mitigation measures outlined, the demolition and site clearance works would not be deemed to have a significant impact. No significant impacts are likely on Natura 2000 sites, alone or in combination with other plans and projects based on the implementation of mitigation measures."*
>
> "*No significant effects are likely on Natura 2000 sites, their features of interest or conservation objectives. The proposed project will not will adversely affect the integrity of European sites.*"

Aquatic Ecology / Invasive Species

Due to the salmonid nature of the River Dodder and the presence of Atlantic salmon (*Salmo salar*) and European eel (*Anguilla Anguilla*) and the direct pathway via the Slang River, negative impacts on aquatic biodiversity from surface water runoff pollution and dust are possible. Mitigation measures will be in place to ensure compliance with Water Pollution Acts to reduce the likelihood of these negative effects occurring.
Impact: Negative/Slight/Short-term, likely, localised. Mitigation is required.

Habitats, Botany and Avian Ecology

There will be a loss of habitats and species on site. It would be expected that the avian fauna associated with these habitats would also be displaced. No flora or habitats of conservation importance were noted during the surveys. During the site visits no bird species of conservation importance as listed on Annex I of the EU Birds Directive, species or habitats of conservation importance were recorded. Bird nesting opportunities will be lost primarily within the scrub, flower beds and borders and treeline areas. The removal of these habitats within bird nesting season could result in the death or injury of juvenile birds. There is potential for dust and noise to extend beyond the site and impact on bird species. Mitigation is required in relation to the removal of vegetation and buildings outside bird nesting season. The project will not impact on bird flightlines.
Impact: Negative/ Slight to Moderate/ Short-term to medium-term, localised, unlikely. *Mitigation is required*.

Bat Fauna

There are no roosts on site. The project will have no likely effect on same. Light spill during construction has the potential to impact on foraging. However, the site is brightly lit by street lighting and foraging activity is very low. No significant impact on flightlines or collision risk would be foreseen. In the event that circumstances change before work begins on the site, mitigation is required in the form of a pre-construction survey to ensure bats have not begun roosting on site between the onsite surveys and the demolition works.
Impact: Neutral; Imperceptible; Temporary, localised. Mitigation is required

Terrestrial Fauna

No signs of protected species of mammals were observed on site. There are no records of protected mammals on site. The site is isolated and surrounded by roads on all sides. A pre-construction survey will be carried out to assess if any present before works commence on site.
Impact: No Likely Impact.

Amphibians and reptiles

Frogs and newts may occur on site in the vicinity of the Slang River and could potentially be impacted through contaminated surface water runoff. A pre-construction survey will be carried out to assess if any present before works commence on site.
Impact: Negative; Slight; Temporary, localised. Mitigation required.

5.5.1 Mitigation Measures

The following mitigation measures are required to be implemented:-

B-C1	Prior to the commencement of development, the developer shall engage the services of a qualified ecologist as an ecological consultant. The consultant shall ensure the implementation of all relevant mitigation measures in the submitted EIAR.
B-C2	Preconstruction surveys will be carried out for bats, mammals and amphibians in the event that circumstances change before work commences on the site.
B-C3	A preconstruction survey for herring gull will be carried out prior to demolition of structures in the event that circumstances change before work commences on the site. Consultation will be carried out with NPWS should they be found nesting on site at the time.
B-C4	To limit the potential impact of construction on breeding birds, vegetation removal will be restricted to non-breeding season (1st September to 28th February). Where this seasonal restriction cannot be accommodated, the project ecologist will be required to check vegetation for nests prior to clearance. A licence from the NPWS will be acquired where necessary to remove nests.

Construction phase mitigation will also be incorporated into the project to minimise the potential negative impacts on the biodiversity within the ZoI. These measures are outlined in Chapter 6.0 Land and Soils, Chapter 7.0 Water and Chapter 8.0 Air and Climate and summarised below.

Designated Conservation sites within 15km
Mitigation measures are required to protect aquatic biodiversity and designated sites located downstream of the site given the proximity of the subject site to the Slang River; that site works and haulage routes could lead to contaminated surface water runoff entering the watercourse; and the proposal to discharge surface water drainage to the Slang River. These mitigation measures are outlined in Chapter 6.0 Land and Soils(LS), Chapter 7.0 Water(W) and Chapter 8.0 Air and Climate (AC) and include the following:-

LS-C1	Prior to demolition site activity, a pre-demolition waste survey shall be carried out to identify all hazardous materials in the buildings. These materials shall be collected, segregated and stored within secondary containment designed to retain at least 110% of the storage contents, prior to awaiting disposal. Safe materials handling of all potentially hazardous materials should be emphasised to all personnel employed during the construction phase of the project.
LS-C2	Temporary bunds shall be provided for oil/diesel storage tanks on the site for all development phases.

LS-C3	Stockpiles of demolition materials will be provided with perimeter sediment skirts. Sediment retention barriers shall be provided in surface water drains within and to the perimeter of the site along the Dundrum Bypass. The contractor shall use adequately designed and maintained hardcore construction roads.
LS-C4	The excavated material will be monitored and assessed with reference to the OCM Waste Characterisation Assessment (Appendix 6A of the EIAR) to determine the most suitable disposal outlet. Material will be categorised according to the Landfill Directive and will be sent to appropriately licensed facilities for treatment/disposal. This will entail carrying out further soil analysis to determine the appropriate waste facility for disposal. Material on site will be segregated and divided into material re-use, material re-cycling and waste material streams.
LS-C5	Exposure of large areas of natural soil to be minimised. Soil stripping, stockpiling and reinstatement of hardstanding to be carried out in a phased sequence.
LS-C6	A no-fines lean mix concrete blinding shall be used to the base of the retaining wall on the Main Street, coupled with a vertical linear sheet and drainage layer under the Lower Ground Floor Slab.
LS-C7	A Water Management System shall be established within the site boundary. The system shall include for all ground water collected from within the site to be directed/pumped to settlement tanks and silt bags prior to discharge at an agreed discharge rate.
LS-C8	Record keeping and monitoring of import and export of soils shall be carried out in accordance with the Waste Management Act. All waste hauliers and receiving facilities shall have valid permits in accordance with the Waste Management Acts and Planning Conditions
LS-C9	A Pre-commencement Survey of existing piezometers is required to record ground water levels prior to commencement of works.
LS-C10	Install temporary retaining structures to immediate adjacent buildings, such as Glenville Terrace, No.'s 11 and 16/17 Main Street and the Parochial House Boundary, as identified in the AGL Design Statement included in Appendix C of the Outline Construction Management Plan.
W-C1	The Main Contractor(s) CEMP shall provide the measures detailed in the Outline Construction Management Plan submitted with this application to avoid discharge of silt contaminated runoff or hydrocarbons.
W-C2	The Contractor shall provide a Water Management System to avoid polluted or silt laden surface water runoff from the site. Pumped flows shall be adequately treated prior to discharge to the receiving water to remove silt and possible contamination by hydrocarbons and cement.
W-C3	The CEMP will include measures to address flood risk during construction without reducing existing flood storage volume.
W-C4	Dedicated fuel storage areas shall be provided on-site which shall be a minimum of 50m from watercourses or drains or, alternatively, fuelling shall take place offsite.
W-C5	A Water Management System shall be established within the site boundary. The system shall include for all ground water collected from within the site to be directed/pumped to settlement tanks and silt bags prior to discharge at an agreed discharge rate.
W-C6	The Contractor shall comply with the following guidance documents: i) Control of Water Pollution from Construction Sites – Guidance for

	Consultants and Contractors (C532D) (CIRIA 2001) and ii) Development and Flood Risk - guidance for the construction industry (C624) (CIRIA 2004).
AC-C1	The main contractor will ensure the following best practice methods are applied during construction:- • Removal of Asbestos prior to demolition works. • Use of water mist cannons to supress dust during demolition works. • Screening and use of water spray bars on mobile crushing plant. • Screening of building during demolition to contain dust. • Provision of vehicle wheel wash facilities at site exits • Cleaning of local roads. • Vehicle/Plant engines shall be turned off when not in use • Vehicle/Plant engines shall be maintained to ensure efficient operation. • Mains power shall be utilised for Site Offices instead of generators
AC-C2	Dust suppression measures will be implemented to minimise dust generation during extended dry periods. Dust monitoring will be conducted through the demolition excavation period. A complaints management procedure shall be developed prior to the commencement of works.

Further, the project will comply with the Water Pollution legislation by adopting best practice measures to ensure that there are no contaminated discharges from the site including contaminated surface runoff, dust, and damage to the existing culvert leading to the marine environment. The project will be supervised by an ecologist that will ensure that the mitigation measures outlined will be implemented.

Development Construction

A robust surface water runoff prevention strategy is proposed as culverted and open sections of the Slang are proximate to the development site and substantial works are proposed in the vicinity. This will take into account the phasing of the project and will be overseen by a project ecologist. All mitigation measures outlined below will be carried out in consultation with and to the satisfaction of the project ecologist. The implementation of the mitigation measures will ensure that watercourses, surface water networks and biodiversity, including instream and downstream biodiversity, are not significantly impacted by the proposed works.

All works on site will have sufficient mitigation measures to prevent silt and dust from runoff during works. This will include measures outlined in Chapter 6.0 Land and Soils, Chapter 7.0 Water and Chapter 8.0 Air and Climate outlined above.

5.5.2 Monitoring

Monitoring measures required during the project are outlined below.

B-M1	Monitoring in relation to dust, surface water and biodiversity will be carried out by the project ecologist during the construction phase.

Monitoring requirements relevant to Biodiversity are also outlined in Chapter 6.0 Land and

Soils (LS), Chapter 7.0 Water (W) and Chapter 8.0 Air and Climate (AC) and include the following:

LS-M1	Additional waste characterisation testing to be carried out during the excavation of made ground in the vicinity of the underground storage tank, particularly in areas classified as Category 'C' – Non-Hazardous, 17 05 04 exceeds inert WAC increases limits as identified in the OMC Waste Characterisation Assessment (Appendix 6A of the EIAR)
LS-M3	Daily monitoring of excavation activities, stockpiling activities in the content of an increase in silt and debris on surrounding roads.
LS-M4	Daily Water quality testing in the open section of the Slang River directly adjacent to and down stream from the site in consultation with the project ecologist.
LS-M5	Daily cleaning and monitoring of the condition and capacity of silt bags in the road gullies along the Dundrum Bypass
LS-M6	The developer must monitor construction activities to ensure compensatory flood storage volume is provided within the site until the permanent compensatory storage is operational in Zones 1 and 2.
W-M1	The Construction Environmental Management Plan (CEMP) shall include detailed provisions to avoid discharge of silt contaminated runoff or hydrocarbons. Any silt settlement ponds and chambers proposed as part of the CEMP will be monitored daily throughout the construction of the works.
AC-M1	A programme of dust deposition and Particulate PM2.5 & PM10 monitoring shall be initiated prior to the commencement of demolition works.

5.6 OPERATIONAL IMPACTS

The potential impacts during the operational phase of the project and the likely effects on the species and habitats that occur within the ZoI are:-

Designated Conservation sites within 15km
During operation of the development foul water will be discharged to existing mains services. Runoff from the development and roads will comply with the Water Pollution Acts and SuDS requirements and will be attenuated and discharged at greenfield rates to the public surface water network. The proposed development will not impact on bird flightlines. As a result, no negative impact on conservation sites is foreseen.
Impact: Neutral /Imperceptible

Aquatic Ecology / Invasive Species
As outlined in section 7.6.1 of the Water Chapter "*An increase in paved and roofed areas in an already heavily developed catchment area could result in a significant increase in the runoff entering a sewer or watercourse, increasing the flood risk down-stream. However, the abandonment of the combined sewer through site results in reduction in flows in the combined sewer downstream of the site and provision of a SUDS management train will result in a reduction in peak discharge from the site to greenfield runoff rates and improvement in quality of surface water discharges. This is a positive long term impact with slight effect*."

However, petrochemical runoff from the site and road could potentially negatively directly or indirectly impact the aquatic ecology. Runoff from the development and roads will have to comply with Water Pollution Acts and will require petrochemical interception and will be attenuated and discharged at greenfield rates to the public surface water network.
Impact: Neutral /Not Significant/ Permanent/ localised

Habitats, Botany and Avian Ecology
There will be an increase in disturbance including noise and light that could potentially impact on birds on site. As the landscaping elements improve with maturity it would be expected that the biodiversity value of the site to birds and flora would also increase.
Impact: Neutral/ Slight/ Permanent, site.

Bat Fauna
The proposed project is within an urban environment with very low bat activity. Light spill from the proposed lighting has the potential to impact on foraging. However, the site is already brightly lit by street lighting and foraging activity is very low.
Impact: Neutral/ Permanent/ Not Significant

Protected mammals
No protected mammal species were noted on site. It is expected that species will avoid built areas once they are constructed. Impacts may be considered as neutral on species of conservation importance in the immediate locality.
Impact: Neutral/ Not significant/ Permanent/Site

Amphibians and reptiles
No impacts are foreseen in relation Amphibians and reptiles during operation.
Impact: No likely impact

5.6.1 Mitigation Measures

The following mitigation measure will be carried out:-

B-O1	The attenuation and surface water connections will be inspected upon completion by the project ecologist.

Operational mitigation measures outlined in Chapter 6.0 Land and Soils (LS) and Chapter 7.0 Water (W) will also be incorporated into the project to minimise the potential negative impacts on the biodiversity within the ZoI.

LS-O1	All waste generated by the everyday operation of the development should be stored within the designated collection areas, provide with concrete slab and the areas drained to foul discharge point
LS-O2	Foul pumping station and balance tank to be designed, constructed and tested in accordance with Irish Water Wastewater-Code-Of-Practice as water tight for both ingress of groundwater and egress of Wastewater.
W-O1	Incidental surface run-off from lower ground floor car parks, compactor units and bin stores / service yard areas will be discharged into the foul drainage system. Grit / petrol / oil separators to be provided in all of the above areas.
W-O2	Petrol /oil separators will be provided for surface water drains receiving flows from the site service road and loading yard

W-O3	Stormwater attenuation shall be provided with flow controls to ensure that the rate of discharge of surface water runoff is limited to greenfield run-off rates at each outfall from the site in accordance with the Greater Dublin Regional Code of Practice for Drainage Works, the Greater Dublin Strategic Drainage Strategy and the local authority's Stormwater Management Policy.
W-O4	A two-stage surface water management train incorporating sustainable drainage components in accordance with local authority's stormwater management policy will improve the water quality of surface water discharges, contributing to improved water quality in the Slang River.
W-O5	Compensatory Flood Storage volume shall be provided within the Service Road and under the Lower Ground Floor of the proposed development in order to ensure that there is no increase in flood risk to any properties in the area.
W-06	Electrical substations and control kiosks will have a floor level of 46mOD or higher in order to avoid risk of flood ingress in a 0.1%AEP flood event. This minimum level includes an allowance for freeboard and climate change.

5.6.2 Cumulative impacts

Based on a review of other planning permissions granted in the vicinity (including those listed at Section 3.10) there are no committed developments in proximity to the subject site which are likely to give rise to cumulative impacts with it. Given this, it is considered that in combination effects with other existing and proposed developments in proximity to the application area would be unlikely, neutral, not significant and localised.

5.7 OTHER EFFECTS

5.7.1 Residual Effects

The construction and operational mitigation proposed for the development satisfactorily addresses the mitigation of potential impacts on the sensitive receptors. The overall impact on the ecology of the proposed development will result in a not significant/ Slight / adverse/ medium term impact on the biodiversity. This is primarily as a result of the loss of terrestrial habitats on site, supported by the creation of additional biodiversity features and complexity, standard construction and operational controls.

The construction and operational mitigation proposed for the development satisfactorily addresses the mitigation of potential impacts on biodiversity and designated conservation sites through the application of standard construction and operational phase controls, as outlined above. In particular, mitigation measures to ensure compliance with Water Pollution Acts will satisfactorily address the potential impacts on downstream biodiversity and designated sites. No significant adverse impacts on biodiversity or designated sites are likely from the project following the mitigation described above.

5.7.2 'Do-nothing' Effect

In the absence of the project, it would be expected that biodiversity would increase on site as a lack of maintenance of the site would lead to scrub encroachment.

5.7.3 Worst Case Effect

Following construction, fire or building collapse would be seen as the main potential worst case scenario risk to biodiversity and conservation sites. Having regard to the scale of the development, a significant fire would release airborne and waterborne pollutants due to the combustion of normally inert industrial materials and appliances. Water used in a significant fire could contain toxic materials that would enter the surface water drainage network with potential for downstream impacts.

Worst Case Scenario Impacts: Unlikely, Negative, Slight*, localised*, Temporary. Mitigation required in the form of compliance with Water Pollution Acts.

5.8 INTERACTIONS

The biodiversity elements of this EIAR have involved consultation with a wide section of the Project Team particularly in relation to the Construction Management, design, lighting, drainage and landscape elements of the proposed development. There are numerous inter-related environmental topics described in detail throughout this EIAR document which are of relevance to the biodiversity chapter. The biodiversity chapter of the EIAR involves interactions with Chapter 6.0 Lands and Soils, Chapter 7.0 Water, Chapter 8.0 Air and Climate, Chapter 9. Noise and Vibration, Chapter 10.0 Material Assets: Built Services, Chapter 11.0 Material Assets: Transportation.

It is considered that there is the potential for slight, temporary negative impacts on biodiversity due to dust (air), noise, emissions to water and construction traffic associated with the Construction Phase of the Project. These impacts are addressed in more detail in the other chapters of the EIAR. There is also potential for the Operational Phase of the proposed development to impact on biodiversity via surface water runoff to the Slang River. However, post mitigation these impacts are not deemed to be significant.

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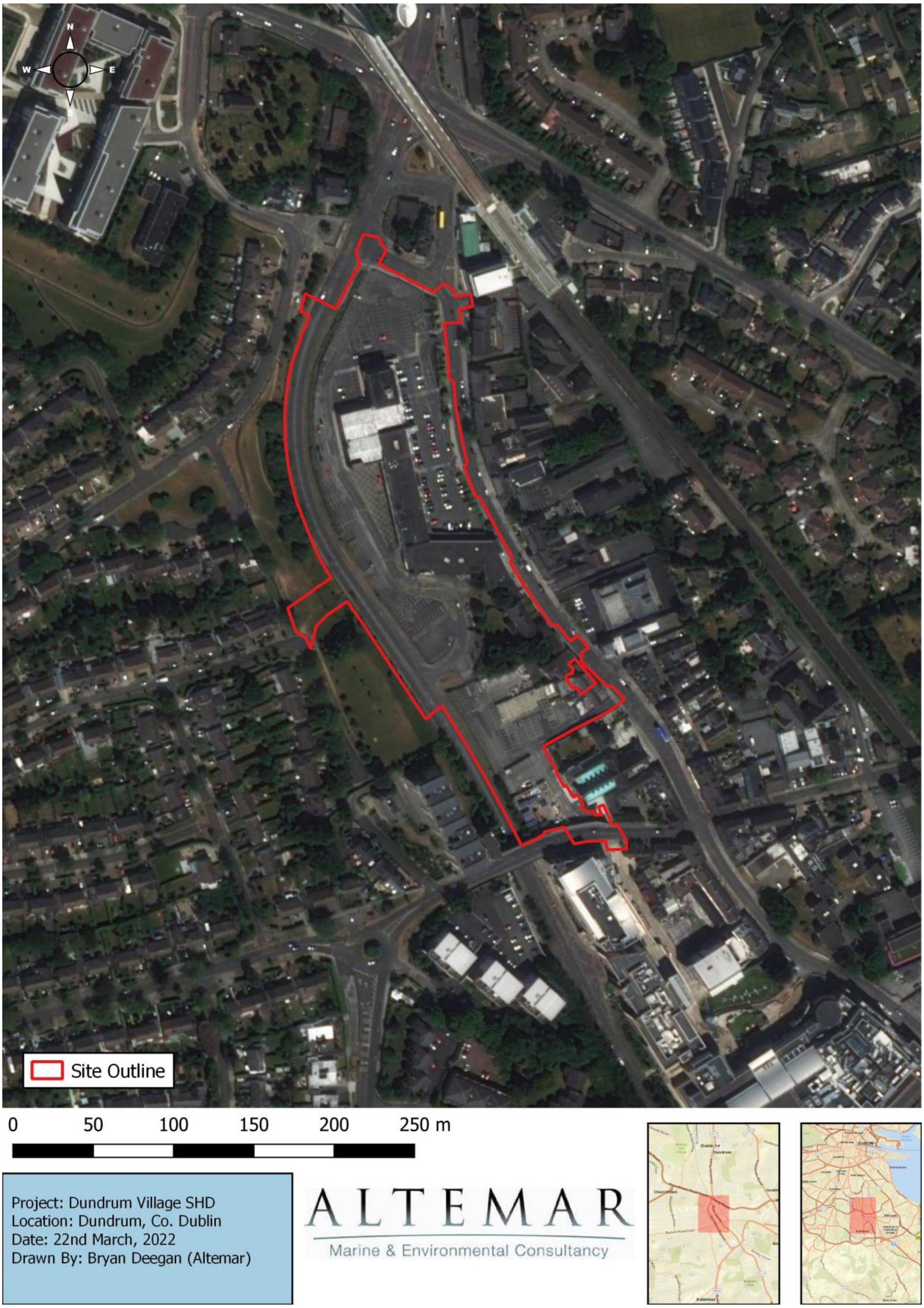

Figure 5.1 – Proposed Development Site Outline (red)

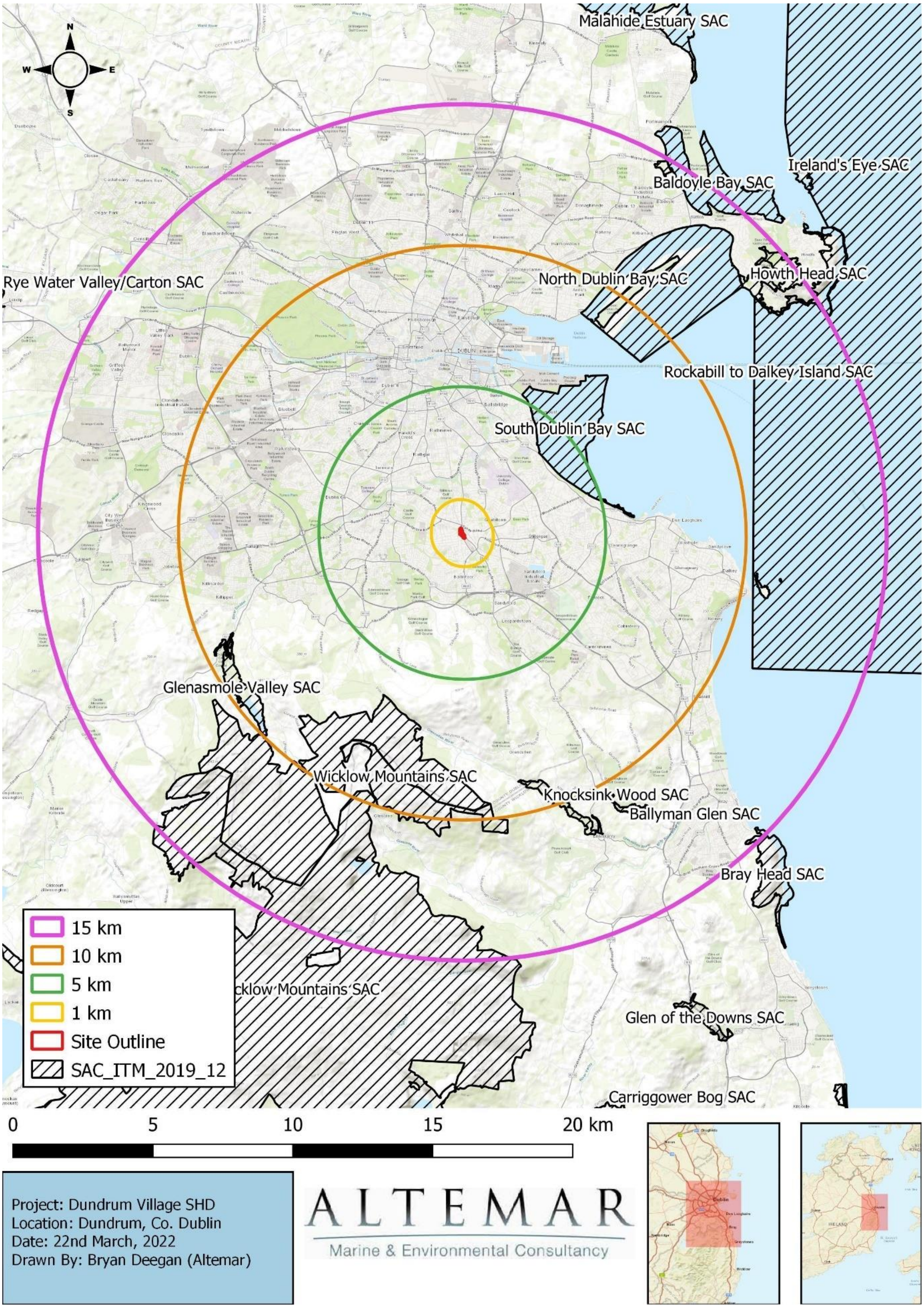

Figure 5.2 – Special Areas of Conservation within 15km of the proposed development site

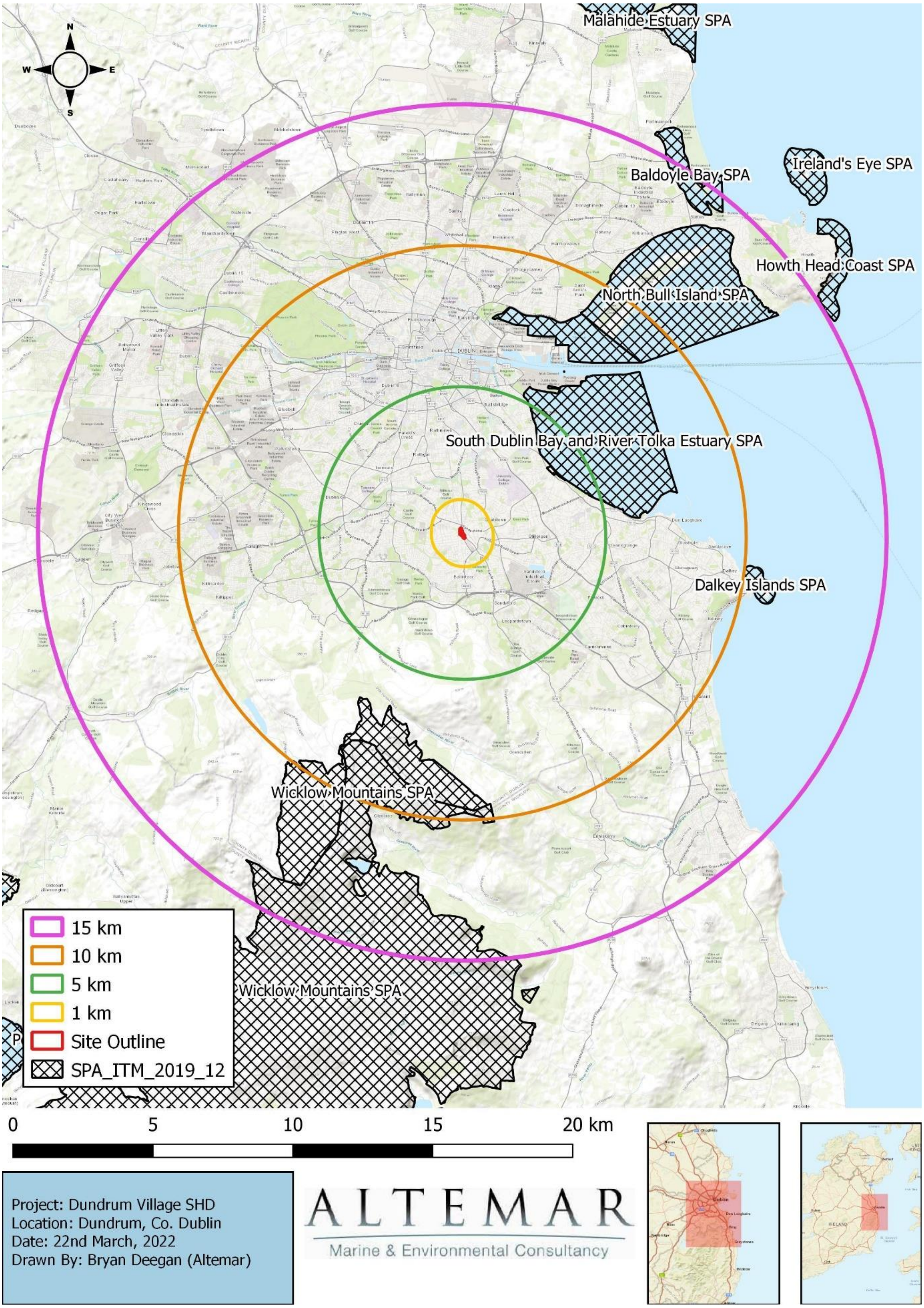

Figure 5.3 – Special Protection Areas within 15km of the proposed development site

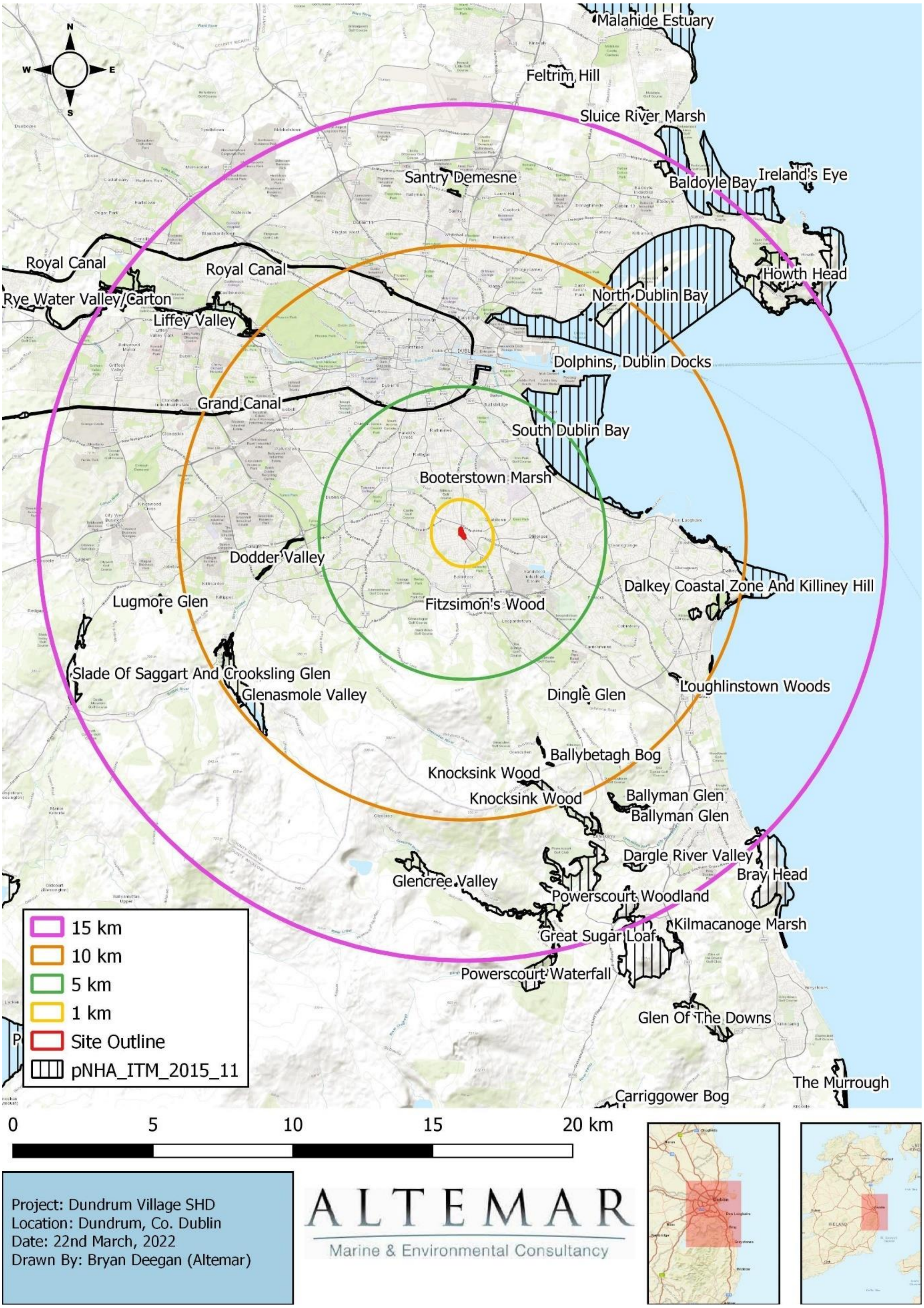

Figure 5.4 – NHAs and pNHAs within 15km of the proposed development site

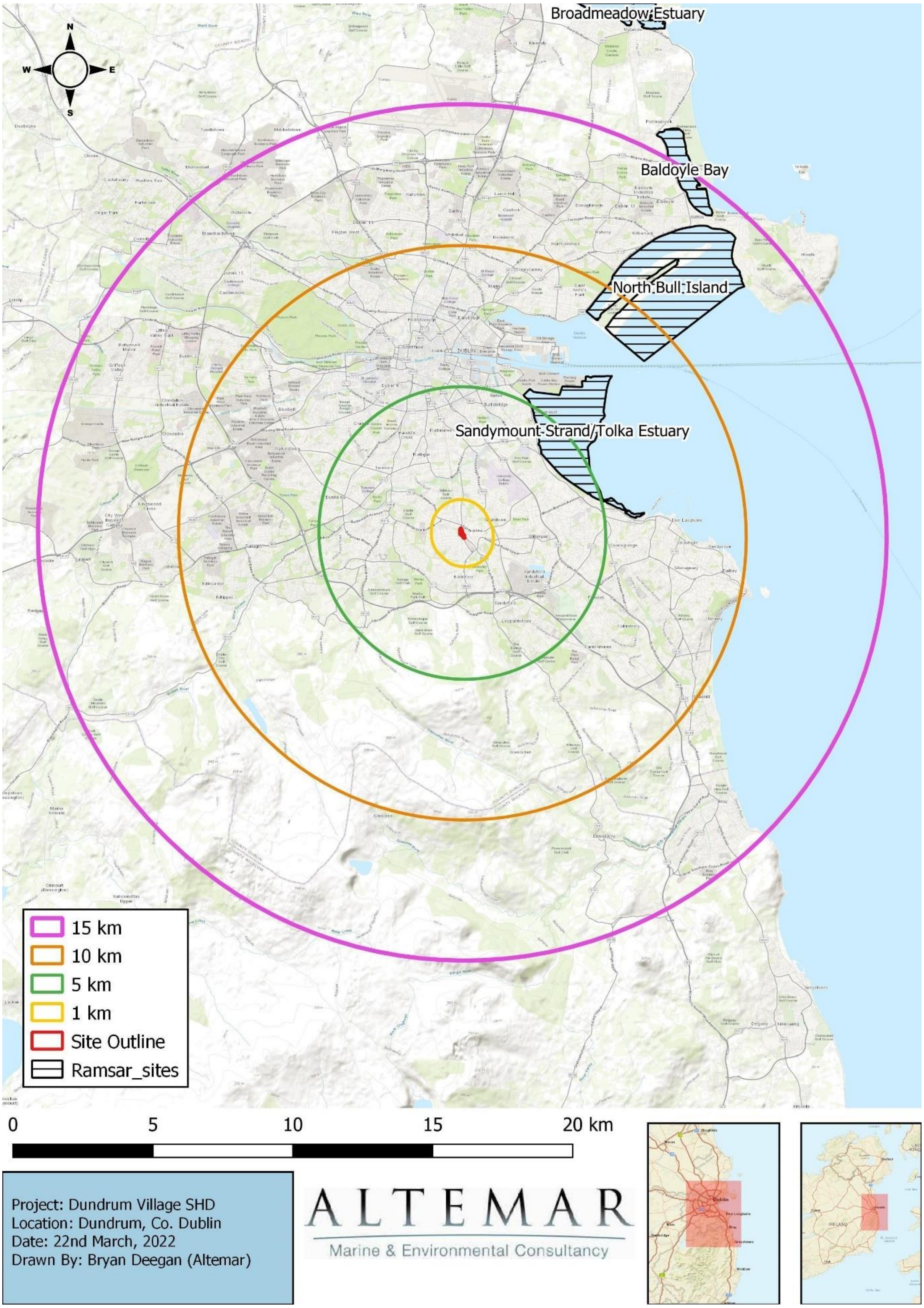

Figure 5.5 – Ramsar sites within 15km of the proposed development site

Figure 5.6 – Waterbodies within 1km of the proposed development site (Actual culverted Slang River in green)

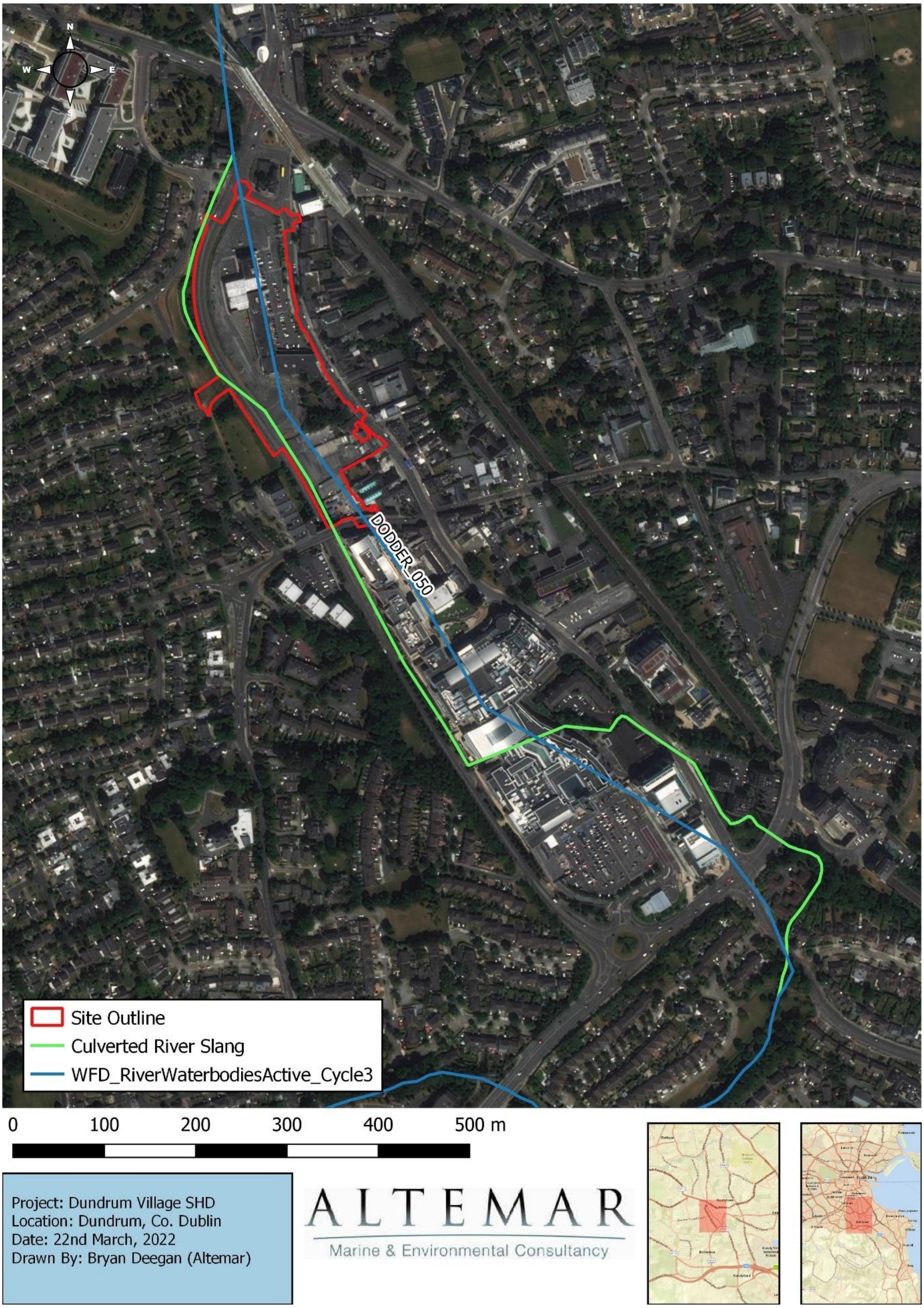

Figure 5.7 – Waterbodies proximate to the proposed development site (Actual culverted Slang River in green)

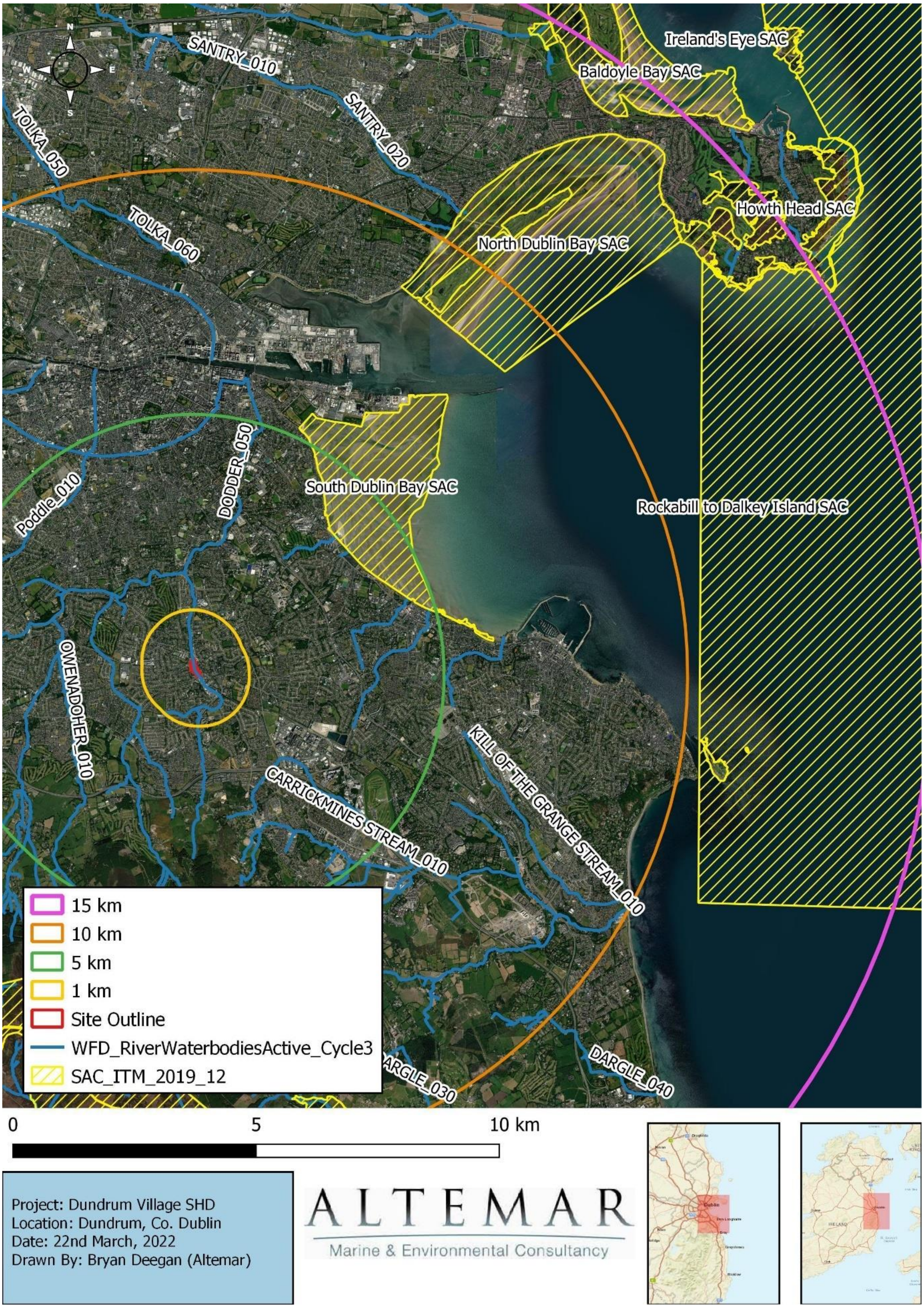

Figure 5.8 – Waterbodies proximate to the subject site and SACs within 15km of the subject site

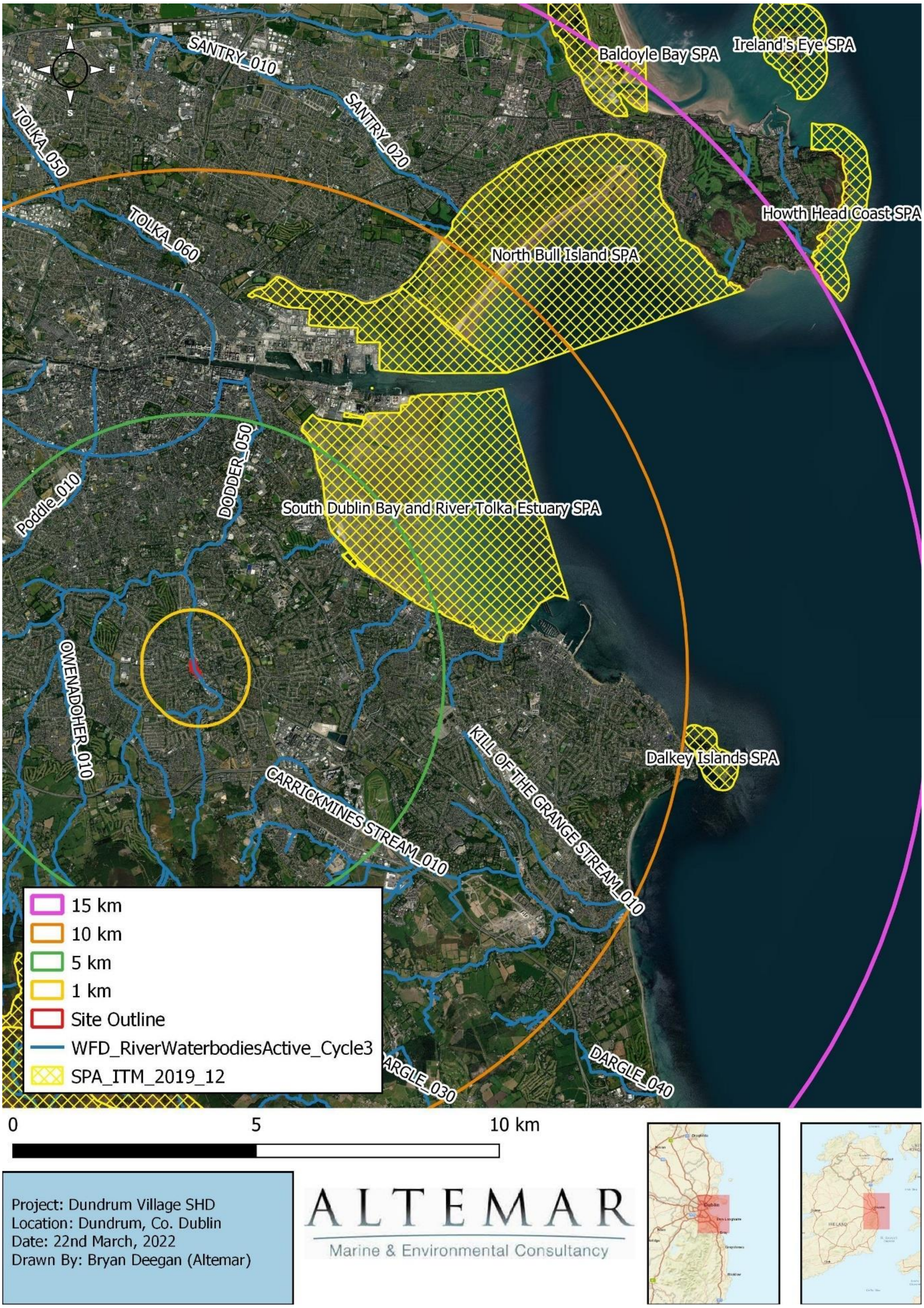

Figure 5.9 – Waterbodies proximate to the subject site and SPAs within 15km of the subject site

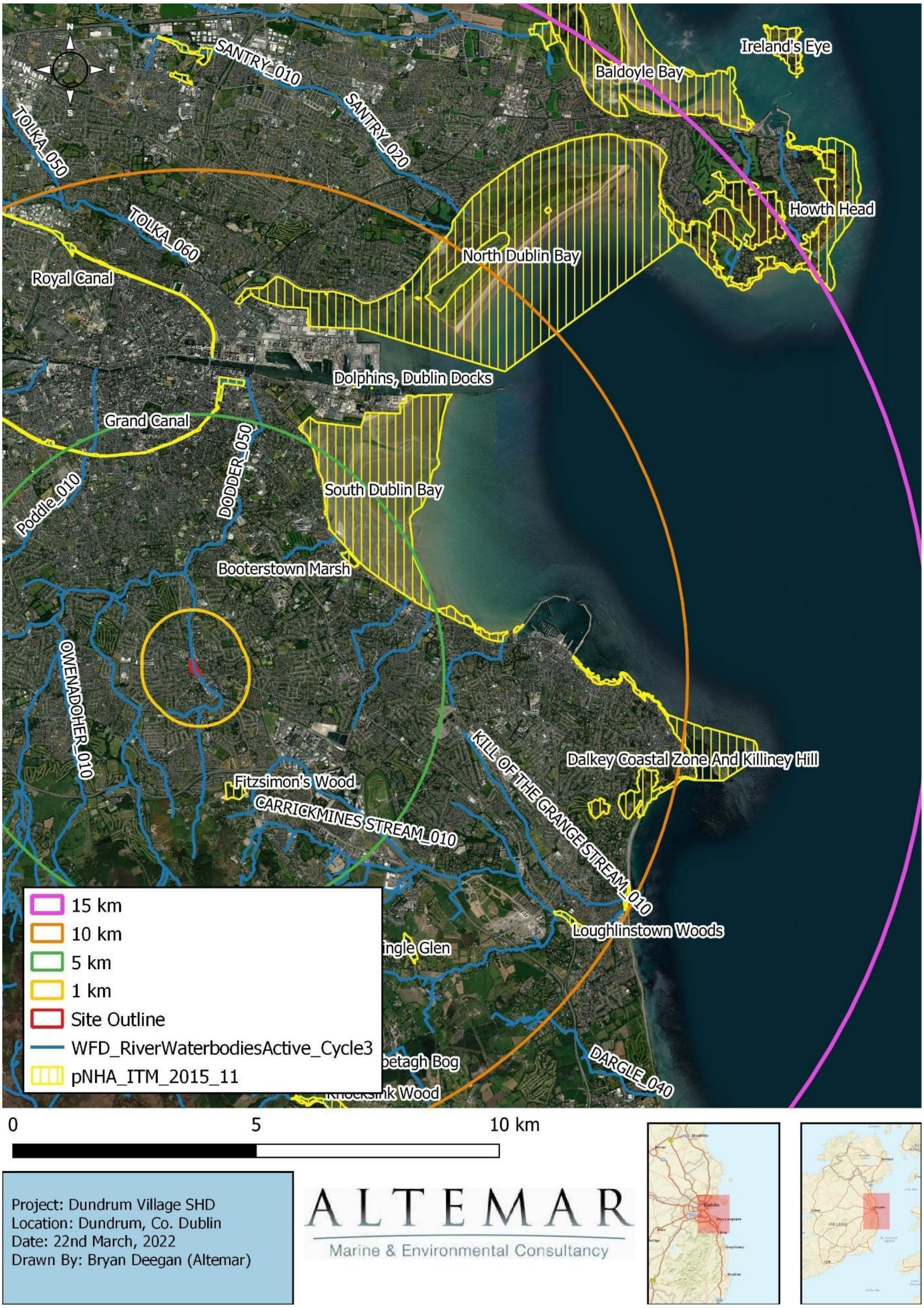

Figure 5.10 – Waterbodies proximate to the subject site and pNHAs within 15km of the subject site

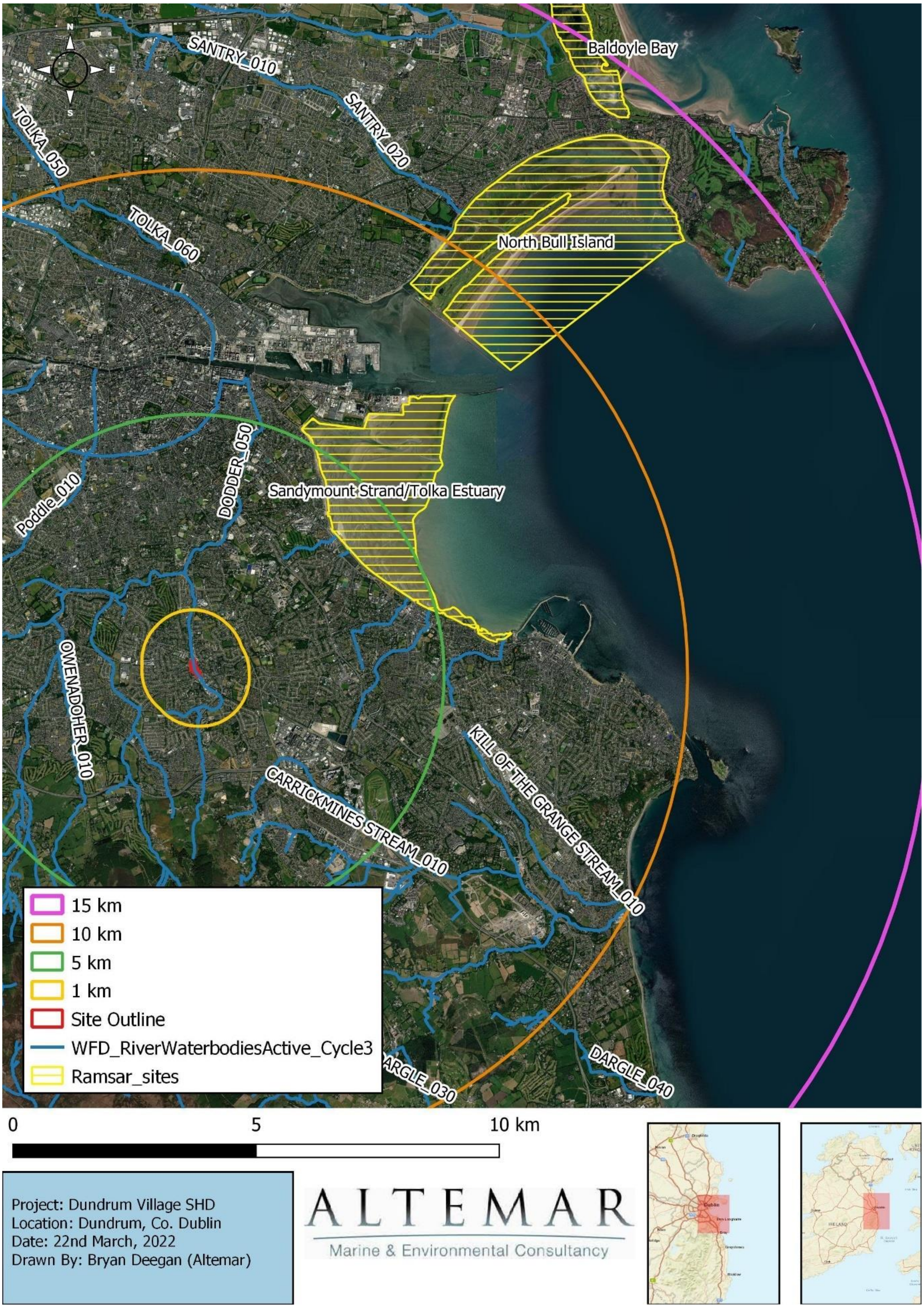

Figure 5.11 – Waterbodies proximate to the subject site and Ramsar sites within 15km of the subject site

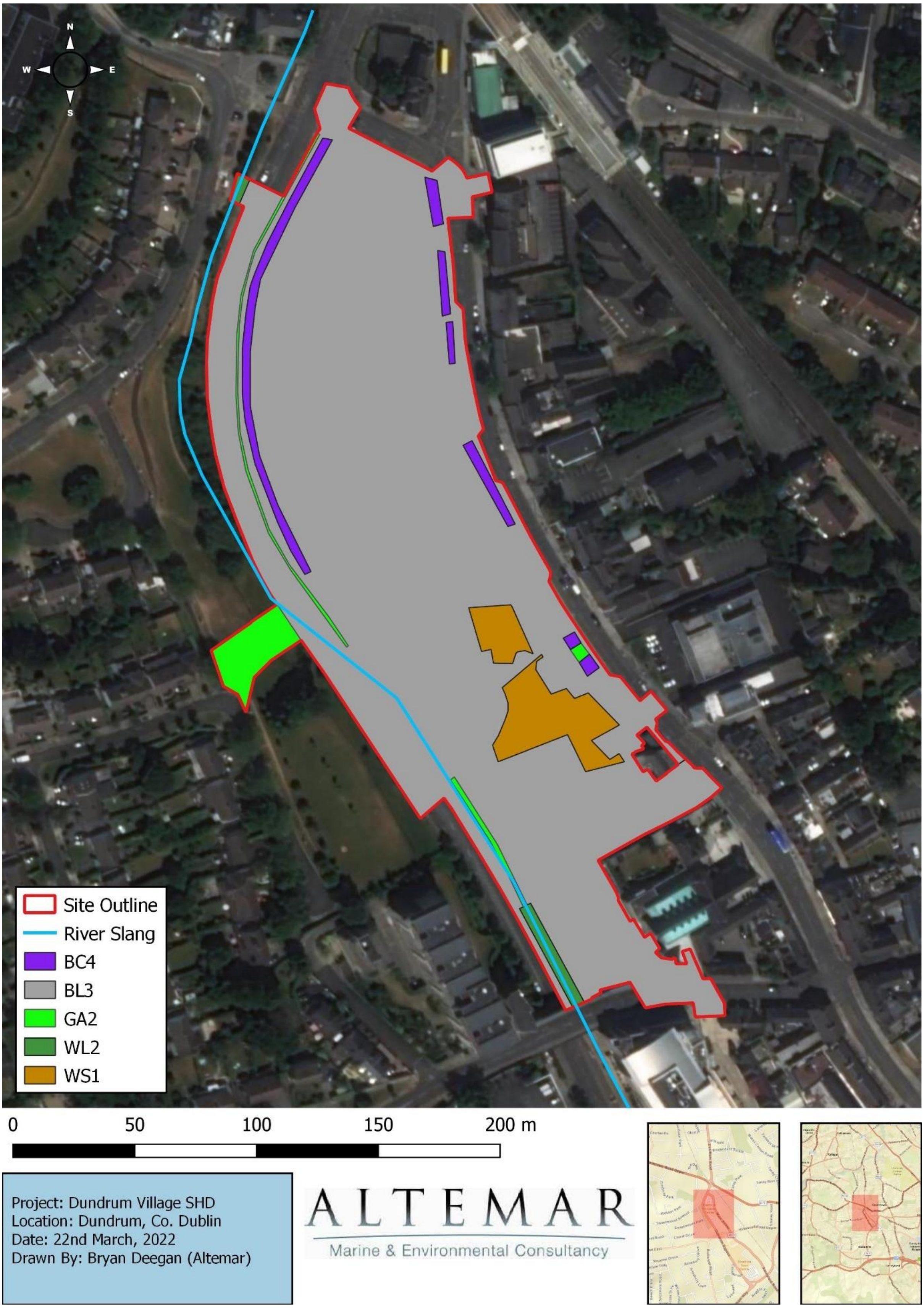

Figure 5.12 – Habitats (Fossitt 2000) within the proposed development site.

6.0 LAND AND SOILS

6.1 INTRODUCTION

This section of the EIAR has been prepared by TJ O'Connor & Associates (TJOC) and describes the existing *Land and Soils* aspects on the site. An assessment is made of the likely impacts arising during the construction and operational phases of the development on these elements.

This chapter was prepared by Thomas Griffin of TJOC. Thomas is a Chartered Engineer with Engineers Ireland and a Chartered Structural Engineer with the Institution of Structural Engineers. Thomas has been a consulting engineering for over 23 years. Thomas has particular knowledge in large scale developments, with specific reference to construction methodologies, environmental monitoring, noise and vibration, site mobility and existing buildings, and specific experience in piling, pile testing and piling in limestone and granite formations.

6.2 ASSESSMENT METHODOLOGY

The assessment was carried out with reference to the legislation and guidelines outlined in Chapter 1. The following Guidelines were also consulted specifically for this chapter:-

- *Guidelines for the preparation of Soils Geology and Hydrogeology Chapters of Environmental Impact Statements* (Institute of Geologists Ireland[11], 2013)
- *Geology in Environmental Impact Statements, A Guide* (Institute of Geologists Ireland, 2002)
- *Guidelines on Procedures for the Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes* (National Roads Authority, 2008)
- *Control of Water Pollution from Construction Sites. Guidance for Consultants and contractors* (Construction Industry Research and Information Association[12], 2001)
- *A New Perspective on Land and Soil in Environmental Impact Assessment* (Institute of Environmental Management and Assessment 2022).

Ground investigations were carried out on the site in November 2021. This supplemented previous investigations between October 2004 and April 2005 (Refer to Appendix 6A for extents of investigations). In addition, the following summary reports have been used in the preparation of this assessment:

- Summary Ground Investigation Report, Jan 2022, Prepared by AGL Consulting Ltd.(Appendix 6A)
- Waste Characterisation Assessment, Nov 2021, Prepared by O'Callaghan Moran & Associates (Appendix 6B)

In developing this chapter and considering the impact on lands and soils we have also considered and had regard to the Water Chapter and the ***Site Specific Construction and Demolition Waste Management Plan*** (prepared by Byrne Environmental) submitted with this application.

[11] Institute of Geologists Ireland - IGI
[12] Construction Industry Research and Information Association - CIRIA

The above reports and a desktop study have been used in an assessment of the soils and bedrock geology underlying the study area. The Desktop study used information from:

- Ordnance Survey of Ireland (OSI) online historical maps and aerial photographs (http://map.geohive.ie/mapviewer.html)
- GSI On-line Groundwater Database. Aquifer Classification & Vulnerability; karst features and groundwater resources; groundwater recharge; source protection areas; and subsoil data.

An assessment of the existing groundwater underlying the study area was undertaken in the form of both a desktop study using information available from The Geological Survey of Ireland (GSI) and ground water monitoring on the site.

The soil and geology profiles were extracted from available information either on the GSI website or the previous ground investigations commissioned on site. This ground investigation was an extensive investigation which carried out testing on samples from trial pits, boreholes and rotary coreholes between 2005 and 2007. Additional ground investigations were recently completed in the context of a further detailed investigation into the Made Ground on the site. This additional ground investigation and a summary of the previous ground investigation reports has been completed by AGL Consulting Ltd for T.J.O' Connor & Associates, January 2022 and is attached in Appendix 6A.

The environmental testing carried out during the 2005 ground investigation was considered to be limited and was not relevant in the context of current legislation and waste characterisation. A new extensive ground investigation to obtain samples of the Made Ground material and testing this material in the context of waste characterisation was carried out in October 2021.

O Callaghan Moran & Associates (OCM), in conjunction with IGSL Ltd., tested selected samples of made ground and natural soils collected from 32No. trail pits taken as part of the ground investigations. The samples were analysed at an accredited laboratory and the results formed the basis for a waste classification assessment, which was undertaken by OCM in accordance with the Environmental Protection Agency (EPA) Guidelines on the Classification of Waste (2015). Previous ground investigations were carried out by Bernard Murphy Associates in 2005 and environmental testing was carried out on a selected number of samples. The testing consists of the use of Photoionisation detectors (PIDs) on-site during this investigation to measure background and sample levels of TVOC, Benzene and Isobutylene. A Summary Ground Investigation Report is included in Appendix 6A).

Additional monitoring and testing will be required during the excavation of the site to account for potential localised areas, however in the context of the EIAR assessment this recent investigation is considered relevant in accordance with current waste classification and waste disposal legislation.

The original factual ground investigations carried out between 2004 and 2007 are considered to remain relevant. No basement development has occurred on the site or in the vicinity of the site in the intervening period to this current SHD application.

There were no difficulties encountered in undertaking this assessment.

6.3 RECEIVING ENVIRONMENT

The vast majority of the site comprises of built land / hardstanding including buildings, carparks, access roads and other hard standing areas. (See Figure 5.12).

The subject lands slope gently along the eastern boundary (Main Street) from an elevation of +53.5m OD at the southern end, to a low point of +45.0m OD at the northern end. The western boundary (Dundrum Bypass) is flatter sloping from an elevation of 47.6m OD at the southern end to the low point of 44.5m OD at the northern end.

The site of the proposed development is situated adjacent to the route of the Slang River, which runs along the western boundary of the site from South to North in a concrete culvert. This comprises the main freshwater receiving environment in the vicinity of the proposed development. The Slang is a tributary of the Dodder which enters the tidal reaches of the river Liffey at Ringsend.

The entire length of the Slang River, including the part which flowed within the site boundary, was diverted to facilitate the construction of the Dundrum Bypass in 2001[13]. The rerouted stream runs in a culvert downstream of Ballinteer Road / Dom Marmion Bridge and emerges on the west side of the Dundrum Bypass adjacent to Sweetmount Terrace where it runs in open channel before running in a further as far as Waldemar Terrace where it re-joins the original route of the watercourse. (Refer to Figure 7.2 and Table 7.1 for details of the culverts).

6.3.1 Geology

The geology of the site and the surrounding area as indicated by the geotechnical investigation on the site generally consists of 1.2 to 4.6m of made ground underlain by deposits of brown boulder clay, sand and gravel, and weathered rock over granite bedrock at a depth of 1.5 to 16.3m below ground level (refer to Figure 6.2 for GSI bedrock geology). Table 6.1 summarises the ground conditions recorded in the borehole and rockcore logs.

The soil profile along the sourthern perimeter of the site is illustrated in Figure 6.1.

Table 6.1 Ground conditions recorded in the borehole and rockcore logs

Stratum	Description	Depth to top of Stratum (m)	Thickness (m)
Tarmac	Hardstanding, Made Ground	0	0.03 – 0.25
Made Ground	Medium dense slightly clayey to clayey, slightly sandy to sandy, Gravel and very soft, soft, soft to firm and firm, slightly sandy to sandy, slightly gravelly to gravelly Clay with some cobbles. Large Lumps of concrete encountered.	0.0 – 0.3	0.8 – 5.0
Possible Made Ground	Medium dense sandy Gravel and soft, firm, slightly sandy to sandy Clay.	1.3 – 3.0	1.0 – 3.3

[13] The plan of the existing Slang stream and culverts following construction of the Dundrum Bypass Scheme are shown in Figure 7.2, with further detail in Table 7.1.

Former Topsoil	Very soft to soft, soft, firm slightly sandy to sandy, slightly gravelly to gravelly Clay and compact slightly sandy, slightly gravelly Silt with pockets of roots and plant material, peat and fragments of slag.	1.5 – 4.0	0.8– 1.6
Brown Boulder Clay	Soft, firm, stiff, very stiff & hard brown slightly sandy to sandy slightly gravelly to gravelly Clay with occasional to some cobbles.	0.0 – 10.2	0.2 – 1.5
Sand/Gravel	Layer/pockets of medium dense, dense & very dense gravelly Sand, Sand & Gravel and clayey, slightly sandy to sandy Gravel with occasional to some cobbles and boulders.	3.0 – 15.0	0.35 – 10.9
Rock	High variable – weak to moderately weak, strong to moderately strong, completely weathered to fresh or slightly weathered, pale grey, coarse grained Granite.	1.5 – 15.5	-

6.3.2 Hydrogeology

Two aquifers underly the site and can be described as follows:

Overburden Aquifer: This aquifer consists of silty sand and gravels interbedded with layers of lower permeability till materials. There is a large range of permeability within the overburden which can be explained by the nature of the overburden consisting of glacial drift. The more permeable layer is located at depth and consists of “silty sand and gravels”. This layer is interbedded with lower permeability till material that overlies and, in some instances, confines it. A one-day constant rate pump test was carried out on site in May 2005 and showed that this aquifer under steady regime could produce a flow rate greater than 240m^3/d. It is likely that the Slang River is in hydraulic continuity with this “underground channel”.

Bedrock Aquifer: This aquifer is located within the Granite bedrock. The GSI public data identifies the underlying bedrock is classed as *Pi – Poor Aquifer* with bedrock which is generally unproductive except for local zones as shown at Figure 6.3. This is reflective of the granite bedrock. To the north of Taney Cross the bedrock is classed by the GSI as *Li - Locally important* aquifer with limestone bedrock which is moderately productive only in local zones. The results of the various hydrogeological investigation undertaken (Constant rate test, packer test, slug test and step tests) tend to confirm that based on the recorded permeability within the bedrock, it would be conventionally referenced as “poor” permeability.

Aquifer vulnerability is defined by the GSI as the intrinsic geological and hydrogeological characteristics that determine the ease with which groundwater may be contaminated by human activities. Vulnerability categories range from Extreme (E) to High (H) to Moderate(M) to Low (L) and are dependent on the nature and thickness of subsoils above the water table. The GSI vulnerability map indicates that the vulnerability at the site is moderate (Figure 6.4). Based on findings of the intrusive investigations the bedrock may be 1.0m to 1.5m below ground level along the east of the site and the vulnerability beneath the site is predominately moderate.

Groundwater was encountered in most of the boreholes and rotary core holes installed as part of the ground investigations, either within the gravels or in the granite (refer to Appendix 6A). Piezometers were installed during the original ground investigation between 2004 and 2005, in the granite and overburden. 62no. standpipe piezometers were installed in a total of 47no.

exploratory boreholes during this previous investigation. Groundwater levels were monitored up to August 2005. This monitoring indicates standing water levels ranging from just over 42.0m OD in BH13 (north end of site) to just over 46.0m OD in the eastern side of the site.

Groundwater recharge rates are indicated to be at the lower end of the scale for the site at Dundrum with an annual recharge rate of 62mm/annum (See Figure 6.5) The GSI have assessed the area in the vicinity of the site as having moderate to high groundwater vulnerability. This is a term used to represent the intrinsic geological and hydrogeological characteristics that determine the ease with which ground water may be contaminated by human activities. Soils in the vicinity of the site are generally classed as made ground with soils in the Sweetmount Park area identified as tills categorised as low permeability.

A review of historical maps available from Ordinance Survey Ireland (OSI) records the site has been occupied by the Village Centre since the early 1970s and the Dundrum Bypass was constructed on greenfield area in the early 2000. Prior to this the area would appear to have been either residential or greenfield. The rear of No.16 & 17 Main Street was a former builder's merchant yard which may have potential for some low local contamination. There is no evidence to suggest that the previous lands had any significant potential for contamination.

6.3.3 Soils Contamination

Levels of TVOC, Benzene and Isobutylene compounds detected in the trial pits and in the soil samples during ground investigations was low and in many cases below the ambient levels in the local atmosphere.

The 2005 environmental testing identified an underground storage tank adjacent the north gable of the Village Centre and directly adjacent to this tank identified significantly elevated levels of Total Volatile Organic Compounds, Benzene and Isobutylene.

Further sampling and testing (Location TP 14) in the area during the 2021 environmental testing did note a medium hydrocarbon odour, however test results on samples taken from this area now identified that this material would be classified as Non-Hazardous and meeting the soil recovery criteria. It is expected that potential local pockets of soil around the underground tank will require further sampling and testing for classification during the excavation of the site.

The OCM Waste Characterisation Assessment (Appendix 6A) concludes that no asbestos was detected in any of the 32 No. samples. 10 no. samples are classified as non-hazardous and the appropriate List of Waste Code is 17 09 04 (Construction and Demolition waste other than those mentioned in 17 09 03). All other samples are classified as non-hazardous and the appropriate List of Waste Code is 17 05 04 (Soil and Stone other than those mentioned in 17 05 03*). For further details refer to the OCM – Waste Characterisation Assessment located in Appendix 6A.

6.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The development is described in Chapter 3. The following description relates to characteristics of the project which are of specific relevance to the land and soils assessment.

- *Demolition*: Comprising of the removal of the existing Dundrum Village Shopping Centre, associated surface car parking, Main Street buildings and the surface car parks to the rear of Holy Cross Church and Former Mulvey's hardware.
- *Excavation & Earthworks :* A surplus of "cut" material to the southern end of the site and along the Main Street will be exported off site to suitably licensed landfill facilities (c. 27,000m^3). Part of the "cut" includes circa 1,200m3 of granite rock removal along the eastern edge adjoining Main Street. The removal of this rock, to form the Lower Ground Floor, will involve the use of pre-drilling, splitting and breaking of the rock.
- *Substructure:* The significant varying level of competent rock across the site will likely require the residential blocks along Main Street to be founded on isolated concrete pad foundations, directly on the granite rock. The residential blocks along the Dundrum Bypass and to the northern tip of the site will likely be founded on bored piles socketed into the rock to support pile caps. The Lower Ground Floor will require a retaining wall along Main Street and to remaining properties along Main Street. Some temporary retaining systems will be required.
  The works proposals include for compensatory flood storage in the hardcore under the Lower Ground Floor. The proposed site levels require a build-up of site levels, this build-up is to be utilised for flood storage and surface water storage.
- *Disposal of Ground Water and Water Run-off:* Significant dewatering is not expected to be required. Some ground water management will be required locally to the excavations for foundations and sewer construction.

6.5 CONSTRUCTION IMPACTS

A large percentage of the site is currently covered by hardstanding areas and therefore provides good protection to the underlying soils particularly during the demolition phase.

The potential impact pertaining to the project with regard to land and soil involves the removal of the existing structure and services on the site and the excavation of material to allow the development to be constructed and the disposal of these materials. The likely impacts are;

- Impact on directly adjacent buildings
- Impact of contaminates within the buildings and ground on workers
- The impact of reducing the groundwater table on adjacent soil strengths
- The impact on existing ground water flow regime by retaining walls acting as a barrier to the groundwater flow and the potential for ground water levels to rise on the up-stream side of the site

The development site works and excavation proposals along the east boundary of the site will impact the underlying bedrock geology during the construction phase. The maximum excavation depth for foundations and lift pits are anticipated to extend to a depth of 4.5m below ground level on the eastern side of the site and in isolated locations to 2.0m below ground level on the western side of the site. Bedrock encountered in the ground investigation varies between 1.5 to 2.0m below the existing ground level to the east of the site and up to 14.0m below ground level on the west of the site. It is therefore considered that the greatest impact of the construction will arise from the extensive stripping and excavation of soils, sub-soils and rock removal. This will have an adverse, moderate, permanent impact on the underlying bedrock geology.

The main volume of excavation will be from the planned construction of the Lower Ground floor level where is cuts into the existing topography along the eastern side of the site. In addition, excavation will be necessary for the removal of existing made ground and necessary excavation for the proposed underground foul pumping station and balance tanks, surface water attenuation systems and compensatory flood storage. Reusable excavated rock will be retained on-site for backfilling or for drainage purposes to reduce the total volume of imported and exported material. The likely impact on soils will be negative, short term and moderate.

The initial development of the site construction for a zone of the works would involve extensive stripping of the existing surface which typically comprises of macadam or topsoil (a minimum thickness of 500mm of the made ground). Excavation of subsoil layers would be required to facilitate site development works, in particular the construction of foul and surface water sewers and underground surface water storage structures (attenuation). It is envisaged that non-reusable excavated material will be removed off-site. The likely impact from the removal of the made ground on the remaining underlying soil will have a positive, moderate and permanent impact.

The proposed development will result in a large volume of excavated material including existing made ground, soil and rock being removed off site for disposal. The material may contain contaminants and therefore will need to be tested and be exported to an approved licensed waste facility. The impact will be negative, slight and permanent in relation to the impact on licensed waste facilities.

The need for dewatering of the site will require local pumping of a low volume of water from the site. This is to facilitate the construction of the Lower Ground Floor and therefore is unavoidable. The disposal of groundwater shall be in accordance with the licensed requirements of Dun Laoghaire Rathdown County Council and will be on a short-term basis. The groundwater water will pass through filtration system to remove sediment from the water and an oil separator prior to discharge to a designated sewer and at a controlled rate. The predicated impacts of same would be classed as negative, slight and temporary.

The particular risks associated with the Construction Phase are:

- The presence of contaminants in the underlying strata and the exposure of site workers to contaminated ground through direct contact, inhalation of dust and vapours or oral intake. The likely impact on human health, without mitigation, will be adverse, significant and permanent

- There is a potential risk of localised contamination of the groundwater due to construction activities i.e. construction spillages, leaks etc. However, the low permeability Boulder Clay will effectively eliminate the potential for contamination to infiltrate into the underlying aquifer. For this reason, the impact on the groundwater contained within the bedrock aquifer is considered as not significant and adverse. The potential impact on hydrogeology during the construction phase is considered to be short term, temporary and moderate without mitigation measures in place.

- Excavated and stripped soil can be disturbed and eroded by site vehicles during the construction. Rainfall and wind can also impact on non-vegetated/uncovered areas within the excavation or where soil is stockpiled. This will have an neutral, moderate and short-term impact. Dust impacts are considered in Chapter 8.0 Air and Climate.

- The removal of soil and rock from the ground along the Main Street, without the adoption of appropriate control measures, may lead to some ground movement in the immediate surrounds of the excavation with an associated risk of settlement and damage to buildings in the immediate area, including No.'s 11 + 16/17 Main Street. The impact will without mitigation will be adverse, moderate and permanent. Details of mitigation methods required are outlined in the next section.

- Increased traffic associated with the construction works would have the effect of compacting existing subsoil layers 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 road network, as well as facilitating the unwelcome transfer of mud and dust to surrounding access routes in the absence of mitigation. The impact will be negative, moderate and temporary.

- The presence of contaminants in the groundwater could have a significant negative impact on Biodiversity in the Slang and downstream. This impact is considered in Chapter 5.0 Biodiversity. The exposure of site workers to existing contaminated groundwater could potentially have a negative significant long term impact on their health but the probability is low and it's this effect is unlikely.

- The potential impact of dewatering and temporarily reducing the ground water level on surrounding structures. This is considered to be local, temporary and not significant impact.

- The impact on existing ground water flow regime. The concern would be that the retaining wall along the Main Street could act as a barrier to the groundwater flow and the potential for ground water levels to rise on the up-stream side of the site. This has been assessed in Chapter 7.0 - Water and the probability of this occurring is unlikely.

- Noise and vibration will be generated through the construction phase particularly during pilling and excavation work. Given that some rock excavation is required it is anticipated that rock breaking techniques will be used. Noise and vibration impacts are considered in detail in Chapter 9.0 Noise and Vibration.

6.5.1 Mitigation Measures

The following mitigation measures are proposed.

LS-C1	Prior to demolition site activity, a pre-demolition waste survey shall be carried out to identify all hazardous materials in the buildings. These materials shall be collected, segregated and stored within secondary containment designed to retain at least 110% of the storage contents, prior to awaiting disposal. Safe materials handling of all potentially hazardous materials should be emphasised to all personnel employed during the construction phase of the project.
LS-C2	Temporary bunds shall be provided for oil/diesel storage tanks on the site for all development phases.
LS-C3	Stockpiles of demolition materials will be provided with perimeter sediment skirts. Sediment retention barriers shall be provided in surface water drains within and to the perimeter of the site along the Dundrum Bypass. The contractor shall use adequately designed and maintained hardcore construction roads.

LS-C4	The excavated material will be monitored and assessed with reference to the OCM Waste Characterisation Assessment (Appendix 6A of the EIAR) to determine the most suitable disposal outlet. Material will be categorised according to the Landfill Directive and will be sent to appropriately licensed facilities for treatment/disposal. This will entail carrying out further soil analysis to determine the appropriate waste facility for disposal. Material on site will be segregated and divided into material re-use, material re-cycling and waste material streams.
LS-C5	Exposure of large areas of natural soil to be minimised. Soil stripping, stockpiling and reinstatement of hardstanding to be carried out in a phased sequence.
LS-C6	A no-fines lean mix concrete blinding shall be used to the base of the retaining wall on the Main Street, coupled with a vertical linear sheet and drainage layer under the Lower Ground Floor Slab.
LS-C7	A Water Management System shall be established within the site boundary. The system shall include for all ground water collected from within the site to be directed/pumped to settlement tanks and silt bags prior to discharge at an agreed discharge rate.
LS-C8	Record keeping and monitoring of import and export of soils shall be carried out in accordance with the Waste Management Act. All waste hauliers and receiving facilities shall have valid permits in accordance with the Waste Management Acts and Planning Conditions
LS-C9	A Pre-commencement Survey of existing piezometers is required to record ground water levels prior to commencement of works.
LS-C10	Install temporary retaining structures to immediate adjacent buildings, such as Glenville Terrace, No.'s 11 and 16/17 Main Street and the Parochial House Boundary, as identified in the AGL Design Statement included in Appendix C of the Outline Construction Management Plan.

6.5.2 Monitoring

The following monitoring measures are proposed:-

LS-M1	Additional waste characterisation testing to be carried out during the excavation of made ground in the vicinity of the underground storage tank, particularly in areas classified as Category 'C' – Non-Hazardous, 17 05 04 exceeds inert WAC increases limits as identified in the OMC Waste Characterisation Assessment (Appendix 6A of the EIAR)
LS-M2	Inclinometers to be installed on temporary retaining systems to rear of Third Party Properties i.e. No.11 (Lisney), No.16/17 (Mulvey Pharmacy), the Parochial House Boundary wall and rear of the Holly Cross Church during excavation of lower ground floor adjoining the premises .
LS-M3	Daily monitoring of excavation activities, stockpiling activities in the content of an increase in silt and debris on surrounding roads.
LS-M4	Daily Water quality testing in the open section of the Slang River directly adjacent to and down stream from the site in consultation with the project ecologist.
LS-M5	Daily cleaning and monitoring of the condition and capacity of silt bags in the road gullies along the Dundrum Bypass

LS-M6	The developer must monitor construction activities to ensure compensatory flood storage volume is provided within the site until the permanent compensatory storage is operational in Zones 1 and 2.

6.5.3 Cumulative Impacts

Cumulative impacts of the proposed development can be considered in two areas:

i) A slight short term negative impact is likely on adjoining underground structures due to the Lower Ground Floor construction and the potential to reduce ground water levels or block groundwater flow patterns.

ii) The requirement for some excavated soils deemed to be disposed on in licenced landfill facilities, thereby reducing the capacity in the landfills to accept future material. The impact is negative but not significant due to fact that the waste characterisation assessment identified that over 60% of the soil tested was suitable for recovery at soil recovery facilities.

6.6 OPERATIONAL IMPACTS

Following construction there will be no long-term significant impacts with respect to soils and geology of the site.

The day-to-day activities of the completed development would be unlikely to have any direct impact on the groundwater environment. Minor impacts would include increased infiltration and therefore slightly increased recharge volumes entering the groundwater. However infiltration testing for the use of the gravel layers underlying the site to be used as part of the SUDs strategy to drain the podium or roof levels proved unsuccessful and therefore this potential for increased infiltration does not appear likely.

Run-off from hardstanding areas will pass through a closed drainage system, which will incorporate silt traps to mitigate the possibility of potentially contaminated surface water from contaminating the soil and bedrock geology. The drainage system from the Lower Ground Floor will drain via oil/petrol interceptor and will then discharge into the Local Authority operated foul sewer system.

The development will be supported by the underlying rock through either direct bearing or through piles drilled into the underlying rock. It is not envisaged that this will have any negative impact on the bedrock geology.

On completion of the construction phase, it is not envisaged that there would be a further direct impact on the soil or geological structure. Ensuring appropriately designed and constructed site services will protect the soils and geology from future contamination arising from operation of the developments.

6.6.1 Mitigation Measures

The following mitigation measures are proposed.

LS-O1	All waste generated by the everyday operation of the development should be stored within the designated collection areas, provide with concrete slab and the areas drained to foul discharge point
LS-O2	Foul pumping station and balance tank to be designed, constructed and tested in accordance with Irish Water Wastewater-Code-Of-Practice as water tight for both ingress of groundwater and egress of Wastewater.

6.6.2 Monitoring

There is no requirement for monitoring.

6.6.3 Cumulative Impacts

There are no cumulative impacts in relation to Land and soils at the operational stage associated with the proposed development and the other projects listed in Section 3.10.

6.7 OTHER EFFECTS

6.7.1 Residual Effects

The implementation of the measures in Section 6.5.1 and 6.6.1 will mitigate against significant long-term adverse impacts. There are no predicted residual impacts on the soil, geology and hydrogeology environments associated with the project.

6.7.2 'Do-nothing' Effect

Under the 'Do-Nothing' Scenario, the existing baseline conditions will remain and there would be no change in the current land use of the site. Therefore, the soil and bedrock geology environments would remain in their current state.

6.7.3 Worst Case Effect

The worst case scenario would be where the mitigation and monitoring measures were not carried out. The main result would be excessive movement of the temporary retaining works resulting in damage to 3rd Party properties. There is the potential for local contamination of the underlying soil from the removal of hazardous materials on the site and some overspill of soil and water run-off onto the Dundrum Bypass entering the Slang River in Sweetmount Park.

6.8 INTERACTIONS

The design team has been in regular contact with each other throughout the design process to minimise environmental impacts and to ensure a sustainable and integrated approach to the design of the proposed development. There is an interaction between Land and Soils and specifically Water (Chapter 7.0), Air Quality and Climate (Chapter 8.0), Noise and Vibration (Chapter 9.0) and Material Assets: Built Services (Chapter 10.0).

These impacts are described in more detail in the various corresponding chapters however some general points are described below: They are also relevant to Human Health, considered in Chapter 4.0 Population and Human Health.

Interaction with Water includes:

- Silt and hydrocarbon run-off from the site entering the Slang River water course
- Maintaining Compensatory Flood Storage volumes during excavation and construction works
- Designing retaining walls and slab construction to provide flow path for ground water

Interaction with Air and Climate include:

- The potential for dust from demolition work, rock crushing, stockpiles and excavations to impact on air quality for both workers and the general public
- The potential for Construction workers to be exposed to contaminants present in the underlying strata through direct contact and inhalation of dust and vapours.

Interaction with Noise & Vibration include:

- Noise and vibration will be generated through the Demolition and Construction Phase particularly during the piling and excavation works.
- Potential for noise and to a less extent vibration from demolition, rock breaking and piling to impact on workers and the general public

Interaction with Material Assets: Built Services includes:

- Impact of excavation on existing underground utilities particularly the combined sewer through the site which also serves Holy Cross Church and Parochial House.

REFERENCES

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- O'Callaghan Moran (2022) *Waste Characterisation Assessment*
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- Dun Laoghaire Rathdown County Council (2021) *Guidance Notes for Environmental Management of Construction Projects.*
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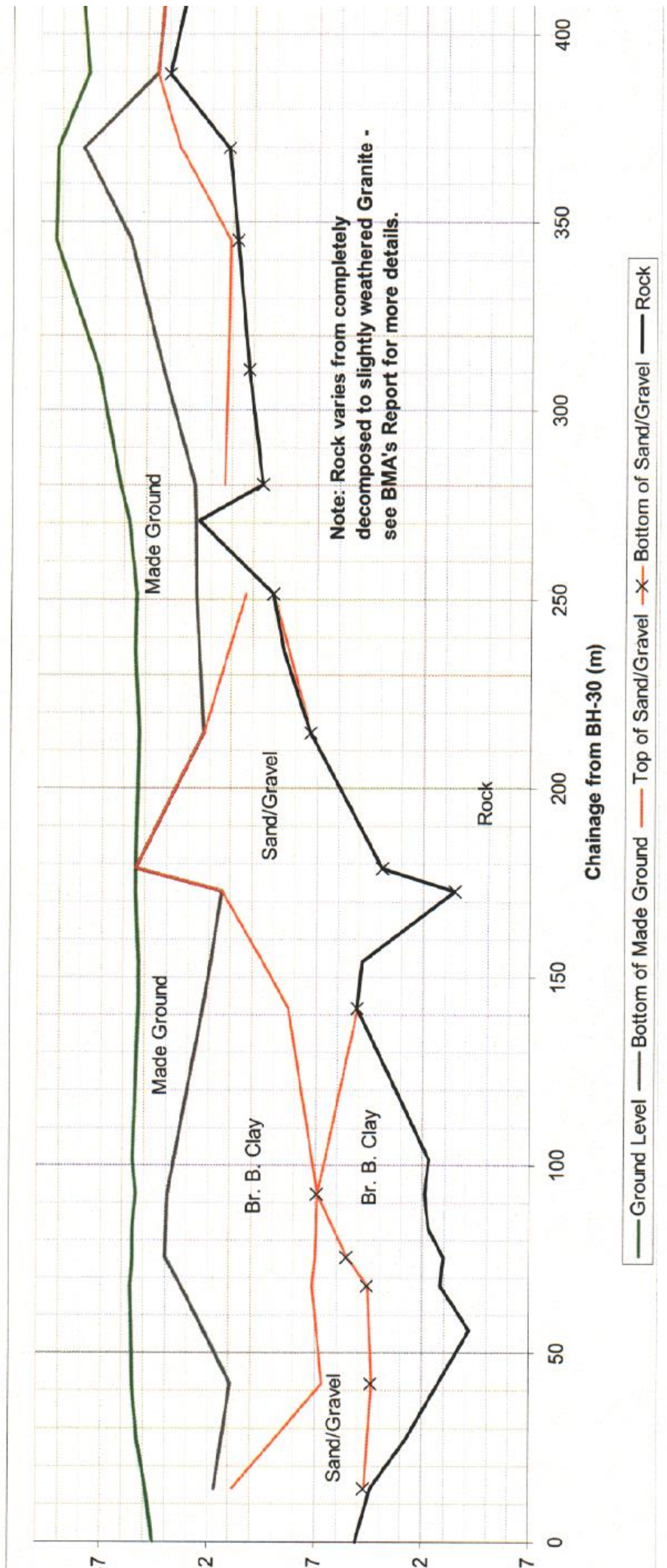

Figure 6.1 Illustrative profile along western boundary of development

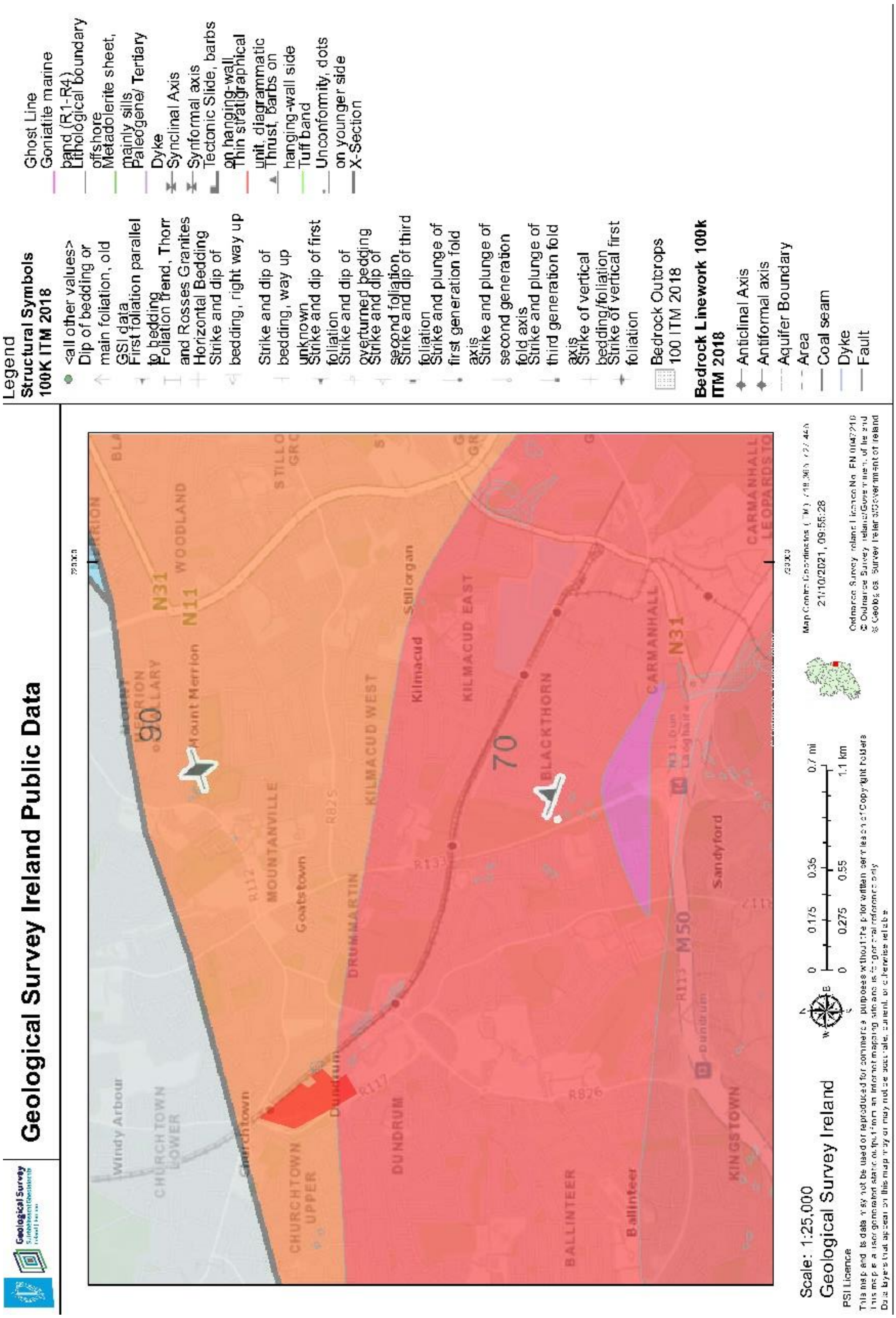

Figure 6.2 GSI Bedrock Geology

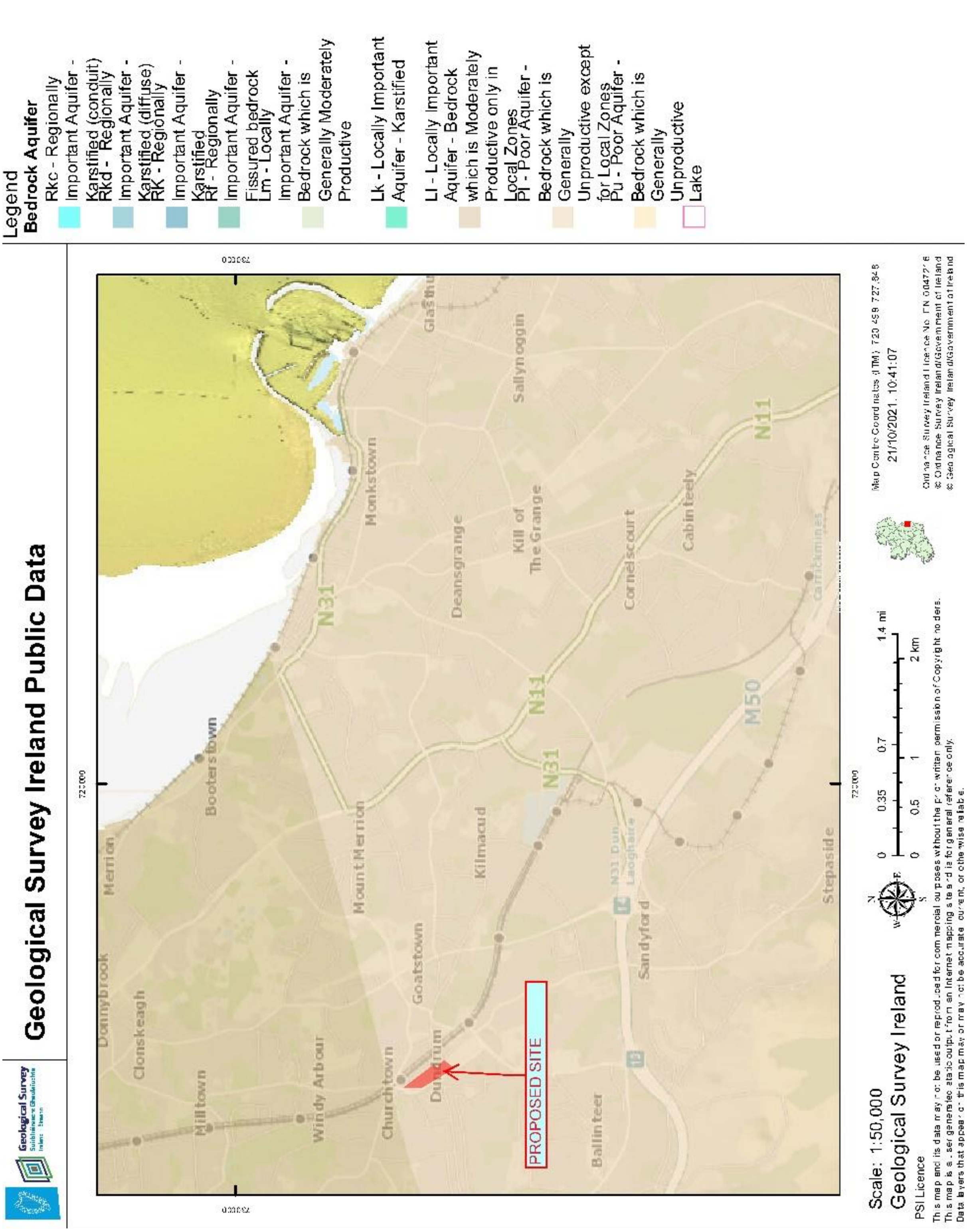

Figure 6.3 GSI Bedrock Aquifer Classification

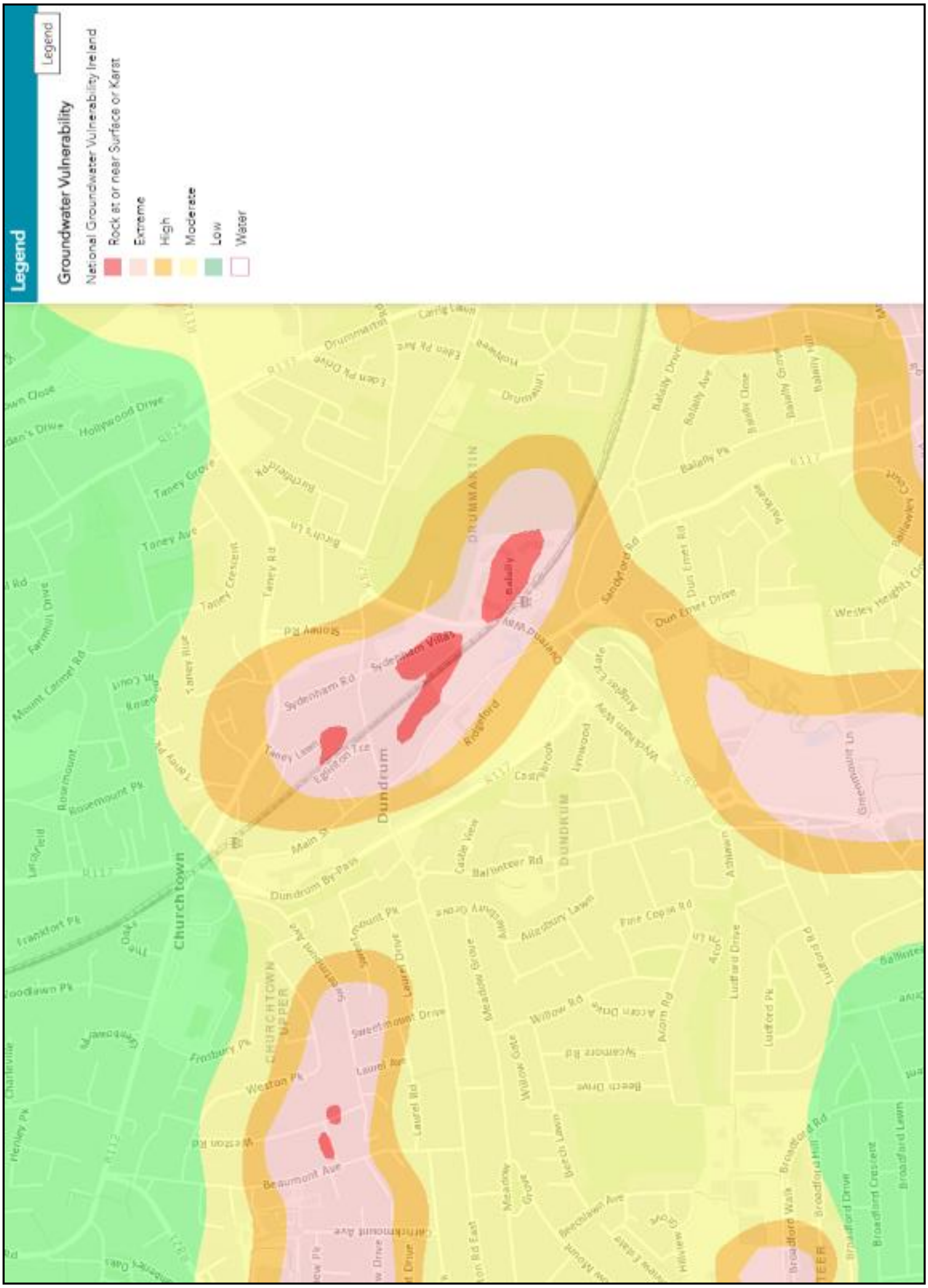

Figure 6.4 GSI Ground Water Vulnerability Map

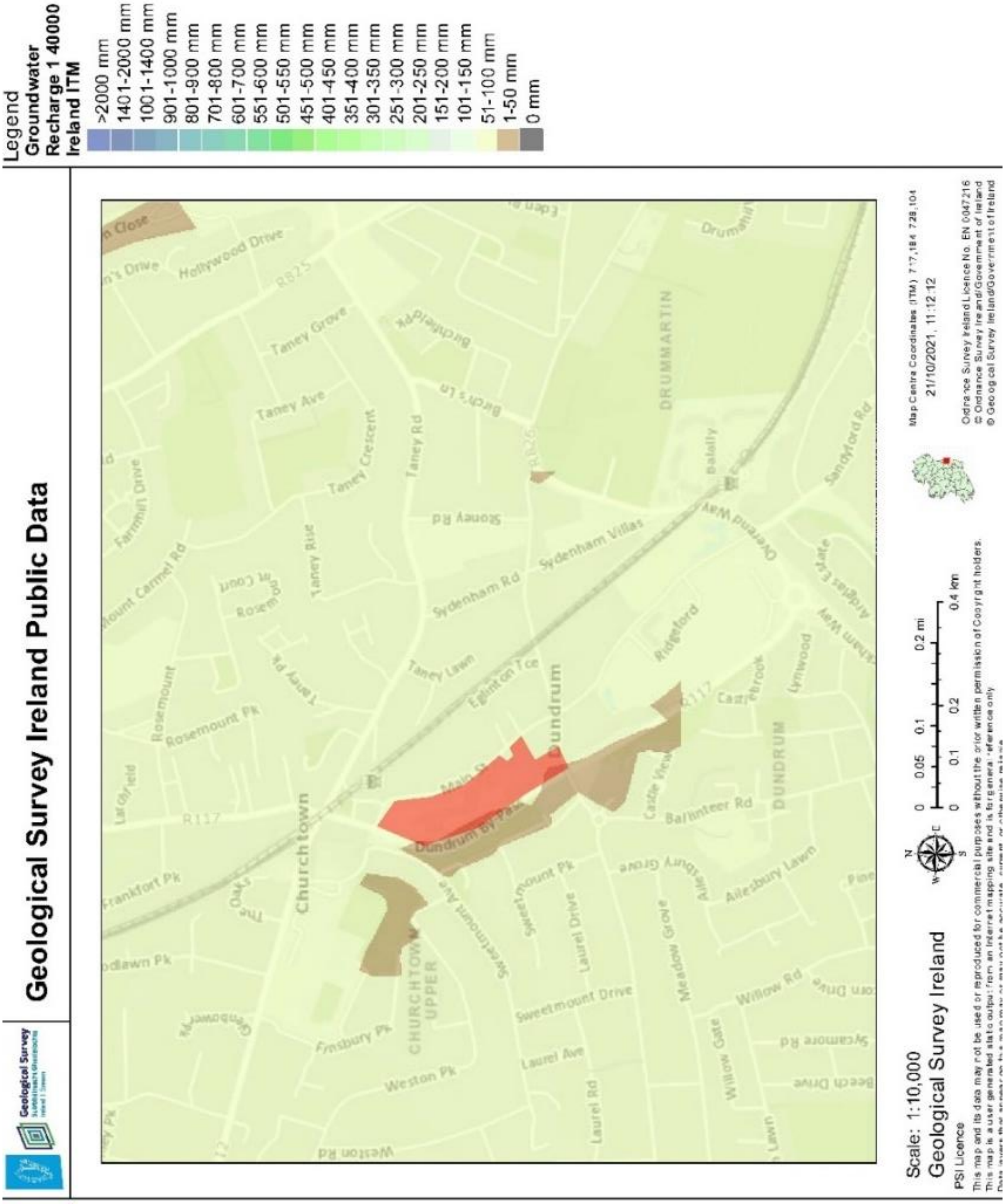

Figure 6.5 GSI Groundwater Recharge Rate

7.0 WATER

7.1 INTRODUCTION

This section of the EIAR describes the existing water, surface water and flooding aspects on the site. An assessment is made of the likely impacts arising during the construction and operational phases of the development on these elements.

This chapter was prepared by Diarmuid Cahalane of T. J O'Connor & Associates. Diarmuid is a Chartered Engineer with Engineers Ireland, a Chartered Member of the Chartered Institute of Water & Environmental Management (CIWEM) and is a Fellow of Engineers Ireland. Diarmuid has been practicing as a consulting engineer for thirty-seven years. Diarmuid holds an undergraduate degree in Civil Engineering, a Master's degree in Engineering Science and a Diploma in Construction Law and Contract Administration.

7.2 ASSESSMENT METHODOLOGY

In addition to the EPA resources listed in Chapter 1, other reference documents used in the preparation of this assessment include the following:

- National Roads Authority (2008) *Guidelines on Procedures for the Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes*.
- Construction Industry Research and Information Association (2001) *Control of water pollution from construction sites*. Guidance for consultants and contractors (C532D)

A desktop study was carried out on the local and regional surface water and drainage network. Information was obtained from documents including the following sources:

- Eastern River Basin District (2005) Catchment Characterisation Report
- Eastern River Basin District River Basin Management Plan 2009-2015 (including Strategic Environmental Assessment)
- Eastern River Basin District Programme of Measures 2009-2015
- EPA online Water Quality Database and Envision Map Viewer (www.epa.ie)
- EPA GIS data (www.gis.epa.ie/EPAMaps/Water)
- EPA Hydronet data for Frankfort Gauge 09011 https://epawebapp.epa.ie/hydronet/#09011
- River Flow estimates- Hydrotool, EPA
- Ordnance Survey of Ireland (OSI) online historical maps and aerial photographs (http://map.geohive.ie/mapviewer.html)
- GSI On-line Groundwater Database. Aquifer Classification & Vulnerability; karst features and groundwater resources; groundwater recharge; source protection areas; and subsoil data.
- OPW Preliminary Flood Risk Assessment Mapping (www.cfram.ie/pfra)
- Department of the Environment, Heritage and Local Government (2009) *The Planning System and Flood Risk Management – Guidelines for Planning Authorities*
- National Parks and Wildlife Service on-line database (www.npws.ie)
- WFD online water quality mapping (http://wfdireland.ie/maps.html)
- Greater Dublin Drainage (2005) Greater Dublin Strategic Drainage Strategy, (www.greaterdublindrainage.com)
- Water Framework Directive mapping on https://gis.epa.ie/EPAMaps/Water

- Dun Laoghaire Rathdown County Development Plan 2016 – 2022 (including Strategic Flood Risk Assessment 2015 - Appendix 13)
- Dun Laoghaire Rathdown Draft County Development Plan 2022 – 2028 (including Strategic Flood Risk Assessment 2021 - Appendix 16)
- Dun Laoghaire Rathdown River Slang (Dundrum) Integrated Catchment Model Hydraulic Modelling Report, NO'D Black & Veatch, June 2020
- Office of Public Works Flood Risk Maps – (https://www.floodinfo.ie/map/floodmaps/)
- Met Eireann – www.met.ie – monthly climatological data
- Met Eireann Weather Observations website - https://wow.met.ie

In addition to the legislation outlined in Chapter 1, the following legislation was referred to in compiling this chapter:

- Water Framework Directive 2000/60/EC - enacted into Irish legislation through S.I. No. 722 of 2003 European Communities (Water Policy) Regulations 2003:
  - European Communities (Quality of Salmonid Waters) Regulations 1988 (S.I. No. 293 of 1988),
  - Local Government (Water Pollution) Acts 1977 – 1990,
  - Water Quality Standards for Phosphorus Regulations 1998 (S.I. No. 258 of 1998).
- European Communities Environmental Objectives (Surface Waters) Regulations 2009 (S.I. No.272 of 2009*):*
  - European Communities Priority Substances Directive 2008:
  - European Communities (Quality of Salmonid Waters) Regulations 1988 (S.I. No. 293 of 1988)
  - Local Government (Water Pollution) Acts 1977 – 1990:
- European Communities Environmental Objectives (Groundwater) Regulations (S.I. 9 of 2010)
- EU Floods Directive 2007/60/EC
- European Communities (Assessment and Management of Flood Risks) Regulations, 2010 (S.I. No. 122 of 2010).
- Water Quality Standards for Phosphorus Regulations 1998 (S.I. No. 258 of 1998):

The impacts and mitigations identified for the proposed development in both the construction stage and the operational phase have regard for the requirements of the Water Framework Directive and the objectives identified in the River Basin Management Plan and also for the requirements and obligations of the Flood Directive.

A *Site Specific Flood Risk Assessment* (SSFRA) compiled by TJ O'Connor & Associates is included as part of the planning application and has formed an integral part of this EIAR. The SSFRA comprises Stage 1, Stage 2 and Stage 3 Flood Risk Assessments as per *The Planning System and Flood Risk Management – Guidelines for Planning Authorities* (2009).

Potential sources of flooding considered were:

- Tidal/Coastal flooding;
- Fluvial flooding (from adjacent surface water bodies)
- Pluvial (direct rainfall)
- Groundwater flooding
- Potential for offsite flooding due to infrastructure failure and culvert blockage.

Background information on the local drainage network, water supply and flooding was obtained from documents provided by Irish Water, Dun Laoghaire Rathdown County Council, As-built information for the Dundrum Town Centre and data compiled through topographical, utility, site investigation and CCTV surveys.

No particular difficulties were encountered while compiling this Chapter.

7.3 RECEIVING ENVIRONMENT

This sub-section describes the receiving environment, the context, character, significance and sensitivity of the baseline receiving environment into which the project will fit. This also takes account of any projects that are likely to proceed.

7.3.1 Hydrology

The site of the proposed development is situated adjacent to the route of the Slang River, which runs along the western boundary of the site from South to North. This comprises the main freshwater receiving environment in the vicinity of the proposed development. The Slang is a tributary of the Dodder which enters the tidal reaches of the river Liffey at Ringsend.

The Slang River rises at Three Rock Mountain at an elevation of approximately +430m OD. It flows in a northerly direction through Dundrum and Windy Arbour before joining the River Dodder at Milltown. The stream is approximately 8km in length, has an overall catchment area of 8.238km^2 and is predicted (based on the EPA Hydrotool estimate) to have an annual mean flow of 0.793m3/s at its confluence with the river Dodder. The stream is extensively channelized and culverted. This includes two culverts constructed in 2001 to divert the Slang from within the site boundary as part of the Dundrum Bypass works. The catchment of the Slang River is shown at Figure 7.1.

The Slang River is included in Dodder_050 River Sub Basin for the purpose of Water Framework Directive Risk Assessments. There are no stations on the Slang River for water quality monitoring. The nearest station is at Milltown, a short distance downstream of the confluence with the river Dodder. This station is classed as Q3-4 in the most recent water quality assessment. The Dodder_050 WFD Sub-catchment was assessed as moderate status for the 2013-2018 reporting cycle and is classed as being At Risk. Pressures identified for the Dodder_050 catchment are urban wastewater in the context of combined sewer overflows along with anthropogenic pressures and diffuse sources run-off.

DLRCC maintain water quality monitoring stations along the Slang River as part of their contribution to water quality management for the Water Framework Directive. Station RS09S041400 is located downstream of the development site at the Lower Churchtown Road and Station RS09S041300 is located immediately upstream of the site at Ballinteer Road / Dom Marmion Bridge.

The Slang River originally passed through the site but the entire length of the Slang within the site boundary was diverted to facilitate the construction of the Dundrum Bypass in 2001. The plan of the existing Slang River and culverts following construction of the Bypass Scheme are shown at Figure 7.2. The rerouted stream runs in culvert for a distance of 322 metres (culvert A) downstream of Ballinteer Road / Dom Marmion Bridge and emerges on the west side of the Dundrum Bypass adjacent to Sweetmount Terrace where it runs in open channel for a distance of 90 metres before running for a further 124metres in culvert (culvert B) as far as Waldemar Terrace where it re-joins the original route of the watercourse. The stream re-enters a culvert a further 57metres downstream. This culvert (culvert C) extends under the Upper Churchtown

Road and the LUAS Overbridge immediately west of the Taney Road Junction for a distance of 65metres. The upstream and downstream ends of culvert C are 2.5m wide by 2.1m high box culverts but the middle section under the Upper Churchtown Road is an original granite arch culvert.

The culverts on the Slang River in the vicinity of the proposed development site have dimensions as summarised in Table 7.1.

Table 7.1.: Slang River Culvert Dimensions in Vicinity of Development.

Culvert	Length	Dimensions (W x H)
Culvert A	322m	3.4m x 1.6m
Culvert B	124m	3.4m x 1.6m
Culvert C	65m	2.5m x 2.1m at either end (tying into existing granite arch culvert under Churchtown Road

Flows in the Slang Steam are presented in Table 7.3.

7.3.2 Surface Water Drainage

The existing site to be developed comprises 92.8% hard-standing and roof area and 7.2% unpaved area (0.189hA). There is no attenuation of surface water on any part of the site at present. The existing surface water drainage system drains to the Slang River and to the 300mm diameter combined sewer which extends through the length of the site from north to south. Runoff from the roof of the existing Village Centre discharges to this combined sewer. Approximately 1.677hA of paved surface within the existing site is connected to this combined sewer, comprising 0.488hA of roof area and 1.189hA of paved surfaces (comprising bitmac and footpaths). A further 0.1hA of unpaved areas (grass and other verges) located upslope of paved areas and within the site may also runoff onto areas connected to the combined sewer. Approximately 0.85hA of impervious area within the existing sites discharges to the Slang River, without attenuation. There is no evidence of petrol interception on the existing surface water drainage system.

The surface water drainage pipework on the site generally comprises 150mm diameter surface water sewers in carparks and service yards. There are separate surface water outfalls from Mulvey's Yard and from the Holy Cross Church to the Slang River culvert. Surface water drains from the rear of other properties fronting onto Main Street adjacent to the site were not identified in the course of the survey of existing services.

There is a shallow 500mm square brick culvert in the Main Street which may be in poor condition. CCTV surveys of this culvert were abandoned due to the number of bricks and other debris in the bed of the culvert. This culvert is connected to a 675mm diameter sewer at Waldemar Terrace, which discharges to the Slang River.

7.3.3 Flooding

DLRCC have confirmed that, when considering planning applications and referrals, they refer to the flood extent maps produced in the River Slang (Dundrum) Integrated Catchment Study undertaken for DLRCC and the OPW. These maps confirm that part of the site of the proposed development lies with Flood Zone B and is at risk of flooding in events with a 0.1% Annual exceedance probability.

A *Site-Specific Flood Risk Assessment* has been completed in respect of the proposed development (prepared by TJ O'Connor & Associates) and this report is included separately with the planning submission documentation.

The historic flooding information available on www.floodmaps.ie were reviewed with a summary of the flooding records shown in Table 7.2.

Table 7.2.: Summary of Historical Floods

Date of Event	Source	Areas Affected
24th Sept 1957	Fluvial	Dundrum River
11th June 1963	Fluvial / Surface Water	Dundrum
5th Nov 1982	*Fluvial / Surface Water	Pine Copse Road, Ballinteer
25th Aug 1986	Fluvial	Slang Frankfort (Hurricane Charlie)
11th June 1993	Unknown	Ashlawn, Ballinteer Road
24th Oct 2011	Fluvial / Surface Water	Frankfort, Dundrum Shopping Centre, Taney's Cross, Willow Bank Apartments (Sandyford Road), Riverdale (Linden & Blackthorn Apartments).
21st Aug 2021	Pluvial/Surface Water	Dundrum Town Centre, Dundrum Bypass, Ballinteer Rd, Roebuck Rd
Recurring	Unknown	Old Ballinteer Road – *"Floods frequently. Not impassable. Remedial works carried out"*
Recurring	Unknown	Pine Copse, Willow Road. *"Road & gardens flood"*.
Recurring	Fluvial	Slang Pyelands
Recurring	Unknown	Ludford Area Ballinteer
Recurring	Unknown	Old railway line, Dundrum
Recurring	Surface Water	Rosemount, Dundrum – *"Flooding due to insufficient drainage"* – mitigated with Luas and Dundrum Bypass works.

**Extremely heavy rainfall on 5th, 6th & 7th Nov 1982. Approx. ¾ of monthly average fell over a 24-hour period. Compounded by surfaces already waterlogged from large amounts of rainfall falling in the weeks prior.*

Inspection of the information relating to the events described in Table 7.2. above, confirmed that the most significant flood events were recorded in September 1957, June 1963, November 1982, August 1986, June 1993 and in October 2011. Flooding for the most part was a result of the capacity constraints or blocked screens at culverts on the Slang River. Flooding reported in the 1982 flood of the disused railway in the vicinity of Dundrum Main Street was identified as a blocked drain which was subsequently cleared. The railway line is now used as the LUAS line from Stephen's Green to Cherrywood and there was no record of flooding on or from the LUAS line during the flood in October 2011.

The most notable major flood event is that of the Dundrum Town Centre flood which occurred in October 2011. Following extremely heavy rainfall on the 23rd/24th October 2011, Dublin, Kildare and parts of Wicklow suffered flooding. The floods mainly affected the city, south Dublin and Wicklow. An extract, covering the proposed development, from a map showing the extent of flooding observed in the vicinity of the site during the event of October 2011, is reproduced in Figure 7.3.

The mapping indicates that flooding occurred in the immediate vicinity of the development site on the Dundrum Bypass. The Ballinteer Road was also flooded in the vicinity of the entrance the Pembroke Quarter of the Dundrum Town Centre. The original of this map was included in the Eastern CFRAMS (2012) Overarching report on the flood event as DRG No. IBE0600Rp0014 A009 and is reproduced at Appendix C in the Flood Risk Assessment report.

A more recent flooding event occurred on the afternoon of the 21st August 2021 when there was a number of thunderstorms which were accompanied by torrential rain. Based on rainfall accumulation data from a private weather station at Churchtown, Dublin 14, a total of 31mm of rainfall fell with 22.06mm of rainfall falling in a 60minute period from 1.30pm to 2.30pm. This information was sourced through WOW-IE, a weather observations website operated by Met Eireann on the https://wow.met.ie/ website. DLRCC reported that a gauge at Marlay Park, approximately 2km to the southwest, recorded 22mm of rainfall in a 2hour period (with 15mm in one hour) corresponding roughly to a 1 in 20yr event.

The flooding that resulted from this event was pluvial in nature and resulted in flooding of roads at low points alongside Maher's Terrace on the Ballinteer Road and on the Dundrum Bypass, alongside the Main St junction. Flooding was also generated on the Dundrum Bypass as a result of overflows from surcharged manholes (at least 2 No) on the Irish Water 675mm diameter combined sewer located on the west side of the Bypass opposite the entrance to the shopping centre carpark.

There was no evidence of any fluvial flooding from the Slang River associated with this event in the vicinity of Dundrum. There is a hydrometric river gauge 09011 on the Slang at Frankfort, approximately 600m north of the development site Figure 7.4. This gauge, operated by DLRCC, recorded a peak 15min water level in this event of 41.864mOD Poolbeg which converts to 39.15mOD Malin. This level is equal to the 10% AEP flood level predicted in the Dundrum Slang ICM Study for Node SL09.05, which is at the location of the gauge.

DLRCC Drainage Planning have confirmed that flood zone mapping in the Dundrum area has been updated based on the output of the River Slang (Dundrum) Integrated Catchment Study. DLRCC has also confirmed that this mapping will provide the basis for assessment of planning applications within the Slang catchment. An extract from the updated mapping in the vicinity of the site taken from Flood Zone Map No 1 of the DLRCC Draft County Development Plan 2022-2028 is reproduced at Figure 7.5. which shows predicted flood extents for 10%, 1% and 0.1% Fluvial flood events.

The output of River Slang (Dundrum) Integrated Catchment Study included flood extent and flood depth maps which provide information on predicted flood levels and flow rates for events with a range of probability of occurrence in any year at specific nodes on the Slang River. Nodes in the vicinity of Dundrum are shown at Figure 7.6. The predicted levels and flows for 10%, 1% and 0.1% Fluvial flood events at these nodes are reproduced at Table 7.3.

Table 7.3.: Dundrum Slang ICM Study Predicted Flood levels

Node Label	Water Level (OD) 10% AEP	Flow (m^3/s) 10% AEP	Water Level (OD) 1% AEP	Flow (m^3/s) 1% AEP	Water Level (OD) 0.1% AEP	Flow (m^3/s) 0.1% AEP
SL22	47.56	4.07	47.96	8.69	48.27	13.40
SL21	44.58	4.15	44.94	9.00	45.68	12.33
SL16	42.97	4.15	44.10	9.21	45.60	12.36
SL15	42.86	4.32	43.79	9.50	45.21	12.87
SL14	42.52	4.52	43.43	9.91	44.97	15.76

This mapping confirms that 16.7% of the proposed development site lies within Flood Zone B with the balance of the site within Flood Zone C. Flood Zone A does not extend into the site. Flood Zone B represents areas where the probability of flooding from river is moderate (between 0.1% or 1 in 1000 year and 1% or 1 in 100 year for river flooding)

7.3.4 Groundwater

The soils and geology within and under the site are described in Chapter 6.0 along with information on previous site investigations.

The underlying bedrock is classed as Pi – Poor Aquifer with bedrock which is generally unproductive except for local zones as shown at Figure 7.7. This is reflective of the granite bedrock. To the north of Taney Cross the bedrock is classed by the GSI as Li - Locally important aquifer with limestone bedrock which is moderately productive only in local zones. There are no gravel aquifers recorded by the GSI in the area. There is some alluvial sediment associated with the original course of the Slang River present within the site.

The Groundwater body in the vicinity of the site was classed as good in the WFD 2013-2018 reporting cycle. The site is underlaid by the Kilcullen waterbody (IE_EA_G_003) which was classed as being at risk in the 3RD Cycle reporting for the WFD

Groundwater recharge rates (Figure 7.8) are indicated to be at the lower end of the scale for the site at Dundrum with an annual recharge rate of 62mm/annum. The groundwater recharge assessment records made ground on the site and a moderate groundwater vulnerability at the site.

Groundwater readings were taken on the site at approximately monthly intervals from October 2004 to April 2005 in connection with a previous site investigation.

The hydrogeological characteristics of the gravel and bedrock were assessed through a series of rising head test (35 No), step tests (3 No) and a constant rate pump and ground aquifer recovery test, all completed between April and May 2005. 62 No standpipe piezometers were installed in a total of 47 exploratory boreholes during this previous investigation. The borehole locations for this site investigation are shown at Figure 7.9. Groundwater was observed to be closet to existing ground level in BH12 (42.00mOD) and BH 13 drilled at the northern end of the site and at BH 24 which was located alongside the Bypass opposite the southern end of the existing shopping centre building. Water levels of up to 46mOD were observed on the eastern side of the site. Groundwater strikes recorded in the further investigations completed in 2021, were consistent with previous investigations.

The GSI have assessed the area in the vicinity of the proposed development site as having moderate to high groundwater vulnerability. This is a term used to represent the intrinsic geological and hydrogeological characteristics that determine the ease with which ground water may be contaminated by human activities. Soils in the vicinity of the site are generally classed as made ground with soils in the Sweetmount Park area identified as Tills categorised as low permeability.

7.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The following detail describes the elements of the development which are relevant from a Water perspective.

- The existing combined sewer running through the site will be removed and separate foul and surface water sewer networks will be constructed,;
- All floor levels (including substations and control kiosks) within the proposed development will be located above the 0.1%AEP flood level, minimum level of 46.00mOD;

- Compensatory flood storage will be provided within the site through a combination of above ground storage and a compensatory storage reservoir located beneath the Lower Ground floor level in the northern part of the site (Zones 1 and 2);
- Surface water drainage provision will incorporate sustainable drainage (SuDS) features and components which will provide water quantity, water quality, amenity and biodiversity benefits;
- Surface water runoff flow will be limited to green field runoff rates prior to discharge to the Slang River;
- Surface water attenuation storage will be provided through a combination of green roof, permeable paving, subbase storage, tree platers, filter drains and below ground storage;
- Surface water runoff from the site will pass through petrol interceptors before discharge to the Slang River;
- Incidental runoff from the lower ground floor carpark will be directed to the foul drainage system as per DLRCC requirements;

A detailed description of these proposals is provided in the Engineering Services Report.

7.5 CONSTRUCTION IMPACTS

The main likely significant effects are outlined below.

7.5.1 Surface Water

There are several surface water connections entering the site from adjacent properties which if not intercepted and managed could lead to flooding of site. A detailed underground utilities survey (completed by Murphy Surveys[14]) has identified where these connections are located. The principal connection is that from the Holy Cross Church and Parochial house which will be diverted around the site. Other connections are associated with buildings which will be demolished (e.g. former Mulvey's Hardware) or incorporated into the development (Glenville Terrace). This is a neutral long term impact, whose effects are not significant.

Uncontrolled silt / contaminated runoff from the site will impact on water quality in the Slang River. This can occur from a variety of construction activities including Run-off of water used to dampen down material during demolition and excavated surfaces; hydrocarbon spills; contaminated materials / water uncovered during excavation works. A construction stage surface water management plan is identified in the OCMP. Implementation of the provisions of the OCMP will result in a positive short term impact , the effect of which is not significant.

The abandonment of the existing combined sewer through the site reduces runoff to the existing combined sewer downstream of site. This sewer passes through the rear of properties on the west side of Dundrum north of Taney crossroads. The reduction in flows to this sewer is a positive slight medium term impact. The abandonment of this sewer within the site will not increase runoff to Slang River as all runoff from the site will be attenuated to the greenfield runoff rate. This is a long term positive impact the effects of which will not be significant.

[14] Information from this survey is reproduced on the existing services drawings, prepared by TJ O'Connor & Associates, included with the application.

Surface water outfalls from the development to the Slang River will be constructed on the culverted sections of the stream and will not require instream works. The construction of these outfalls will have a neutral impact with short-term effects which are not significant.

7.5.2 Flood Risk

The construction of the proposed development will be undertaken without increasing flood risk within the site or elsewhere. Part of the site is at moderate risk of flooding in events with a probability of less than 1% in a year. The site is not within the functional area of the Slang River and does not provide a conveyance function in flood events. The construction methodology will maintain existing flood storage volumes in the 0.1% Annual Exceedance Probability (AEP) event through each phase and stage of the construction of the development.

A fluvial or pluvial flood event during construction could result in inundation of excavations and collapse of unsupported faces within the site. This is a negative impact which is of short term and slight effect.

Construction activities are proposed as detailed in the OCMP such that there will be no loss of flood storage in the 0.1%AEP flood event or removal of overland flood flow paths. This will avoid any increase in fluvial flood risk to adjacent and downstream properties. This is a therefore a neutral impact of short term and moderate effect.

Excessive silt and or debris in runoff from the construction site could reduce capacity in the Slang River system in the vicinity of the site leading to increased flood risk to adjacent properties in Sweetmount Park and Waldemar Terrace. This is a moderate negative impact of short-term duration.

Biodiversity impacts of the Dundrum Slang and downstream, in the event of flooding during construction, are discussed in Chapter 5.0 Biodiversity.

7.5.3 Groundwater

Excavation below existing ground level results in drawdown of water table with potential negative impact on buildings within the site i.e. No.'s 1+-3 Glenville Terrace, adjacent buildings on Main Street including No.'s 11 and 16/17 Main Street, Holy Cross Church and Parochial House. To a lesser degree, properties on the east side of Main Street are also included. This is a short term negative impact with slight effects. Conversely, the introduction of the retaining wall along Main Street could act as a barrier to the groundwater flow with the potential for ground water levels to rise on the up-stream (Main Street) side of the site. This is also a short-term negative impact with slight effects.

Removal of existing overburden could result in an increase in the vulnerability of the underlying groundwater with the potential for groundwater from the demolition and construction phase of the project to contribute to contamination of the local groundwater. This is a short-term negative impact with slight effects.

Contamination of groundwater can occur through mobilisation and migration of soluble contaminants in groundwater. Alluviums, comprising sands and gravels, underlie the original route of the Slang River through the development site. This layer is largely confined by overlying tills although it approaches the surface midway along the western boundary. Interception of this gravel layer in the course of excavations could provide connectivity between the construction site and the Slang River and its associated underground channel, leading to contamination of these water bodies. This is a short-term negative impact with slight effects.

7.5.4 Mitigation Measures

Mitigation measures relating to impacts outlined in the previous section are outlined below:

W-C1	The Main Contractor(s) CEMP shall provide the measures detailed in the Outline Construction Management Plan submitted with this application to avoid discharge of silt contaminated runoff or hydrocarbons.
W-C2	The Contractor shall provide a Water Management System to avoid polluted or silt laden surface water runoff from the site. Pumped flows shall be adequately treated prior to discharge to the receiving water to remove silt and possible contamination by hydrocarbons and cement.
W-C3	The CEMP will include measures to address flood risk during construction without reducing existing flood storage volume.
W-C4	Dedicated fuel storage areas shall be provided on-site which shall be a minimum of 50m from watercourses or drains or, alternatively, fuelling shall take place offsite.
W-C5	A Water Management System shall be established within the site boundary. The system shall include for all ground water collected from within the site to be directed/pumped to settlement tanks and silt bags prior to discharge at an agreed discharge rate.
W-C6	The Contractor shall comply with the following guidance documents: i) Control of Water Pollution from Construction Sites – Guidance for Consultants and Contractors (C532D) (CIRIA 2001) and ii) Development and Flood Risk - guidance for the construction industry (C624) (CIRIA 2004).

7.5.5 Monitoring

In addition to the monitoring measures included in Section 6.5.2 (Land and Soils), the following monitoring is required:-

W-M1	The Construction Environmental Management Plan (CEMP) shall include detailed provisions to avoid discharge of silt contaminated runoff or hydrocarbons. Any silt settlement ponds and chambers proposed as part of the CEMP will be monitored daily throughout the construction of the works.

7.5.6 Cumulative Impacts

Culvert blockage or an exceedance event upstream of the site may give rise to overland flood flows which will impact the site. DLRCC has produced mapping of the flood flows and depths arising in a 0.1%AEP event with 50% blockage on the culvert inlet at Dundrum Town Centre. During the construction stage the site may be at risk of flooding in such an event. This is a brief negative impact with a moderate effect.

7.6 OPERATIONAL IMPACTS

The likely significant effects are:

7.6.1 Surface Water

The removal of surface water from the existing combined sewers and abandonment of combined sewers within the site will reduce the hydraulic load on the existing public sewerage network and Waste Water Treatment Plant at Ringsend. This is a positive long term impact with slight effect.

An increase in paved and roofed areas in an already heavily developed catchment area could result in a significant increase in the runoff entering a sewer or watercourse, increasing the flood risk down-stream. However, the abandonment of the combined sewer through site results in reduction in flows in the combined sewer downstream of the site and provision of a SUDS management train will result in a reduction in peak discharge from the site to greenfield runoff rates and improvement in quality of surface water discharges. This is a positive long term impact with slight effect.

The ground conditions on site comprise made ground overlying glacial till (with gravel lenses) over weathered granite (grit) over granite bedrock. The depth to bedrock varies considerably over the site with bedrock falling away steeply from a depth of 1m approximately alongside Main Street to in excess of 16m alongside the Bypass. Infiltration test on site have confirmed that the overburden is of low permeability unsuitable for infiltration to ground.

The combination of subbase storage beneath hard landscaped areas, tree pits, stormwater swales, French drains and intensive and extensive green roofs SuDS features will ensure that the surface runoff from the site will receive filtration and settlement in addition to attenuation. Therefore, runoff quality will be improved relative to the existing situation, in addition to the reduction in runoff rates in storm events. The provision of tree pits intensive green roofs and swales in the surface water drainage scheme will also contribute an amenity benefit for the residents. The provision of these, along with green roofs, will also contribute to the biodiversity of the site.

The provision of a two-stage management train is consistent with the recommendations of the 2015 The SuDS Manual C753 (CIRIA) and the DLRCC Surface Water Management Policy achieving water quality, water quantity, biodiversity and amenity benefits. Interception Storage will be provided via the use of the green roofs on the apartment buildings and by the use of local drainage into landscaped areas and tree pits where applicable. This will allow both interception and treatment volumes from the proposed development to be provided for.

Overall, this is a positive significant long term impact.

7.6.2 Flood Risk

Development within the flood plain could increase the risk of flooding to other property in the area, resulting in an increased number of properties affected and/or an increased depth of flooding. Properties at Sweetmount Park and Waldemar terrace are located with Flood Zone B (Fig 7.4) and could be negatively affected. The proposed development has incorporated compensatory flood storage into the design to ensure that there will be no reduction in the available flood storage within the site in events up to and exceeding the 0.1% AEP event as a result of the proposed development. The potential impact is slight neutral and long term.

Location of development within flood plain of Slang River could expose occupants of the development and of other property in the vicinity to flood risk with particular risk to persons occupying residential developments with floor levels below the predicted flood level. This significant negative long term impact is unlikely with the implementation of the mitigation measures outlined below.

Flood levels in Slang River could prevent discharge of surface water from the site during an extreme rainfall event on the site resulting in flooding within the development and potentially spilling onto the adjacent roads. If this coincides with a significant surface water or rainfall evet on the site, the scheme has been designed to allow for overflow back into the compensatory flood storage reservoir. This is a not significant brief adverse impact. The joint probability of simultaneous occurrence of such peak fluvial flows and surface water runoff volumes is likely to be lower than the 0.1% AEP fluvial/pluvial flood flows.

Blockage could arise as a result of an accidental collapse of the stream or culverts on the stream or as a result of other damage to a culvert. Similarly, flooding which is more severe than the standard of protection provided for in the design of the compensatory storage or exceedance events with a probability of occurrence that is lower than the 0.1%AEP event could occur. The effects of these events which could be classed as disasters are considered in the *Site Specific Flood Risk Assessment* included with the application. Such events have the potential for brief significant negative impact.

Accumulation of waterborne debris in flood flows could result in a blockage of the channel or of the culverts resulting in flooding. The inlets to the below ground compensatory storage reservoir have a greater capacity than the existing flood flow paths from the Bypass to the site and also incorporate overflow inlet gratings at a higher level which provide a back up in the event of substantial build up of debris. Therefore, the impact of such waterborne debris accumulation is a brief negative impact with moderate effect.

Surface water runoff from the service road and loading yard in the development or incidental water discharges from the covered carparking areas could result in the discharge of hydrocarbon contaminated flows the Slang River. This is a long term moderate negative impact.

7.6.3 Groundwater

The operational phase of the development has the potential to impact on groundwater environment through infiltration from subsurface attenuation and compensatory flood storage volumes. Run-off from hardstanding areas could negatively impact on ground water quality through infiltration of hydrocarbon and other contaminants. These are long term slight negative impacts.

7.6.4 Mitigation Measures

The following mitigation measures are proposed

W-O1	Incidental surface run-off from lower ground floor car parks, compactor units and bin stores / service yard areas will be discharged into the foul drainage system. Grit / petrol / oil separators to be provided in all of the above areas.

W-O2	Petrol /oil separators will be provided for surface water drains receiving flows from the site service road and loading yard
W-O3	Stormwater attenuation shall be provided with flow controls to ensure that the rate of discharge of surface water runoff is limited to greenfield run-off rates at each outfall from the site in accordance with the Greater Dublin Regional Code of Practice for Drainage Works, the Greater Dublin Strategic Drainage Strategy and the local authority's Stormwater Management Policy.
W-O4	A two-stage surface water management train incorporating sustainable drainage components in accordance with local authority's stormwater management policy will improve the water quality of surface water discharges, contributing to improved water quality in the Slang River.
W-O5	Compensatory Flood Storage volume shall be provided within the Service Road and under the Lower Ground Floor of the proposed development in order to ensure that there is no increase in flood risk to any properties in the area.
W-06	Electrical substations and control kiosks will have a floor level of 46mOD or higher in order to avoid risk of flood ingress in a 0.1%AEP flood event. This minimum level includes an allowance for freeboard and climate change.

7.6.5 Monitoring

The following monitoring measures are proposed:-

W-M2	The Sustainable Urban Drainage Scheme (SuDS) and compensatory flood storage provisions will be subject to ongoing maintenance and routine inspection in accordance with an operational management plan to ensure that flow controls and SuDS features are functioning properly.
W-M3	Construction activities shall be monitored to ensure that the compensatory flood storage volume is provided within the site until the permanent compensatory storage is operational in Zones 1 and 2.
W-M4	The compensatory flood storage system will incorporate inspection chambers to confirm that there is no ingress of groundwater or surface water runoff into the below ground storage volume. These inspection chambers will also allow visual confirmation that the system has drained down after any flood event that results in a build-up of flood waters on the service road.
W-M5	Water quality testing shall be undertaken in the open section of the Slang River directly adjacent to and down-stream from the site in consultation with the project ecologist when construction works are in progress.
W-M6	Daily monitoring of the condition and capacity of silt bags in the road gullies along the Dundrum Bypass shall be undertaken during construction stage of the project with gully cleaning and silt bag replacement undertaken as necessary.

7.6.6 Cumulative Impacts

Culvert blockage or an exceedance event upstream of the proposed development may give rise to overland flood flows which will impact the site. DLRCC has produced mapping of the flood flows and depths arising in a 0.1%AEP event with 50% blockage on the culvert inlet at Dundrum Town centre in the River Slang (Dundrum) Integrated Catchment Study and flood Zone map 01 in *Dun Laoghaire Rathdown Draft County Development Plan 2022 2028*. During the operation stage the site may be at risk of flooding in such an event. This is a brief negative impact classed as moderate effect.

Other commercial and residential developments in the area, as listed in Section 3.10, are also required to comply with the Greater Dublin Regional Code of Practice for Drainage Works, the Greater Dublin Strategic Drainage Strategy and the local authority's Stormwater Management Policy, limiting runoff from new developments to the greenfield runoff rate. Therefore, the cumulative impact of these developments on flows in the Slang River is long term slight neutral for existing greenfield sites and is long term slight positive for redevelopment of brownfield sites.

7.7 OTHER EFFECTS

7.7.1 Residual Effects

Moderate negative impacts during the construction phase will be brief or short term only in duration. Implementation of the above measures will mitigate any significant long-term adverse impact.

The capacity of the compensatory flood storage reservoir beneath the Lower Ground Floor of the proposed development exceeds the storage volume on site in a 0.1%AEP flood event providing additional on site storage in an exceedance or culvert blockage event, thereby minimising the impact on neighbouring properties at Sweetmount Avenue and Waldemar Terrace.

The proposed development will have a positive long-term impact in respect of the elimination of surface water discharges from the site to the combined sewer network and in a reduction in peak runoff rates from the site to greenfield runoff rates. The provision of interception storage and a SUDS management train will have a positive long-term impact on the quality of surface water discharges from the site to the Slang River. The impact on water quality within the Slang River will be long term slight positive

The provision of compensatory flood storage within the site which effectively includes a factor of safety on volume in the 0.1% AEP event, and the adoption of measures to address residual risks including culvert blockage, emergency access and climate change means that the proposed development will have a neutral moderate long term impact.

7.7.2 'Do-nothing' Effect

The 'Do-Nothing' scenario assesses the environmental impact of not redeveloping the proposed development site in respect of the existing impacts to water, hydrology and existing drainage and water supply systems at the proposed site.

Under the 'Do-Nothing' Scenario there would be no change in the current site and therefore the hydrology environment and the drainage systems and water supply would remain as is.

In the scenario where the proposed development does not proceed as planned, the existing land-use, water services infrastructure and public utilities in the study area would remain as currently identified in the desktop study.

Surface water would continue to be directed to the 300mm diameter combined sewer from the roof of the shopping centre and from a substantial area of the existing carpark. Infiltration from groundwater would continue to enter this sewer at open joints and where the sewer has suffered damage/structural failure. The existing situation whereby surface water runoff from the entire site area is not attenuated in any form would continue.

Similarly, the site is at risk of fluvial and pluvial flooding in flood events of moderate probability. In the 'Do-Nothing' scenario this situation would continue unchanged.

7.7.3 Worst Case Effect

Construction Phase

A 'worst case' scenario during the construction phase would entail a loss of potable and drainage services to the surrounding community or the occurrence of a flood event of moderate probability resulting in ingress of flood waters or overland flows onto the construction site. If not properly planned and catered for in the design proposals this could result in increased flood risk to neighbouring properties, particularly at Sweetmount Avenue and Waldemar terrace.

The risk of loss of potable water supply to the surrounding community is limited due to the fact that the proposed development is a self-contained site with no water supplies passing through the site to adjacent or other properties. The risk of damage to public water mains while making connections or undertaking service crossings will be managed by prior consultation with Irish Water, comprehensive underground utility surveys and detailed Risk Assessment and Method Statements for such activities.

Operational Phase

From an operational standpoint post development, the worst-case scenario in respect of the impact of surface water or ground water would be minimal because the site was previously developed and the proposed development will provide surface water attenuation reducing the surface runoff from the site to greenfield runoff rates.

The worst-case scenario from a flooding context would be the occurrence of a flood event of moderate probability (an event with an Annual Exceedance Probability of between 1%% to 0.1%) or lower. This could result in overland flows approaching the site and in floodwaters from the Slang River crossing the Bypass and entering the site. These risks are managed and mitigated by providing overland flood flow relief routes on the perimeter of the site and by incorporating a comprehensive compensatory flood storage volume within the site, which incorporates a factor of safety in respect of volume and which is designed to avoid any negative impact in terms of any additional properties being at flood risk, or an increase in flood depth to properties currently at flood risk.

7.8 INTERACTIONS

Interactions exist between Water and Land and Soils, Biodiversity and Material Assets Built Services as identified in this Chapter.

REFERENCES

- Construction Industry Research and Information Association (2001) *Control of water pollution from construction sites*. Guidance for consultants and contractors (C532D)
- Construction Industry Research and Information Association (2001) - Development and Flood Risk - guidance for the construction industry (C624)
- Construction Industry Research and Information Association (2015) *The SuDS Manual* (C753)
- DLRCC (2016) *Dun Laoghaire Rathdown County Development Plan 2016–2022* including Strategic Flood Risk Assessment;
- DLRCC (2022) *Dun Laoghaire Rathdown Draft County Development Plan 2022–2028* including Strategic Flood Risk Assessment;
- Department of the Environment, Heritage and Local Government (2009) The Planning System and Flood Risk Management – Guidelines for Planning Authorities
- Eastern River Basin District (2005) Catchment Characterisation Report
- Eastern River Basin District River Basin Management Plan 2009-2015 (including Strategic Environmental Assessment)
- Eastern River Basin District Programme of Measures 2009-2015
- EPA online Water Quality Database and Envision Map Viewer (www.epa.ie)
- EPA GIS data (www.gis.epa.ie/EPAMaps/Water)
- EPA Hydronet data for Frankfort Gauge 9011https://epawebapp.epa.ie/hydronet/#09011
- EPA River Flow estimates- Hydrotool,
- GDSDS Regional Code of Practice For Development Works, Version 6;
- Greater Dublin Drainage (2005) Greater Dublin Strategic Drainage Strategy;
- Irish Water (2020) Code of Practice - Water Infrastructure - IW-CDS-5020-03
- Irish Water (2020) Code of Practice - Wastewater Infrastructure - IW-CDS-5030-03
- National Roads Authority (2008) *Guidelines on Procedures for the Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes*.
- Met Eireann – www.met.ie – monthly climatological data
- Met Eireann Weather Observations website - https://wow.met.ie
- N O 'Dwyer and Black & Veatch (2020) River Slang (Dundrum) Integrated Catchment Model Hydraulic Modelling report
- Office of Public Works Flood Maps (online) https://www.floodinfo.ie (Accessed on various dates in November / December 2021)
- Office of Public Works Flood Risk Maps – (https://www.floodinfo.ie/map/floodmaps/)
- Local Authority/Irish Water Drainage Records

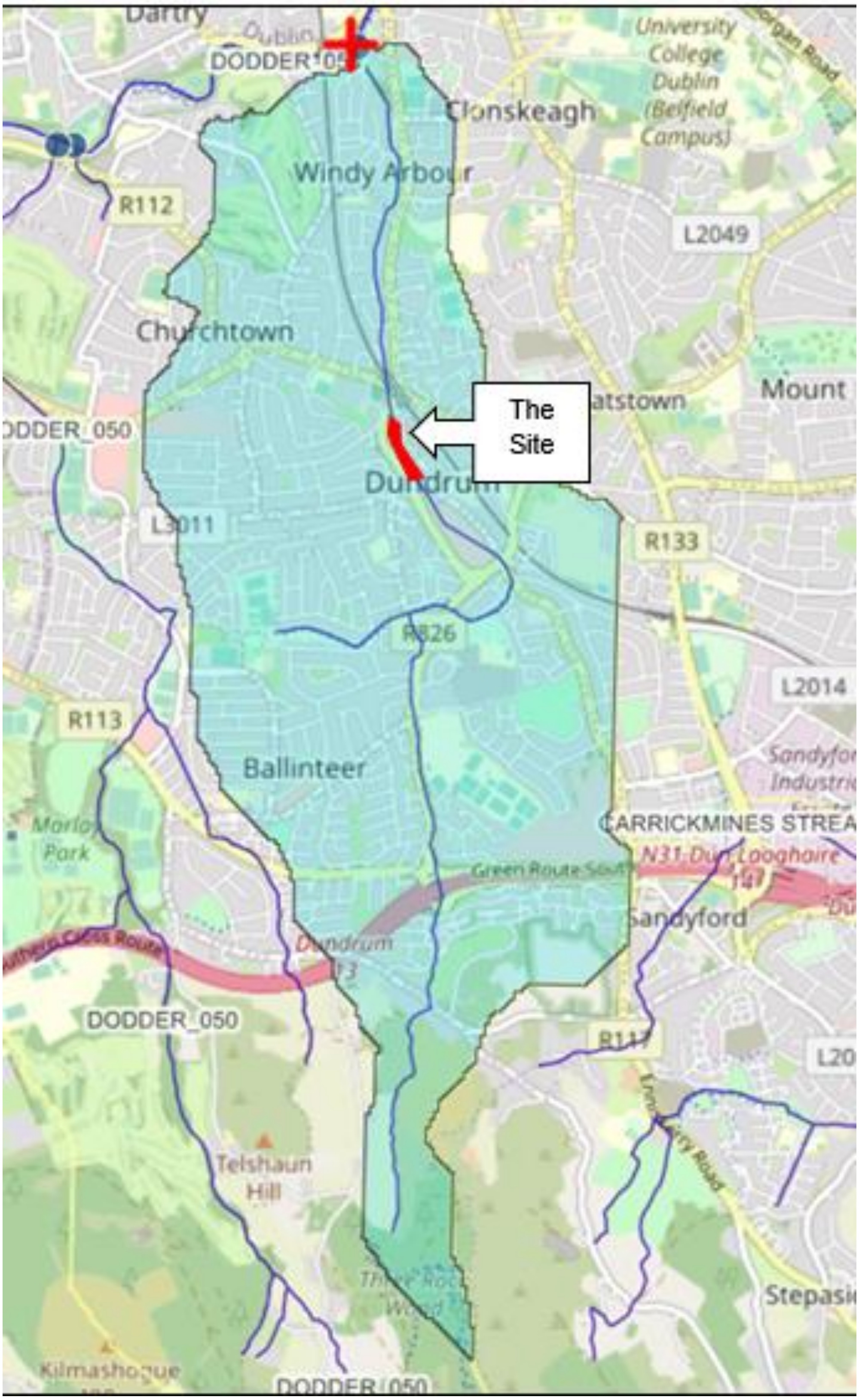

Figure 7.1. Catchment Area of Slang River

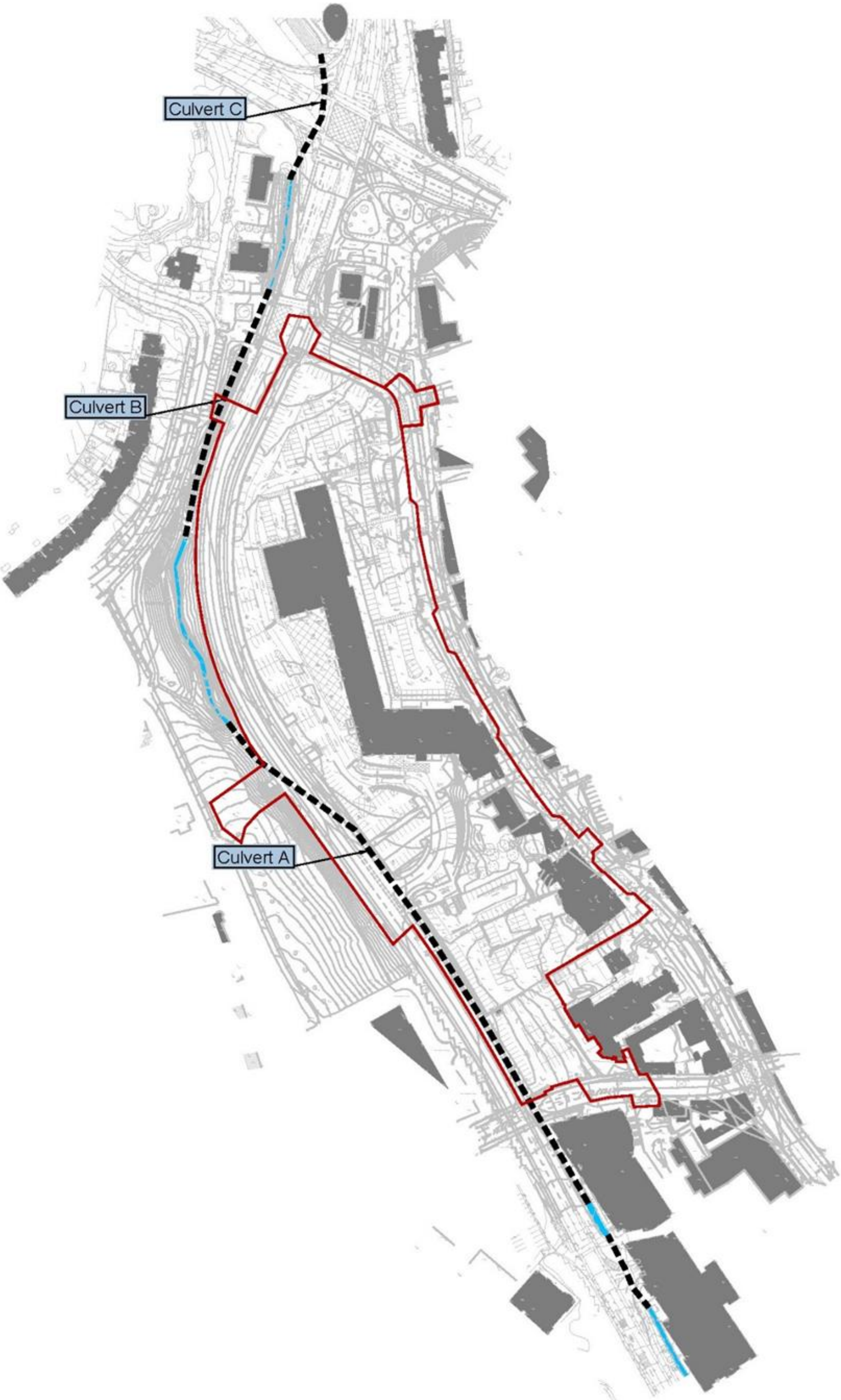

Figure 7.2 Slang River and culverts

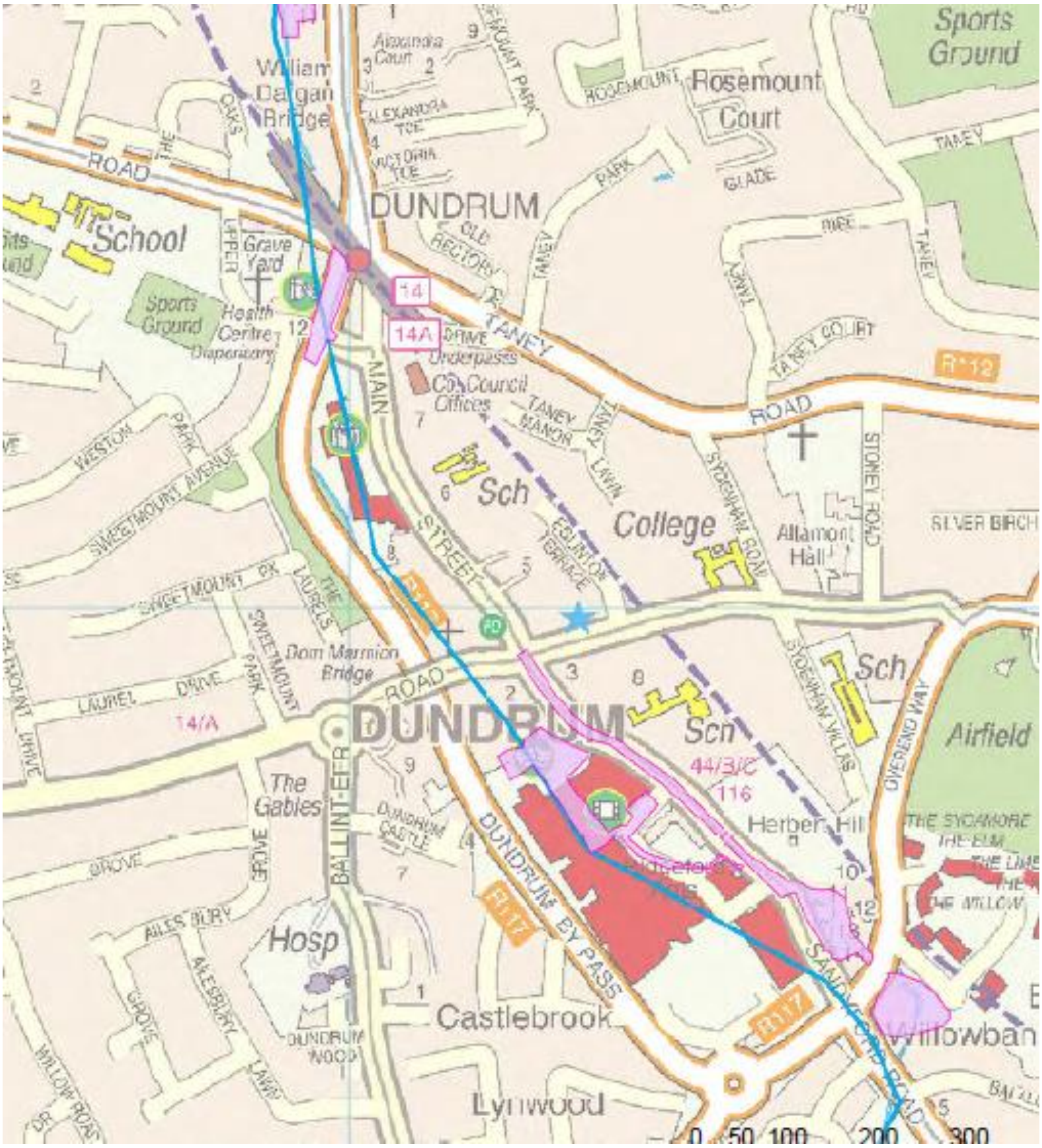

Figure 7.3: Fluvial Flood Extents of October 2011 Event

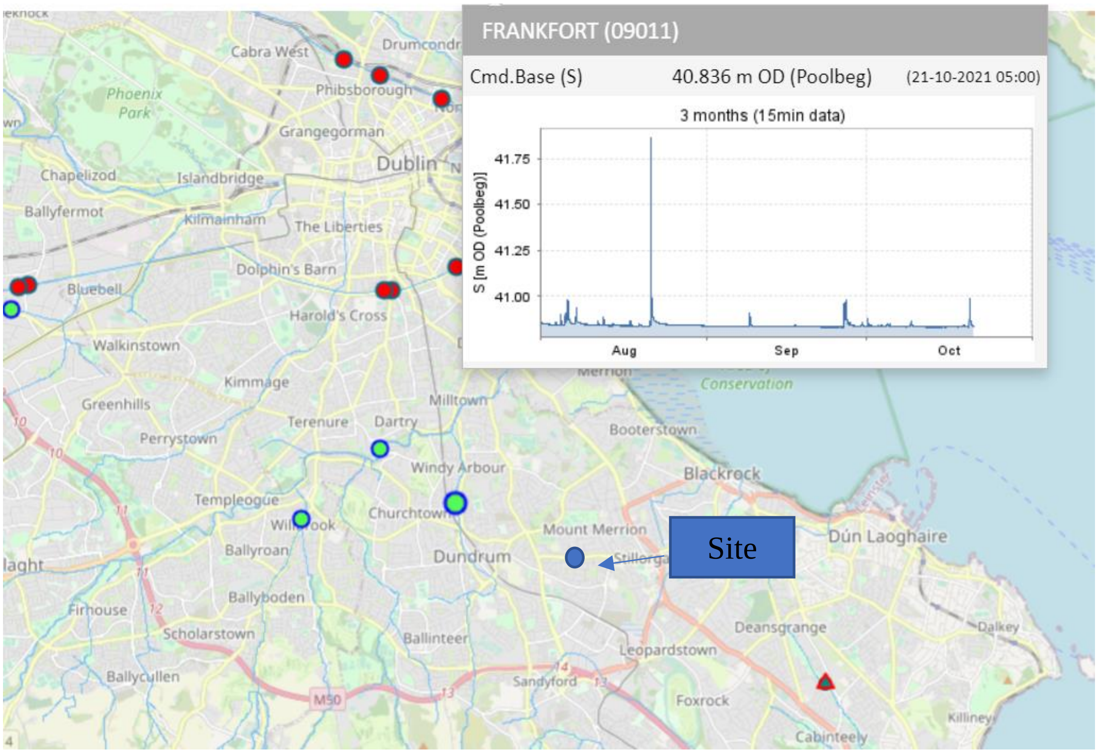

Figure 7.4 Frankfort Gauge Location and Water Levels Aug-Oct 2021

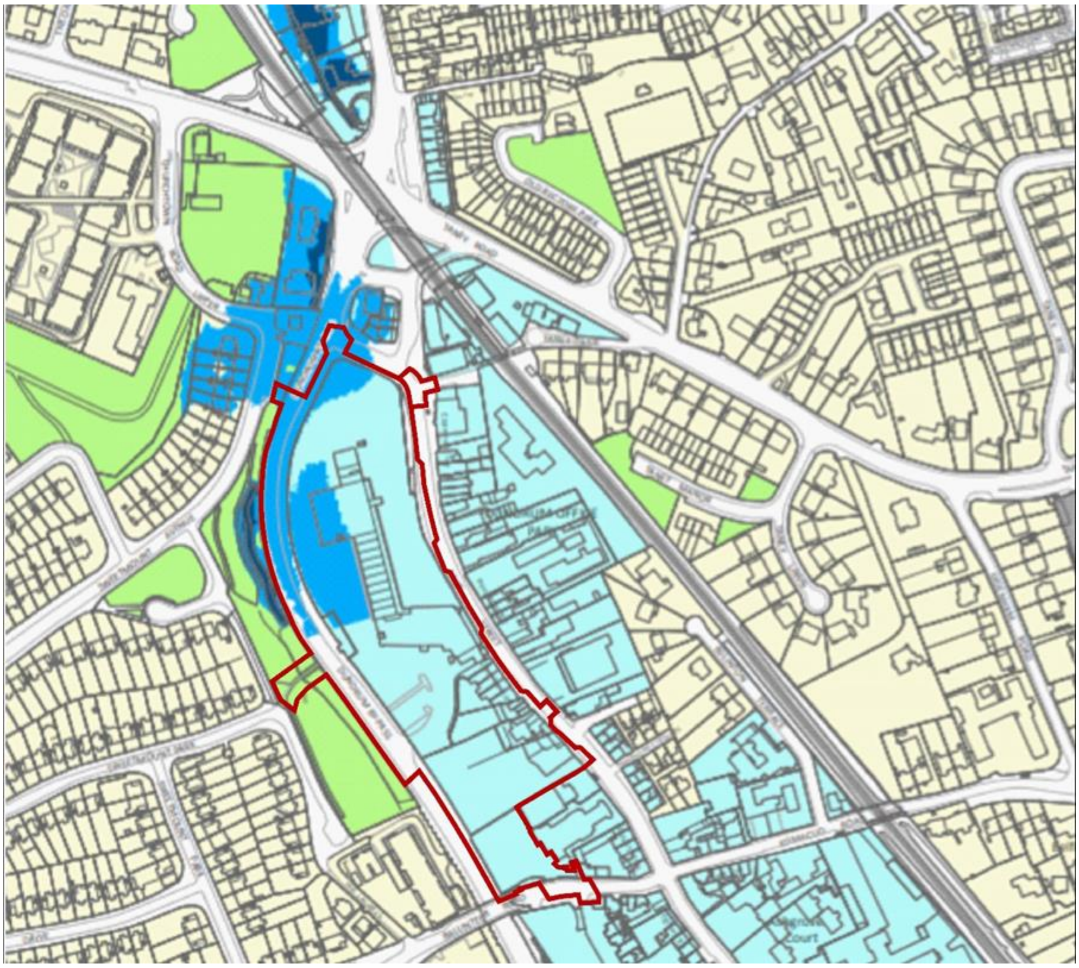

Figure 7.5.: Extract from Flood Zone Map 1 Draft County Development Plan Nov 2021

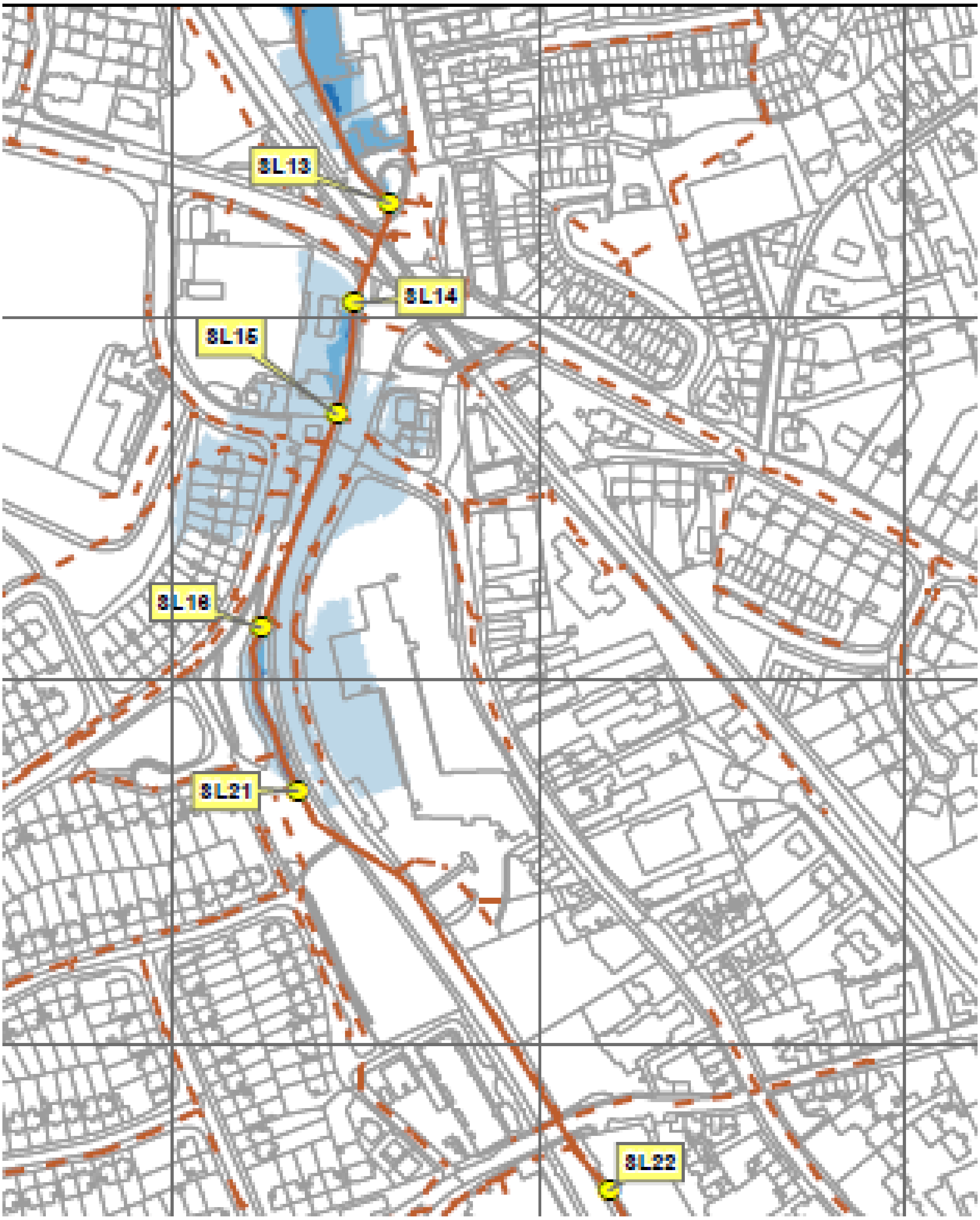

Figure 7.6: Predicted Flood Extents

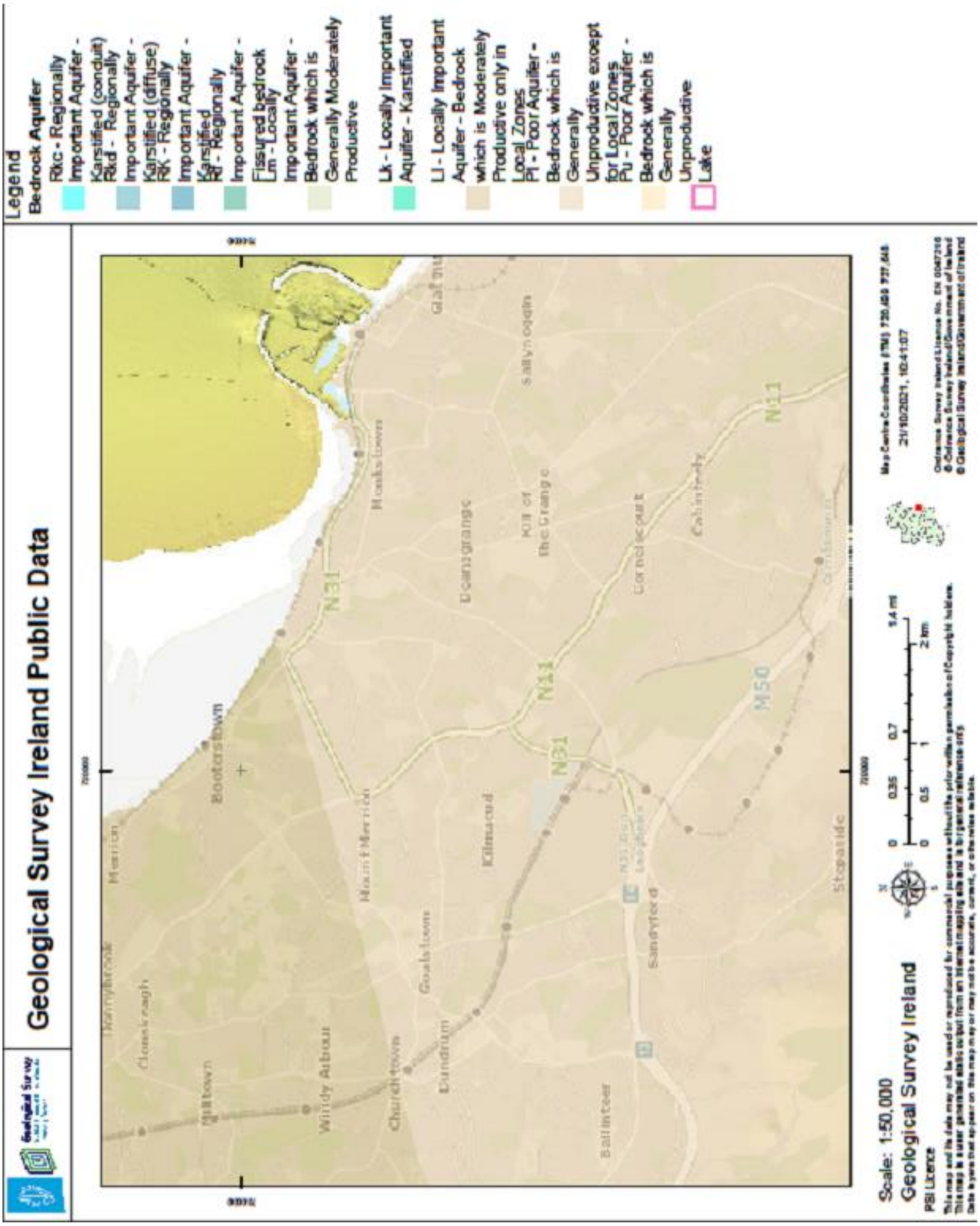

Figure 7.7 Bedrock Aquifers at Dundrum

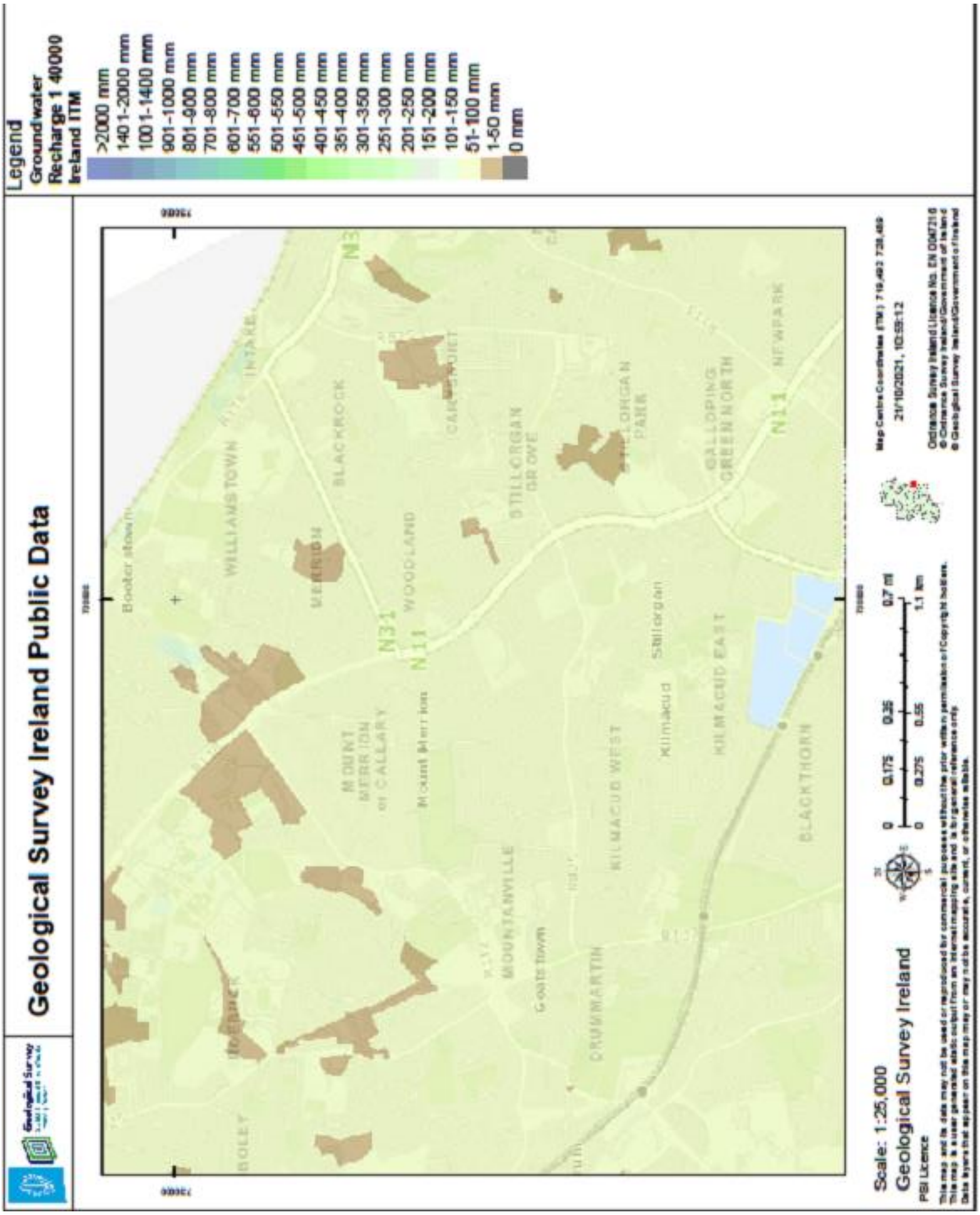

Figure 7.8 Groundwater Recharge at Dundrum

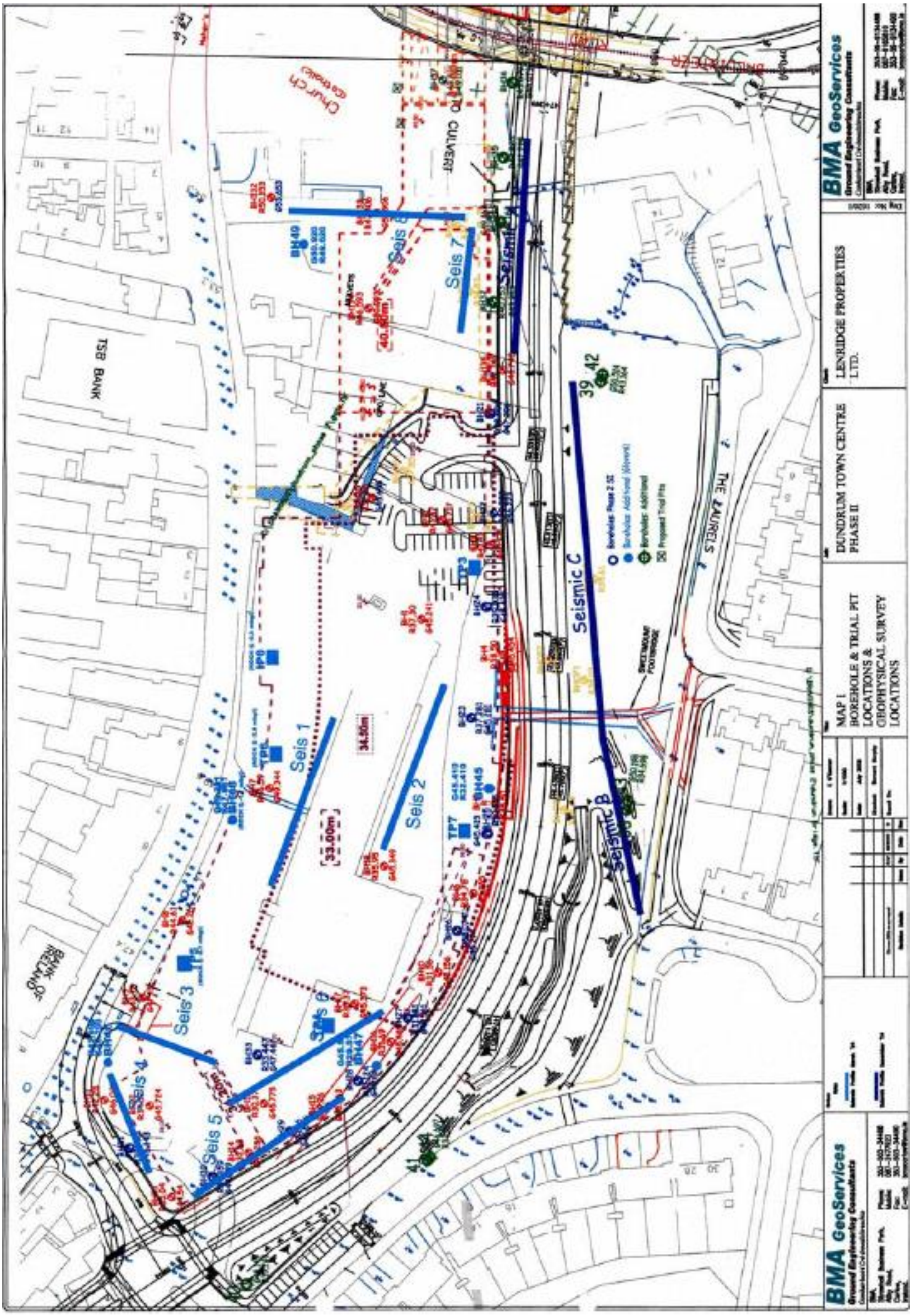

Figure 7.9. October 2004-April 2005 Site Investigation Borehole locations

8.0 AIR AND CLIMATE

8.1 INTRODUCTION

This chapter has been prepared by Byrne Environmental Consulting Ltd to identify and assess the potential air quality and climate impacts associated with the project.

The assessment includes a comprehensive description of the existing air quality in the vicinity of the subject site, a description and assessment of how construction activities and the operation of the project may impact existing air quality and climate, the mitigation measures that will be implemented to control and minimise the impact that the project may have on local ambient air quality and finally to demonstrate how the project shall be constructed and operated in an environmentally sustainable manner.

Ian Byrne, Principal Consultant, MSc Environmental Protection, Dip. Environmental & Planning Law, Member of the Institute of Acoustics has over 25 years' experience in the preparation of air quality and climate impact assessments for commercial, residential and industrial developments and conducted all aspects of the project works.

8.2 ASSESSMENT METHODOLOGY

8.2.1 Baseline Air Quality Assessment Methodology

Existing ambient air quality in the vicinity of the site has been characterised with information obtained from site specific baseline air quality surveys for Nitrogen Dioxide and Sulphur Dioxide and by reviewing the EPA's 2019 Annual Report "Air Quality in Ireland". This EPA report provides detailed monitoring data collected from a number of monitoring locations throughout Ireland on an annual basis to assess national compliance with National Air Quality Regulations. Given the location of the site, it is characterised as a Zone A area within the Dublin Conurbation as defined by the EPA.

8.2.2 Air Quality Assessment Methodology

Air quality standards and guidelines are available from a number of sources. The guidelines and standards referenced in this report include those from Ireland and the European Union.

In order to reduce the risk to health from poor air quality, National and European statutory bodies have set limit values in ambient air for a range of air pollutants. These limit values or "Air Quality Standards" are health or environmental-based levels for which additional factors may be considered. For example, natural background levels, environmental conditions and socio-economic factors may all play a part in the limit values as defined in Table 8-1.

Air quality significance criteria are assessed on the basis of compliance with the appropriate standards or limit values. The applicable standards in Ireland include the National Air Quality Standards Regulations 2011 (S.I No. 180 of 2011), which implement European Commission Directive 2008/50/EC which has set limit values for the pollutants SO2, NO2, PM10, benzene and CO. Council Directive 2008/50/EC replaces the previous Air Quality Framework Directive (96/62/EC) and its subsequent daughter directives (including 1999/30/EC and 2000/69/EC). Provisions are also made for the inclusion of new ambient limit values relating to PM2.5. The

European 2008/50/EC Clean Air for Europe (CAFÉ) Directive is the current air quality directive for Europe which supersedes the European Directives 1999/30/EC and 2000/69/EC. The Directive is implemented by the Air Quality Standards Regulations 2011 which replace the Air Quality Standards Regulations 2002 (S.I. No. 271 of 2002), the Ozone in Ambient Air Regulations 2004 (S.I. No. 53 of 2004) and S.I. No. 33 of 1999.

In order to assess a wider range of air pollutants in the development area it is necessary to review current air quality monitoring data from published sources such as the most recent EPA's 2019 Annual report entitled Air Quality in Ireland. This EPA report provides detailed monitoring data collected from a number of monitoring locations throughout Ireland on an annual basis to assess national compliance with National Air Quality Regulations. Given the location of the site in the Dublin Conurbation it is characterised as a Zone A area as defined by the EPA.

EU legislation on air quality requires that Member States divide their territory into zones for the assessment and management of air quality. The zones in place in Ireland in 2019 are as follows:

- Zone A is the Dublin conurbation,
- Zone B is the Cork conurbation
- Zone C comprising 23 large towns in Ireland with a population >15,000.
- Zone D is the remaining area of Ireland.

The air quality in each zone is assessed and classified with respect to upper and lower assessment thresholds based on measurements over the previous five years. Upper and lower assessment thresholds are prescribed in the legislation for each pollutant. The number of monitoring locations required is dependent on population size and whether ambient air quality concentrations exceed the upper assessment threshold, are between the upper and lower assessment thresholds, or are below the lower assessment threshold. A summary of the EPA's Annual report entitled Air Quality in Ireland 2019 is detailed below in Table 8-2.

Table 8-1 Air Quality Standards Regulations 2011 (based on EU Council Directive 2008/50/EC)

Pollutant	Regulation	Limit Criteria	Tolerance	Limit Value
Nitrogen Dioxide	2008/50/EC	Hourly limit for the protection of human health – not to be exceeded more than 18 times/year	40% until 2003 reducing linearly to 0% by 2010	200 µg/m3
		Annual limit for the protection of human health	40% until 2003 reducing linearly to 0% by 2010	40 µg/m3
		Annual limit for the protection of vegetation	None	400 µg/m3 NO & NO2
Lead	2008/50/EC	Annual limit for the protection of human health	100%	0.5 µg/m3
Sulphur Dioxide	2008/50/EC	Hourly limit for protection of human health – not to be exceeded more than 24 times/year	150 µg/m3	350 µg/m3
		Daily limit for protection of human health – not to be exceeded more than 3 times/year	None	125 µg/m3

		Annual and Winter limit for the protection of ecosystems	None	20 µg/m3
Particulate Matter PM10	2008/50/EC	24-hour limit for protection of human health – not to be exceeded more than 35 times/year Annual limit for the protection of human health	50% 20%	50 µg/m3 40 µg/m3
Particulate Matter PM2.5 Stage 1	2008/50/EC	Annual limit for the protection of human health	20% from June 2008. Decreasing linearly to 0% by 2015	25 µg/m3
Particulate Matter PM2.5 Stage 2	2008/50/EC	Annual limit for the protection of human health	None	20 µg/m3
Benzene	2008/50/EC	Annual limit for the protection of human health	20% until 2006. Decreasing linearly to 0% by 2010	5 µg/m3
Carbon Monoxide	2008/50/EC	8-hour limit (on a rolling basis) for protection of human health	60%	10 mg/m3
Dust Deposition	German TA Luft Air Quality Standard Note 1	30 Day Average	None	350 mg/m2/day

Table 8-2 EPA 2019 Assessment Zone Classification

Pollutant	EPA 2019 Assessment Classification
NO_2 Zone A & B Zone C & D	 Above lower assessment threshold Below lower assessment threshold
SO_2 Zone A & B Zone C & D	 Below lower assessment threshold Below lower assessment threshold
CO Zone A & B Zone C & D	 Below lower assessment threshold Below lower assessment threshold
Ozone Zone A & B Zone C & D	 Below long term objective Above long term objective
PM_{10} Zone A & B & C Zone D	 Above lower assessment threshold Below lower assessment threshold
$PM_{2.5}$ Zone A & B Zone C & D	 Below lower assessment threshold Above lower assessment threshold
Benzene Zone A & B Zone C & D	 Below lower assessment threshold Below lower assessment threshold
Heavy Metals (As, Ni, Cd, Pb)	

Zone A & B Zone C & D	Below lower assessment threshold Below lower assessment threshold
Poly Aromatic Hydrocarbons (PAH) Zone A & C & D Zone B	 Above lower assessment threshold Above upper assessment threshold

8.2.3 Climate Assessment Methodology

Climate has implications for many aspects of the environment from soils to biodiversity and land use practices. The proposed development may impact on both the macro-climate and micro-climate. The macro-climate is the climate of a large geographic area such as Ireland. The micro-climate refers to the climate in the immediate area.

The micro-climatic impacts of wind are considered with regard to the *Microclimatic Wind Analysis and Pedestrian Comfort Report.* This wind analysis was undertaken by IN2 and a copy of the Report is submitted with the application.

The impact of the proposed scheme upon the macro-climate is assessed through the consideration of the change in CO2 emissions that will occur due to the changes in traffic flow that occur in response to the proposed scheme.

The Conference of the Parties to the Convention (COP26) occurred in Glasgow in November 2021 with the following outcomes.

Emissions
One of the key aims of COP26 was to create a timetable for agreeing to more ambitious National Determined Contributions (NDCs), as the current NDCs are inadequate to limit temperature rises to 1.5C and, prior to COP26, nations were only required to set new NDCs every five years. While only one major emitter - India - produced a new NDC at COP26, the aim of the summit was not for numerous countries to produce new NDCs, but to agree to the faster roadmap. The Glasgow Climate Pact ensures that the question of revising NDCs will be discussed at COP27 in Egypt in 2022 and again for the following COP in 2023, providing a lever for more ambitious countries to ensure slower countries make the step up.

Fossil Fuels
The use of coal provided the most contentious moment of the negotiations, as India and China insisted on changing the wording of the final text from a commitment to "phase out" coal power to "phase down" coal power, which the EU and US both accepted, angering the UK and smaller island nations. However, it is notable that this is the first COP agreement that has made a direct reference to phasing down fossil fuels, including a statement that inefficient subsidies for all fossil fuels should be removed and an acknowledgement of the need for a "just transition" to a clean energy system. Nations are also "invited" to reduce methane emissions this decade, again the first-time methane has been mentioned in a COP final agreement.

Climate Finance and Adaption
In 2009, it was agreed that developing nations would receive at least $100bn a year from public and private sources to help them cut emissions and cope with the impacts of the climate crisis. However, in 2019, it was found that only $80bn had been made available, and the Glasgow Climate Pact urges developed countries to "fully deliver" the $100bn goal through to 2025. The Glasgow Climate Pact also agrees to double the proportion of climate finance going towards adaptation following pressure from developing nations who argue that too much of climate finance is spent on funding emissions-cutting projects in middle-income countries that don't

need the funding.

Loss and Damage
The EU and the US reportedly managed to veto the expansion of the loss and damage finance facility from the final agreement. The facility originated at the Paris Agreement and was designed to provide financial assistance for developing countries to deal with environmental damage incurred as a result of climate change. Going into the negotiations, nations including China and the G77, which represents 134 developing and emerging economies, expressed frustration that no further financial commitments to combatting loss and damage had been made. Despite this lack of progress, the Pact does confirm that a "technical assistance facility" will be introduced to support loss and damage in relation to climate change in developing countries and will fall under the Santiago Network from the UNFCCC.

Carbon Markets
The Glasgow Climate Pact also resolves some key issues in Article 6 of the Paris Agreement, the section pertaining to carbon markets and how emissions reductions under NDCs can and should be accounted for. The final text states that carbon offsetting should rely on "real, verified and additional" emissions removal taking place from 2021 onward and there is a requirement for co-benefits in terms of adaptation and the economy, and for nations to put at least 5% of the proceeds into adaptation. Plans for a potential two-tier system, and to transfer existing forest credits into Article 6, were deleted from drafts, in a move most green groups have praised.

Reaffirming the Paris Agreement
Prior to the summit, some nations opposed to stronger action had criticised the focus at COP26 on 1.5C as "reopening the Paris agreement", the main goal of which is to hold temperature rises "well below" 2C above pre-industrial levels while "pursuing efforts" to limit rises to 1.5C.

European Commission Directive 2001/81/EC, the National Emissions Ceiling Directive (NECD) (2014), prescribes the same emission limits as the 1999 Gothenburg Protocol. A National Programme for the progressive reduction of emissions of these four transboundary pollutants has been in place since April 2005 (DEHLG, 2007a; 2004). Data available from the EU in 2010 indicated that Ireland complied with the emissions ceilings for SO2, VOCs and NH3 but failed to comply with the ceiling for NOX (EEA, 2012). Directive (EU) 2016/2284 "On the Reduction of National Emissions of Certain Atmospheric Pollutants and Amending Directive 2003/35/EC and Repealing Directive 2001/81/EC" was published in December 2016.The Directive will apply the 2010 NECD limits until 2020 and establish new national emission reduction commitments which will be applicable from 2020 and 2030 for SO2, NOX, NMVOC, NH3, PM2.5 and CH4. In relation to Ireland, 2020-29 emission targets are for SO2 (65% below 2005 levels), for NOX (49% reduction), for VOCs (25% reduction), for NH3 (1% reduction) and for PM2.5 (18% reduction). In relation to 2030, Ireland's emission targets are for SO2 (85% below 2005 levels), for NOX (69% reduction), for VOCs (32% reduction), for NH3 (5% reduction) and for PM2.5 (41% reduction).

Climate Action and Low Carbon Development (Amendment) Act 2021
The Climate Action and Low Carbon Development (Amendment) embeds the process of setting binding and ambitious emissions-reductions targets in law. It provides for a national climate objective, which commits to pursue and achieve no later than 2050, the transition to a climate resilient, biodiversity-rich, environmentally-sustainable and climate-neutral economy. The following are the key relevant outcomes of the Act:-

- The Act provides that the first two five-year carbon budgets proposed by the Climate Change Advisory Council should equate to a total reduction of 51% over the period to

2030, relative to a baseline of 2018
- The role of the Climate Change Advisory Council has been strengthened, enabling it to propose carbon budgets to the Minister which match our ambition and international obligations
- The government must adopt carbon budgets that are consistent with the Paris agreement and other international obligations. All forms of greenhouse gas emissions including biogenic methane will be included in the carbon budgets, and carbon removals will be taken into account in setting budgets. *However it is up to government to decide on the trajectories for different sectors
- The Government will determine, following consultation, how to apply the carbon budget across the relevant sectors, and what each sector will contribute in a given five-year period
- Actions for each sector will be detailed in the Climate Action Plan which must be updated annually
- Government Ministers will be responsible for achieving the legally-binding targets for their own sectoral area with each Minister accounting for their performance towards sectoral targets and actions before an Oireachtas Committee each year
- Local Authorities must prepare individual Climate Action Plans which will include both mitigation and adaptation measures and will be updated every five years. Local Authority Development Plans must be aligned with their Climate Action Plan
- Public Bodies will be obliged to take account of Climate Action Plans in the performance of their functions

Guidelines, EU Directives and other References

The following guidelines and EU Directives relating to Climate Change aspects of EIA reports have been applied to this assessment in order to determine the potential impacts that the proposed development may have an climate change.
- 2017 EPA Draft Guidelines on information to be contained in Environmental Impact Assessment Reports.
- European Union (Planning & Development)(Environmental Impact Assessment) Regulations 2018 (SI No. 296 of 2018)
- European EIA Directive 2014/52/EU
- The Irish Building Regulations Technical Guidance Document L – Conservation of Fuel & Energy – Dwellings amended in 2017 includes requirements for all residential dwellings to be “Nearly Zero Energy Buildings” (NZEB’s) by 31st December 2020.
- Irelands National Energy and Climate Plan 2021 - 2030

The following reports which accompany this SHD planning application have also been relied upon in this assessment:-
- *Microclimatic Wind Analysis and Pedestrian Comfort Report,* prepared by IN2
- *Energy & Sustainability Statement*, prepared by BDP

8.2.4 Construction Air Quality Impact Assessment Methodology

The Institute of Air Quality Management – *Guidance on the Assessment of Dust from Demolition and Construction* (IAQM, 2014) classifies demolition and construction sites according to the risk of impacts and to identify mitigation measures appropriate to the risk.

The main air quality impacts that may arise are:
- Dust Deposition resulting in the soiling of surfaces
- Visible dust plumes, which are evidence of dust emissions
- Elevated PM10 concentrations as a result of dust generating activities on site

- Increase in airborne particles and NO_2 from diesel fuelled site vehicles and plant

The risk assessment considers the following site activities and their associated potential impacts:
- Demolition activities
- Earthworks
- Construction works
- Trackout (vehicle movements)

The risk assessment considers the following dust related impacts:
- Annoyance due to dust soiling
- The risk to health from exposure to PM_{10}
- Harm to Ecological receptors

The magnitude of the potential dust emission requires the scale of the works to be classified as Small, Medium or Large which are defined as follows:

Demolition Works

Large	Building Volume >50,000m3
Medium	Building Volume 20,000m3 – 50,000m3
Small	Building Volume <20,000m3

Subject Building Volume Medium 20,000 -50,000m3

Table 8-3 Risk of Dust Impacts Demolition

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

Earthworks

Subject Site
Medium Site Area 2500m2 – 10,000m2
Moderately dusty soil (e.g. silts)
5- 10 earth moving vehicles operating simultaneously

Subject Site Area Medium Volume 2500m2 - 10,000m2

Table 8-4 Risk of Dust Impacts Earthworks

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

Construction Works

Large	Total Building Volume >100,000m3
Medium	Total Building Volume 25,000m3 - 100,000m3
Small	Total Building Volume <25,000m3

Building Volume Medium Volume 25,000 - 100,000m3

Table 8-5 Risk of Dust Impacts Construction

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

Trackout

Subject Site Trackout Movements Large Volume >50 HGV/day

Table 8-6 Risk of Dust Impacts Trackout

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

The dust risk assessment for soiling, health and ecology completed for each of the four aspects of dust emissions has been determined from the characteristics of the development as detailed above. Table 8-7 presents the dust risk for each aspect.

Table 8-7 Dust Risk Assessment to Define Site-Specific Mitigation Measures

Sensitivity of Area	Dust Emission Magnitude			
High	Demolition	Earthworks	Construction	Trackout
Soiling	Low Risk	High Risk	High Risk	High Risk
Human Health	Low Risk	High Risk	High Risk	High Risk
Ecology	Low Risk	Medium Risk	Medium Risk	Medium Risk

In order to reduce the risk that generated dusts and particulate matter as PM10 may have on the receiving environment, an appropriately high degree of mitigation measures will be required for the duration of the construction phase.

The German TA-Luft standard for dust deposition (non-hazardous dust) (German VDI, 2002) sets a maximum permissible emission level for dust deposition of 350 mg/(m2*day) averaged over a one month period at any receptors outside the site boundary. Recommendations from the Department of the Environment, Health & Local Government (DOEHLG, 2004) apply the Bergerhoff limit value of 350 mg/(m2*day).

In relation to construction related traffic, air quality significance criteria are assessed on the basis of compliance with the appropriate standards air limit values. The Air Quality Standards Regulations 2011 replace the Air Quality Standards Regulations 2002 (S.I. No. 271 of 2002), the Ozone in Ambient Air Regulations 2004 (S.I. No. 53 of 2004) and S.I. No. 33 of 1999.

8.2.5 Ecological Assessment

Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities (DEHLG, 2010) and Transport Infrastructure Ireland's *Guidelines for Assessment of Ecological Impacts of National Road Schemes* (2009) provide details regarding the legal protection of designated conservation areas.

According to the Transport Infrastructure Ireland (TII) Guidelines, for routes that pass within 2 km of a designated area of conservation (either Irish or European designation), TII requires consultation with an Ecologist. However, the TII guidance states that in practice the potential for impact to an ecological site is highest within 200 m of the proposed road scheme and when significant changes in AADT (>5%) occur.

If both of the following assessment criteria are met, an assessment of the potential for impact due to nitrogen deposition shall be conducted:

- A European designated area of conservation is located within 200 m of the proposed development; and
- A significant change in AADT flows (>5%) will occur.

There are no designated areas of conservation within 200m of the development site therefore an assessment of the impact of the proposed development on NOx concentrations and nitrogen deposition is not required.

8.2.6 Operational Air Quality Assessment Methodology

Once operational, the proposed residential development may impact on air quality as a result of the requirements of new buildings to be heated and with traffic movements associated with the development.

Air quality significance criteria are assessed on the basis of compliance with the national air quality limit values. The Air Quality Standards Regulations 2011 replace the Air Quality Standards Regulations 2002 (S.I. No. 271 of 2002), the Ozone in Ambient Air Regulations 2004 (S.I. No. 53 of 2004) and S.I. No. 33 of 1999.

8.3 RECEIVING ENVIRONMENT

The existing site is comprised of the current Dundrum Village Centre, associated surface car parking, a number of occupiers and vacant buildings along Main Street and the surface car park to the rear of Dundrum Church. The site is located between Dundrum Main Street and the R117 (Dundrum By-Pass).

8.3.1 Baseline Air Quality

A site-specific short-term monitoring study was conducted at the site for Nitrogen Dioxide (NO2) and Sulphur Dioxide (SO2) and Benzene during August 2021. NO_2 and SO_2 were measured at the eastern and western site boundaries (A1 &A2) using a passive diffusion tube over a two-week period. Benzene was monitored along the western site boundary adjacent the Dundrum By-Pass. Figure 8-1 identifies the monitoring locations.

The monitoring locations were chosen in order to obtain short-term sample concentrations for the identified parameters from the principal sources of local pollution i.e. vehicle exhaust emissions and building heating fossil fuel emissions.

The survey was indicative only and results obtained cannot be used to demonstrate compliance with short-term or annual limit values detailed in Table 8-1 above. The survey does, however, aid in identifying the influence of sources in the vicinity of the proposed development site. The results from the baseline air quality surveys are presented in Table 8-8.

The concentrations of SO2, NO2 and BTEX measured during the short-term measurement survey were significantly below their respective annual limit values and comparable with levels reported by the EPA. The air quality samples were analysed by *Gradko International Ltd UK*.

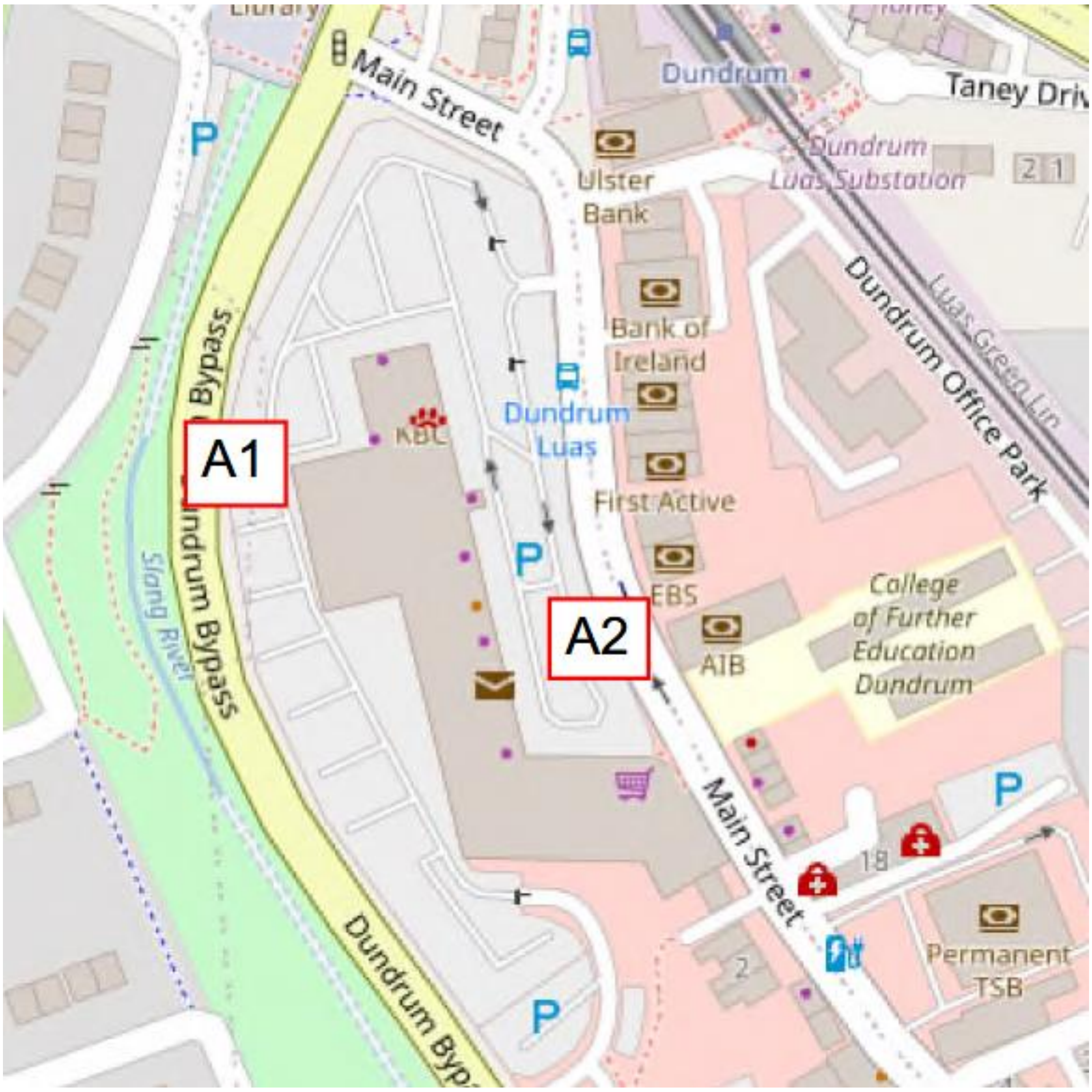

Figure 8-1 Baseline Air Quality Monitoring Locations A1 & A2

Table 8-8 Results of site air quality monitoring at the development site

Pollutant	Location A1 Western Site Boundary	Location A2 Eastern Site Boundary	Assessment criteria
Sulphur dioxide	<1.56 ug/m^3	<1.56 ug/m^3	125 µg/m^3 (as annual average)
Nitrogen dioxide	11.54 ug/m^3	12.62 ug/m^3	40 µg/m^3 (as annual average)
Benzene	1.78 ug/m^3	NA	5 ug/m^3 (as annual average)

Dublin Conurbation EPA Air Quality Data 2019

Annual air quality monitoring programs have been undertaken in recent years by the EPA and Local Authorities. The most recent annual report on air quality "Air Quality in Ireland 2019 (Published September 2020) details the range and scope of monitoring undertaken throughout Ireland. The Dublin Conurbation is categorised as Zone A.

The most recent 2019 EPA publication includes a number of Zone A monitoring locations which would be comparable to the expected air quality at the subject site. The various Zone A air quality monitoring stations within Dublin provide a comprehensive range of air quality monitoring data sets which have been selected as part of this assessment to describe the existing ambient air quality at the subject site.
Nitrogen Dioxide

The Air Quality Standards Regulations 2011 specify a limit value of 40 µg/m3, for the protection of human health, over a calendar year. The standard, taken from the 2008 CAFÉ Directive 2000/69/EC, came into force in 2011.

Nitrogen Dioxide
Long term NO2 monitoring was carried out at ten Zone A locations in 2019. The NO2 annual mean in 2019 for these sites ranged from 15 - 43 µg/m3 compared against the annual average limit of 40 µg/m3.

The monitoring of NO2 during 2019 at St John Road in Dublin reported an exceedance (43ug/m3) of the EU Air Quality Annual Limit of 40ug/m3. The EPA 2019 Reports states that heavy road traffic along St John Road was the cause of the elevated concentrations of NO2.

Sulphur Dioxide
The Air Quality Standards Regulations 2011 specify a daily limit value of 125 µg/m3 for the protection of human health. The standard, taken from the 2008 CAFÉ Directive 2000/69/EC, came into force in 2011.

Long term SO2 monitoring was carried out at four Zone A locations in 2019. The daily SO2 daily means in 2019 for these sites ranged from 0.8 – 2.5 µg/m3. Therefore, 5-year long term averages were below the daily limit of 125 µg/m3.

The annual mean SO2 concentrations in Ireland have been declining since 2003. This trend is reflective in the shift in fuel choice across Ireland in both residential heating and the energy production sector.

Carbon Monoxide
The Air Quality Standards Regulations 2011 specify an 8-hour limit value (on a rolling basis) for the protection of human health of 10,000 µg/m3. The standard, taken from the 2008 CAFÉ Directive 2000/69/EC, came into force in 2011.

Long term CO monitoring was carried out at one Zone A location in 2019. The 8-hour CO concentrations was 0.2 – 0.3mg/m3 which is below the 8-hour limit value (on a rolling basis) of 10 mg/m3.

Particulate Matter PM10
The Air Quality Standards Regulations 2011 specify a PM10 limit value of 40 µg/m3 over a calendar year. The standard, taken from the 2008 CAFÉ Directive 2000/69/EC, came into force in 2011.
Long term PM10 monitoring was carried out at thirteen Zone A locations in 2019. The PM10 annual mean in 2019 for these sites ranged from 11 - 19µg/m3. Therefore, long term averages were below the annual average limit of 40 µg/m3.
Particulate Matter PM2.5
The Air Quality Standards Regulations 2011 specify a PM2.5 limit value of 25 µg/m3 over a calendar year.

Long term PM2.5 monitoring was carried out at ten Zone A locations in 2019. The PM2.5 average in 2019 for these sites ranged from 8 - 11µg/m3. Therefore, long term averages were below the target value 25 µg/m3.

Table 8-9 Summary of the 2019 Air Quality data obtained from Zone A area

Pollutant	Regulation	Limit type	Limit value	EPA monitoring data 2019
Nitrogen dioxide	2008/50/EC	Annual limit for protection of human health	40 µg/m^3	15 – 43* µg/m^3
Sulphur dioxide	2008/50/EC	Daily limit for protection of human health (not to be exceeded more than 3 times per year)	125 µg/m^3	0.8 – 2.5 µg/m^3
Carbon monoxide	2008/50/EC	8-hour limit (on a rolling basis) for protection of human health (Zone C)	10,000 µg/m^3	300 µg/m^3
Particulate matter (as PM_{10})	2008/50/EC	Annual limit for protection of human health	40 µg/m^3	11 – 19 µg/m^3
Particulate matter (as $PM_{2.5}$)	2008/50/EC	Annual limit for protection of human health	25 µg/m^3	8 - 11 µg/m^3
Benzene	2008/50/EC	Annual limit for protection of human health	5 µg/m^3	< 0.21µg/m^3

8.3.2 Summary of Baseline Air Quality Assessment

Based on the most recent published EPA air quality data for 2019 for the Zone A (Dublin) area in which the subject site is located together with site specific monitoring data, it may be concluded that the existing baseline air quality at the subject site may be characterised as being good with no exceedances of the National Air Quality Standards Regulations 2011 (S.I No. 180 of 2011) limit values of individual pollutants. There is therefore currently sufficient atmospheric budget to accommodate the development without adversely impacting existing ambient air quality. The quality of existing air quality at the subject site must be maintained and improved where possible as a result of the proposed development to ensure that local human health and the ecological environment is not adversely affected.

8.3.3 Description of the Existing Climate

EU2020 Strategy - EU's Effort Sharing Decision (ESD), 406/2009/EC1 address Ireland's GHG emissions, of which one of the biggest contributors is transport.

Long-term projected decrease in greenhouse gas emissions as a result of inclusion of new climate mitigation policies and measures that formed part of the National Development Plan (NDP). Implementation of these are classed as a "With Additional Measures scenario" for future scenarios. A change from generating electricity using coal and peat to wind power and diesel vehicle engines to electric vehicle engines are envisaged under this scenario.

EPA - Ireland is projected to cumulatively exceed its compliance obligations with the EU's Effort Sharing Decision (Decision No. 406/2009/EC) 2020 targets by approximately 12.2 Mt CO2eq under the "With Existing Measures" scenario and 9 Mt CO2eq under the "With Additional Measures" scenario (EPA, June 2021).
The nearest synoptic meteorological station to the subject site is at Dublin Airport which is located approximately 11km north-west of the proposed development site and as such, long-term measurements of wind speed/direction and air temperature for this location are representative of prevailing conditions experienced at the subject site. Recent meteorological

data sets for Dublin Airport were obtained from Met Éireann for the purposes of this assessment study.

Rainfall - Precipitation data from the Dublin Airport meteorological station for the period 2011-2020 indicates a mean annual total of about 762 mm. This is within the expected range for most of the eastern half of the Ireland which has between 750 mm and 1000 mm of rainfall in the year.

Temperature - The annual mean temperature at Dublin Airport (2011-2020) is 9.5ºC with a mean maximum of 15.3ºC and a mean minimum of 4.0ºC. Given the relatively close proximity of this meteorological station to the proposed development site, similar conditions would be observed. Table 13-6 sets out meteorological data for Dublin Airport from 2011-2020.

Wind – Wind is of key importance for both the generation and dispersal of air pollutants. Meteorological data for Dublin Airport indicates that the prevailing wind direction, in the Dublin area, is from the West and Southwest and blows Northeast across the proposed development. The mean annual wind speed in the Dublin area between 2011 - 2020 is 5.7 m/s.

Table 8-10 Meteorological Data for Dublin Airport 2011-2020

Year	Period	Rainfall (mm)	Maximum mean Temperature (^{0}C)	Minimum mean Temperature (^{0}C)	Mean Temperature (^{0}C)
2011	Annual Mean	672	16.7	3.1	9.4
2012	Annual Mean	850	15.3	5.4	9.3
2013	Annual Mean	764	14.0	3.6	9.9
2014	Annual Mean	870	15.8	5.4	10.6
2015	Annual Mean	766	14.0	4.0	9.0
2016	Annual Mean	725	15.7	4.4	10.1
2017	Annual Mean	661	15.0	5.3	9.9
2018	Annual Mean	709	14.8	4.8	9.7
2019	Annual Mean	886	15.9	5.1	9.6
2020	Annual Mean	749	15.7	5.0	9.6
Mean		767	15.3	4.0	9.5

8.3.4 Sensitive Receptors

Sensitive receptors for the purposes of this assessment, indicated on Figure 8-2, include:-

D1. Main Street (north)
D2. Main Street (east)
D3. Holy Cross Church + Parochial house + No.'s 11 and 16/17 Main Street
D4. The Laurels / Sweetmount Park Residential Communities + Open space
D5. Sweetmount Avenue
D6. Dundrum View Apartments

8.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The project is described in Chapter 3. The following detail is relevant to this assessment.

The construction phase of the project will involve the demolition of existing buildings and removal of hardstanding areas from its current brownfield site to facilitate the development of a residential development. It will also include the removal of some green space and trees (largely to the rear of No. 13/13A Main Street, No.'s 1-4 Glenville Terrace and the former post office / Joe Daly cycles premises). This will be replaced in the landscaping scheme including the replanting of trees appropriate to the local area and the development of green roof's on the apartment blocks.

The operational phase of the development will see the functioning of modern, well insulated thermally efficient buildings in which energy efficiency shall be achieved by implementing sustainable features into the development's buildings and infrastructure design. The proposed development has been designed to minimise the impact on climate where possible in line with the most recent development guidelines (Nearly Zero Energy Building (NZEB) Part L of the Building Regulations, 1997 to 2020) and in reference to measures within the National Mitigation Plan. The design of the residential units is proposed to ensure their operation will have a minimum impact on the receiving climate and that their design will withstand future potential extreme weather events associated with climate change.

The foul pumping station proposed adjacent to the Bypass includes an odour control unit to mitigate smells – this will be designed to meet Irish Water standards.

Climate friendly design and the promotion of more sustainable modes of transport such as public transport, cycling and walking have been included in the proposed development.

8.5 CONSTRUCTION IMPACTS

Various elements of the construction phase of the project have the potential to impact on the receiving environment, local ambient air quality and on human health. The likely potential impacts, prior to mitigation, are described in this section.

8.5.1 Air Quality

Works activities associated with the 'Site set up' stage (e.g. site security hoarding and site compounds, site offices, materials and waste storage areas and staff welfare facilities) are temporary activities which will have a minimal potential to generate fugitive dust emissions or combustion gas emissions.

Site clearance including structure demolition, ground excavation works and rock breaking have the potential to generate fugitive windblown dust emissions during dry and windy weather arising from the operation of mechanical plant including excavators and trucks and the movement of these vehicles on exposed surfaces at the site.

With regard to the volume of demolition waste material generated during site clearance, there will be a requirement for HGV trucks to remove the material from the site. Trucks shall be loaded with material on-site by mechanical excavators and loading shovels which will generate fugitive dust emissions as a result of the transfer of the excavated materials comprised principally of soils and stones from stockpile to truck.

The movements of construction vehicles on the site shall also generate windblown dust emissions. Where dusty material is loaded onto exposed open trucks, fine dusts may be released as the truck travels along public roads.

During the construction phase there will be extensive site works, involving construction machinery, construction activities on site which have the potential to generate fugitive windblown dust emissions. It is proposed that excavated rock shall be crushed on-site so that it can be re-used on site for construction purposes. Construction equipment including generators and compressors will also give rise to diesel and petrol engine exhaust emissions. Construction traffic to and from the site shall result in a short-term increase in the volume of diesel fuelled HGV's along the local road network which will generate additional hydrocarbon and particulate emissions from the vehicle exhausts.

These site activities in the absence of mitigation have the potential to impact local air quality, human health, the local ecological environment and cause the soiling of property and vegetation resulting in a short-term-transient, negative, minor impact. The most sensitive receptors are the closest residential communities to the west including D4, D5 and D6 (Refer to Figure 8-2). The impacts will also be experienced by premises on Main Street, including D1-D3, while the Main Street blocks are being constructed. Further, the significance of the effect will be greatest for the phase of the development adjacent to these properties.

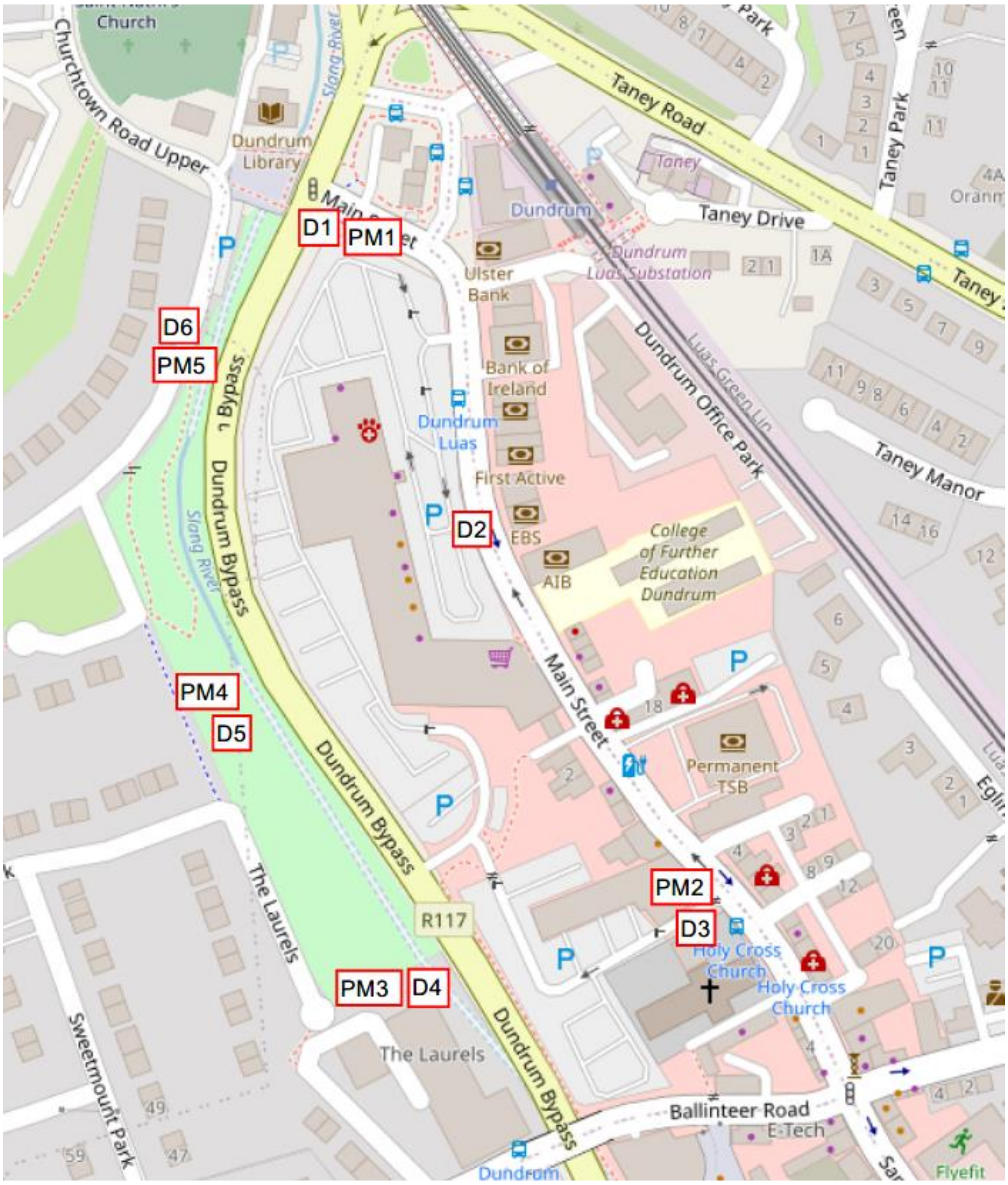

Figure 8-2 Construction Phase Dust Deposition (D) and Particulate Matter (PM) Monitoring Locations

8.5.2 Climate

During the construction phase NO_2 and CO_2 will be released into the atmosphere as a result of the movement of construction vehicles and the use of construction plant, vehicles and generators. The Institute of Air Quality Management document *Guidance on the Assessment of Dust from Demolition and Construction* (IAQM, 2014) states that site traffic and plant is unlikely to make a significant impact on climate.

8.5.3 Human Health

With regard to the Institute of Air Quality Management – *Guidance on the Assessment of Dust from Demolition and Construction* (2014), the sensitivities of local population to dust soiling and PM_{10} and $PM_{2.5}$ exposure in the local area may be classified as a High.

The most sensitive receptors in this case will be D3, D4, D5 and D6 and the significance of the effect will be greatest during the construction phase of the development adjacent to these properties i.e. the impacts on D3, D4, D5 and D6 will be significant during Zone 4 works only. The duration of these impacts will be short-term. The impacts on D2 will be significant for the properties in the vicinity i.e. Properties at the northern end of Main Street (east) will be impacted during Zone 1 and 2 works, but there will be no impact on properties at the southern end of Main Street during these stages.

8.5.4 Mitigation Measures

The following mitigations measures are required:-

AC-C1	The main contractor will ensure the following best practice methods are applied during construction:- • Removal of Asbestos prior to demolition works. • Use of water mist cannons to supress dust during demolition works. • Screening and use of water spray bars on mobile crushing plant. • Screening of building during demolition to contain dust. • Provision of vehicle wheel wash facilities at site exits • Cleaning of local roads. • Vehicle/Plant engines shall be turned off when not in use • Vehicle/Plant engines shall be maintained to ensure efficient operation. • Mains power shall be utilised for Site Offices instead of generators
AC-C2	Dust suppression measures will be implemented to minimise dust generation during extended dry periods. Dust monitoring will be conducted through the demolition excavation period. A complaints management procedure shall be developed prior to the commencement of works.

8.5.5 Monitoring

The following measures are required:-

AC-M1	A programme of dust deposition and Particulate PM2.5 & PM10 monitoring shall be initiated prior to the commencement of demolition works.

8.5.6 Cumulative Impacts

Other projects, planned or approved within the surrounding area, have been considered and no cumulative impact on local air quality or on climate has been found in conjunction with this project.

8.6 OPERATIONAL IMPACTS

8.6.1 Air Quality

The operational phase of the project has the potential to have a neutral impact on local air quality as a result of the sustainable requirements for new buildings when compared to the thermally inefficient existing shopping centre buildings and with the decreased traffic movements associated with the project.

The odour control unit installed on the foul pumping station will negate against any significant negative impacts for the receiving environment and the future residents.

Traffic movements associated with the development have been evaluated and assessed as part of the ***Transport Assessment*** prepared by Systra. The change of use of the site from retail to primarily residential will result in a net reduction in 2-way vehicle movements during the peak AM and PM periods.

The results of the NO2 impact have been determined using the UK DEFRA methodology and a Road NO2 value of 1.91ug/m3 has been determined giving a Total NO2 value of 9.61 ug/m3. These values are below the Air Quality Standards Regulations 2011 40ug/m3 limit value for the protection of human health and the 30ug/m3 for the protection of vegetation . The impact will be long-term, localised, neutral and imperceptible.

8.6.2 Climate

The development will include open space, and landscaped areas. The overall development includes the construction of buildings and roadways which may have the potential effect of marginally raising localised air temperatures, especially in summer.

Motor vehicles are a major source of atmospheric emissions which contribute to climate change and vehicle exhaust emissions may have a potential to impact the macro-climate.

Climate change has the potential to alter weather patterns and increase the frequency of rainfall. Part of the northern extent of the site is located within flood Zone B. The project is designed with a finished floor level above the flood level and including an allowance for climate change. Compensatory flood storage, adequate attenuation and drainage have also been provided to account for increased rainfall in future years associated with Climate Change as part of the design of this development. Therefore, the impact will be long-term, localised, negative and slight.

The *Microclimatic Wind Analysis and Pedestrian Comfort Report* by IN2 concludes that the development will not introduce any adverse wind effects to the receiving environment.

8.6.3 Human Health

It has been predicted that there will be a negligible impact on local air quality as a result of traffic movements associated with the proposed development. National and European Air Quality Standard limit criteria designed for the protection of human health will not be exceeded. The operational phase impact associated with traffic movements will be long-term, localised, neutral and imperceptible.

8.6.4 Mitigation Measures

The following mitigation measures are proposed:-

AC-01	Energy Efficiency – All residential units shall be designed and constructed in accordance with The Irish Building Regulations Technical Guidance Document L – Conservation of Fuel & Energy – Dwellings amended in 2021 includes requirements for all residential dwellings to be "Nearly Zero Energy Buildings" (NZEB's)
AC-02	U-values for floor and roof will exceed the building regulation backstops
AC-03	Solar Photovoltaic Panels shall be installed at roof level on all buildings, where possible
AC-04	Extensive planting and green areas throughout the development to enhance local biodiversity
AC-05	E-Vehicle charging points to be provided in line with the requirements of the Dun Laoghaire Rathdown County Development Plan (2022-2028) and Part L Building Regulations.
AC-06	Install an odour control unit on the foul pumping station in accordance with Irish Water standards.
AC-07	Hot water and heating to be generated by heat pumps

8.6.5 Monitoring

No monitoring measures are proposed.

8.6.6 Cumulative Impacts

The transportation impact assessment for the development demonstrates that the operational phase will result in an overall increase in two-way trips during peak periods but the new trip generation levels are offset by existing traffic flows associated with the existing development. The assessment concludes that there will be an additional 139 two-way trips during the AM Peak and an additional 8 two-way trips during the PM Peak resulting in an impact that is not significant. The assessment has considered future traffic flows in the area and it is thus concluded that the cumulative impact on air quality and climate associated with the subject development and future traffic flows will be long-term and not significant.

8.7 OTHER EFFECTS

8.7.1 Residual Effects

Construction

Various elements associated with the construction of the project have the potential to impact on local ambient air quality, human health and climate. However, the potential construction phase impacts shall be mitigated and monitored to ensure there is no adverse impact on ambient air quality for the duration of all construction phase works. It is predicted that the construction phase will not generate air emissions that would have an adverse impact on local ambient air quality or on local human health or on the local micro-climate or the wider macro-climate.

The Table below summarises the identified likely residual effects of the project during the construction phase.

Table 8-11 Summary of Construction Phase Likely Significant Effects with Mitigation

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Type
Construction Phase Air Quality	Negative	Slight	Local	Likely	Short-Term	Residual
Construction Phase Climate	Negative	Imperceptible	Local	Likely	Short-Term	Residual

Operational

The sustainable features that are incorporated into the design of all residential units will ensure that the operational phase will not have an adverse impact on human health, local air quality or on local or global climate patterns. The residential units will be designed to ensure that they can withstand the potential changes in climate which may generate more extreme and prolonged meteorological events in the future.

It is predicted that fossil fuel combustion gas emissions including Carbon Dioxide, Sulphur Dioxide, Nitrogen Oxides, Carbon Monoxide and hydrocarbon particulate emissions will be slight and will not have an adverse significant impact on the existing ambient air quality in the vicinity of the proposed development site.

Motor vehicles are a major source of atmospheric emissions which contribute to climate change, however, vehicle exhaust emissions generated from vehicles associated with the development will have a negligible impact on the macro-climate given modern technological developments in cleaner and more efficient vehicle engines. Current trends suggest that vehicle manufacturers are ceasing the manufacture of large diesel engines for private cars and instead adopting hybrid engine and all electric technologies which will contribute to the reduction of engine exhaust emissions including particulate matter, Nitrogen Oxides, Sulphur Dioxide, Carbon Dioxide and Carbon Monoxide. Parking provision in the proposed development is low with the focus on public transport and cycling.

To further reduce the climatic impact of the operational phase, electric vehicle charging points shall be installed in dedicated parking spaces. Spaces will also be provided for a car sharing club.

The development has been designed to provide thermally efficient buildings which will reduce the consumption of fossil fuels within each individual dwelling. This will reduce the impact the operational phase of the development will have on the micro and macro climate.

The thermal efficiency of the buildings will ensure that the development will be sustainable and will be protected against the impacts of future climate change which may include storm events and prolonged colder periods during the winter season. These factors will contribute to reducing the impact the operational development has on the local and global climate which will ultimately contribute in a positive manner in reducing the impact on local and further afield human health.

The Table below summarises the identified likely significant residual effects of the proposed development

Table 8-12 Summary of Operational Phase Likely Significant Effects with Mitigation

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Type
Operational Phase Air Quality	Neutral	Imperceptible	Local	Likely	Long-Term	Residual
Operational Phase Climate	Neutral	Imperceptible	Local	Likely	Long-Term	Residual

8.7.2 'Do-nothing' Effect

Should the project not proceed, it is likely that another development may be applied for in the future as the subject site is zoned *Major Town Centre*. Should the site remain as is with thermally inefficient buildings, it will continue to use fossil fuels for heating resulting in a depletion of natural resources and emissions to atmosphere.

8.7.3 'Worst Case' Effect

A worst-case scenario would arise if the mitigation measures are not implemented during the construction phase. This would result in the generation of uncontrolled vehicle and dust emissions from the site which would result in an unacceptable negative impact on local receptors and the receiving environment.

8.8 INTERACTIONS

The principal interactions between Air Quality and Climate (Human Beings, Biodiversity and Traffic) have been addressed in this chapter.

Construction Phase: Best practice mitigation measures are proposed for the construction phase which will focus on the pro-active control of dust and other air pollutants to minimise generation of emissions at source. The mitigation measures that will be put in place during construction will ensure that the impact of the development complies with all EU ambient air quality legislative limit values which are based on the protection of human health or on the natural environment.

Operational Phase: Operational traffic emissions as a result of the proposed development are compliant with all National and EU ambient air quality limit values which are set for the protection of human health and therefore, will not result in an adverse or harmful impact on human health or the natural environment.

REFERENCES

- Air Quality Regulations 2011, SI 180 of 2011
- European Union Directive (2008/50/EC).
- German Federal Government Technical Instructions on Air Quality Control - TA Luft 2002
- German Standard Method for determination of dust deposition rate, VDI 2129.

- Greater London Authority – The Control of dust emissions from construction and demolition Best Practice Guidelines, Nov 2006.
- Transport Infrastructure Ireland (TII) 2011 Guidelines for the Treatment of Air Quality during the Planning and Construction of National Road Schemes Revision 1.
- The Irish Building Regulations Technical Guidance Document L – Conservation of Fuel & Energy – Dwellings
- EPA 2019 Air Quality in Ireland
- WHO Air Quality Guidelines, 2006
- UK Highways Agency Design Manual for Roads and Bridges, 2007
- Institute of Air Quality Management – Guidance on the assessment of dust from demolition and construction 2016
- Dun Laoghaire Rathdown County Council (2021) *Guidance Notes for Environmental Management of Construction Projects*

9.0 NOISE AND VIBRATION

9.1 INTRODUCTION

This chapter has been prepared by Byrne Environmental Consulting Ltd to identify and assess the potential noise and vibrational impacts associated with the project.

This document includes a comprehensive description of the receiving ambient noise climate in the vicinity of the subject site; a description of how the construction and operational phases may impact the existing ambient noise climate, the mitigation measures that shall be implemented to control and minimise the impact that the development may have on ambient noise levels and the proposed acoustic design features required to minimise the impact of external noise sources on the residential units.

Various elements of both the construction and operational phases have the potential to impact on the local receiving noise environment, on adjacent properties and on human health. The likely potential impacts of project prior to mitigation are described in sections 9.5 and 9.6. The mitigation measures are described in Section 9.5.1 and 9.6.1. The residual impacts, with the development in place and the mitigation measures incorporated, are described in Section 9.7.1.

Ian Byrne, Principal Consultant, MSc Environmental Protection, Dip. Environmental & Planning Law, Member of the Institute of Acoustics has over 25 years' experience in the preparation of noise and vibration assessments for commercial, residential and industrial developments and conducted all aspects of the project works.

9.2 ASSESSMENT METHODOLOGY

This chapter has been prepared having regard to the EIA Directives, legislation and guidelines outlined in Chapter 1.

9.2.2 Baseline Noise Assessment Methodology

The existing ambient noise climate in the vicinity of the site has been characterised with information obtained from site specific baseline noise surveys conducted within the site and in the vicinity of the closest noise sensitive receptors to the subject site (Figure 9.2). Baseline noise surveys were conducted during October 2021 post CV19 restrictions and upon the opening of the new school term, thus an accurate assessment of normal baseline noise levels was possible. Noise measurements were conducted in accordance with ISO 1996-1: 2017: Acoustics – Description, measurement and assessment of environmental noise and with regard to the EPA's 2016 Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4).

The EPA's *Round 3 Strategic Noise Mapping of Aircraft, Road and Rail* (2018) was reviewed to establish the specific impact that transportation related noise sources Road and Rail (LUAS) have on the proposed development site.

9.2.3 Inward Noise Impact Assessment Methodology

The impact of the proposed development has been determined through prediction of future noise levels associated with the scheme using established calculation techniques.

Construction noise and vibration impacts have been assessed in accordance with Transport Infrastructure Irelands (TII) guidance document *Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes* (March 2014). Indicative construction noise calculations have been undertaken using the methodology set out in BS 5228 Code of Practice for noise and vibration control of construction and open sites - Part 1: Noise 2009+A1 2014.

Impacts associated with road traffic movements on the development when operational have been assessed with regard to the NRA's Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes (March 2014). UK Department of Transport (Welsh Office) - Calculation of Road Traffic Noise [CRTN] and the Highways Agency Design Manual for Roads and Bridges Part 7 HD 213/11 – Revision 1 Noise and Vibration.

The operational phase of the development has been assessed with regard the Department of the Environment, Building Regulations 2014, Technical Guidance Document E – Sound. Acoustic design of apartments refers to the 2020 Ministerial Guidelines *"Sustainable Urban Housing – Design Standards for New Apartments*. Paragraph 1.17 of the document refers specifically to the Building Regulations Technical Guidance Documents and states that the construction of the apartment building shall comply with all relevant requirements.

The inward noise impact that the external environment has been assessed with regard to *Professional Guidance on Planning & Noise* (ProPG), (IoA/ANC, 2017).

The *Professional Guidance on Planning & Noise* (ProPG) document May 2017 was prepared by a working group comprising members of the Association of Noise Consultants (ANC), the Institute of Acoustics (IOA) and the Chartered Institute of Environmental Health (CIEH) has been generally considered as a best practice guidance and has been widely adopted in the absence of equivalent Irish guidance.

The ProPG outlines a systematic risk based 2 stage approach for evaluating noise exposure on prospective sites for residential development. The two primary stages of the approach can be summarised as follows:

- Stage 1 - Comprises a high-level initial noise risk assessment of the proposed site considering either measured and or predicted noise levels; and,
- Stage 2 – Involves a full detailed appraisal of the proposed development covering four "key elements" that include:
- Element 1 - Good Acoustic Design Process;
- Element 2 - Noise Level Guidelines;
- Element 3 - External Amenity Area Noise Assessment
- Element 4 - Other Relevant Issues

The initial noise risk assessment is intended to provide an early indication of any acoustic issues that may be encountered. It calls for the categorisation of the site as a negligible, low, medium or high risk based on the pre-existing noise environment. Figure 9.1 presents the basis of the initial noise risk assessment, it provides appropriate risk categories for a range of continuous noise levels either measured and/or predicted on site.

A site should not be considered a negligible risk if more than 10dB(A) LAFmax events exceed

60 dB during the night period and the site should be considered a high risk if the LAFmax events exceed 80 dB more than 20 times a night.

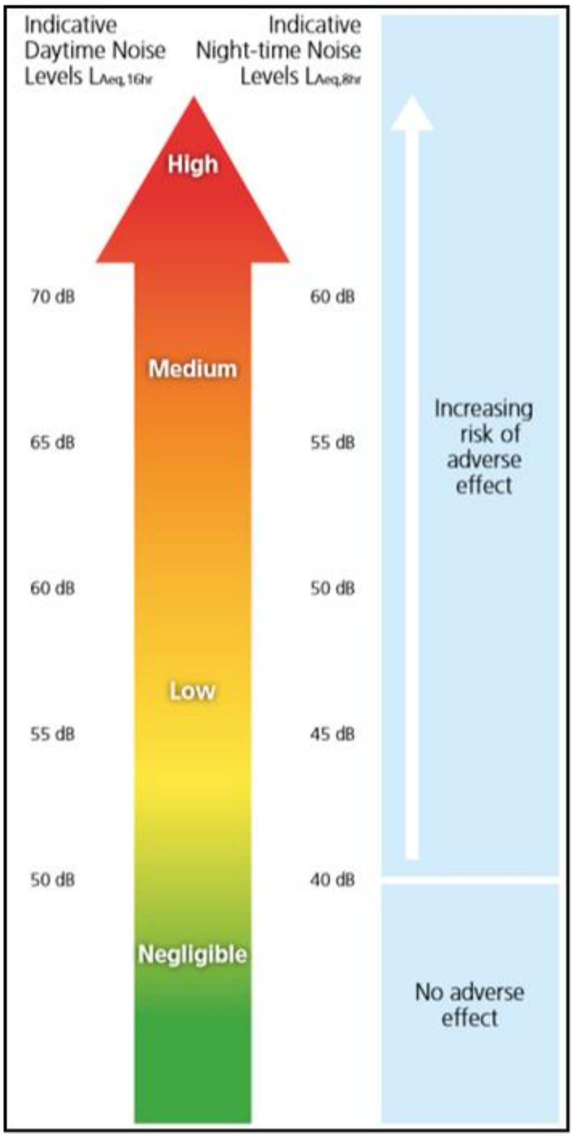

Figure 9-1 ProPG Stage 1 Initial Risk Assessment

With regard to the ProPG risk assessment conducted based on the baseline noise assessment, the development site may be classified as having a low risk in terms of the existing low-noise climate at the site, that is, there are no adverse pre-existing noise sources in proximity to the development site which may impact the residential units once developed and occupied by residents. Element 2 of the ProPG document sets out recommended internal noise targets derived from BS 8233 (2014). The recommended indoor ambient noise levels are set out in Table 9-1 and are based on annual average data levels.

Table 9-1 ProPG Internal Noise Levels

Activity	Location	(07:00 to 23:00hrs)	(23:00 to 07:00hrs)
Resting	Living Room	35 dB $L_{Aeq,\ 16hr}$	-
Dining	Dining Room/Area	40 dB $L_{Aeq,\ 16hr}$	-
Sleeping (Daytime Resting)	Bedroom	35 dB $L_{Aeq,\ 16hr}$	30 dB $L_{Aeq,\ 8hr}$ 45 dB L_{AFmax}

9.2.4 Outward Noise Impact Assessment Methodology

This section describes the methodologies used to assess the outward noise impact that the construction and operational phases of the proposed development may have on the receiving environment including local receptors.

The construction noise limits which are presented in Table 9.2 are specified in British Standard BS 5228 – 1:2009+A1 2014 Code of practice for noise and vibration control on open sites: Part 1 Noise and are based on the noise measured at the external façade of a receptor. BS5228 states that noise sensitive receptors (houses) are designated a category based on existing ambient noise levels. Each category is then assigned with a noise limit value.

- Category A Threshold values when ambient noise levels are less than these values.
- Category B Threshold values when ambient noise levels are the same as the Category A values.
- Category C Threshold values when ambient noise levels are higher than the Category A values.

Table 9-2 Threshold of Potential Significant Effect at Dwelling

Category and Threshold Value Period LAeq dB(A)	Category A	Category B	Category C
Night 23:00 – 07:00	45	50	55
Evening 19:00 - 23:00 & Weekends	55	60	65
Day 07:00 – 19:00 & Sat 07:00 – 13:00	65	70	75

The UK Design Manual for Roads and Bridges (DMRB, Volume 11, Section 3, Part 7) states that a change in noise level of 1dB LA10,18h is equivalent to a 25% increase or a 20% decrease in traffic flow, assuming other factors remain unchanged and a change in noise level of 3dB LA10,18h is equivalent to a 100% increase or a 50% decrease in traffic flow.

A change in traffic noise of less than 2dBA is generally not noticeable to the human ear whilst a change of 3dBA is generally considered to be just perceptible. Changes in noise levels of 3 to 5 dBA would however be noticeable and, depending on the final noise level, there may be a slight or moderate noise impact. Changes in noise level in excess of 6dBA would be clearly noticeable, and depending on the final noise level, the impact may be moderate or significant. However, a significant change in traffic volumes or traffic category i.e. increase in the use of a road by HGVs, would be required to result in such increases.

Traffic noise levels in excess of 60dBA (Lden) are considered to be potentially intrusive. LDEN is the day-evening-night composite noise indicator for assessing overall noise annoyance. For new roads projects the National Roads Authority design goal is to mitigate when predicted levels exceed 60dB Lden. However, for existing roads the Dublin Agglomeration, within the Noise Action Plan, have set a level of 70dB (Lday) and 55dB (Lnight) above which mitigation measures should be considered.

Table 9-3 Likely impact associated with change in traffic noise level

Change in sound level (L_{10})	Subjective reaction	Impact
<3	Inaudible	Imperceptible
3-5	Perceptible	Slight
6-10	Up to a doubling of loudness	Moderate
11-15	Over a doubling of loudness	Significant
>15		Profound

9.2.5 Construction Phase Vibration Assessment Methodology

Vibration standards come in two varieties: those dealing with human comfort and those dealing with cosmetic or structural damage to buildings. In both instances, it is appropriate to consider the magnitude of vibration in terms of Peak Particle Velocity (PPV).

Construction impacts have been assessed in accordance with BS 7385-2:1993 – Evaluation and Measurement for Vibration in Buildings: Part 2 – Guide to Damage Levels from Groundborne Vibration and BS 5228 Code of Practice for noise and vibration control of construction and open sites - Part 2: Vibration 2009+A1 2014.

Table 9.4 details the limits above which cosmetic damage could occur for transient vibration. Minor damage is possible at vibration magnitudes which are greater than twice those shown in Table 12.4, and major damage to a building structure would only generally occur at values greater than four times the tabulated values. These values only relate to transient vibration. If there is a continuous vibration, the guide values shown in Table 12-3 shall be reduced by up to 50%.

This guidance is reproduced from BS 5228-2:2009+A1 2014 – Code of Practice for Noise and Vibration Control on Construction and Open Sites: Part 2 – Vibration and BS 7385-2:1993 – Evaluation and Measurement for Vibration in Buildings: Part 2 – Guide to Damage Levels from Groundborne Vibration.

Table 9-4 Transient vibration guide values for cosmetic damage

Type of building	PPV (mm/s) in frequency range of predominant pulse	
	4-15Hz	15Hz and above
Reinforced or framed structures. Industrial and heavy commercial buildings.	50mm/s at 4Hz and above.	50mm/s at 4Hz and above.
Unreinforced or light framed structures. Residential or light commercial buildings.	15mm/s at 4Hz increasing to 20mm/s at 15Hz.	20mm/s at 15Hz increasing to 50mm/s at 40Hz and above.

Table 9-5, reproduced from *BS 5228 Code of Practice for noise and vibration control of construction and open sites - Part 2: Vibration 2009+A1 2014* outlines the vibration levels (in terms of PPV) from construction activities and their likely effect on humans.

Table 9-5 Guidance on the effect of construction vibration levels on humans

Vibration Level (PPV)	Effect
0.14mm/s	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.
0.30mm/s	Vibration might be just perceptible in residential environments.
1.0mm/s	It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents.
10mm/s	Vibration is likely to be intolerable for any more than a very brief exposure to this level.

9.3 RECEIVING ENVIRONMENT

The existing site is comprised of the Dundrum Village Centre, a number of occupied and vacant buildings along Main Street, associated surface car parking, and surface car park to the rear of Dundrum Church. The site is located between Dundrum Main Street and the R117 (Dundrum By-Pass).

The existing ambient noise climate at the site is dominated by road traffic in Dundrum Village to the east and road traffic on the R117 Dundrum By-Pass to the west. The LUAS is audible but not intrusive at the northern site boundary.

The measured existing ambient noise levels are typical of a busy urban village/town setting without being influenced by dominant industrial noise sources.

9.3.1 Baseline Noise Survey Locations

There are a number of existing noise sensitive receptors located in proximity to the development site boundaries. Baseline noise measurements surveys were conducted at on-site locations to determine the potential inward noise impact and at off-site noise sensitive receptors to assess how the outward noise from the construction and operational phases of the development may impact existing noise sensitive receptors. The following five locations were identified for measurement, as shown in Figure 9-2 below, as representative of the noise sensitive receptors

A – Northern Site Boundary
B – Western Site Boundary
C – Holy Cross Church + Parochial house
D – Eastern Site Boundary (North)
E – The Laurels / Sweetmount Park

The noise parameters used to describe the existing ambient noise climate are described as follows:

- LAeq: The equivalent continuous sound level. It is a type of average and is used to describe a fluctuating noise in terms of a single noise level over the sample period.
- LA10: The sound level that is exceeded for 10% of the sample period. It is typically used as a descriptor for traffic noise.
- LA90: The sound level that is exceeded for 90% of the sample period. It is typically used as a descriptor for background noise.
- LAmax: The instantaneous maximum sound level measured during the sample period.
- The Lden parameter is a descriptor of noise level based on energy equivalent noise level (Leq) over a whole day with a penalty of 10dB(A) for night time noise (23:00 – 07:00hrs) and an additional penalty of 5dB(A) for evening noise (19:00 – 23:00hrs).
- The Lnight parameter is a descriptor of noise level based on energy equivalent noise level (Leq) over an 8-hour night period between (23:00 – 07:00hrs).
- 1/3 Octave band analysis: The frequency analysis of a sound such that the frequency spectrum is subdivided into bands of one-third of an octave each. Used to determine tonal components of a sound source.

Noise levels are measured using a logarithmic noise scale (decibel) and are denoted dBA. The "A" indicates that a frequency weighting has been applied to allow for the variation in the sensitivity of the human ear.

Figure 9-2 Baseline Noise Survey Locations

9.3.2 Baseline Noise Survey Results

Attended baseline noise measurement surveys were conducted at 5 no. locations A-D as described in Table 9-6 to 9-10 during October 2021.

Table 9-6 Location A Northern Site Boundary

Location A	Measured sound pressure levels dBA (re 20µPa)			
	L_{Aeq}	L_{90}	L_{A10}	L_{AFmax}
12.10.21	65	57	68	79
Dominant Noise Sources	Road Traffic on R117 and Dundrum Main Street Passing LUAS movements			

Table 9-7 Location B Western Site Boundary

Location B	Measured sound pressure levels dBA (re 20µPa)		
	$L_{Aeq,16hr}$	L_{A8hr}	
12.10.21	71	66	
Dominant Noise Sources	Road Traffic on R117 Dundrum By-Pass		

Table 9-8 Location C Church

Location C	**Measured sound pressure levels dBA (re 20µPa)**			
	$L_{Aeq,3\text{-}hr}$	$L_{A90,\,3\text{-}hr}$	$L_{A10\ 3\text{-}hr}$	L_{AFmax}
12.10.21	63	57	66	83
Dominant Noise Sources	Road Traffic on R117 and Dundrum Main Street Traffic in carpark			

Table 9-9 Location D Eastern Site Boundary

Location D	**Measured sound pressure levels dBA (re 20µPa)**		
	$L_{Aeq,16hr}$	L_{A8hr}	
12.10.21	60	57	
Dominant Noise Sources	Road Traffic Dundrum Main Street		

Table 9-10 Location E The Laurels Residential Receptors West of Site

Location E	**Measured sound pressure levels dBA (re 20µPa)**			
	$L_{Aeq,3\text{-}hr}$	$L_{A90,\,3\text{-}hr}$	$L_{A10\ 3\text{-}hr}$	L_{AFmax}
12.10.21	55	51	56	73
Dominant Noise Sources	Road Traffic on R117 Dundrum By-Pass			

9.3.3 Predicted Construction Noise Levels

The predicted construction noise levels that will be experienced at the nearest receptors as a result of demolition and construction activities have been calculated using the activity LAeq method outlined in BS 5228 1:2009+A1 2014 – Code of Practice for noise and vibration control on construction and open sites – Part 1 Noise.

Tables 9-11 to 9-13 detail the typical plant items to be used during the demolition and construction phases with the associated source reference from BS 5228: 2009+A1 2014.

Table 9-11 Site Preparation Noise Sources

Plant Item	**BS 5228 Reference**	**Construction Noise Level L_{Aeq} dB @10m**
Tracked Excavator	C.2 22	72
Dump Truck	C.4.2	78
Dozer	C2.13	78
Loader Lorry	C3.1	75
Calculated sound pressure levels LAeq dB at distances from receptors		
$L_{Aeq,1hr}$ @ 10m	74	
$L_{Aeq,1hr}$ @ 20m	67	
$L_{Aeq,1hr}$ @ 30m	62	
$L_{Aeq,1hr}$ @ 40m	59	
$L_{Aeq,1hr}$ @ 50m	57	
$L_{Aeq,1hr}$ @ 60m	55	

Table 9-12 Demolition Noise Sources

Plant Item	**BS 5228 Reference**	**Construction Noise Level L_{Aeq} dB @ 10m**
Pneumatic breaker on Backhoe	C1.2	92
Tracked Excavator	C2.22	72

Plant Item	BS 5228 Reference	Construction Noise Level L_{Aeq} dB @ 10m
Pulveriser on Tracked Excavator	C1.5	72
Dump Truck	C4.2	78
Mobile crusher	C1.14	82
Calculated sound pressure levels LAeq dB at distances from receptors		
$L_{Aeq,1hr}$ @ 10m	83	
$L_{Aeq,1hr}$ @ 20m	75	
$L_{Aeq,1hr}$ @ 30m	71	
$L_{Aeq,1hr}$ @ 40m	68	
$L_{Aeq,1hr}$ @ 50m	65	
$L_{Aeq,1hr}$ @ 60m	62	

Table 9-13 Piling Noise Sources

Plant Item	BS 5228 Reference	Construction Noise Level LAeq dB @ 10m
Rotary Piling	C3.14	83
Concrete Pump	C3.25	78
Tracked Excavator	C2.22	72
Calculated sound pressure levels LAeq dB at distances from receptors		
$L_{Aeq,1hr}$ @ 10m	74	
$L_{Aeq,1hr}$ @ 20m	67	
$L_{Aeq,1hr}$ @ 30m	62	
$L_{Aeq,1hr}$ @ 40m	59	
$L_{Aeq,1hr}$ @ 50m	56	
$L_{Aeq,1hr}$ @ 60m	53	

Table 9-14 Foundation Pour Noise Sources

Plant Item	BS 5228 Reference	Construction Noise Level LAeq dB @ 10m
Tracked Excavator	C2.22	72
Concrete Pump	C3.25	78
Poker Vibrator	C4.33	78
Compressor	D7.6	77
Calculated sound pressure levels LAeq dB at distances from receptors		
$L_{Aeq,1hr}$ @ 10m	75	
$L_{Aeq,1hr}$ @ 20m	67	
$L_{Aeq,1hr}$ @ 30m	63	
$L_{Aeq,1hr}$ @ 40m	60	
$L_{Aeq,1hr}$ @ 50m	57	
$L_{Aeq,1hr}$ @ 60m	54	

Table 9-15 General Construction Activities Noise Sources

Plant Item	BS 5228 Reference	Construction Noise Level LAeq dB @10m
Generator (enclosed)	D6.	61
Articulated Truck	Note	77
Cement mixer truck pumping concrete	C4.25	82
Tower Crane	C4.48	76

Plant Item	BS 5228 Reference	Construction Noise Level LAeq dB @10m
Calculated sound pressure levels LAeq dB at distances from receptors		
$L_{Aeq,1hr}$ @ 10m	74	
$L_{Aeq,1hr}$ @ 20m	67	
$L_{Aeq,1hr}$ @ 30m	62	
$L_{Aeq,1hr}$ @ 40m	59	
$L_{Aeq,1hr}$ @ 50m	57	
$L_{Aeq,1hr}$ @ 60m	55	

Note: Sound Data from Byrne Environmental database on construction noise sources

9.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed development is described in Chapter 3. The following detail is relevant to the assessment in this Chapter.

Short term noise exposure during the construction phase must be managed and controlled to acceptable levels. There are a number of existing noise sensitive receptors located in proximity to the development site boundaries. It is fundamental that the proposed development or any aspect of the proposed development must not adversely impact the existing noise levels experienced at these receptors during both the short-term construction phase and the long-term operational phase.

The development of the site will be conducted over a total period of c.8 years with construction proposed to begin in Zone 1 and extend southwards through Zones 2-4. Each zone of works is estimated to take c. 2 years to complete. Works may overlap between zones.

<u>Enabling works / Site Set Up</u>**:-** Works activities associated with the 'Site set up' will be undertaken prior to construction works commencing. The setting up of the site shall involve the construction of site security hoarding and site compounds, site offices, materials and waste storage areas and staff welfare facilities. These short-term activities will have a minimal potential to generate elevated noise levels beyond the site boundary.

<u>Demolition Works</u>**:-** The demolition phase will require excavators, pneumatic breakers, compressors and generators as well as specialist demolition equipment such as mulching attachments on long reach tracked excavators. This phase of work has the potential to generate elevated noise levels beyond the site boundary.

<u>Bulk Excavation</u>**:-** A variety of plant (i.e. excavators, dump trucks, compressors and generators and pneumatic breakers) will be in use during site clearance and ground excavation. The operation of these items of plant has the potential to generate elevated noise levels beyond the site boundary. During the site clearance works and the basement bulk dig, the movement of trucks to and from the site shall result in an increase in the volume of HGV's within the immediate area and along the proposed haul routes which will generate additional noise levels.

<u>On-Site Rock Crushing</u>**:-** As part of the bulk excavation, rock will be extracted from the site through a combination of drilling, ripping and pneumatic breaking. It is proposed that the excavated rock will be crushed on-site to allow its re-use on-site for piling pads. This activity has the potential to generate elevated noise levels beyond the site boundary.

Basement Piling Works:- Basement construction will involve the insertion of piles around the perimeter of the proposed apartment block buildings using rotary piling plant. Once the secant pile wall is complete, the basement area will be dug out by excavators.

General Construction Works:- During the construction phase there will be extensive site works, involving construction machinery, construction activities on site, and construction traffic, which will all generate noise. The highest noise levels will be generated during the general construction activities. The construction noise levels will be of relatively short-term duration and will only occur during daytime hours which will serve to minimise the noise impacts at local existing receptors. The construction phase will result in a short-term increase in noise levels in the area as well as introducing tonal and impulsive noise as a result of construction activities such as pneumatic breaking, cutting, excavating, vehicle movements and general manual construction activities.

9.5 CONSTRUCTION IMPACTS

The potential effects of the proposed development are considered for the short-medium term construction phase are set out in the following sections.

Construction noise has a negative impact. It will be moderate and temporary. The frequency will not be consistent during this time, with effects on sensitive receptors changing depending on the type of activity being undertaken and the proximity to zone of development being constructed at that time.

Table 9-16 presents the predicted construction activity noise (LAeq,1hr) at each specified receptor for each phase of the construction works. (Refer to Figure 9.3 for locations). The results of the assessment conclude that provided all mitigation measures including site hoarding are implemented, the BS5228 guidance construction day time noise limit of 75dB LAeq, 11hr shall be complied with during site enabling, demolition, excavation, piling and general construction works.

Table 9-16 Predicted Construction Activity Noise (LAeq,1hr)

Location	Site Preparation	Demolition Phase	Piling Works	Foundation Works	General Construction
			LAeq, $_{1hr}$ dB(A)		
N1 Main St North	62	75	67	67	67
N2 Main St East	74	75	67	67	67
N3 Holy Cross Church	74	75	74	75	74
N4 The Laurels / Sweetmount Park	62	62	53	54	55
N5 11, 16/17 Main St	74	75	74	75	74
N6 Sweetmount Avenue	57	65	56	57	57
N7 Dundrum View Apts	62	71	62	63	62

The proposed construction phase noise mitigation measures outlined in Section 9.5.1 shall ensure that all demolition and construction activities are controlled and managed.

Construction Traffic Noise

The maximum volume of construction traffic will be associated with the bulk excavation which will include up to 70 HGV movements per day on the haul routes to and from the site along public roads, the resulting average predicted traffic noise level at the closest receptors is calculated as follows:

The predicted noise levels at any receptor located within 5m of the haul route road has been calculated using a standard international acoustical formula as described below.

LAeq, T = SEL + 10log10(N) - 10log10(T) + 20log10(r1/r2) dB
where
LAeq, This the equivalent continuous sound level over time period (T) (3600 sec);
SEL is the A weighted Sound Exposure Level of the noise event (77dB);
N is the number of events over the time period T (70);
r1 is the distance at which SEL is assessed (5m)
r2 is the closest distance to the receptor from the road (10m)

The calculations are based on a 10-hour working day a maximum, a Sound Exposure Level of 77dBA for the trucks and the minimum distance between the local road passing by each of the nearest noise sensitive receptors to the public road (10m). No attenuation, above geometric spreading, has been considered within these calculations and they may be considered the worst case scenario.

The maximum predicted LAeq, period values as a result of the HGV traffic movements at the nearest noise sensitive receptors located along the haul route roads is predicted to be 54dBA, LAeq, period.

It is not expected that the predicted short-term increase in HGV movements associated with the construction phase of the development will have an adverse impact on the existing noise climate of the wider area or on local receptors.

Construction Generated Vibration

The most significant potential sources of ground borne vibrations that may be generated during the construction phase of the development will be generated by the following practices:

- Movement of site vehicles tracked excavators and dump trucks on ground surfaces
- Pneumatic breaking of ground surfaces
- Piling
- Hard core surfaces and haul road compaction with vibro-rolling vehicles
- Road construction surface vibro-rolling

It is predicted that vibration levels associated with construction activities at the closest receptors to the site will not exceed 7.5mm/sec PPV. Human response to ground borne vibrations will be perceptible at levels between 0.14 to 1.0 mm/sec PPV.

The Table below summarises the identified likely significant effects of the proposed development in the absence of mitigation during the construction phase.

Table 9-14 Summary of Construction Phase Likely Significant Effects without Mitigation

	Quality	Significance	Extent	Probability	Duration	Type
Construction Noise	Negative	Moderate to significant	Local	Likely	Temporary/Short-Term	Worst Case
Construction vibration	Negative	Slight to Moderate	Local	Likely	Short-Term	Worst Case
Construction Traffic	Negative	Slight	Local	Likely	Short-Term	Worst Case

9.5.1 Mitigation Measures

The following measures will be applied for the construction (including demolition) phase:-

NV-C1	The appointed Contractor will implement best practice noise mitigation and control methods and manage the construction and demolition works to comply with noise limits outlined in BS 5228-1:2009+A1 2014. Part 1 – Noise
NV-C2	Compressors will be attenuated models fitted with properly lined and sealed acoustic covers which will be kept closed whenever the machines are in use and all ancillary pneumatic tools shall be fitted with suitable silencers.
NV-C3	Machinery that is used intermittently will be shut down or throttled back to a minimum during periods when not in use.
NV-C4	Erection of good quality site hoarding to the site perimeters which will act as a noise barrier to general construction activity at ground level.
NV-C5	Erection of barriers as necessary around items such as generators or high duty compressors; and situate high noise plant as far away from sensitive properties as permitted by site constraints.
NV-C6	Screening to be erected around high noise activities such as pneumatic breaking and crushing
NV-C7	All tracked vehicles shall be fitted with rubber tracks and broadband reverse warning beacons
NV-C8	Pneumatic hammers shall be fitted with dampers
NV-C9	The appointed Contractor will implement best practice vibration mitigation and control methods outlined in BS 5228-1:2009+A1 2014. Part 2 – Vibration
NV-C10	Loud works occurring in proximity to Dundrum Church will temporarily cease during funeral services

9.5.2 Monitoring

The following monitoring measures are required:-

NV-M1	A comprehensive programme of continuous live noise monitoring shall be conducted at the site boundaries in proximity to noise sensitive receptors for the duration of the construction phase. The systems shall be capable of transmitting live text and email alerts to nominated construction staff should a noise limit be approached or exceeded.
NV-M2	A comprehensive programme of continuous live vibration monitoring shall be conducted at structures in proximity to the site boundaries for the duration of the construction phase. The systems shall be capable of transmitting live text and email alerts to nominated construction staff if vibration levels approach or exceed the specified warning and limit values.

<u>**Noise Monitoring Methodology**</u>

This section describes the noise monitoring methodologies that shall be implemented at the site to ensure that construction site activities do not cause excessive nuisance at local receptors and to demonstrate how live monitoring systems will assist construction management to comply with noise limit criteria.

Prior to the commencement of the site construction activities, a programme of continuous noise monitoring at the closest receptors to the site shall be undertaken to assess and manage the impact that site activities may have on ambient noise levels at receptors. These surveys will establish the noise impact of site activities at the closest noise sensitive receptors to assess compliance with the specified construction noise limit criteria and to ensure that mitigation and control measures are being implemented as required.

All noise monitoring data will be compiled into a monthly technical monitoring report which will include a full assessment of the potential noise impacts arising from site construction activities.

The environmental noise measurements will be completed in accordance with the requirements of ISO 1996-1: 2017: Acoustics – Description, measurement and assessment of environmental noise and with regard to the EPA's 2016 Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4). The measurement parameters to be recorded include LAeq, LA90, LA10 and LAmax , and 1/3 Octave Frequency analysis to allow tonal noise to be identified.

All live noise monitoring systems shall be programmed to include audio recording to allow construction management identify the source of high noise. The systems shall be capable of transmitting live text and email alerts to nominated construction staff should a noise limit be approached or exceeded.

Noise monitoring shall be conducted in proximity to the closest noise sensitive receptors to the site. The noise monitoring locations (N) in proximity to the closest receptors are shown in Figure 9-3.

Vibration Monitoring Methodology

In order to ensure that site construction activities are conducted to minimise the vibration impacts on the receiving environment, it is proposed that structural vibration monitoring shall be implemented during the course of the construction phase. It is proposed that vibration monitoring will be conducted at the closest adjacent properties to the site boundaries using live data logging vibration monitors and geophones with live text and email alert functionality to ensure that if vibration levels approach or exceed the specified warning and limit values, nominated construction staff shall be instantly alerted to cease at the earliest instance and appropriate mitigation measures may then be implemented to minimise the ongoing impact on the monitored structures.

The monitoring points chosen for locating the geophone of the vibration measuring instrument will be determined according to the guidelines in *British Standard BS 7385:, Evaluation and measurement for vibration in buildings, Part1 1990 Guide for measurement of vibrations and evaluation of their effects on buildings and Part 2 1993 Guide to damage levels arising from ground borne vibration.*

The vibration monitoring locations (V) in proximity to the closest receptors are shown in Figure 9-3.

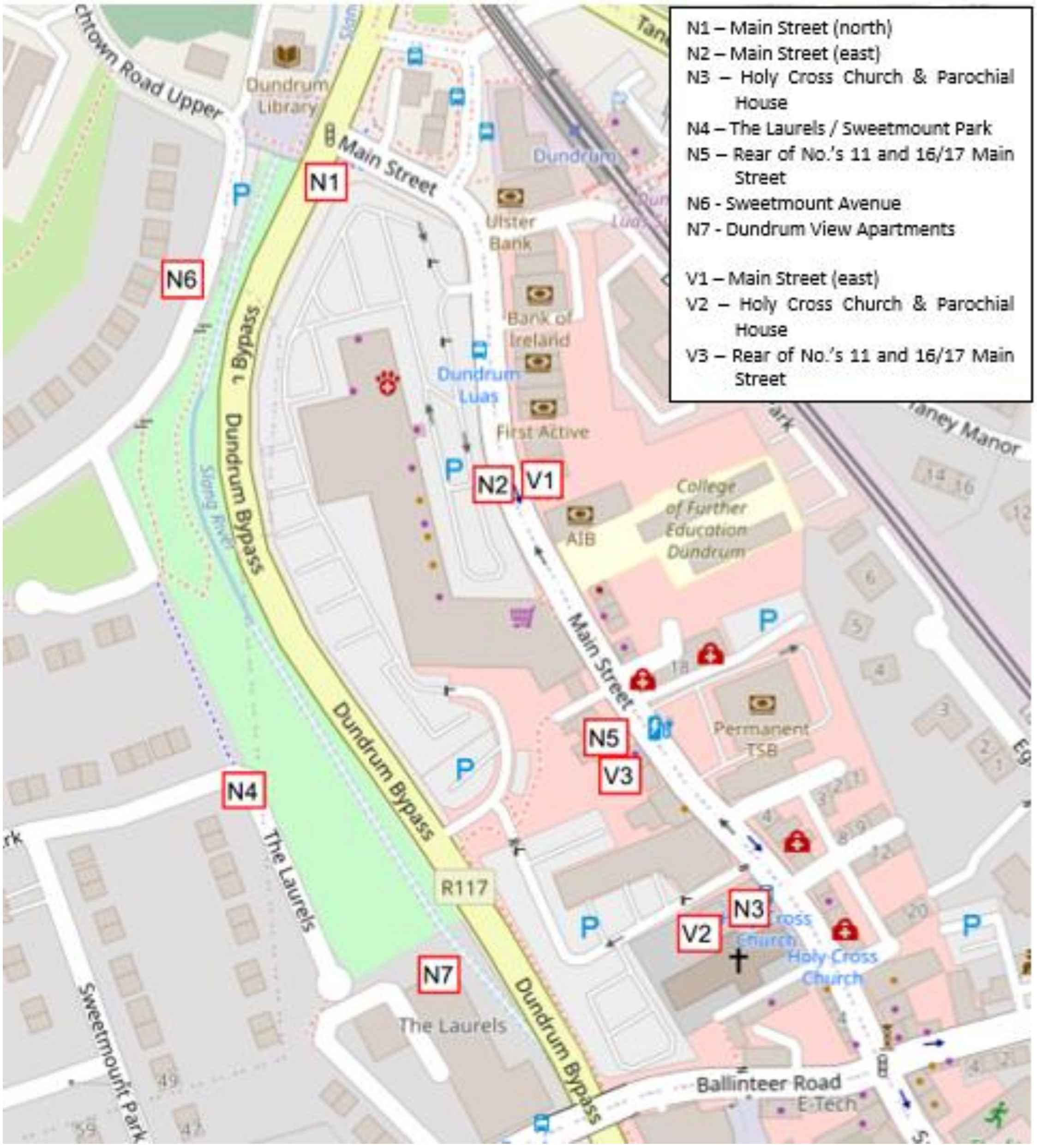

Figure 9-3 **Noise & Vibration Monitoring Locations**

9.6 OPERATIONAL IMPACTS

The potential effects of the proposed development are considered for the permanent operational phase (effects lasting 60+ years). These are set out in the following sections.

<u>Internal Residential Traffic Noise</u>

The development includes the provision of basement level car parking spaces for the residential units. Vehicles within the residential areas will generally travel at speeds <20kmph as a result of speed limit signage and speed reducing ramps throughout the development which result in low noise levels being generated by internal vehicle movements.

<u>Neighbourhood Noise</u>

Within the proposed development, sounds generated by everyday domestic activities including waste collection activities, pedestrians, children, and use of open spaces, are part of everyday living, and are not considered “noise” in the sense of a potential nuisance. These activity noises would not have any potential to cause an adverse noise impact beyond the boundaries of the site or within the site itself.

Commercial / Retail Unit and Creche Facility Noise
The proposed commercial / retail units and creche will be located at ground floor level within the apartment block structures. It is predicted that the operation of any such unit will not result in adverse noise levels at any receptor within the development or beyond the site boundaries.

9.6.1 Mitigation Measures

The following measures are required:-

NV-01	All external mechanical plant shall be enclosed in louvered structures

9.6.2 Monitoring Measures

No monitoring is required.

9.6.3 Cumulative Effects

There will be no cumulative effect associated with the subject development occurring at the same time as another local large scale development.

9.7 OTHER EFFECTS

9.7.1 Residual Effects

Construction Phase

Residual Noise Impact: The impact of the construction phase will result in an increase in daytime noise levels at the closest receptors to the site. With mitigation measures in place, it is predicted that the guideline construction noise limit of 75dB(A) LAeq, 11-hour can be complied with at receptor locations N1 – N7.

Residual Vibration Impact: Site activities, in particular ground clearance and piling works will generate perceptible vibration at the locations V1-V3 adjoining the development site It is predicted that vibration levels associated with construction activities at the closest receptors to the site will not exceed 15 mm/sec PPV. Human response to ground borne vibrations will be perceptible at levels between 0.14 to 1.0 mm/sec PPV.

The Table below summarises the identified likely significant effects of the proposed development during the construction phase post application of mitigation measures.

Table 9-11 Summary of Construction Phase Residual Effects

	Quality	Significance	Extent	Probability	Duration	Type
Construction Phase Noise	Negative	Moderate to significant	Local	Likely	Temporary to Short-Term	Residual
Construction Phase Vibration	Negative	Not Significant	Local	Likely	Temporary to Short-Term	Residual

Operational Phase

Residual Noise Impact: The operational phase of the development will not adversely impact the existing noise climate at local receptors.

Residual Vibration Impact: The operational phase of the development will not generate ground borne vibration levels.

The Table below summarises the identified likely significant effects of the proposed development during the operational phase post application of mitigation measures.

Table 9-12 Summary of Operational Phase Residual Effects

	Quality	Significance	Extent	Probability	Duration	Type
Operational Phase Noise	Neutral	Not Significant	Local	Likely	Long-Term	Residual
Operational Phase Vibration	Neutral	No Effect	N/A	N/A	N/A	N/A

Inward Noise Impact Assessment

The measured noise levels are within the ProPG Medium Risk Assessment Category during the daytime period and within the Medium Risk Category during the night time period as detailed in Table 9-13.

Table 9-13 ProPG Assessment

ProPG Assessment Period	Measured Value dB(A)	ProPG Risk Assessment Criteria dB(A)	Effect without Mitigation
Northern Facade $L_{Aeq, 16hr}$ Daytime	69	60	Medium Risk
Northern Facade $L_{Aeq, 8hr}$ Nighttime	65	55	Medium Risk
Western Facade $L_{Aeq, 16hr}$ Daytime	71	60	Medium Risk
Western Facade $L_{Aeq, 8hr}$ Nighttime	66	55	Medium Risk
Eastern Facade $L_{Aeq, 16hr}$ Daytime	60	60	Low Risk
Eastern Facade $L_{Aeq, 8hr}$ Nighttime	57	55	Low Risk

The recorded noise levels demonstrate that existing road related noise at the development site vary and range between the ProPG Low and Medium Risk Assessment Categories which means that the site is likely to be acceptable from a noise perspective provided that good acoustic design process is followed.

Based on the baseline noise survey results an *Intrusive Noise Assessment Stage 3* was prepared by AWN Consulting (Appendix 9A) to specify building façade sound insulation requirements to ensure that the internal residential units comply with the recommended internal sound levels as specified in *British Standard BS 8233:2014: Guidance on Sound Insulation and Noise*

Reduction in Buildings.

Figure 9-4 shows the Façade Performance Requirements and Table 9-14 details the associated acoustic specifications to comply with the *BS 8233:2014* internal noise levels design criteria.

Figure 9.4 Façade Performance Requirement

Table 9-14 Minimum Sound Insulation Performance Requirements (Sound Reduction Index R, dB)

Type	Façade Mark Up	Octave Band Centre Frequency (Hz)						Nominal dB R_w
		125	250	500	1k	2k	4k	
A	Red	25	32	37	42	45	45	40
B	Orange	22	27	32	37	42	42	37
C	Green	21	20	26	38	37	39	32

9.7.2 Do Nothing Effects

Should the subject development not proceed, the existing activities on the site will remain and there will be no change to the baseline situation described in Section 9.3.

9.7.3 Worst case Effects

A worst-case scenario would arise if the noise and vibration mitigation measures are not implemented during the construction phase of the development. This would result in the generation of uncontrolled noise and vibration from the site which would result in an unacceptable impact on local receptors and the receiving environment.

9.8 INTERACTIONS

Interactions between the noise and vibration assessment and traffic assessment. With decreased traffic movements associated with the operational phase, the noise levels in the surrounding area will decrease. The impacts of the proposed development on the noise environment are assessed by reviewing the change in traffic flows on roads close to the site. In this assessment, the impact of the interactions between traffic and noise will result in a positive impact as a result of less traffic movements.

REFERENCES

- Dublin Agglomeration Noise Action Plan 2018 – 2023 (NAP).
- Design Manual for Roads & Bridges – Volume 11 Section 3.
- EPA (2018) Round 3 Strategic Noise Mapping of Aircraft, Road and Rail
- Professional Guidance on Planning & Noise (ProPG), (IoA, 2017).
- British Standard BS 5228 (2009 +A1 2014): Code of Practice for Control of Noise and Vibration on Construction and Open Sites Part 1: Noise & Part 2: Vibration.
- British Standard BS 7385 (1993): Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration.
- British Standard BS 8233: 2014: Guidance on sound insulation and noise reduction for buildings.
- British Standard BS 4142: 2014: Methods for Rating and Assessing Industrial and Commercial Sound
- Calculation of Road Traffic Noise, Department of Transport Welsh Office, HMSO, 1988.
- ISO 1996-2: 2017: Acoustics – Description, measurement and assessment of environmental noise.
- ISO 9613 (1996): Acoustics – Attenuation of sound during propagation outdoors, Part 2: General method of calculation.
- Dun Laoghaire Rathdown County Council (2021) Guidance Notes for Environmental Management of Construction Projects

10.0 MATERIAL ASSETS: BUILT SERVICES

10.1 INTRODUCTION

This Chapter of the EIAR describes the existing material assets for the drainage and potable water aspects of the project as well as Electricity, Gas and Telecommunications and assesses the potential impacts associated with the project.

This chapter was prepared by Diarmuid Cahalane of T. J O'Connor & Associates. Diarmuid is a Chartered Engineer with Engineers Ireland, a Chartered Member of the Chartered Institute of Water & Environmental Management (CIWEM) and is a Fellow of Engineers Ireland. Diarmuid has been practicing as a consulting engineer for thirty-seven years. Diarmuid holds an undergraduate degree in Civil Engineering, a Master's degree in Engineering Science and a Diploma in Construction Law and Contract Administration.

Input in relation to proposed electrical, gas and telecommunications environment has been prepared by Brian West of BDP. Brian West is a Chartered Engineer with Engineers Ireland and is a Fellow of the Chartered Institution of Building Services Engineers. Brian holds a Master's degree in Building Services Engineering and has been practicing as a consulting engineer for twenty-four years.

10.2 ASSESSMENT METHODOLOGY

In addition to the sources listed in Chapter 1, other reference documents used in the preparation of this assessment include the following:

- National Roads Authority (2008) *Guidelines on Procedures for the Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes*.
- Construction Industry Research and Information Association (2001) *Control of water pollution from construction sites. Guidance for consultants and contractors (C532D)* .

A desktop study was carried out on the local and regional surface water and drainage network. Information was obtained from documents including the following sources:

- ERBDA (2005) Eastern River Basin District Catchment Characterisation Report
- ERBDA (2010a) ERBD River Basin Management Plan 2009-2015
- ERBDA (2010b) ERBD Programme of Measures 2009-2015
- ERBDA (2011) ERBD River Basin Management Plan - Strategic Environmental Assessment
- EPA (online – Accessed on various date March 2022) Water Quality Database and Envision Map Viewer (www.epa.ie)
- Dun Laoghaire Rathdown County Council Water and Drainage Department record drawings and discussions with Drainage Division Engineers
- Irish Water record drawings and discussions with Irish Water Engineers;
- TJOC (2022) *Site Specific Flood Risk Assessment* Report which accompanies this Planning Application.
- All available information concerning the development including development plans.

The following legislation was referred to in compiling this chapter:

- *Water Framework Directive 2000/60/EC*
  The EU Water Framework Directive (WFD) 2000/60/EC came into force on 22nd December 2000 and enacted into Irish legislation through S.I. No. 722 of 2003 European

Communities (Water Policy) Regulations 2003. This legislation and regulation is a significant piece of legislation for water policy, as it provides a co-ordinated approach across Europe for all water policies, establishing a management structure for future water policy. A few key objectives of the Directive are to:

- Protect all waters, including rivers, lakes, groundwater, transitional and coastal waters.
- Achieve "good status" in all waters by 2015, and maintaining "high status" where the status already exists.
- Have water management based on River Basin Districts (RBD).

The strategies and objectives of the Water Framework Directive in Ireland have been influenced by a range of National and European Union legislation and regulation including:

- European Communities (Quality of Salmonid Waters) Regulations 1988 (S.I. No. 293 of 1988),
- Local Government (Water Pollution) Acts 1977 – 2007,
- Water Quality Standards for Phosphorus Regulations 1998 (S.I. No. 258 of 1998).

In turn the implementation of the Water Framework Directive and its associated policies has necessitated the introduction of new regulations in Ireland including, the European Communities Environmental Objectives (Surface Waters) Regulations 2009, which are discussed further in the following section.

- *European Communities Environmental Objectives (Surface Waters) Regulations 2009 (S.I. No.272 of 2009)*
  These regulations have been devised as a more complete and stringent set of surface water quality regulations which covers the requirements of the Water Framework Directive and the Dangerous Substances Directive. These regulations came into effect on 30th July 2009 and have been adopted by the Government. These new regulations supersede previous water quality regulations (both EU and national). This project must still be cognisant of previous regulations as they form the basis for a wide range of impact assessment and monitoring methodologies. It is envisaged that a detailed construction management plan which will include the management or disposal of surface water runoff will be prepared in advance of construction commencing on site. The construction management plan will be cognisant of these new regulations and apply them throughout the construction phase.

- *Directive 2013/39/EU of the European Parliament and of the Council of 12 August 2013 amending Directives 2000/60/EC and 2008/105/EC as regards priority substances in the field of water policy*
  This Directive has been devised to assign a chemical status assessment for water bodies. Directive 2008/105/EC provides environmental quality standards in the field of water policy.

- *European Communities (Quality of Salmonid Waters) Regulations 1988 (S.I. No. 293 of 1988)*
  The Salmonid Regulations set water quality standards for salmonid waters, with identification of salmonid waters, water quality standards, and frequencies of sampling and methods of analysis and inspection.

- *Local Government (Water Pollution) Acts 1977 – 2007*

The Act is the main legislation for the prevention and control of water pollution, including the general prohibition of polluting matter to waters. While this act has largely been superseded by the 2009 Regulations, current impact assessment and monitoring methodologies must still be cognisant of this legislation.

- *Water Quality Standards for Phosphorus Regulations 1998 (S.I. No. 258 of 1998)*
  As part of the Water Pollution Acts, these regulations require water quality be maintained or improved, with reference to the biological quality river rating system (Q Rating) as assigned by the Environmental Protection Agency between 1995 to 1997.

An assessment of the existing water quality was also carried out in the form of a desktop study examining water quality data from the EPA from surveys predominately conducted by the EPA and local authorities. Various quality classes are used to establish and monitor the condition of rivers and streams in Ireland. Quality classes relate to the potential beneficial use of a water body and can be affected by the quality of water discharged to surface water during construction and operation of a development.

Background Information on the local drainage network and water supply was obtained from documents from local authorities. Discussions were held between Irish Water and Dun Laoghaire Rathdown County Council.

A desktop study of the existing services infrastructure serving the site was undertaken. As part of this, the following data was sourced online:-
- Electrical Supply (ESB Networks);
- Gas Supply (Gas Networks Ireland);
- Telecommunications (Éir and Virgin Media).

Information provided by the above providers was reviewed in order to gain an appreciation of how the development site is currently served and determine its adequacy in terms of the proposed overall mixed-use development.

The assessment of potential impacts on the built services for the proposed development were assessed through a desktop study of the information provided in consultation with the relevant utility providers, listed above.

10.3 RECEIVING ENVIRONMENT

10.3.1 Foul Drainage

The existing sewerage system serving the surrounding area is recorded on Irish Water and DLRCC drainage record mapping as follows:-
- A 300mm diameter combined sewer flowing northwards along the valley of the Slang River behind Holy Cross Church and through the Dundrum Village Centre Car Park. This sewer receives connections from existing properties on the west side of Main Street and from the existing shopping centre. It also receives surface water from these properties and from the existing shopping centre. A CCTV survey of this sewer has shown that sections of it are in poor condition and that there is infiltration into the sewer at several locations.
- A 450mm diameter foul sewer serving the Ballinteer Road which increases to 750mm diameter at the point where it turns to run northwards along the west side of the

Dundrum Bypass. This foul sewer continues northwards through Sweetmount Park as a 675mm diameter sewer;

- A 225mm diameter foul sewer from Castlebrook estate and a 450 mm diameter foul sewer from the Dundrum Town Centre are connected to the southern end of the 675mm diameter sewer between Dundrum Castle and Ballinteer Road;
- A 225mm diameter combined sewer in the Sandyford Road originates near the Irish Marketing Institute in Balally. This sewer was diverted along the Ballinteer Road and into the 675mm diameter Dundrum Bypass foul sewer when the Dundrum Town Centre and the Bypass were constructed.
- A 225mm diameter combined sewer in Main Street. This sewer has a branch connection from the Upper Kilmacud Road and it continues down Main Street, increasing in size to 300mm for the section between the Shopping centre and Waldemar Terrace. It connects to the 300mm diameter sewer from the Shopping Centre immediately north of the junction with the Bypass. Problems have been experienced with this sewer in Dundrum Main Street as a result of ingress of surface runoff from the older housing on the Upper Kilmacud Road. There is no evidence that the buildings fronting the west side of the Main Street, north of Ballinteer Road, are connected to this sewer.

Foul and combined sewers in the vicinity of the site are shown at Figure 10.1 which is an extract from Irish Water (IW) records provided by DLRCC.

10.3.2 Public Water Supply

The existing public watermains serving the surrounding area is recorded on Irish Water and DLRCC drainage record mapping as follows:-

- A 400mm diameter watermain in the roadway at the north entrance to the existing shopping centre (Waldemar Terrace). This watermain runs from west to east across Main Street.
- 100mm diameter watermain in Sweetmount Terrace and Sweetmount Avenue on the west side of the Slang River.
- A 150mm diameter water main in Main Street laid within the carriageway in front of the Shopping Centre but close to or beneath the eastern footpath further south opposite Mulvey's and the Roman Catholic Church.
- A 150mm diameter watermain is located in the Ballinteer Road from the junction with Sandyford Road as far as the entrance to Pembroke Quarter near Dom Marmion Bridge. A 3 inch watermain is also located in this road and there is a ¾ inch connection from this latter main to the Roman Catholic Church.
- A 300mm watermain extending from a 600mm trunk main located at Gort Mhuire alongside the Wyckham Bypass as far as the southern end of the Dundrum Bypass and extending from there along the length of the Dundrum Bypass, located in the eastern verge of the roadway. Watermains in the vicinity of the site are shown at Figure 10.1 which is an extract from IW records provided by DLRCC.

10.3.3 Electricity

The existing site is serviced by an 10kV network cable which feeds a number of substations on the site. In discussions with ESB Networks, in the course of making this application, it has been confirmed that there is no issue with the proposed loads of the development, even when all phases are energised. ESB Networks infrastructure in the vicinity of the site is shown at Figure 10.2.

10.3.4 Natural Gas Supply

There is an existing 180mm PE-80 25 mbar low pressure supply network running through the development site at present with a connection into the shopping centre building. GNI infrastructure in the vicinity of the site is shown at Figure 10.3. It is also worth noting that the proposed development will not have any gas connections.

10.3.5 Telecommunications

The current site is well serviced with infrastructure on Main Street and on the Dundrum Bypass. Telecommunication infrastructure in the vicinity of the site, provided by Eir and Virgin Media is shown at Figures 10.4 and 10.5.

10.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed development is described in Chapter 3. The following detail is relevant to the assessment in this Chapter.

10.4.1 Foul Drainage

A new separate foul drainage network to collect and convey the wastewater generated by the project will be required.

Proposed Wastewater Load
The peak design wastewater demand for the project is c. 15.5l/s. Wastewater flows from Holy Cross Church and Parochial House discharge to the 300mm diameter combined sewer which runs through the length of the site at present. These flows will be diverted to the new foul sewer serving the proposed development. An allowance of 5000 l/day has been included in the estimates for the flows from these two buildings. The design wastewater demand quoted above includes the diverted flows from the Church and Parochial House[15].

Proposed Arrangements
Wastewater will be conveyed from each of the four zones of the development to a proposed trunk foul sewer within the proposed service road. The existing 300mm diameter combined sewer through the site will be abandoned.

Irish Water Confirmation of Feasibility
Irish Water has provided a Confirmation of Feasibility in respect of the project which included site-specific requirements in respect of wastewater. These site specific requirements are addressed in the development proposals as follows:-

IW Site-Specific Requirements	Design Team Response
Separate storm and foul water connection services will be provided for the Development.	The storm water from the site will be discharged only into the existing storm water network with no storm water

[15] Refer to the *Engineering Services Report* by T.J. O'Connor & Associates accompanying this application for calculations.

	discharges connected to the Irish Water network.
The current storm water discharge will be removed from the combined network. Further information, verified by surveys, will be provided at a connection application stage and before any existing infrastructure is demolished, regarding the current storm connections.	Strict wastewater flow management will be provided by using a pump station. Peak discharges from the development into the Irish Water network will be limited to 2.0 average Dry Weather Flow (DWF) (10.4l/s).
Details of the exact connection point will be determined by Irish Water at the connection application stage.	The development proposals identify the location proposed for the connection point as detailed at Figure. 10.6. This will be confirmed by Irish Water at connection application stage.

The proposed development will be provided with separate foul and surface water drainage systems. Surface water from the proposed development will pass through a SuDS management train and be attenuated prior to discharge to the Slang River and to ground through infiltration. All existing surface water drainage connections within the site to the sewers on the Irish Water combined sewer network will be abandoned when the development is constructed.

A pumping station incorporating balancing storage will be constructed on the proposed sewer network. This pumping station will limit discharges into the Irish Water network to 2 Dry Weather Flow (DWF) corresponding to 10.4l/s. The pumping station will include duty and standby pumps, a penstock in the final manhole upstream of the pumping station and a balancing tank that will also satisfy emergency storage requirements.

The rising main from the pumping station to the Irish Water network will be a 125mm OD HPPE pipeline and the discharge location will be agreed with Irish Water. It is proposed to discharge this rising main to a standoff manhole alongside the 675mm diameter IW sewer on the west side of the Dundrum Bypass. This standoff manhole will have a cover level of 46.188 and an invert level of 42.595 as shown at Figure 10.6.

10.4.2 Water Supply

Proposed Potable Water System

An estimate of daily water consumption has been prepared based on daily consumption figures and is estimated to be 386m^3/day

Table 10.2: Proposed Water Demand

		Water Demand	Average Water Demand	Peak Hour Demand
Residential	881units	356,805/day	4.13l/s	
Creche	225 children and staff	20,293l/day	0.23l/s	
Retail	3,424.7m^2	3,082l/day	0.04l/s	
Restaurants / Cafes	403.5m^2	6,053l/day	0.16l/s	
Total			4.47l/s	5. 59l/s

This estimate of daily water consumption is exclusive of fire-fighting water requirements and is based on standard consumption and peaking factors as set out in the Irish Water Code of Practice – Water Infrastructure.

Proposed Watermains

The water supply for the development will comprise of a 200 mm diameter watermain within the service road with connections to each of the four zones. A bulk water meter will be provided at the point of connection to the Irish Water network.

Within the individual zones, a boosted water supply system is proposed to boost to all blocks. Isolation Devices will be provided to prevent backflow from the internal water system to Irish Water's Network.

Fire Hydrants will be provided in non-trafficable areas only. Hydrants located on the podium level will be located alongside fire tender access.

Storage tanks for sprinkler systems will be located within the plant rooms at the lower ground floor of the proposed development site accessible from the Service Road

A three-way sluice valve arrangement will be provided at the proposed connection to an existing watermain point to isolate the site. A bulk Electro-Magnetic flow meter in accordance with Irish Water requirements will be installed at the connection point with remote read facilities.

Irish Water Confirmation of Feasibility

Irish Water has provided a Confirmation of Feasibility in respect of the project which included site-specific requirements in respect of water supply. These site specific requirements are addressed in the development proposals as follows:-

IW Site-Specific Requirements	Design Team Response
The watermain connection will be made to the existing 300mm DI main, downstream of the existing DMA and PRV, via a new 200mm ID pipe.	Connection will be made as per IW site-specific requirements. On site water storage will be provided, based on the average day peak week demand rate of the commercial section, for 24-hour period with 12- hour refill time

10.4.3 Natural Gas Supply

The new development will not have any gas connections, in order to be a Net Zero Carbon development.

10.4.4 Electrical Supply

The new incoming ESB supply for the development will originate from the main ESB Networks 10kV distribution network along the Dundrum Bypass.

A series of new ESB Networks substations will be positioned along the proposed access road adjoining Dundrum Bypass to supply electricity. These shall feed the Landlord connections for each zone, and the multiple centrally metered residential and retail unit connections.

Each zone will be served by separate electricity supply infrastructure, to allow flexibility in the construction of each zone.

10.4.5 Information and Communications Technology (ICT)

Telecoms and TV Services shall be provided to the development from the main telecoms service providers in the area. The main providers are Eir and Virgin Media, which are located along Dundrum Bypass and on Main Street.

Underground ducting infrastructure shall be provided from multiple entry points to and around each zone to provide resilient high speed telecoms, broadband and TV services.

10.5 CONSTRUCTION IMPACTS

Foul Water - Welfare facilities for the workforce engaged in the construction activities will generate a wastewater demand. Based on a workforce of 200 – 300 workers, the demand will be less than the demand generated by the existing buildings on site. The wastewater load generated by the construction workforce will have a neutral imperceptible impact in the short term.

Phased construction may require flows from some existing sewers to be maintained until subsequent phases of the new development are completed. The impact will be neutral. Diversion of any existing sewers to the new foul sewer network will not result in an increase in the peak discharge due to the wastewater pumping station managing and limiting the peak flow to the sewer network.

Surface Water – Surface water currently discharging to the combined sewer will be diverted to the construction stage water management system in conjunction with demolition of existing buildings and excavation of existing carparks. The impact will be positive. Surface water discharges, without attenuation, to the combined sewer and to the Slang River in the existing situation. During the construction stage runoff from areas under construction will no longer discharge to the combined sewer and will be attenuated before discharge to the Slang River.

The cessation of surface water flows to the existing combined sewer through the site will have a long term positive slight impact on sewer capacity and flood risk downstream.

Watermains - Welfare facilities for the workforce engaged in the construction activities will necessitate the provision of a construction stage water supply to the site. This water demand will not exceed the average or peak day water demand of the existing or the proposed water connections. Therefore, impact on the water supply network is likely to be neutral, imperceptible and short term.

Natural Gas Supply - The existing supply of natural gas from the network will be disconnected and removed at the start of the construction works. It will not be operational during the construction phase of the development. The effect will be neutral, imperceptible and permanent.

Electrical Supply - The permanent electricity connections will not be live during the construction phase until near completion of each zone, which will have lesser impact on the electricity demand of the development. There are existing ESB connections that will be de-energised and removed on a phased basis during the construction stages.

Construction related activities will require temporary connection to the local electrical supply network. The potential impact from the construction phase of the proposed development on the local electrical supply network is likely to be negative, moderate and short – medium term as the temporary connections required will be relatively large.

Information and Communications Technology (ICT) - Telecoms diversions are not required so there will be no impact on local telecoms connectivity.

10.5.1 Mitigation Measures

There is no specific requirement for mitigation in the context of this chapter, however, the following construction measures are relevant to the installation of services on site.

MA:BS-C1	Foul Drainage - Temporary discharge of wastewater during construction utilising the existing or permitted sewerage network shall be by agreement with Irish Water. All necessary health and safety measures shall be undertaken to ensure the safety and welfare of construction personnel, the public and road users during construction of the foul infrastructure.
MA:BS-C2	Water Supply – Temporary water supply for the construction stage shall be by agreement with Irish Water. A water meter will be installed to monitor water consumption on the site during construction and to enable early detection of any potential leaks. Existing watermains which are to be abandoned shall be isolated prior to removal
MA:BS-C3	Prior to the commencement of excavations in public areas, all utilities and public services shall be identified and checked. Adequate protection measures to minimise the risk of service disruption shall be implemented in accordance with Irish Water / DLRCC Requirements.
MA:BS-C4	All excavations within the public area shall be backfilled in a controlled manner and surface re-instated to the satisfaction of the Local Authority.
MA:BS-C5	A CCTV survey of all new sewers and existing culverts in the vicinity of outfalls from the surface water drainage system shall be completed post construction to identify any possible physical defects for rectification prior to operational phase.

10.5.2 Monitoring

No Monitoring measures are recommended.

10.5.3 Cumulative Impacts

Other projects in the vicinity of the site, as identified in Section 3.10, have been considered and found that, cumulatively, there will be no significant impacts upon Material Assets: Built Services during the construction stage.

10.6 OPERATIONAL IMPACTS

Foul Drainage - The cessation of surface water flows to the existing combined sewer through the site will have a permanent positive very significant effect on sewer capacity. This action will also have a permanent positive significant effect on sewer surcharge and flood risk downstream.

The elimination of this sewer, which has extensive defects, will also have a long term positive significant impact from an operational and maintenance perspective.

The additional wastewater loads generated by the proposed development will be offset by the elimination of surface water runoff from the site entering the foul/combined sewer network in the area - as outlined in Section 10.3 above, surface water from c 1.6Ha of the site drains to the combined sewer. This has a significantly greater flow than the wastewater load calculated for the development. This is therefore a neutral imperceptible permanent impact.

Capacity constraints elsewhere in the wider catchment of the Dodder trunk sewer dictates that, in conjunction with other proposed developments in the area, flows from the proposed development must be limited to 2 DWF. While the increased flow from the development relative to the capacity constraints in the wider network has the potential to be a negative impact in the short term, this is mitigated to a neutral impact by limiting the flow from the development to 2 times DWF.

The inclusion of a foul pumping station has the potential to result in an uncontrolled overflow in the event of pump failure and also has the potential to give rise to odour nuisance if such emissions are not collected and routed through odour removal installation properly managed. The provision of an emergency holding tank, designed to Irish Water standards for sizing and layout, will preclude the need to provide an emergency overflow to any adjacent sewer or watercourse. An odour control unit will be installed to mitigate smells – this will be designed to meet Irish Water standards. With this designed in mitigation, the impact will be slight negative and of short term duration. The pumping station will be decommissioned once Irish Water completes sewer infrastructure upgrades in the Dundrum area.

Water Supply - The increased demand from the development will have a neutral imperceptible impact on overall network demand on the basis that the network has been designed to serve development of this site.

Natural Gas Supply – This development will not be served by a gas connection. Therefore, demand on the network will decrease. The potential impact is therefore likely to be significant, positive and permanent.

Electrical Supply - The proposed development will create an increase in the demand on the existing electricity network. ESB Networks have confirmed that there is sufficient capacity to supply the development. This is because although the development is large, residential electricity demand is relatively low. The potential impact is likely to be neutral, long term and not significant.

Information and Communications Technology (ICT) - Demand from the telecoms service providers is likely to increase as a result of the proposed development. The potential impact is likely to be long term and moderate and neutral / positive as the development will enable increased connectivity infrastructure in the area.

10.6.1 Mitigation Measures

The following measures are proposed for the Operational phase.

MA:BS-O1	Foul Drainage- The discharge from the development will be limited to 2 times Dry Weather Flow (DWF) by means of a pumped connection

	from a foul pumping station serving the entire development. This pumping station shall incorporate a balancing/emergency holding tank designed in accordance with Irish Water Code of Practice - Wastewater Infrastructure.
MA:BS:02	The on-site wastewater pumping station shall be maintained by a specialist contractor under a maintenance contract
MA:BS:03	An odour control unit shall be installed at the wastewater pumping station to mitigate potential odour nuisance. The specification of the odour control unit shall conform to Irish Water specifications

10.6.2 Monitoring

No monitoring measures are recommended.

10.6.3 Cumulative Impacts

The proposed development in conjunction with other developments in the Dundrum area has the potential to increase demand on built services material assets. During Pre-Connection enquiry consultations with Irish Water, they have confirmed that their networks and systems have capacity to accommodate the demand generated by the proposed development, subject to restrictions being applied until network upgrades are completed by Irish Water. These restrictions include the provision of an emergency holding tank on site and a restriction on pumping to 2 times Dry Weather Flow (DWF)

10.7 OTHER EFFECTS

10.7.1 Residual Effects

If the mitigation measures identified above are implemented there should be no residual impacts to the material assets built infrastructure as a result of the proposed development.

10.7.2 Do Nothing Effects

In this scenario, the existing land-use, water services infrastructure and public utilities in the study area would remain as currently identified in the desktop study, site visit and site-specific investigations.

Surface water would continue to be directed to the 300mm diameter combined sewer from the roof of the shopping centre and from a substantial area of the existing carpark. Infiltration from groundwater would continue to enter this sewer at open joints and where the sewer has suffered damage/structural failure.

There would be no change to the baseline situation for electrical, gas and telecommunications infrastructure serving the site.

10.7.3 Worst Case Effects

If the development were to proceed without mitigations (e.g. SW discharging unattenuated to combined sewer and no balancing of wastewater flows) it would result in significant long term negative impacts as a result of excessive surcharging and overloading of sewers in the vicinity and downstream of the site with an increased risk of flooding from these sewers.

10.8 INTERACTIONS

The built services material assets have the potential to interact with Biodiversity, Water, Air, Noise and Vibration. The mitigations outlined above address the specific interactions.

REFERENCES

- Construction Industry Research and Information Association (2015) The SuDS Manual (C753)
- Construction Industry Research and Information Association (2001)(*Control of water pollution from construction sites. Guidance for consultants and contractors (C532D)*.
- DLRCC (2016) Dun Laoghaire Rathdown County Development Plan 2016–2022 including Strategic Flood Risk Assessment
- DLRCC (2022) Dun Laoghaire Rathdown Draft County Development Plan 2022–2028 including Draft Strategic Flood Risk Assessment
- Eastern River Basin District (2005) Catchment Characterisation Report
- Eastern River Basin District (2010a) River Basin Management Plan 2009-2015
- Eastern River Basin District (2010b) Programme of Measures 2009-2015 (ERBDA, 2010b)
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- EPA online Water Quality Database and Envision Map Viewer (www.epa.ie)
- Greater Dublin Drainage (2005) Greater Dublin Strategic Drainage Strategy
- Greater Dublin Drainage (2006) Greater Dublin Regional Code of Practice For Drainage Works, Version 6;
- Department of the Environment, Heritage and Local Government (2009) *The Planning System and Flood Risk Management – Guidelines for Planning Authorities*
- Irish Water (2020) *Code of Practice - Water Infrastructure 'IW-CDS-5020-03 Rev 2'*
- Irish Water (2020) *Code of Practice - Wastewater Infrastructure 'IW-CDS-5030-03 Rev 2'*
- Local Authority/Irish Water Drainage Records
- National Roads Authority (2008) *Guidelines on Procedures for the Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes*.

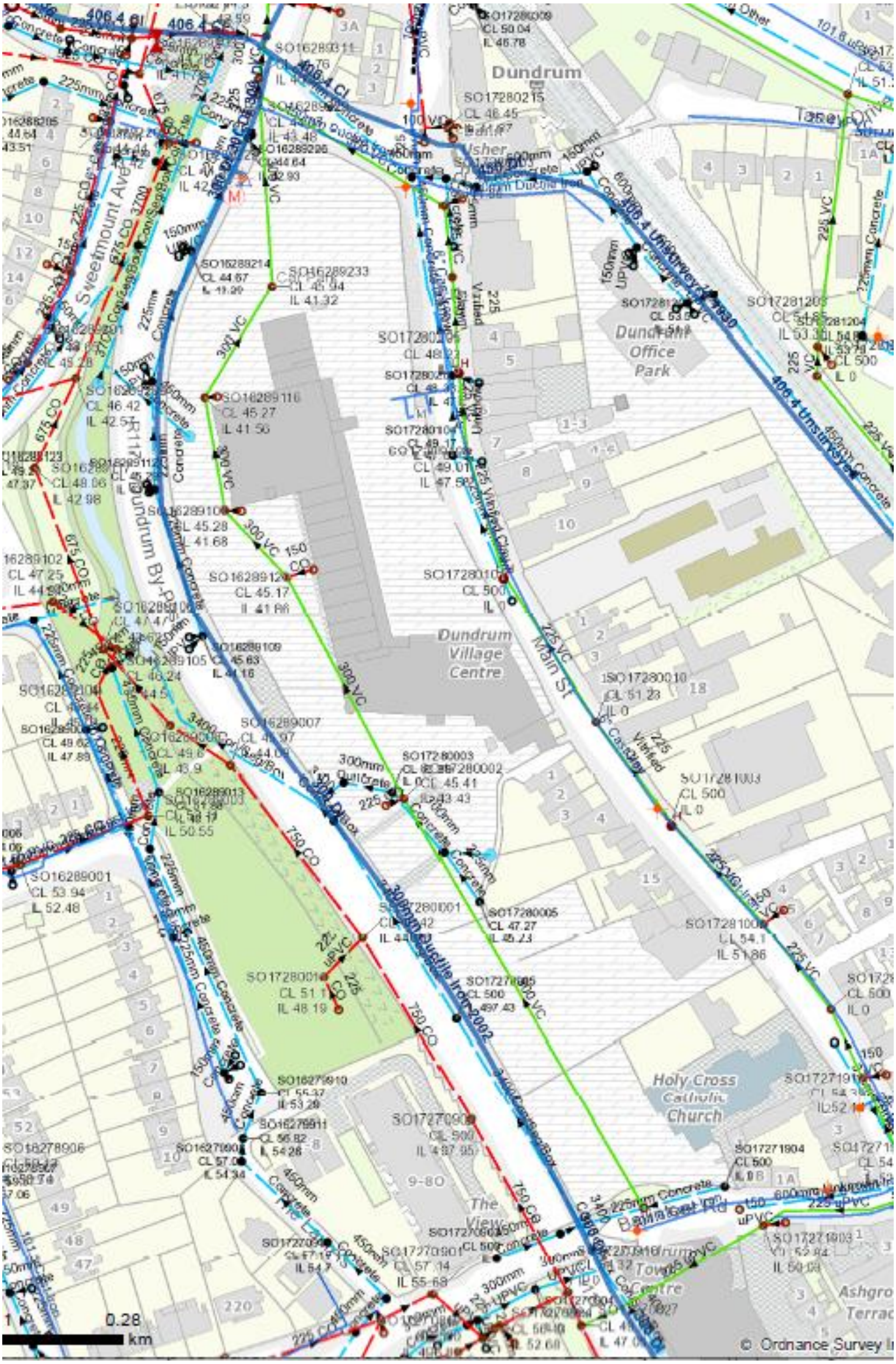


Figure 10.1.: Existing Sewers and Watermains

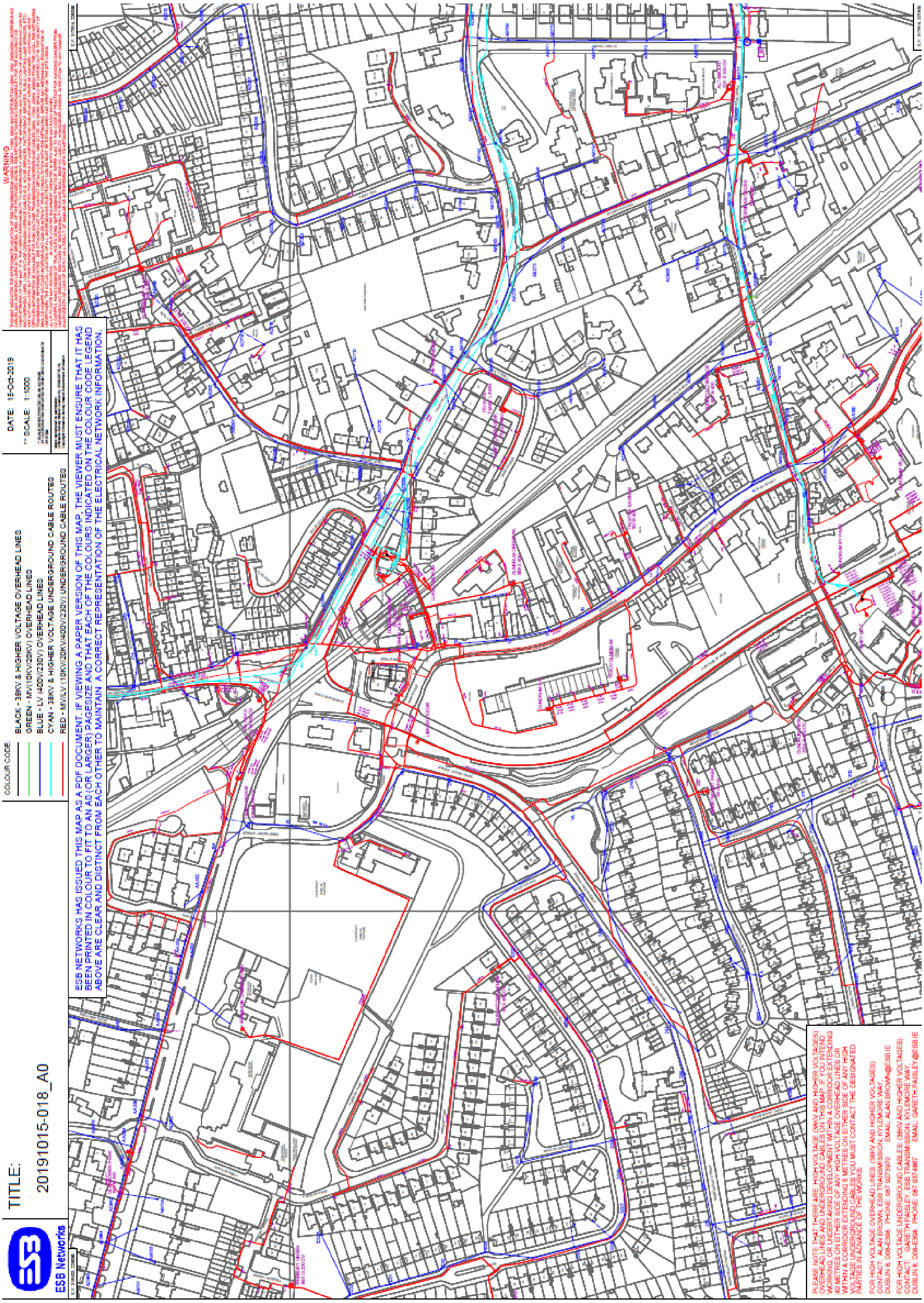


Figure 10.2 Existing Electricity Supply Infrastructure

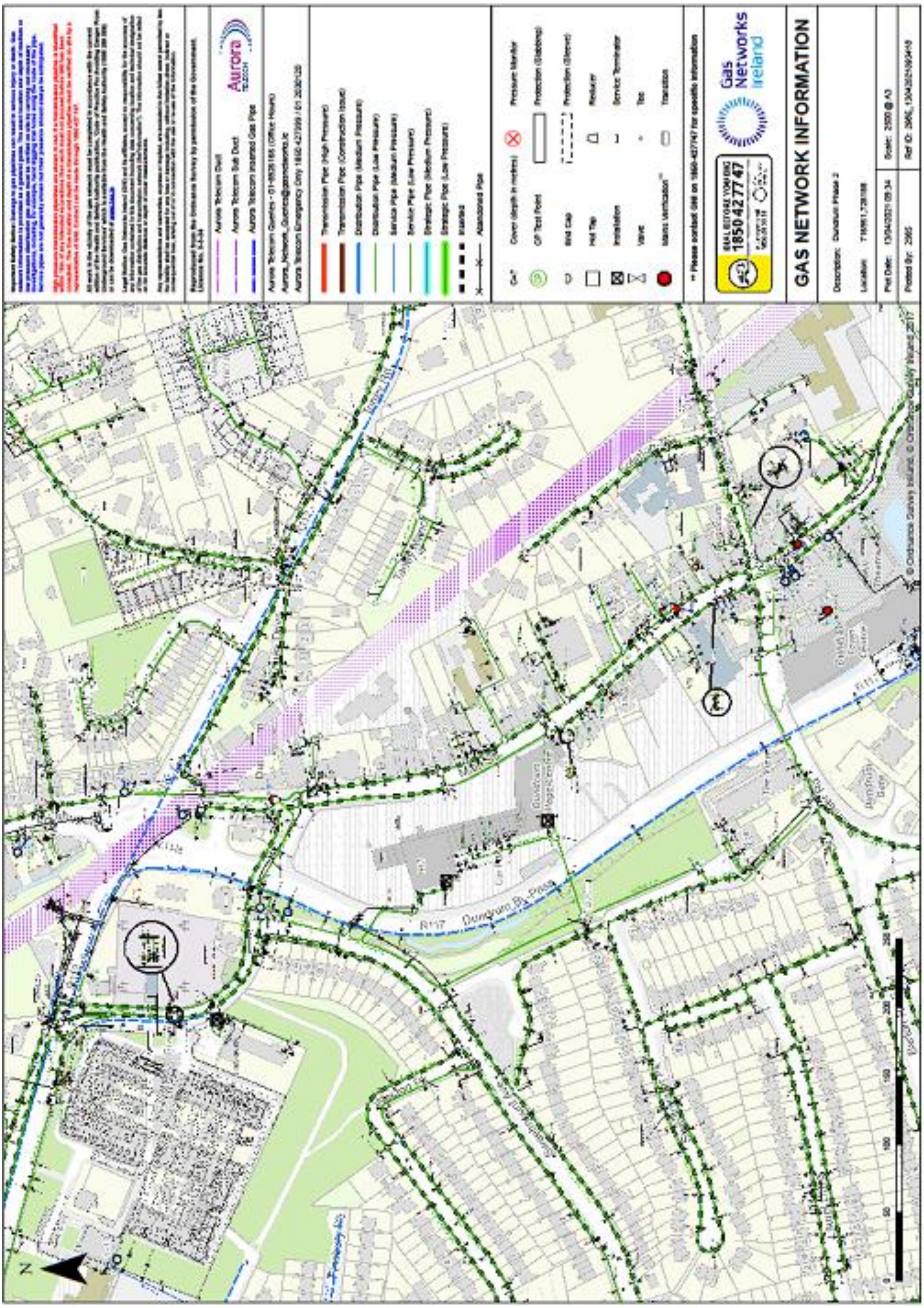


Figure 10.3 Existing Gas Network Infrastructure

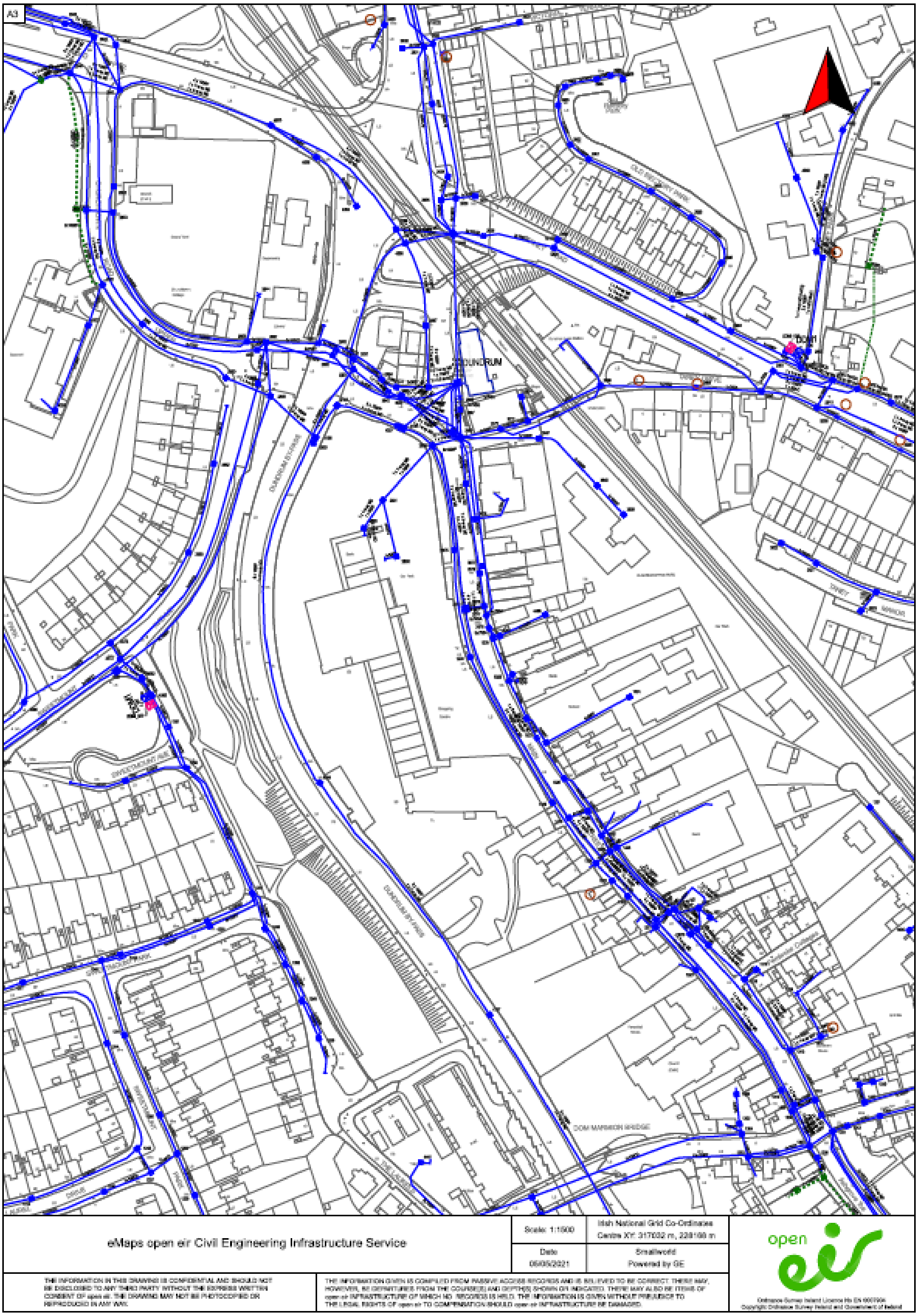


Figure 10.4 Existing Telecoms Network Infrastructure - EIR

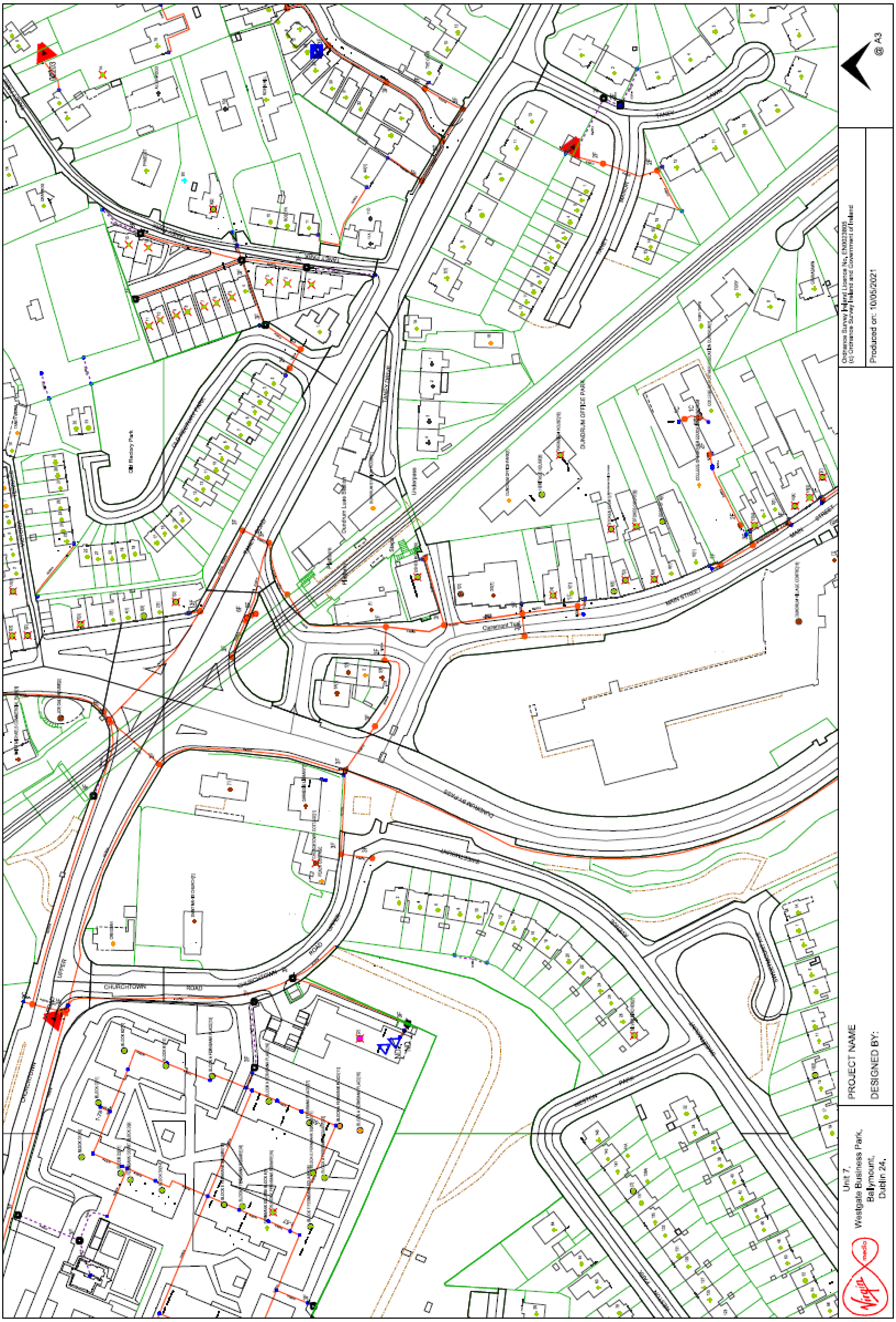


Figure 10.5 Existing Telecoms Network Infrastructure – Virgin

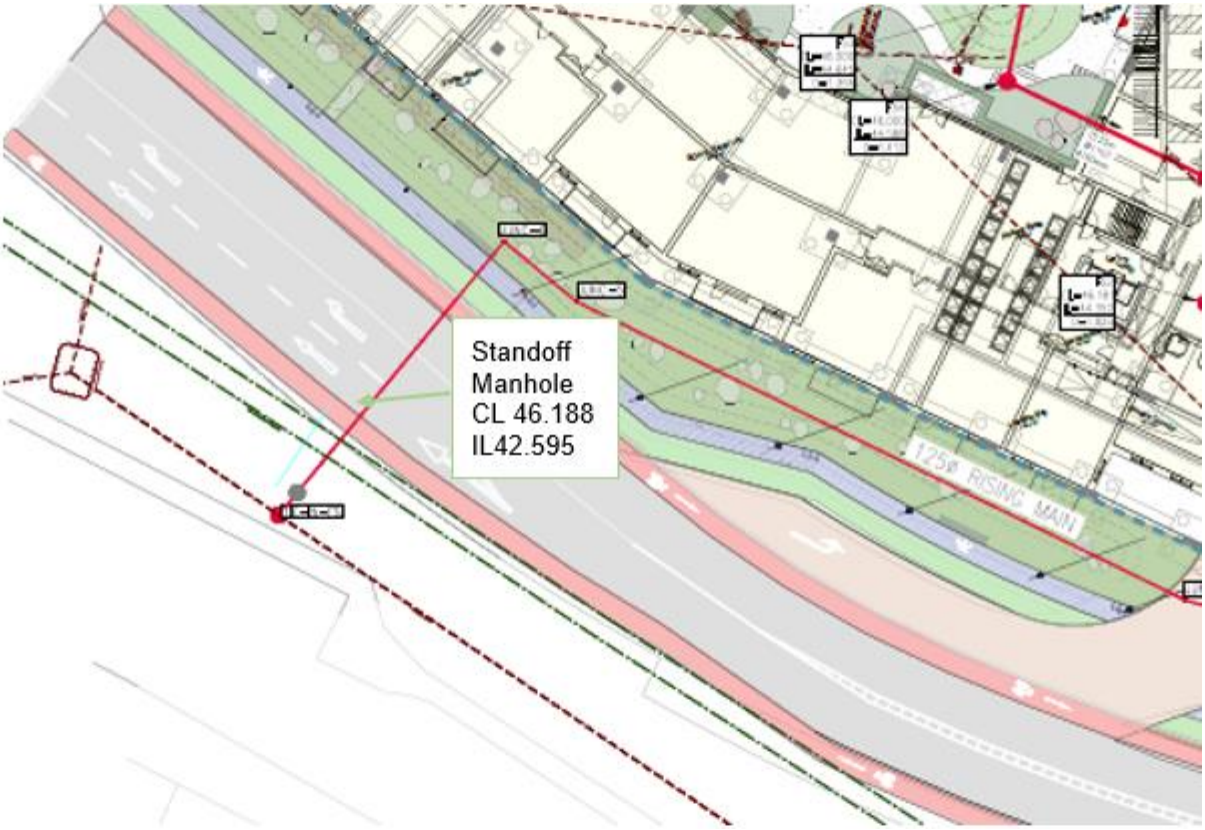


Figure 10.6: Location of Proposed Connection Manhole

11.0 MATERIAL ASSETS: TRANSPORTATION

11.1 INTRODUCTION

This chapter of the EIAR has been prepared by Alan DeVenny, BEng (Hons), PhD (Civil Eng), CEng, MICE. Alan is a Project Director with SYSTRA Ltd (SYSTRA) and has over 22 years' experience in the management and design of major public and private traffic management schemes to improve traffic and improve road safety. Alan has vast experience of producing Traffic Assessments for major development proposals and inputting into environmental impact assessments.

The purpose of this Chapter is to assess the potential impact of the proposed development in terms of traffic and transport. This chapter provides an overview of the existing receiving environment; a detailed and robust assessment of the potential impact of the proposed development on the operation of the local road network during construction and operational phases; and outlines mitigation measures to ensure any identified significant effects are minimised or avoided.

This assessment is based on a detailed **Transport Assessment** (TA) report also prepared by SYSTRA and submitted separately in support of the planning application. For full details of the TA methodology and other transport related aspects of the proposed development, please refer to the standalone TA.

11.2 ASSESSMENT METHODOLOGY

This chapter has been prepared having regard to the legislation and guidelines listed in Chapter 1 and the following guidelines specifically related to this topic:-

- *Traffic and Transport Assessment Guidelines* (2014), Transport Infrastructure Ireland
- *Project Appraisal Guidelines* (2011), Transport Infrastructure Ireland
- *Guidelines for the Environmental Assessment of Road Traffic* (2003), Institute of Environmental Management & Assessment (UK Based).

There are also a number of relevant national and regional policies which have guided the assessment and the identification of mitigation measures where required. These include the following documents:

- Design Manual for Urban Roads and Streets (2019);
- Greater Dublin Area Transport Strategy 2016-2023 (NTA);
- Greater Dublin Area Cycle Network Plan (NTA,2013); and
- Dun Laoghaire Rathdown County Development Plan 2016-2022.
- Dun Laoghaire Rathdown Draft County Development Plan 2022-2028

The methodology adopted for the assessment is outlined below and is in line with the 2014 *Traffic and Transport Assessment Guidelines* set out by Transport Infrastructure Ireland (TII).

- Baseline Assessment: Desktop Study, Data Collection (including Surveys), Existing Accessibility, Local Travel Patterns & Policy Review.
- Trip Generation: Forecast person trips to/from development using TRICS, to determine the potential vehicle trips to and from the proposed development during peak hours.
- Trip Generation during construction period based on preliminary construction programme and estimated movements.

- Trip Assignment & Distribution: Vehicular Trip to be assigned based on predicted final destination & distributed across the wider network based on baseline travel patterns.
- Impact Analysis: Assessment of the resultant impact of development on the wider network with detailed modelling undertaken locally, where traffic impacts exceed and acceptable threshold limit.
- Conclusion and Recommendations: Identification of potential impacts and necessary mitigation and supporting measures.

11.2.1 Vehicular Trip Distribution

A trip distribution assessment has been undertaken using a gravity model, which assumes that he likelihood of a trip to/from a particular destination is directly proportionate to the number of potential trip attractors at a given destination and the overall distance by road to that destination.

The gravity model also assumes that the number of attractors at a destination is linked to the population at that destination, i.e. a destination with a higher population will generally have a higher proportion of trip attractors such as employment land uses.

The calculation undertaken for each data zone is as follows:

$$\boldsymbol{Trip\ Potential} = \frac{\boldsymbol{Total\ Population}}{\boldsymbol{Distance^2}}$$

Chapter 5.4 in the *TA* presents a detailed methodology for calculating the vehicular trip distribution using the gravity model and electoral areas within a 10km catchment area of the Proposed Development. QGIS software was used to assign trips by shortest journey time onto the local road network between the Proposed Development and the centroid of each electoral area. The results of this trip distribution on local roads, can be seen in Table 11.4.

11.2.2 Assessment Criteria

The EPA draft EIAR guidelines (2017) outlines the definitions to be used in the description of effects (refer to Chapter 1). In Ireland, there are currently no specific guidelines or standards which outline how the effect of traffic and transport should be quantified or described for the purposes of Environmental Impact Assessment. However, TII's *Traffic and Transport Assessment Guidelines* (2014) indicate that if the impact generated by the additional traffic generated by a new development amounts to over 10% upon the local network, where there is no existing prolonged congestion, it is considered material in the context of the local network. This threshold is reduced to 5% in situations where the network is experiencing notable congestion. For robustness, a 5% threshold has been used in the below impact assessment.

Based on these guidelines, and professional judgement, a rating of the potential effects has been assigned, based on potential traffic increases, as shown in Table 11.1. This is intended to guide the assessment of the likely effects of the proposed development.

Table 11.1 : Rating of Effects Based on Traffic Contribution

Significance of Effects	Traffic Increase
Imperceptible	0-2.5%
Not Significant	2.5-5%
Slight	5-10%

Moderate	10-20%
Significant	20-30%
Very Significant	30%-50%
Profound	50%+

11.2.3 Surveys / Traffic Counts

As part of the baseline assessments, an initial assessment of traffic data from existing surveys has been undertaken. This survey data has been factored up to the anticipated opening year of the proposed development (2024), to ensure a robust assessment has been undertaken. A 1.4% annual growth in network traffic over the period between 2021 and 2024 (3 years) is anticipated, consistent with the methodology agreed with the local authority at the transport assessment scoping stage. Therefore, a medium growth of 4.2% has been applied between 2021 and 2024.

Junction turning count surveys have been undertaken for 9 junctions during the network peak periods (07:00-10:00 and 14:00-19:00). Figure 11.1 illustrates the locations where surveys have been undertaken in the form of classified turning counts.

The future year junction performance assessments undertaken for the proposed development also includes relevant traffic flow data for other committed developments in the vicinity (refer to the Transport Assessment by Systra for details)

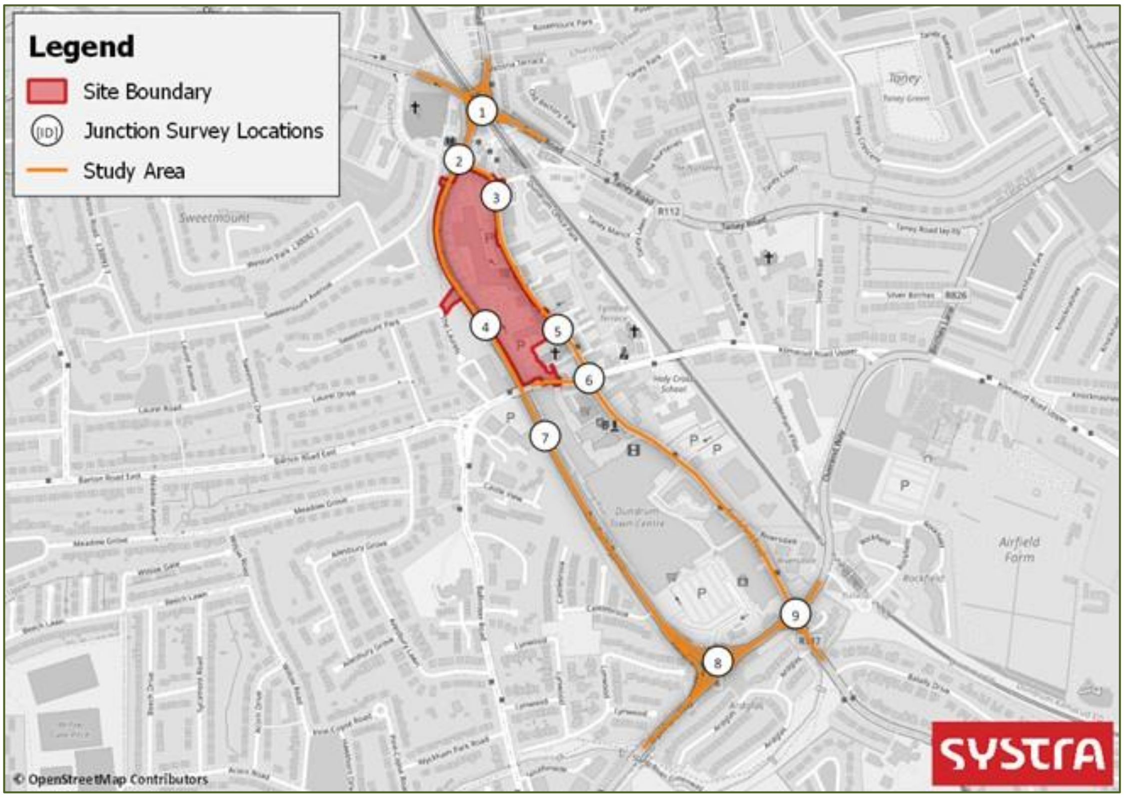


Figure 11.1: Traffic Survey Locations

11.3 RECEIVING ENVIRONMENT

11.3.1 Site Location

The site is bound by Main Street to the north and east, Ballinteer Road / Dom Marmion Bridge to the South and Dundrum Bypass to the west. A large residential area lies to the west of the Dundrum Bypass (Sweetmount) and to the north and west of Taney junction which is a large intersection between Taney Road and the Dundrum Bypass to the north of the development site. The Dundrum LUAS Station and bus interchange lie to the immediate north-east of the site.

A context plan for the site is indicated in Figure 11.2 .

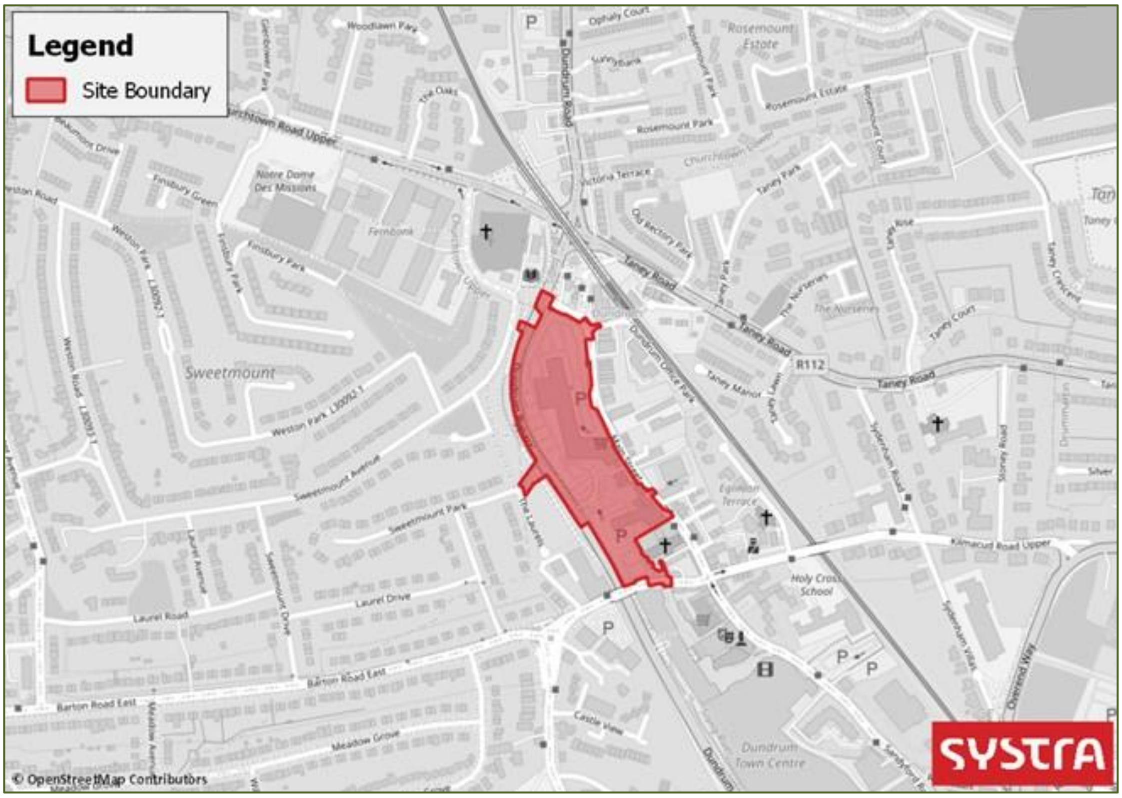


Figure 11.2 : Location of proposed development site

11.3.2 Site Accessibility – Walking and Cycling

Figure 11.3 illustrates the primary pedestrian infrastructure surrounding and through the development site, including the various pedestrian crossing facilities to the north and south. The figure demonstrates that there is a good level of existing pedestrian infrastructure serving the site which is conducive to a high proportion of pedestrian trips within the local area. In the vicinity of the development, the footways are generally in the region of 1.5m – 2.0m in width with provision of dropped kerb and tactile paving arrangements at crossing points.

The cycling infrastructure in the immediate vicinity of the site is considered to be very good, with several key links at Taney Road, Main Street, Churchtown Road Upper and on the Dundrum Bypass. Figure 11.4 demonstrates the strategic cycle network in Dundrum and the surrounding local areas. There is a wealth of cycle routes to several local and strategic destinations, including Sandyford, Dublin City, Blackrock and Tallaght.

Figure 11.3 : Pedestrian Infrastructure

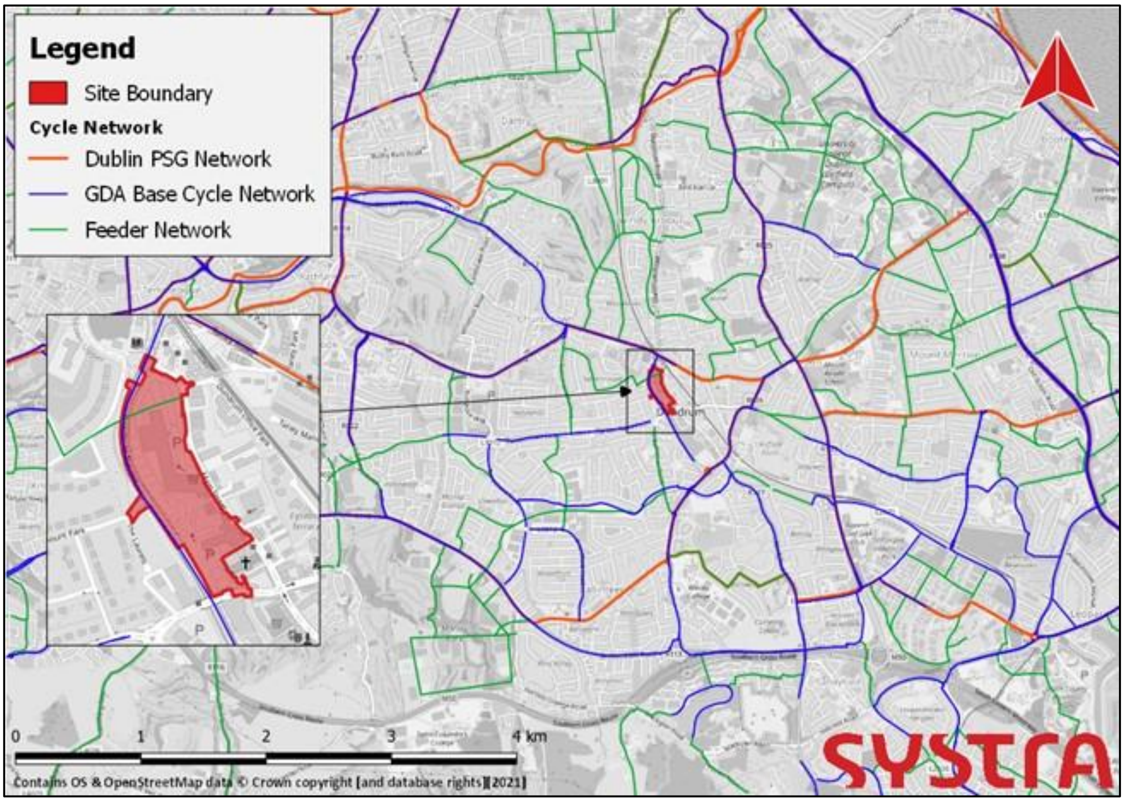


Figure 11.4: Cycling Infrastructure

11.3.3 Site Accessibility – Public Transport

The site benefits significantly from its town centre location within Dundrum and there are a wealth of existing public transport opportunities within the immediate vicinity of the site, including 16 bus stops and the Dundrum LUAS station all located within a 5-minute walk (approximately 400m) of the site. Refer to Figure 11.5.

The bus service provision is exemplary for a town centre site, with numerous services in either direction to destinations such as Dublin City Centre, Beaumont, Blackrock, Enniskerry and Tallaght. The existing bus service frequencies are set out in Table 3.2 of the Transport Assessment [Systra].

The LUAS tram 'green line' runs adjacent to Main Street to the eastern boundary of the site**.** The 'green line' operates between Broombridge and Brides Glen and is a very popular choice for those accessing Dublin City Centre, and many other locations. The approximate average frequency between Monday and Friday is 6.4 minutes, 8.5 minutes on a Saturday and 13.3 minutes on a Sunday.

Patronage levels on the bus and LUAS Green Line have not yet returned to pre-covid levels. Notwithstanding this, service enhancements are proposed for both bus and luas services which will bring a step change in the capacity available:-

- Bus Connects proposals are to deliver a significant increase in the range of bus services serving Dundrum.
- The provision of additional fleet and infrastructure are proposed to enhance the capacity of the Luas Green line to meet forecast passenger demand.

With the planned enhancements to the Luas Green Line and the introduction of the Bus Connects scheme, the additional demand from the development can be accommodated through the increased public transport capacity and frequency of services that will be delivered in the Dundrum area.

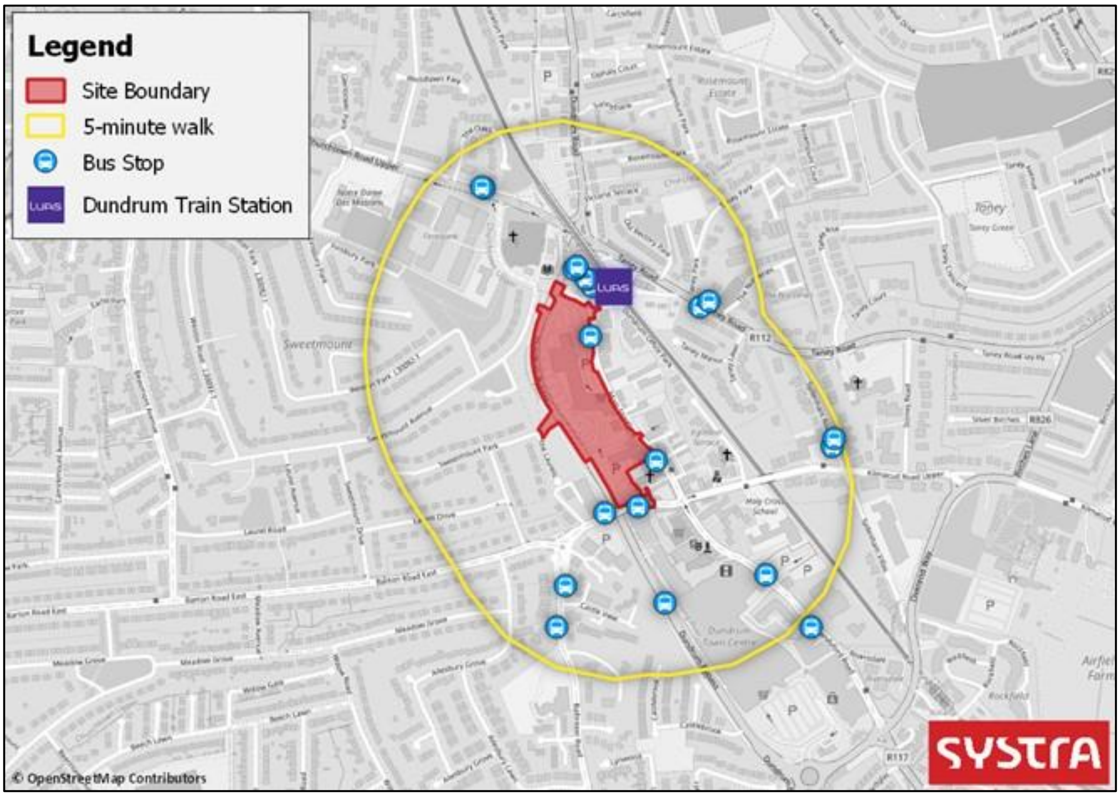


Figure 11.5: Public Transport

11.3.4 Site Accessibility – Local Road Network

Figure 11.6 illustrates the local roads which surround the site and provide access to the wider area and to the strategic road network. To the north and east, the site is bound by Main Street, to the west by the Dundrum Bypass, and to the south by Ballinteer Road, including a section of road bridge that crosses along the north side of the existing Dundrum Town Centre development.

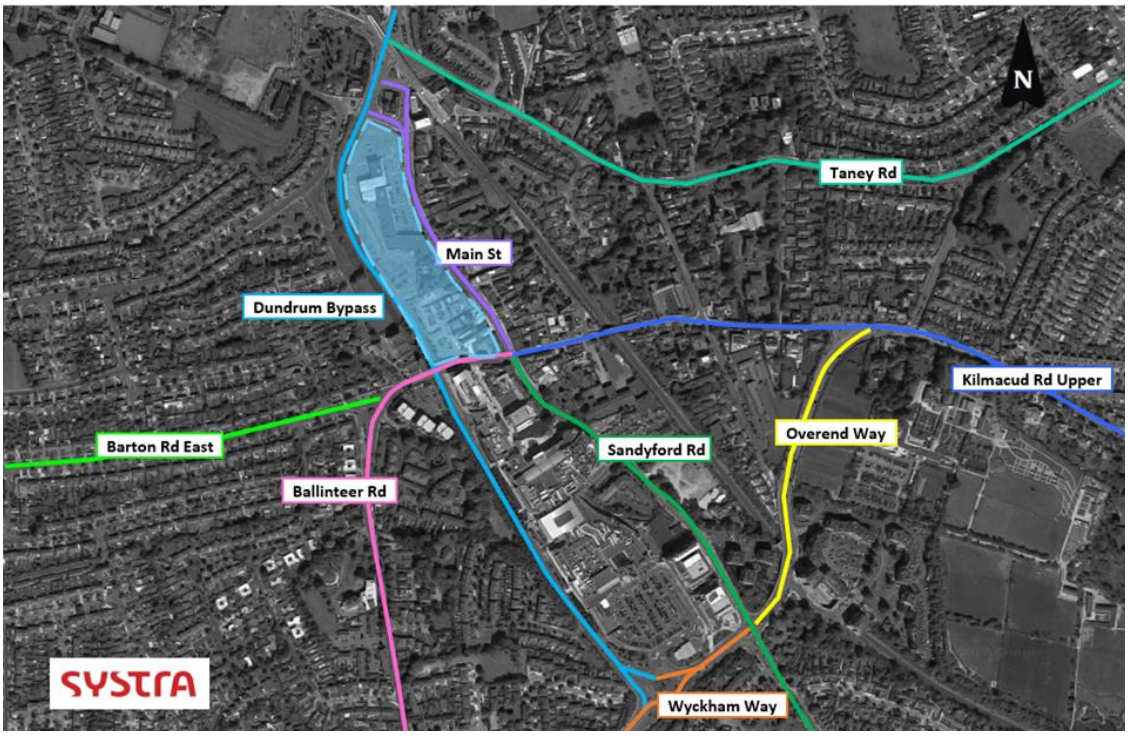


Figure 11.6: Local Roads

A brief overview of each of the key roads/streets on the periphery of the site is set out below.

Main Street

Main Street is a one-way street of town centre characteristics. The street has recently been modified to reallocate road space for pedestrian / cycle use as part of measures introduced to encourage active travel during the Covid 19 pandemic.

The Dundrum Bypass

The Dundrum Bypass is a two-way road of urban characteristics which features generous carriageway widths of between 7.0m to 7.6m. The road is subject to a 50km/h speed restriction and features a number of accesses into the existing car parks along the western site boundary (including the multi-storey car park south of Ballinteer Road / Dom Marmion Bridge).

Ballinteer Road

Ballinteer Road is a distributor road which routes between Dundrum (at a junction with Main Street, Sandyford Road and Kilmacud Road Upper) and the M50 motorway approximately 2.0km south of the development site. The road is of varying characteristics but is generally of residential and urban standards. In the direct vicinity of the site, Ballinteer Road crosses the Dundrum Bypass via Dom Marmion Bridge. This bridge also crosses an existing vehicular access into the development site from the Dundrum Town Centre development south of Ballinteer Road.

11.3.5 On Site Parking

The existing site contains a total of 459 car parking spaces which take up a large proportion of the site footprint. The spaces essentially serve the existing retail offer on the site and the parking provision is split into four areas as follows:

- Village Centre – Surface parking adjoining Main Street + Dundrum Bypass
- Former Mulvey's Hardware and Builders Yard
- Rear of Holy Cross Church
- Surface carpark, Dundrum Bypass

The existing car parking areas are served by three access points from Main Street, one access point on the Dundrum Bypass and via an access road beneath the Dom Marmion Bridge which provides a link across to the Dundrum Town Centre Car Park.

11.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposals are to create a new residential development with retail and commercial uses, associated car parking and public realm space. The proposed development mix is outlined in Chapter 3.

11.4.1 Internal Layout

The proposed development includes a high-level of open spaces within the central spine of the development. It is proposed to provide high-quality public realm / amenity spaces throughout the development, with pedestrian and cycling provision at the forefront of the site design.

11.4.2 Pedestrian Accessibility

The proposed development will have multiple access points for pedestrians including a wealth of access points from Main Street which has recently been upgraded for pedestrians and cyclists. This will ensure that the proposed development will integrate into the existing town centre offering, making use of the existing high quality pedestrian infrastructure which provides links to the remainder of the town centre as well as to the nearby public transport opportunities that include the Luas station to the immediate east of the site and the bus interchange to the immediate north of the site.

There are numerous amenities such as supermarkets, schools, a cinema, public transport stations and multiple shops and restaurants that are accessible within a 20 minute walk from the development. It is considered that the existing local infrastructure will be able to support the additional pedestrian movements generated by the development with just local changes to infrastructure to provide integration between the existing network and the development.

With the creation of the new residential and commercial units with direct frontage to Main Street, there is a need to create a new environment along this part of the Main Street corridor. This new environment needs to ensure that the area is highly attractive to pedestrians and cyclists while catering for existing public transport movements.

The proposals acknowledge and enhance the benefits that the DLRCC Covid interventions have brought to the Main Street. The new one-way system has significantly enhanced the urban street environment and promote cyclist and pedestrian permeability.

The Dundrum Village proposals provide for the removal of the two existing vehicular access points from Main Street into the site by providing additional access points from the Dundrum Bypass. Eliminating access points from the Main Street to the Phase 2 site will greatly assist in removing further traffic from the Main Street which will in turn improve pedestrian movement to and from the Luas Station. The new crossing will take the form of a raised table across the junction with the lane that extends eastwards to the Luas Station.

It is proposed to improve the pedestrian environment on Main Street so that a safe and convenient pedestrian linkage is created between the development and the existing public transport facilities. Key to this will be the delivery of a new pedestrian crossing facility on Main Street.

The design requires that pedestrians are given ample footway space, are given priority and pedestrian / vehicular conflicts are minimised. Consideration has therefore been given to the location and form of existing pedestrian crossing points and how these may be re-located and enhanced so that there are high quality linkages in place between the development and the LUAS station / bus facilities opposite. These have been designed to line up with a series of public realm squares on the development side of the road so that there are legible routes and crossing points along pedestrian desire lines.

Pedestrian access to the development site will be further enhanced by the provision of the new bridge link over the Dundrum Bypass which links the development to the Sweetmount area to the west and beyond. A new pedestrian crossing will also be provided on Ballinteer Road / Dom Marmion Bridge to provide a high quality pedestrian link to the existing Dundrum Town Centre site.

11.4.3 Cycle Accessibility

The proposed development is well situated with regards to cycling facilities with cycle lanes, on and off-road routes and cycle parking located within the vicinity of the site. The development will also bring forward a provision of cycle parking in excess of 1,600 spaces for residents and visitors, maximising the opportunities for people to choose cycling as a mode of travel to and from the development.

Cycle access to the development will be available from multiple locations on Main Street and also from the service road which in turn, is accessed from the Dundrum Bypass. Cycle parking is split between the ground floor (accessed from Main Street) and the lower ground floor (accessed via the Dundrum Bypass). Cycle access will also be available by means of the proposed Sweetmount bridge, linking the residential communities in the west, over Dundrum Bypass, to Main Street.

11.4.4 Vehicular Access Strategy

Figure 11.7 demonstrates the proposed access points and the vehicular flows into and through the site. The proposed access strategy is to eliminate all vehicular access points from Main Street. The purpose is to further enhance the priority which is given to pedestrians under the new Main Street layout and to create a more pleasant environment for walking and cycling in this corridor. Instead, all vehicles accessing the site will do so via the Dundrum Bypass and via a secondary access via the Dundrum Town Centre development under the Dom Marmion Bridge.

The three primary access points will take the following form:

A. A new northern left-in only access with an approximate 39.5m auxiliary lane for deceleration upon entry to the site;
B. An all-movements ghost-island junction at the location of the existing all-movements junction (this will be upgraded to provide a raised table across the access for pedestrian/cyclist priority); and
C. A new left-out only junction at the southern extents of the western development boundary.

The site and the existing Dundrum Town Centre development will be joined below the bridge at car park level whilst pedestrian links will be provided across the bridge (via a new crossing facility) to ensure that there is permeability between the two developments.

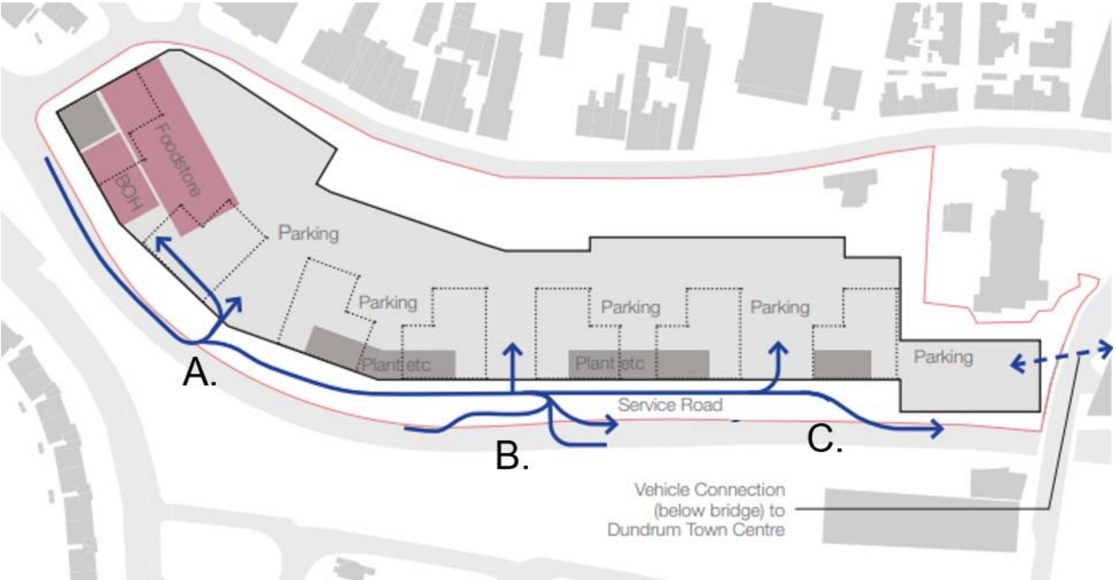


Figure 11.7 : Proposed Vehicular Access Strategy

11.4.5 Incorporated Design Mitigation

There are a number of measures which have been included from the outset in the design of the development to reduce any potential negative impacts on the local transport network arising from additional traffic generated by the development.

A significant measure in design mitigation is the parking ratios which have been applied, at 0.4 car parking spaces per residential unit and one cycle parking space per bedroom for residential units. The overall parking numbers, encompassing the retail element of the proposed development are as follows[16] :

- 318 residential spaces;
- 3 spaces for creche staff;

[16] A breakdown of the provision is included in the refer to the *Transport Assessment* [Systra] submitted with this application

- 52 retail / commercial spaces; and
- 1,750 cycle parking spaces

The total car parking provision (373 spaces) is therefore a considerable reduction to current spaces (459) accommodated on the existing site. In addition, the residential car parking ratio is below the maximum standards for 1 per unit as set out in the *Dun Laoghaire Rathdown Draft County Development Plan 2022-2028*.

The number of cycle parking spaces generally meets the requirements of DHLG's 'Design *Standards for New Apartments*' in relation to parking for residents with a total of 1,508 cycle parking spaces provided for residents within internal areas. This equates to a standard of 1 cycle parking space per bedroom (refer to architects' schedule of accommodation for breakdown). Therefore, the lower car parking provision and number of cycle parking spaces provided should allow more residents to travel sustainably by bicycle. In addition, the range of retail, non-retail, leisure, entertainment services etc. proposed on-site or already available on Main Street and at Dundrum Town Centre coupled with the proximity of the development to public transport will significantly lower the demand for private transport. A slight relaxation in standard is proposed in relation to visitor cycle parking spaces but a total provision of 242 spaces provided. This level of provision is considered appropriate given the scale of the development and the high level of public transport provision in the area.

The public realm and road network have also been designed to limit the impact of traffic on the local road network. A safe pedestrian and cycle environment has been created through multiple pedestrian access points from Main Street and through the upgrade of pedestrian infrastructure. This ensures the site is integrated within the town centre and is located in close proximity to the LUAS station and bus interchange. The new environment on Main Street ensures a highly attractive area to walk and cycle whilst discouraging car use.

Alongside this, a proposed public square to the rear of Dundrum Church will promote further pedestrian movement between the town centre and the village, through a new pedestrian crossing on Ballinteer Road / Dom Marmion Bridge. A new bridge between the development and the residential areas to the west of Dundrum Bypass is also proposed to ensure direct walking routes within the local area. The bridge would operate with a shared surface for pedestrians and cyclists, encouraging further active travel.

In addition, the proposals provide for the removal of the two existing vehicular access points from Main Street into the site by providing additional access points from the Dundrum Bypass. Eliminating access points from Main Street to the site will greatly assist in removing further traffic from the Main Street and consideration will be given to the extension of the one-way system and improving pedestrian movement to and from the LUAS Station.

The internal network has been designed to limit car speeds and promote the priority of walking and cycling. Facilitating walking and cycling forms a key part of the *Mobility Management Plan* [Systra] (submitted with this application), designed to promote sustainable travel choices among users of the site. The proposed improvements to the public realm and active travel measures are likely to create a significant positive impact on the local area.

The residential car parks in Zones 2-4 will be interlinked whilst the existing link from the Dundrum Town Centre car park beneath the Dom Marmion Bridge will be maintained in this application. This link will serve as a secondary access point providing a useful alternative access route to the residential car parks.

11.4.6 Trip Generation Operational Phase

A trip generation assessment for the operational phase of the development has been undertaken using the TRICS database, with data filtered for the following land-use categories:

- Land Use: "*03 – RESIDENTIAL*"; and
- Category: "*C - FLATS PRIVATELY OWNED*"

There will also be an element of retail/commercial development at the site, however, this will primarily serve the residents of the proposed development as well as an element of 'pass-by' trips associated with the retail element of the development.

The trip rates and the resultant total people trips for 881 dwellings is presented in Table 11.4 below, for the development AM and PM peak hours of 09:00-10:00 and 17:00-18:00 respectively.

Table 11.2 : TRICS Residential People – Trip Assessment

Mode	09:00 – 10:00			17:00 – 18:00		
	Arrive	Depart	2-way	Arrive	Depart	2-way
Per dwelling	0.104	0.531	0.635	0.416	0.172	0.588
881 dwellings	92	468	560	366	152	518

The table indicates that approximately 560 two-way people trips will be generated by the proposed development during the AM peak hour. In the PM peak hour, there will be around 518 two-way people trips generated.

To determine a suitable mode share for the proposed development, the Irish Census (2016) data was consulted for the local electoral area of Dundrum. The data for '*method of travel to work or study*' has been interrogated to identify a modal split which can anticipated for the proposed development, once it becomes occupied. 'Working from home,' 'not stated,' and 'other,' mode share categories were ignored to determine a modal split. These modal split values have been applied to the total people trips above, as shown in Table 11.5.

Table 11.3 : TRICS Residential People Trips by Mode

Mode	AM peak Hour			PM Peak Hour			Mode Share
	Arrive	Depart	2-way	Arrive	Depart	2-way	
Walking	14	70	84	55	23	78	15%
Cycling	8	42	50	33	14	47	9%
Public Transport	22	112	134	88	36	124	24%
Vehicle Passenger	12	61	73	47	20	678	13%
Vehicle Driver	36	183	219	143	59	202	39%
TOTAL	92	468	560	366	152	518	100%

The data identifies that approximately 219 two-way vehicle trips (36 arrivals / 183 departures) will be generated by the development during the AM peak hour. In the PM peak hour, approximately 202 two-way vehicle trips will be generated (143 arrivals / 59 departures).

To understand the net impacts of the proposed development on the local road network for the retail aspect of the site, existing survey data from Dundrum Village has been used. The following comparison table (Table 11.6) demonstrates the relative impact of the development compared with the current land use which is retail in nature. In doing so, consideration has been given to a nominal level of vehicle trips associated with the proposed food-retail element by undertaking a further TRICS assessment for the approximate 2,100sqm food store and applying this by taking account of a 50% reduction to consider the potential for shared trips with the apartments as well as some pass-by. We would consider that the potential for shared and pass-by trips will be greater than 50%, but assuming this level for the purposes of comparison is considered to be robust.

As shown, there is an overall increase in two-way vehicle trips during the peak periods but the new trip generation levels are heavily offset by the flows associated with the existing development on the site. In particular, the table shows that there are just 8 additional two-way trips added to the network in the critical PM peak period.

Table 11.4 : Comparison of Vehicle Trip Generation – Existing versus Proposed

Access	AM Peak Hour			PM Peak Hour		
	IN	OUT	2-WAY	IN	OUT	2-WAY
Existing Town Centre Flows (2021 Survey)						
Bypass	35	13	48	32	106	138
Main Street North	53	10	63	77	74	151
Main Street South	7	0	7	7	1	8
TOTAL	95	23	118	116	181	297
Development						
Residential	36	183	219	143	59	203
Retail (50% pass-by)	23	16	39	50	53	103
Bypass (ALL)	60	199	259	196	114	310
NET						
Bypass	24	185	209	161	6	167
Main Street North	6	188	194	116	38	154
Main Street South	52	198	250	186	111	297
COMBINED	**-36**	**175**	**139**	**77**	**-69**	**8**

11.4.7 Trip Distribution Operational Phase

A trip distribution assessment has been undertaken using a gravity model, which assumes that the likelihood of a trip to/from a particular destination is directly proportionate to the number of potential trip attractors at a given destination and the overall distance by road to that destination.

The gravity model also assumes that the number of attractors at a destination is linked to the population at that destination, i.e. a destination with a higher population will generally have a higher proportion of trip attractors such as employment land uses.

The calculation undertaken for each data zone is as follows:

$$\boldsymbol{Trip\ Potential} = \frac{\boldsymbol{Total\ Population}}{\boldsymbol{Distance^2}}$$

Chapter 5.4 in the TA presents a detailed methodology for calculating the vehicular trip distribution using the gravity model and electoral areas within a 10km catchment area of the Proposed Development. Geographic Information Systems (GIS) software was used to assign trips by shortest journey time onto the local road network between the Proposed

Development and the centroid of each electoral area. The results of this trip distribution on local roads, can be seen in Table 11.7.

Table 11.5 : Local Road Assignment

Distribution (Local Roads)	Percentage (%)
Dundrum Bypass (NORTH)	**94%**
Churchtown Road	**35%**
Dundrum Road	**33%**
Taney Road	**26%**
Dundrum Bypass (SOUTH)	**6%**
Sandyford Road	5%
Wyckham Way	1%
TOTAL	100%

The majority of trips (94%) will route north on the Dundrum Bypass and distribute at the Taney Cross junction. The remaining 6% will route south, with the majority of these trips heading south via Sandyford Road.

11.5 CONSTRUCTION IMPACTS

During construction of the project, it is expected that vehicular traffic to and from the site shall reach a peak during site clearance works and basement excavation earthworks, which shall require the removal from site of construction waste and spoil. Under a 'worst-case' scenario, it is possible that up to 6 no. HGV trips may be made to the site each hour during construction (one HGV arrival and one HGV departure every 10 minutes); this would equate to total movements of 12 HGVs in each of the background peak hours, equivalent to 28 Passenger Car Units (PCU).

Allowing for a potential additional 50 no. light vehicle arrivals and 5no. light vehicle departures during the AM peak (associated with construction workers), with these movements reversed during the PM peak, the maximum potential construction-related vehicle movements in either of the peak hours is 83 PCU. This is significantly lower than the operational phase peak hour trip generation given in Table 11.8.

Table 11.6 : Construction Trips (PCUs)

Peak Hour	Arrivals	Departures	Total Trips
		Light Vehicles (PCU)	
AM Peak	50	5	55
PM Peak	5	50	55
		Heavy Vehicles (PCU)	
AM Peak	14	14	28
PM Peak	14	14	28
		Total Trips (PCU)	
AM Peak	64	19	83
PM Peak	19	64	83

Table 11.6 above shows the average number of HGVs during the most onerous anticipated construction activity and during peak periods, as an estimation.

Peak hour vehicular trip generation during the development's construction phase shall be significantly less than that during its operational phase. Junction assessments have therefore not been conducted for the construction phase of the development. During its construction phase, the subject development is predicted to result overall in a not significant - slight adverse impact on the operation of junctions on the surrounding road network. Any construction traffic is also noted to be for the duration of the construction period only.

It is also recognised that there is potential during the construction phase for construction-related activity to impact upon the surrounding road network, in ways beyond the operational performance of the junctions assessed. These impacts would potentially take the form of surrounding roads being temporarily obstructed by stopped/parked construction vehicles or by delivery/loading operations, or their condition being temporarily degraded by the presence of dirt/debris originating from the construction site. These impacts are negative, slight and short-term.

The construction of Sweetmount Bridge, requiring the closure of Dundrum Bypass for a limited period, will have an imperceptible neutral effect on the Bypass and its users, with road closures limited to night-time periods.

11.5.1 Mitigation Measures

The construction phase mitigation measures are intended to ensure that any construction related traffic has limited impact on the local area and environmental impacts are minimised or prevented.

In addition to the following, a CEMP will be prepared and a Community Liaison Officer will be appointed (refer to Mitigation Measure PHH – C1 and PHH – C2 respectively).

MA:T-C1	A Construction Stage Traffic Management Plan (CTMP) will be prepared by the Contractor prior to works commencing on site. The CTMP will outline measures to be taken to mitigate the impact of construction traffic on the surrounding road network. Such measures are expected to include: • Construction Staff encouraged to arrive before 7:30am and leave after 18:00pm and outside of school drop off hours; • Construction Travel Plan to be developed by appointed Contractor; • Bike parking, storage and drying areas provided on site; • Agreed haulage routes along designated HGV routes, taking into account other active developments in the vicinity at the time of construction eg. Central Mental Hospital; • Wheel wash facilities and road sweeping; • Conducting all loading of excess material within the site boundary; • Limited parking on site for staff with majority required to arrive by sustainable means; • Construction signage at all entrances and exits; • HGVs carrying soil to be fully sheeted; • HGVs inspected for dirt and mud before exiting onto public road network;

	• Control / consolidating of deliveries where possible; and entrances and exits manned by flag men during deliveries.
MA:T-C2	Construction delivery vehicles will be prohibited from parking along public roads. Parking will be provided on site for staff.
MA:T-C3	All construction vehicles will access the site from Dundrum Bypass. There will be no vehicular access to the site from Main Street.

11.5.2 Monitoring

The following measures are proposed:-

MA:T-M1	Vehicle movements will be monitored by the appointed site manager on a continuous basis and regular monthly progress reports will be prepared and shared with DLRCC where requested.

11.5.3 Cumulative Impacts

The future year junction performance assessments undertaken for the proposed development also includes relevant traffic flow data for other committed developments in the vicinity. Peak hour vehicular trip generation during the development's construction phase and similar traffic from other projects in the vicinity shall be significantly less than that during its operational phase. During its construction phase, the subject development is predicted to result overall in a slight adverse impact on the operation of junctions on the surrounding road network. Any adverse impact related to road blockages / debris will be temporary.

11.6 OPERATIONAL IMPACTS

Junction turning count surveys have been undertaken for 9 junctions (in November 2021) during the network peak periods (07:00-10:00 and 14:00-19:00). The locations of the surveys are identified in Section 11.2.3 and Figure 11.1

Table 11.9 below presents the information of the operational network assessment based on the surveyed baseline flows. The table shows two junctions have a traffic impact above the 5% threshold. The maximum impact at the Dundrum Bypass / Main Street junction is 33% with this impact rated to be "very significant" in accordance with Table 11.1. The impact at the Dundrum Road / Taney Road junction is estimated to be 21% which is considered to be "significant" in accordance with Table 11.1. Chapter 6 of the Transport Assessment models the performance of the identified junctions as well as demonstrating that the proposed access junctions can operate within capacity.

The results of the traffic modelling exercise have identified that the existing Taney Cross junction operates over capacity under base plus committed development traffic conditions. With the addition of development traffic, the junction operates marginally increases the degree of saturation and queuing figures, but the increases are not considered significant and as such, there are no proposals to implement any new physical mitigation measures at the junction. Instead, the development will focus on ensuring that it maximises the use of sustainable transport modes to access the site and a Mobility Management Plan will be implemented to assist this objective.

The other junctions modelled are all predicted to operate within capacity for the opening year of the development.

Table 11.7 : Operational Traffic Impact Assessment

JUNCTION / ARM	AM PEAK HOUR			PM PEAK HOUR		
	B + C	DEV	↑	B + C	DEV	↑
1. Dundrum Bypass / Main Street						
Dundrum Bypass (N)	518	-1	0%	669	92	14%
Main Street	275	-10	-4%	361	-76	-21%
Dundrum Bypass (S)	521	171	33%	574	44	8%
2. Dundrum Road / Taney Road / Dundrum Bypass / Churchtown Road						
Dundrum Road	616	-12	-2%	678	20	3%
Taney Road	442	7	2%	473	35	7%
Dundrum Bypass	777	161	21%	808	-33	-4%
Churchtown Road	996	4	0%	838	37	4%
3. Dundrum Bypass / Multi-Storey Car Park						
Dundrum Bypass (N)	534	13	2%	826	-42	-5%
Multi-Storey Car Park	18	0	0%	87	0	0%
Dundrum Bypass (S)	535	-8	-1%	552	21	4%
4. Dundrum Bypass / Wyckham Way / TESCO Car Park						
Dundrum Bypass	507	12	2%	777	-46	-6%
TESCO Car Park	72	0	0%	408	5	1%
Wyckham Way (E)	677	-1	0%	794	9	1%
Wyckham Way (W)	1,305	-8	-1%	1,097	6	1%
5. Main Street / Ballinteer Road / Kilmacud Road / Sandyford Road						
Main Street	6	0	0%	5	0	0%
Kilmacud Road	241	-2	-1%	287	-3	-1%
Sandyford Road	189	-11	-6%	219	-20	-9%
Ballinteer Road	196	-18	-9%	88	-15	-17%
6. Sandyford Road / Overend Avenue / Wyckham Way						
Sandyford Road (N)	100	0	0%	280	1	0%
Overend Avenue	573	0	0%	654	-1	0%
Sandyford Road (S)	606	-1	0%	554	4	1%
Wyckham Way	994	8	1%	942	6	1%

11.6.1 Mitigation Measures

Although no formal mitigation is strictly required for the operational stage of the development, it is proposed to deliver the following as good practice measures.

MA:T-O1	The developer / management company will implement the measures included in the *Mobility Management Plan* (prepared by Systra and submitted with the application) as follows: • Appointment of Mobility Manager; • Welcome Travel Pack with details of local transport network, maps of local amenities, detail of on-site facilities and incentivises for sustainable travel. • Provision of information on locations of public transport stops, routes, timetables, walking times to main public transport facilities, etc. • Marketing and Travel information and Personalised Travel Planning to be provided by Mobility Manager; • Walking and Cycling Challenges and promotion events; and

	• A Car sharing club will be provided on site exclusively for the use of residents.

11.6.2 Monitoring Measures

The following measure is proposed:-

MA:T-M2	A mobility manager will be appointed from within the management company to ensure the implementation of the *Mobility Management Plan*. They will also be responsible for the undertaking of post occupation travel surveys and act as a point of contact for residents for all mobility and access related issues.

11.6.3 Cumulative Impacts

As is standard in the evaluation of traffic impact, the operational traffic impact in Table 11.6 and future year junction performance assessments conducted in respect of the proposed development also include other traffic flows to be generated by relevant nearby committed development. Therefore, the cumulative impacts from local developments have been included in the assessment.

11.7 OTHER EFFECTS

11.7.1 Residual Effects

The impact on traffic and transport will not be significant. However, some mitigation is proposed as good practice measures. The proposed development site is ideally situated to have a low car mode share and with the supporting measures identified in the MMP in place, car traffic may be lower than that assumed in the modelling assessment. The MMP will have the effect of encouraging people to travel by more sustainable modes of travel which in turn will reduce traffic levels The delays for traffic on the local network are in general minor with no significant delays modelled as result of the additional development.

11.7.2 Do Nothing Effects

Where the development does not proceed, there would be no changes to the existing traffic levels with the exception of background traffic growth and traffic generated by other new development activity in the area.

The existing site would continue to operate as a retail development with its existing car parking provision. The existing access points on Main Street would remain open with potential implications for the future operation of the Main Street Corridor and on the successful delivery of the Bus Connects project in this area. With regard to sustainable transport, the proposed bridge over the Dundrum bypass would not be delivered and there would be no pedestrian linkage improvements and no pedestrian crossing improvements delivered.

11.7.3 Worst Case Effects

During the construction phase, the worst-case scenario is represented by a failure to correctly manage construction-related traffic and site-generated dirt/debris, resulting in temporary obstruction or fouling of surrounding roads.

The worst case scenario for traffic relates to the AM and PM peak periods where baseline traffic is high and development trip generation is high.

11.8 INTERACTIONS

In terms of interactions, transport effects and in particular the increase in traffic levels and re-distribution of traffic is closely linked with and Air Quality and Climate (Chapter 8.0) and Noise and Vibration (Chapter 9.0). The daily traffic levels for the development proposals have been produced and used to inform the above assessments.

REFERENCES

- Central Statistics Office (CSO): 2016 Census data.
- *Design Manual for Urban Roads and* Streets (2019) Department of Housing, Planning and Local Government & Department of Transport.
- Dun Laoghaire Rathdown County Development Plan 2016-2022.
- Dun Laoghaire Rathdown Draft County Development Plan 2022-2028
- *Guidelines for the Environmental Assessment of Road Traffic* (2003) Institute of Environmental Management & Assessment (UK Based).
- *Project Appraisal Guidelines for National Roads Unit 5.3 - Travel Demand Projections*, October 2016, TII.
- *Project Appraisal Guidelines for National Roads Unit 5.1- Construction of Transport Models*, October 2016, TII.
- *Traffic and Transport Assessment Guidelines* (2014) Transport Infrastructure Ireland (TII).
- TRICS Consortium: Trip Rate Information Computer System (TRICS) database.

12.0 MATERIAL ASSETS: RESOURCE AND WASTE MANAGEMENT

12.1 INTRODUCTION

Byrne Environmental Consulting Ltd. have assessed the potential impacts that construction and operational wastes associated which the project may have on the receiving environment and how wastes generated shall be managed in accordance with the *Eastern-Midlands Region Waste Management Plan 2015-2021.*

The assessment includes a comprehensive description of the types and quantities of wastes that will be generated, how wastes will be managed and how the principals of reduce-reuse and recycle shall be implemented into the design of the development to ensure that the development will be constructed and operated in an environmentally sustainable manner.

The waste management strategies included in this Chapter of the EIAR present the potential environmental impacts, proposed mitigation and monitoring methodologies, based on the concept of Best Practice. Reference to Local, National and International Guidance and Standards are also included where relevant.

The projection of material assets of human origin was conducted and resource use and management of wastes generated were assessed for both the constructional and operational phases of the proposed development and their associated impacts assessed. Mitigation and best practice waste management are proposed where appropriate.

This Chapter was prepared by Ian Byrne. Ian is the Principal Consultant of Byrne Environmental Consulting Ltd. and holds a MSc Environmental Protection and a Dip. Environmental & Planning Law. He is a Member of the Institute of Acoustics and has over 25 years' experience in the preparation of waste management impact assessments for commercial, residential and industrial developments and conducted all aspects of the project works.

12.2 ASSESSMENT METHODOLOGY

This chapter has been prepared having regard to the EIA legislation and Best Practice Guidelines for both the Demolition and Construction Phase and the Operational Phase of the development.

12.2.1 Construction & Demolition Waste Assessment Methodology

This Assessment has been prepared to demonstrate how the Construction Phase (including demolition) will comply with the following relevant legislation and Best Practice Guidelines:
- Waste Management Act 1996;
- Waste Management (Collection Permit) Regulations 2007 (SI No. 820 of 2007).
- Waste Management (Collection Permit) Amendment Regulations 2008 (SI No. 87 of 2008).
- Department of the Environment, Heritage and Local Government – Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects – July 2006.
- EPA "Guidance on Soil and Stone By-Products in the context of Article 27 of the European Communities (Waste Directive) Regulations – Version 3 June 2019

- Dun Laoghaire Rathdown County Council (2021) - Guidance Notes for Environmental Management of Construction Projects.

The predicted volumes and types of construction and demolition waste to be produced have been determined in the *Outline Construction Management Plan* (OCMP) included with this application. Opportunities for the re-use of demolition phase materials on-site have been explored as part of the Circular Economy concept which will assist in reducing the amount of new or virgin raw materials required to be imported to the site during the construction phase.

12.2.2 Operational Waste Assessment Methodology

This Assessment has been prepared to demonstrate how the Operational Phase will comply with the following relevant regulations and Dun Laoghaire Rathdown County Council's design standards for waste management in residential developments.

- Waste Management Act 1996.
- Waste Management (Collection Permit) Regulations 2007 (SI No. 820 of 2007).
- Waste Management (Collection Permit) Amendment Regulations 2008 (SI No. 87 of 2008).
- Eastern-Midlands Region Waste Management Plan 2015-2021.
- Sections 4.8 and 4.9 Refuse Storage of The Department of Housing, Planning and Local Government – Sustainable Urban Housing: Design Standards for New Apartments – Guidelines for Planning Authorities (As Amended). 2020.
- Dun Laoghaire Rathdown County Council – *Guidance Notes for Waste Management in Residential and Commercial Developments* (2020)
- Dun Laoghaire Rathdown County Development Plan 2016-2022 Waste Management Policies, specifically Policy EI13

It is Council policy to conform to the EU and National waste hierarchy as follows:

Waste Prevention
|
Minimisation
|
Re-Use
|
Recycling
|
Recovery
|
Disposal

The predicted volumes of residential and commercial waste that will be produced during the operational phase of the development are established by site-specific waste calculations and modelling. The concept of segregating waste at source is a principal design element of the development which will assist in the sustainability of the development into the future.

12.3 RECEIVING ENVIRONMENT

The retail units within the site generate commercial and retail waste.

The construction and operation of the project will introduce new volumes of waste into the local area in terms of the short-term generation of construction waste and the longer-term generation of domestic waste when the development is occupied.

There is a recycling centre in the local area on Ballyogan Road which serves the local community. Currently Oxygen, Thorntons and AES provide domestic and commercial waste collection services in the Dundrum area.

12.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed development is described in Chapter 3. The following detail is relevant to the assessment in this Chapter.

The Construction and Operational Waste Management Plans prepared as part of the application[17] shall be implemented throughout the construction phase and operational stage of the development to ensure the following:

- That all site demolition and construction activities are effectively managed to minimise the generation of waste and to maximise the opportunities for on-site reuse and recycling of waste materials.
- To ensure that all demolition and construction waste materials generated by site activities are removed from site by appropriately permitted waste haulage contractors and that all wastes are disposed of at approved waste licensed / permitted facilities in compliance with the Waste Management Act 1996 and all associated Waste Management Regulations.
- The design of the development will ensure that users of the development are provided with sufficient facilities to segregate, store and recycle domestic and commercial waste.

12.5 CONSTRUCTION IMPACTS

Construction Waste Generation

The development of the subject site will require the demolition of existing buildings and structures followed by ground preparation works prior to the commencement of construction activities which will generate a range of waste types. The predicted waste generation for demolition, soil and rock, asbestos and construction waste are presented in Tables 12-1 to 12-4.

Demolition wastes if not managed and segregated on-site will have the potential to be difficult to separate into different waste streams to allow for further processing, recovery, re-use or to be recycled

Concrete waste arising from the demolition will potentially be reused on site (subject to testing) as temporary hardcore fill material for the piling mat. This fill material would provide a stable and level mattress for the piling rigs. This crushed concrete material would be removed from the site on completion of the piling works and a portion of the material could be used as general fill material elsewhere.

<u>Contaminated Soils</u>

Site investigations have identified that there are no hazardous soils at the site and that soils are classified as inert and non-hazardous.

[17] *Site Specific Construction and Demolition Waste Management Plan* and the *Operational Waste Management Plan*

Soils have previously been characterised in accordance with Landfill Directive (2003/33/EC) by conducting site investigations in October 2021. The classification of the soils was established by Waste Acceptance Criteria testing (WAC). The Waste Classification Report including a Haz Waste Online Classification prepared by O'Callaghan Moran & Associates (Re. Appendix 6A of the EIAR) concludes that on-site soils are non-hazardous.

Table 12-1 Predicted Demolition Waste Generation

Waste Type	Predicted Tonnage to be Produced	Re-Use		Recyclable		Disposal	
		%	Tonnage	%	Tonnage	%	Tonnage
Mixed C&D	1654	10	165	80	1323	10	165
Timber	945	40	378	55	520	5	47
Plasterboard	709	30	213	60	425	10	71
Metals	236	5	12	90	213	5	12
Concrete	473	30	142	65	307	5	24
Mixed Waste	709	20	142	60	425	20	142
Total	**4725**		**1051**		**3213**		**461**

Table 12-2 Predicted Waste Soil & Rock Generation

Waste Type	Predicted tonnage to be produced	Re-Use		Recyclable		Disposal	
		Tonnage	%	Tonnage	%	Tonnage	%
Soils Tonnage	40,500 T	0	0	0	0	40,500 T	100
Soils Volume	27,000m^3	na	0	na	0	27,000m^3	100
Rock Volume	1200m^3	1200m^3	100	0	0	0	0

Table 12-3 Predicted Asbestos Generation

Waste Type	Predicted quantity of ACM's to be removed	Re-Use		Recyclable		Disposal	
		Area	%	Area	%	Area	%
Asbestos Containing Materials	11, 050m^2	0	0	0	0	11,050m^2	100

Table 12-4 Predicted Construction Waste Generation

Waste Type	Predicted Tonnage to be Produced	Re-Use		Recyclable		Disposal	
		%	Tonnage	%	Tonnage	%	Tonnage
Mixed C&D	**1997**	**200**	**10**	**1597**	**80**	**200**	**10**
Timber	**1694**	**678**	**40**	**932**	**55**	**85**	**5**
Plasterboard	**605**	**182**	**30**	**363**	**60**	**61**	**10**

Metals	**484**	**24**	**5**	**436**	**90**	**24**	**5**
Concrete	**363**	**109**	**30**	**236**	**65**	**18**	**5**
Mixed Waste	**908**	**182**	**20**	**545**	**60**	**182**	**20**
Total	**6051**	**1374**		**4109**		**569**	

12.5.1 Mitigation Measures

The following mitigation measures are proposed. These are contained in the *Site-Specific Construction and Demolition Waste Management Plan* [Byrne Environmental] submitted with this application.

MA:RWM-C1	A dedicated C&D Waste Manager shall be appointed by the Contractor to manage all demolition and Construction Wastes
MA: RWM-C2	Demolition and Construction Wastes shall be managed in accordance with the Site-Specific Construction and Demolition Waste Management Plan.
MA: RWM-C3	The soft stripping of buildings prior to demolition shall identify materials that can be re-used
MA: RWM-C4	Excavated rock, if suitable, shall be re-used on-site for pile pads
MA: RWM-C5	An On-Site Construction Waste Compound for the segregation of construction and demolition wastes shall be established
MA: RWM-C6	Tool-Box talks on waste reduction, reuse, recycling and segregation shall be provided to all site staff and Contractors
MA: RWM-C7	Routine Waste Management Audits shall be conducted on a weekly basis.
MA: RWM-C8	Waste Collection Permits and Letters of acceptance from Waste Acceptance Facilities shall compiled and made available to DLRCC, if requested, on the appointment of Contractors
MA: RWM-C9	All waste loads leaving the site shall be digitally recorded
MA: RWM-C10	A monthly waste out record shall be compiled and made available to DLRCC if requested.
MA: RWM-C11	All vehicles exiting the site carrying waste materials shall display a valid National Waste Collection Permit number and be verified at the site exit gate

12.5.2 Monitoring Measures

The effectiveness of the *Site-Specific Construction and Demolition Waste Management Plan* and its implementation shall be monitored by conducting weekly audits by the C&D Waste & Resource Manager for the duration of the demolition and construction phases of the project.

The regular audits shall focus on materials inputs to the project and the waste outputs for each operation identifying additional opportunities for waste reduction, re-use and recycling. The audits will also investigate the operational factors and management policies that contribute to the generation of waste and identify appropriate corrective actions, where necessary.

Performance targets will be developed, e.g. an 85% overall recycling target, successes and failures will be recorded and Action Plans will be developed to address any issue which arise.

Inspections of the waste storage areas will be undertaken on a weekly basis, issues relating to housekeeping, inappropriate storage and / or segregation will be actioned at the earliest practicable opportunity.

The C&D Waste & Resource Manager will record the findings of the audits, including waste types identified, quantities of waste arising, final treatments and cost, in a report to be available to the Local Authority as required during the course of the works.

Details of the inputs of materials to the construction site and the outputs of wastage arising from the project will be investigated and recorded in the Final Waste Audit, which will identify the amount, nature and composition of the waste generated on the site. The Final Waste Audit will examine the manner in which the waste is produced and will provide a commentary highlighting how management policies and practices may inherently contribute to the production of construction and demolition waste. The measure waste quantities will be used to qualify the costs of management and disposal in a Waste Audit Report, which will also record lessons learned from these experiences, which can be applied to future projects.

The *Site-Specific Construction & Demolition Waste Management Plan* specifies how construction and demolition waste shall be monitored in accordance with Dun Laoghaire Rathdown County Council's Guidance Notes for Environmental Management of Construction Projects. The following monitoring measure is required.

MA:RWM-M1	C&D waste shall be monitored as follows: • The C&D Waste & Resource Manager will record the findings of the audits, including waste types identified, quantities of waste arising, final treatments and cost, in a report to be available to the Local Authority as required during the course of the works. • All demolition and construction waste loads leaving the site on an appropriately waste permitted vehicle shall have an associated receipt from the authorised receiving facility. o Each waste vehicle exiting the site will have a Waste Collection Permit (WCP) Number displayed on the side of the vehicle. All vehicles shall be checked by the Gate Person prior to exit. Any vehicle not displaying a WCP Number shall not be permitted to exist the site with waste materials. o A n electronic monthly record of all wastes exported from the site shall include at a minimum: o Vehicle Reg and WCP Number o Description of Waste and associated LoW Code o Name and Address of the Destination Facility and the associated Waste Permit Number o Volume/Tonnage of material delivered to the Destination Facility • The monthly waste export file shall be issued to DLRCC as requested.

12.5.3 Cumulative Impacts

The other projects listed in Section 3.10 of this Report have been considered and no significant cumulative impacts have been found. Should other developments arise during the construction phase, they would be similarly required to prepare a C&D Waste Management Plan in accordance with Dun Laoghaire Rathdown County Council planning requirements and specify how C&D wastes shall be managed.

12.6 OPERATIONAL IMPACTS

Waste Generation

The operational phase of the development will consist of:

- Residential apartments
- Retail and Café / restaurant units
- Residents Facilities
- Creche

The most recent EPA Waste statistics (2019, issued December 2021) on household waste generation states 628kg is produced per person per year or 1.72Kg/day.

Table 12-4 Calculated waste generation

Source	# Units	Waste/Day	Waste/week
	No.	Litres	Litres
Residential Units	881	15,080	105,560
Residents Facilities	na	100	700
Retail	1781 sqm	2544	17,810
Food Store	1999 sqm	4286	30,000
Creche	1	440	2,200
Total for development	n/a	22,450	156,270

Table 12-5 Calculated domestic waste composition

Waste Type	% Waste	Kg/week	Kg/day
Organic waste	30.6	**10385**	**1484**
Paper	12.5	**4242**	**606**
Cardboard	3.6	**1222**	**175**
Composites	1	**339**	**48**
Textiles	15.5	**5261**	**752**
Plastics	13.6	**4616**	**659**
Glass	3.4	**1154**	**165**
Metals	3.1	**1052**	**150**
Wood	1.2	**407**	**58**
Hazardous municipal waste	0.9	**305**	**44**
Unclassified combustibles	1.4	**475**	**68**
Unclassified incombustibles	1.2	**407**	**58**
Fines	11.7	**3971**	**567**
Bulky Waste & WEEE	0.3	**102**	**15**
Totals	100	33939	4848

12.6.1 Mitigation Measures

The following measures are proposed.

MA: RWM -O1	The communal domestic waste storage areas shall be managed by the Facilities Management Company.
MA: RWM -O2	Domestic and Commercial Wastes shall be managed in accordance

	with the Operational Waste Management Plan
MA: RWM -O3	Residents shall be provided with information by the Facilities Management Company on the correct segregation and disposal of waste in order to minimise the generation of mixed waste streams and to increase recycling rates.
MA: RWM -O4	All residential units shall include a 3-bin waste segregation at source waste bin system.
MA: RWM -O5	The communal waste storage areas shall include WEEE and waste battery storage units.
MA: RWM -O6	The communal waste storage areas shall be of sufficient size to allow for the contingency storage of waste
MA: RWM -O7	An annual bulky waste collection service will be provided to residents by the Facilities Management Company.
MA: RWM -O8	A dedicated retail and commercial waste storage area shall be provided for the retail, café / restaurant units and Creche. This area shall be separate from the domestic communal waste storage areas.
MA: RWM -O9	The Facilities Management Company shall maintain a record of all domestic waste produced and shall prepare an annual report for residents and DLRCC detailing how waste reduction and recycling targets are being achieved with regard to The Eastern Region Waste Management Plan.

12.6.2 Monitoring

No Monitoring measures are required.

12.6.3 Cumulative Impacts

The cumulative operational waste impact of the proposed development and of other developments that may be developed in the local area in the future will together place a greater demand on local waste management services. However, with regard to the requirements for all new developments to integrate waste segregation and recycling infrastructure into the design of residential developments, the cumulative impact on regional waste management infrastructure will be imperceptible

12.7 OTHER EFFECTS

12.7.1 Residual Effects

Construction Phase

The management of wastes generated during the construction of the proposed development will be in accordance with *a Site-Specific Construction Phase Waste Management Plan*. With regard to how it has been demonstrated how demolition and construction wastes will be managed through design, management and waste reduction and recycling initiatives at the proposed development, it is predicted that the impact of the construction phase of the development will not have an adverse impact on the receiving environment, existing material assets and local and regional waste management services.

Table 12-6 summarises the identified likely residual effects of the proposed development during the construction phase post application of mitigation measures.

Table 12-6 Summary of Construction Phase Residual Effects

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Type
Regional Construction Waste Infrastructure	Negative	Not Significant	Regional	Likely	Short-Term	Residual

Operational Phase

The development shall be designed to provide adequate domestic waste infrastructure and storage areas for all apartments. This will promote the appropriate segregation at source of domestic generated waste from all residential units at the development and thus reduce the potential for the generation of mixed un-recyclable domestic waste streams.

The predicted operational phase residual impacts on regional waste management infrastructure will be neutral, not-significant and long-term.

The Table below summarises the identified likely residual effects of the proposed development during the operational phase post application of mitigation measures.

Table 12-7 Summary of Operational Phase Residual Effects

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Type
Regional Domestic Waste Infrastructure	Negative	Not Significant	Regional	Likely	Long-Term	Residual

12.7.2 Do Nothing Effects

Should the development not proceed, the current Dundrum Village Centre shall continue to generate commercial and retail waste in to the future.

12.7.3 Worst Case Effects

A worst-case scenario would arise if the construction phase and operational phase wastes streams were not managed in accordance with the Construction & Demolition Waste Management Plan or the Operational Waste Management Plan. Unmanaged waste streams will reduce the ability to re-use and recycle waste fractions and result in the generation of unsegregated waste streams which will have an increased impact on the environment as a result of the energy required to dispose of them in landfill or by incineration. In this worst-case scenario the effect would be short-term to long-term, significant and negative.

12.8 INTERACTIONS

The identified interactions between the management of waste arisings during both the construction and operational stages are as follows;

- Population & Human Health, management of waste in the construction and operational phase to mitigate nuisance.
- Land & Soils, excavation to facilitate the development.

- Traffic, specifically movement of waste associated with the construction stage.

REFERENCES

- Waste Management Act 1996;
- Waste Management (Collection Permit) Regulations 2007 (SI No. 820 of 2007);
- Waste Management (Collection Permit) Amendment Regulations 2008 (SI No. 87 of 2008);
- Eastern-Midlands Region Waste Management Plan 2015-2021;
- European Communities (Waste Directive) Regulations 2011;
- Department of the Environment, Heritage and Local Government (2006) *Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects*
- Department of Housing, Planning and Local Government (2020) *Sustainable Urban Housing : Design Standards for New Apartments – Guidelines for Planning Authorities*(As Amended 2020), Section's 4.8 and 4.9 Refuse Storage;
- British Standard (2005) *Waste Management in Buildings-Code of Practice* BS 5906:2005
- Dun Laoghaire Rathdown County Council (2016) *Dun Laoghaire Rathdown County Development Plan 2016-2022* (Waste Management Policies)
- Dun Laoghaire Rathdown County Council (2021) *Guidance Notes for Waste Management in Residential and Commercial Developments*
- Dun Laoghaire Rathdown County Council (2021) *Guidance Notes for Environmental Management of Construction Projects.*

13.0 CULTURAL HERITAGE

13.1 INTRODUCTION

This chapter is prepared by Lisa Courtney of Courtney Deery Consultancy Ltd and Sinéad Flynn and Julia Crimmins of Cathal Crimmins Architects, RIAI Grade 1 Conservation Architects. The chapter describes and assesses the archaeological, architectural and cultural heritage of the lands proposed for residential and mixed use development at Dundrum.

Lisa Courtney is a director of Courtney Deery Heritage Consultancy and has over 25 years of field and research experience in environmental impact assessment reporting. Lisa holds a BA (Hons) in Archaeology and Economics and a Msc (Ag) in Environmental Resource Management from University College Dublin and has obtained certificates from the University of Oxford in Condition Surveys of Historic Buildings (2017) and the assessment of setting of heritage assets (2013). Lisa holds a higher diploma in Planning and Environmental Law (2020). Lisa is a member of the Institute of Archaeologists of Ireland (IAI) and a member of the International Council of Monuments and Places (ICOMOS). Lisa has carried out reports for large scale infrastructural projects and conservation initiatives, her experience demonstrates a capability of characterising the existing historic and archaeological environment and evaluating its significance.

Sinéad Flynn is a conservation architect and has over 13 years of field and research experience in preparing architectural heritage impact assessments. Sinead holds a Bachelor of Architecture (2007), a Professional Diploma Architecture (2010) and a Masters in Urban and Building Conservation (2017) from University College Dublin. Sinead is a member of the Royal institute of Architects Ireland (RIAI) and a Committee Member RIAI Historic Buildings Committee.

Julia Crimmins is a built heritage consultant and has over 15 years experience in a preparing architectural heritage impact assessments. Julia holds a BA in Archaeology and Classical Civilization from University College Dublin (2000), a higher diploma in Archaeology from University College Cork (2003), a MUBC Masters in Urban and Building conservation University College Dublin (2006) and a Msc (Sp) in Spatial Planning from the Technical University of Dublin (2019). Julia is a member of the Institute of Archaeologists of Ireland (IAI), The Irish Planning Institute (IPI) and a member of the International Council of Monuments and Places (ICOMOS). Julia has carried out reports for large scale infrastructural and residential projects.

A detailed archaeological and historical background has been included which describes the character of the immediate and wider historic landscape, as well as the individual heritage assets.

13.2 ASSESSMENT METHODOLOGY

The evaluation of the archaeological and cultural heritage resource of the proposed development site was based on a desk study of published and unpublished documentary and cartographic sources, supported by a site inspection. In addition to the legislation, standards and guidelines listed in Chapter 1, the following were consulted to inform the assessment:

- National Monuments (Amendments) Acts, 1930-2014, as amended;
- The Planning and Development Act 2000, as amended;

- Heritage Act, 1995;
- Council of Europe Convention for the Protection of the Architectural Heritage of Europe (Granada) 1985, ratified by Ireland in 1991;
- Council of Europe European Convention on the Protection of the Archaeological Heritage (Valletta) 1992, ratified by Ireland in 1997;
- Frameworks and Principles for the Protection of the Archaeological Heritage, 1999, (formerly) Department of Arts, Heritage, Gaeltacht and Islands;
- Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act, 2000 and the Planning and Development Act 2000;
- Guidelines for the Assessment of Architectural Heritage Impact of National Road Schemes, 2005, NRA;
- Guidelines for the Assessment of Archaeological Heritage Impact of National Road Schemes, 2005, NRA;
- National Landscape Strategy for Ireland 2015-2025, Department of Arts, Heritage and the Gaeltacht.

The assessment has been conducted based on the available information and has followed the existing best practice format of desk and site survey. The desk study used the following sources:

- National Monuments, Preservation Orders and Register of Historic Monuments lists, which were sourced directly from the Department of Housing, Local Government and Heritage (DHLGH);
- Record of Monuments and Places ('RMP') and Sites and Monuments Record ('SMR'). The SMR, as revised in the light of fieldwork, formed the basis for the establishment of the statutory RMP in 1994 (pursuant to Section 12 of the National Monuments (Amendment) Act, 1994). The RMP records known upstanding archaeological monuments, their original location (in cases of destroyed monuments) and the position of possible sites identified as cropmarks on vertical aerial photographs. The information held in the RMP files is read in conjunction with published constraint maps. Archaeological sites identified since 1994 have been added to the non-statutory SMR database of the Archaeological Survey of Ireland ('ASI', National Monuments Service, DHLGH), which is available online at www.archaeology.ie and includes both RMP and SMR sites. Those sites designated as SMR sites have not yet been added to the statutory record, but are scheduled for inclusion in the next revision of the RMP
- Dun Laoghaire-Rathdown County Development Plan 2016-2022
- Dun Laoghaire-Rathdown Draft County Development Plan 2022-2028
- The topographical files of the National Museum of Ireland ('NMI')
- Cartographic sources, which included Down (1654), Rocque (1760), Taylor (1816), Duncan (1821), Ordnance Survey ('OS') and Griffith's Valuation maps
- Excavations Bulletins and Excavations Database (1970-2020)
- Other documentary sources (as listed in the references)
- Aerial imagery (Google Earth 2001–2020).

A site inspection was undertaken on 10th September 2021 to assess the current condition and use of the proposed development lands. The site inspection was carried out within the context of an assessment of the archaeological and cultural heritage potential of the surrounding area, taking cognisance of the potential implications of the development on the surviving cultural heritage landscape (where upstanding monuments are located).

External inspections relating to the existing architectural heritage assets were undertaken on the 2nd of August and 16th of September 2021. External site inspections were carried out with regard to the assessment of the architectural heritage of the surrounding area, taking cognisance of the potential implications of the development on the surviving architectural heritage landscape and the character of the area. Internal inspections were carried out on the 1st and 21st of October. They were undertaken to assess the current condition and heritage significance of the existing architectural heritage assets within the receiving environment of the proposed development lands.

The assessment of the likely significant effects on the environment resulting from the construction and/or operation of the proposed development relies on a combination of qualitative and quantitative assessment. The methodology assessed both direct physical effects, as well as impacts to the setting of individual heritage assets. By using all the different sources and data sets an understanding of the historic character that surrounds and is part of the proposed development has been developed and as a result of this the cumulative effect of the proposed development can be assessed.

Cultural heritage is a broad term that includes a wide range of tangible and intangible cultural considerations. It encompasses aspects of archaeology and architecture and is expressed in the physical landscape as well as in non -physical ways. Archaeological and cultural heritage sites are considered to be a non-renewable resource and cultural heritage material assets are generally considered to be location sensitive. In this context, any change to their environment, such as construction activity and ground disturbance works, could affect these sites. The likely significance of all effects is determined in consideration of the magnitude of the effects and the baseline rating of the cultural heritage asset (i.e. its sensitivity or value). Having assessed the magnitude of effect with respect to the sensitivity/value of the asset, the overall significance of the effect is then classified as imperceptible, slight, moderate, significant, or profound.

Cultural heritage can relate to settlements, former designed landscapes, building and structures, as well as folklore, townland and place names, historical events and traditions.

13.2.1 Assessment of Impacts

The assessment of the likely significant effects on the environment resulting from the construction and/or operation of the proposed development relies on a combination of qualitative and quantitative assessment.

Archaeological sites/landscapes are considered to be a non-renewable resource and cultural heritage material assets are generally considered to be location sensitive. In this context, any change to their environment, such as construction activity and ground disturbance works, could impact these sites.

Architectural heritage is a unique and irreplaceable material asset which is given value by its design, setting, quality of workmanship and use of materials. In this context, any change to the architectural heritage fabric, structure and setting, resulting from construction and operation activity, may adversely impact these sites.

Cultural heritage is a broad term that includes a wide range of tangible and intangible cultural considerations. It encompasses aspects of archaeology and architecture and is expressed in the physical landscape as well as in non -physical ways. Cultural heritage can relate to settlements, former designed landscapes, building and structures, as well as folklore, townland and place names, historical events and traditions.

Impacts on the setting of heritage assets describe how the presence of a development changes the surroundings of a heritage asset (archaeological, or cultural heritage sites) in such a way that it affects (positively or negatively) the heritage significance of that asset. Visual impacts are most commonly encountered but other environmental factors such as noise, light or air quality can be relevant in some cases. Such impacts may be encountered at all stages in the life cycle of a development from construction to decommissioning but they are only likely to be considered significant during the prolonged operational life of the development.

Impacts on the receiving archaeological and built heritage environment are assessed in line with the requirements of the 2017 EPA Guidelines (refer to section 1.7 for terminology). The following impact assessment terms are relevant for the assessment of impacts on Cultural Heritage.

Significance Criteria

These criteria have regard to the Environmental Protection Agency (EPA) assessment criteria as per the draft EPA Guidelines on Information to be Contained in Environmental Impact Assessment Reports (2017).

Archaeological, architectural heritage and cultural heritage sites are a non-renewable resource and cultural heritage material assets are generally considered to be location sensitive. In this context, any change to their environment, such as construction activity and ground disturbance works, could adversely affect these sites.

In accordance with EPA Guidelines (EPA 2017), the context, character, significance and sensitivity of each archaeological, architectural heritage and cultural heritage asset requires evaluation and the significance of the impact is then determined by considering the significance / sensitivity of the asset and the predicted magnitude of the impact.

An evaluation of the significance / sensitivity of heritage assets is based on its designation and the extent to which these assets contribute to the archaeological or built heritage environment, though their individual or group qualities, either directly or potentially. Table 13.1 presents the scale of significance / sensitivity together with criteria.

Table 13.1 Significance Criteria

Sensitivity Value	Criteria
High	Sites of international significance: World Heritage Sites National Monuments Protected Structures (assessed by the NIAH to be of international and national importance) Designed landscapes and gardens of national importance Architectural Conservation Areas Undesignated archaeological, architectural and/ or cultural heritage sites.
Medium	Recorded Monuments (RMP sites & SMR sites scheduled for inclusion in the next revision of the RMP) Protected Structures (assessed by the NIAH to be of regional importance) NIAH – Building and Garden Survey Newly identified archaeological sites, confirmed through archaeological investigation or research, to be added to the SMR. Undesignated archaeological, architectural and/or cultural heritage sites.
Low	Sites listed National Inventory of Architectural Heritage (NIAH) Building for which there are no upstanding remains.

Sensitivity Value	Criteria
	Undesignated archaeological, architectural and/or cultural heritage sites. Undisturbed greenfield areas and riverine environs, which have an inherent archaeological potential.
Negligible	Assets with very little or no surviving archaeological, architectural and cultural heritage interest.

Magnitude of Impact

When considering the impact magnitude (Table 13.2), the following criteria need to be considered:

- Extent – size, scale and spatial distributions of the impact;
- Duration – period of time over which the impact will occur;
- Frequency – how often the impact will occur; and
- Context – how will the extent, duration and frequency contrast with the accepted baseline conditions

Table 13.2 Magnitude of Impact Criteria

Criteria	Impact Magnitude
These impacts arise where an archaeological, architectural and cultural heritage asset is completely and irreversibly destroyed by a proposed development. A change such that the value of the asset is totally altered or destroyed, leading to a complete loss of character, integrity and data about the site.	High
An impact which, by its magnitude, duration or intensity alters an important / significant aspect of the environment. An impact like this would be where an archaeological, architectural and cultural heritage asset would be impacted upon leading to a significant loss of character, integrity and data about the site. Or an impact which by its magnitude results in the partial loss of a historic structure (including fabric loss or alteration) or grounds including the part removal of buildings or features or part removal of demesne land (e.g. severance, visual intrusion or degradation of setting and amenity). A permanent positive impact that enhances or restores the character and / or setting of a cultural heritage site or upstanding archaeological and architectural heritage site in a clearly noticeable manner.	Medium
A low impact arises where a change to the site is proposed which though noticeable is not such that the archaeological, architectural and cultural heritage character / integrity of the site is significantly compromised, and where there is no significant loss of data about the site. A positive impact that results in partial enhancement of the character and / or setting of a cultural heritage site, upstanding archaeological, architectural heritage site in the medium to long-term.	Low
An impact which causes very minor changes in the character of the environment and does not directly impact an archaeological, architectural and cultural heritage asset, or affect the appreciation or significance of the asset. There would be very minor changes to the character and integrity of the asset and no loss of data about the site.	Negligible

13.3 RECEIVING ENVIRONMENT

The old Dundrum Shopping Centre (Village Centre) and carparking forms the majority of the area to be developed. The topography of the site falls considerably from south to north accommodating different building heights throughout the proposed application area. The proposal provides an opportunity to develop the street scape at the northern end of Main Street and to provide public realm improvements and improvements to the setting of Holy Cross Church (Protected Structures RPS No. 1129) and Parochial House (Proposed Protected Structures RPS No. 2095[18]).

Dundrum has grown from the nucleus of the river crossing with the castle standing on the ridge above. Its urban character evolved relatively recently and was instigated by the arrival of the railway and the Pembroke estate, which had the distinctive terraces of cottages constructed for its workers.

Architecturally, Dundrum retains a strong village identity through the retention of its Victorian buildings and character, though this has been fragmented and diluted over the years.

There are three recorded monuments in the general Dundrum area, all are located outside the proposed development area. Dundrum Castle (RMP 022-023) overlooks the site from the southwest, the church and graveyard including ecclesiastical remains at Taney (RMP022-016/001-003), located to the north and a mill complex (SMR 022-100/001-003) located within the existing Dundrum Town centre.

The ground rises on both sides of the now largely culverted Dundrum Slang at Dundrum village. The castle is located on the steeply sloping western side of the river. The remains of Dundrum Castle is located within a private residential complex and surrounded by mature trees with no accessible views to and from the proposed development.

St Nahi's church and graveyard (RMP022-016/001-003) is set in what is essentially an urbanised context, surrounded on all sides by roads and the Luas bridge to the northeast which dominates the skyline over the church when viewed from the east. Views from the church looking west are impeded by the boundary wall of the proposed development site. Despite the built-up surroundings, the interior of the graveyard is a relatively peaceful place and the surroundings do not seem to interfere with the enjoyment of the site which includes St Nahi's Graveyard Pod Trail.

The Mill House (RPS 1234) and mill pond form a focal point and an area to gather around within the Dundrum Town centre. The mill race was excavated as part of the development works.

13.3.1 Historical Context

Prehistoric Period (c.9000BC-500AD)

No early prehistoric finds or early settlement sites (9000-4000BC) have been identified in the vicinity of the proposed development site. The topographical files of the Irish Antiquities Division of the National Museum of Ireland record the discovery of a stone axehead (NMI 1934:463) dating to the Neolithic period. The artefact was provenanced to "near Dundrum" within the parish of Taney.

[18] The Parochial House is included as a proposed protected structure in the Dun Laoghaire Rathdown Draft County Development Plan 2022-2028. The Parochial House will be included in the Record of Protected Structures on adoption of this Plan.

Early Medieval Period (c.500-1100AD)

The name Dundrum, meaning the 'fort on the ridge', has its origins in the Early Medieval period (c. 500-1100AD). The location of the 'fort' has not been established, but it has been suggested that the site probably lies on high ground overlooking the present village and that the present site of Dundrum Castle is located close to, or on, the site of the original 'Dun Drum'. However, research excavations at Dundrum Castle between 1988 and 1991 have not uncovered any earlier phases of activity consistent with a pre-existing fort predating the Norman (c. AD1200) castle. The director of the excavations has pointed out that the scope of the excavations was limited to the area adjacent to the surviving castle walls and that an earlier site cannot be ruled out (O'Brien 1989). The castle was built by Sir John de Clahull c. 1187, the earliest feature exposed is a section of fosse (Wth 7m, D 1.40m) that enclosed the top of the ridge. Finds included Leinster cooking ware, a buckle and a socketed arrowhead. Associated with this moat was a triple-slotted drawbridge with an entrance to a gatehouse extending from the drawbridge to part of the outer wall of the early castle. Part of a stone-lined watercourse runs under the base of the wall and the shaft of a garderobe was revealed within the wall (Newman Johnson 2014).

Taney or Tech Nath Í, meaning 'Nathi's House' is located within the over-kingdom of Laigin (Irish spelling of the Kingdom of Leinster) close to the north-western limit of the territory controlled by the Uí Biúin Chualann, a dynasty with close genealogical ties to the Uí Dúnlainge, who controlled the north of Laigin (Laigin Tuathgabair) from the 7th century. Though the river Liffey marks the northern border of the over-kingdom of Laigin for most of the early medieval period, it is clear that in the fifth century (and indeed earlier) the territory of Laigin extended much further north, most likely demarcated by the river Boyne (Smyth 1974; Smyth 1982).

Dundrum and the surrounding area of south county Dublin was occupied in the 5th century by the Dál Messin Corb, an early Leinster clan from whom a number of early saints in the locality, including St Nathí, claimed ancestry. The most acclaimed Dál Messin Corb saint is Cóemgen (Kevin) of Glendalough. By the 7th century the principle dynasty of the Dál Messin Corb (Uí Garrchon) were restricted to the east of the Wicklow mountains along the coast around Wicklow town, with smaller collateral dynasties further north along the coast (within the territory of Uí Briúin Cualann) at Delgany (Uí Bráen Deilgni) and Shankill (Uí Amsáin). However, analysis of the annal entries for the 5th and 6th centuries, the saints lives (in particular the 7th century vitae of Patrick) and the location of ecclesiastical sites founded or associated with members of the Dál Messin Corb, clearly indicates that originally they were based in the plains of Kildare, dominating the politics of Laigin (Smyth 1974).

In the seventh century, these lands south of River Liffey were known as Cualu and as the power of the *Dál Messin Corb* declined in the later part of the 7th century Cualu came under the control of two clans, the Uí Cellach Cuallan and the Uí Briuin Cuallan. From the eighth century the area around Dundrum lay within territory controlled by the Uí Briúin Chualann dynasty (Stout & Stout 1992, 19). The River Liffey separated Cualu from the province of Míde or Meath to the north. Historical sources suggest that tillage crops were important at this time and Clarke (1978) tells us that the ale of Cualu was renowned for its quality and was consumed from vessels made from horns of wild ox. According to one early text "He is not king over glorious Ireland who does not consume the ale of Cualu" (Corlett 1999, 34).

Further upheavals in the late 9th and 10th centuries occurred with the establishment of the Norse town of Dublin, whose rulers extended control over large tracts of modern county Dublin both north and south, creating a hinterland (Dyflinaskerri or Fine Gall). This impacted on the territories of the Uí Dunchada branch of Uí Dúnlainge in southwest Dublin and the land of Uí Briúin Cualann in southeast Dublin and northeast Wicklow. The initial Anglo-Norman documentation in relation to this latter area indicates that the main overlords, the Harolds and Mac Torcaills, were of Norse extraction.

Tíg Nathí, also known as Taney Church (St. Nahi's (DU022:016)), had its origins in the Early Medieval period. The place name Taney is derived from Tíg Nathí (or the house of Nathí, its patron saint). The landscape in and around the early medieval church site at St. Nahi's has altered radically since it foundation over a thousand years ago. According to Swan (1985), in almost all cases of known early monastic enclosures, the surviving elements comprise a church and graveyard of mostly late medieval or post-medieval date. The present Church of Ireland church on Upper Churchtown Road was rebuilt between 1750 and 1760. It is likely to be located on the site of an earlier church within the original monastery. A bell-cote present in the gable end of the existing church appears to have been retained from the earlier medieval church and the granite wall fabric indicates that it is likely that the earlier structure was remodelled rather than completely rebuilt in 1750/60. Thus elements of the present 18th century church incorporate earlier phases of an older medieval church. Swan (1985) also indicates that the pattern of present-day streets, roads or field fences invariably provide an indication of the outline and dimensions of an earlier enclosure, and at times constitute the only evidence for the existence of an early monastic site. The curving arc of the Upper Churchtown Road represents the alignment of an enclosure at the site. This is likely to have been the inner enclosure surrounding the church and graveyard. The enclosing ditch or outer enclosure found during the archaeological excavation (O'Donovan 2009) in the grounds north of the proposed convent site suggests that the early ecclesiastical settlement extended west of the Lower Churchtown Road which presently provides the western limit to St. Nahi's.

Medieval Period (c. 1100-1600AD)

In 1243, Dundrum is recorded as being owned by Hugh de Clahull and it is probable that he built the first castle on the site. By 1268, Dundrum had come into the possession of Sir Robert Bagod of Baggodrath. By the year 1326, however, Dundrum had been acquired by Alexander Archbishop of Dublin on behalf of a member of the Fitzwilliam family. The Fitzgeralds lived at Dundrum until the end of the fifteenth century, when they moved their residence to Baggodrath castle allowing the castle at Dundrum to fall into disrepair.

The castle was rebuilt in the 1590s by Sir Thomas Fitzgerald and was occupied by that family until the 1640s when the castle again fell into disrepair. In 1653, it was leased to a Cromwellian officer, Colonel Isaac Dobson, who restored it. At the time, it was described as a 'slated castle in good repair with three hearths and having attached to it a barn and a garden'. It is likely that the castle formed a focus of settlement that developed into the village of Dundrum. There are no early medieval buildings in the village and the present bridge across the river dates to the nineteenth century. The castle was continuously occupied until the nineteenth century but fell into disrepair and eventually was used as a cow byre. It was acquired by David Johnson in the 1980s and archaeological excavations were carried out in advance of restoration and rebuilding works.

An archaeological assessment was carried out on the environs of Dundrum Castle, in response to a proposed development (Licence ref. 97E110). The area was investigated by a total of five test trenches but no significant archaeological soils, features or deposits were encountered as a result of the excavations.

The main lands of Taney, however, formed part of the archiepiscopal manor of St. Sepulchre's. The manorial centre was adjacent to St. Patrick's Cathedral at St. Sepulchre's palace (now Kevin Street Garda Station) and its lands extended south from there including Rathmines, Cullenswood, Milltown and Roebuck as well as Taney. A manorial extent of 1326 describes the extent of the archbishop's land holding at Taney and Milltown as 'four score acres … 40 acres waste and untilled for want of tenants … four cottages now waste for want of tenants' (MacNeill 1950, 171) with and additional five score acres let to Adam de Bertynes. Leases or grants of sections of the lands of Taney are recorded in Archbishop Alen's Register (MacNeill 1950, 8; 86; 204; 237; 295; 302-3). Some of these leases can clearly be identified with the modern townland of Churchtown Lower, and it is likely that lands in Churchtown Upper were also part of the manor.

The topographical files of the National Museum of Ireland record two artefacts from Dundrum which date to the medieval period. A bronze finger ring (NMI no register number), was recovered from the garden of 7 Beech Lawn Dundrum and appears to date to the 16th century. A bronze gaming piece featuring animal design (NMI 1947:193) dating to the 12th or 13th century was recovered from Dundrum.

Post Medieval Period (1600-1800AD)

The Parish of Taney is illustrated on the 1656 Down Survey Map as consisting of the townlands of Dondrom, Ballintery, Rabuck, Ownenstown, Kilmacudd, Ballowley, Tyberstowne, Moltanstowne, and Militowne. Dondrom and Ballintery are represented by the modern Townlands of Ballinteer (i.e., Baile-an-tsaeir, or the town of the Carpenter), Drummartin, and Dundrum.

Unlike the individual churches, the archbishopric of Dublin appears to have maintained and retained much of its medieval property and landholding during the 16th century. A document of 1602 details leases and grants by the archbishop of lands located in most of the medieval archiepiscopal manors including: 'the Towne and village of Thanahie within the Lordship of St. Sepulchre's and all other Lands and hereditaments near Dondrome, commonly called the bushups Lands' to Patrick Hearring (Gillespie 1997, 115). After the Restoration, Taney parish was generally placed in charge of the curate appointed to Donnybrook and the church was allowed to remain in a state of dilapidation.

Churchtown, which most likely derives its name from the presence of St Nahi's (Pearson 1998), covers the townlands of Churchtown Upper and Whitehall. The area, as much of the environs of Dundrum, remained a principally rural one into the 20th century. It is situated beneath the Dublin and Wicklow Mountains and the quality of its land ensured that the area was principally characterised by demesne lands in the 19th century. As Lewis (1837, 594), in his Topographical Dictionary, writes of Taney 'the surrounding scenery is richly diversified, and the parish thickly studded with handsome seats and pleasing villas.'

The rural character of the Churchtown and Dundrum area is evident on Rocque's mid-18th century map of County Dublin, where a road network twists throughout treelined fields with the occasional building depicted.

Ball (1903) states that Dundrum was a small village in the 18th century, chiefly remarkable for being on the high road to Powerscourt. Pearson (1998, 258), mentions that the area and surrounding areas of Kilmacud, Goatstown, Balally, Sandyford and Churchtown were noted for dairying. In consequence, Dundrum became a resort for invalids from Dublin in the 18th and early 19th centuries. John Rutty states in his '*Natural History of the County of Dublin*', published in 1772 stated that '*goat's milk was considered a cure for tuberculosis and that boarding houses around Dundrum accommodated respectable ladies and gentlemen that went there to recuperate.'*

Similarly, Brewer, in his Beauties of Ireland (1825) described Dundrum Village as follows:

'Dundrum is in a sheltered declivity, sheltered from the harsh winds. The village is the fashionable resort of invalids for the purpose of drinking goats' whey. At early hours of the morning numerous jaunting cars convey from the city large parties of visitors to partake of that sanative beverage amidst the reviving scenery over which the animals have browzed. In this rural hamlet are many romantic cottages, whose white fronts and low proportions would appear to harmonise with the wishes of those who frequent the place, by holding forth the soothing invitations of retirement and peace'.

Lewis (1837, 594), recorded that there were 680 inhabitants in Dundrum in 1837. He describes it as '*a village, in which were a number of very pretty cottages'*. A post office, catholic chapel, school, and a dispensary had been established by the time Lewis was writing.

The construction of the railway in the 1850s had a dramatic effect on the village, effectively re-routing the west end of the Taney Road and transforming the upper end of the village. Many of the buildings on the Main Street, including those within the development site date from the mid or late 19th century. Pembroke Cottages which are located within two separate Architectural Conservation Areas on Main Street and Ballinteer Road were built by the Pembroke Estate.

Apart from the dairies in the vicinity, there were a number of other industries. The Dundrum Iron Works is shown on the first edition 6-inch Ordnance Survey map (1843) after which it was acquired by the Manor Mill Laundry. The Manor Mill Laundry was established in 1876. Water was diverted from the nearby Dundrum Slang into a large millpond and the overflow waterfall was used to drive the mill. The Manor Mill was the largest employer of female labour in the district and collected and delivered work from as far away as Wicklow town. The laundry was closed in 1942, due to war-time shortages and the general introduction of domestic washing machines. The buildings were taken over by Pye Ireland Ltd., in 1943 and used as factory and warehouse space, at the height of production 1,200 people were employed. The mill pond and mill house have been conserved and retained within the Dundrum Town Centre and the area has been fully archaeologically investigated.

The development of Dundrum continued with road and housing developments in the 20th Century and with the construction of the William Dargan Bridge and Luas line in the 21st Century. The building of Dundrum Town Centre brought about a big change in the village.

13.3.2 Archaeology

<u>*Record of Monuments and Places*</u>

There are no recorded monuments on the footprint of the development site. The closest individual monuments to the development site are listed in Table 13.3 and discussed below.

Table 13.3 RMP/ SMR sites located within 1.5km of the proposed development

RMP/ SMR	Class	Townland	Scheduled for inclusion in next RMP	Distance from development site
RMP DU022-016	Ecclesiastical remains	Churchtown Road Upper	Yes	62m
RMP DU022-016001	Ecclesiastical enclosure	Churchtown Road Upper	Yes	62m
RMP DU022-016002	Church site	Churchtown	Yes	107m

		Road Upper		
RMP DU022-016003	Graveyard	Churchtown Road Upper	Yes	45m
SMR DU022-016004	Graveslab	Churchtown Road Upper	Yes	80m
RMP DU022-02301	Tower House	Ballinteer Road	Yes	100m
RMP DU022-02302	Castle	Ballinteer Road	Yes	100m
RMP DU018-100/001	Mill - unclassified	Ballinteer Road	No	73m
RMP DU018-100/002	Mill Pond	Ballinteer Road	No	126m
RMP DU018-100/003	Mill Race	Ballinteer Road	No	73m

The ecclesiastical remains at Churchtown Upper (DU022-016/001-003) comprises a plain Church of Ireland church built between 1750 and 1760 by William Monk Gibbon. This church was constructed on the site of a medieval church, which in turn succeeded an Early Historic monastic settlement. The precise location of the monastic church has not been established. However, the location of the early church is likely to coincide with the site of the present building. The present graveyard boundary curves on the south and west of the site suggesting that it follows the curvature of a possible Early Christian enclosure. The ground slopes steeply from west to east in the graveyard, in which there are no early graveslabs. The earliest memorials are eighteenth century in date and are found in the southwest portion of the graveyard, although Ball ([1903]; 1995) describes two seventeenth century headstones that have since disappeared. The graveyard to the south of the church is raised above the level of the ground outside the boundary, and overlooks a former nineteenth century female school house; outside the southern boundary the ground falls steeply by approximately 3–5m. The present restoration of the church was completed in 1910–14.

Dundrum Castle (DU022-023) presents as an L-shaped shell in relatively poor condition. It is a three-storey building measuring 8.25m by 10.25m externally with a tower measuring 5.25m x 7.0m. The tower projects from the eastern end of the northwest facing wall of the main building. Excavations carried out between 1987 and 1991 revealed that the front wall of the main portion of the building rests on the foundation of the thirteenth-century drawbridge structure that was built against the side of a substantial moat. The moat did not continue around to the east and it seems that it may not have continued far around the west side of the castle, though this was not confirmed during the excavations. It appears to have been excavated for the purposes of the drawbridge only and to have been backfilled soon after it was excavated. The limit of the castle and associated structures appears to coincide with the summit area at the top of the steep slope to the stream, but this has not been proven by excavation.

Numerous archaeological studies and investigations have been conducted and submitted to the statutory authorities on the mill house, millpond, millrace and site (DU022-100/001-003) in advance and as a result of the development of Dundrum Town Centre. The mill house and mill pond now form part of the public realm for the centre.

The record of monuments and places manual and map record all three sites in the environs of Dundrum as shown on Figure 13.1. The Sites and Monument Record (as shown on the Historic Environment Viewer) have removed the mill pond and mill site as it is not scheduled for inclusion in the upcoming revision of the RMP (Figure 13.2).

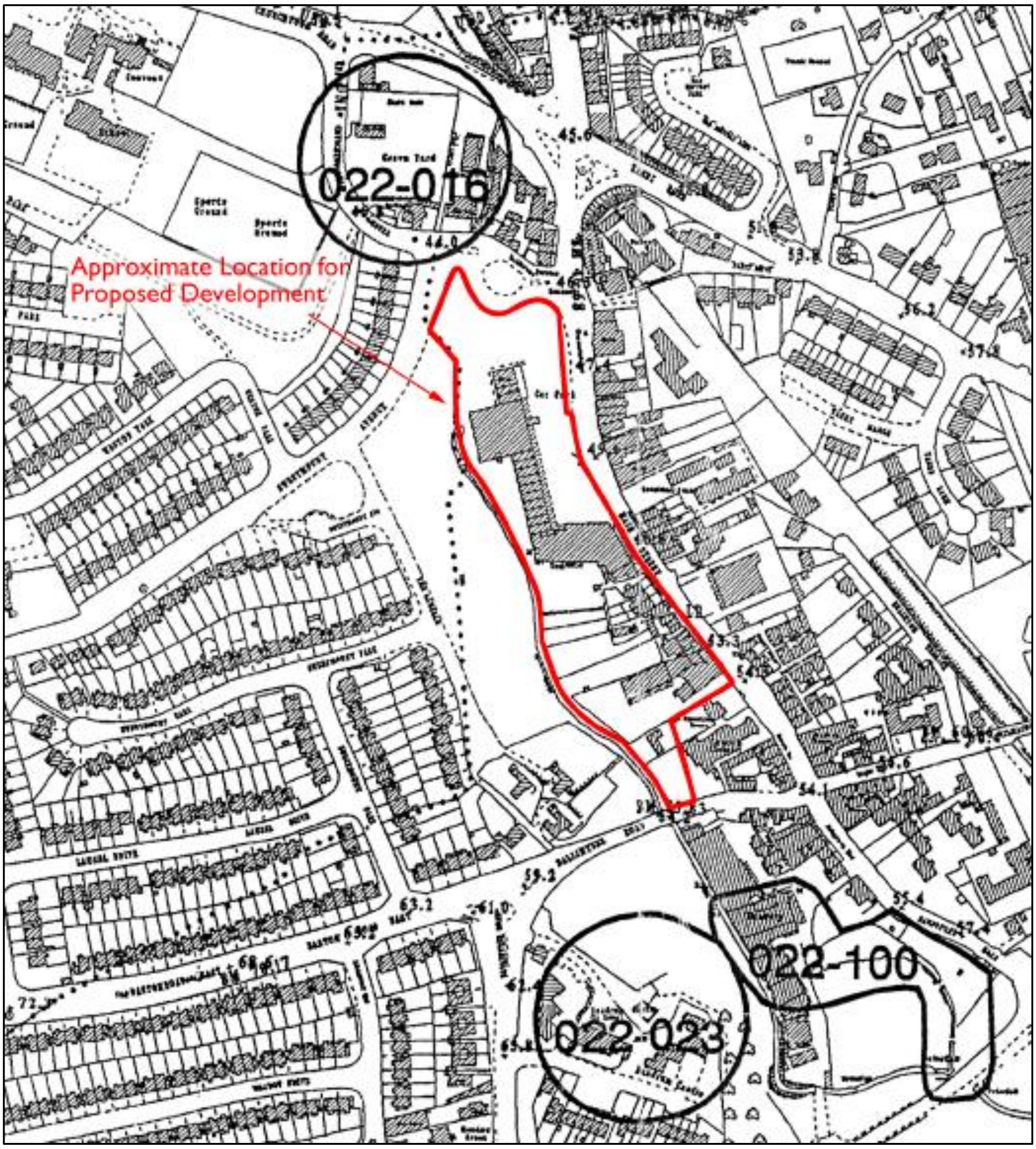


Figure 13.1 RMP site location and approximate location of Proposed Development

Figure 13.2 SMR site location and approximate location of the proposed development

<u>Topographical Files</u>

The topographical files in the National Museum of Ireland were consulted and while finds were noted within the townland of Dundrum, the exact location of those finds is unknown. Table 13.4 lists and describes the finds.

The most recent find, a granite carved head, now stored in the National Museum of Ireland was reported to the museum in 1996 during the demolition of a premises off Main Street in Dundrum. The site was adjacent to Holy Cross church, and it is possible that the object may originally have been associated with the church. The object is carved from granite and is of a human head on a tapering pedestal like neck. The stone was revealed while taking down a wall within the building. There is an incised capital letter ‘M’ at the front, near the base which, if original tends to suggest a relatively recent date.

Table 13.4 National Museum of Ireland finds located within 1km of the proposed development

Museum Reg	Find	Location	Acquisition
1947:193	Bronze gaming piece with animal design, probably of 12th/13th century date.	Dundrum	Gift of M.S.D. Westropp, 10 St James Terrace, Clonskeagh.
1934:463	Polished stone axehead, 14.5cm in length, 8.5cm in width at cutting edge. Grooved or waisted towards the pointed butt. Cutting edge well beveled and surface fairly well polished.	'near Dundrum'	Purchased from Mr. W. I. Verschoyle-Campbell, 9 Fitzwilliam Square.
No record	Small stone cup, diameter 17/8"	Dundrum (Taney Road)	Lent for recording by F.G. Moore, Virginia, Dundrum.
No record	Bronze finger ring, perhaps gilt, with a very fine band that has a semi-oval cross section and large oval bezel with plain side. Of 16th century or later date. Maximum internal diameter 1.8cm, thickness of band 2mm and width of band 0.8mm, maximum diameter of bezel 1.45cm, surface of bezel has maximum diameter of 1.2cm, thickness of bezel 4mm.	Dundrum. Found in garden of No. 7, Beech Lawn, Dundrum.	In the possession of Victor Reynolds, 7, Beech Lawn, Dundrum
No record	Modern (19th century) metal objects found by metal detectors in the vicinity of Dundrum Castle.	Dundrum	In the possession of Paul Flynn, No. 86 St. Columbanus Road, Milltown
IA/65/78	Metal objects (modern)	Dundrum Castle	Returned to finder
1997:52	Carved stone head. Granite head considered by the NMI to be 18^{th} or 19^{th} century in date.	Dundrum, rear of house at Maher's Terrace, Main Street	Sean Murray, Dundrum Lighting Ltd, Dundrum

Previous Excavations

A number of archaeological investigations in the form of monitoring, test trenching and excavations have taken place in the Dundrum and Churchtown area in close proximity to the proposed development area. These are largely based around the recorded, known archaeological presence, namely Dundrum Castle to the southwest of the proposed development, St Nahi's to the north and the mill complex within the existing Dundrum Town Centre. Fourteen investigations have been carried out within a distance of c. 200m from the development site. Four of these had no archaeological significance, and four were of post medieval date (Table 13.5). The results and findings from these investigations and excavations provides a greater understanding of the below ground archaeological potential of the area.

Table 13.5 Previous archaeological excavations in the surrounding area (within c. 200m)

Excavation number	Location	Site type	Author
12E0219	Dundrum Main Street	No archaeological significance	Garrett Sheehan
00E0060	Dundrum Town Centre	19th century industrial millpond	Angela Wallace
00E0736 ext	Dundrum Town Centre	Post-medieval millpond and dam	Red Tobin
03E0370	Dundrum Town Centre	Millpond	Red Tobin
99E0089	Dundrum Town Centre	Millrace	Red Tobin
06E1153	Notre Dame Des Missions Dundrum	Early medieval, ecclesiastical	Kevin Lohan
07E0116	Notre Dame Des Missions Dundrum	Early Christian, medieval and post medieval	Edmond O'Donovan
N/A	Dundrum Castle	Medieval Castle	Elizabeth O'Brien
97E0110	Dundrum Castle	Environs of a castle	Edmond O'Donovan
97E0438	Dundrum Castle	Vicinity of castle	James Eogan
97E0438 ext	Dundrum Castle House	Medieval	E. Eoin Sullivan
15E0231	Churchtown Road, in the vicinity of St Nahi's Church	No archaeological significance	Billy Quinn
17E0308	Notre Dame Des Missions Dundrum	No archaeological significance	Gill McLoughlin
01E1185	Sandyford-St Stephen's Green	No archaeological significance. 19th century railway works had removed archaeological deposits.	Franc Myles
00E0066	Dundrum Bypass	No archaeological significance	Margaret Gowen & Co Ltd

Archaeological excavation (Licence Ref. 07E0116) within the former lands of Notre Dame Des Missons Convent School revealed an ecclesiastical enclosure associated with St Nahi's church and graveyard, two principal phases of activity were identified, dating to the early medieval period (c. 1000 AD) and the later medieval period (c. 1200-1500 AD) (Figure 13.3).

An Early Christian grave slab was exposed in the graveyard, fragments of which are kept in the present St Nahi's church. The slab features an incised Saltire cross formed by two sets of three lines radiating from a central cup mark. The central cup mark is quite faint (Corlett 2013).

Excavations were also carried out at Dundrum Castle between 1987 and 1991 (O'Brien 1987, O' Brien 1989) and again in 1997, in advance of its restoration, which revealed two phases of building: a later tower house (c. 1590) which incorporates and replaced an earlier castle (12th-14th century) which had been abandoned c. 1490.

Archaeological monitoring of construction of the Dundrum By-Pass and the LUAS (Sandyford – St Stephen's Green) uncovered nothing of archaeological interest.

Monitoring (Licence 03E0370) took place of testing of silt deposits within the millpond structure overlying the puddle clay lining of the pond. Nothing of archaeological significance was exposed. Further excavation of the milling complex at Dundrum Town Centre, revealed the millrace which was fully recorded.

Archaeological monitoring took place along the Main Street of Dundrum during the upgrading of watermains in 2012 (Licence 012E219) no archaeological features were revealed.

An archaeological inspection of site investigations for the proposed development was carried out in October 2021 by Courtney Deery Heritage Consultancy. No archaeology was identified. In total, 32 trial pits were opened up throughout the site for site investigation purposes. These pits were generally 2m long by 0.4m-0.5m wide and up to 2.2m deep.

The results of the test pits that were inspected for archaeological purposes demonstrated that much disturbance has been experienced on site with modern inclusions such as plastic being noted at a depth of 1.75m below the current ground level. A great variance in the soil profile was noted throughout the site with the soils ranging from light sandy soil, gravels to sticky clay with large boulders preventing a further excavation (Plate 13.1-13.5).

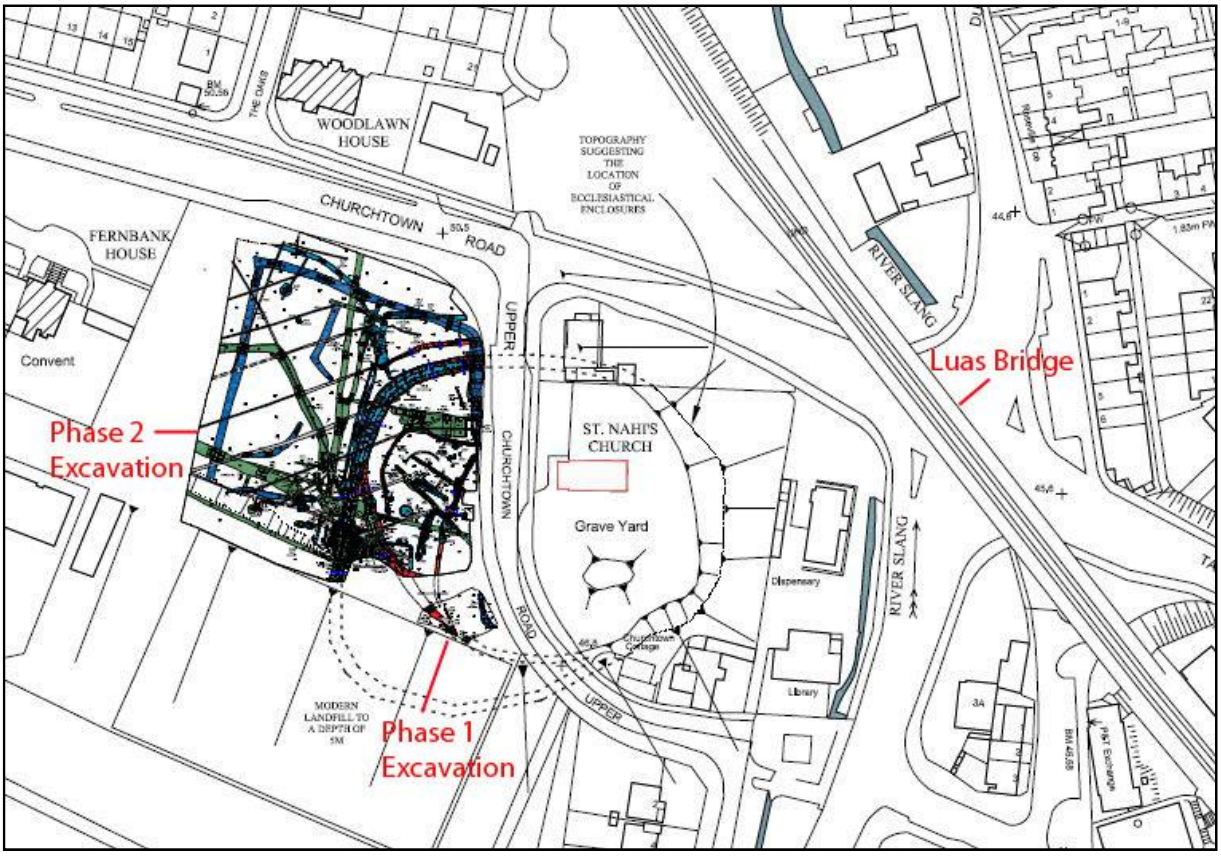


Figure 13.3 Location of archaeological excavations (License Ref. 07E0116)


Plate 13.1 Trial Pit 24


Plate 13.2 Trial Pit 3


Plate 13.3 Trial Pit 25


Plate 13.4 Trial Pit 10


Plate 13.5 Trial Pit 30

Site Walkover Visit

The site was inspected on the 10th of September 2021. The proposed development area has been extensively altered over the years. The northern end of the site consists of a shopping centre and carpark. This area is built over and no features of an archaeological nature or earlier fabric were noted. St Naithi's church which is located in an elevated position to the north of the site was visited and it was noted that there were limited views towards the proposed development due to vegetation screening within the site and the location of adjoining buildings.

To the west of the development is Sweetmount Park where a pedestrian link will be facilitated to the proposed development. This is a linear park under grass, where the ground slopes steeply to the east to the Dundrum Slang. This river flows in a north-south direction and is largely culverted, however, there is an open stretch of the river that forms part of the park (Plates 13.7-13.10).

The proposed development addresses Main Street, Dundrum and the architectural heritage section describes in detail the buildings and existing character of the street. To the rear of Glenville Terrace, a pocket of green space survives within this urban environment, in the form of gardens. These areas are heavily overgrown and contain the occasional tree.

Further carparking is provided to the rear of Holy Cross Church and to north of the parochial house to the rear of the former post office on Main Street and a modern terrace.

There are no clear views to or from Dundrum Castle and the proposed development. The castle is now located within a private residential development and is surrounded by mature trees.

No archaeological features were noted during site visit.

Plate 13.7 View to the north from southern extent of the site

Plate 13.8 View from the west to the site

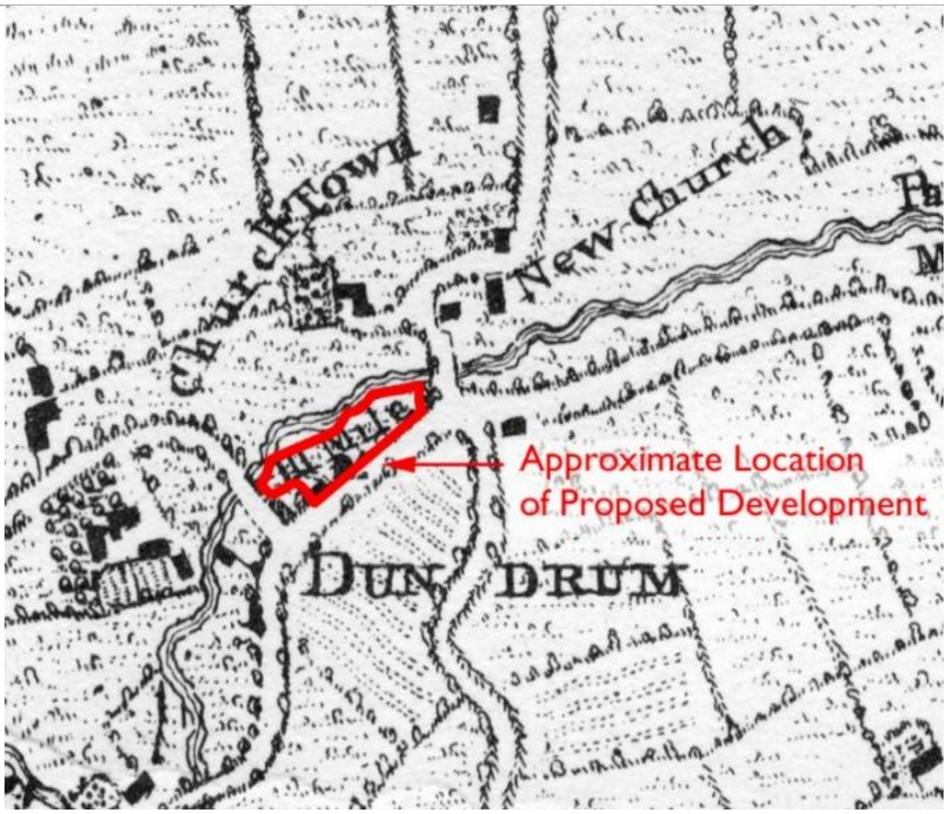
Plate 13.9 View from St Nahi's towards the site

Plate 13.10 Dundrum Slang, looking south

Cartographic Analysis

Relevant historical maps were consulted in the compilation of this assessment (Table 13.6) including maps produced by Rocque (1760), Duncan (1821) and the first and revised editions of the Ordnance Survey maps.

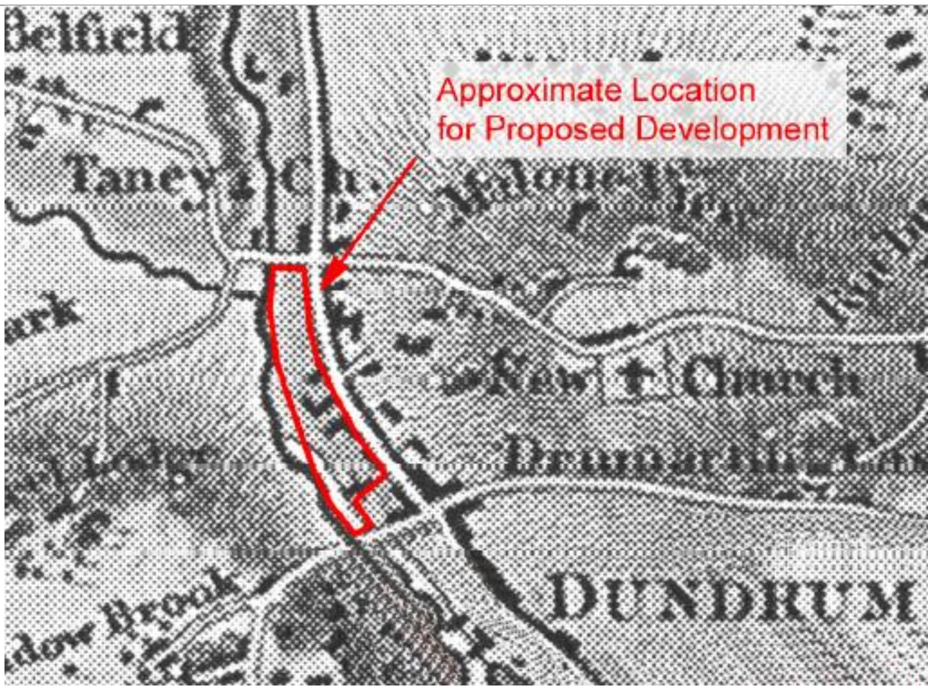
Table 13.6 Historical cartographic sources

Map	Date	Description
John Rocque's map of Dublin	1760	Rocque depicts a rural landscape with an unnamed river flowing in a north-south direction. The proposed development area is shown as agricultural in nature with a '1 Mile' annotation noted. A 'New Church' (St Nathi's Church) is illustrated to the north. A number of structures are shown on the south west side of Main Street. None are specifically named. What is now a crossroads where the Main Street meets the Ballinteer, Sandyford and Lower Kilmacud Roads, was then a T-junction, as the Kilmacud Road did not exist at that point. There is a long building at the corner of the Ballinteer Road and the Main Street. It is EW in orientation and unlike anything shown on the same site in later maps. Several more structures are shown on the west side of what is now the Sandyford Road. There is a long structure adjacent to a mill on the river. It is probable that it is the Mill House. Dundrum Castle and a collection of outbuildings are shown to the south, although they are not named.
		 **Figure 13.4 Rocque 1760**
Taylor	1816	John Taylor's map indicates that some development had taken place on the Main Street in the late 18th or early 19th centuries particularly on the east side but also in the area of the proposed development. There is also a chapel marked on the Main Street. This is probably the Catholic chapel that preceded the present Church of the Holy Cross designed by George Ashlin and built between

		1876 and 1879. With the exception of the crossroads at the south end of the Main Street and the (unnamed) Mill House, there are very few other structures that can definitely be identified. Most appear to be semi-detached structures, possibly the cottages referred to by Lewis. Taney Church is annotated as the New Church, located to the north east of the proposed development.

Figure 13.5 Taylor 1816

Duncan	1821	Further development had occurred within Dundrum and within the proposed development area by 1821. A few structures are shown on the western side of what is now known as Main Street with the eastern side more developed. The footprints of the buildings are different to those on Taylor's map. For instance, there are larger L-shaped buildings on the west side. The Catholic Chapel is shown but not marked. The crossroads at the south end is much the same except that the building on the corner of the Ballinteer Road and Main Street has been extended along the Ballinteer Road. There are fewer buildings shown on the Sandyford Road, though the Dundrum iron works (unnamed) and the Mill House are among them. Taney Church is annotated to the north east of the proposed development. What appears as the female school on the first edition Ordnance Survey, is shown to the east of Nahi's church. The mills to the north are shown, but not marked.

		 **Figure 13.6 Duncan 1821**
Ordnance Survey	1843	The form of the village is shown on the first edition 6-inch OS map (figure 13.7). Structures line the Main Street and there are linear plots and rear gardens that previously cut across the proposed development area in an east-west direction. A group of buildings are shown where the former Post Office is located. A long building with a substantial rear projection is indicated where Glenville Terrace now stands. A building with a very similar footprint to Number 15a is shown along with a large building where Mulvey's Pharmacy and Mulveys Hardware at numbers 16 and 17 Main Street. At the northern end, the land is open and surrounded by trees while a R.C Chapel is annotated to the south (outside the proposed development area). A graveyard along with a male school and female school is illustrated outside the proposed developments lands to the north. Dundrum Castle is annotated to the southwest and Dundrum Iron Works along with its mill pond is shown to the south. The 1837 Ordnance Survey Field Name Books record Dundrum as: '*In the north side of the townland is the village of Dundrum. A neat village having a small river running to the west of it with some trees planted along its banks. In Dundrum there is a dispensary where medical attendance may be has 2 days a week. A penny post. A Catholic Chapel with 2 school houses attached to it. A male and female. About 43 are instructed in each. The National School received £16 or 8 for male and the same for female children from the National Board*'.

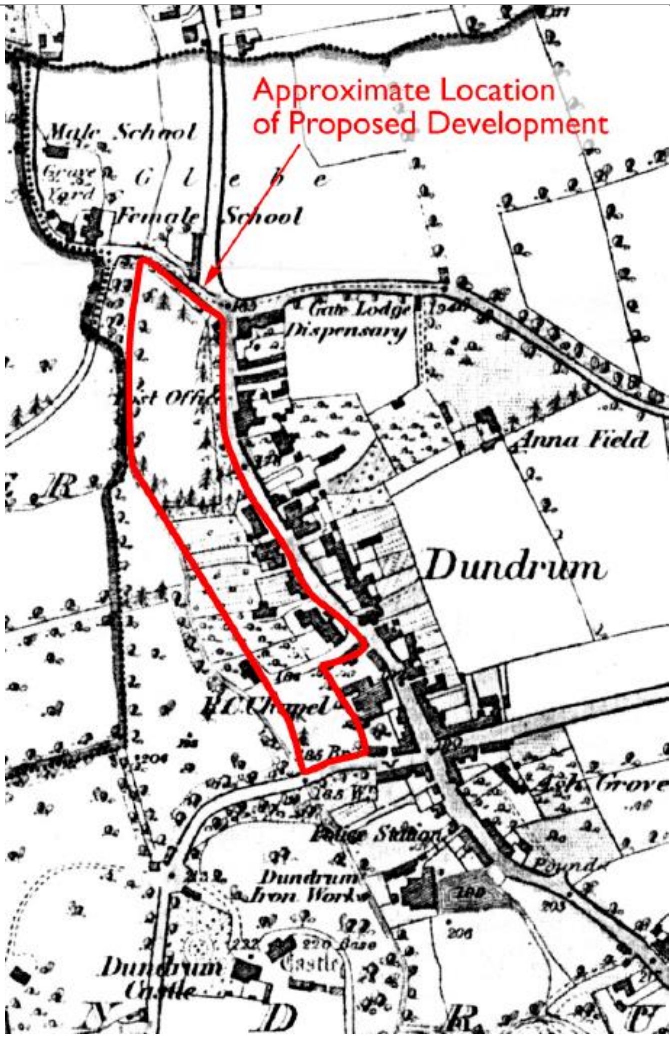


Figure 13.7 First edition 6-inch Ordnance Survey (1843)

Parish Map	c.1860	The Taney Civil Parish map which dates to the 1860s clearly shows the railway which was constructed as part of the Harcourt Street Line in the 1850s and associated station was opened in 1854. The map shows the footprint of the former post office though does not name it. The large building where Glenville Terrace stands had been extended to the front, roughly where number 4 Glenville Terrace now stands. Number 15a is much more clearly visible then it was on the 1843 Ordinance Survey map and the long narrow building where Mulvey's Hardware and Mulvey's Pharmacy are located is clearly defined as two separate buildings. To the south, the Church is named as the R.C Chapel.

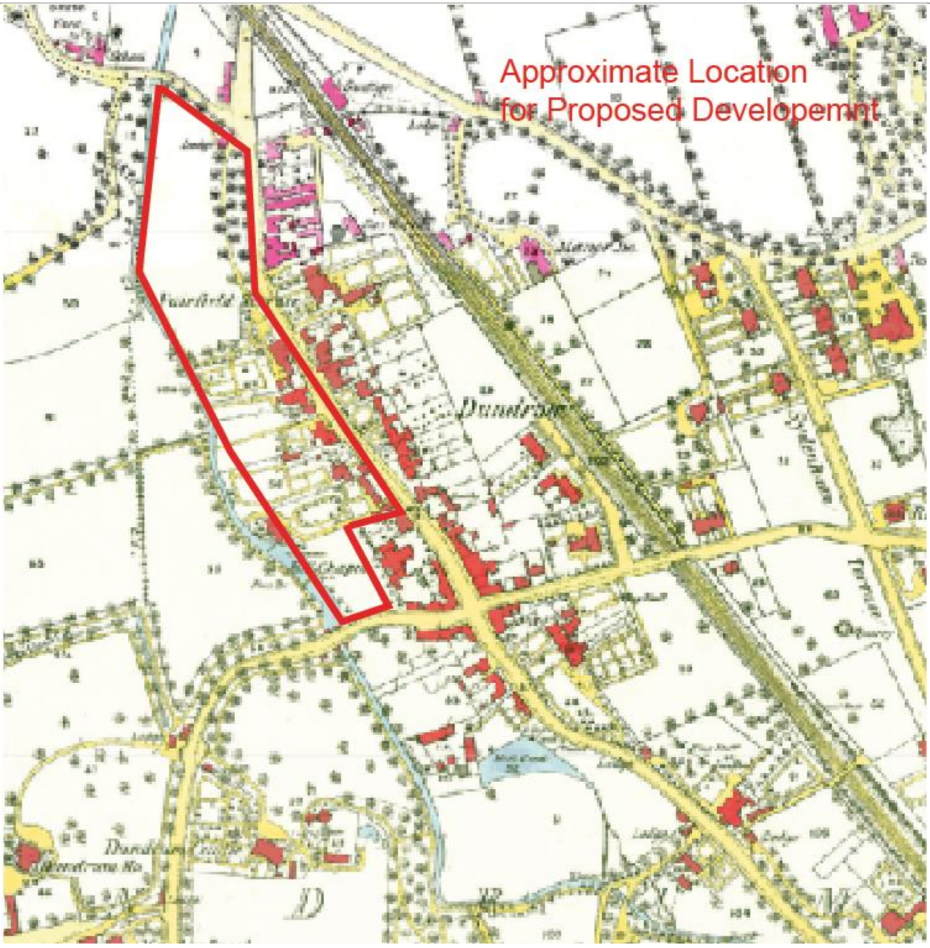
		 **Figure 13.8 25 inch Taney Civil Parish Map (c 1860)**
Ordnance Survey	1871	On the revised edition OS map, the southern end of the proposed development area is shown as landholdings extending in an east-west direction with the principal structure aligned along the street frontage and the gardens and outbuildings to the rear. The R.C Chapel is named. this building was replaced by the present Church of the Holy Cross, designed by George Ashlin and built between 1876-79. The land to the north presents as an open field with a small structure located at the northeast corner. Dundrum Castle is named as is the mill pond to the south of the land proposed for development while to the north the extent of the grave yard is delineated.

		 **Figure 13.9 Revised 6-inch Ordnance Survey (1871)**
Ordnance Survey	1910	All of the architectural heritage buildings within the application site are identifiable on the revised edition OS map of 1910 including the old post office, 1 to 4 Glennville Terrace, 13 to 13a, 15a and 16 to 17 Main Street. The R.C church and the small bank building at 15 are named. The east side of the Main Street was more built ub but like the west side was populated with terracces and semi detached houses and shops. Two complexes of Pembroke Cottages, one on the east side of the Main Street and one on the south side of Ballinteer Road are also shown and were built by the Pembroke Estate as workers housing for their tennants. To the south Church of the Holy Cross, designed by George Ashlin and built between 1876-79 and the associated presbytery and schools are shown

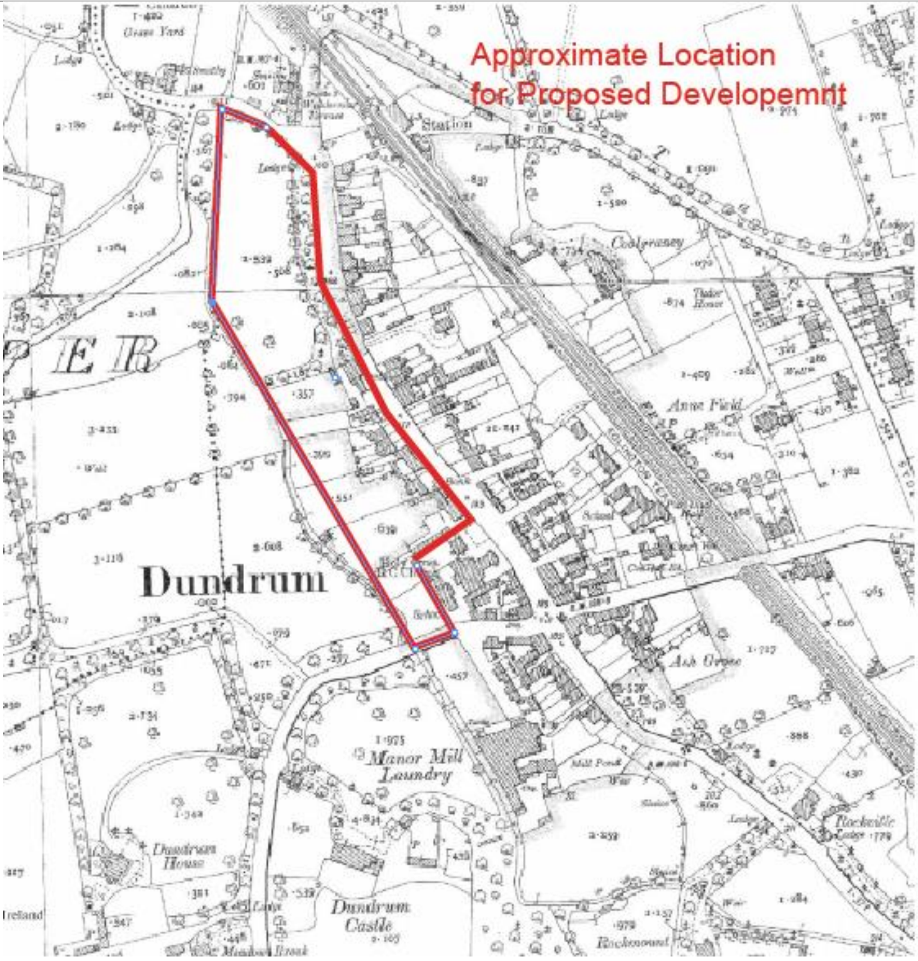


Figure 13.10 Revised 25 -inch Ordnance Survey (1910)

13.3.2 Architectural Heritage

The changes that had major impacts since Dundrum was a small village on the road from Dublin to Powerscourt were the arrival of the railway in the mid 19th century, the closing of the railway and the building of the old shopping centre to the north of the village in the mid 20th century, and the 21st century opening of the Luas Line and building of the present Dundrum Town Centre and associate rail and road improvements.

<u>Architectural Heritage Context</u>

Pearson (1998,162) states that Dundrum Main Street has few major buildings of architectural significance, but it does possess a distinctive village atmosphere. This, he notes that this '*is derived from the pleasant groupings of two storey brick houses and shops*'. The character of the village changed from what were probably simple cottages in the 18th century, to the 19th century village of slated pitched roof terraced buildings with decorative tall stacks, red brick walls with granite details lining the Main Street.

Plate 13.11. A c. 1905 photograph of Main Street, looking south.

Right to left are 4 Glenville Terrace, 13 and 13a Main Street and a small single storey bank building located in front of number 15 which has since been demolished. Beyond, at numbers 16/17 Main Street (not within the application site) and the former Mulvey's Hardware are a terrace of houses with late 19th century shop extensions to the front. These have since been replaced with 20th century extensions.

Many of the 19th and early 20th century buildings in the village and on the Main Street survive, though they have been altered to accommodate commercial uses. The village itself has again altered dramatically with the new road and rail layout and the Dundrum Town Centre introducing a new and higher scaled contemporary architecture dwarfing what remains of the 19th and early 20th century buildings on the Main Street.

Architectural Heritage Features Within the Application site

The application site contains the following buildings or groups of buildings of architectural heritage interest:-

Table 13.7 Buildings of Architectural Heritage Interest on the Proposed Site

Eircode	Building/Structure	Categories of Special Interest	Architectural Importance
D14 V8K8	Main Street (former post office / Joe Daly Cycles)	architectural, social and artistic	Local
D14 KF67	1 Glenville Terrace	Architectural and artistic	Regional
D14 E6N3	2 Glenville Terrace (Pembroke House)	Architectural and artistic	Regional
D14 N6P0	3 Glenville Terrace (Glenville House)	Architectural	Regional
D14 E261	4 Glenville Terrace (XL)	Architectural	Local
D14 A0Y0	13 Main Street (Havana)	Architectural	Local
D14 P2X8	13a Main Street (Irene's Flower Cabin)	Architectural	Local
D14 YP78	15a Main Street	Architectural	Local
D14 T3K2	15 Main Street (The Best Barber)	Architectural	None
D14 W2W1	8 Main Street (Essence Café)	Architectural	None
D14 A250	Main Street (former Mulvey's Hardware and builders yard)	Architectural	Limited

1 to 3 Glenville Terrace is an attractive red brick terrace of two-bay two-story late-19th-Century houses which are set back from the Main Street behind gardens framed with decorative iron railings. They form a cohesive group. Number 1 in particular retains much original and internal fabric.

The former post office, 4 Glenville Terrace, number 13/13a and number 15a Main Street are all three bay two storey houses of a similar form and scale, with pitched roofs, most with stacks located at the end walls. All have been converted to commercial use. The former post office and 13/13a Main Street have red brick walls and segmental arched openings to the first floor which suggests a late 19th century date, although previous investigations of the former post office suggest that 18th century fabric survives in the return. 4 Glenville Terrace and number 15a Main Street have rendered walls and mouldings to the window architraves, photographic and cartographic evidence suggests that they are mid 19th century. Because of their form, scale, and use of similar materials and treatments such as red brick, dressed segmental openings or moulded architraves, they contribute to the Victorian character of the Main Street. This has become fragmented by insensitive 20th century alterations **at** number 8 and 15 and in front of 13/13a to the buildings which have obscured or removed original features such as the ground floor front elevations and the removal of stacks. This is particularly the case at No. 16 /17 Main Street and the former Mulvey's hardware which historic photographic evidence suggests was a terrace of red brick mid 19th century houses. The houses have been obscured by the 20th century additions to the front and the removal of the stacks. This has led to a loss of character so that the original buildings are only just legible.

An assessment of significance for each of the buildings is given in Table 13.8

The application site currently has no statutory architectural heritage designation. Part of the application site encompassing 1 to 4 Glenville Terrace and 13 and 13a Main Street lies within a proposed candidate Architectural Conservation Area as indicated in the *Dun Laoghaire-Rathdown Draft County Development Plan 2022-2028.*

Table 13.8 Assessment of Significance for Buildings on the Proposed Site

Buildings on the Proposed Site	Assessment of significance
Main Street (former post office / Joe Daly cycles)  A three bay two storey over basement red-brick building. A single storey over basement return extends from the north side of the rear elevation. It has a painted pebble-dashed façade and a pitched roof. The first edition O.S. map published in 1843 depicts one or more structures on the site of the present building. A lane runs along the south side of the structure leading to what appears to be a large garden at the rear. Richard Griffith's Primary Valuation map of Dublin is an early revision of the first edition Ordinance Survey Map but shows much the same information. The accompanying valuations were undertaken in 1849. The more detailed Griffith Valuation Town map of Taney has the date 1848 written on the bottom right corner. It is considerably clearer than the first edition Ordinance Survey map and the Griffith Valuation County Map. It is apparent that the collection of buildings shown on the first edition Ordinance Survey Map was two buildings, number 9, which was a narrow building located to the north which projected out beyond number 10 on to the street. The other, is marked number 10, is located where the present building stands and had a similar footprint to the present structure. It is clearly shown as east facing building with a return projecting from the north end of the rear/ west elevation. The valuation map also indicates that it was a post office at one point as post office is written on the map though it is crossed out. The c. 1860 parish map shows the same footprint except that an outbuilding is indicated to the south. The narrow building to the north (number 9) was still present in 1910, though its projection to the front had been removed.	The former post office is of architectural, social and artistic interest. The architectural interest is established through the design, proportion and detailing of the principal elevation, and how this elevation relates to what remains of the nineteenth century streetscape. Some changes have occurred at ground level disrupting the historic elevation. The building is of some social interest due to its former use as a post office. There is limited artistic interest in the surviving decorative plasterwork, and joinery in the interior. The former post office is of local importance due to architectural and streetscape values.

<table>
<tr>
<td>The 1940 Ordinance survey map shows much the same information. In the early/mid twentieth century, the change of use of the ground floor of the building to commercial premises resulted in the alteration of the front façade of the ground floor. The south window ope was converted into a door ope and all of the ground floor opes were given a rendered moulded surround. The pebble-dashed façade here and on the return and rear elevations was probably applied at the same time.

In the later twentieth century, the internal configuration of some of the rooms underwent alteration. On the ground floor, the dividing wall between the entrance hall and front room was broken through to create a single space spanning the full width of the building. On the first floor, partitions were erected in the large room on the south thereby creating three separate spaces. Modern doors and architraves were inserted on the first floor and in some of the rooms of the return.</td>
<td></td>
</tr>
<tr>
<td>1 to 3 Glenville Terrace, Main Street, Dundrum

1 to 3 Glenville Terrace is an attractive red brick terrace of two-bay two-storey late-19th-Century houses with returns to the rear. They are set back from the Main Street behind gardens framed with decorative iron railings. They form a cohesive group. Number 1 in particular retains much original and internal fabric.

A photographic and written description of the buildings is contained in Appendix 13A.

The footprint of a long narrow building with a wide return and a garden to the rear is shown on the Ordnance Survey map of 1843. The 1860s parish map shows a similar footprint except there is a large projection on to the street where number 4 Glenville Terrace is now located. The 1910 Ordinance Survey map shows the present buildings as they are today, except that there was a larger amount of ground and outbuildings to the rear. This together with the architectural detailing in the houses suggests a late 19th century date.</td>
<td>1 to 3 Glenville Terrace is of architectural and artistic interest.

The architectural interest is established through the design, proportion and detailing of the principal elevations, and how this elevation relates to what remains of the nineteenth century streetscape. Features of note include the windows and doors, the over-hanging eaves, the natural slate roof and the brick stacks, the front gardens, gates, railings and granite plinths.

In the interior the original plan form, spatial hierarchies, relationships and proportions are also of note. Artistic interest is established through the surviving decorative plasterwork and joinery in the interior, especially the first-floor front room ceiling of Number 1, the sash windows and surrounds and the original staircases.</td>
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<td></td>
<td>Numbers 2 and 3 have been altered internally and their returns have been replaced previously but together with Number 1, they contribute to the historic character of Main Street. Number 1 retains much of its internal fabric, along with its original return, it is an exemplar of Victorian Architecture.

Glenville Terrace is of Regional importance with regard to its contribution to the street scape and the quality of the historic interiors.</td>
</tr>
<tr>
<td>4 Glenville Terrace Main Street, Dundrum

Number 4 Glenville Terrace projects out from the rest of the terrace. It is not on the first edition OS map of 1843 but is on the civil parish map of c 1860. The c.1905 photograph (Plate 13.11) indicates that it was originally a double fronted house with a fanlight to the doorcase that is typical of the mid 19th century. The first floor window openings contained sash windows and the ground floor window had a similar architrave to those that survive on the first floor. The photograph shows that a shop had been inserted at the north end. The building is indicated on the 1910 OS as a single wedge shaped structure with a small garden and outbuilding to the rear

</td>
<td>4 Glenville Terrace is of some architectural interest.

The architectural interest is established through the design, proportion and detailing of the front elevation, including the window openings, the roof scape and stacks, though this has been diminished by the insertion of the shop in front of the ground floor. The interior of the main building has been altered and modernised and no details of note were identified on inspection.

4 Glenville Terrace is of Local importance with regard to its contribution to the streetscape of Dundrum Main Street.</td>
</tr>
</table>

13 and 13a Main Street, Dundrum

Number 13 and 13a is a three bay two storey red brick building with two shops situated in a single storey modern flat roofed extension to the front.
Cartographic evidence suggests that it is late 19th century , built after Glenville Terrace. It is not shown on the first edition ordinance survey map of 1843 nor the 1860s parish map but is clearly shown on the 1910 Ordinance Survey map with a projection to the front and a substantial outbuilding to the rear.

The c. 1905 photograph (Plate 13.11 indicates that the projection to the front had similar brick dressings to the main portion of the building but was flat roofed and had a large shop window. there was also a carriage arch ore arched entrance to the north which had similar brick dressings to the windows on the first floor.

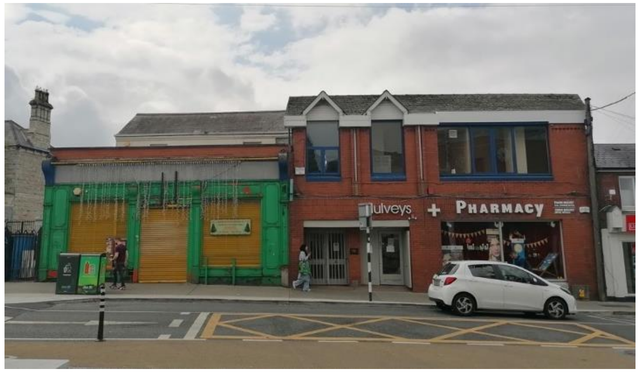
13 and 13a Main Street are of some architectural interest.

The architectural interest is established through the design, proportion and detailing of the front elevation, including the window openings with decorative brick surrounds, the roof scape and stacks. This has been diminished by the insertion of the shop fronts at ground floor. The interior of the main building has been altered and modernised with limited original joinery surviving (some window surrounds and parts of a staircase that has been altered).
13 and 13a Main Street is of Local importance with regard to its contribution to the streetscape of Dundrum Main Street. The flat roofed 20th century extensions to the front are of no architectural or historic interest.

8, 15 and 15A Main Street, Dundrum

No. 15a is a detached three bay two storey villa with a large return to the rear, set back from the Main Street and has been extended to the east at ground level (No.'s 8 and 15), covering the original garden and obscuring the ground floor elevation of the original two-storey building. This single storey flat roofed extension houses a barber and a patisserie.
Cartographic evidence suggests that the original two story structure is early to mid 19th century. The footprint of a building with a small projection to the north is shown on the 1843 Ordinance Survey map along with a small outbuilding to the front and a long narrow

No. 15a Main Street is of some architectural interest.
The architectural interest is established through the design, proportion and detailing of the front elevation, including the window openings, the roof scape and stacks, though this has been diminished by the insertion of the shop in front of the ground floor. The interior of the main building has been altered and modernised. It is in poor condition. Limited original joinery and plasterwork surviving (some window surrounds and parts of a staircase in very poor condition).
No. 15a Main Street is of Local importance with regard to its contribution to the streetscape of Dundrum Main Street.

outbuilding to the rear. This smaller building is Indicated as a bank on the 1910 OS map. The c.1905 photograph (Plate 13.11) indicates that it was single storey gable fronted building with a pitched roof and a stack at the rear gable. There was an arched entrance to the street. No trace of this building survives.	No.'s 8 and 15 Main Street are 20th century extensions to the front are of no architectural or historic interest with regard to their contribution to the streetscape of Dundrum Main Street.
Former Mulveys Hardware, including buildings to the rear of 16 / 17 Main Street, Dundrum  The former Mulvey's hardware unit (and Mulvey's Pharmacy at 16/17 Main Street) is of late 20th century construction and of little architectural heritage interest. The rear portion however is older. The roofline of the 19th century building is just visible behind the late 20th century shop front. The rear portion (including the portion to the rear of No. 16/17) consists of long narrow two storey buildings with a pitched slate roofs and rendered walls. It is likely mid 19th century as a long narrow footprint is shown in the same location on the first edition ordinance Survey map of 1843. It appears to have had a projection to the rear. It is shown as two separate properties on the 1860s parish map. The c. 1905 photograph (Plate 13.11) indicated that it was a terrace of two storey brick houses with 5 stacks and single storey ornate late 19th century shop extension to the front. This is confirmed by the Ordinance map of 1910 which shows that both No. 16 and 17 had been extended to the front and also had large number of outbuildings built against the garden walls to the rear. The houses have been considerably altered in the 20th century. The stacks have been removed but were still extant in the 1980s when Ken Finlay took an aerial photograph of the Main Street. The 19th century shop extensions have been replaced with the present 20th century additions which obscure much of the front elevation. (Note: No. 16/17 Main Street (Mulvey's Pharmacy) is not included in the proposed development.)	The Former Mulvey's Hardware, including the buildings to the rear of 16 / 17 Main Street are of limited architectural interest with regard to their contribution to the streetscape of Dundrum Main Street. They have been substantially altered internally with few features of note remining. Cornices, dado rails, panelled doors and door surrounds survive in part. There are few intact features. The internal arrangement has also been substantially altered.

13.3.3 The surrounding built environment

The application site is surrounded by buildings and complexes of architectural heritage interest including Protected Structures and both proposed and existing Architectural Conservation Areas.

The proposed development may impact their curtilage, views, setting and prospects.

Protected Structures

The site does not contain any Protected Structures but there are eight within 150m of the application site including the Usher Memorial, Saint Nahi's Church and the Carnegie Library (refer to Table 13.9). The Usher Memorial and the Holy Cross Catholic Church directly adjoin or are located opposite the application site and are particularly sensitive in terms of any proposed development and changes to the setting and streetscape in which these structures sit.

Table 13.9 Protected Structures adjacent to the development site

RPS Ref	Building/Structure	Address
905	Railway Station:- Built in 1854 to the design of George Wilkinson under the direction of William Dargan.	Taney Drive, Goatstown, Dublin 14
1110	Dundrum Courthouse:- Pearson mentions that the Courthouse and police barracks as Gothic style buildings designed by Benjamin Woodward and erected in 1855. During the civil war they stood as burnt out shells. The Police Barracks, which were demolished in 1970 and, unsympathetically replaced. Williams describes the Courthouse as small, squat and forceful, entered from the side through a doorway recessed into an extended buttress. Rothery by comparison, states that the courthouse is a highly original adaptation of Gothic with steep pitched roofs and embryonic buttresses and that the windows are an ingenious amalgamation of medieval details.	Kilmacud Road Upper, Dublin 14
934	Usher Monument:- a fountain in the form of an obelisk. The Usher Monument was erected by the Friends of Dr. Usher to commemorate Dr. Usher's death in 1917. A car had reversed into Dr. Usher, near the railway station, killing him. The Monument originally functioned as a drinking fountain and was used by 'humans and animals' alike. The troughs have since been filled in but the monument remains today.	Situated in front of Usher House Main Street, Dundrum, Co. Dublin
1129	Holy Cross Roman Catholic Church was built in 1877 to the designs of George Ashlin at a cost of £5000. It is constructed of granite with sandstone dressings and has an impressive open timber roof. The church replaced an earlier one. The catholic parish of Dundrum has existed since the 18th century but there was no Catholic chapel until 1813. The present church retains the Georgian vessels that came from the previous churches. The Church of the Holy Cross is described by Pearson as an attractive, Gothic style building. Costello regards the sandstone façade as one of the interesting in the area. Williams by comparison states that the unpromising exterior hides a simple but effective interior and that the transept is screened of so that	Main Street, Dundrum, Dublin 14

	the Michael Healy Nativity window appears as a sudden apparition. It was enlarged in 1953 so that it was almost doubled in size. The extension provided more space as well as a hall underneath. Costello goes on to say that it was extended in a sensitive way that retains the old character.	
2095	Holy Cross Parochial House[19], built between 1876 and 79 by Messrs Meade & Son to the design of George Ashlin as part of a group of buildings which included Holy Cross Roman Catholic Church and a School to the rear.	Main Street, Dundrum, Dublin 14
1234	The Mill House. Former miller's House with part of the house fabric dating from the late 17th century. Much altered and extended in the mid-nineteenth century and again in the mid 20th century. Now being restored, extended and converted to a restaurant. Former miller's House with part of the house fabric dating from the late 17th century. Much altered and extended in the mid-nineteenth century and again in the mid 20th century. Now being restored, extended and converted to a restaurant.	Sandyford Road, Dublin 16
1319	Dundrum Castle is of 13th century origin. Dundrum is recorded in 1243 as being owned by Hugh de Clahull and it is probable that he built the first castle on the site. The castle was rebuilt in the 1590s by Sir Thomas Fitzgerald and was occupied by that family until the 1640s when the castle again fell into disrepair. In 1653, it was leased to a Cromwellian officer, Colonel Isaac Dobson, who restored it. The castle was continuously occupied until the nineteenth century but fell into disrepair and remains a ruin. (Also RMP DU022-023001)	Ballinteer Road, Ballinteer, Dublin 16
857	Saint Nahi's Church, described above, is of medieval origin. The present Church of Ireland church on Upper Churchtown Road was rebuilt between 1750 and 1760. (Also RMP DU022-016002)	Churchtown Road Upper, Churchtown, Dublin 14
883	Carnegie Library, an five bay, two storey building built in 1912-1914 to the design of Rudolf Maximilian Butler (1872-1942) who designed more libraries than any other Irish architect. Pearson (1998) regards the library as one of the most attractive 20th century buildings in Dundrum. He particularly notes the cement rendered façade with an attractive pillared entrance, above which is an unusual oval shaped window draped with Renaissance style swags. It continues to provide a library service to the local community.	Churchtown Road Upper, Churchtown, Dublin 14

Architectural Conservation Areas

There are 2 existing Architectural Conservation Areas (ACA's) located near the application site which are illustrated in Figure 13.10. The Pembroke Cottages ACA's are located on the opposite side of on Main Street and on Ballinteer Road. The first encompasses 1 to 10 Pembroke Cottages, Main Street, Dundrum. The second consists of 1 to 6 Pembroke Cottages,

[19] Proposed Protected Structure included in the Dun Laoghaire Rathdown Draft County Development Plan 2022-2028.

Ballinteer Road, Dundrum. Any development on the application site has the potential to impact the setting of these ACA's and the streetscape and character of the village.

Both schemes were built by the Pembroke Estate in the 1870s and 1880s, on lands owned by the Earl of Pembroke. At this time the Pembroke Estate was the largest family-owned estate in County Dublin. The cottages were built for their tenants or estate workers and are regarded as an early example of philanthropic housing. The architect of the Cottages is unclear, however, James Owen (Architect with the Office of Public Works) had a supervisory role overseeing the construction of these cottages. The Pembroke Cottages occupy the whole of the east side of Main Street, between Dundrum House Public House to the south and the Credit Union building to the north.

The cottages are arranged to form two terraces of two-storey dormer red brick houses, opening directly onto the Main Street. The lanes between the terraces lead to rows of smaller scale three-bay single-storey cottages. The Pembroke Cottages on Ballinteer Road, are faced in squared rubble granite, with granite ashlar, red and vitrified (dark grey) brick dressing. The group is arranged as three pairs of semi-detached single-storey cottages, with paired breakfront gables and recessed entrance bays and decorative slate canopy over the entrance door.

Figure 13.10 Extract of Dún Laoghaire Rathdown County Development Plan 2016–2022 map (location of ACA hatched in red)

The site is partially within a proposed Architectural Conservation Area (ACA) under the Dún Laoghaire Rathdown Draft County Development Plan 2022–2028. The Dundrum ACA encompasses numbers 4 to 6, numbers 1 to 3 Pembroke Terrace and numbers 14 to 15 on the east side of the Main Street and the old Post Office, numbers 1 to 4 Glenville Terrace and numbers 13 and 14 on the west side of the Main Street. It also includes buildings centred on the Crossroads of Main Street, Upper Kilmacud Road, Sandyford Road and Ballinteer Road i.e. 1 A, B and C, and 1 to 2 Ballinteer Road, Holy Cross Church and Presbytery, 53 to 57 Main Street, 1 to 5 Maher's Terrace Main Street, 31 and 31a Sandyford Road, Pembroke Square, 1 to 5 Ashgrove Terrace Sandyford Road, 1 Kilmacud Road Upper, Shamrock House, 2 Kilmacud

Road Upper, the Eagle pub and 1 to 4 Eagle Terrace Kilmacud Road Upper. The buildings in the proposed ACA are predominantly 19th century and form the core of the old village.

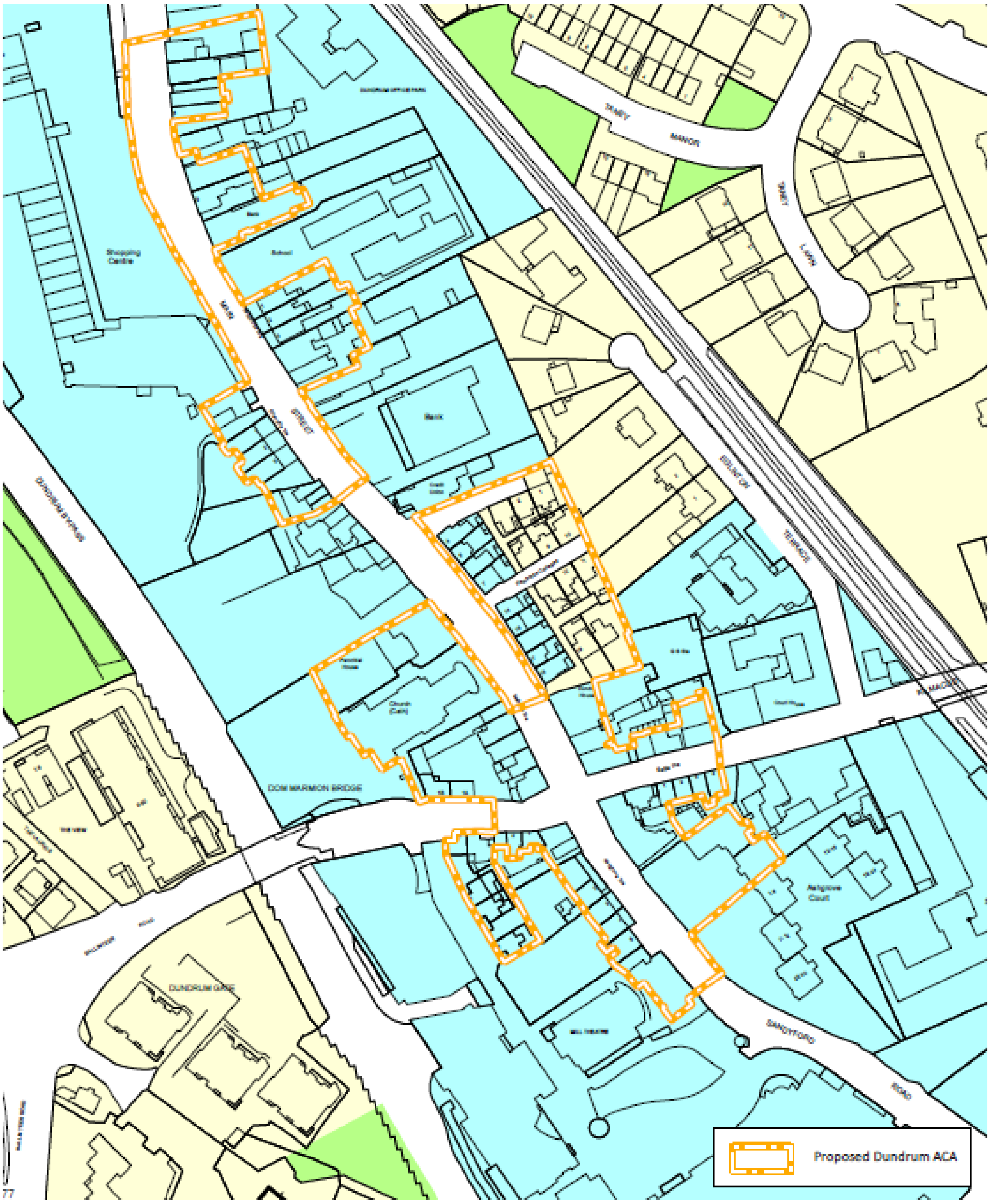


Figure 13.11 Proposed Dundrum ACA boundary (Extract from proposed Dundrum ACA Map, part of the Material Amendments to the Dún Laoghaire Rathdown Draft County Development Plan 2022–2028.

Adjacent NIAH structures

The NIAH has not been fully published for Dun Laoghaire-Rathdown. Only a small portion of Dundrum containing the Central Mental Hospital has been published to date. The Central Mental Hospital is c.660m from the application site.

Table 13.10 NIAH buildings adjacent to the development site

NIAH Ref	Building	Type
60220001	Central Criminal Lunatic Asylum, built 1847-51, Central Mental Hospital, Dundrum Road, Churchtown Lower, Dundrum, Dublin	Asylum
60220002	Chapel, built 1901, Central Mental Hospital, Dundrum Road, Churchtown Lower, Dundrum, Dublin	Church / chapel
60220003	Hospital, built 1847-51, Central Mental Hospital, Dundrum Road, Churchtown Lower, Dundrum, Dublin	Hospital/infirmary

13.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

A description of the proposed development is set out in Chapter 3.

The properties on Main Street within the application site include the Former Post Office (building north of Glenville Terrace / Joe Daly Cycles), No.'s 1-4 Glenville Terrace and No's 13/13a, 15/15a and 8 Main Street and the former Mulvey's hardware (including buildings to the rear of No. 16/17 Main Street). All existing structures on the site are to be demolished, with the exception of No's 1 – 3 Glenville Terrace.

No.'s 1 – 3 Glenville Terrace will standalone between the new residential units and will accommodate support uses associated with the overall residential development. External elements will be retained, refurbished, or replaced with like for like to meet current building regulations. Other elements that have fallen into disrepair will be made good, brickwork and roof tiles will be cleaned, repointed and repaired where necessary. The hall doors to all three houses will be retained and made good. The door of No. 2 will be retained as a false door. The existing sash windows in No.'s 1-3 Glenville Terrace are to be retained throughout. They are to be upgraded to double glazed units. Repairs will be carried out where necessary. Replacements will only be installed where necessary and will be on a like for like basis.

With regard to No. 1 Glenville Terrace, internal features such party walls, stairs, doors are being retained where possible, repaired where necessary, failing that, replaced on a like for like basis. The existing blocked openings on the north elevation of No.1 Glenville Terrace are to be reopened.

The return of No. 1 is to be removed and replaced as there are significant structural issues. The return is built on poor foundations and is pulling away from the main portion of the building with a large fissure evident on the rear. The return is to be rebuilt on a like for like basis.

The proposal includes the removal of internal walls in No.'s 2 and 3. This includes the halls of No's 2 and 3 and the rooms of the hall in No. 3 at hall level. It also includes the basements and first floor spaces in No's 2 and 3 where the internal spaces are also being amalgamated. The central staircases are being removed and will be relocated to the return of No.'s 2 and 3. The returns will be removed and rebuilt to allow the main space to be more flexible.

In addition to the stairs, a disabled lift will be added to the return of No.'s 2 and 3 for accessibility.

The external railings to the front will be kept with a new fence line to the south of No.3 proposed to match the existing.

The proposals retain the Main Street active frontage approach of the previously permitted developments (2003-2009) and replaces the shopping centre building with a series of apartment buildings arranged around a series of interconnected courtyards. The buildings range in height from 4-5 storeys on Main Street to 9-16 storeys to the Dundrum Bypass.

Church Square will provide an important focal point for the new streets and a point of congregation for residents and the general public.

13.5 CONSTRUCTION IMPACTS

13.5.1 Archaeology

The main findings in relation to archaeological heritage are as follows:

- There are no Recorded Monument within the area of the proposed development.
- Outside the proposed development area, previous archaeological excavations in the environs of the Dundrum area have revealed remains associated with recorded archaeological sites namely Dundrum Castle, St Nathi's and the post medieval mill complex. General monitoring works and test excavations have not revealed any features or deposits of an archaeological nature.
- No areas of archaeological potential were noted within the proposed development area in the review of cartographic sources.
- An inspection of site investigation works did not reveal any archaeology.
- An area of greenfield potential was noted during the site inspection to the rear of Glenville terrace. This area is overgrown with vegetation and while nothing of an archaeological nature was detected during the site inspection, given that the area was not previously built upon or experienced large-scale disturbance (apart from landscaping), it is possible that archaeological material may survive below the ground.

There will be no direct effects on any recorded archaeological sites. Archaeological features are often discovered during construction projects that involve earthmoving. The Dundrum Slang, which flows to the west of the proposed development, would have been a useful water source for the inhabitants of Dundrum Castle and the area in general. Watercourses have attracted activity such as milling and industry in the past and this was borne out at Dundrum Town Centre where the millpond and millrace were archaeologically investigated, with the mill pond reinstated as a focal point at the centre. Finds and features can often become preserved in the waterlogged soils that align rivers and streams and as such are considered to be of archaeological potential.

While there are no visible archaeological sites or features within the site, there is the potential that below ground remains with no surface expression remain buried beneath the site. A programme of archaeological monitoring will be carried out during the site preparation stage and prior to construction to ascertain if there are truncated remains of an archaeological interest. This will involve the monitoring of all earthmoving activity including the removal of topsoil and subsequent stratigraphy – See Mitigation and Monitoring Measures CH-C1 (Section 13.6). Should any archaeological features be revealed they will be resolved by preservation by record and subject to agreement with the statutory authorities, full excavation shall take place of the newly discovered remains – See Mitigation and Monitoring Measure CH-C2 (Section 13.6). All archaeological and cultural heritage issues will be resolved during the preconstruction and construction phases.

Attention is drawn to the relevant sections of National Monuments legislation (as amended), and planning legislation which describe the responsibility of the developer, including that in the event of the discovery of archaeological finds or remains, the Department of Housing, Local Government and Heritage (DHLGH), should be notified immediately.

The developer is aware of their responsibility to make provision to allow for and to fund any archaeological investigation that will be required during the development. Adequate financial provision will also be made available for related post-excavation work, the conservation of artefacts and the publication of any archaeological excavation results remains – See Mitigation and Monitoring Measure CH-C4 (Section 13.6).

13.5.2 Architectural Heritage

The main findings in relation to architectural heritage are as follows:

- The proposals retain the Main Street active frontage approach of the previously permitted developments (2003-2009) and replaces the shopping centre building with a series of apartment buildings arranged around a series of interconnected courtyards. It is predicted that these works will have a significant, positive long term impact and will ensure the future of the Main Street.

- The existing identified heritage buildings within the site have either been substantially altered internally, as at No. 4 Glenville Terrace, No.'s 13/13a Main Street, and former Mulvey's hardware, Main Street or lain vacant for over 15 years and are suffering from long term neglect as at the former Post Office, No.'s 1 to 3 Glenville Terrace and No. 15a Main Street. This has led to a significant loss of character, particularly internally.

- No.'s 1 - 3 Glenville Terrace are of architectural and artistic interest with respect to their contribution to the nineteenth century street scape and the architectural and decorative detailing of the interiors. The proposal will bring No.'s 1 - 3 Glenville Terrace back in to use which is a conservation gain. The proposals include repairs to roofs, stacks, gutters, and pointing. The windows will be retained and repaired as necessary. These works are also a conservation gain. Replacements of windows will only occur where necessary and any upgrades will be carried out sensitively and using the existing sashes. Overall, it is predicted that these works will have a significant, positive long term impact and will ensure the future of the three terraced houses.

- The retention of the railings to the front of the No.'s 1-3 Glenville Terrace with the new fence line along the southern edge will create an enclosed space. This will have a significant positive impact on the character of the terrace.

- Much of the existing internal fabric of No. 1 Glenville Terrace will be retained and repaired including cornices, and internal joinery features such as the stairs, skirtings, doors and their surrounds. The reopening of blocked openings in No. 1 Grenville Terrace is also positive and will bring more light in to the building, particularly at basement level which will greatly improve the amenity of the basement spaces. These works will have a significant, positive long term impact on No. 1 Glenville Terrace.

- Although the return is to be removed and rebuilt, this is primarily for structural reasons.

Unlike the main portion of the house, the return is not built on the rock foundations and there is a drop in level. Over time this has led to subsidence within the return and the return is pulling away from the main portion of the building. A visible fissure has developed between the return and the rear elevation of the house. Cracking is evident on the gable end and internally. Subsidence of the floors on the interior of the return was also evident. The possibility of underpinning was explored by the project engineers T.J. O'Connor & Associates, but it was determined that this was not feasible and previous attempts to underpin the return were found to have failed. See the supporting report prepared by T.J. O'Connor & Associates in the appendices. The proposal will result in the loss of original fabric which will have significant negative permanent impact. The reuse of materials and fabric from the existing return, as specified in the mitigation herein and in the *Conservation Method Statement* in the appendices will reduce the negative impact to moderate.

- No.'s 2 and 3 Glenville Terrace are less intact internally then No. 1. The removal of internal walls, joinery and stairs will none the less result in a loss of historic fabric which will have significant negative permanent impact. Such an intervention is however not unprecedented. No.'s 1-5 Ashgrove Terrace were amalgamated internally under the Pembroke Square development (Planning Reference D14A/0718). It is intended that the chimney stacks and associated breasts will be retained in the amalgamated rooms. Cornices and joinery details will also be kept and made good, retaining the most significant features and retaining the legibility of the interior. This will reduce the negative impact so that there is a slight negative impact which could be reversed.

- The alteration of the hall door of No. 2 Glenville Terrace from an operable door to a false door will retain the existing fabric of the door and is a reversible intervention. The predicted impact is negative slight and reversible.

- The relocation of the stairs and the addition of a lift in the rebuilt return of No.'s 2 and 3 will not result in a loss of historic fabric as the existing return is 20th century and of poor quality. The proposal will improve accessibility. There is a risk of damage to the main portion of No.'s 2 and 3 from the removal of the existing 20th century return during construction because of accidental or unforeseen damage. The predicted impact is moderate, negative, and temporary.

- The proposals include the removal of the former Post Office to the north of Glenville Terrace, No. 4 Glenville Terrace, No.'s 8, 13/a, 15/15a, and former Mulvey's Hardware, Main Street. The proposal is not unprecedented. Permission was previously granted for the removal of the former Post Office, No. 4 Glenville Terrace, No.'s 8, 13/13a, 15/15a, former Mulvey's Hardware, Main Street and No.'s 1-3 Glenville Terrace (planning Reference D08A/0231). The present proposal retains more of the existing streetscape, than the previous permitted proposal. It also retains the most significant parts of it, namely No.'s 1-3 Glenville Terrace and brings them back in to use.

- None the less, the removal of buildings will represent a significant loss to the Main Street and the proposed ACA. The proposed ACA under the 2022-2028 Draft Development plan encompasses No.'s 1 - 4 Glenville Terrace, No.'s 13 / 13a Main Street and the former post office. The Post Office is of some architectural and social interest with respect to its former use, and the contribution of the building to the nineteenth-century streetscape. No. 4 Glenville Terrace, No.'s 13/13a and 15a Main Street are of architectural interest with regard to their contribution to the street scape of Main Street. All of the buildings have been diminished through a combination of insensitive modern interventions and prolonged neglect, particularly internally, so that the significance has been reduced.

- It is anticipated that the proposed demolition of the former Post Office, No. 4 Glenville Terrace, No.'s 8, 13/13a, 15/15a, will have a Moderate Negative Permanent impact on the historic character of Dundrum Main Street. The demolition of the former Post Office, No. 4 Glenville Terrace and No.'s 13/13a Main Street will also negatively impact the proposed ACA representing a loss of the late nineteenth century building fabric in this part of Main Street.

- The former Mulvey's hardware building suffered heavily from insensitive alterations and neglect. Here the impact of their removal would be Slight Negative Permanent.

- Holy Cross Roman Catholic Church and Parochial House (proposed) are protected structures of architectural, artistic and social interest, which share a boundary with the site. It is anticipated that the Construction Works will have a negative impact on the setting of the Church and Parochial House during construction. With regard to the proximity of the Church and Parochial House to the site, the significance of impact would be Moderate. The impact duration would be short term.

13.5.3 Mitigation Measures

The following Mitigation Measures are recommended.

CH-C1	Should archaeological material be identified and subject to approval from the statutory authorities, the remains will be preserved by record through archaeological excavation. All findings will be submitted to the National Monuments Service (NMS) of the Department of Housing, Local Government and Heritage and the National Museum of Ireland.
CH-C2	The strip out of a structure scheduled for demolition will be inspected by an archaeologist to identify, record and remove any surviving historic fabric of an archaeological interest.
CH-C3	The developer will make provision to allow for and to fund any archaeological investigation that will be required during the development. Adequate financial provision will also be made available for related post-excavation work, the conservation of artefacts and the publication of any archaeological excavation results.
CH-C4	As part of the licensing requirement, a report will be lodged with the relevant statutory authorities on the results of archaeological monitoring and any archaeological investigation that occurs on site.
CH-C5	The developer will appoint a Conservation Architect to oversee the Works to No.'s 1-3 Glenville Terrace. These works shall adhere to the *Conservation Method Statement for the proposed repair of No.'s 1-3 Glenville Terrace* contained in Appendix 13B of the EIAR (or updated report prepared by a suitably qualified Conservation Architect).
CH-C6	Where possible, existing fabric of No. 1 Glenville Terrace such as masonry, brick, slates, joinery should be retained for reuse and put back in the reconstructed return, thus retaining as much of the existing fabric as possible .
CH-C7	Removed joinery from No.'s 2 and 3 Glenville Terrace should also be retained where joinery is to be made good. A profile of existing cornices will be taken where cornices are to be made good.

CH-C8	The 20th century returns to No.'s 2 and 3 Glenville Terrace are to be taken down carefully to avoid the risk of damage to the main portions of each house.
CH-C9	The hall door to No.2 Glenville Terrace is to be retained as a false door, thus ensuring that the intervention is reversible.
CH-C10	Building materials from the buildings being demolished such as slates, should be salvaged for repair works to No.'s 1-3 Glenville Terrace.

All conclusions and mitigation measures expressed in relation to archaeology are subject to the approval of the DHLGH and Dun Laoghaire Rathdown Local Authority.

13.5.4 Monitoring

The following Monitoring is recommended.

CH-M1	A programme of archaeological monitoring under licence to an archaeologist will be carried out during the site preparation stage and construction stage of the project to ascertain if there are truncated remains of an archaeological interest. This will involve the monitoring of ground reduction and earthmoving activity throughout the site including the removal of topsoil and subsequent stratigraphy.

13.5.5 Cumulative Impacts

When assessing this development, all previous archaeological findings and features of an archaeological, cultural heritage and built heritage interest within the environs of Dundrum Village were considered as well as previous schemes such as Dundrum Town Centre. There is no significant potential cumulative impact to archaeology or cultural heritage features as a result of this project.

Following the implementation of the mitigation measures, there will not be a significant cumulative effect whether this scheme and phasing of permitted and proposed developments are undertaken concurrently or consecutively from an archaeological perspective. No significant cumulative effects will occur.

13.6 OPERATIONAL IMPACTS

13.6.1 Archaeology

Any arising archaeological and cultural heritage issues will be resolved prior to or during the construction phase resulting in no impacts during the operational phase.

13.6.2 Architectural Heritage

Although the proposed residential development will introduce a more active streetscape, the removal of the 19th century buildings will alter the architectural character of Dundrum Village and the proposed ACA.

The scale of the proposed development will be tempered by the fact that the site slopes behind the existing street frontage, thereby significantly reducing the perceived height of the development from Main Street. The street frontage from Glenville Terrace northwards will be reinstated, generating an urban character that the elevation of the existing shopping centre has never possessed. Overall, this will have a moderate positive permanent impact on the character of Main Street.

Predicted Impacts on View and Vistas
Impacts on View and Vistas are considered with reference to the photomontages prepared by Modelworks and presented in Vol.2 of this EIAR.

Views 4, 5 and 25 of the photomontages (Vol.2) show that the scale of the project will detract from Holy Cross Roman Catholic Church and Parochial House (DLR RPS 1129 and 2095). The negative visual impact of the proposed apartment blocks on the Church and Parochial House will be reduced however. The proposed apartment blocks have been set back from the Catholic Church and Parochial House to reduce the visual impact. The proposals also include landscaping works to the north and west of the church which will enhance its setting. The project will have a moderate negative impact on the setting of the Church and Parochial House.

The Usher Monument (DLR RPS 934) is located to the north of the proposed development on Main Street. The proposed development will have a moderate negative impact.

The Railway Station (DLR RPS 905) is located off the main street to the north. Its setting will not be significantly altered by the development. View 18 of the photomontages (Vol.2) indicate that there will be a slight negative impact on the vista of the Dublin Mountains from the Station.

The Carnegie Library and Saint Nahi's Church (DLR RPS 883, DLR RPS 857/RMP DU022-016002) are located northwest of the project. Views 17, 26a and 26c of the photomontages (Vol.2) indicate that the project will dominate the view of the village from the library and Nahi's Church. The current aspect of the old shopping centre is poor however. View 20 suggests that the project will not have a significant negative impact on the setting of the Library. There will be a slight negative impact on the setting of Nahi's Church (view 21, 26c) from Churchtown Road Upper. The predicted impact is negative, slight and permanent.

Dundrum Castle, The Mill House and the Courthouse (DLR RPS 1234, 1110 and 1319/ RMP DU022-023001) are located to the south and away from the project. They are largely screened by other buildings. Views 4, 6 and 9 of the photomontages (Vol.2) indicate that the project will not have any significant negative impact on the setting of either of these protected structures. The predicted impact negative, not significant, permanent.

13.6.3 Mitigation Measures

There are no mitigation measures recommended at the Operational Stage, all measures will be taken at the site preparation and construction stages of the project.

The proposed planting and landscaping will reduce the negative visual impact on the streetscape and in the vicinity of the Catholic Church and Parochial House and will provide amenity locally.

13.6.4 Monitoring

There will be no requirement for monitoring at the operation phase, post-construction..

13.6.5 Cumulative Impacts

Following the implementation of the mitigation measures, there will not be a significant cumulative effect whether this scheme and phasing of permitted and proposed developments are undertaken concurrently or consecutively from an archaeological perspective. No significant cumulative effects will occur.

13.7 OTHER EFFECTS

13.7.1 Residual Effects

No residual effects were identified during the course of the assessment on archaeological heritage features or items of a cultural heritage interest. Should any archaeological remains be uncovered, they will be fully resolved prior to the main construction and operation stages of the proposed development.

The proposed mitigation in the construction phases will retain the existing street frontage around Glenville Terrace and the Catholic Church, integrate the character of the existing Main Street with what will be a new active street frontage where the old shopping centre is currently located. The proposed planting and landscaping along the Main Street, between the apartments and the Church and within the residential development will further integrate the proposed development into the existing village, softening negative visual impacts. The main residual effect on the architectural heritage is the loss of the 19th century buildings. Although the proposal will introduce an active street frontage and the existing buildings have been degraded over the last 15 years, their removal none the less results in the loss of a large portion of the 19th century streetscape.

13.7.2 Do Nothing Effects

In the 'Do-Nothing' scenario, the development would not proceed and the land would remain in use as is. No archaeological monitoring would take place in order to identify below ground remains (if present) and no further archaeological sites would be identified and recorded.

The existing building on the Main Street including the former Post Office to the north of Glenville Terrace, No.'s 1- 4 Glenville Terrace, 15a, and the former Mulvey's Hardware on Main Street have lain vacant for over 15 years and have deteriorated in condition. In a 'Do-Nothing' scenario they would continue to deteriorate. No.'s 1-3 Glenville Terrace would not be brought back in to use. No. 4 Glenville Terrace, No.'s 8, 13/13a and 15 Main Street are in use but their character has been eroded, particularly internally through insensitive alterations. It is likely that this would continue in a do nothing scenario

13.7.3 Worst Case Effects

Within the worst case scenario an archaeological site would be removed without full recording taking place and there would be no record or archive of the site. Archaeological monitoring mitigates against this scenario from occurring.

From an architectural heritage perspective, a worse case scenario is that the proposed works to the returns of No.'s 1-3 Glenville Terrace cause further damage to the terrace than is currently envisaged. It is recommended that any taking down be monitored in order to avoid any unforeseen damage to the main portions of the terrace – refer to Mitigation Measure CH-C8 above.

13.8 INTERACTIONS

No significant interactions were noted. Site investigations were reviewed to provide an understanding of the underlying stratigraphy on site.

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14.0 LANDSCAPE

14.1 INTRODUCTION

This chapter assesses the potential effects of the proposed development on the landscape/ townscape character and views/ visual amenity in the receiving environment. It should be read in conjunction with the verified photomontages contained in Appendix 14A (Volume 2), prepared by Saad Minhas of Model Works.

The Landscape and Visual Impact Assessment (LVIA) was prepared by Richard Barker of Macro Works. Richard has a master's degree in Landscape Architecture, is a member of the Irish Landscape Institute and has over 17 years' experience, specialising in LVIA.

14.2 ASSESSMENT METHODOLOGY

The assessment was carried out with reference to the EPA Guidelines (2002 and 2017)[20] and the 2018 *Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment* (Department of Housing, Planning and Local Government). The following Guidelines were also consulted specifically for this chapter:

- *Guidelines for Landscape and Visual Impact Assessment*, 3rd edition, 2013, published by the Landscape Institute;
- *Technical Information Note on Townscape Character Assessment*, 2016, published by the Landscape Institute;

The draft EPA guidelines provide a general methodology and impact ratings for all environmental topics covered in an EIAR; the *Guidelines for Landscape and Visual Impact Assessment* (GLVIA) provides specific guidelines for landscape and visual impact assessment. Therefore, a combination of the draft EPA guidelines and the GLVIA has informed the methodology for this assessment. Although closely linked, the GLVIA requires separate assessment of landscape effects and visual effects.

Landscape/townscape assessment relates to changes in the physical environment, brought about by a proposed development, which may alter its character. This requires a detailed analysis of the individual elements and characteristics of a landscape/townscape that go together to make up the overall character of that area. By understanding the aspects that contribute to this character it is possible to make judgements in relation to its quality (integrity) and to identify key sensitivities. This, in turn, provides a measure of the ability of the landscape/townscape in question to accommodate the type and scale of change associated with the proposed development, without causing unacceptable adverse changes to its character.

Visual Impact Assessment relates to changes in the composition of views as a result of changes to the landscape/townscape, how these are perceived and the effects on visual amenity. Such impacts are population-based, rather than resource-based, as in the case of landscape impacts.

[20] *Guidelines on the Information to be Contained in Environmental Impact Statements* (2002) and Draft *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports* (2017)

For construction stage impacts it is not considered necessary to undertake alternative assessments for both townscape impacts and visual impacts as the nature of the effects are common to both. Pragmatically, best-practice does not dictate that construction stage verified views are required, especially because effects tend to relate to dynamic movement and the emerging development changes constantly.

14.2.1 Methodology for Assessment of Townscape Effects

Production of this Landscape/townscape and Visual Impact Assessment involved:

- A desktop study to establish an appropriate study area and relevant landscape and visual designations in the Dun Laoghaire Rathdown County Development Plan 2016-2022;
- Fieldwork undertaken in October 2021 to study the receiving environment;
- Assessment of the significance of the landscape impact of the proposed development as a function of landscape sensitivity weighed against the magnitude of the landscape impact;
- Assessment of the significance of the visual impact of the proposed development as a function of visual receptor sensitivity weighed against the magnitude of the visual impact.

Townscape Sensitivity

When assessing the potential impacts on the townscape resulting from a proposed development, the following criteria are considered:

- Landscape/townscape character, value and sensitivity;
- Magnitude of likely impacts;
- Significance of landscape effects.

The sensitivity of the townscape to change is the degree to which a particular setting can accommodate changes or new elements without unacceptable detrimental effects to its essential characteristics. Landscape/townscape Value and Sensitivity is classified using the following criteria (Table 14.1).

Table 14.1: Categories of Townscape Sensitivity

Sensitivity	Description
Very High	Areas where the townscape character exhibits a very low capacity for change in the form of development. Examples of which are high value townscapes, protected at an international or national level (e.g. World Heritage Site), where the principal management objectives are likely to be protection of the existing character.
High	Areas where the townscape character exhibits a low capacity for change in the form of development. Examples of which are high value townscapes, protected at a national or regional level, where the principal management objectives are likely to be considered conservation of the existing character.
Medium	Areas where the townscape character exhibits some capacity and scope for development. Examples of which are townscapes, which have a designation of protection at a county level or at non-designated local level where there is evidence of local value and use.
Low	Areas where the townscape character exhibits a higher capacity for change from development. Typically, this would include lower value, non-designated townscapes that may also have some elements or features of recognisable quality, where management objectives include, enhancement, repair and restoration.

Negligible	Areas of townscape character that include derelict sites and degradation where there would be a reasonable capacity to embrace change or the capacity to include the development proposals. Management objectives in such areas could be focused on change, creation of townscape improvements and/or restoration.

Magnitude of Townscape Change

The magnitude of a predicted landscape/townscape impact is a product of the scale, extent or degree of change that is likely to be experienced as a result of the proposed Development. The magnitude takes into account whether there is a direct physical impact resulting from the loss of landscape/townscape components and/or a change that extends beyond the immediate setting that may have an effect on the townscape character. Table 14-2 refers

Table 14.2: Categories of Townscape Change

Sensitivity	Description
Very High	Change that would be large in extent and scale with the loss of critically important landscape elements and features, that may also involve the introduction of new uncharacteristic elements or features that contribute to an overall change of the townscape in terms of character, value and quality.
High	Change that would be more limited in extent and scale with the loss of important townscape elements and features, that may also involve the introduction of new uncharacteristic elements or features that contribute to an overall change of the townscape in terms of character, value and quality.
Medium	Changes that are modest in extent and scale involving the loss of landscape characteristics or elements that may also involve the introduction of new uncharacteristic elements or features that would lead to changes in landscape character, and quality.
Low	Changes affecting small areas of landscape character and quality, together with the loss of some less characteristic landscape elements or the addition of new features or elements.
Negligible	Changes affecting small or very restricted areas of landscape character. This may include the limited loss of some elements or the addition of some new features or elements that are characteristic of the existing landscape or are hardly perceivable.

Significance of Effects

The significance of a landscape/townscape impact is based on a balance between the sensitivity of the landscape receptor and the magnitude of the impact. The significance of landscape impacts is arrived at using the following matrix set out in Table 14-3.

Table 14.3: Impact Significance Matrix

	Sensitivity of Receptor				
Scale/Magnitude	*Very High*	*High*	*Medium*	*Low*	*Negligible*
Very High	Profound	Profound-substantial	Substantial	Moderate	Minor
High	Profound-substantial	Substantial	Substantial-moderate	Moderate-slight	Slight-imperceptible
Medium	Substantial	Substantial-moderate	Moderate	Slight	Imperceptible

Low	Moderate	Moderate-slight	Slight	Slight-imperceptible	Imperceptible
Negligible	Slight	Slight-imperceptible	Imperceptible	Imperceptible	Imperceptible

Note: The significance matrix provides an indicative framework from which the significance of impact is derived. The significance judgement is ultimately determined by the assessor using professional judgement. Due to nuances within the constituent sensitivity and magnitude judgements, this may be up to one category higher or lower than indicated by the matrix. Judgements indicated in shaded cells are considered to be 'significant impacts' in EIA terms

14.2.2 Methodology for Assessment of Visual Effects

As with the landscape/townscape impact, the visual impact of the proposed development will be assessed as a function of sensitivity versus magnitude. In this instance the sensitivity of the visual receptor, weighed against the magnitude of the visual effect.

Sensitivity of Visual Receptors
Unlike landscape sensitivity, the sensitivity of visual receptors has an anthropocentric (human) basis. It considers factors such as the perceived quality and values associated with the view, the landscape/townscape context of the viewer, the likely activity they are engaged in and whether this heightens their awareness of the surrounding landscape. A list of the factors considered by the assessor in estimating the level of sensitivity for a particular visual receptor is outlined below to establish visual receptor sensitivity at each viewpoint:

Susceptibility of Receptors
In accordance with the Institute of Environmental Management and Assessment ("IEMA") *Guidelines for Landscape and Visual Assessment* (3rd edition 2013) visual receptors most susceptible to changes in views and visual amenity are:

- *"Residents at home;*
- *People, whether residents or visitors, who are engaged in outdoor recreation, including use of public rights of way, whose attention or interest is likely to be focussed on the landscape and on particular views;*
- *Visitors to heritage assets, or to other attractions, where views of the surroundings are an important contributor to the experience;*
- *Communities where views contribute to the landscape setting enjoyed by residents in the area;*
- *Travellers on road rail or other transport routes where such travel involves recognised scenic routes and awareness of views is likely to be heightened".*

Visual receptors that are less susceptible to changes in views and visual amenity include;

- *"People engaged in outdoor sport or recreation, which does not involve or depend upon appreciation of views of the landscape;*
- *People at their place of work whose attention may be focussed on their work or activity, not their surroundings and where the setting is not important to the quality of working life".*

Recognised scenic value of the view. Such scenic value is usually identified in Development Plan designations, guidebooks, touring maps, postcards etc). These represent a consensus in terms of which scenic views and routes within an area are strongly valued by the population because in the case of Developments Plans, for example, a public consultation process is required;

Views from within highly sensitive townscape areas. These are likely to be in the form of Architectural Conservation Areas, which are incorporated within the Development Plan and therefore subject to the public consultation process. Viewers within such areas are likely to be highly attuned to the townscape around them;

Primary views from residential receptors. Even within a dynamic city context views from residential properties are an important consideration in respect of residential amenity;

Intensity of use, popularity. This relates to the number of viewers likely to experience a view on a regular basis and whether this is significant at a national or regional scale;

Viewer connection with the townscape. This considers whether or not receptors are likely to be highly attuned to views of the townscape i.e. commuters hurriedly driving on busy roads versus tourists focussed on the character and detail of the townscape;

Provision of vast, elevated panoramic views. This relates to the extent of the view on offer and the tendency for receptors to become more attuned to the surrounding landscape at locations that afford broad vistas;

Sense of remoteness and/or tranquillity. Receptors taking in a remote and tranquil scene, which is likely to be fairly static, are likely to be more receptive to changes in the view than those taking in the view of a busy street scene, for example;

Degree of perceived naturalness. Where a view is valued for the sense of naturalness of the surrounding landscape it is likely to be highly sensitive to visual intrusion by distinctly manmade features;

Presence of striking or noteworthy features. A view might be strongly valued because it contains a distinctive and memorable landscape / townscape feature such as a cathedral or castle;

Historical, cultural and / or spiritual significance. Such attributes may be evident or sensed by receptors at certain viewing locations, which may attract visitors for the purposes of contemplation or reflection heightening the sense of their surroundings;

Rarity or uniqueness of the view. This might include the noteworthy representativeness of a certain townscape type and considers whether the receptor could take in similar views anywhere in the broader region or the country;

Integrity of the townscape character. This looks at the condition and intactness of the townscape in view and whether the townscape pattern is a regular one of few strongly related components or an irregular one containing a variety of disparate components;

Sense of place. This considers whether there is special sense of wholeness and harmony at the viewing location;

Sense of awe. This considers whether the view inspires an overwhelming sense of scale or the power of nature / human endeavour.

Those locations which are deemed to satisfy many of the above criteria are likely to be of higher sensitivity. No relative importance is inferred by the order of listing. Overall sensitivity may be a result of a number of these factors or, alternatively, a strong association with one or two in particular.

Magnitude of Change to the View

The visual impact magnitude relates to the scale and nature of the visual change brought about by the proposal and this is reflected in the criteria contained in Table 14.4):

Table 14.4: Categories of Magnitude of Visual Change

Sensitivity	Description
Very High	The proposal alters a large proportion or critical part of the available vista and is without question the most distinctive element. A high degree of visual clutter or disharmony is also generated, strongly reducing the visual amenity of the scene.
High	The proposal alters a significant proportion or important part of the available vista and is one of the most noticeable elements. A considerable degree of visual clutter or disharmony is also likely to be generated, appreciably reducing the visual amenity of the scene.
Medium	The proposal represents a moderate alteration to the available vista, is a readily noticeable element and/or it may generate a degree of visual clutter or disharmony, thereby reducing the visual amenity of the scene.
Low	The proposal alters the available vista to a minor extent and may not be noticed by a casual observer and/or the proposal would not have a marked effect on the visual amenity of the scene.
Negligible	The proposal would be barely discernible within the available vista and/or it would not detract from, and may even enhance, the visual amenity of the scene.

Significance of Visual Effects

As stated above, the significance of visual impacts is a function of visual receptor sensitivity and visual impact magnitude. This relationship is expressed in the same significance matrix and applies the same definitions of significance as used earlier in respect of townscape impacts (Table 14.3).

14.2.3 Quality of Effects

In addition to assessing the significance of landscape/townscape effects and visual effects, EPA Guidance for EIAs requires that the quality of the effects is also determined. This could be negative/adverse, neutral, or positive/beneficial.

Whereas, the introduction of new built elements into countryside areas more often results in negative landscape and visual effects, in urban settings, development proposals are often replacing one built feature with another. The consequence for the townscape character and visual amenity is often beneficial, or may be a combination of positive effects and negative effects for different receptors. In the context of this assessment, the judgment of the quality of the effects is made in combination with the significance judgement for both landscape/townscape impacts and visual impacts e.g. Moderate / Positive or Moderate / Negative.

14.2.4 Photomontage Methodology

The photomontages (Vol. 2) were produced by Saad Minhas of Model Works Ltd. The photomontage methodology is based on the Landscape Institute advice note 01/11 Photography and Photomontage in Landscape and Visual Impact Assessment and 20 years' experience in photomontage production. The method has five main steps:

- Photography
- Survey
- 3D Modelling and Camera Matching
- Rendering and Finishing of Photomontages
- Presentation

Photography

- Date, Time and Conditions: The photography is timed so that the scene conditions, weather conditions and sun position allow - as far as possible - for a clear and representative baseline photograph to be captured. The objective is to ensure that all key elements of the view are clearly visible and unobscured by, for example, vehicular or pedestrian traffic in the foreground, precipitation, darkness/shade, sun glare, etc. The date and time of each photograph are recorded so that the sun position can be accurately portrayed in the 3D model ultimately montaged into the baseline photograph.
- Camera and Camera Set-up: The photographs are taken using a Canon EOS5D Mark II camera with a 21 mega pixel sensor and image resolution of 5616 x 3744 pixels. At each viewpoint the camera is positioned on a tripod with the lens 1.65m above ground level (the level of the average adult's eyes), directed at the site and levelled in the horizontal and vertical axes.
- Lenses: Prime lenses (fixed focal length with no zoom function) are used as this ensures that the image parameters for every photograph are the same and that all photographs taken with the same lens are comparable. For the close-up to middle distant views a 24mm prime lens is normally used. This lens captures a field of view of 73 degrees. This relatively wide field of view is preferred for the purpose of Landscape and Visual Impact Assessment as it shows more of the context landscape/townscape surrounding a site. For distant viewpoints a 50mm prime lens may be used, capturing a 39 degree horizontal field of view.

Survey

The coordinates of each viewpoint/camera position, including the elevation, are recorded using a survey grade GPS receiver, the Trimble Geo7X, which is accurate to within 1cm. For each viewpoint, the coordinates of several static objects in the view are also surveyed (e.g. lamp posts, bollards, corners of buildings, etc.). The coordinates of these 'markers' are used as reference points later in the process, to ensure that the direction of view of the cameras in the 3D model matches the direction of view of the photographs.

3D Model and Camera Matching

- Creation of 3D Model: An Autodesk Revit model of the proposed development was supplied by the architect for the production of the photomontages. Model Works exported the Revit model into the software package Autodesk 3DS Max, in which materials were applied to the model's buildings and surfaces. Model Works built a 3D model of the proposed public realm/landscaping based on AutoCAD drawings provided by the landscape architect.
- 3D Camera Positions: The surveyed camera positions and the markers for each view are inserted into the 3D model, with information on the focal length of the lens attributed to each camera. For each camera/view, the date and time is set to match those of the original photograph. This ensures that the direction of sunlight and shadows in the 3D model match those of the photographs.

- Camera Matching: The photographs are then inserted as backdrops to the views of each camera in the 3D model. The direction of view of the cameras in the 3D model are matched with the direction of view of the photographs using the surveyed markers. This ensures that the camera positions, the direction of the views and the focal length of the cameras in the 3D model are accurate, so that the proposed development appears in the correct position and scale when montaged into the photographs.

Rendering of 3D Model and Finishing of Photomontages

For each view a render of the development is generated. This is the process of creating a photo-realistic image of the 3D model, as seen from each camera position, with sunlight and shadow applied to the model. The render of the development is then montaged into the photograph to create the photomontage.

Presentation and Viewing

The individual photomontages are presented on A3 pages in landscape format in Appendix 14A. For each photomontage, the viewpoint number, location description, and the date and time of photography are provided on the page.

14.2.5 Extent of Study Area

Given the scale, nature and location of the project within a built-up area of south Dublin, it is anticipated that the proposed development is unlikely to give rise to significant landscape/townscape or visual impacts beyond approximately 1km. Therefore a 1km-radius study area is used

Figure 14.1 1km radius study area

14.3 RECEIVING ENVIRONMENT

14.3.1 Townscape Evolution

First records of the Dundrum area relate to a St Nahi's Church and date from the 8th century. As part of the fortifications put in place to protect Dublin from invaders from outside of the Pale, a castle was built in the 13th Century and later replaced by a newer castle in 1590 (see Chapter 13 – Cultural Heritage for greater detail).

In the mid 19th century a railway line was built from Dublin City Centre out past Dundrum, which still stands adjacent to the current LUAS stop, and Dundrum Station was constructed in 1854. The LUAS now follows the original rail line. The arrival of the original rail line brought about rapid expansion of Dundrum as a centre of commerce on the outskirts of Dublin. Dundrum village has since been enveloped by mid to low density residential expansion, but remains a key centre of population and commerce hosting the country's largest shopping centre and serviced by a series of major transport routes including the LUAS light rail service for which there are two stops at either end of the village.

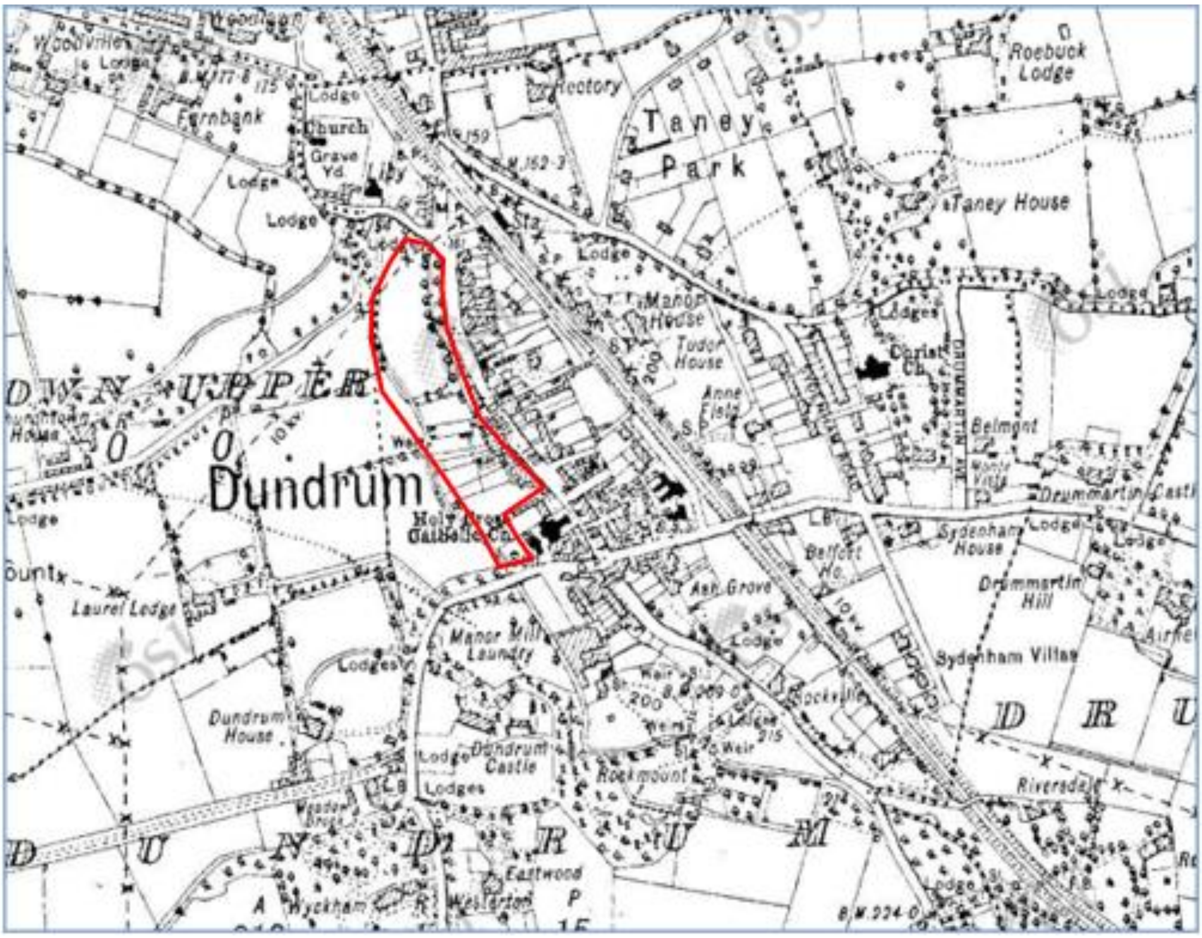

Figure 14.2: Historic map of Dundrum (surveyed between 1830s and 1930s)

14.3.2 The Site

In terms of its topography, the site lies on gently sloping ground near the base of a shallow valley. The ground rises to the east and south in the direction of Drummartin Hill and continues to fall to a very modest degree to the northwest of the site before rising again.

It is currently occupied with a mix of uses, but dominated by the Dundrum Village Centre shopping mall – a 2-3 storey strip of shops and offices dating from 1971 that has an extensive surface car park along its eastern side. A Lidl Supermarket occupies the southern end of this shopping precinct, whilst service access and parking for the commercial and retail uses occurs to the west of the shopping mall.

The southern end of the site rises and narrows as it becomes compressed between Main Street retail uses and the Holy Cross Church. It is currently contained in surface car parking and storage areas.

Figure 14.3: Southward oblique aerial view across the site from the north (Source: Google Earth pro imagery date 20/04/2020)

14.3.3 The Immediate Site Context

Defining the western boundary of the site is the busy R117 Dundrum Bypass road, which is contained to its west by a linear parkland (Figure 14.4) that slopes up to the residential neighbourhoods of 'The Laurels' and Sweetmount Park, which consist of treelined roads of semi-detached two storey dwellings.

There is 6-7 storey + setback penthouse level apartment complex at the overpass intersection of the R826 over the Dundrum Bypass, which overlooks the southern end of the site from the southwest. This apartment complex is appropriately named Dundrum View and along with the surrounding lower density residential neighbourhoods to the west of the site, it is at a higher elevation than the site.

Figure 14.4: View towards the site from the top of the sloping linear park that divides the Dundrum Bypass road from the Sweetmount / Laurels Residential estates

To the northwest of the site is a lower-lying residential terrace of semi-detached dwellings lining Sweetmount Avenue. These are separated from the site by both Sweetmount Avenue and the Dundrum Bypass road and there is also a planted berm between these two roads (Figure 14.5).

Figure 14.5: View showing the context between the northern end of the site (shopping centre car park to the left) and Sweetmount Avenue residential street (dwellings visible to the right)

Further to the northwest is a small park and low-rise residential (Weston Park), whilst to the north of the park, is the recently completed Fernbank Apartment development.

Immediately north of the site, across the northern entrance to Dundrum Main Street, is a small residential / commercial enclave (Waldemar Terrace) which presents as a residual island of red-brick, two storey, terraced dwellings and/or offices surrounded by busy roads.

The major intersection of the Dundrum Bypass and Churchtown / Taney Roads occurs just beyond and the scale and importance of this intersection is contributed to by the iconic Dundrum LUAS suspension bridge (the William Dargan Bridge), which passes over it in a northwest – southeast direction. (Figure 14.6)

Figure 14.6: View towards the site from beneath the LUAS suspension bridge over the Churchtown Road / Dundrum Bypass intersection.

To the east of the site is the Main Street of Dundrum village, which is lined by traditional two storey commercial / retail development along with some interspersed residential development (Figure 14.7).

Figure 14.7: View northwards along Dundrum Village Main Street towards the intersection of Ballinteer Road (Candidate Architectural Conservation Area).

This rises eastward towards the LUAS line which forms a strong edge/divide within the urban fabric of the study area reinforced by a consolidated band of mature trees along the eastern side of the corridor, which separates it from low density residential housing estates further beyond.

To the south of the site is the large and intensively developed Dundrum Town Centre. This transitions in terms of scale and intensity from the R826 (Ballinteer Road) overpass, which divides it from the current site towards the main shopping mall at the southern end of the Dundrum Town Centre precinct. There is a central pedestrian avenue leading south from Ballinteer Road that has the low rise rear of Main Street premises on its eastern side and around 4-5 storeys of restaurants and retail premises on its western side (Figure 14.8). The avenue then steps up to an open space plaza and amenity pond that serves as the main southern entrance apron to the shopping centre.

Figure 14.8: View towards Dundrum Town Centre along pedestrian avenue from the Ballinteer Road overpass of Dundrum Bypass road.

14.3.4 Features of Note within the Wider Study Area

Whilst most of the study area is contained in mid to low density residential neighbourhoods, there is a concentration of mid to high rise apartment developments concentrated around Dundrum Town Centre and particularly its northern end near the Balally LUAS stop and Rockfield Business Park.

Other notable land uses include Airfield Estate, which is an urban farm and garden that is open to the public and lies on sloping land in the south-eastern quarter of the study area. At the northern extents of the study area is the large and enclosed Central Mental Hospital site. This is currently the subject of substantial scale residential re-development proposals and the submission of an SHD application is understood to be imminent.

14.3.5 Relevant Townscape and Visual Planning Policy

Dun Laoghaire Rathdown County Development Plan 2016 - 2022

According to the DLRCDP:

- The site is zoned under Land Use Zoning objective 'MTC,' with an objective *'To protect, provide for and-or improve major town centre facilities'.*

- There is a protected structure (Holy Cross Church) immediately adjacent to the south-eastern boundary of the site.[21]
- There is an Architectural Conservation Area (ACA) on the eastern side of the Main Street of Dundrum Village facing Holy Cross Church and another on the southern side of Ballinteer Road
- There is a candidate ACA encompassing Holy Cross Church and the intersection of the Dundrum Main Street and Ballinteer Road
- There are three 'Specific Local Objectives'. SLO 150 is relevant to this assessment:-*'To ensure that Phase 2 of the Dundrum Town Centre takes cognisance of the character and streetscape of the Old Main Street.'*

Aside from the aforementioned zoning considerations (above), according to Map 1 of the development plan (see Figure 14.8 below):

- There are no designations to preserve 'Views', 'Prospects' or 'Trees/Woodlands' within the near vicinity of the site
- The site is not within or near a High Amenity Area.

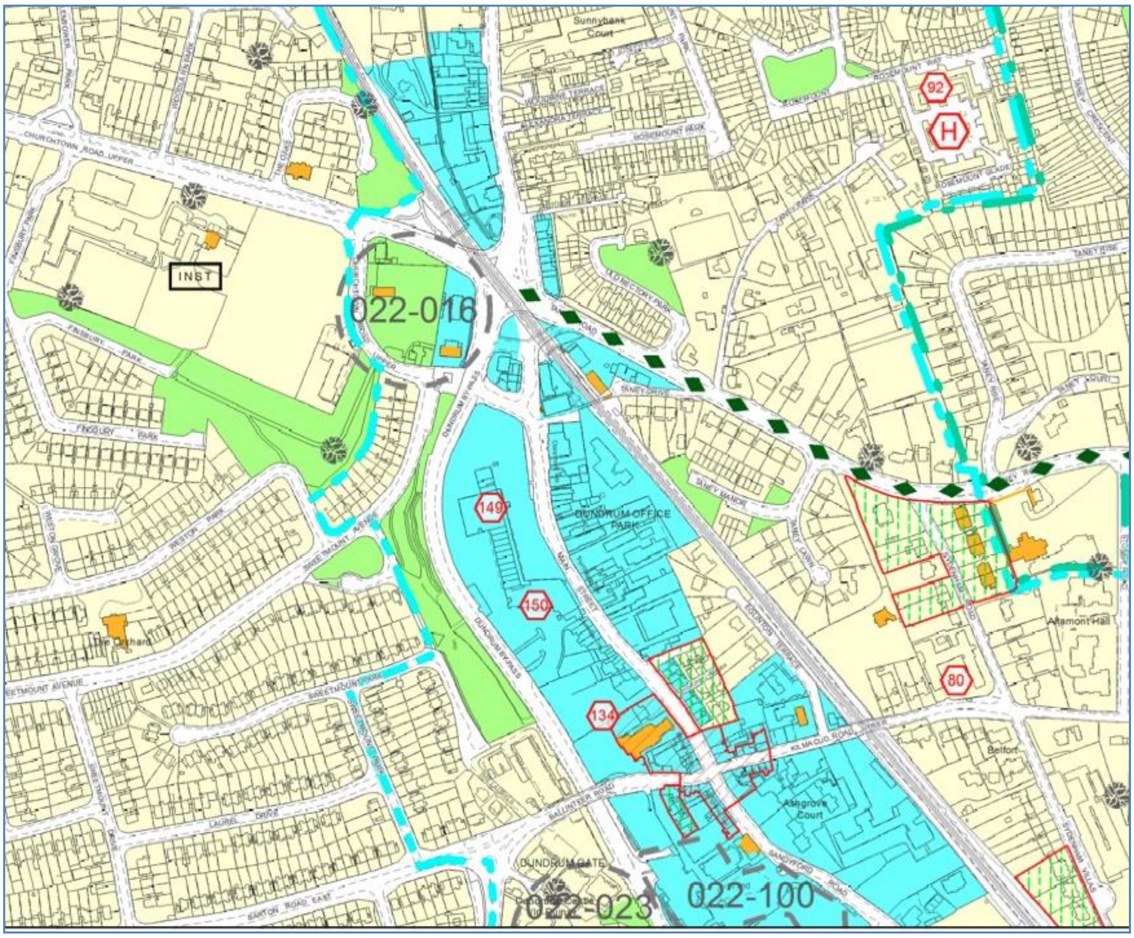

Figure 14.8: Excerpt from Zoning Map 1 of the Dun Laoghaire Rathdown Development Plan

Chapter 4 of the 2016 County Development Plan pertains to 'Landscape, Heritage and Biodiversity' with Section 4.1.2 pertaining to 'Landscape.' It states:

[21] The Parochial House is a proposed protected structure in the Dun Laoghaire Rathdown Draft County Development Plan 2022-2028

"The landscape of Dún Laoghaire-Rathdown is a dynamic and living landscape. It is not a static entity but is the outcome of thousands of years of action and interaction between natural and human factors."

However, there are no known policies or objectives in this Section that are of relevance to the site.

There are no protected views or prospects within the 2016 County Development Plan which are relevant to the site.

Distant views of the proposed development will be afforded from designated scenic views within the Dublin Mountains. These are well outside of the study area and the viewing scenario will be that of a node of increased intensity of residential development within the overall context of Dublin City. In that context, views of the development may be of notable interest, but will not have a material negative influence on visual amenity.

The Dun Laoghaire Rathdown Draft County Development Plan 2022-2028 has also been reviewed and it is noted that there are no fundamental changes to the above which are relevant to this assessment.

14.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed development is described in full in Chapter 3. This description has been summarised below, focussing on the elements most relevant to the assessment in this Chapter.

Layout and Massing

There will be 11no. buildings arranged around the central pedestrian spine and a series of 4no. courtyards corresponding to four separate "zones" or character areas. The tallest building (Block 1A) will rise to 16 storeys and is located at the northern apex to the site where it will signify arrival to Dundrum Village / 'Town Centre' for those approaching from the major transport junction of Churchtown Road and Dundrum Bypass beneath the LUAS bridge to the north of the site. The proposed development pattern thereafter moving south through the site is taller 9-12 storey blocks (2A, 2B / 3A, 3B / 4A) along the lower western side of the side fronting the Dundrum Bypass road with opposing smaller 4-5 storey blocks on the higher eastern side of the site fronting the village Main Street (Blocks 2C, 3C and 4B). The refurbished Glenville Terrace (2 storeys) will remain between proposed blocks 3C and 4B, also fronting Main Street.

At the northern end of the site immediately below the Ballinteer Road Overpass is a proposed open space. 'Church Square' is shared with Holy Cross Church and provides an important element of the new urban structure with the potential to accommodate a range of possible uses and activities.

Connectivity

Connecting physically, visually and functionally with surrounding urban elements and precincts is a key component of what is essentially a strategic infill development. The north south pedestrian spine through the development is a continuation of a similar theme from the Pembroke quarter of Dundrum Town Centre Phase I, albeit there is a notable step down in elevation to Church Square in the interests of a stronger connection to Holy Cross Church and Parochial House. There is also a new pedestrian / cyclist overpass bridge, Sweetmount bridge, that will span west across the Dundrum Bypass to connect to residential housing estates west of the site. The reduced scale of the blocks fronting Main Street and their ground floor retail / commercial uses is intended to assimilate with the existing Main Street.

14.5 CONSTRUCTION IMPACTS

14.5.1 Townscape and Visual Impacts

There will be permanent physical effects to the land cover of the site, which are not readily reversible. During the construction stage, which is proposed to be undertaken in a phased sequence over a period of up to 8 years, there will be periods of intense construction-related activity within and around the site, including approach roads. This will include, but is not limited to:

- HGVs transporting materials to and from the site;
- Movement of heavy earth-moving machinery and tower cranes on-site;
- Temporary storage of excavated materials and construction materials on-site;
- Temporary site offices and worker welfare facilities;
- Gradual emergence of the proposed apartment buildings, and associated works;

An external hoarding will be put in place around the site at the beginning of the construction stage. Given the site's generally low-lying nature relative to surrounding receptors, it is only following basement and ground level construction work that the buildings will begin to rise into view above the perimeter hoarding. It is at this point that construction stage landscape and visual effects will become noticeably increased. In addition to the scale and intensity of the emerging buildings, there will be a degree of clutter and movement associated with scaffolding, worker activity and materials being moved at height. Such effects are typical for any large scale construction project and are familiar in the fast changing environs of Dundrum in recent decades.

The physical impacts to the site's land cover will be permanent and not readily reversible. However, it is already a highly modified site with dated and low quality buildings and surface materials. The replacement land cover represents a higher quality of external open space and buildings, albeit at a much greater scale and intensity.

Construction stage impacts on landscape/townscape character will be 'Short-term' (i.e. lasting 1-7 years), in accordance with the EPA definitions of impact duration.

On the basis of the reasons outlined above, the magnitude of construction stage landscape/townscape impacts is deemed to be High in the immediate context of the site, but reducing to Medium and Negligible at greater separation distances i.e. where only the emergence of taller components is visible rather than surface activity. Due to their nature, the quality of construction stage effects will be Negative, but also Short-term in duration.

14.5.2 Mitigation Measures

The following mitigation measure are recommended.

L -C1	Hoarding is to be well maintained to screen ground level construction activity.

14.5.3 Monitoring

No monitoring is required.

14.5.4 Cumulative Impacts

There are no other projects in the vicinity of the site which would alter the effects described above.

14.6 OPERATIONAL IMPACTS

14.6.1 Townscape Sensitivity

The sensitivity to townscape change varies around the site for particular townscape elements and precincts, which closely relate to the Dun Laoghaire Rathdown County Development Plan land use zoning maps. Such features and precincts include:-

1. The Architectural Conservation Areas and Candidate Architectural Conservation Areas immediately southeast of the site
2. Dundrum Town Centre Phase I to the south of the site
3. Main Street / original village centre of Dundrum east and southeast of the site
4. The major transport node around the LUAS bridge to the north of the site
5. Mid to low density Residential neighbourhoods and parks west and northwest of the site

The above areas are illustrated on Figure 14.9 along with key urban fabric elements that perceptually divide and define them.

Figure 14.9: Perceptual map of the central study area indicating Paths, Edges, Districts, Nodes and Landmarks along with sensitivity judgements

In addition to highlighting varying degrees of townscape sensitivity, this map is based on some of founding principals of urban design first introduced in Kevin Lynch's publication: '*The image of the City'* (1960), the most widely read urban design publication of all time. This outlines that people tend to perceive urban areas (townscapes) as a series of 'Paths', 'Edges', 'Districts', 'Nodes' and 'Landmarks'. An analysis of the way in which Dundrum is likely to be currently perceived in these terms allows for a comparison with how such perceptions might change following completion of the proposed project and whether these changes will result in positive or negative impacts.

LUAS Bridge Transport Node - Starting from the north of the site, one of the most distinctive nodes in the urban fabric of Dundrum is the architecturally striking LUAS suspension bridge – the William Dargan Bridge. This serves as a local landmark and an arrival threshold under which those approaching Dundrum from the direction of Dublin City Centre must pass. It is an important transport node because it also marks the intersection of the Dundrum Road with Goatstown Road and Taney Road – all occurring beneath the LUAS bridge. Furthermore, the LUAS station is essentially on the eastern end of the bridge. This is a busy section of the study area defined by a range of land uses, albeit dominated by major transport corridors. Consequently, this area is deemed to be of Low sensitivity to development.

High Density Residential Districts (Apartments) - There are two areas of higher density residential development, in the form of apartment blocks, within the immediate context of the site. These include Fernbank to the northwest of the site near the LUAS bridge transport node and Dundrum View to the west surrounding the intersection of the Ballinteer road over pass of the Dundrum Bypass. These are both elevated the site in terms of prevailing ground levels and separated from it by major routes. There is also another area of apartment developments slightly further away to the east of Dundrum Town Centre Phase I, on the eastern side of Sandyford. Given the substantial scale and intensive nature of these developments, it is not considered that these districts are particularly sensitive to a similar proposed form of development within the site. Thus they are considered to be of Low sensitivity sections of urban form/fabric.

Low density Residential neighbourhoods - There are two main areas of mid-low density residential neighbourhood (predominantly semi-detached dwellings) in the vicinity of the site and both of these occupy higher ground than the site, to the east and west respectively. To the east can be described as the Taney residential district and the west is the Sweetmount residential district. Aside from being on higher ground, the Taney residential district is separated from the site by both the treelined LUAS corridor and the eastern side of Dundrum Village – that which lies between the Main Street and the LUAS line.

Figure 14.10: Mid to low density Sweetmount residential district to the west of the site – nearest houses gabling-on the a linear park that separates this area from Dundrum Bypass and the site

The Sweetmount district is separated by a linear park that lines the Dundrum bypass and the bypass itself. Nearest dwellings tend to gable-on to the park or contained by mature trees within the park. The minor exception to this scenario is the north-eastern end of Sweetmount Avenue, which is at a similar or lower elevation to the site and where the linear park has confined into a planted embankment. There are around 12 dwellings that front towards the site, albeit separated by Sweetmount Avenue, the planted embankment and Dundrum bypass – a nearest distance of around 50m. Notwithstanding, that these tree-lined residential neighbourhoods are a fairly typical suburban form, they are already located near to the major urban retail and transport hub of Dundrum. On balance, therefore, the sensitivity of these residential districts to further larger scale development within the Dundrum village / town centre precinct is considered to be Medium-low.

Figure 14.11: Spatial relationship between Sweetmount Avenue dwellings (to the right) and the site (to the left)

Dundrum Town Centre Phase I - This earlier phase of Dundrum Town Centre (2005) is predominantly in the form of the largest shopping mall in the country and is separated from the site by the Pembroke Quarter, which is a slightly lower scale and intensity district of retail and restaurants. It is not considered that this first phase of development is at all sensitive to its second phase of predominantly residential development. Thus, the sensitivity is deemed to be Negligible.

Dundrum Village (including ACAs)- Unlike Dundrum Town Centre Phase I, Dundrum Village has evolved over several hundred years and has a much more traditional 'main street' urban form with predominantly shops at street level and offices above. However, while there are still some sections that have retained original buildings and a heritage character, other back areas and peripheral areas have been subject of redevelopment over more recent decades and there is also something of an eclectic character, but a vibrant one. In this sense, Dundrum village can be divided into two districts / nodes in terms of townscape sensitivity. Firstly, there is the ACA designated areas (including candidate ACAs), which include Holy Cross Church, the Pembroke Quarter and the traditional Main Street setting at the junction of Ballinteer Road and Main Street. Then there is the remaining areas of less distinct form and heritage character than occupy the slopes between Main Street and the LUAS line. The former is deemed to be of High-medium sensitivity, bearing in mind that it is already surrounded by a major shopping centre and the latter is considered to be of Medium-low townscape sensitivity.

The Site- The site contains a mix of dated, modest intensity retail buildings in the form of the existing shopping centre, surrounded by swathes of surface level customer car parking to the east and delivery vehicle circulation and parking to the west. There is further carparking and storage areas to the south of the shopping centre and to the rear of the main street shops / Holy Cross Church. The site can best be described as an underutilised degraded perceptual void in terms of its urban form in this wider setting. Indeed, it could only be described as ripe for redevelopment of an appropriate form. For these reasons the sensitivity of the site to redevelopment is deemed to be Negligible.

14.6.2 Townscape Effects

Once completed, the proposed development will represent a dramatic uplift in the scale and intensity of urban development within the site and its immediate environs. Nonetheless, its function and form are familiar with the area and it will fill a perceptual void, which is currently underutilised for predominantly car parking, vehicle circulation and material storage outside of a shopping mall that is dated in both appearance and function.

The scale of the development is appropriate to the site, which is lower-lying relative than most surrounding areas and buffered from lower density residential areas by other forms of development and at least one major route (LUAS corridor or Dundrum bypass) as well as a sloping linear park to the west. The tallest building (16 storeys) is appropriately located at the northern end of the site where it will serve as a landmark building in its own right and will combine with the LUAS suspension bridge to announce the arrival at Dundrum town centre for those arriving from the direction of Dublin City by road or rail. Block 1A is deliberately, distinctly taller than the surrounding proposed apartment blocks. This reinforces it as a landmark building, whilst also varying the profile of the overall development and minimising the bulk and massing that could occur if it was flanked by similar height buildings. In other words, it has tall sentry-like qualities at the entrance to Dundrum (not just this development), but without overbearing scale and massing.

In terms of connectivity, the proposed development continues a north-south running pedestrian avenue incorporating a frequent series of open spaces from the design approach to Dundrum Town Centre Phase I. It will physically connect to Phase I via a grand stairs down to a plaza designed to integrate with Holy Cross Church and parochial house (Church Square). There will be a new pedestrian / cyclist bridge from the development to the top of the linear park to the west of the development as well as considerable street level permeability into the site for pedestrians. Overall, the proposed development represents stronger pedestrian connectivity to and through Dundrum in a manner that is much less dominated by vehicles than the current baseline scenario of the site.

In terms of townscape planning policy, the proposed development is contained within an area zoned for Major Town Centre development and where the development of the site is actively and specifically sought i.e. Policy RET3 and RET4 of the DLRCDP.

In terms of building heights, the *Urban Development and Building Height Guidelines for Planning Authorities* (2018) are relevant for this development. The key principles of these guidelines are set out in Table 14.5 along with discussion on the manner in which the proposed development responds to the Development Management Criteria set out in section 3.2 of the Guidelines.

Table 14.5: Summary of Consistency with SPPR3(A) Building Height Guidelines - Development Management Criteria

Building Height Guidelines Criteria	Assessment
At the scale of the relevant city/ town:	
The site is well served by public transport with high capacity, frequent service and	The subject site is centrally located on a designated Town Centre site is very well served by public transport - Luas is located

good links to other modes of public transport.	immediately adjacent with the site; Bus stops are located on Main Street, Ballinteer Road and on the By-pass). The frequency of services is good and capacity is available to accommodate the proposed development. It is noted that the service providers are proposing upgrades to the public transport system with additional fleet for the Luas and further services under Bus Connects. The site is also within walking distance of the wide range of amenities and services in Dundrum Town Centre. Therefore, the site meets with this criterion. Refer to *Transport Assessment* (Systra) for further details.
Development proposals incorporating increased building height, including proposals within architecturally sensitive areas, should successfully integrate into/ enhance the character and public realm of the area, having regard to topography, its cultural context, setting of key landmarks, protection of key views. Such development proposals shall undertake a landscape and visual assessment, by a suitably qualified practitioner such as a chartered landscape architect.	The proposed development has been designed to integrate with the surrounding context and local communities. The site is lower lying than most of the surrounding area including that which contains the ACAs and candidate ACAs relating to the traditional core of the main street, Holy Cross Church and the Pembroke quarter. The development is also set back from these with an appropriate scale transition so that a shared open space between them can be provided and so that the proposed development is not overbearing in relation to the built form subject of the ACA designation. The building height strategy is proposed to respond to the established building heights and character of the local area, with 4-5 storey buildings on Main Street rising to 8-12 storeys on the By-pass and stepping to a landmark 16 storey building on the northernmost point of the site. The proposed development incorporates a landmark building that complements the other major landmark in the vicinity (the LUAS suspension bridge) and reinforces the transport junction / Dundrum arrival node that already exists there. There are no designated scenic views within the study area. This Landscape and Visual Assessment has been completed by Richard Barker, MacroWorks, with the Verified Views prepared by Saad Minhas of Modelworks (refer to Table 1.1 and Section 14.1 for details of qualifications)
On larger urban redevelopment sites, proposed developments should make a	The scheme is a compact urban form of development, ensuring an efficient use of this

positive contribution to place-making, incorporating new streets and public spaces, using massing and height to achieve the required densities but with sufficient variety in scale and form to respond to the scale of adjoining developments and create visual interest in the streetscape.	prime Major Town Centre site, whilst filling a perceptual void in the urban form / fabric of Dundrum yet respecting the surrounding area. The height strategy is responding to established building heights, positioning the taller buildings away from the Main Street where the site can accommodate greater scale. A sense of place and creating a new identity for the site were important influences in the architect's design, with new streets and public spaces created through the site. The proposed apartment blocks provide stronger definition and containment to the Dundrum bypass and the lower main street at differing and appropriate scale to each of these distinctly different interfaces, thereby generating variation and interest in the building profile. The public spaces are / will be linked with the wider area through a series of additional pedestrian linkages delivering significant pedestrian and cycle connections with the surrounding area. The landmark buildings offer visual interest in the development. The main taller element is positioned at the northernmost point of the site on the key junction Main Street and Dundrum By-pass. It is also positioned in a manner that place it at an important point when viewed on the approaches from the north (Dundrum Road) and the south (Bypass approach) where it terminates vistas along these approaches.
At the scale of district/neighbourhood/street:	
The proposal responds to its overall natural and built environment and makes a positive contribution to the urban neighbourhood and streetscape.	The scheme is a high-quality architectural solution and will make a positive contribution towards the regeneration of the area. The proposed development incorporates pedestrian linkages and open spaces along with a vibrant and dynamic streetscape along the lower main street.
The proposal is not monolithic and avoids long, uninterrupted walls of building in the form of slab blocks with materials / building fabric well considered.	The modulation of the blocks and the use of materials and architectural devices have introduced variety and interest to the design and avoids monolithic buildings. This residential scheme is in contrast to the scale and bulk previously permitted on the site when the scheme was a retail-led shopping centre type development.

	Refer to the *Design Statement* [GRID] for further details on Heights, massing and materials/finishes
The proposal enhances the urban design context for public spaces and key thoroughfares and inland waterway/ marine frontage, thereby enabling additional height in development form to be favourably considered in terms of enhancing a sense of scale and enclosure while being in line with the requirements of "The Planning System and Flood Risk Management – Guidelines for Planning Authorities" (2009).	The design strategy is consistent with the Urban Framework Plan principles for Dundrum which have been incorporated into successive Development Plans since 2004. The 11 building blocks of varying heights respond to their surrounding built context and have a good degree of permeability through and between them. The proposed development is a considerable improvement to the dated shopping centre and vehicle dominated setting that currently exists on the site and which negatively contributes to the townscape character of Dundrum at present. The site and local area is within a flood zone. A *Site Specific Flood Risk Assessment* [TJ O'Connor & Associates] confirms that the site meets the Justification Test and is consistent with the 2009 Flood Risk Management Guidelines and the Dun Laoghaire Rathdown County Development Plan.
The proposal makes a positive contribution to the improvement of legibility through the site or wider urban area within which the development is situated and integrates in a cohesive manner.	Movement and connectivity both within the site and to the wider area is a key principle of the design and the building height strategy will mark out Dundrum Town Centre "MTC" lands as the focal point of the area. The inclusion of the Sweetmount Park bridge will be an important addition to the permeability and legibility of the and will reinstate the connection between Main Street and the Sweetmount estates which was truncated by the Bypass The *Design Statement* [GRID] provides further details on Movements and connections.
The proposal positively contributes to the mix of uses and/ or building/ dwelling typologies available in the neighbourhood	The development also includes a mix of retail /commercial units and a creche with an emphasis on neighbourhood type offer to contrast and complement the Dundrum Town Centre offer which is mainly fashion. This mix of uses will positively contribute to the neighbourhood in accordance with the Development Plan objectives for the old village centre.
At The Scale Of The Site/ Building	

The form, massing and height of proposed developments should be carefully modulated so as to maximise access to natural daylight, ventilation and views and minimise overshadowing and loss of light	The form, massing and height of all the blocks have been designed to maximise access to natural daylight, ventilation and views with particular focus on the ground / podium level corner units and external landscaped areas. Refer to *Daylight Sunlight & Overshadowing study* [BDP]. The scale of proposed blocks is relative to the surrounding built context to each elevation and ensures that neighbouring development is not overlooked or overshadowed to a significant degree.
Appropriate and reasonable regard should be taken of quantitative performance approaches to daylight provision outlined in guides like the Building Research Establishment's 'Site Layout Planning for Daylight and Sunlight' (2nd edition) or BS 8206-2: 2008 – 'Lighting for Buildings – Part 2: Code of Practice for Daylighting'.	The proposed development has been designed by the architects in collaboration with BDP regarding daylight. The modelling undertaken, following the BRE Guidelines, has produced quantitative data to inform the design of the scheme with revisions made to ensure good quality living environments. Refer to the *Design Statement* [GRID] which has been informed by the Daylight / Sunlight analysis undertaken by BDP as part of the design process.
Where a proposal may not be able to fully meet all the requirements of the daylight provisions above, this must be clearly identified and a rationale for any alternative, compensatory design solutions must be set out, in respect of which the planning authority or An Bord Pleanála should apply their discretion, having regard to local factors including specific site constraints and the balancing of that assessment against the desirability of achieving wider planning objectives. Such objectives might include securing comprehensive urban regeneration and or an effective urban design and streetscape solution.	The majority of the units proposed meet the required daylight provisions. The design process has been an iterative one with GRID and BDP introducing compensatory measures in the design to improve the daylight provisions for the apartments with lowest results. It is considered that the level of compliance is appropriate for the proposed development, having regard to achieving the wider planning objectives for this urban site.

In relation to the other specific assessments referred to in the Building Height Guidelines, these have also been considered insofar as they are relevant to the proposed development.

Specific Assessments	*To support proposals at some or all of these scales, specific assessments may be required and these may include:*	
	Specific impact assessment of the micro-climatic effects such as downdraft. Such assessments shall include measures to avoid/ mitigate	A *Microclimatic Wind Analysis and Pedestrian Comfort Report* [IN2] has been completed to inform the scheme design and is included with the planning documentation submitted.

such micro-climatic effects and, where appropriate, shall include an assessment of the cumulative micro-climatic effects where taller buildings are clustered.	
In development locations in proximity to sensitive bird and / or bat areas, proposed developments need to consider the potential interaction of the building location, building materials and artificial lighting to impact flight lines and / or collision.	The *Appropriate Assessment Screening & Natura Impact Statement* (Altemar) enclosed has found that the Project, alone or in combination with other projects, is not likely to have significant effects on the Natura 2000 Network or any of the flora and fauna in the surrounding area. The site is not located within or directly adjacent to any Natura 2000 site. The *Winter Bird and Flightlines Survey* completed for the project [Appendix 5A of the EIAR] "*revealed that no significant target species such as Brent Geese would appear at least to pass over this site or nearby with any regularity" and* therefore the risk of collision is imperceptible. The site is not an important site for any overwintering species (Refer to Chapter 5 and Appendix 5A of the EIAR). With regard to SPPR3, no issues arise in relation to any ecological receptors e.g. via the disruption of flight lines for birds or disruption to commuting or foraging bats. (Refer to Chapter 5 and Appendices 5A and 5B of the EIAR).
An assessment that the proposal allows for the retention of important telecommunication channels, such as microwave links.	Given its location, the height, scale and orientation of the proposed development is such that it will not impact on existing telecommunication channels or microware links. Refer to the *Telecommunications Report* by ISM submitted with this application.
An assessment that the proposal maintains safe air navigation.	Under the Standardised European rules of the Air (SERA), it is not permissible to fly over built up areas at a height of less than 1000ft. The proposed development does not impact on the standardised approaches\departures to Dublin airport, Casement aerodrome or Westin Airport. The proposed development does not impact on any of the Dublin hospitals where a helipad is used. Source: IAIP (Integrated Aeronautical Information Package), dated 22nd April 2021 The applicant will consult with the Irish Aviation Authority (info@iaa.ie) to ascertain if there are any specific requirements relating to air navigation during the construction or

	operational phases (Mitigation Measure PHH-C4).
An urban design statement including, as appropriate, impact on the historic built environment.	Refer to the *Design Statement* (GRID)
Relevant environmental assessment requirements, including SEA, EIA, AA and Ecological Impact Assessment, as appropriate.	An *Environmental Impact Assessment Report* (EIAR) and a *Appropriate Assessment Screening & Natura Impact Statement* (Altemar) has been completed and is included with the planning documentation submitted.

14.6.3 Significance and Quality of Townscape Impacts

For the reasons outlined above the magnitude of change to the townscape setting introduced by the proposed Dundrum phase II development can only be considered High and this is primarily due to its scale and intensity relative to the baseline context rather than any sense of it being an inappropriate form or nature of development. The High magnitude of impact generates a potential for significant impacts to occur, but mainly in relation to higher sensitivity receptors that do not include the site itself.

In relation to the quality of effect, the proposed development is a considerable improvement to the degraded and underutilised site in its current form and will satisfy planning objectives and policies to redevelop this site as part of the Dundrum 'Major Town Centre' zoning in the Dun Laoghaire Rathdown County Development Plan. Furthermore, it accords with the Development management criteria of the 'Building Height Guidelines' in terms of justifying increased heights at particular key locations and in the interests of incorporating a landmark building. Consequently, the 'quality' of townscape effect is deemed to be Positive.

Overall, it is not considered that there will be any significant and negative townscape impact arising from the proposed development.

14.6.4 Visual Impacts

Viewshed Reference Points (VRP's) are the locations used to study the likely visual impacts associated with the proposed development. It is not warranted to include each and every location that provides a view as this would result in an unwieldy report and make it extremely difficult to draw out the key impacts arising from the proposed development. Instead, the selected viewpoints are intended to reflect a range of different receptor types, distances and angles. The visual impact of a proposed development is assessed using up to 6 categories of receptor type as listed below:

- Key Views - from features of national or international importance;
- Designated Scenic Routes and Views;
- Local Community views;
- Centres of Population;
- Major Routes;
- Amenity and heritage features.

The Viewshed Reference Points selected in this instance are shown on Figure 14.11 and assessed thereafter in Table 14.6.

The views selected are in my professional opinion representative of the proposed development. They also include views requested by the Council during the Stage 2 SHD consultations. Some of the viewpoints are selected for illustrative purposes i.e. to illustrate the absence of effect at particular relevant receptors. The use of 'illustrative' views is supported by the GLVIA (2013) Guidance as they help to provide a comprehensive understanding of the nature and scale of visibility across the study area.

The Verified Views and CGI's are contained in Volume 2 Appendix 14A.

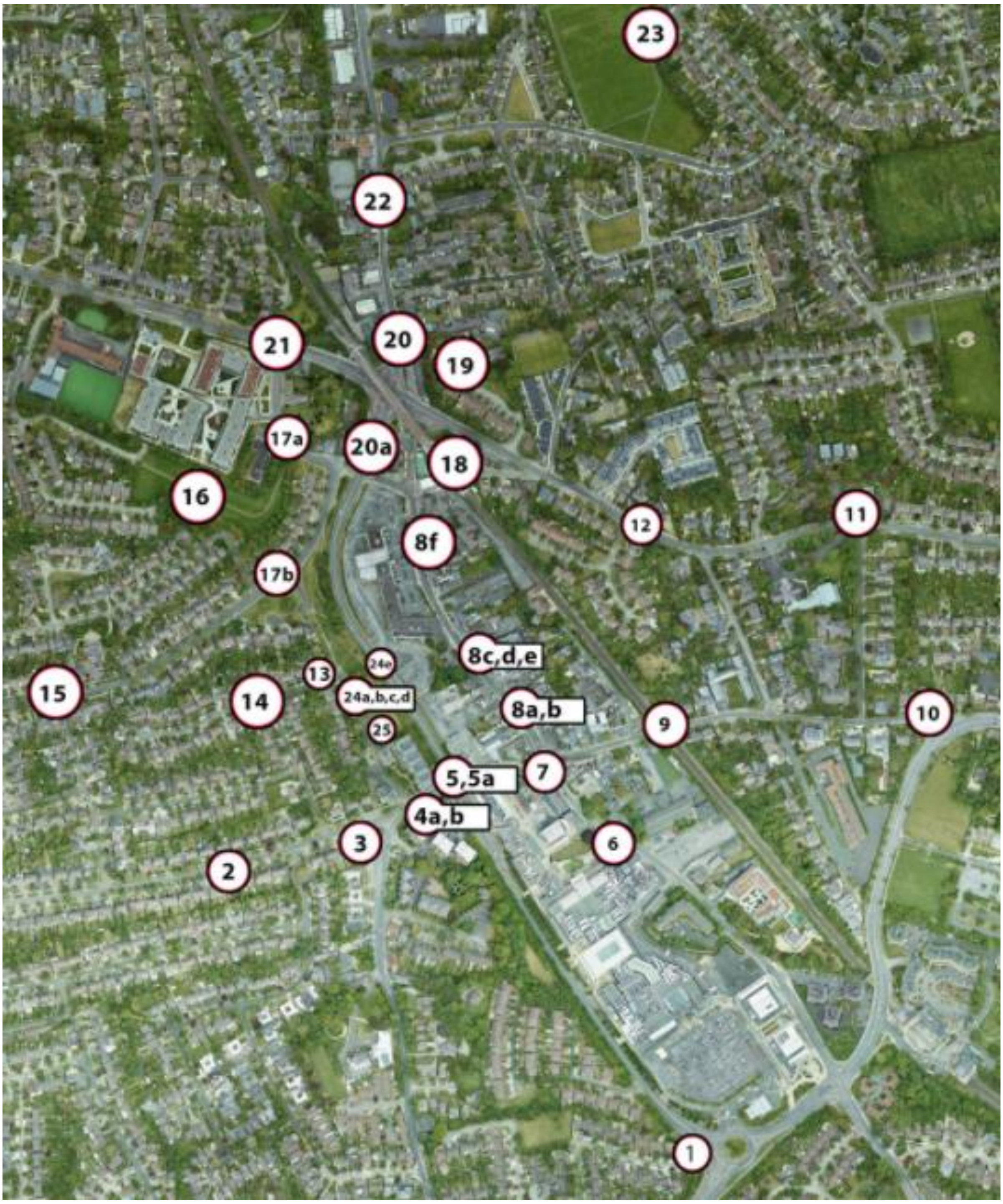

Figure 14.11: Viewpoint location map (source Model Works)

Table 14.6: Visual Effects Assessment

No	Viewpoint Location	Baseline View	Sensitivity	Visual Change	Magnitude of Change	Significance of Effects
1	Intersection of Dundrum bypass and Wyckham Way	This is a downhill view to the north along the Dundrum bypass from the major roundabout at its junction of Wyckham Way and the southwestern entrance to Dundrum Town Centre Phase I. The Dundrum bypass road is enclosed by vegetation walls and buildings and has little interface / intersection with the surrounding urban context	Low	The proposed development is fully screened Dundrum Town Centre buildings.	None	Imperceptible / Neutral
2	Intersection of Barton Road East and Ailesbury Grove	This is an easterly view across the intersection of residential roads typical of the mid-low density residential area to the west of the site. It takes in terraced and semi-detached, two storey dwellings set back from treelined streets and front gardens.	Medium-low	The proposed development is substantially screened by intervening buildings and vegetation leaving only partial views of the profile of the southernmost blocks (more so during winter months). There will be a marginal increase in the intensity and diversity of development within view with little effect on the visual amenity of the street scene.	Low-negligible	Slight-imperceptible/ Negative
3	Intersection of Barton Road East and Ballinteer Road	This is a north-easterly view across a complex intersection of residential and distributer roads. In the foreground the view is framed by detached and semi-detached houses, but the main focus in the near middle distance is the Dundrum View Apartments.	Medium-low	The upper levels and roof profile of the southernmost blocks will be partially visible from here above and between foreground dwellings and apartment blocks. Whilst they are clearly larger structures than the nearer apartment block, they rise to a similar height above the skyline and will impart a similar degree of enclosure. The proposed development will add to the scale and intensity of apartment development within the scene, but without introducing a new and unfamiliar element to the scene. Furthermore, they will not obstruct any key amenity views.	Low	Slight / Negative

No	Viewpoint Location	Baseline View	Sensitivity	Visual Change	Magnitude of Change	Significance of Effects
4a	Ballinteer Road at Dundrum View Apartments	This is a framed easterly view nearing the western end of the proposed Sweetmount Park bridge. To the left are the Dundrum View apartments and to the right is the southern end of Dundrum Shopping Centre. The central focus of the view is the western façade of Holy Cross Church.	Medium-low	The proposed buildings will not be visible from here and an unobstructed view of Holy Cross Church and parochial house will remain unimpeded. This is due to the provision of 'Church Square' adjacent to the rear of the church (below the overpass) and the positioning of the nearest proposed building north of the square leaving space to appreciate the church setting.	None	Imperceptible / Neutral
4b	Ballinteer Road at western end of Overpass	This view is marginally closer to the site than VP 4a and takes in a greater proportion of the proposed site below and beyond the proposed Sweetmount Park bridge to the northeast. Holy Cross Church is more peripheral in this view	Medium-low	The end of proposed blocks 4A and 4B can be seen rising in the space between the foreground apartment building and Holy Cross Church and is setback from the overpass to allow for the new 'Church Square'. This setback ensures that other than an increased sense of enclosure, the proposed buildings will not appear overbearing. Instead, they fill a void space and provide a pleasant degree of enclosure that does not compromise the sense of openness and permeability though this urban area. Indeed, a gap through to the main street is maintained to the north of the church and there is an obvious transition in scale down to the main street.	High-medium	Moderate / Positive
5, 5a	Ballinteer Road Overpass	This is an elevated and open view along the site from the middle of the Ballinteer Road Overpass, which is flanked on its western side by mature trees. The site itself consists of derelict and backland uses such as surface carparking and storage with views of the backs of main street buildings and Holy Cross Church. The LUAS bridge can be seen rising in the middle distance. The 5a view is a CGI view that focusses on the Church Square aspect of the	Low	This is a close and dramatic view of the south-western portions of the proposed development. The nearest building (Block 3B) rises prominently and sets up a strong perspective with the other blocks running away from the viewer along the Dundrum bypass. The ground level unit of the nearest block interactively opens onto Church Square, which can be seen immediately below the overpass to the northeast. Whilst the proposed development represents substantial visual change in the form of a new tall building with considerable combined massing.	Very High	Moderate / Positive

No	Viewpoint Location	Baseline View	Sensitivity	Visual Change	Magnitude of Change	Significance of Effects
		proposed development as seen from the overpass.				
6	Dundrum main street at entrance to the Mill Pond	This is a view northwards from Sandyford Road at what is the main pedestrian entrance into the Dundrum Town Centre development. In the middle distance, there is a sweep of long standing two-storey main street buildings on the left hand side of the road, which form part of the ACA. A large broadleaf tree encloses the view on the other side of the road.	Medium	The roof profile of several blocks can be seen rising just above / beyond the two storey shops and offices that make up the ACA core of Dundrum village. They add marginally to the intensity of development within view and generate a more complex roofline profile above the intervening Main Street buildings. However, they are set back beyond the Main Street setting and do not represent an overbearing or competing presence – more a backdrop feature.	Low	Slight / Negative
7	Intersection of Ballinteer Road and Dundrum Main Street	This view is from slightly further north than VP6 along the Dundrum Main Street at the intersection with Ballinteer Road. This is the main intersection in the core of Dundrum Village and also marks the epicentre of the main street ACA. The street is modestly enclosed by two and three storey office-over-shop buildings and the front of Holy Cross Church can be seen rising above rooftops on the left hand side of the road with a slight setback from the road. There is little other containment to the view along the street other than Usher House in the middle distance.	High-medium	The nearest blocks from the proposed development are screened from view behind Main Street buildings and Holy Cross Church. Only the buildings at the northern end of the development can be seen terracing up in scale further along the Main Street alignment. Whilst they add to the scale and intensity of built development within the scene, they serve as a diverse backdrop to the street scene and a welcome degree of enclosure to Dundrum village. Instead of competing with the Main Street ACA, the proposed development provides a rich juxtaposition that serves to highlight the layers of evolution in Dundrum and overall, a stronger sense of place.	Medium-low	Moderate / Positive
8a, 8b, 8c	Dundrum Main Street (south)	This is a view across the Dundrum main street towards the elegant, but modest scale façade of Holy Cross Church. This protected structure is setback from the street allowing a small plaza to the front. Further north along the main	High-medium	Beyond a pedestrian access way to be provided along the northern side of the church is the nearest Block 4B of the proposed development occupying the south-eastern corner of the site. The taller Block 4A can just be seen rising beyond it the northwest, whilst the other 'B' blocks can be seen	High-medium	Moderate / Positive

No	Viewpoint Location	Baseline View	Sensitivity	Visual Change	Magnitude of Change	Significance of Effects
		street is an eclectic array of shops and offices fronted by a street trees and planter boxes that divide the single lane vehicle carriageway from a bike lane. The gentle decent of the street aids the sense of openness. The 8b view is a CGI view focussed along the new pedestrian access between the church and the proposed Block 4B. The 8c view is also a CGI view that looks back at the same elements as 8a and 8b, but from slightly further north and in the opposite direction		terracing down the main street to the north. In the distance the taller landmark buildings of Block 1 contain the middle distance view. The introduction of all of these buildings represents dramatic visual change. Notwithstanding the substantial increase in the scale and intensity of built development within this street scene, the proposed development also represents a comprehensive consolidation of this urban setting. The buildings are not overbearing in scale having been designed to terrace down to the human scale of the main street and they have a rich and lively frontage onto both the main street and the Church Square pedestrian access. There is a strong sense of integration and permeability with the main street, which now appears as much a welcoming urban space as a functional traffic conduit.		
8d, 8e	Dundrum Main Street (middle)	This view is slightly further north from VP8a, VP8b and VP8c and focusses on several of the earlier modest scale two storey buildings that line the western side of Dundrum's main street (Glenville Terrace). These older buildings give way to the less aesthetic and larger scale Dundrum Shopping Centre buildings further north. The 8e view is a CGI view that focuses directly on Glenville Terrace.	Medium	Blocks 4B and 3C will flank Glenville Terrace, which itself is incorporated into the development. Block 3A rises beyond the northwest and although it is taller than the nearer blocks, its more distant and downhill position serves as a scale balance. The 4/5 storey 'B' blocks run down the main street to the north before the landmark building (1A) rises as a distinctive middle ground feature of the Street scene. There will be a dramatic visual change from the proposed development and the buildings that surround the retained Glenville Terrace will result in a degree of scale disparity with it. However, there is a distinct and deliberate terracing in scale away from the existing building in order to integrate it in to the development and there will be a pleasant open space enclave to the front of Glenville Terrace on the main street. Block 3C is an architecturally	High-Medium	Moderate / Positive

No	Viewpoint Location	Baseline View	Sensitivity	Visual Change	Magnitude of Change	Significance of Effects
				striking 'cornerstone' building for the development, which engages with the main street setting through overlooking balconies and a welcoming street level interface. The same is true for the other buildings that line the main street further north, which are richly diverse in appearance using offset angles to generate lively spaces.		
8f	Dundrum Main Street (north)	This view is from the northern end of the main street looking to the southwest across the Dundrum Shopping Centre car park and low-rise commercial buildings, which appear dated. A two storey building lines the eastern side of the street and there is an array of street trees.	Low	Again, there will be dramatic visual change as a result of enclosure by the taller and closer Block 2B that will occupy the former surface car park. It is visible in the context of a small pocket park enclave that serves as an access between the Block 1 and Block 2 buildings. Whilst the taller Block 2A building is also visible across the central spine of the proposed development, the more modest Block 3B can be seen fronting the main street further south. Despite the increased scale and intensity of the proposed development, there is a sense of consolidation and engagement with the main street that has been missing heretofore. The scale of the main street buildings and their street level integration make for a welcoming urban setting without a sense of overbearing.	High-medium	Moderate / Positive
9	Kilmacud Road Upper at Dundrum Garda Station	This is a view experienced by those heading downhill towards the centre of Dundrum along Kilmacud Road Upper. The garda Station occupies a former church in the foreground and further on can be seen the long existing main street shops backed by the Dundrum Town Centre development and surrounding	Medium-low	A small section of the roof profile of one of the proposed blocks will be visible above and between trees and buildings including the Dundrum Garda Station. The remainder of the development will be fully screened. Whilst it is a discernible addition to the street scene it adds to the eclectic array of built form and will not be readily noticeable feature. It will not draw from the amenity of the view.	Negligible	Imperceptible / Neutral

No	Viewpoint Location	Baseline View	Sensitivity	Visual Change	Magnitude of Change	Significance of Effects
10	Junction of Kilmacud Road Upper and Overend Avenue	This is a residential view from high ground to the east of Dundrum Village at the eastern end of Kilmacud Road Upper. The view is enclosed by a two storey residential dwellings and vegetation at a modest distance.	Medium-low	Only a minute portion of the proposed development is potentially discernible in the distance from here along the road alignment. It will not have a material effect on visual amenity.	Negligible	Imperceptible / Neutral
11	Taney Road near Stoney Road junction	This is a channelled view looking westwards along Taney Road and in this instance the enclosure on either side of the road is provided by mature stands of trees.	Medium-low	Only a small section of the roofline of two of the blocks will be visible from here along the road alignment. These will rise just above the intervening roofline of dwellings and tree tops at a bend in the road in the middle distance. The development will add marginally to the intensity and complexity of built development along the road alignment and will block the brief and limited view of the Dublin Mountains.	Low	Slight-imperceptible / Negative
12	Junction of Taney Road and Taney Lawn	This is a residential context, at least in the foreground, looking downhill to the northwest along Taney road towards the LUAS bridge, The foreground dwelling sits at the corner of Taney Manor.	Medium-low	The uppermost portions of the tallest blocks at the northern end of the site will rise into view above foreground houses and just to the left of a large street tree. They will also be seen just to the left of the similar height LUAS suspension bridge, which lies on the Taney Road alignment. It will introduce a larger scale and different form of residential development to this mid-low density foreground setting, but is not out of place in the context of the LUAS bridge which also serves as an arrival landmark for Dundrum. Despite the height of the proposed buildings, they are on lower ground at a reasonable remove from the foreground residential setting and serve as a discrete backdrop feature that is not spatially overbearing. There will be a stronger sense of being located close to Dundrum centre, but with that a reinforced sense of place.	Medium-low	Moderate-slight / Neutral
13	Corner of The Laurels and Sweetmount Park	This is a framed view between mature foreground trees across a linear park	Medium-low	This is a dramatic change in view from a low-rise dilapidated shopping centre, to a much larger scale	Very High	Substantial-moderate /

No	Viewpoint Location	Baseline View	Sensitivity	Visual Change	Magnitude of Change	Significance of Effects
		towards the proposed development site on lower ground on the opposite side of the Dundrum Bypass. The middle ground context is dominated by the rear of the Dundrum Shopping Centre and its associated parking and delivery areas. A glimpse of the LUAS bridge is also afforded.		multi-block apartment development that fully exploits the site. The nearest blocks will rise prominently in the fore-to-middle ground and will provide a strong sense of enclosure to the scene. However, there is also permeability and respite from the considerable massing afforded by a generous gap between blocks, which allows an avenue of visibility through the middle of the development to treetops on the opposite side. It is also utilised as a dramatic entrance into the site across the proposed Sweetmount Park bridge from the foreground park across Dundrum bypass road. The nearest dwellings to the left gable on to the linear park (see Figure 14.10), whilst mature trees buffer those dwellings to the right, thereby reducing the potential for a sense of overbearing and overlooking (there is a distance of around 70m from nearest dwellings to the proposed blocks). In this instance the scale and intensity of built development is balanced by the higher quality of design, materials and urban form of the proposed development.		Neutral (on balance)
14	Sweetmount Park	This view looks east along the residential street of Sweetmount Park and it is framed by two storey semi-detached dwellings. Street trees, front yard vegetation and mature trees also serve to contain the view at a modest distance.	Medium-low	There will be a substantial change to the easterly view from here with four of the proposed blocks rising well above the roofline of foreground dwellings. There will be a much stronger sense of enclosure throughout the easterly quarter. This view does not benefit from the site context (lower ground / Dundrum bypass/ dilapidated shopping centre) as the nearer VP13 and thus there is some degree of contextual / scale conflict with the foreground residential setting. Nonetheless, the proposed blocks are not spatially overbearing and there is an avenue of open space through the	High	Substantial-moderate / Negative

No	Viewpoint Location	Baseline View	Sensitivity	Visual Change	Magnitude of Change	Significance of Effects
				centre of the development, which gives some respite to the otherwise substantial massing of the development. The development is also of a high standard of design and finish contained on a site for which there has long been anticipation of large scale redevelopment.		
15	Corner of Sweetmount Avenue and Sweetmount Drive	This is a slightly elevated view from the residential area west of the site at the intersection of two streets. Whilst both sides of the road are contained by setback semi-detached dwellings, those to the south (right) occupy higher ground and provide more containment. A dense bank of mature vegetation lines the road in the middle distance.	Medium-low	Around 5 of the taller western and north-western blocks will rise into view above the densely vegetated street alignment and intervening roof tops. It is only the upper storeys of these blocks that will be visible in the lower middle distance and they do not present in a visually or spatially dominating manner. Instead, they add rich variety of profile and a high quality of design and materials to the now built backdrop of this scene. In this regard, they also add the scale intensity and diversity of built development within the easterly view. The sense of place, being near Dundrum's commercial node is reinforced. Despite the noticeable visual change it is not considered that the scheme wholly draws from visual amenity or improves it.	Medium-low	Moderate-slight / Neutral
16	Park between Fernbank Apartments and Weston Park	This is a slightly elevated view from within Finsbury Park, which is substantially contained by mature broadleaf trees albeit with glimpse views of rooftops and a Church steeple.	Medium-low	The taller northern blocks of the proposed development will rise prominently into view above the mature trees and rooftops at the southern end of the park. They will provide a much stronger sense of enclosure, albeit without obstructing amenity views of more distant features. It is a dramatic change to the parkland scene where heretofore there was little sense of the Dundrum commercial core. Whilst the scale and intensity of visible development is substantially increased, it brings with it stronger sense of place and even safety through passive surveillance. Furthermore, the development does not appear over-scaled or out of	High	Moderate / positive

No	Viewpoint Location	Baseline View	Sensitivity	Visual Change	Magnitude of Change	Significance of Effects
				context in this setting where instead it generates a landmark sense of place.		
17a	Churchtown Road Upper	This is a slightly elevated view southwards towards Dundrum Village across the Dundrum bypass road. The surface car park and tallest building from the Dundrum Shopping Centre lies to the fore and to the right of Usher House and other smaller main street buildings in what is a complex intersection of roads and built form. The rear of residential dwellings from Sweetmount Avenue can be seen in the foreground and stretching further to the west. The LUAS bridge rises in close proximity to the southeast.	Low	Viewing directly across the Dundrum Bypass at the 16 storey landmark building of the proposed development replacing the surface car park of a dated low rise shopping mall is as an immense visual change. The building towers above the viewer, is spatially and visually dominating thereby performs its function as a landmark building. It has a striking architectural form and sets up a dramatic sense of scale perspective with the smaller buildings that flank it along the Dundrum Bypass and smaller again along the lower Main Street. A landmark building is designed as a distinct profile point principally for mid and even long range views and the consequence of this can be that it does not relate so readily to its immediate surroundings. Although buffered by intervening roads the block 1A building will visually and spatially dominate the residential dwellings at the northern end of Sweetmount Avenue (just to the west of this viewpoint) and the small group of residential/commercial properties at Waldemere Terrace (visible across the Dundrum Bypass road). Whilst there is some balance to the visual impact from an improved quality and form of urban development within this perceptual void there is a conflict of interest in the scale and nature of the design (strategic landmark building within a major town centre zoning objective vs localised residential visual amenity).	Very High	Moderate / Negative
17b	Sweetmount Avenue (northern end)	This view is around the corner from VP17b and represents the residential context of Sweetmount Avenue, which	Medium-low	There will be dramatic visual change as the landmark Block 1 buildings will rise prominently above the Dundrum Bypass Road at the northern	High	Substantial Moderate / Negative

No	Viewpoint Location	Baseline View	Sensitivity	Visual Change	Magnitude of Change	Significance of Effects
		represents one of the closest residential receptors to the site. The view is across both Sweetmount Avenue and the Dundrum Bypass Road which are separated by a linear park. Unlike the southern and more elevated end of the linear park, the vegetation at this end is less mature and smaller. This allows reasonably open views into the rear of the Dundrum Shopping centre and its associated delivery and parking areas. An eclectic array of budlings rise along the more distant main street context.		end of the site. These are separated from the Block 2A building by a generous gap and podium level landscaped terrace. The other Block 'A' buildings that front the Dundrum bypass further south will also be visible from here, but at decreasing scales due to increasing distance. There is some scale disparity and a rapid scale transition from the Sweetmount Avenue properties up the nearest proposed blocks, but there is also 50m+ between them and that intervening context contains two roads and a vegetated linear park. Nonetheless there will be some sense of overlooking and overbearing in this localised context. Although the scale and intensity of development vastly exceeds the existing context there is an improved quality and sense of consolidation with the new development replacing the back area view of a tired shopping centre.		
18	Dundrum LUAS stop	This is a view between two mid-height office buildings from the elevated LUAS bridge at the Dundrum stop. The rooftops of an assorted array of main street buildings can be seen in the lower middle ground giving way to tree tops and then a distant view of the Dublin Mountains.	Low	The proposed development will fully occupy the open vista westwards towards the Dublin Mountains with the uppermost sections of the majority of blocks visible. The 16 storey landmark building frames the view to the right with the lower block C buildings that front the Main Street terracing up to the taller Block A & B buildings that front the Dundrum bypass on the far side of the site. Indeed, the terracing of built form begins with the existing Main Street buildings in the foreground. Despite the loss of the view of the Dublin Mountains, there is a pleasant depth and legibility to the view of the development with both framing and terracing elements adding to the richness and variety of built form. The proposed development, in conjunction with the adjacent	High	Moderate-slight / Neutral (on balance)

No	Viewpoint Location	Baseline View	Sensitivity	Visual Change	Magnitude of Change	Significance of Effects
				LUAS suspension bridge (just out of the depicted view) adds a gravitas and strong sense of place to the setting which is already a key transport node. There will be a stronger sense of arrival at the Dundrum commercial core for LUAS users than there has been heretofore.		
19	Old Rectory Park	This is a small residential enclave just to the northwest of Dundrum main Street beyond the intervening LUAS line. The view in question takes in the front of two storey terraced dwellings and is framed by a large tree in the foreground.	Medium-low	Given the slightly higher elevation than the site and the existing level of enclosure from houses and vegetation, only the upper storeys of the 16 storey landmark building will be seen above foreground rooflines from here (there will be clearer views from the upper floors of the houses themselves). As there is no view of the current site context, the development appears slightly at odds with the foreground residential setting, but it does reinforce the sense of place close to the commercial core of Dundrum. While it will add to the scale, intensity and diversity of built development within view, the development is not overbearing.	Low	Slight / negative
20	Dundrum Road near junction with Victoria Terrace	This is a view from Dundrum Road just on the north-eastern side of the LUAS bridge, which is the dominating feature of this view. A row of shops known as Victoria Terrace is contained in the foreground to the left, whilst the curved façade of a more modern commercial building flanks the right. A mix of buildings from the northern end of the Dundrum main street can be seen a short distance beyond the LUAS bridge.	Low	The proposed 16 storey landmark building rises as a prominent feature of this view despite the competing elements. The other visible blocks are the smaller C blocks fronting Dundrum Main Street to the left of the landmark building which are much less noticeable beyond the southern end of the LUAS bridge by comparison. The landmark building works in tandem with the LUAS bridge to reinforce the transport arrival node at Dundrum. The two landmarks complement rather than compete with each other because of their distinctly different form and function. The proposed development reinforces the sense of place for the Dundrum commercial core and improves the visual amenity of this diverse and lively street scene.	High-medium	Moderate / Positive

No	Viewpoint Location	Baseline View	Sensitivity	Visual Change	Magnitude of Change	Significance of Effects
20a	Junction of main Street and Dundrum Bypass	This is a direct view across the Dundrum Shopping Centre car park and its dated low-rise commercial buildings. The Dundrum main street opens to the southeast, whilst the Dundrum Bypass continues to the southwest and is lined by a linear park on its western side.	Low	This is a close and striking view (CGI) of the proposed landmark building (Block 1A) at the northern corner of the development rising dramatically above the viewer. It will completely change the southerly aspect of the view and its scale is slightly imposing. However, it is a tall and slender building that does not overwhelm in terms of it bulk and it is made up of several distinct massing components as well as a rich and varied façade. Along with the residential balconies that protrude from each elevation, the street level commercial uses will provide lively integration with the street. It is considered that the design and scale of the building serves its function as a sentry-like threshold marker for Dundrum's commercial core and the fact that it is slightly imposing at close quarters only reinforces its designed function.	Very High	Moderate / Positive
21	Goatstown Road at Fernbank	This is a slightly elevated view looking southwest from the Goatstown Road across a residential dwelling and St Canice's Church behind a high wall. The LUAS bridge dominates the southerly aspect and the Dublin Mountains can be seen in the distance to the west. The Fernbank Apartment development is also just outside of the depicted view to the right.	Low	The two nearest / tallest Block 1 A&B buildings will rise prominently into view above the foreground dwelling and St Nahi's Church and together these built elements form a concentrated group to the south with lower lying vegetation flanking them. The LUAS bridge is an even more prominent and distinctive feature nearby to the southeast. Together with the LUAS bridge, the proposed landmark building reinforces the transport arrival node for Dundrum centre and there is little in terms of scale or contextual conflict with the foreground buildings as the separation distance is clear. The view towards the Dublin Mountains also remains unimpeded.	Medium	Moderate-slight / Positive
22	Dundrum Road (Uncle Tom's Cabin)	This view is from slightly further away from the site than VP20 along the	Low	The proposed 16 storey landmark building can be seen rising as a prominent feature of this view	Medium	Moderate-slight / Positive

No	Viewpoint Location	Baseline View	Sensitivity	Visual Change	Magnitude of Change	Significance of Effects
		Dundrum Road. Again the LUAS bridge is a prominent feature, but there is generally less of the Dundrum village context in view. Two storey commercial buildings line the northern side of the road in the foreground and serve to channel the view.		adjacent to the left of the nearer LUAS bridge and on the alignment of the road corridor. The landmark building works in tandem with the LUAS bridge to reinforce the transport arrival node at Dundrum. The two landmarks complement rather than compete with each other because of their distinctly different form and function. The proposed development reinforces the sense of place for the Dundrum commercial core, albeit partially obstructing the distant view of the Dublin Mountains.		
23	Rosemount Green	This is a westward view across the residential park of Rosemount Green, which consists of open playing fields and perimeter paths. The open space is surrounded by residential housing estates in all directions except to the north where a tall wall separates it from the Central Mental Hospital.	Medium-low	The proposed 16 storey landmark building at the northern end of the site can be seen rising above intervening treetops and rooftops on the far side of the park. There will also be a glimpse view of the roofline of an adjacent proposed building between trees. The LUAS suspension bridge is a short distance to the left of the landmark building and together they mark the location of Dundrum centre. Although it is seen to the fore of the Dublin Mountains, the proposed building does not represent a notable obstruction to the view towards them. The proposed redevelopment of the Central Mental Hospital will occur immediately to the rear of the viewer at this location and will provide a much stronger degree of visual change at this locality than the proposed development. It is not considered that there will be a material cumulative effect from the two developments given the relative viewing distances involved and the view orientations. Similarly no material cumulative effect is anticipated for the proposed Eircom	Low	Slight / Neutral

No	Viewpoint Location	Baseline View	Sensitivity	Visual Change	Magnitude of Change	Significance of Effects
				project i.e. the redevelopment of Somerville House to the west of up to 6 stories – ABP ref.TC06d.312935)		
24a 24b 24c 24d 24e	The Laurels	This is an open and elevated view across a linear park at the Laurels towards the proposed development site on lower ground on the opposite side of the Dundrum Bypass. The middle ground context is dominated by the rear of the Dundrum Shopping Centre and its associated parking and delivery areas. There is also a view of the LUAS bridge in the middle distance to the northeast are also afforded.	Medium-low	As per the assessment of VP13, which is very close to these viewpoints and has a similar context, this is a dramatic change in view from a low-rise dilapidated shopping centre, to a much larger scale multi-block apartment development that fully exploits the site. The nearest blocks will rise prominently in the fore-to-middle ground and will provide a strong sense of enclosure to the scene and have a broad lateral extent. However, there is also permeability and respite from the considerable massing afforded by gaps between blocks, which allows avenues of visibility through the middle of the development to treetops on the opposite side. It is also utilised as a dramatic entrance into the site across the proposed Sweetmount Park bridge from the foreground park across Dundrum bypass road (View 24a). In this instance the scale and intensity of built development is balanced by the higher quality of design, materials and urban form of the proposed development. Even though the visual envelope of the development is large in both a vertical and horizontal sense, the sense of overbearing is ameliorated by the lower ground level of the development and some retained openness north and south along the linear park.	Very High	Substantial-moderate / Neutral (on balance)
25	Sweetmount Park (South – CGI)	Although this CGI view is from a very similar location to the VP24 views within Sweetmount Park, it is oriented slightly more to the southeast in the direction of Holy Cross Church.	Medium-low	The nature, scale and quality of visual change from the proposed development is very similar to that already described for the VP24 views. However, the key consideration of this particular view is the relationship between the proposed development	Very High	Substantial-moderate / Neutral (on balance)

No	Viewpoint Location	Baseline View	Sensitivity	Visual Change	Magnitude of Change	Significance of Effects
				(southern Blocks) and Holy Cross Church. In this regard, the proposed 4C block terraces down slightly in scale from the adjacent blocks to the north and Holy Cross Church is also on higher ground on the opposite side of the site. Thus there is not a marked scale imbalance. Furthermore, the proposed Church Square open space and its abundant planting provide an appropriate physical and visual apron to appreciate the church building even in the context of the considerably increased intensity of development that otherwise surrounds it.		

14.6.5 Summary of Visual Effects

The assessment found that visual effects ranged widely in terms of significance and quality largely relating to the degree of screening, legible context and the baseline scenario. The key conclusions are set out below.

Immediate Context Views

For those views of the proposed development from its immediate context, where the dated shopping centre and expansive carparking areas form part of the current baseline, the magnitude of change in views is high or very high. However, the proposed scale and intensity of the development appears as the appropriate design response to redevelop this degraded site. It is a bold response that incorporates a high quality of design and materials and integrates respectfully with the Main Street ACA. This is epitomised by the view from VP5, where the proposed development will dominate the northerly view from the Ballinteer Road overpass, but fills a dated and perceptual void in the landscape fabric of Dundrum, whilst integrating with Holy Cross Church in the form of a new open space square.

Aside from the ACA area, which is deemed to have a High-medium visual receptor sensitivity, most of the urban area surrounding the site is considered to be of Low sensitivity to visual change. The combination of sensitivity and magnitude judgements tends to result in impact significance in the mid to high range, but this is also deemed to be of a positive quality. In some instances, such as for VP13, a balancing combination of both positive and negative factors is deemed to result in a Neutral quality of effect.

Dundrum Main Street Interface

Dundrum Main Street views adjacent to the site are dramatically changed in a positive manner with strong connection and integration of development at street level and enhanced sense of place. The blocks fronting onto the main street are terraced down in scale from those at the more robust and lower western side of the site to aid scale integration with existing main street buildings and a welcoming human scale. The main street blocks are set at slightly offset and varying angles to the street generating both an interesting series of façades and spaces between. The approach also helps to break down the massing. The facades also incorporate balconies onto the street, which provide for lively integration and this is mirrored at street level where a the ground floor uses open onto the street in a welcoming manner and pedestrian access into the site are regularly provided. These effects can be seen in the series of main street viewpoints (VP7, VP8a, VP8b,VP8c, VP8d, VP8e and VP8f), which are all considered to result in positive visual impacts due to the consolidation and integration of the Main Street.

Another key main street consideration is the visual interaction between the Architectural Conservation Area centred on the Ballinteer Road intersection (see VP7) and the relationship between Holy Cross Church and Parochial House (see VP8a). From VP7 the nearest buildings are largely screened from view because they are set below and well beyond the existing main street buildings. From VP8a Holly Cross church remains a dominant feature that is appropriately buffered and framed by the proposed development, which is both setback from it and terraced down to it in terms of scale.

Residential Areas east of the site

With the exception of immediate views of the development from the Main Street, views from the east of the site tend to be substantially screened. This includes the portion of Dundrum Village between the Main Street and the LUAS line as well as the mid-low density residential neighbourhood further beyond. Only the upper levels of the taller blocks tend to be visible from this section above buildings and abundant treetops and the degree of screening is also aided by the fact that the site is contained downslope at a considerably lower ground level. Where available, views towards the Dublin Mountains and across the city tend to be maintained with only minor intrusion from the proposed development. The scale and intensity of the development, when seen in such scenarios also tends to highlight the commercial core of Dundrum emphasising the sense of place. The significance of impacts from the east of the site tends to be in the mid-low range and either Neutral or slightly Negative in terms of the quality of effect.

Residential Areas to the west and northwest of the site

These areas include The Laurels and Sweetmount neighbourhoods and the nature of visual impact varies considerably from this area depending on the baseline visual context. This is highlighted by the difference in impact between VP13 and VP14, which are only separated by a short distance. VP13 is from the upper edge of a Linear Park that affords relatively clear views across the current degraded site, which represents a draw on visual amenity. Whilst the visual change for this viewpoint is unquestionably dramatic (Very High) from the introduction of a series of large apartment blocks on the opposite side of the Dundrum Bypass, the scale and intensity of development is deemed to be balanced by an improved quality and design of built form and the new pedestrian / cyclist Sweetmount Park bridge connection to the development and onwards to Main Street (Substantial-moderate significance / Neutral quality – on balance). Whereas, for the slightly more distant VP14, the baseline context is a typical suburban residential street and the same apartment blocks rising into view above roofs and treetops lacks the same degree of legibility. Whilst this view will reinforce the sense of being closely connected to Dundrum's central core the same level of significance (Substantial-moderate) is accompanied by a Negative quality of effect. As this western residential area is also located at a higher elevation than the site, the significance of visual impact dissipates quicky with increased distance.

Further north, the residential area around Sweetmount Avenue descends in elevation to a ground level that is similar to the site and around a dozen dwellings at the northern end of Sweetmount Avenue will be afforded relatively close and clear views of the tallest Block 1A and 1B buildings directly across the Dundrum Bypass road. Although the baseline view includes the existing tired shopping centre and its associated surface level car parking, the proposed landmark building (Block 1A) will be slightly overbearing in scale generating a localised significant and negative impact.

Northern Approach to Dundrum (transport node)

In contrast to the negative effect likely to be experienced at the nearby residential enclave of Sweetmount Avenue, the views approaching Dundrum from the direction of Goatstown or the city centre by car or by LUAS illustrate why the appropriate design response for this site is to locate a tall landmark building at its northern end which serves as an arrival threshold not on the proposed development, but Dundrum commercial core in a broader sense. In these views which include VP20, VP21, VP21a and VP22, the proposed landmark building combines with the iconic LUAS suspension bridge in a sentry-like manner to mark arrival at Dundrum from converging forms of transportation. These receptors are deemed to be low in terms of sensitivity and the mid to high range magnitude of change is considered to be positive in terms of the quality of effect.

14.6.6 Mitigation Measures

It is considered that the design response is appropriate to the site and its surrounding context and its zoned land use objective. It is not considered necessary to provide additional specific mitigation measures in respect of landscape / townscape and visual impacts.

14.6.7 Monitoring

No monitoring is required.

14.6.8 Cumulative Impacts

The proposed development is located in an urban setting and the baseline environment is everchanging with new developments. However, there are no other projects in the vicinity of the site which would significantly alter the effects on the viewpoints described above.

14.7 OTHER EFFECTS

14.7.1 Residual Effects

As there are no specific Townscape and Visual mitigation measures considered necessary and the siting and design of the development (including landscape measures) are all incorporated into the photomontages used for the visual impact assessment, residual effects will be the same as those already identified in section 14.6.

14.7.2 Do Nothing Effects

The site would remain as a substantial and underutilised land parcel containing a underutilised / vacant Main Street properties and a degraded and increasingly marginalised shopping centre with excessive areas of surface car parking. This would represent unsustainable use of a strategically important opportunity for regeneration in accordance with its underlying land use zoning for Major Town Centre development.

14.7.3 Worst Case Effects

Worst Case Effects would occur if the development was substantially constructed, but not completed and left for a prolonged period as a derelict construction site. This would result in the short-term, negative construction effects extending for a longer duration than anticipated.

14.8 INTERACTIONS

The main interactions for TVIA were with Cultural and Architectural Heritage, Architectural Design and landscape Design.

REFERENCES

- DLRCC (2016) Dun Laoghaire Rathdown County Development Plan 2016-2022
- DLRCC (2022) Dun Laoghaire Rathdown Draft County Development Plan 2022-2028
- Guidelines for Landscape and Visual Impact Assessment, 3rd edition, 2013, Landscape Institute and Institute of Environmental Management and Assessment.
- Townscape Character Assessment, Technical Information Note 05/2017, Landscape Institute.
- Urban Design Manual – A Best Practice Guide, Department of Environment, Heritage and Local Government, 2009.
- Urban Development and Building Height Guidelines for Planning Authorities (2018) Department of Housing, Planning and Local Government.

15.0 SUMMARY OF SIGNIFICANT EFFECTS, INTERACTIONS AND MITIGATION/ MONITORING MEASURES

15.1 INTRODUCTION

Schedule 6 of the Planning and Development Regulations, 2001, As Amended details the information to be contained in an Environmental Impact Assessment Report, all of which have been complied with, where appropriate, in the relevant Chapter of this EIAR.

This Chapter of the EIAR identifies the significant effects of the project. It also summarises the interactions between impacts by different environmental factors previously discussed in the assessment chapters.

From the description of the project and assessment of effects outlined in the previous chapters, the significant effects of the project are considered under the following Chapter headings:

- Population and Human Health
- Biodiversity
- Land and Soils
- Water
- Air and Climate
- Noise and Vibration
- Material Assets: Built Services
- Material Assets: Transportation
- Material Assets: Resource and Waste Management
- Cultural Heritage
- Landscape

Where appropriate, the relevant impact areas are considered in grouped form, as set out below.

15.2 SUMMARY OF PRINCIPAL INTERACTIONS OF EFFECTS

Schedule 6 Item 2(d) of the Planning and Development Regulations, 2001 as amended requires that projects are examined with regard to the inter-relationship of aspects referred to in Item 2(d) of Schedule 6.

The matrix incorporated in Table 15.1 inter-relates the various Chapters of the EIAR to the various impact headings referred to in Schedule 6 Item 2(d) of the Planning and Development Regulations, 2001, As Amended. This matrix does not represent a form of relative assessment of impacts, but merely identifies and amalgamates areas of principal interaction.

15.3 SIGNIFICANT EFFECTS AND PRINCIPAL INTERACTIONS

The likely significant adverse effects of the project are summarised below on a Chapter by Chapter basis taking into consideration the principal interactions between the environmental factors.

The assessment on significant effects includes, where relevant, cumulative effects i.e. the addition of many minor or significant effects and the effects of other projects.

Population and Human Health
All environmental factors interact with Population and Human Health (Chapter 4). The key areas of interactions are:-
- Air and Climate
- Noise and Vibration
- Material Assets: Transportation
- Landscape

There are no significant adverse effects for Population and Human Health.

Biodiversity
Impacts to biodiversity are addressed in Biodiversity (Chapter 5) and are strongly related to water quality and impacts which may affect the aquatic environment during both the construction and operation phases. Interactions with the following chapters are therefore relevant:
- Water
- Land and Soils
- Air and Climate
- Landscape

Subject to the adherence to the recommended mitigation measures, no significant adverse impacts are anticipated.

Land and Soils
Effects to land and soils are related to water quality, dust and waste. Interactions with the following chapters are therefore relevant:
- Water
- Biodiversity
- Air and Climate
- Material Assets: Resource and Waste Management

Subject to the adherence to the recommended mitigation measures, no significant adverse impacts are anticipated.

Water
Effects on Water (Chapter 7) interact particularly with the following Chapters:-
- Biodiversity
- Land and Soils
- Material Assets: Built Services

Subject to the adherence to the recommended mitigation measures, no significant adverse impacts are anticipated.

Air and Climate
The main interaction with respect to Air Quality And Climate (Chapter 8) is with respect to traffic and transportation (used as an input for the air quality and climate assessment of the operational phase). Other key interactions relate to health impacts, dust nuisance and atmospheric emissions (which have the potential to impact on biodiversity). These impacts are considered in the following chapters :
- Material Assets: Transportation
- Population and Human Health

- Biodiversity

Subject to the adherence to the recommended mitigation measures, no significant adverse impacts are anticipated.

Noise and Vibration
The effects associated with Noise and Vibration (Chapter 9) interact with the following Chapters:-
- Population and Human Health
- Biodiversity
- Land and Soils
- Material Assets: Transportation

Subject to the adherence to the recommended mitigation measures, no significant adverse impacts are anticipated.

Material Assets: Built Services
The impacts of Built Services (Chapter 10) interacts with the following Chapters:
- Population and Human Health
- Land and Soils
- Water

Subject to the adherence to the recommended mitigation measures, no significant adverse impacts are anticipated.

Material Assets: Transportation (Chapter 11)
The impacts of Transportation interact with the following Chapters:-
- Population and Human Health
- Air and Climate
- Noise and Vibration

Subject to the adherence to the recommended mitigation measures, no significant adverse impacts are anticipated.

Material Assets: Resource and Waste Management (Chapter 12)
The effects of the use of resources and waste management interact with the following Chapters:-
- Population and Human Health
- Land and Soils
- Water
- Material Assets: Transportation

Subject to the adherence to the recommended mitigation measures, no significant adverse impacts are anticipated.

Cultural Heritage (Chapter 13)
The impact on cultural heritage interacts with
- Landscape

Subject to the adherence to the recommended mitigation measures, no significant adverse impacts are anticipated.

Landscape (Chapter 14)
In terms of interactions, the impact on the landscape relates to many of the impact areas considered. In the current context, the most significant interactions are considered in the following Chapters:

- Population and Human Health
- Biodiversity
- Land and Soils
- Water
- Cultural Heritage

The impact on landscape is significant but consistent with the prevailing planning policy context and sustainable development objectives enunciated in international, national, regional and local policy.

15.4 OTHER EFFECTS

Schedule 6 Item 2(e) of the Planning and Development Regulations, 2001 As Amended requires that an EIAR contains a description of the likely significant effects (including direct, indirect, secondary, cumulative, transboundary, short, medium and long-term, permanent and temporary, positive and negative) of the project on the environment resulting from the following:-

(I) The construction and the existence of the proposed development, including, where relevant, demolition works

A description of the development including the proposed demolition works is provided in Chapter 3 of this EIAR.

(II) the Use of Natural Resources, in particular land, soil, water and biodiversity, considering as far as possible the sustainable availability of these resources,

No likely significant effects on the environment are expected to arise from the use of natural resources in the construction / operation of this urban primarily residential project. Refer to chapters 5, 6, 7 and 12 of this EIAR.

(III) the emission of pollutants, noise, vibration, light, heat and radiation, the creation of nuisances, and the disposal and recovery of waste,

No likely significant effects on the environment are expected to arise from the emission of pollutants, the creation of nuisances or the elimination of waste associated with this project. Refer to chapters 8, 9 and 12 of this EIAR.

(IV) *the risks to human health, cultural heritage or the environment (for example due to accidents or disasters)*

The likely significant effects of risks due to major accidents or disasters are described in Section 1.5 of this EIAR and Chapters 4 and 7.

(V) *The cumulation of effects with other existing or approved developments, or both, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources*

Cumulative impacts with other projects, existing or approved, are considered in Chapters 4-14 of this EIAR.

(VI) the impact of the proposed development on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the proposed development to climate change, and

Climate Change impacts and the vulnerability of the development to climate change is considered in Chapter 8.0 Air and Climate, with flood risk and climate change impacts considered in Chapter 7.0 Water.

(VII) The technologies and the substances used.

This is an urban residential development and there are no technologies or substances associated with the project which would adversely affect the environment.

Table 15.1 Summary of Interactions

√ Area of Principal Interaction	Population and Human Health	Biodiversity	Land and Soils	Water	Air and Climate	Noise and Vibration	Material Assets: Built Services	Material Assets: Transportation	Material Assets: Resource and Waste Management	Cultural Heritage	Landscape	Major Accidents / Disasters	Use of Natural Resources	Emission of Pollutants	Technologies and Substances Used
Population and Human Health					√	√	√	√	√		√	√			
Biodiversity			√	√	√						√				
Land and Soils				√			√		√		√				
Water		√	√				√		√		√				
Air and Climate	√		√					√						√	
Noise and Vibration	√	√						√							
Material Assets: Built Services				√											
Material Assets: Transportation	√				√	√			√					√	
Material Assets: Resource and Waste Management			√										√		
Cultural Heritage											√				
Landscape	√	√								√					

15.5 ENVIRONMENTAL COMMITMENTS - MITIGATION AND MONTORING MEASURES

These measures should be implemented through planning conditions imposed by the planning authority.

Mitigation and monitoring measures will be managed by the contractor(s) during the Construction Phase and by the developer/ landowners thereafter.

An objective of EIA is to identify likely significant adverse impacts at the pre-consent stage and, where necessary, to propose measures to mitigate or ameliorate such impacts.

The 2018 EIA Guidelines published by the Department of Housing, Planning and Local Government state:

> *'While not a mandatory requirement an EIAR can very usefully include a summary table of features and/or measures envisaged to avoid, prevent or reduce and, if possible, offset likely significant adverse effects of the proposed development, and a timescale for the implementation of proposed mitigation measures.'*

Therefore, mitigation and monitoring measures to be adopted during the construction and operational phases of the project are detailed within each chapter and collated below.

EIA related conditions may be imposed as part of conditions of planning permission and this Chapter brings these together the key mitigation measures arising from the EIA process for this project to facilitate the competent/consent authority in this respect.

It is intended that the mitigation and monitoring measures proposed by the individual specialists will be incorporated into the Construction Stage Construction and Environmental Management Plan (CEMP).

15.5.1 Construction Phase – Mitigation

Population & Human Health	
PHH-C1	**Construction and Environmental Management Plan (CEMP)-** In order to mitigate potential temporary community disturbance during construction, an *Outline Construction Management Plan* (OCMP) has been prepared and is included with the application. If the project is approved and to be implemented, the appointed contractor will incorporate the environmental commitments contained in this EIAR and prepare a Construction and Environment Management Plan (CEMP) for the agreement of the Planning Authority prior to development commencing on site.
PHH-C2	**Liaison Officer** – The contractor(s) will appoint a liaison officer to ensure that any issues from the local community are dealt with promptly and efficiently during construction. These details will be included in the Contractor(s) CEMP prepared prior to construction commencing.
PHH-C3	**Working Hours –** Typically, construction working hours will be limited to 7am – 6pm Monday to Friday and 8am – 2pm on Saturday. It is anticipated that there will be times, due to exceptional circumstances, that construction work will be necessary outside these standard hours i.e. large concrete pours. Deviations from these standard times will be

	agreed in advance with the Planning Authority.
PHH-C4	Prior to the erection of cranes on the site the developer shall notify and consult with the Irish Aviation Authority.
Biodiversity	
B-C1	Prior to the commencement of development, the developer shall engage the services of a qualified ecologist as an ecological consultant. The consultant shall ensure the implementation of all relevant mitigation measures in the submitted EIAR.
B-C2	Preconstruction surveys will be carried out for bats, mammals and amphibians in the event that circumstances change before work commences on the site.
B-C3	A preconstruction survey for herring gull will be carried out prior to demolition of structures in the event that circumstances change before work commences on the site. Consultation will be carried out with NPWS should they be found nesting on site at the time.
B-C4	To limit the potential impact of construction on breeding birds, vegetation removal will be restricted to non-breeding season (1st September to 28th February). Where this seasonal restriction cannot be accommodated, the project ecologist will be required to check vegetation for nests prior to clearance. A licence from the NPWS will be acquired where necessary to remove nests.
Land And Soils	
LS-C1	Prior to demolition site activity, a pre-demolition waste survey shall be carried out to identify all hazardous materials in the buildings. These materials shall be collected, segregated and stored within secondary containment designed to retain at least 110% of the storage contents, prior to awaiting disposal. Safe materials handling of all potentially hazardous materials should be emphasised to all personnel employed during the construction phase of the project.
LS-C2	Temporary bunds shall be provided for oil/diesel storage tanks on the site for all development phases.
LS-C3	Stockpiles of demolition materials will be provided with perimeter sediment skirts. Sediment retention barriers shall be provided in surface water drains within and to the perimeter of the site along the Dundrum Bypass. The contractor shall use adequately designed and maintained hardcore construction roads.
LS-C4	The excavated material will be monitored and assessed with reference to the OCM Waste Characterisation Assessment (Appendix 6A of the EIAR) to determine the most suitable disposal outlet. Material will be categorised according to the Landfill Directive and will be sent to appropriately licensed facilities for treatment/disposal. This will entail carrying out further soil analysis to determine the appropriate waste facility for disposal. Material on site will be segregated and divided into material re-use, material re-cycling and waste material streams.
LS-C5	Exposure of large areas of natural soil to be minimised. Soil stripping, stockpiling and reinstatement of hardstanding to be carried out in a phased sequence.
LS-C6	A no-fines lean mix concrete blinding shall be used to the base of the retaining wall on the Main Street, coupled with a vertical linear sheet and drainage layer under the Lower Ground Floor Slab.
LS-C7	A Water Management System shall be established within the site boundary. The system shall include for all ground water collected from

	within the site to be directed/pumped to settlement tanks and silt bags prior to discharge at an agreed discharge rate.
LS-C8	Record keeping and monitoring of import and export of soils shall be carried out in accordance with the Waste Management Act. All waste hauliers and receiving facilities shall have valid permits in accordance with the Waste Management Acts and Planning Conditions
LS-C9	A Pre-commencement Survey of existing piezometers is required to record ground water levels prior to commencement of works.
LS-C10	Install temporary retaining structures to immediate adjacent buildings, such as Glenville Terrace, No.'s 11 and 16/17 Main Street and the Parochial House Boundary, as identified in the AGL Design Statement included in Appendix C of the Outline Construction Management Plan.
Water	
W-C1	The Main Contractor(s) CEMP shall provide the measures detailed in the Outline Construction Management Plan submitted with this application to avoid discharge of silt contaminated runoff or hydrocarbons.
W-C2	The Contractor shall provide a Water Management System to avoid polluted or silt laden surface water runoff from the site. Pumped flows shall be adequately treated prior to discharge to the receiving water to remove silt and possible contamination by hydrocarbons and cement.
W-C3	The CEMP will include measures to address flood risk during construction without reducing existing flood storage volume.
W-C4	Dedicated fuel storage areas shall be provided on-site which shall be a minimum of 50m from watercourses or drains or, alternatively, fuelling shall take place offsite.
W-C5	A Water Management System shall be established within the site boundary. The system shall include for all ground water collected from within the site to be directed/pumped to settlement tanks and silt bags prior to discharge at an agreed discharge rate.
W-C6	The Contractor shall comply with the following guidance documents: i) Control of Water Pollution from Construction Sites – Guidance for Consultants and Contractors (C532D) (CIRIA 2001) and ii) Development and Flood Risk - guidance for the construction industry (C624) (CIRIA 2004).
Air And Climate	
AC-C1	The main contractor will ensure the following best practice methods are applied during construction:- • Removal of Asbestos prior to demolition works. • Use of water mist cannons to supress dust during demolition works. • Screening and use of water spray bars on mobile crushing plant. • Screening of building during demolition to contain dust. • Provision of vehicle wheel wash facilities at site exits • Cleaning of local roads. • Vehicle/Plant engines shall be turned off when not in use • Vehicle/Plant engines shall be maintained to ensure efficient operation. • Mains power shall be utilised for Site Offices instead of generators
AC-C2	Dust suppression measures will be implemented to minimise dust generation during extended dry periods. Dust monitoring will be conducted through the demolition excavation period. A complaints

	management procedure shall be developed prior to the commencement of works.
Noise And Vibration	
NV-C1	The appointed Contractor will implement best practice noise mitigation and control methods and manage the construction and demolition works to comply with noise limits outlined in BS 5228-1:2009+A1 2014. Part 1 – Noise
NV-C2	Compressors will be attenuated models fitted with properly lined and sealed acoustic covers which will be kept closed whenever the machines are in use and all ancillary pneumatic tools shall be fitted with suitable silencers.
NV-C3	Machinery that is used intermittently will be shut down or throttled back to a minimum during periods when not in use.
NV-C4	Erection of good quality site hoarding to the site perimeters which will act as a noise barrier to general construction activity at ground level.
NV-C5	Erection of barriers as necessary around items such as generators or high duty compressors; and situate high noise plant as far away from sensitive properties as permitted by site constraints.
NV-C6	Screening to be erected around high noise activities such as pneumatic breaking and crushing
NV-C7	All tracked vehicles shall be fitted with rubber tracks and broadband reverse warning beacons
NV-C8	Pneumatic hammers shall be fitted with dampers
NV-C9	The appointed Contractor will implement best practice vibration mitigation and control methods outlined in BS 5228-1:2009+A1 2014. Part 2 – Vibration
NV-C10	Loud works occurring in proximity to Dundrum Church will temporarily cease during funeral services
Material Assets: Built Services	
MA:BS-C1	Foul Drainage - Temporary discharge of wastewater during construction utilising the existing or permitted sewerage network shall be by agreement with Irish Water. All necessary health and safety measures shall be undertaken to ensure the safety and welfare of construction personnel, the public and road users during construction of the foul infrastructure.
MA:BS-C2	Water Supply – Temporary water supply for the construction stage shall be by agreement with Irish Water. A water meter will be installed to monitor water consumption on the site during construction and to enable early detection of any potential leaks. Existing watermains which are to be abandoned shall be isolated prior to removal
MA:BS-C3	Prior to the commencement of excavations in public areas, all utilities and public services shall be identified and checked. Adequate protection measures to minimise the risk of service disruption shall be implemented in accordance with Irish Water / DLRCC Requirements.
MA:BS-C4	All excavations within the public area shall be backfilled in a controlled manner and surface re-instated to the satisfaction of the Local Authority.
MA:BS-C5	A CCTV survey of all new sewers and existing culverts in the vicinity of outfalls from the surface water drainage system shall be completed post construction to identify any possible physical defects for rectification prior to operational phase.
Material Assets: Transportation	
MA:T-C1	A Construction Stage Traffic Management Plan (CTMP) will be

	prepared by the Contractor prior to works commencing on site. The CTMP will outline measures to be taken to mitigate the impact of construction traffic on the surrounding road network. Such measures are expected to include: • Construction Staff encouraged to arrive before 7:30am and leave after 18:00pm and outside of school drop off hours; • Construction Travel Plan to be developed by appointed Contractor; • Bike parking, storage and drying areas provided on site; • Agreed haulage routes along designated HGV routes, taking into account other active developments in the vicinity at the time of construction eg. Central Mental Hospital; • Wheel wash facilities and road sweeping; • Conducting all loading of excess material within the site boundary; • Limited parking on site for staff with majority required to arrive by sustainable means; • Construction signage at all entrances and exits; • HGVs carrying soil to be fully sheeted; • HGVs inspected for dirt and mud before exiting onto public road network; • Control / consolidating of deliveries where possible; and entrances and exits manned by flag men during deliveries.
MA:T-C2	Construction delivery vehicles will be prohibited from parking along public roads. Parking will be provided on site for staff.
MA:T-C3	All construction vehicles will access the site from Dundrum Bypass. There will be no vehicular access to the site from Main Street.
Material Assets: Resource & Waste Management	
MA:RWM-C1	A dedicated C&D Waste Manager shall be appointed by the Contractor to manage all demolition and Construction Wastes
MA: RWM-C2	Demolition and Construction Wastes shall be managed in accordance with the Site-Specific Construction and Demolition Waste Management Plan.
MA: RWM-C3	The soft stripping of buildings prior to demolition shall identify materials that can be re-used
MA: RWM-C4	Excavated rock, if suitable, shall be re-used on-site for pile pads
MA: RWM-C5	An On-Site Construction Waste Compound for the segregation of construction and demolition wastes shall be established
MA: RWM-C6	Tool-Box talks on waste reduction, reuse, recycling and segregation shall be provided to all site staff and Contractors
MA: RWM-C7	Routine Waste Management Audits shall be conducted on a weekly basis.
MA: RWM-C8	Waste Collection Permits and Letters of acceptance from Waste Acceptance Facilities shall compiled and made available to DLRCC, if requested, on the appointment of Contractors
MA: RWM-C9	All waste loads leaving the site shall be digitally recorded
MA: RWM-C10	A monthly waste out record shall be compiled and made available to DLRCC if requested.
MA: RWM-C11	All vehicles exiting the site carrying waste materials shall display a valid National Waste Collection Permit number and be verified at the site exit gate
Cultural Heritage	
CH-C1	Should archaeological material be identified and subject to approval

	from the statutory authorities, the remains will be preserved by record through archaeological excavation. All findings will be submitted to the National Monuments Service (NMS) of the Department of Housing, Local Government and Heritage and the National Museum of Ireland.
CH-C2	The strip out of a structure scheduled for demolition will be inspected by an archaeologist to identify, record and remove any surviving historic fabric of an archaeological interest.
CH-C3	The developer will make provision to allow for and to fund any archaeological investigation that will be required during the development. Adequate financial provision will also be made available for related post-excavation work, the conservation of artefacts and the publication of any archaeological excavation results.
CH-C4	As part of the licensing requirement, a report will be lodged with the relevant statutory authorities on the results of archaeological monitoring and any archaeological investigation that occurs on site.
CH-C5	The developer will appoint a Conservation Architect to oversee the Works to No.'s 1-3 Glenville Terrace. These works shall adhere to the *Conservation Method Statement for the proposed repair of No.'s 1-3 Glenville Terrace* contained in Appendix 13B of the EIAR (or updated report prepared by a suitably qualified Conservation Architect).
CH-C6	Where possible, existing fabric of No. 1 Glenville Terrace such as masonry, brick, slates, joinery should be retained for reuse and put back in the reconstructed return, thus retaining as much of the existing fabric as possible
CH-C7	Removed joinery from No.'s 2 and 3 Glenville Terrace should also be retained where joinery is to be made good. A profile of existing cornices will be taken where cornices are to be made good.
CH-C8	The 20th century returns to No.'s 2 and 3 Glenville Terrace are to be taken down carefully to avoid the risk of damage to the main portions of each house.
CH-C9	The hall door to No.2 Glenville Terrace is to be retained as a false door, thus ensuring that the intervention is reversible.
CH-C10	Building materials from the buildings being demolished such as slates, should be salvaged for repair works to No.'s 1-3 Glenville Terrace.
Landscape	
L -C1	Hoarding is to be well maintained to screen ground level construction activity.

15.5.2 Operational Phase - Mitigation

Biodiversity	
B-O1	The attenuation and surface water connections will be inspected upon completion by the project ecologist.
Land And Soils	
LS-O1	All waste generated by the everyday operation of the development should be stored within the designated collection areas, provide with concrete slab and the areas drained to foul discharge point
LS-O2	Foul pumping station and balance tank to be designed, constructed and tested in accordance with Irish Water Wastewater-Code-Of-Practice as water tight for both ingress of groundwater and egress of Wastewater.
Water	
W-O1	Incidental surface run-off from lower ground floor car parks, compactor units and bin stores / service yard areas will be discharged into the foul

	drainage system. Grit / petrol / oil separators to be provided in all of the above areas.
W-O2	Petrol /oil separators will be provided for surface water drains receiving flows from the site service road and loading yard
W-O3	Stormwater attenuation shall be provided with flow controls to ensure that the rate of discharge of surface water runoff is limited to greenfield run-off rates at each outfall from the site in accordance with the Greater Dublin Regional Code of Practice for Drainage Works, the Greater Dublin Strategic Drainage Strategy and the local authority's Stormwater Management Policy.
W-O4	A two-stage surface water management train incorporating sustainable drainage components in accordance with local authority's stormwater management policy will improve the water quality of surface water discharges, contributing to improved water quality in the Slang River.
W-O5	Compensatory Flood Storage volume shall be provided within the Service Road and under the Lower Ground Floor of the proposed development in order to ensure that there is no increase in flood risk to any properties in the area.
W-06	Electrical substations and control kiosks will have a floor level of 46mOD or higher in order to avoid risk of flood ingress in a 0.1%AEP flood event. This minimum level includes an allowance for freeboard and climate change.
Air And Climate	
AC-01	Energy Efficiency – All residential units shall be designed and constructed in accordance with The Irish Building Regulations Technical Guidance Document L – Conservation of Fuel & Energy – Dwellings amended in 2021 includes requirements for all residential dwellings to be "Nearly Zero Energy Buildings" (NZEB's)
AC-02	U-values for floor and roof will exceed the building regulation backstops
AC-03	Solar Photovoltaic Panels shall be installed at roof level on all buildings, where possible
AC-04	Extensive planting and green areas throughout the development to enhance local biodiversity
AC-05	E-Vehicle charging points to be provided in line with the requirements of the Dun Laoghaire Rathdown County Development Plan (2022-2028) and Part L Building Regulations.
AC-06	Install an odour control unit on the foul pumping station in accordance with Irish Water standards.
AC-07	Hot water and heating to be generated by heat pumps
Noise And Vibration	
NV-01	All external mechanical plant shall be enclosed in louvered structures
Material Assets: Built Services	
MA:BS-O1	Foul Drainage- The discharge from the development will be limited to 2 times Dry Weather Flow (DWF) by means of a pumped connection from a foul pumping station serving the entire development. This pumping station shall incorporate a balancing/emergency holding tank designed in accordance with Irish Water Code of Practice - Wastewater Infrastructure.
MA:BS:02	The on-site wastewater pumping station shall be maintained by a specialist contractor under a maintenance contract
MA:BS:03	An odour control unit shall be installed at the wastewater pumping station to mitigate potential odour nuisance. The specification of the

	odour control unit shall conform to Irish Water specifications
Material Assets: Transportation	
MA:T-O1	The developer / management company will implement the measures included in the *Mobility Management Plan* (prepared by Systra and submitted with the application) as follows: • Appointment of Mobility Manager; • Welcome Travel Pack with details of local transport network, maps of local amenities, detail of on-site facilities and incentivises for sustainable travel. • Provision of information on locations of public transport stops, routes, timetables, walking times to main public transport facilities, etc. • Marketing and Travel information and Personalised Travel Planning to be provided by Mobility Manager; • Walking and Cycling Challenges and promotion events; and • A Car sharing club will be provided on site exclusively for the use of residents.
Material Assets: Resource & Waste Management	
MA: RWM -O1	The communal domestic waste storage areas shall be managed by the Facilities Management Company.
MA: RWM -O2	Domestic and Commercial Wastes shall be managed in accordance with the Operational Waste Management Plan
MA: RWM -O3	Residents shall be provided with information by the Facilities Management Company on the correct segregation and disposal of waste in order to minimise the generation of mixed waste streams and to increase recycling rates.
MA: RWM -O4	All residential units shall include a 3-bin waste segregation at source waste bin system.
MA: RWM -O5	The communal waste storage areas shall include WEEE and waste battery storage units.
MA: RWM -O6	The communal waste storage areas shall be of sufficient size to allow for the contingency storage of waste
MA: RWM -O7	An annual bulky waste collection service will be provided to residents by the Facilities Management Company.
MA: RWM -O8	A dedicated retail and commercial waste storage area shall be provided for the retail, café / restaurant units and Creche. This area shall be separate from the domestic communal waste storage areas.
MA: RWM -O9	The Facilities Management Company shall maintain a record of all domestic waste produced and shall prepare an annual report for residents and DLRCC detailing how waste reduction and recycling targets are being achieved with regard to The Eastern Region Waste Management Plan.

15.5.3 Monitoring Measures

Biodiversity	
B-M1	Monitoring in relation to dust, surface water and biodiversity will be carried out by the project ecologist during the construction phase.
Land And Soils	
LS-M1	Additional waste characterisation testing to be carried out during the excavation of made ground in the vicinity of the underground storage tank, particularly in areas classified as Category 'C' – Non-Hazardous,

	17 05 04 exceeds inert WAC increases limits as identified in the OMC Waste Characterisation Assessment (Appendix 6A of the EIAR)
LS-M2	Inclinometers to be installed on temporary retaining systems to rear of Third Party Properties i.e. No.11 (Lisney), No.16/17 (Mulvey Pharmacy), the Parochial House Boundary wall and rear of the Holly Cross Church during excavation of lower ground floor adjoining the premises .
LS-M3	Daily monitoring of excavation activities, stockpiling activities in the content of an increase in silt and debris on surrounding roads.
LS-M4	Daily Water quality testing in the open section of the Slang River directly adjacent to and down stream from the site in consultation with the project ecologist.
LS-M5	Daily cleaning and monitoring of the condition and capacity of silt bags in the road gullies along the Dundrum Bypass
LS-M6	The developer must monitor construction activities to ensure compensatory flood storage volume is provided within the site until the permanent compensatory storage is operational in Zones 1 and 2.
Water	
W-M1	The Construction Environmental Management Plan (CEMP) shall include detailed provisions to avoid discharge of silt contaminated runoff or hydrocarbons. Any silt settlement ponds and chambers proposed as part of the CEMP will be monitored daily throughout the construction of the works.
W-M2	The Sustainable Urban Drainage Scheme (SuDS) and compensatory flood storage provisions will be subject to ongoing maintenance and routine inspection in accordance with an operational management plan to ensure that flow controls and SuDS features are functioning properly.
W-M3	Construction activities shall be monitored to ensure that the compensatory flood storage volume is provided within the site until the permanent compensatory storage is operational in Zones 1 and 2.
W-M4	The compensatory flood storage system will incorporate inspection chambers to confirm that there is no ingress of groundwater or surface water runoff into the below ground storage volume. These inspection chambers will also allow visual confirmation that the system has drained down after any flood event that results in a build-up of flood waters on the service road.
W-M5	Water quality testing shall be undertaken in the open section of the Slang River directly adjacent to and down-stream from the site in consultation with the project ecologist when construction works are in progress.
W-M6	Daily monitoring of the condition and capacity of silt bags in the road gullies along the Dundrum Bypass shall be undertaken during construction stage of the project with gully cleaning and silt bag replacement undertaken as necessary.
Air And Climate	
AC-M1	A programme of dust deposition and Particulate PM2.5 & PM10 monitoring shall be initiated prior to the commencement of demolition works.
Noise And Vibration	
NV-M1	A comprehensive programme of continuous live noise monitoring shall be conducted at the site boundaries in proximity to noise sensitive receptors for the duration of the construction phase. The systems shall

	be capable of transmitting live text and email alerts to nominated construction staff should a noise limit be approached or exceeded.
NV-M2	A comprehensive programme of continuous live vibration monitoring shall be conducted at structures in proximity to the site boundaries for the duration of the construction phase. The systems shall be capable of transmitting live text and email alerts to nominated construction staff if vibration levels approach or exceed the specified warning and limit values.
Material Assets: Transportation	
MA:T-M1	Vehicle movements will be monitored by the appointed site manager on a continuous basis and regular monthly progress reports will be prepared and shared with DLRCC where requested.
MA:T-M2	A mobility manager will be appointed from within the management company to ensure the implementation of the *Mobility Management Plan*. They will also be responsible for the undertaking of post occupation travel surveys and act as a point of contact for residents for all mobility and access related issues.
Material Assets: Resource & Waste Management	
MA:RWM-M1	C&D waste shall be monitored as follows: • The C&D Waste & Resource Manager will record the findings of the audits, including waste types identified, quantities of waste arising, final treatments and cost, in a report to be available to the Local Authority as required during the course of the works. • All demolition and construction waste loads leaving the site on an appropriately waste permitted vehicle shall have an associated receipt from the authorised receiving facility. o Each waste vehicle exiting the site will have a Waste Collection Permit (WCP) Number displayed on the side of the vehicle. All vehicles shall be checked by the Gate Person prior to exit. Any vehicle not displaying a WCP Number shall not be permitted to exist the site with waste materials. o A n electronic monthly record of all wastes exported from the site shall include at a minimum: o Vehicle Reg and WCP Number o Description of Waste and associated LoW Code o Name and Address of the Destination Facility and the associated Waste Permit Number o Volume/Tonnage of material delivered to the Destination Facility The monthly waste export file shall be issued to DLRCC as requested.
Cultural Heritage	
CH-M1	A programme of archaeological monitoring under licence to an archaeologist will be carried out during the site preparation stage and construction stage of the project to ascertain if there are truncated remains of an archaeological interest. This will involve the monitoring of ground reduction and earthmoving activity throughout the site including the removal of topsoil and subsequent stratigraphy.

15.6 CONCLUSION

The EIAR has considered the likely, significant, adverse effects of the proposed project on the receiving environment.

Mitigation measures (see Chapter 15) are included, to avoid and / or reduce impacts on the environment where considered necessary. This includes mitigation measures incorporated into the design of the proposed development.

The EIAR concludes that there are no material or significant environmental issues arising from the project which would prohibit the competent authority from issuing consent for the development.

APPENDICES

APPENDIX 5A : WINTER BIRD AND FLIGHTLINE SURVEYS

Prepared By Hugh Delaney

(January 2022)

In January 2022 two winter bird/flightline surveys were conducted at the Dundrum Village Centre, adjacent Main Street, Dundrum, Co Dublin, by Hugh Delaney. High Delaney is an Ecologist (Birds primarily) having completed work on numerous sites with ecological consultancies over 10+ years. Hugh is local to the Dun Laoghaire-Rathdown area in Dublin and is especially familiar with the bird life and its ecology in the environs going back over 30 years.

Winter Bird Survey Methodology
Winter bird surveys are conducted from soon after sunrise until late in the afternoon before sunset, the site is monitored throughout the day and all bird species utilizing the site recorded, including species flying through overhead. Checks are also made on suitable habitat nearby or adjacent the site for comparative purposes and to monitor any interchange of birds between sites. Target species (species of more special interest) utilizing the site will be mapped and estimates of the time these species frequented the site recorded. Specific emphasis was placed on establishing the presence of Brent Geese passing over or close to the site, with dedicated observation (especially early and late in day when Geese would be most likely recorded passing through site on route to sites from the coast). On survey was conducted on January 12th and a second a week later on January 19th. Dublin Bay tides (North Wall) are recorded for the purposes of this possibly being a factor with any sightings recorded.

Site location and description
The site is located just off the Main Street in Dundrum is an urban site comprising a shopping centre structure (approximately 20m in height) and adjacent tarmacadam carpark with a few trees and shrubbery around the border. The surrounding area is a well-developed urban environment.

The vantage points (Figure 1) provided optimal viewing over entire site, with the elevation of the adjacent Dundrum Luas Station viewpoint especially beneficial. Observations were switched at intervals between the three vantage points, with most time spent at the vantage points at Luas Station and Ulster bank below the station as these were considered the most optimal.

Survey results
<u>January 12th, 2022</u>
Sunrise- 08.35hrs/Sunset 16.32hrs. Weather – Wind F1 Southwest, Cloud 4/8, Dry, 10c, Excellent visibility. On-site 08.20hrs – 16.40hrs.
Dublin Bay tides (North Wall) 00.48hrs (1.4m), 07.26hrs (3.2m), 13.10hrs (1.6m), 19.38hrs (3.3m).
Species recorded – Rook, Jackdaw, Magpie, Blackbird, Starling, Feral Pigeon, Dunnock, Pied Wagtail, Grey Wagtail, Herring Gull, Black-headed Gull, Hooded Crow, Woodpigeon.

08.20hrs-12.30hrs – On arrival on site optimal vantage points were established (best at northeast side of site). Site was boundary was circled on foot several times during morning, with continual checking of overhead passing species. Herring Gull and Black-headed Gull were the most frequent species noted over site, maximum counts of 8-10 Herring Gulls around site at one time. Small numbers of Black-headed Gulls recorded, maximum counts of 5 or less. Feral Pigeon and occasional small flocks of Starling noted passing over site. No other Target species recorded.

12.30hrs-16.40hrs – Vantage point observations made from the northeast locations made for most of afternoon and continually from Luas Station from 14.00hrs to finish. Similar numbers of Herring and Black-headed Gulls recorded with a notable increase from 15.00hrs of Black-headed Gulls (c.100) passing east (likely birds returning to Dublin Bay to roost). Small numbers of Starling and Feral Pigeon also passing over site. Corvids noted on Shopping Centre roof and around car park with Jackdaw being commonest, maximum count of 15 birds noted. A few of the other passerine species recorded mostly foraging around car park area. No other species recorded.

<u>January 19th, 2021</u>

Sunrise- 08.27hrs/Sunset 16.44hrs. Weather – Wind F4 Northwest, Cloud 6/8, Dry, 9c, Excellent visibility. On-site 08.15hrs – 16.45hrs.
Dublin Bay tides (North Wall) 00.15hrs (3.69m), 05.49hrs (1.08m), 12.27hrs (3.95m), 18.19hrs (0.89m).
Species recorded – Rook, Jackdaw, Magpie, Song Thrush, Mistle Thrush, Blackbird, Starling, Feral Pigeon, Dunnock, Pied Wagtail, Grey Wagtail, Herring Gull, Black-headed Gull, Hooded Crow, Woodpigeon.
08.15hrs-12.30hrs – Most of morning spent overlooking site from the northeast vantage points, and a circuit of site made in late morning. Again, Herring Gull (< 5 at a time usual) and Black-headed Gull (singles or several) observed over site in small numbers and occasionally landing onto shopping centre roof. Feral Pigeon and Starling observed passing through site in small numbers with Feral Pigeon also observed on the roof of the structure. A Rowan Tree heavily laden with berries attracted some Thrush species on the main street opposite Bank of Ireland. Otherwise, quiet with no other target species noted.

12.30hrs-16.45hrs – All three vantage points utilized, and several circuits of site made, Herring Gull and Black-headed Gull again in small numbers with once again a late afternoon passage noted of both species east over the site (likely heading to roost in Dublin Bay) with c.30 Herring and c.80 Black-headed noted from 15.00hrs-16.45hrs. Feral Pigeon, Starling again occasionally passing over site and the dominate corvid species noted being Jackdaw. No other species noted.

Figure 1. Vantage points selected are marked in yellow

APPENDIX 5B: BAT FAUNA IMPACT ASSESSMENT

Bat Fauna Survey

22nd March 2022

Prepared by: Bryan Deegan (MCIEEM) of Altemar Ltd.
RE: DUNDRUM VILLAGE STRATEGIC HOUSING DEVELOPMENT (SHD)
Applicant: Dundrum Retail GP DAC (Acting for and on behalf of Dundrum Retail Limited Partnership)

Altemar Ltd., 50 Templecarrig Upper, Delgany, Co. Wicklow. 00-353-1-2010713. info@altemar.ie
Directors: Bryan Deegan and Sara Corcoran
Company No.427560 VAT No. 9649832U
www.altemar.ie

SUMMARY

Structure:	The subject site consists of an existing shopping centre, associated car parks, residential and retail units, and a small greenspace.
Location:	Dundrum, Co. Dublin.
Bat species present:	None Roosting. A single Soprano Pipistrelle was noted foraging in the area.
Proposed work:	Proposed Strategic Housing Development (SHD) at Dundrum, Co. Dublin.
Impact on bats:	Increased lighting on site may impact foraging. However, onsite foraging activity is extremely low and no significant effects are foreseen from the proposed development. The lighting strategy has been prepared in consultation with Altemar and has been designed to be sensitive to bats. No trees of bat roosting potential are noted on site. A pre-demolition of buildings survey for bats will be carried out. No significant residual impact on bats is foreseen during the construction or operation of the proposed development.
Survey by:	Bryan Deegan MCIEEM
Survey date:	15th & 17th September 2021.

Receiving Environment

Background

Dundrum Retail GP DAC (acting for and on behalf of Dundrum Retail Limited Partnership) intend to apply for planning permission for a proposed Strategic Housing Development at Dundrum, Co. Dublin.

The development comprises 11no. urban blocks arranged around the central pedestrian spine and a series of 4 courtyards corresponding to 4 separate "zones" or character areas.

The buildings range in height from 4-5 storeys on Main Street to 9-16 storeys to the Dundrum Bypass.

The development will consist of c. 881no. residential units. This development also includes a foodstore, retail, café/restaurant and a creche are at ground floor level, fronting Main Street, as detailed in the Schedule of Accommodation included with this submission.

The development will include the demolition of all existing structures on the site with the exception of No.'s 1-3 Glenville Terrace which will be refurbished.

Vehicular and cycle parking is provided below podium with visitor cycle parking spaces in the public realm. Vehicular access to serve the proposed development will be provided via Dundrum Bypass. The existing vehicular entrance on Main Street will be closed.

Pedestrian connections and linkages are proposed through the site, forming connections that are not currently possible from within the site to Main Street; to the south via Church Square and Ballinteer Road Bridge; and west via the proposed new Sweetmount Bridge connecting Main Street to the residential communities west of the Bypass.

The proposed site outline and location is demonstrated in Figure 1. In order to provide additional information in relation to the proposed project further information on the potential arboricultural impact and the lighting design have been provided.

Competency of Assessor

This report has been prepared by Bryan Deegan MSc, BSc (MCIEEM). Bryan has over 26 years of experience providing ecological consultancy services in Ireland. He has extensive experience in carrying out a wide range of bat surveys including dusk emergence, dawn re-entry and static detector surveys. He also has extensive experience reducing the potential impact of projects that involve external lighting on Bats. Bryan trained with Conor Kelleher author of the Bat Mitigation Guidelines for Ireland (Kelleher and Marnell (2007)) and Bryan is currently providing bat ecology (impact assessment and enhancement) services to Dun Laoghaire Rathdown County Council primarily on the Shanganagh Park Masterplan. The desk and field surveys were carried out having regard to the guidance: Bat Surveys for Professional Ecologists – Good Practice Guidelines 3rd Edition (Collins, J. (Ed.) 2016) and Kelleher and Marnell (2007), Bat Mitigation Guidelines for Ireland.

Legislative Context

Wildlife (Amendment) Act 2000.

Bats in Ireland are protected by the Wildlife (Amendment) Act 2000. Based on this legislation it is an offence to wilfully interfere with or destroy the breeding or resting place of any species of bat. Under this legislation it is an offence to "*Intentionally kill, injure or take a bat, possess or control any live or dead specimen or anything derived from a bat, wilfully interfere with any structure or place used for breeding or resting by a bat, wilfully interfere with a bat while it is occupying a structure or place which it uses for that purpose.* "

Habitats Directive- Council Directive 92/43/EEC 1992 on the conservation of natural habitats and of wild fauna and flora transposed into Irish Law i.e. European Communities (Natural Habitats) Regulations, 1997 (SI No. 64/1997). Annex II of the Council Directive 92/43/EEC 1992 on the conservation of natural habitats and of wild fauna and flora (EC Habitats Directive) lists animal and plant species of Community interest, the conservation of which requires the designation of Special

Areas of Conservation (SACs); Annex IV lists animal and plant species of Community interest in need of strict protection. All bat species in Ireland are listed on Annex IV of the Directive, while the Lesser Horseshoe Bat (*Rhinolophus hipposideros*) is protected under Annex II which related to the designation of Special Areas of Conservation for a species.

Under section 23 of SI No. 64/1997 all bats are listed under the first schedule of Section 23 which makes it an offence to:

- deliberately capture a bat
- deliberately disturb a bat,
- damage or destroy a breeding site or resting place of a bat.

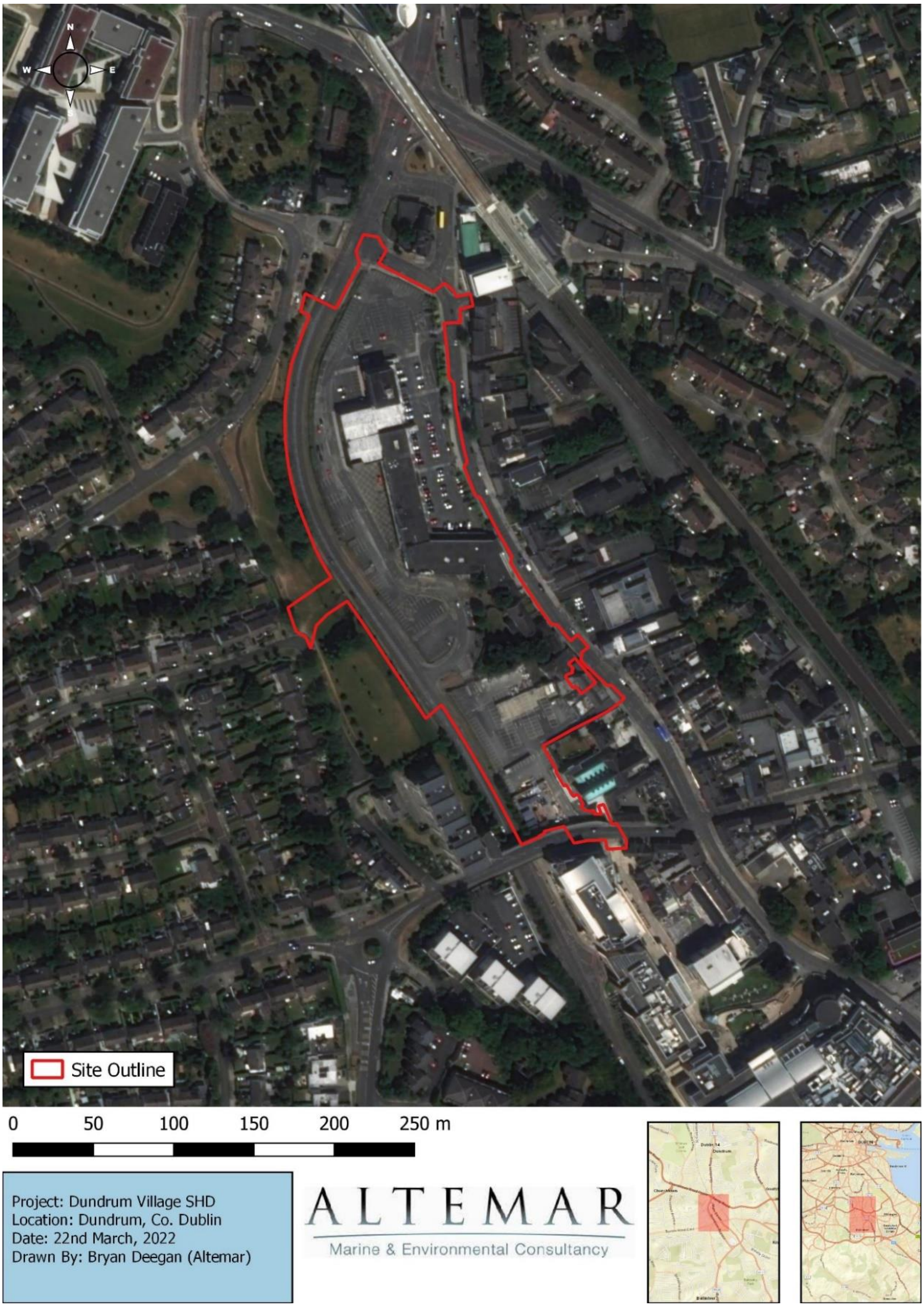

Figure 1. Outline of proposed site.

Arboricultural Assessment & Impact Report

An Arboricultural Assessment & Impact Report has been prepared by CMK Horticulture + Arborist Ltd. to accompany this planning application. This report outlines the description of trees, impact of the proposed development, and tree protection plan for the proposed development. The report states that *'the majority of the trees have been planted since the shopping centre opened in the 1970s. However, there are trees which appear to be associated with the older properties on Main Street. These trees are located in rear gardens or abandoned parcels of land to the rear of these properties.'* The report states that 68% of all the category A, B & C trees on the site will be removed. However, this includes the removal of the larger trees located to the rear of the houses on Dundrum Main Street (Figure 2).

Lighting

A Public Lighting Design Report has been prepared by Building Design Partnership Ltd. to accompany this planning application. In relation to Light Pollution and Ecology, this report outlines that *"All lighting shall be designed to minimise light pollution. By minimising light spill we will ensure that any impact on surrounding wildlife habitats is mitigated."*

The proposed lighting layout including isolines and is demonstrated in Figure 3. As can be seen from Figure 3, the proposed lighting on site will result in a lighting strategy that does not result in significant spill outside the immediate vicinity of the proposed development and adjacent habitats would not be significantly impacts. It should be noted that the site is already surrounded by significant levels of street lighting. Bat foraging may be expected where light levels are below 3 lux. Within the proposed development area these levels would be seen above roof buildings. However, in areas of low level lighting foraging may also occur particularly in landscaped areas where insects would be present.

Figure 2. Arboricultural assessment and constraints plan (Area 2)

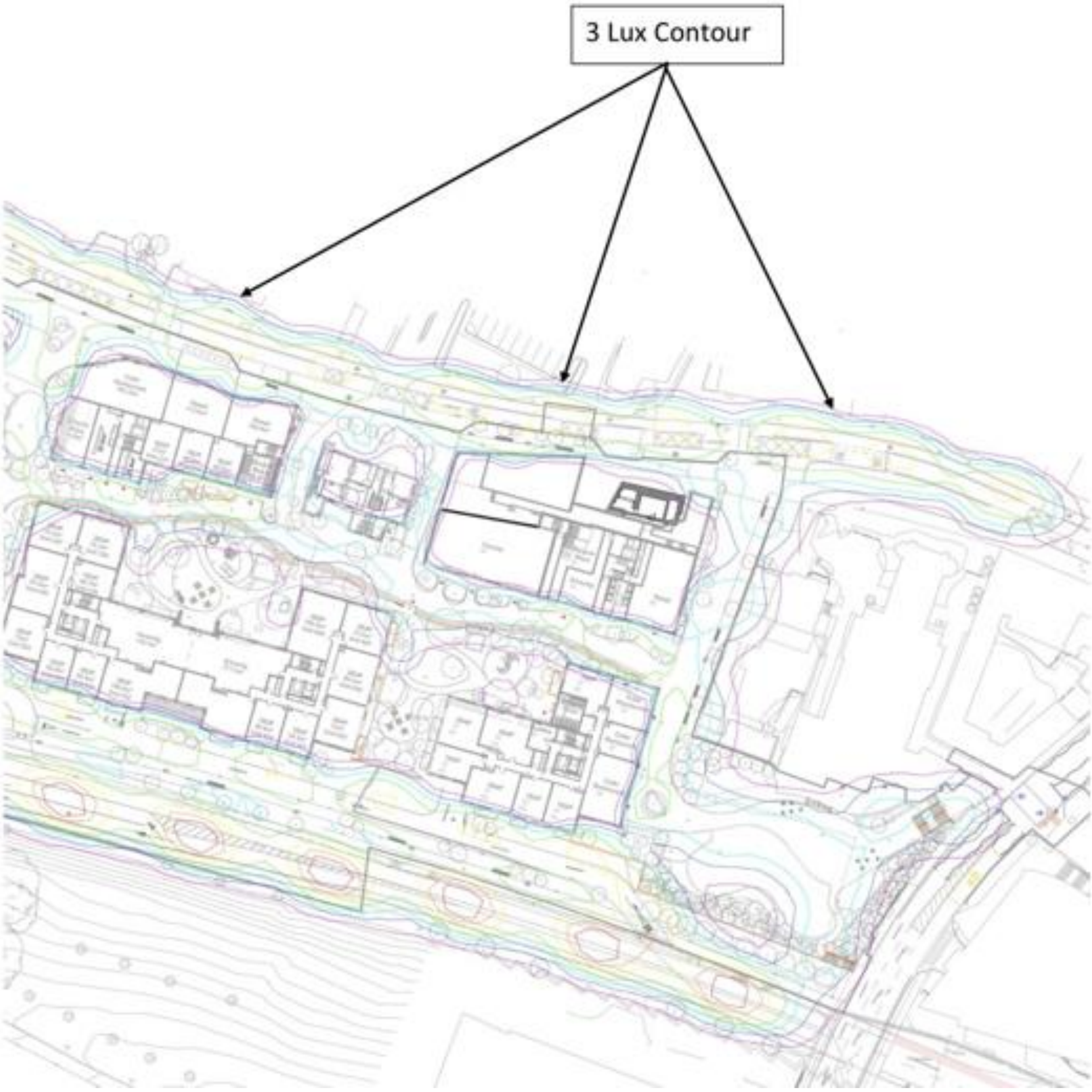

Figure 3a. Proposed public lighting layout – isolines including the 3 lux contour (blue). (Refer to Drg. (6-)E003 prepared by BDP)

Figure 3b. Proposed public lighting layout – isolines including the 3 lux contour (blue). (Refer to Drg. (6-)E003 prepared by BDP)

Bat assessment findings

Review of local bat records

The review of existing bat records (sourced from Bat Conservation Ireland's National Bat Records Database) within two 2km^2 grids (Reference grids O12U & O12T) encompassing the study area reveals that three of the nine known Irish species have been observed locally (Tables 1 & 2). The National Biodiversity Data Centre's online viewer was consulted in order to determine whether there have been recorded bat sightings in the wider area. This is visually represented in Figures 4 - 7. The following species were noted in the wider area: Brown Long-eared Bat (*Plecotus auritus*), Daubenton's Bat (*Myotis daubentonii*), Whiskered Bat (*Myotis mystacinus*), Natterer's Bat (*Myotis nattereri*), Nathusius's Pipistrelle, (*Pipistrellus nathusii*), Lesser Noctule (*Nyctalus leisleri*), Soprano Pipistrelle (*Pipistrellus pygmaeus*), and Pipistrelle (aggregate of Sorpano and Common pipistrelle (*Pipistrellus pipstrellus sensu lato*) (Figures 5 – 8).

Table 1: Status of bat species within O12U 2km^2 grid

Species name	Record count	Date of last record	Note
Lesser Noctule (*Nyctalus leisleri*)	2	04/09/2003	National Bat Database of Ireland
Pipistrelle (*Pipistrellus pipistrellus sensu lato*)	3	15/04/2011	National Bat Database of Ireland
Soprano Pipistrelle (*Pipistrellus pygmaeus*)	3	15/04/2011	National Bat Database of Ireland

Table 2: Status of bat species within O12T 2km^2 grid

Species name	Record count	Date of last record	Note
Lesser Noctule (*Nyctalus leisleri*)	3	18/08/2003	National Bat Database of Ireland
Pipistrelle (*Pipistrellus pipistrellus sensu lato*)	6	01/10/2009	National Bat Database of Ireland
Soprano Pipistrelle (*Pipistrellus pygmaeus*)	4	01/09/2004	National Bat Database of Ireland

Figure 4. Brown Long-eared Bat (*Plecotus auritus*) (yellow), Daubenton's Bat (*Myotis daubentonii*) (purple), and both Brown Long-eared Bat and Daubenton's Bat (orange) (Source NBDC) (Site – red circle)

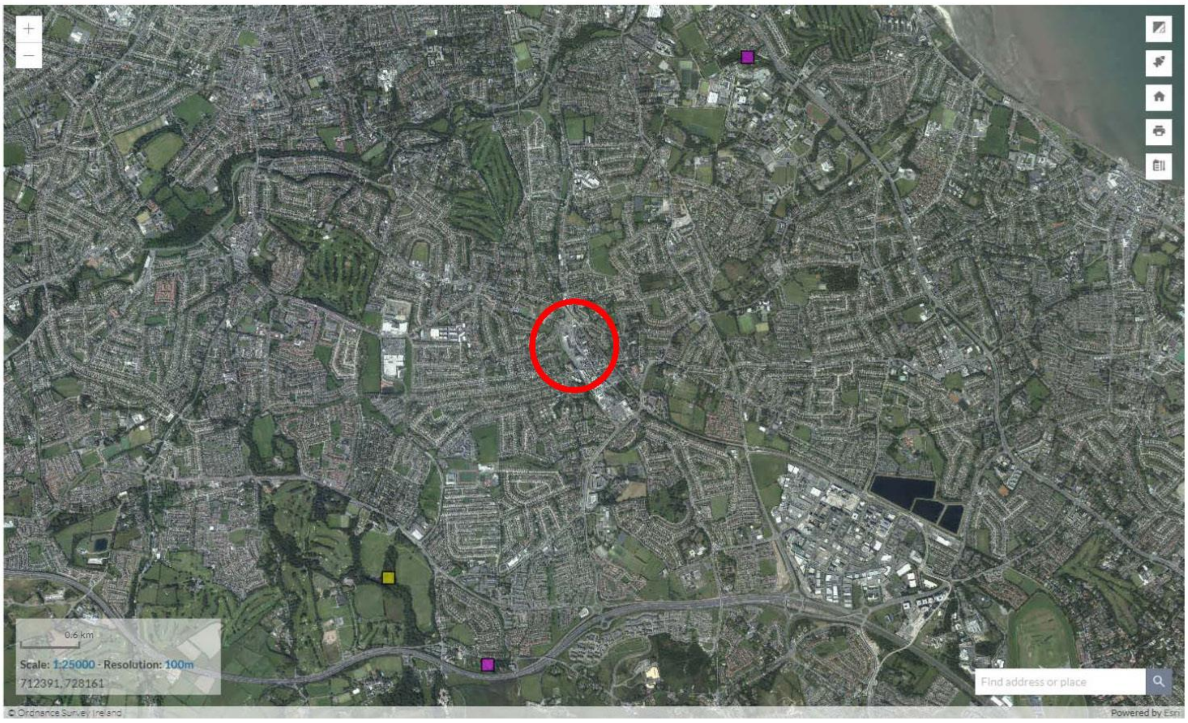

Figure 5. Whiskered Bat (*Myotis mystacinus*) (yellow) and Natterer's Bat (*Myotis nattereri*) (purple) (Source NBDC) (Site – red circle)

Figure 6. Nathusius's Pipistrelle (*Pipistrellus nathusii*) (yellow) and Lesser Noctule (*Nyctalus leisleri*) (purple) and both Nathusius's Pipistrelle and Lesser Noctule (orange) (Source NBDC) (Site – red circle)

Figure 7. Pipistrelle (*Pipistrellus pipistrellus sensu lato*) (purple) (Species aggregate), Soprano Pipistrelle (*Pipistrellus pygmaeus*) (yellow), and both Pipistrelle and Soprano Pipistrelle (orange) (Source NBDC) (Site – red circle)

Bat survey

This report also presents the results of site visits by Bryan Deegan (MCIEEM) on 15th & 17th September 2021, (building inspections, tree roosting potential and bat emergent/foraging surveys) during which all on site buildings were assessed for bat roosts and trees were assessed for bat roosting potential. At dusk, bat detector surveys (emergent and foraging) were carried out onsite using an *echometer touch 2 pro android* detector to determine bat activity. An Anabat Express Passive Bat Detector was also placed on site.

Tree Roosting Potential Survey

The survey on the 15th September also reviewed trees of bat roosting potential on site. No trees of bat roosting potential were present within the development site.

Building Inspections

Buildings on site were inspected both internally and externally for evidence of bat activity and bat roosting. No evidence of bat roosting or bat activity were noted within the buildings present within the development site.

Survey constraints

The detector surveys were undertaken during the active bat season. Weather conditions were good with mild temperatures greater than 10°C. Winds were light and there was no rainfall during the surveys.

Detector survey

As seen in Figure 8, bat activity on site was very low, in the vicinity of the trees to the rear of buildings on Main Street, in specific places where insects are likely to be plentiful and have the ability to swarm. A single species was noted on site :

- Soprano pipistrelle (*Pipistrellus pygmaeus*)

The static detector also noted the low level of activity on site with a Soprano pipistrelle (*Pipistrellus pygmaeus*) being noted. No bats were detected emerging from any of the onsite trees.

Potential impacts of proposed redevelopment on bats

No bats emerging onsite trees or buildings were observed. No trees on site have the potential for bat roosting. No bat roosting was noted on site. Increased lighting on site may impact foraging. However, onsite foraging activity is extremely low and no significant effects are foreseen from the proposed development. The lighting strategy has been prepared in consultation with Altemar Ltd. and has been designed to be sensitive to bats. No significant impacts on bats are foreseen in relation to the proposed development.

Mitigation measures

No trees of bat roosting potential are noted on site. A pre-demolition of buildings survey for bats will be carried out. No significant residual impact on bats is foreseen wither during the construction or operation of the proposed development.

Predicted and residual impact of the proposal

No significant residual impact on bats is foreseen during the construction or operation of the proposed development.

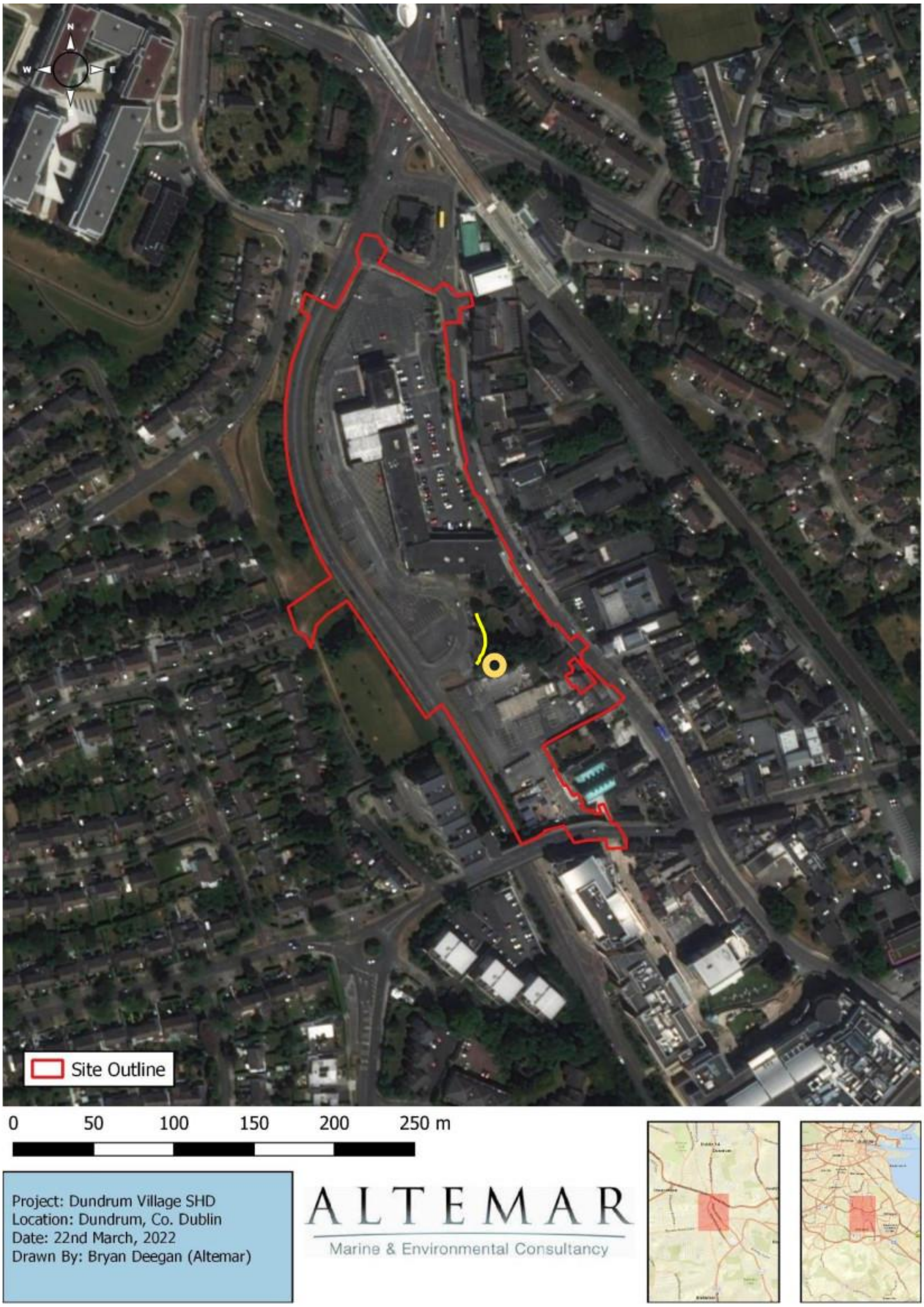

Figure 8. Bat activity on site (brief foraging of Soprano pipistrelle-yellow) and location of static bat detector (orange)

Legal status and conservation issues – bats

All Irish bat species are protected under the Wildlife Act (1976) and Wildlife Amendment Acts (2000 and 2010). Also, the EC Directive on The Conservation of Natural habitats and of Wild Fauna and Flora (Habitats Directive 1992), seeks to protect rare species, including bats, and their habitats and requires that appropriate monitoring of populations be undertaken. All Irish bats are listed in Annex IV of the Habitats Directive and the lesser horseshoe bat *Rhinolophus hipposideros* is further listed under Annex II. Across Europe, they are further protected under the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention 1982), which, in relation to bats, exists to conserve all species and their habitats. The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention 1979, enacted 1983) was instigated to protect migrant species across all European boundaries. The Irish government has ratified both these conventions.

All Irish bats are listed in Annex IV of the Habitats Directive and the lesser horseshoe bat is further listed under Annex II.

The current status and legal protection of the known bat species occurring in Ireland is given in the following table.

Common and scientific name	Wildlife Act 1976 & Wildlife (Amendment) Acts 2000/2010	Irish Red List status	Habitats Directive	Bern & Bonn Conventions
Common pipistrelle *Pipistrellus pipistrellus*	Yes	Least Concern	Annex IV	Appendix II
Soprano pipistrelle *P. pygmaeus*	Yes	Least Concern	Annex IV	Appendix II
Nathusius pipistrelle *P. nathusii*	Yes	Not referenced	Annex IV	Appendix II
Leisler's bat *Nyctalus leisleri*	Yes	Near Threatened	Annex IV	Appendix II
Brown long-eared bat *Plecotus auritus*	Yes	Least Concern	Annex IV	Appendix II
Lesser horseshoe bat *Rhinolophus hipposideros*	Yes	Least Concern	Annex II Annex IV	Appendix II
Daubenton's bat *Myotis daubentonii*	Yes	Least Concern	Annex IV	Appendix II
Natterer's bat *M. nattereri*	Yes	Least Concern	Annex IV	Appendix II
Whiskered bat *M. mystacinus*	Yes	Least Concern	Annex IV	Appendix II
Brandt's bat *M. brandtii*	Yes	Data Deficient	Annex IV	Appendix II

Also, under existing legislation, the destruction, alteration or evacuation of a known bat roost is a notifiable action and a derogation licence has to be obtained from the *National Parks and Wildlife Service* before works can commence. It should also be noted that any works interfering with bats and especially their roosts, including for instance, the installation of lighting in the vicinity of the latter, may only be carried out under a licence to derogate from Regulation 23 of the Habitats Regulations 1997, (which transposed the EU Habitats Directive into Irish law) issued by NPWS. The details with regards to appropriate assessments, the strict parameters within which derogation licences may be issued and the procedures by which and the order in relation to the planning and development regulations such licences should be obtained, are set out in Circular Letter NPWS 2/07 "*Guidance on Compliance with Regulation 23 of the Habitats Regulations 1997 - strict protection of certain* *species/applications for derogation licences*" issued on behalf of the Minister of the Environment, Heritage and Local Government on the 16th of May 2007.

Furthermore, on 21st September 2011, the Irish Government published the European Communities (Birds and Natural Habitats) Regulations 2011 which include the protection of the Irish bat fauna and further outline derogation licensing requirements re: European Protected Species.

References

Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) 1982

Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention) 1979

EC Directive on The Conservation of Natural habitats and of Wild Fauna and Flora (Habitats Directive) 1992

European Communities (Birds and Natural Habitats) Regulations 2011 Government of Ireland, Dublin

Kelleher, C. and Marnell, F. 2007 *Bat Mitigation Guidelines for Ireland – Irish Wildlife Manuals No. 25*. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin

Marnell, F., Kingston, N. and Looney, D. 2009 *Ireland Red List No. 3: Terrestrial Mammals.* National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin

Wildlife Act 1976 and Wildlife Amendment Acts 2000 and 2010. Government of Ireland

Bat Surveys for Professional Ecologists: Good Practice Guidelines (Collins, 2016) https://cdn.bats.org.uk/pdf/Resources/Bat_Survey_Guidelines_2016_NON_PRINTABLE.pdf?mtime=20181115113931&focal=none

Bat Mitigation Guidelines for Ireland (NPWS, 2006) https://www.npws.ie/sites/default/files/publications/pdf/IWM25.pdf

Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes (NRA, 2006).

https://www.tii.ie/technical-services/environment/planning/Best_Practice_Guidelines_for_the_Conservation_of_Bats_in_the_Planning_of_National_Road_Schemes.pdf

APPENDIX 6A: SUMMARY GROUND INVESTIGATIONS REPORT
(AGL Consulting)

DUNDRUM VILLAGE
STRATEGIC HOUSING DEVELOPMENT

SUMMARY GROUND INVESTIGATION REPORT

for

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January 2022

Document Approval Form

DUNDRUM VILLAGE
STRATEGIC HOUSING DEVELOPMENT

SUMMARY GROUND INVESTIGATION REPORT

Revision	Description	Date	Notes
Rev 0	Summary GIR	28/01/2022	First issue
Rev 1	Summary GIR	31/01/2022	Reduced report

Document No:	**21-157-R03**	
Made:	Luca Mauri	Luca Mauri
Checked:	Dr David Gill	David Gill

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DUNDRUM VILLAGE SCHEME PHASE II

SUMMARY GROUND INVESTIGATION REPORT

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Tables

DUNDRUM VILLAGE
STRATEGIC HOUSING DEVELOPMENT

GROUND INVESTIGATION REPORT

1 INTRODUCTION

AGL Consulting was requested by TJ O'Connor & Associates (TJOC) to interpret the ground investigation information for the proposed Dundrum Village Scheme Phase 2 in Dundrum, Dublin and to prepare a Ground Investigation Report (GIR) on the findings.

It is understood that the proposed development will replace the existing Old Dundrum Shopping centre and will consist of up to 16 storey buildings with a mix of residential and retail units and a Lower Ground Floor for car parking, storage units and plant/ancillary rooms.

The site location is shown in Figure 1-1, while an overview of the site is presented in Figure 1-2.

This report presents the findings of the desk study and available ground investigation information along with a brief interpretation of the ground and groundwater conditions on the site as well as the main geotechnical design and construction considerations for the potential development. Emphasis will be given to the foundations for the proposed buildings and the retaining wall that will be constructed along the Main Street as part of the temporary enabling works.

1.1 Site description

The site is located in Dundrum on the grounds of the existing Old Village Centre which consists of low-rise rise (max four-storey) commercial and retail buildings and paved areas including car parks. The site is bound to the east and north by Dundrum Main Street, to the south by a church site and Ballinteer Road and to the west by the Dundrum Bypass.

The existing ground level rises from + 44.5mOD in the north part of the site to + 51.0mOD in the south-east part.

1.2 Geotechnical Category of project

The development is considered a conventional structure and foundations with no exceptional risk or difficult soil or loading conditions. Therefore, the project is classified as Geotechnical Category 2 in accordance with IS EN 1997-1:2005 and the Irish National Annex.

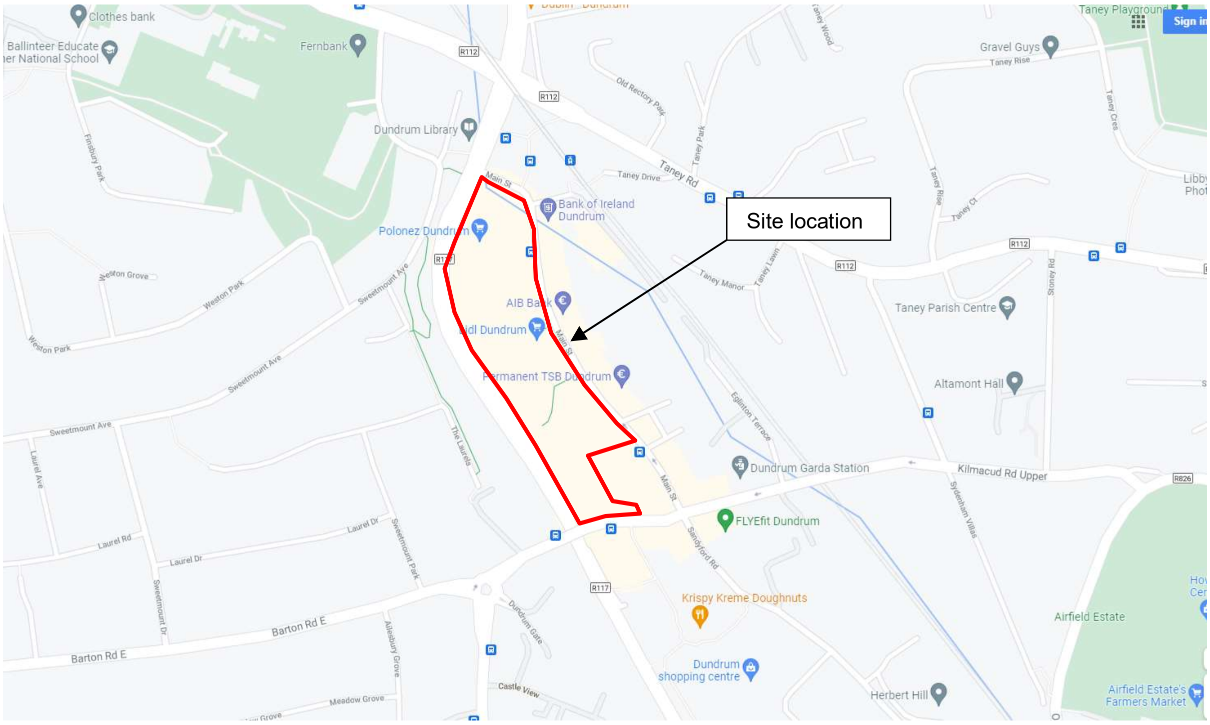

Figure 1-1: Site location of Dundrum Village Scheme Phase II (Google Maps, 2021)

Figure 1-2: Aerial photograph of the site (Google Maps, 2021)

2 INFORMATION PROVIDED

The following information was provided to AGL or is held in the AGL archives from involvement in previous phases of development at the site. The original ground investigation reports are still relevant as no basement development has occurred on the site or in the vicinity of the site since they were carried out.

Documents

- BMA Geoservices Ltd, Report titled "Geotechnical Interpretative Report – Rock" dated February 2006.
- AGL Consulting, Report titled "Interpretative Report on Geotechnical Aspects of the Dundrum Town Centre Phase II", dated May 2005.

Ground Investigations

- BMA Geoservices Ltd, Report titled "Geotechnical Interpretative Report – Rock" dated February 2006.
- Site Investigations Ltd, Logs of April 2004 SI exploratory points (Appendix 1 of BMA Report).
- Geotech Specialists Ltd, Factual Report No. KD4124 titled "Dundrum Village Centre – Dundrum, Co. Dublin – Report on Site Investigation" dated April 2005 (Appendix 4 of BMA Report).
- Glovers Site Investigation Ltd, Logs of February 2005 SI exploratory points of SI carried out at Sweetmount Park, Dundrum in February 2005 (Appendix 1 of BMA Report).
- Glovers Site Investigation Ltd, Report No. 06-871 titled "Dundrum Town Centre – Phase II" dated March 2007.
- IGSL Ltd, Report titled "Dundrum Village SHD", dated October 2021

Relevant Drawings

- TJ O'Connor & Associates (2021), Dwg No 16031-TJOC-XX-XX-DR0S-0008 to 0014, Rev. P01 titled 'Dundrum Phase 2 - Sections', dated 7th May 2021.
- TJ O'Connor & Associates (2021), Dwg No 16031-TJOC-XX-XX-DR0S-0009 to 0014, Rev. P01 titled 'Dundrum Phase 2 – Sections Sheet 2', dated 31th May 2021.
- TJ O'Connor & Associates, Dwg No 16031-TJOC-XX-XX-DR-C-0023, titled 'Dundrum Phase 2 – Existing Ground Investigations', dated 25th January 2022.
- TJ O'Connor & Associates, Dwg No 16031-TJOC-XX-XX-DR-C-0024, titled 'Dundrum Phase 2 – Proposed Ground Investigations', dated 29th September 2021.

3 THE PROPOSED DEVELOPMENT

An overview of the plan layout of the Lower Ground Floor of the proposed development is shown on Figure 3-1. Figure 3-2 shows a cross-section of the development to illustrate the Lower Ground Floor and foundation arrangements. The finished floor level of the single-storey Lower Ground Floor ranges from +46.0 to +47mOD.

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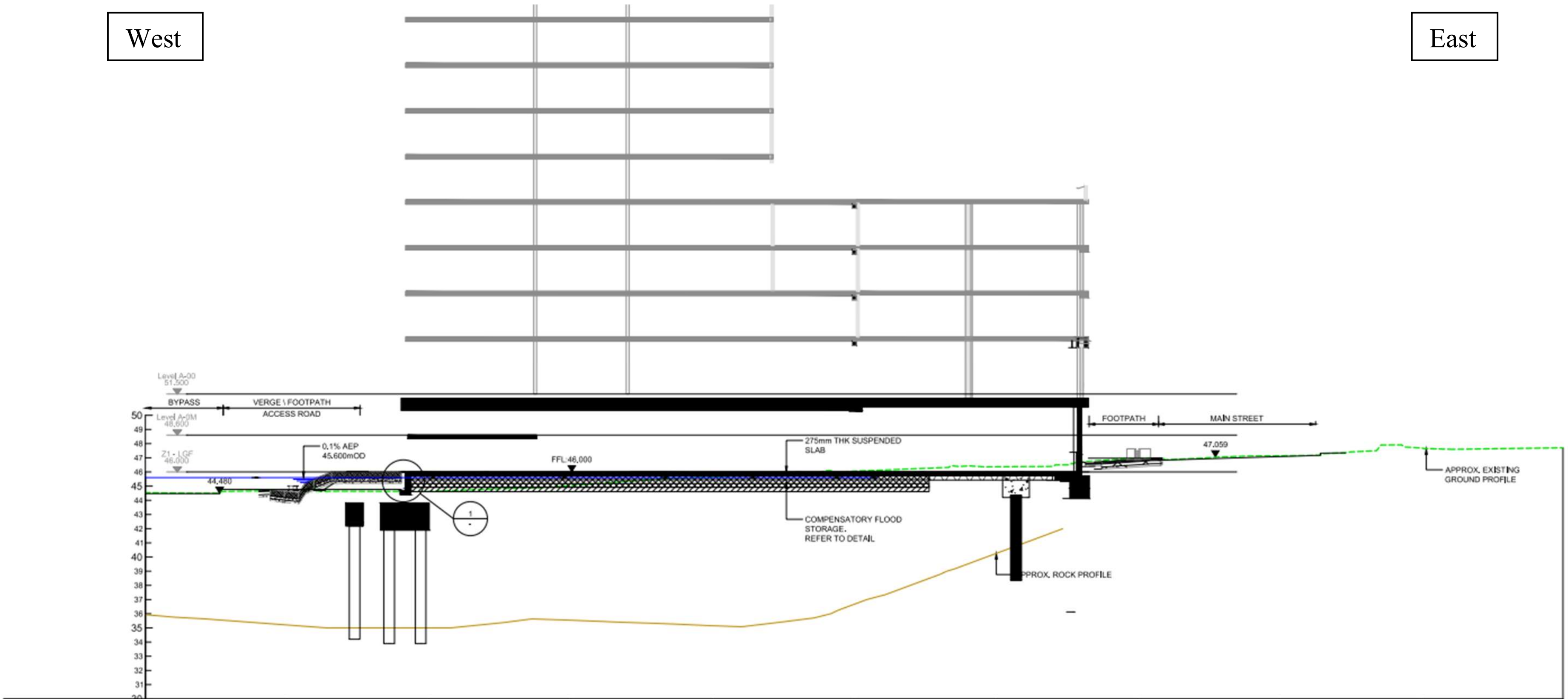
Figure 3-1: Proposed plan layout (TJOC, Dwg titled ''Foundations - retaining walls and piling layout)



EXISTING LEVEL	44,546	44,712	44,632	45,041	45,649	46,060	46,368	46,958	47,149	47,691	47,708
PROPOSED LEVELS			46,000	46,000	46,000	46,000	46,000				
ROCK PROFILE	35,932	35,207	35,000	35,542	35,155	36,668	40,248				
CHAINAGE		10,000	20,000	30,000	40,000	50,000	60,000	70,000	80,000	90,000	

BUILDING SECTION 1 - LONGSECTION
SCALE: 1:200 HORIZONTAL,1:200 VERTICAL

Figure 3-2: Cross Section A-A of the proposed development showing the lower ground floor and foundations (TJOC dwg 16031-TJOC-XX-XX-DR0S-0010)

4 DESK STUDY

A desk study of the site was carried out for the site of the proposed Dundrum Village - Strategic Housing Development. The key relevant features are summarised below.

- The GSI Quaternary map shows the site to be directly underlain predominately by **Glacial Till derived from Limestones (TLs)**. Alluvium, associated with the Slang River is shown to the west of the site and encroaches into a limited area in the north-west part of the site. A zone of bedrock that outcrops/subcrops is indicated to be present 150-200m to the east of the site.
- The GSI 1:100,000 bedrock geology map shows the solid geology at the site comprises **Type 2p microline porphyritic: Granite with microline phenocrysts.** To the immediate south of the site lies the 'Type 2p microline porphyritic: Pale grey fine to coarse-grained granite'. A fault line running in a west-to-east direction is shown at approx. 200m north of the site, separating the 'Type 2p microline porphyritic' formation from the 'Dark Limestone and shale (calp)' of the Lucan Formation.
- The bedrock aquifer map shows the site to be located within a **Poor Aquifer - Bedrock which is Generally Unproductive except for Local Zones (PI).**
- The bedrock aquifer vulnerability on the site is generally classified as **Moderate (M),** increasing to **High** in the eastern part of the site.
- The GSI karst database mapping shows no karst features in the area. This is consistent with the geology at the site which is not susceptible to karstification.
- The GSI Groundwater Wells and Springs shows no such features to be present in the vicinity to the site.
- The EPA Hydrology Map shows that the River Slang flows in a northerly direction close to the west boundary on the opposite side of the bypass. The EPA map also shows a culverted river runs under the centre of the site in a north-south direction. The site hydrology is described in more detail in the EIAR Chapter on Water.
- OSI historical maps (6 inch 1837-1842, 25 inch 1888-1913) show the site predominately as a greenfield with a number of buildings constructed in the south-east part of the site along the modern Dundrum Main Street. A stream, presumably the River Slang, is shown to be flowing along the western boundary of the site.

5 FIELDWORK

5.1 Introduction

The relevant investigation points for the site are summarised in Table 5-1.

Table 5-1: Relevant Investigation points

Reference	Boreholes	Rotary Coreholes	Trial Pits	Dynamic Probes
Site Investigations (2004)	BH1 – BH19	-	-	-
Geotech Specialists (2004)	BH21 - BH37	-	-	-
Glovers Site Investigation 2005	BH45-49	-	-	-
Glovers Site Investigation 2006	-	RC (BH)50-54, BH61	-	-
BMA GeoServices Ltd (2004/2005)	-	-	TP1-TP7	-
IGSL (2021)			TP01-TP32	DP01-DP24

5.2 Site Investigations (2004)

The 2004 Site Investigations GI comprised the following:

- 19 No. cable percussion boreholes extended by Odex drilling (BH01 to BH19)
- 15 No. standpipes installed for groundwater monitoring

5.3 Geotech (2004)

The 2004 Geotech GI comprised the following:

- 17 No. cable percussion boreholes extended by Rotary core drilling/open hole drilling (BH21 to BH37) with Standard Penetration Testing (SPT).
- 28 No. standpipes installed in 17 No. boreholes for groundwater monitoring between October 2004 and April 2005
- 2 No. Variable Head permeability tests carried out in BH34 and BH35.

5.4 BMA (2004-2005)

The 2004-2005 BMA GI comprised the following (note that only the relevant SI points are listed hereafter):

- 7 No. Trial Pits (TP1-TP7)
- Geophysical survey (11 No. seismic refraction profiles)

- Field permeability tests comprising 35 No. rising head tests, 3No. step tests and 1 No. constant rate pump and ground aquifer recovery test.

5.5 Glovers (2005)

The 2005 Glovers GI comprised the following (note that only the relevant SI points are listed hereafter):

- 5 No. boreholes by Symmetrix drilling method + rotary coring (BH45 - BH49) with Standard penetration testing (SPT) carried out in BH45.
- 2 No. Field permeability tests

5.6 Glovers (2006)

The 2006 Glovers GI comprised the following (note that only the relevant SI points are listed hereafter):

- 6 No. boreholes by rotary drilling method (BH50-54, BH61) with Standard Penetration Testing (SPT).
- 1 No. pump test borehole (WELL01)
- 2 No. standpipes installations (BH51-52)
- 1 No. variable head permeability test (BH51)

5.7 IGSL (2021)

- 32 No. Trial pits (TP01-TP32)
- 24 No. Dynamic Probes Heavy (DP01-DP24)

5.8 Pile Load testing

Preliminary/investigation pile load tests were carried out in 2007 on 4 No. instrumented trial piles (TPILE 1 to 4) on the site of the proposed development. The location of the Trial pile tests is shown on Figure 5-3.

5.9 Site investigation points

A combined hole location plan of the ground investigations is shown in Figure 5.1. For the sake of clarity, the area has been divided into four zones, namely Zones 1 to 4.

The following is a list of the relevant SI points for each area. An additional area pertinent to the retaining wall that is to be constructed along the eastern boundary to enable excavation of the Lower Ground Floor of the proposed development is also included.

Zone 1

- Trial Pits: TP4, TP5 (BMA), TP04 to TP14 (IGSL)
- Boreholes: BH07-17 and BH19 (Site Investigation), BH27-31 and BH33 (Geotech), BH46-48 (Glovers 2005)
- Rotary Coreholes: RC (BH)50-52 (Glovers 2006)
- Pile testing: TPILE 1, 2

Zone 2

- Trial Pits: TP6, TP7 (BMA), TP01 to TP03, TP16 to TP20 (IGSL)
- Boreholes: BH05-07, BH18 (Site Investigation), BH45 and BH48 (Glovers 2005), BH23, BH25, BH26 (Geotech)
- Rotary Coreholes: RC(BH)52-53, BH61 (Glovers 2006)
- Pile testing: TPILE 4

Zone 3

- Trial Pits: TP3 (BMA), TP21 to TP25 (IGSL)
- Boreholes: BH01-04 (Site Investigation), BH21-24 (Geotech)
- Rotary Coreholes: RC(BH)53-54, BH61 (Glovers 2006)
- Pile testing: TPILE 3

Zone 4

- Trial Pits: TP1, TP2 (BMA), TP26 to TP32 (IGSL)
- Boreholes: BH32, BH34-37 (Geotech), BH49 (Glovers)

Retaining wall

- Trial Pits: TP5, TP06 (BMA), TP02, TP06-07, TP22, TP26, TP29, TP31-32 (IGSL)
- Boreholes: BH7-9, BH46, BH48 (Glovers 2005)
- Rotary Coreholes: BH61 (Glovers 2006)

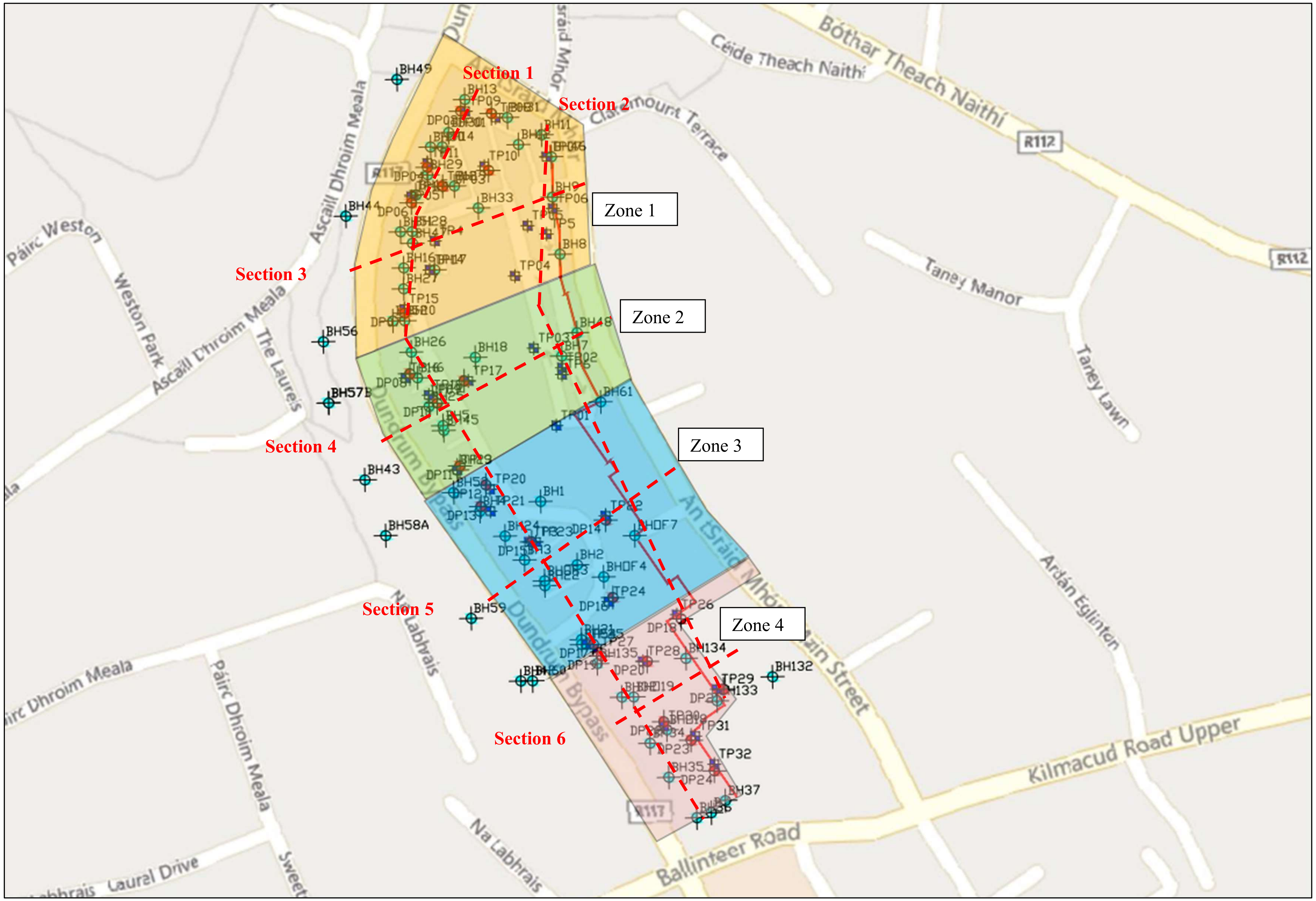


Figure 5-1: Combined SI Location Plan and Zone Layout

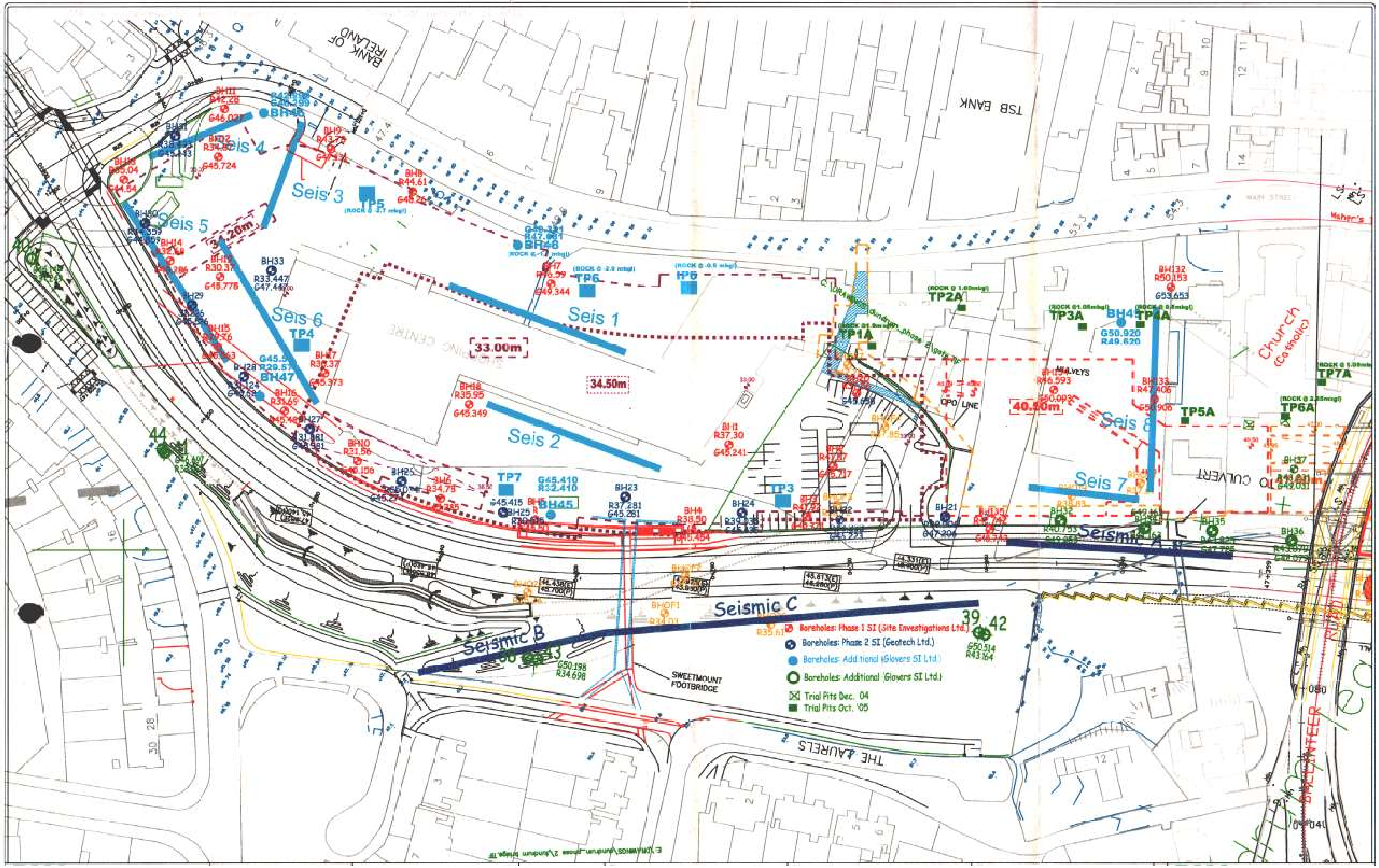


Figure 5-2: SI location plan showing 8 No. out of 11 No. seismic refraction profiles (2006 BMA Report)

Figure 5-3: Pile load test locations (TOC Dwg. No. 1190-SK194C)

6 GROUND AND GROUNDWATER CONDITIONS

6.1 Introduction

The ground conditions encountered in the site investigations comprise the following strata:

- Made Ground / Former Topsoil
- Glacial Till (Brown Boulder Clay)
- Sand & Gravel
- Granite bedrock

The ground conditions indicated by the geotechnical investigations on the site generally consist of 1.0 to 5.0 m of made ground underlain by deposits of brown boulder clay, sand and gravel, and weathered rock over granite bedrock at a depths of 1.0 to 16.3m below ground level. Table 6.1 summarises the ground conditions recorded in the borehole logs. 6 No. subsurface profiles at locations shown in Figure 5-1 are presented in Appendix A.

6.2 Made Ground / Former Topsoil

Made Ground/Fill was encountered in the majority of exploratory holes across the site. It typically consisted of Tarmacadam over brown/grey sandy angular GRAVEL (presumed Clause 804) or brown, clayey sandy GRAVEL/gravelly SAND or reworked boulder clay described as very soft to stiff, slightly sandy slightly gravelly to gravelly CLAY with some cobbles and occasional fragments of wood, plastics, building materials, and organic material. Oil contamination is also reported in three locations (TP03, TP13, TP14) of the IGSL 2021 investigation.

Former Topsoil was encountered in a number of SI points (Geotech BH22, 27, 28, 29, 30,31 and 33) at 1.5-4.0mbgl and was described as very soft to soft and firm, slightly sandy to sandy, slightly gravelly to gravelly CLAY/SILT with roots and plant material. Organic material is also reported in the IGSL 2021 trial pits (TP09, TP16, TP19-21, TP25-26) and is mainly located at the western part of the site.

The thickness of Made Ground/ Former Topsoil ranged from 1.0 to 5.0m across the site, with the deepest layers encountered in the western part of the site where thickness ranged 3.5-5.0m decreasing to 1.0-2.5m towards the east.

11 No. Moisture content tests returned typical values of 5.3 to 24%. 8 No. Atterberg Limit tests were carried out on samples of Made Ground. The samples had Liquid Limits (LL) of 28-56 and Plasticity Indices (PI) of 11-20, thus classifying the fines content as a Clay of low and intermediate plasticity (CL/CI) and a SILT of Low to High plasticity (ML/MI/MH).

4 No. Particle Size Distribution (PSD) tests carried out in this stratum returned Fines = 1.5, 3 and 24-33%, Sand = 13,16 and 33-44%, Gravel = 25, 78 and 34-81% and Cobbles = 3-7%. The soil would therefore be described as a very clayey/silty, very gravelly SAND or slightly silty/clayey, sandy GRAVEL with low to medium cobble content in accordance with BS 5930:2015.

23 No. SPTs were carried out in this stratum and recorded a wide range of N-values of 2-16.

6.3 Glacial Till (Brown Boulder Clay)

The Made Ground/Topsoil layers was typically underlain by deposits of glacial till that were described as firm to very stiff brown slightly sandy, slightly gravelly to gravelly CLAY with some cobbles (Brown Boulder Clay).

The stratum was encountered at ground level to 5.0mbgl (+40.5 to +48.0mOD) and its thickness ranged from 0.5m to 15m across the site, typically decreasing from north to south.

8 No. Moisture content tests returned values of 10 to 15%. 9 No. Atterberg Limit tests were carried out on samples of Brown Boulder Clay. The samples had typical Liquid Limits (LL) of 29-36 and Plasticity Indices (PI) of 9-15, thus classifying the fines content as a Clay of low and intermediate plasticity (CL/CI) and a SILT of Intermediate plasticity (MI).

5 No. Particle Size Distribution (PSD) tests carried out in this stratum returned Fines = 38-43% and 55%, Sand = 17% and 24-31%, Gravel = 28-34%. The soil would therefore be described as a slightly gravelly, slightly sandy CLAY in accordance with BS 5930:2015.

70 No. SPTs were carried out in this stratum and recorded a typical range of N-values of 9-50 with a general trend showing an increase with depth. However, in BH51 (Zone 1), N_{SPT} values of 17-28 were recorded below 13.0mbgl (+34.0mOD), below the general trend of N-SPT vs depth.

The typical range of N-values would correspond to undrained shear strengths of 45-250 kPa using the empirical relationship $c_u = 5 \times N_{SPT}$ (Stroud, 1989) thus classifying the soil strength as typically Medium to Very high.

6.4 Sand & Gravel

Sand & Gravel layers were encountered in the eastern part of the site underneath the Brown Boulder Clay or directly under Made Ground and were typically described as medium dense to very dense, clayey SAND or medium dense to dense clayey sandy GRAVEL with occasional cobbles and boulders.

The top of the stratum was typically encountered at 3.0 to 9.5mbgl (+35.0 to +42.5). The thickness generally decreases from 4.0-7.0m in the northern part of the site to 1.0-3.0m in the southern part. Locally, in BH33 (Zone 1) and BH25 (Zone 2), the stratum thickness reached values of 10-11m.

4 No. Moisture content tests returned values of 13 to 29%. No Atterberg Limit tests were carried out in the stratum.

17 No. Particle Size Distribution (PSD) tests carried out in this stratum typically returned Fines = 2-17%, Sand = 14-28%, Gravel = 66-89% and Cobbles = 0-14%. The soil would therefore be typically described as slightly clayey/silty to clayey/silty, sandy to very sandy GRAVEL with low to medium cobble content in accordance with BS 5930:2015.

2 No. PSD tests carried out in BH33 (Zone 1) and TP7 (Zone2) returned Fines = 9-11%, Sand = 47-54% and Gravel = 37-42%, which classifies the stratum as slightly clayey/silty, very gravelly SAND.

2 No. drained shear box tests were carried out in the stratum in BH30 and BH33 and recorded the following shear strength parameters:

- $c' = 0$ kPa, $\phi' = 41.5$ degrees
- $c' = 49$ kPa, $\phi' = 31$ degrees

46 No. SPTs were carried out in this stratum and recorded a typical range of N-values of 14-50 with a trend showing a slight increase with depth. However, in BH25 (Zone 2), BH52 (Zone 1-2) and BH54 (Zone 3), N-values of 16-27 lying below the general trend of N-SPT vs depth were recorded below +36.0mOD.

The typical range of N-values would correspond to medium dense to dense granular deposits, in agreement with the description given in the relevant exploratory points logs.

6.5 Rock

Rock was encountered as Decomposed/Highly weathered rock in the vast majority of the exploratory points across the site and was described as clayey, sandy, angular to subangular gravel and cobbles of Granite underlain by very weak to strong, completely weathered to slightly weathered GRANITE.

The rockhead profile rises from the north-west part of the site (9.0-16.7mbgl /+28.8 to +35.5mOD) towards the south-east, reaching 1.0mbgl (+48.5mOD) in BH61 (zone 2) and 2.3m (+47.1mOD) in BH48 (Zone 1).

Typical N-SPT values of 29 to 62 and refusals were recorded in the decomposed rock and weathered rock. The N-SPT recorded in decomposed rock would indicate a dense to very dense soil material.

No PSD tests were carried out on decomposed rock.

73 No. Point Load Index (PLI) Tests were carried out on samples of rock and recorded a typical range of Is50 of 0.03 - 4.44MPa. Using the correlation UCS = 20 x Is_{50}, UCS values typically ranged 0.6-88.8MPa, indicating a variable rock strength of extremely weak to Strong. There were 15 No. Unconfined Compressive Strength Tests carried out on samples of rock which recorded UCS values of 7.3MPa to 39.7MPa, which indicates a rock strength of weak to medium strong.

A summary of the rock strength parameters recorded across different zones of the site is provided in Table 6-1. The location of the zones are shown in Figure 5-1.

Table 6-1: Summary of rock strength parameters

Zone	Typical UCS range (MPa)	Rock strength
1	9.2 - 36.6	Weak to Medium strong
2	2.3 - 56.2	Very weak to Strong
3	3.0 - 30.8	Very weak to Medium strong
4	0.6 - 47.4	Extremely weak to Medium strong

The rock coring parameters recorded wide ranges of values, namely TCR = 0-100%, SCR =0-100% and RQD = 0-100%. The following is the typical range recorded for each Zone:

- Zone 1: TCR = 0-100%; SCR = 0-60%; RQD = 0-66%
- Zone 2: TCR = 35-100%; SCR = 0-66%; RQD = 0-66%
- Zone 3: TCR = 27-100%; SCR = 0-45%; RQD = 0-33%
- Zone 4: TCR = 45-100; SCR = 13-95%; RQD = 0-88%

6.6 Groundwater (All zones)

Groundwater strikes / levels were reported at a wide range of depths of less than 1.0m in BH13 to 13.6mbgl in BH10, with a range of groundwater levels of +35.9 to +45.4mOD. A summary of the water strikes recorded across the overall site is presented in Table 6-2. This includes groundwater strikes recorded in the IGSL trial pits carried out in 2021.

Note that groundwater strikes in boreholes, coreholes and trial pits may not provide a reliable indication of the static groundwater level unless holes remain open for a sufficient period to enable groundwater levels within the hole to stabilise. However, they may indicate where permeable soils are present below the groundwater table or where perched water levels exist above low permeability soils or rock.

A summary of the groundwater monitoring results from the 2004 Site Investigations and the 2005 Geotech GIs across the site is provided in Table 5-1. The BH numbers are prefixed by ‘R’, ‘L’ and ‘U’ which corresponds to ‘Rock’, Lower Gravel’ and ‘Upper Gravel’ respectfully.

Groundwater monitoring was carried out between September 2004 and February 2006. Water levels typically ranged from 4.12 to 0.1mBGL (+42.22 to +45.93mOD).

Although there would be some minor fluctuation in the groundwater levels since the last measurements were taken between 2004 and 2006, there would not be a significant change to the current ground water levels. The groundwater strikes recorded in 2021, which were between 42.8 and 44.6mOD are consistent with previous investigations.

Table 6-2: Summary of groundwater strikes

SI ID	SI point	Ground water depth (mbgl)	Ground water elevation (mOD)	Comments on Exploratory Log	Highest groundwater elevation observed (mOD)
Site investigations	BH1	2	43.24		43.24
	BH2	2.05	43.67		43.67
	BH3	3	42.77	Large flow	42.77
	BH4	6.95	38.50	Large flow	38.50
	BH5	3.55	41.95		41.95
	BH6	9.4	35.89		35.89
	BH9	3.5	43.63		43.63
	BH10	7.4	37.76		37.76
		13.6	40.73	Major inflow	40.73
	BH11	5.3	44.07		44.07
	BH12	1.65	40.67		40.67
		5.05	43.54		43.54
	BH13	<1.0	>39.89		>39.89
	BH13	4.65	36.69		36.69
	BH14	8.6	36.96	Very strong flow	36.96
	BH15	8.6	36.69		36.69
	BH16	8.8	37.37		37.37
	BH17	8	37.35		37.35
	BH18	8	36.78		36.78
	BH19	9	41.21		41.41
Geotech	BH21	6	41.42		42.82
	BH22	4.8	43.84		45.44
	BH24	1.6	38.27		42.27
	BH26	7	37.08	Strong inflow	37.38
	BH27	8.3	37.92	Moderate inflow	38.32
	BH28	7.7	40.93		41.43
	BH29	4.6	42.66	Moderate inflow	43.06
	BH30	2.2	40.64	Moderate inflow	41.54
	BH31	4.5	44.45	Moderate inflow	44.90
	BH32	4.8	42.45		43.65
	BH33	5	43.46		44.86
	BH34	5.7	45.43		45.63
	BH35	2.3	44.18		44.28
	BH36	3.9	45.43		45.83
	BH37	3.6	37.57	Slight inflow	45.57
	BH47	8	40.40		45.60
	BH51	5.2	43.50		45.50
BMA	TP3	2.0	42.00	Minor seepage	42.30
		3.5	43.90		45.50
	TP4	1.6	43.00	Slight inflow	45.50
		2.5	41.90	Slight inflow	42.10
	TP7	3.5	41.30		41.70
		4.1	43.24		43.24
IGSL (2021)	TP8	2.0	42.93	Slow water	42.93
	TP9	0.7 & 1.2	43.84 & 42.44	Seepage	42.84
	TP10	1.4	44.6	Seepage	44.6
	TP19	1.4	44.15	Seepage	44.15
	TP23	1.7	43.6	Seepage	43.6

Table 6-3: Summary of Groundwater Monitoring Results

Reference	No. of readings	Max GW level recorded (mOD)	Min GW level recorded (mOD)	Avg. GW level recorded (mOD)	Max GW depth recorded (mBGL)	Min GW depth recorded (mBGL)	Avg. GW depth recorded (mBGL)
10R	4	44.54	43.54	43.82	1.92	0.92	1.64
11R	4	43.55	42.80	43.11	3.23	2.48	2.92
12R	3	45.62	45.52	45.59	0.20	0.10	0.13
13R	3	42.66	42.33	42.44	2.21	1.88	2.10
14R	4	42.91	42.49	42.64	2.80	2.38	2.65
15R	4	43.03	42.61	42.76	2.95	2.53	2.80
16R	4	44.25	42.80	43.21	2.69	1.24	2.28
17R	4	43.77	43.07	43.37	2.30	1.60	2.00
18R	4	45.25	45.25	45.25	0.10	0.10	0.10
19R	4	42.99	42.42	42.67	3.37	2.80	3.11
20R	2	44.21	44.18	44.20	1.48	1.45	1.46
21R	3	44.83	44.63	44.73	2.58	2.38	2.48
22R	3	44.00	44.00	44.00	2.22	2.22	2.22
22U	3	44.46	44.24	44.37	1.98	1.76	1.85
23R	3	44.50	43.88	44.12	1.40	0.78	1.16
23U	3	43.89	43.83	43.87	1.45	1.39	1.41
24L	2	43.86	43.85	43.85	1.60	1.59	1.59
24R	2	43.87	43.76	43.81	1.69	1.58	1.63
24U	2	44.00	44.00	44.00	1.44	1.44	1.44
25R	4	44.22	43.73	43.89	1.70	1.21	1.53
26R	4	43.94	43.55	43.69	1.72	1.33	1.58
26U	4	43.73	43.46	43.57	1.81	1.54	1.70
27R	3	42.89	42.78	42.85	2.60	2.49	2.53
28L	3	42.67	42.53	42.61	3.09	2.95	3.01
28R	3	42.67	42.63	42.65	2.99	2.95	2.97
28U	3	43.52	43.32	43.40	2.30	2.10	2.22
29R	4	42.94	42.56	42.67	2.97	2.59	2.86
29U	4	42.68	42.47	42.54	3.06	2.85	2.99
30R	3	42.35	42.34	42.34	2.52	2.51	2.52
30U	3	42.40	42.22	42.31	2.64	2.46	2.55
31R	2	42.55	42.44	42.50	2.70	2.59	2.64
31U	2	42.53	42.47	42.50	2.67	2.61	2.64
32R	2	45.35	45.18	45.27	4.07	3.90	3.98
32U	2	45.32	45.13	45.23	4.12	3.93	4.02
33R	3	44.65	44.47	44.55	2.98	2.80	2.90
34R	2	45.74	45.34	45.54	3.82	3.42	3.62
34U	1	45.53	45.53	45.53	3.63	3.63	3.63
35R	2	45.75	45.65	45.70	2.08	1.99	2.04
35U	2	45.78	45.75	45.76	1.99	1.96	1.97
36R	1	45.75	45.75	45.75	2.33	2.33	2.33
36U	1	45.73	45.73	45.73	2.35	2.35	2.35
37R	1	45.75	45.75	45.75	3.28	3.28	3.28
37U	1	45.78	45.78	45.78	3.25	3.25	3.25
3R	2	44.29	44.22	44.26	1.55	1.48	1.51
4R	2	45.05	43.97	44.51	1.48	0.40	0.94
5R	4	44.20	43.72	43.89	1.78	1.30	1.61
6R	4	44.04	43.61	43.78	1.69	1.26	1.52
7R	2	45.93	45.90	45.92	3.44	3.41	3.42
8R	4	45.71	45.36	45.51	2.90	2.55	2.75
9R	3	45.26	45.12	45.20	2.01	1.87	1.93

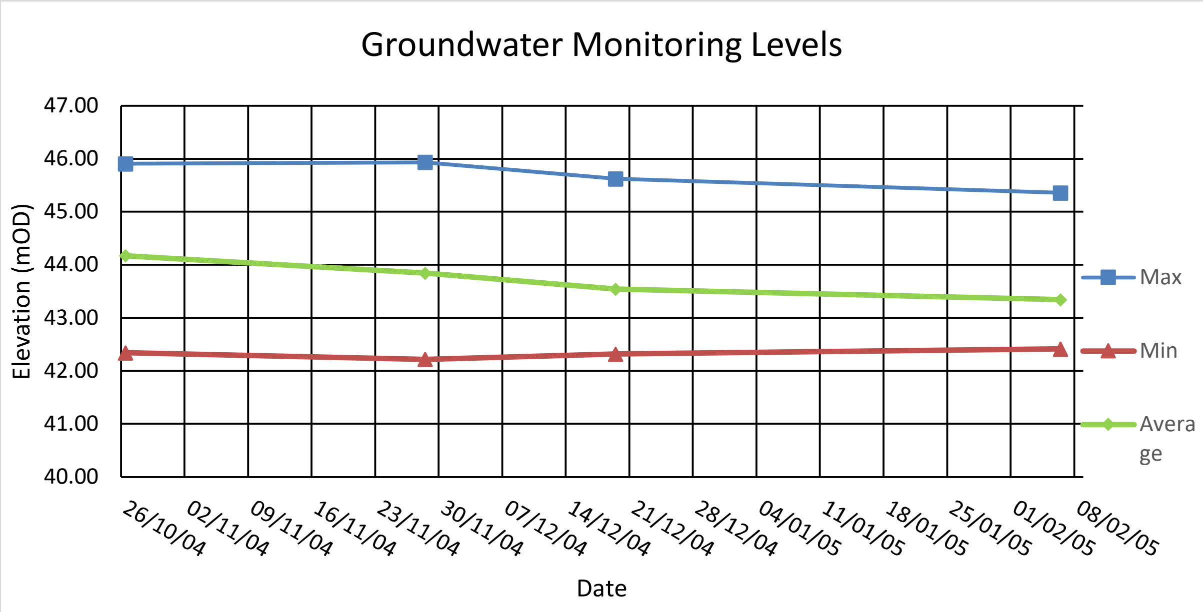


Figure 6-1: Groundwater Monitoring Reading (mOD)

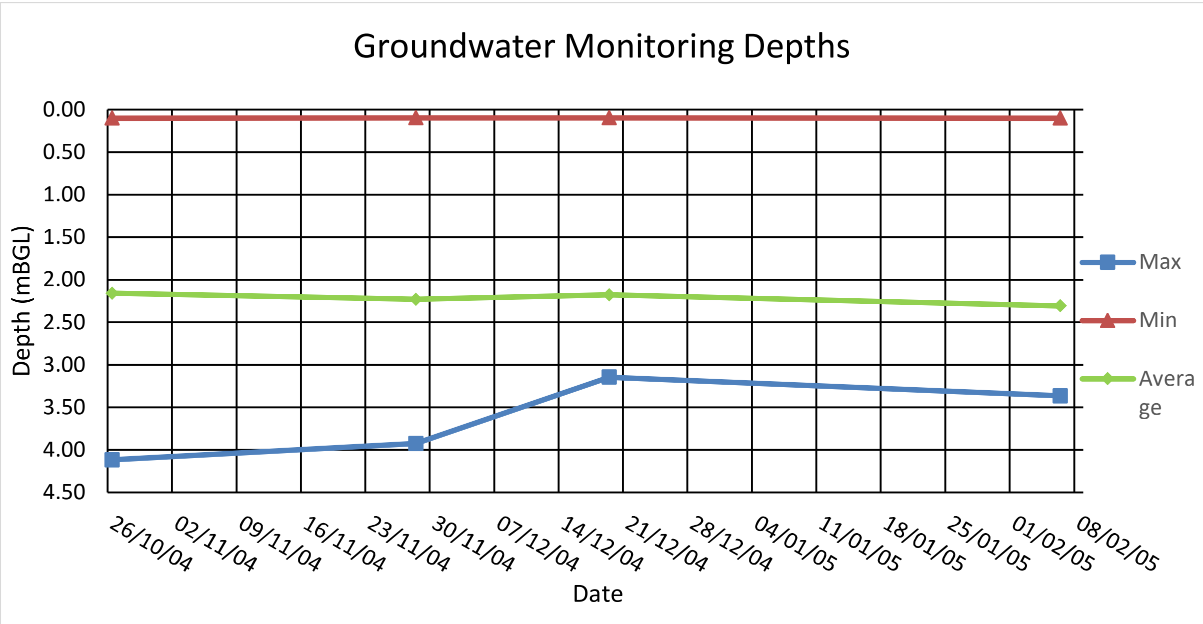


Figure 6-2: Groundwater Monitoring Results (mBGL)

Table 6-4 Summary of ground conditions

Stratum	Description	Depth to Top of Stratum (m)	Thickness (m)	Comment
Tarmac	Hardstanding, made ground.	0	0.03 – 0.25	Encountered in boreholes 22, 23A, 23B, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34 & 35.
Made ground	Medium dense slightly clayey to very clayey, slightly sandy to sandy, GRAVEL or clause 804 and very soft, soft, soft to firm and firm, slightly sandy to sandy, slightly gravelly to gravelly CLAY with some cobbles. Various amounts of plastic and building materials encountered.	0.0 – 0.3	0.8 – 5.0	Not encountered in boreholes; 43 & 48, See Section 6.1.
Possible Made Ground	Medium dense sandy GRAVEL and soft, firm, slightly sandy to sandy CLAY.	1.3 – 3.0	1.0 – 3.3	Encountered in Boreholes 29, 33 & 35.
Former Topsoil	Very soft to soft, soft, firm slightly sandy to sandy, slightly gravelly to gravelly CLAY and compact slightly sandy, slightly gravelly SILT with pockets of roots and plant material, peat and fragments of slag.	1.5 – 4.0	0.8 – 1.6	Encountered in boreholes 22, 27, 28, 30, 31 & 33. See Section 6.2.
Brown Boulder Clay	Soft, firm, stiff, very stiff & hard brown slightly sandy to sandy slightly gravelly to gravelly CLAY with occasional to some cobbles.	0.0 – 5.0	0.2 – 15	Not encountered in boreholes 23A, 23B, 25, 31, 35, 36, & 37. See section 6.3.
Sand/Gravel	Layer/pockets of medium dense, dense, & very dense gravelly SAND, SAND & GRAVEL and clayey, slightly sandy to sandy GRAVEL with occasional to some cobbles and boulders.	3.0 – 15.0	0.35 – 10.9	Not encountered in boreholes 23A, 27, 46, 48, 48A & 49. See section 6.4.
Rock	Highly variable - weak to moderately weak, strong to moderately strong, completely decomposed/weathered to fresh or slightly weathered, pale grey, coarse grained GRANITE.	1.5 – 15.5	~	

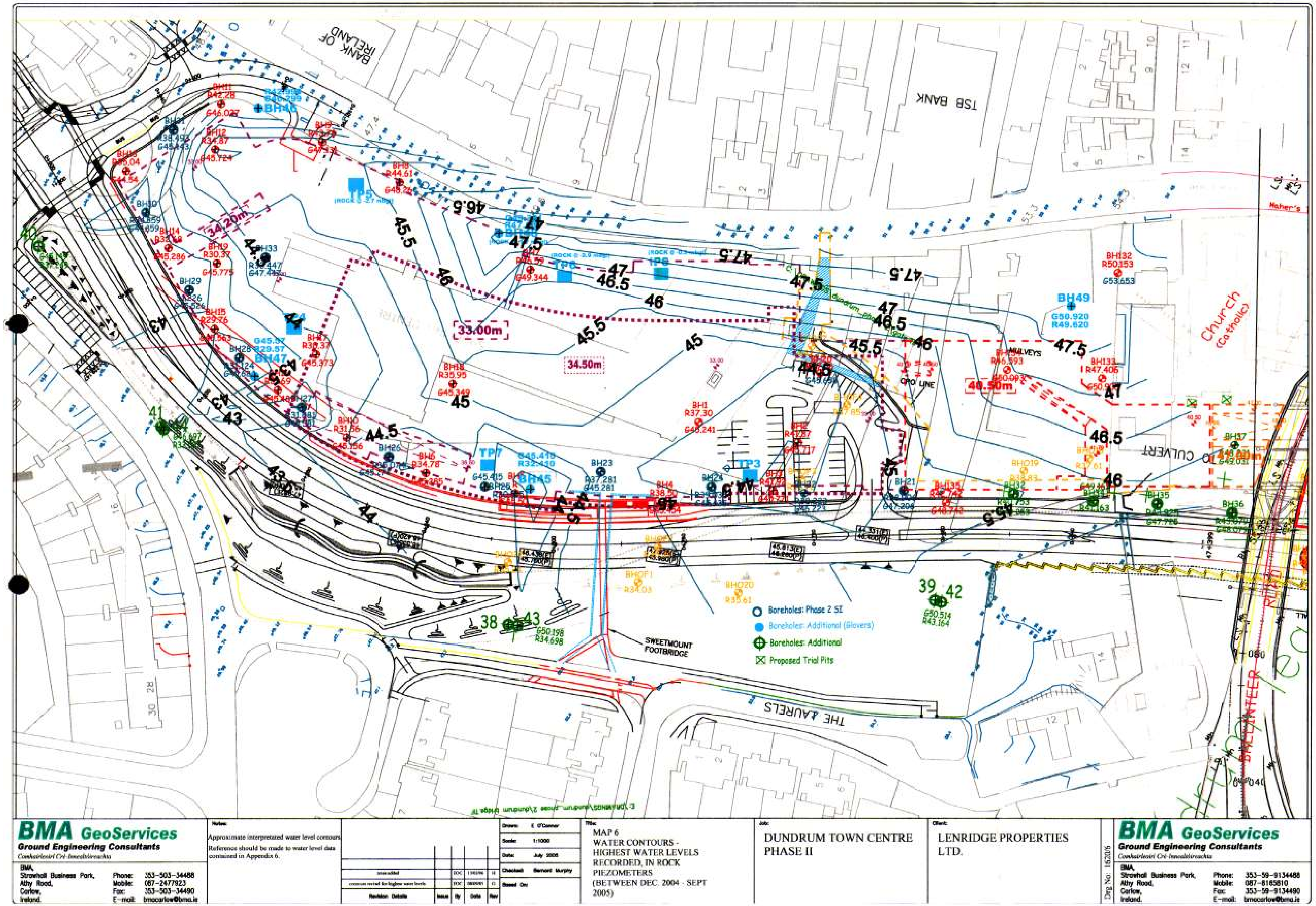


Figure 6-3: Water contours – Highest water levels recorded in rock piezometers

7 GEOTECHNICAL CONSIDERATIONS

The geotechnical design issues that need to be considered for the proposed development at the site include the following:

- Suitable options for foundations
- Groundwater
- Excavations
- Pavements
- Classification of site with regards to concrete aggressivity of soil.

The design issues will be addressed in full at the detailed design stage. A brief comment is made below with regard to suitable options for foundations.

7.1 Foundation options

The site is underlain by a sequence of:

- Made Ground, which is typically very soft to firm reworked glacial till;
- Former Topsoil, which is typically soft with organic material and is locally present below the made ground;
- Soft to hard fine grained glacial till (Boulder Clay);
- Medium dense and dense coarse grained glacial till comprising Sand and Gravels, and;
- Rock, comprising very weak to strong Granite in various states of weathering ranging from completely decomposed to slightly weathered. The rock quality generally improves in a north to south direction.

The made ground/old topsoil strata are typically 1 to 5m thick across the site. The proposed formation level for ground slabs, allowing for a suitable build-up of stone fill will be 45mOD in the north of the site rising to 46mOD in the south. Due to the general fall in ground level form east to west and from south to north this will require cut excavation in the eastern part of the site and fill at the western part.

Ground bearing slabs

Ground bearing slabs will not be suitable where soft ground and organic soils are present. These soils are typically present close to the north and north-western boundaries and then on local zones along the western boundary. The use of ground bearing slabs is not suitable in these areas and will require either pile support or excavate and replace to remove the unsuitable soils. The use of lightly loaded ground bearing slabs is feasible within the rest of the site for the purpose of car parking.

Building foundations

The made ground and old topsoil layers are not suitable founding strata for foundations. Therefore the buildings will be need to be founded in the glacial deposits of Boulder Clay and Sands & Gravels or in the granite bedrock. Foundation options include the use of:

- Spread foundations in the glacial deposits (Boulder Clay and Sands & Gravel) and in the Granite, where the bearing resistance of the soil and potential differential settlements with piled foundations allow.
- Piled foundations, typically taken into the Granite bedrock.

The mixing of spread foundations in the glacial till with pile foundation types within the same building may give rise to excessive differential settlement, so are unlikely to be suitable. However where rock is shallow and is moderately strong to strong, such as at the north eastern part of the site then spread foundations are likely to be feasible in combination with piles where rock is deeper due to the high bearing resistance and stiffness of the rock.

Where the building loads are high and deep glacial deposits are present then piled foundations in founded in the granite rock will be required. Piled foundation options may include rotary bored piles and continuous flight auger (CFA) piles. The most suitable pile type is likely to be rotary bored piles, which are capable of penetrating the full range of rock conditions expected. Extensive trial pile testing of rotary bored piles has also been previously carried out at the site to investigate the resistance in the granite, which ranges from very weak decomposed rock to strong slightly weathered rock. This information will inform the foundation selection and the preliminary design of piles.

The use of CFA piles may be possible in some parts of the site. High powered CFA rigs are capable of penetrating highly weathered and fractured rock and also to found the pile base on stronger and more intact rock by drilling to refusal on these layers.

8 REFERENCES

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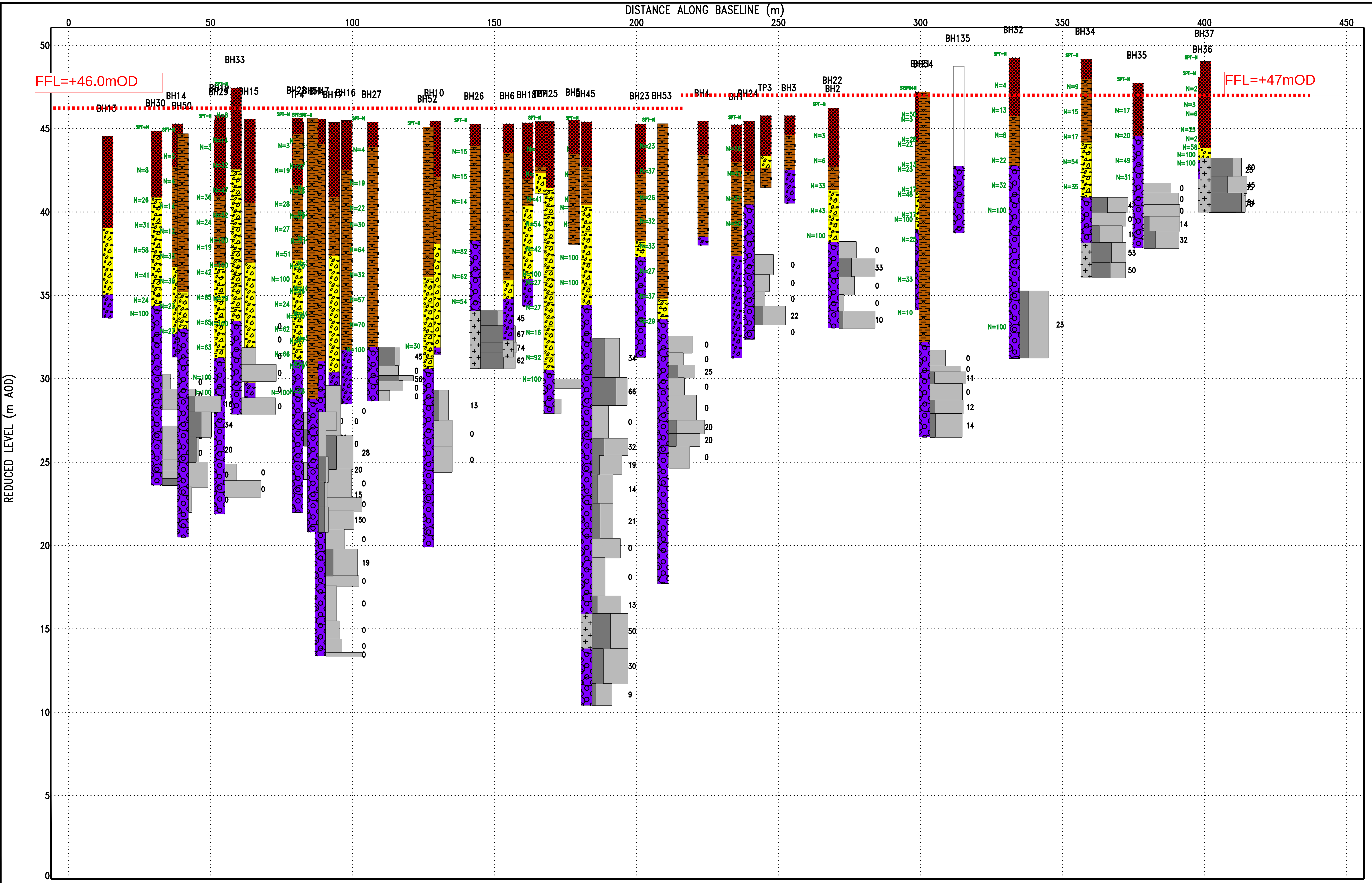
APPENDIX A

SUBSURFACE SECTIONS



AGL Consulting
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www.agl.ie

Made Ground
Sand and Gravel
Boulder Clay
Boulders and Cobbles (Highly Weathered/ Decomposed Rock)
Granite

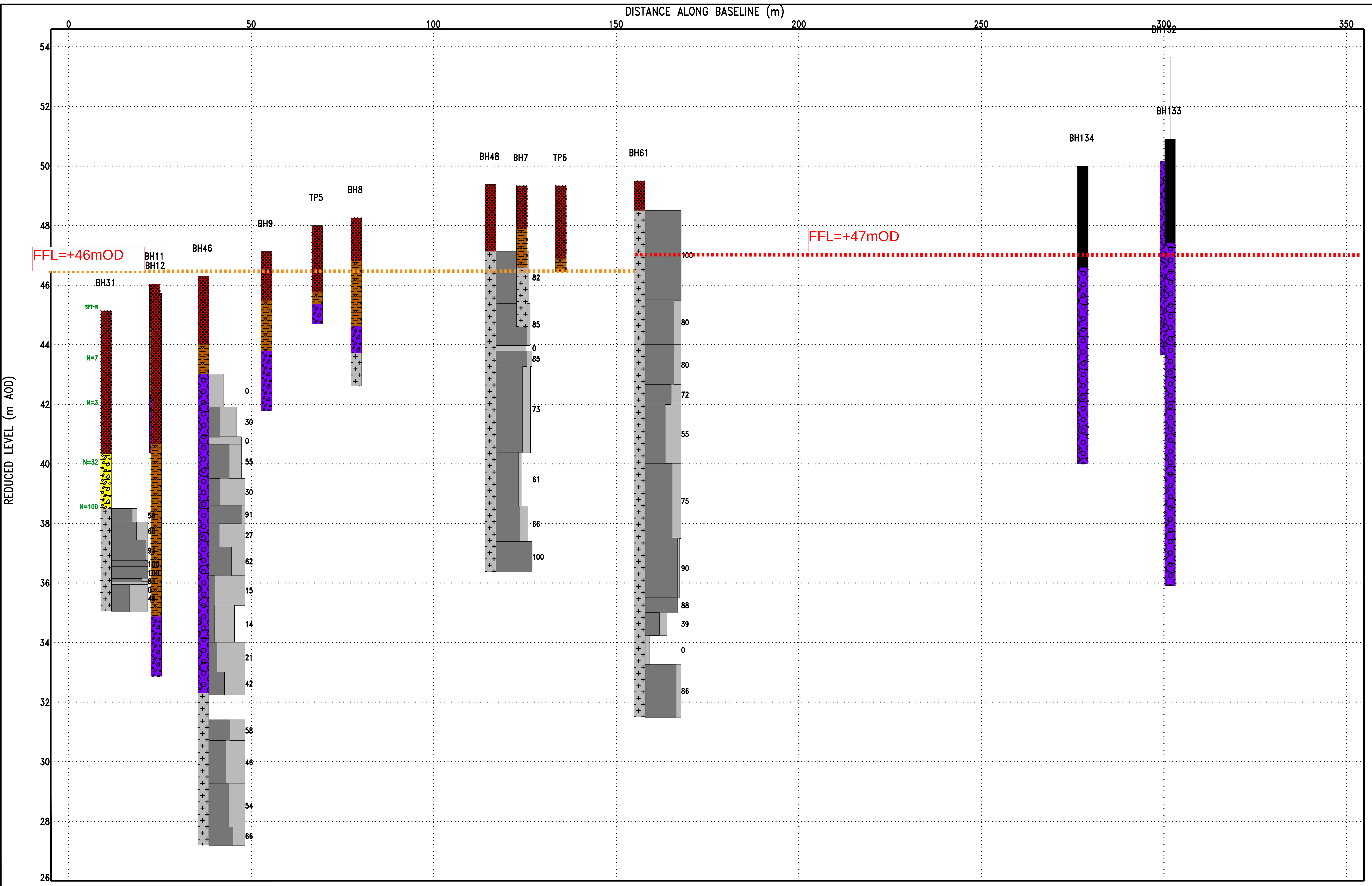
Project:
Dundrum Villiage Scheme Phase II

Drawing Title:
Profile 1 – West

Drawing No:	Rev:	Date:	Job Number: 21-157	Scale:

Client:

Rev	Date:	Description	Drawn	Check'd



AGL Consulting
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Tel: 01 2956532
www.agl.ie

Made Ground	Sand and Gravel
Boulder Clay	Boulders and Cobbles (Highly Weathered/ Decomposed Rock)
Granite	

Project:
Dundrum Villiage Scheme Phase II

Drawing Title:
Profile 2 – East

Drawing No:	Rev:	Date:	Job Number: 21-157	Scale:

Client:

Rev	Date:	Description	Drawn	Check'd

APPENDIX 6B: WASTE CHARACTERISATION ASSESSMENT
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ENVIRONMENTAL MANAGEMENT FOR BUSINESS

Waste Characterisation Assessment

Dundrum SHD Application

Phase 2

Dundrum

Dublin 14

Prepared For: -

TJ O'Connor Consulting Engineers
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Prepared By: -

O' Callaghan Moran & Associates
Unit 15 Melbourne Business Park
Model Farm Road
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November 2021

Project	Waste Characterisation: Dundrum SHD, Phase 2			
Client	IGSL Limited			
Report No	**Date**	**Status**	**Prepared By**	**Reviewed By**
210140201	30/11/2021	Final	Austin Hynes MSc	Sean Moran B.Sc. MSc

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1 INTRODUCTION

TJ O'Connor & Associates, Consulting Engineers requested O'Callaghan Moran & Associates (OCM) to undertake a waste characterisation assessment of samples of made ground and natural soils collected from thirty two (32 No.) trial pits at the Dundrum Town Centre Phase 2 site in Dundrum, Dublin 14.

1.1 Methodology

The site investigations were undertaken by Irish Geotechnical Consulting Services (IGSL) under direction from OCM. IGSL provided a description of the ground conditions and collected samples of the soils from the trial pit locations. The samples were analysed at an accredited laboratory and the results formed the basis for a waste classification assessment, which was undertaken by OCM in accordance with the Environmental Protection Agency (EPA) Guidelines on the Classification of Waste (2015).

2 WASTE CLASSIFICATION ASSESSMENT

2.1 Soil Sampling and Laboratory Analysis

2.1.1 *Site Investigation*

The site investigation was completed by IGSL Limited in October 2021 and included the collection of forty eight composite samples from thirty two (32 No.) trial pits. The locations are shown on Figure 2.1.

There is bitumen paving at the surface of all locations with the exception of TP25. The surface of TP25 is composed of Made Ground comprising dark brown, sandy very gravelly CLAY with occasional cobbles. There is Made Ground at all locations ranging between 1.50-2.20m in depth. The Made Ground varies in composition across the site but is predominantly comprised of loose to dense, clayey gravelly SAND or clayey sandy GRAVEL with cobble content. Some layers of sandy gravelly CLAY are encountered across the site.

Natural Ground was encountered in TP01, TP08, TP10, TP14, TP16, TP22 and TP24. At TP01, TP10 and TP16 the Natural Ground is composed of Firm, sandy gravelly CLAY with low cobble content. At TP08, TP14, TP22 and TP24 the Natural Ground is composed of medium dense, sandy GRAVEL with cobble content possibly derived from weathered bedrock.

The Made Ground at TP06, TP07, TP09, TP16, TP17, TP23, TP28, TP29, TP30 and TP32 contains man-made material >2% (concrete, red brick, timber, plastic, pottery and metal fragments) of the soil matrix.

At TP03 and TP14 a medium hydrocarbon odour was noted in the Made Ground.

2.1.2 *Sample Collection*

IGSL collected the samples and placed them in laboratory prepared containers that were stored in coolers prior to shipment to Chemtest Ltd.

2.1.3 *Laboratory Analysis*

The samples were tested for, metals (arsenic, barium, cadmium, chromium, copper, mercury, molybdenum, nickel, lead, antimony, selenium and zinc, total organic carbon (TOC), BTEX (benzene, toluene, ethylbenzene and xylene) aliphatic and aromatic hydrocarbons, polychlorinated biphenyls (PCB), mineral oil, polyaromatic hydrocarbons (PAH) and asbestos. Leachate generated from the samples was tested for arsenic, barium, cadmium, chromium, copper, mercury, molybdenum, nickel, lead, antimony, selenium and zinc, chloride, fluoride, soluble sulphate, phenols, dissolved organic carbon (DOC), total dissolved solids (TDS).

This parameter range facilitates an assessment of the hazardous properties of the waste, and also allows a determination of appropriate off-site management options based on the Waste Acceptance Criteria (WAC) applied by landfill operators.

The analytical methods were all ISO/CEN approved and the method detection limits were below the relevant guidance/threshold values.

2.2 Waste Classification

The Haz Waste Online Classification Engine, developed in the UK by One Touch Data Ltd, was used to determine the waste classification. This tool was developed specifically to establish whether waste is non-hazardous or hazardous and has been approved for use in Ireland by the Environmental Protection Agency. The results are summarised in Table 2.1.

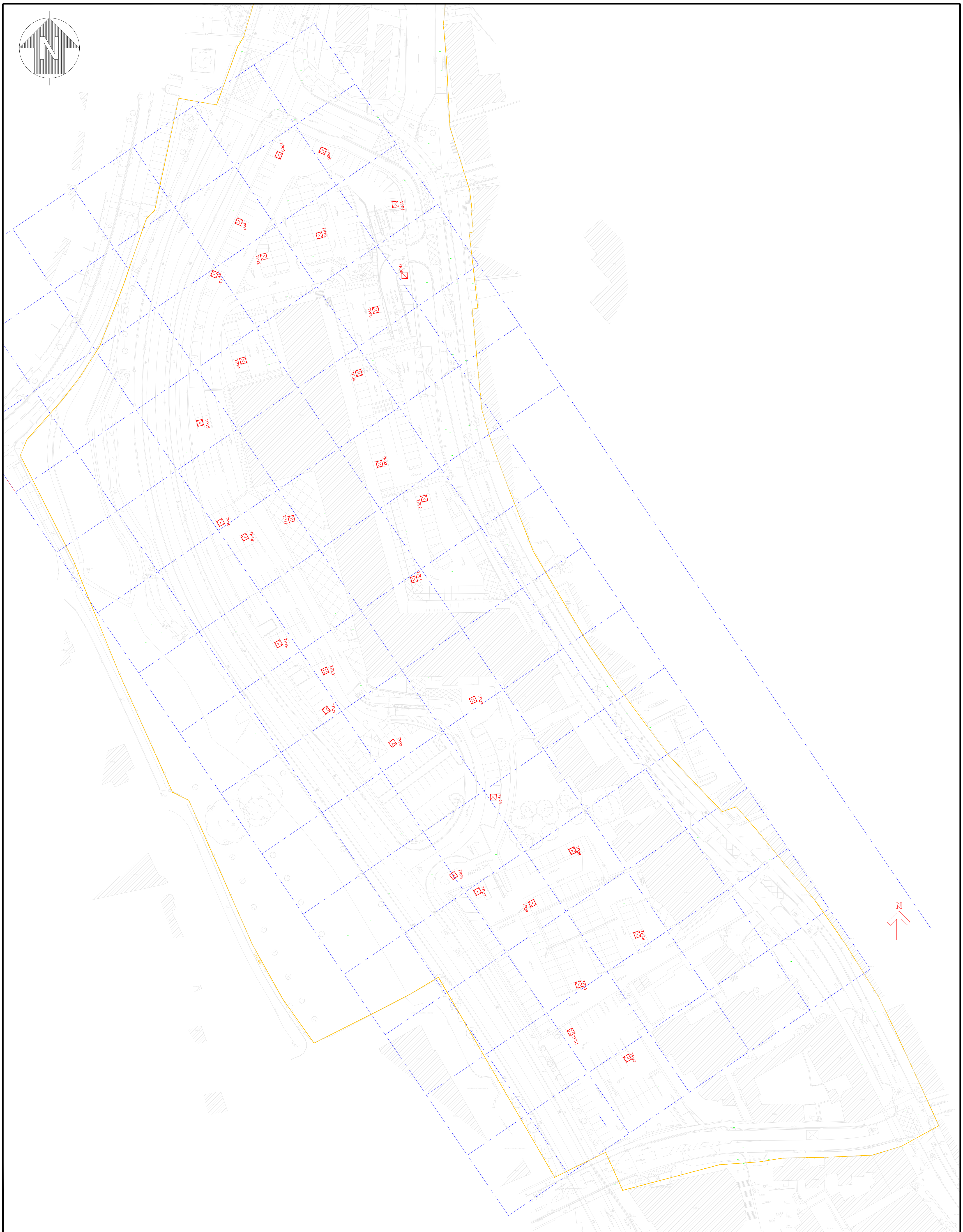
Table 2.1 Waste Classification

Sample No.	Depth	Classification	LoW Code	Sample No.	Depth	Classification	LoW Code
TP1	0.3-1.5	Non-Hazardous	17 05 04	TP15	1.0-2.0	Non-Hazardous	17 05 04
TP1	1.8-2.1	Non-Hazardous	17 05 04	TP16	0.3-1.5	Non-Hazardous	17 09 04
TP2	0.1-1.2	Non-Hazardous	17 05 04	TP16	1.8-2.1	Non-Hazardous	17 05 04
TP2	1.2-2.1	Non-Hazardous	17 05 04	TP17	0.1-0.9	Non-Hazardous	17 09 04
TP3	0.7-1.5	Non-Hazardous	17 05 04	TP17	0.9-2.1	Non-Hazardous	17 05 04
TP4	0.3-1.5	Non-Hazardous	17 05 04	TP18	0.5-0.6	Non-Hazardous	17 05 04
TP5	0.5-2.0	Non-Hazardous	17 05 04	TP18	0.9-1.4	Non-Hazardous	17 05 04
TP5	2.0-2.2	Non-Hazardous	17 05 04	TP19	0.3-1.3	Non-Hazardous	17 05 04
TP6	0.1-1.7	Non-Hazardous	17 09 04	TP20	0.5-2.0	Non-Hazardous	17 05 04
TP7	0.15-1.8	Non-Hazardous	17 09 04	TP21	0.1-0.6	Non-Hazardous	17 05 04
TP7	1.8-2.1	Non-Hazardous	17 05 04	TP21	1.0-2.0	Non-Hazardous	17 05 04
TP8	0.3-1.3	Non-Hazardous	17 05 04	TP22	0.1-0.8	Non-Hazardous	17 05 04
TP8	1.5-2.3	Non-Hazardous	17 05 04	TP22	1.0-1.7	Non-Hazardous	17 05 04
TP9	0.2-1.3	Non-Hazardous	17 05 04	TP23	0.2-0.7	Non-Hazardous	17 05 04
TP9	1.3-2.1	Non-Hazardous	17 09 04	TP23	1.0-1.7	Non-Hazardous	17 09 04
TP10	0.3-1.4	Non-Hazardous	17 05 04	TP24	0.4-1.4	Non-Hazardous	17 05 04
TP10	1.5-2.0	Non-Hazardous	17 05 04	TP25	0.4-2.0	Non-Hazardous	17 05 04
TP11	0.1-1.1	Non-Hazardous	17 05 04	TP26	0.5-2.0	Non-Hazardous	17 05 04
TP11	1.3-2.2	Non-Hazardous	17 05 04	TP27	0.5-2.0	Non-Hazardous	17 05 04
TP12	0.2-0.8	Non-Hazardous	17 05 04	TP28	0.5-1.7	Non-Hazardous	17 09 04
TP13	0.3-1.0	Non-Hazardous	17 05 04	TP29	0.2-1.0	Non-Hazardous	17 09 04
TP14	0.3-1.3	Non-Hazardous	17 05 04	TP30	0.5-2.0	Non-Hazardous	17 09 04
TP14	1.5-1.9	Non-Hazardous	17 05 04	TP31	0.5-1.8	Non-Hazardous	17 05 04
TP15	0.1-0.7	Non-Hazardous	17 05 04	TP32	0.5-2.0	Non-Hazardous	17 09 04

Asbestos was not detected in any of the samples.

The samples from TP06 (0.1-1.7m), TP07 (0.15-1.8m), TP09 (1.3-2.1), TP16 (0.3-1.5m), TP17 (0.1-0.9m), TP23 (1.0-1.7m), TP28 (0.5-1.7m), TP29 (0.2-1.0m), TP30 (0.5-2.0m) and TP32 (0.5-2.0m) are classified as non-hazardous and the appropriate List of Waste Code is 17 09 04 (Construction and Demolition waste other than those mentioned in 17 09 03*).

All other samples are classified as non-hazardous and the appropriate List of Waste Code is 17 05 04 (Soil and Stone other than those mentioned in 17 05 03*).



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environmental management for business

CLIENT	TJOC Consulting Engineers
TITLE	Sample Location Plan
FIGURE No.	2.1
SCALE	SCALE

2.3 **Waste Acceptance Criteria**

The results of the WAC testing are presented in Table 2.2-2.5, which includes for comparative purposes the WAC for Inert, Non Hazardous and Hazardous Waste Landfills pursuant to Article 16 of the EU Landfill Directive 1999/31/EC Annex II which establishes criteria and procedures for the acceptance of waste at landfills.

The sample from TP03 (0.7-1.5m) exceeds the inert WAC for Total Organic Carbon (TOC) and the inert WAC increased limits for Mineral Oil. The samples from TP11 exceed the inert WAC for Antimony. The sample from TP15 (0.1-0.7m) exceed the inert WAC increased limits for Dissolved Organic Carbon (DOC). The sample from TP23 exceeds the inert WAC for TOC. The sample from TP24 exceeds the inert WAC for Arsenic and the inert WAC increased limits for Total PAH's. The sample from TP30 (0.5-2.0m) exceeds the inert WAC for Sulphate and TOC. All other samples meet the inert landfill WAC.

Table 2.2 WAC Results

Parameter	Unit	TP1	TP1	TP2	TP2	TP3	TP4	TP5	TP5	TP6	TP7	TP7	TP8	Inert Landfill	Inert Landfill Increased Limits	Non-Hazardous Landfill	Hazardous Landfill
Depth	**m**	**0.3-1.5**	**1.8-2.1**	**0.1-1.2**	**1.2-2.1**	**0.7-1.5**	**0.3-1.5**	**0.5-2.0**	**2.0-2.2**	**0.1-1.7**	**0.15-1.8**	**1.8-2.1**	**0.3-1.3**				
Antimony	mg/kg	< 0.0005	0.0089	< 0.0005	< 0.0005	< 0.0005	0.013	< 0.0005	< 0.0005	0.021	< 0.0005	< 0.0005	< 0.0005	0.06	0.18	0.7	5
Arsenic	mg/kg	0.030	0.12	0.036	0.022	0.016	0.038	0.011	0.013	0.050	0.018	0.040	0.021	0.5	1.5	2	25
Barium	mg/kg	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.11	< 0.0005	< 0.0005	0.11	< 0.0005	< 0.0005	< 0.0005	20	20	100	300
Cadmium	mg/kg	< 0.00011	< 0.00011	< 0.00011	< 0.00011	< 0.00011	< 0.00011	< 0.00011	< 0.00011	< 0.00011	< 0.00011	< 0.00011	< 0.00011	0.04	0.04	1	5
Chromium	mg/kg	0.029	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.14	< 0.0005	< 0.0005	< 0.0005	0.5	0.5	10	70
Copper	mg/kg	0.0089	0.020	0.012	0.010	0.015	0.019	0.0088	0.013	0.027	0.0090	0.017	0.011	2	2	50	100
Lead	mg/kg	< 0.0005	< 0.0005	0.0093	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.072	< 0.0005	0.021	< 0.0005	0.5	0.5	10	50
Molybdenum	mg/kg	0.065	0.067	0.0052	0.014	0.053	0.067	0.0059	0.0098	0.029	0.019	0.0082	0.023	0.5	1.5	10	30
Nickel	mg/kg	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.4	0.4	10	40
Selenium	mg/kg	< 0.0005	< 0.0005	< 0.0005	0.0091	< 0.0005	0.034	< 0.0005	< 0.0005	0.0067	< 0.0005	0.0061	< 0.0005	0.1	0.3	0.5	7
Zinc	mg/kg	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	4	4	50	200
Mercury	mg/kg	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.01	0.01	0.2	2
Phenol	mg/kg	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	1	1	NE	NE
Fluoride	mg/kg	2.4	2.0	1.3	1.1	2.6	2.8	1.2	1.7	2.9	1.8	1.2	1.4	10	10	150	500
Chloride	mg/kg	26	30	< 10	10	94	100	< 10	22	110	< 10	13	98	800	2,400	15,000	25,000
Sulphate	mg/kg	19	47	14	31	65	550	52	17	43	12	24	12	1000*	3,000	20000*	50,000
**DOC ** **	mg/kg	120	290	70	< 50	88	< 50	75	58	100	69	83	< 50	500	500	800	1,000
pH	pH units	8.8	8.5	8.7	8.3	8.9	9.0	8.8	8.7	8.5	8.7	8.7	8.9	NE	NE	NE	NE
TDS ***	mg/kg	600	710	380	400	780	1200	440	530	970	650	370	720	4,000	12,000	60,000	100,000
TOC	%	2	< 0.20	1.1	2	5	0.8	0.48	1.7	0.79	0.25	0.61	< 0.20	3	6	NE	6
Benzene	mg/kg	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	6	6	NE	NE
Toluene	mg/kg	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	6	6	NE	NE
Ethylbenzene	mg/kg	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	6	6	NE	NE
m/p-Xylene	mg/kg	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	6	6	NE	NE
o-Xylene	mg/kg	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	6	6	NE	NE
PCB Total of 7	mg/kg	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	1	1	NE	NE
Total 17 PAH's	mg/kg	< 0.20	0.34	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	0.51	< 0.20	< 0.20	1.9	NE	100	NE	NE
Mineral Oil	mg/kg	< 10	< 10	< 10	< 10	950	68	< 10	< 10	< 10	< 10	< 10	< 10	500	500	NE	NE
Asbestos	% mass	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NE	NE	NE	NE

NAD denotes No Asbestos Detected

* denotes sulphate level exceeding inert waste limit may be considered as complying if the TDS value does not exceed 6,000mg/kg at L/S = 10l/kg.

** denotes a higher limit may be accepted provided the DOC alternative values of 500mg/kg is achieved

*** denotes TDS. The values for TDS can be used to sulphate and chloride.

PAH over 1mg/kg and Mineral Oil over 50 mg/kg exceeds limit at soil recovery site in Ireland

Table 2.3 WAC Results

Parameter	Unit	TP8	TP9	TP9	TP10	TP10	TP11	TP11	TP12	TP13	TP14	TP14	TP15	Inert Landfill	Inert Landfill Increased Limits	Non-Hazardous Landfill	Hazardous Landfill
Depth	**m**	**1.5-2.3**	**0.2-1.3**	**1.3-2.1**	**0.3-1.4**	**1.5-2.0**	**0.1-1.1**	**1.3-2.2**	**0.2-0.8**	**0.3-1.0**	**0.3-1.3**	**1.5-1.9**	**0.1-0.7**				
Antimony	mg/kg	0.018	0.012	0.030	< 0.0005	< 0.0005	0.061	0.063	0.012	0.0081	0.0057	0.021	< 0.0005	0.06	0.18	0.7	5
Arsenic	mg/kg	0.027	0.035	0.019	0.0093	0.0050	0.060	0.040	0.11	0.044	0.075	0.11	0.0082	0.5	1.5	2	25
Barium	mg/kg	0.062	0.071	0.44	< 0.0005	0.16	0.19	0.21	0.051	0.054	0.057	0.10	0.11	20	20	100	300
Cadmium	mg/kg	< 0.00011	< 0.00011	< 0.00011	< 0.00011	< 0.00011	0.0025	< 0.00011	< 0.00011	< 0.00011	< 0.00011	0.0015	< 0.00011	0.04	0.04	1	5
Chromium	mg/kg	0.0085	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.0063	0.0074	0.049	0.0066	0.0066	0.5	0.5	10	70
Copper	mg/kg	0.026	0.018	0.013	0.010	0.016	0.039	0.028	0.076	0.047	0.026	0.074	0.79	2	2	50	100
Lead	mg/kg	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.014	< 0.0005	0.015	< 0.0005	< 0.0005	0.022	0.0079	0.5	0.5	10	50
Molybdenum	mg/kg	0.036	0.10	0.19	0.013	0.20	0.14	0.24	0.012	0.026	0.030	0.021	0.0047	0.5	1.5	10	30
Nickel	mg/kg	0.0067	0.0056	0.014	< 0.0005	< 0.0005	0.016	0.013	0.036	0.015	0.0066	0.030	0.0057	0.4	0.4	10	40
Selenium	mg/kg	0.022	0.034	0.016	0.0066	0.017	0.056	0.037	0.026	0.011	0.012	0.035	< 0.0005	0.1	0.3	0.5	7
Zinc	mg/kg	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	0.053	< 0.003	< 0.003	0.054	0.14	4	4	50	200
Mercury	mg/kg	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.01	0.01	0.2	2
Phenol	mg/kg	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	1	1	NE	NE
Fluoride	mg/kg	3.1	2.8	2.0	1.6	2.1	1.4	1.5	1.5	2.1	2.0	1.5	1.0	10	10	150	500
Chloride	mg/kg	140	81	34	51	20	220	250	98	50	36	43	42	800	2,400	15,000	25,000
Sulphate	mg/kg	530	120	280	18	160	150	230	92	260	230	100	< 10	1000*	3,000	20000*	50,000
DOC **	mg/kg	< 50	< 50	< 50	76	82	< 50	< 50	< 50	63	< 50	80	1200	500	500	800	1,000
pH	pH units	8.7	8.5	8.3	9.0	9.1	8.3	8.7	9.1	9.5	9.1	9.0	8.4	NE	NE	NE	NE
TDS ***	mg/kg	1900	1000	1400	550	840	910	1000	850	1000	2000	710	310	4,000	12,000	60,000	100,000
TOC	%	< 0.20	0.54	0.74	0.3	0.5	0.53	0.21	0.41	0.22	1	0.3	0.51	3	6	NE	6
Benzene	mg/kg	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	6	6	NE	NE
Toluene	mg/kg	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	6	6	NE	NE
Ethylbenzene	mg/kg	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	6	6	NE	NE
m/p-Xylene	mg/kg	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	6	6	NE	NE
o-Xylene	mg/kg	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	6	6	NE	NE
PCB Total of 7	mg/kg	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	1	1	NE	NE
Total 17 PAH's	mg/kg	< 0.20	0.21	0.62	0.9	< 0.20	< 0.20	< 0.20	1.7	< 0.20	< 0.20	< 0.20	3.9	NE	100	NE	NE
Mineral Oil	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	500	500	NE	NE
Asbestos	% mass	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NE	NE	NE	NE

NAD denotes No Asbestos Detected

* denotes sulphate level exceeding inert waste limit may be considered as complying if the TDS value does not exceed 6,000mg/kg at L/S = 10l/kg.

** denotes a higher limit may be accepted provided the DOC alternative values of 500mg/kg is achieved

*** denotes TDS. The values for TDS can be used to sulphate and chloride.

PAH over 1mg/kg and Mineral Oil over 50 mg/kg exceeds limit at soil recovery site in Ireland

Table 2.4 WAC Results

Parameter	Unit	TP15	TP16	TP16	TP17	TP17	TP18	TP18	TP19	TP20	TP21	TP21	TP22	Inert Landfill	Inert Landfill Increased Limits	Non-Hazardous Landfill	Hazardous Landfill
Depth	**m**	**1.0-2.0**	**0.3-1.5**	**1.8-2.1**	**0.1-0.9**	**0.9-2.1**	**0.5-0.6**	**0.9-1.4**	**0.3-1.3**	**0.5-2.0**	**0.1-0.6**	**1.0-2.0**	**0.1-0.8**				
Antimony	mg/kg	0.012	0.015	0.011	0.021	0.026	0.0085	< 0.0005	0.023	0.010	< 0.0005	< 0.0005	0.0056	0.06	0.18	0.7	5
Arsenic	mg/kg	0.030	0.027	0.018	0.085	0.057	0.065	0.028	0.033	0.023	0.039	0.0067	0.055	0.5	1.5	2	25
Barium	mg/kg	0.11	0.19	0.088	0.081	0.41	0.14	< 0.0005	0.22	0.096	0.083	0.052	< 0.0005	20	20	100	300
Cadmium	mg/kg	< 0.00011	< 0.00011	0.0019	< 0.00011	< 0.00011	< 0.00011	< 0.00011	< 0.00011	< 0.00011	< 0.00011	< 0.00011	< 0.00011	0.04	0.04	1	5
Chromium	mg/kg	< 0.0005	< 0.0005	0.012	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.5	0.5	10	70
Copper	mg/kg	0.020	0.034	0.060	0.040	0.019	0.011	0.0083	0.010	0.017	0.0094	0.0059	0.0088	2	2	50	100
Lead	mg/kg	< 0.0005	< 0.0005	0.016	0.0061	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.5	0.5	10	50
Molybdenum	mg/kg	0.069	0.13	0.017	0.041	0.086	0.11	0.039	0.099	0.10	0.014	0.064	0.033	0.5	1.5	10	30
Nickel	mg/kg	0.0069	0.016	0.031	0.011	0.0074	0.0052	< 0.0005	< 0.0005	0.010	< 0.0005	< 0.0005	< 0.0005	0.4	0.4	10	40
Selenium	mg/kg	0.0060	0.013	0.010	0.018	0.012	0.0064	< 0.0005	0.012	0.0064	< 0.0005	0.0071	0.0075	0.1	0.3	0.5	7
Zinc	mg/kg	< 0.003	< 0.003	0.042	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	4	4	50	200
Mercury	mg/kg	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.01	0.01	0.2	2
Phenol	mg/kg	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	1	1	NE	NE
Fluoride	mg/kg	2.8	3.2	3.8	1.3	1.3	4.2	3.9	4.1	2.9	1.9	2.7	2.6	10	10	150	500
Chloride	mg/kg	< 10	< 10	18	< 10	16	14	< 10	< 10	43	< 10	< 10	< 10	800	2,400	15,000	25,000
Sulphate	mg/kg	270	160	93	63	200	150	< 10	210	85	18	30	23	1000*	3,000	20000*	50,000
DOC **	mg/kg	59	130	110	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	500	500	800	1,000
pH	pH units	8.5	8.4	8.3	8.3	8.4	8.6	8.3	7.5	8.5	7.5	7.3	7.4	NE	NE	NE	NE
TDS ***	mg/kg	1200	1600	710	640	980	980	470	1800	1200	490	640	590	4,000	12,000	60,000	100,000
TOC	%	0.89	1.1	1	0.4	0.79	0.52	< 0.20	1.1	0.38	0.66	0.27	1.2	3	6	NE	6
Benzene	mg/kg	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	6	6	NE	NE
Toluene	mg/kg	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	6	6	NE	NE
Ethylbenzene	mg/kg	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	6	6	NE	NE
m/p-Xylene	mg/kg	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	6	6	NE	NE
o-Xylene	mg/kg	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	6	6	NE	NE
PCB Total of 7	mg/kg	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	1	1	NE	NE
Total 17 PAH's	mg/kg	0.49	0.82	< 0.20	1.7	< 0.20	1.6	< 0.20	23	< 0.20	< 0.20	< 0.20	< 0.20	NE	100	NE	NE
Mineral Oil	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	500	500	NE	NE
Asbestos	% mass	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NE	NE	NE	NE

NAD denotes No Asbestos Detected

* denotes sulphate level exceeding inert waste limit may be considered as complying if the TDS value does not exceed 6,000mg/kg at L/S = 10l/kg.

** denotes a higher limit may be accepted provided the DOC alternative values of 500mg/kg is achieved

*** denotes TDS. The values for TDS can be used to sulphate and chloride.

PAH over 1mg/kg and Mineral Oil over 50 mg/kg exceeds limit at soil recovery site in Ireland

Table 2.5 WAC Results

Parameter	Unit	TP22	TP23	TP23	TP24	TP25	TP26	TP27	TP28	TP29	TP30	TP31	TP32	Inert Landfill	Inert Landfill Increased Limits	Non-Hazardous Landfill	Hazardous Landfill
Depth	**m**	**1.0-1.7**	**0.2-0.7**	**1.0-1.7**	**0.4-1.4**	**0.4-2.0**	**0.5-2.0**	**0.5-2.0**	**0.5-1.7**	**0.2-1.0**	**0.5-2.0**	**0.5-1.8**	**0.5-2.0**				
Antimony	mg/kg	< 0.0005	< 0.0005	0.012	0.024	0.0069	< 0.0005	< 0.0005	0.014	0.014	0.052	< 0.0005	0.023	0.06	0.18	0.7	5
Arsenic	mg/kg	0.049	0.035	0.069	1.3	0.087	0.15	0.45	0.043	0.095	0.044	0.096	0.093	0.5	1.5	2	25
Barium	mg/kg	< 0.0005	0.16	0.15	0.086	< 0.0005	< 0.0005	< 0.0005	0.15	< 0.0005	0.25	< 0.0005	0.068	20	20	100	300
Cadmium	mg/kg	< 0.00011	< 0.00011	< 0.00011	< 0.00011	< 0.00011	< 0.00011	< 0.00011	< 0.00011	< 0.00011	< 0.00011	< 0.00011	< 0.00011	0.04	0.04	1	5
Chromium	mg/kg	< 0.0005	< 0.0005	0.017	0.0062	< 0.0005	< 0.0005	< 0.0005	0.020	0.020	0.059	0.11	0.0051	0.5	0.5	10	70
Copper	mg/kg	0.0068	0.012	0.036	0.077	0.020	0.018	0.014	0.044	0.027	0.039	0.017	0.048	2	2	50	100
Lead	mg/kg	< 0.0005	< 0.0005	0.0056	0.013	< 0.0005	< 0.0005	< 0.0005	0.13	0.024	0.011	0.0062	0.0057	0.5	0.5	10	50
Molybdenum	mg/kg	0.085	0.042	0.062	0.13	0.077	0.032	0.026	0.023	0.018	0.029	0.0054	0.079	0.5	1.5	10	30
Nickel	mg/kg	< 0.0005	< 0.0005	0.0079	0.021	< 0.0005	0.0092	0.0083	0.0098	< 0.0005	< 0.0005	< 0.0005	0.0055	0.4	0.4	10	40
Selenium	mg/kg	< 0.0005	0.0099	0.012	0.023	0.0066	< 0.0005	< 0.0005	0.0057	< 0.0005	0.016	< 0.0005	0.0056	0.1	0.3	0.5	7
Zinc	mg/kg	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	0.33	< 0.003	0.049	< 0.003	< 0.003	4	4	50	200
Mercury	mg/kg	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.01	0.01	0.2	2
Phenol	mg/kg	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	1	1	NE	NE
Fluoride	mg/kg	2.8	3.9	4.1	2.2	3.6	2.0	1.7	3.3	1.7	1.4	1.4	2.3	10	10	150	500
Chloride	mg/kg	< 10	< 10	54	25	< 10	< 10	< 10	14	29	55	< 10	40	800	2,400	15,000	25,000
Sulphate	mg/kg	< 10	110	120	300	47	51	170	120	200	1200	< 10	220	1000*	3,000	20000*	50,000
DOC **	mg/kg	< 50	< 50	< 50	120	140	< 50	< 50	120	92	67	56	89	500	500	800	1,000
pH	pH units	7.4	7.4	8.2	10.2	9.5	8.6	8.6	8.3	8.7	8.5	8.2	8.7	NE	NE	NE	NE
TDS ***	mg/kg	430	570	970	850	710	710	720	780	910	2300	400	970	4,000	12,000	60,000	100,000
TOC	%	0.23	2.6	3.4	1.2	0.8	1.8	0.23	2.6	1.9	4.6	< 0.20	2.3	3	6	NE	6
Benzene	mg/kg	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	6	6	NE	NE
Toluene	mg/kg	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	6	6	NE	NE
Ethylbenzene	mg/kg	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	6	6	NE	NE
m/p-Xylene	mg/kg	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	6	6	NE	NE
o-Xylene	mg/kg	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	6	6	NE	NE
PCB Total of 7	mg/kg	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	1	1	NE	NE
Total 17 PAH's	mg/kg	2.2	1.9	3.2	120	3.1	< 0.20	< 0.20	< 0.20	< 0.20	35	< 0.20	< 0.20	NE	100	NE	NE
Mineral Oil	mg/kg	< 10	< 10	< 10	160	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	500	500	NE	NE
Asbestos	% mass	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NE	NE	NE	NE

NAD denotes No Asbestos Detected

* denotes sulphate level exceeding inert waste limit may be considered as complying if the TDS value does not exceed 6,000mg/kg at L/S = 10l/kg.
** denotes a higher limit may be accepted provided the DOC alternative values of 500mg/kg is achieved
*** denotes TDS. The values for TDS can be used to sulphate and chloride.

PAH over 1mg/kg and Mineral Oil over 50 mg/kg exceeds limit at soil recovery site in Ireland

2.4 Waste Management Options

The EPA has issued guidance on acceptance criteria for a range of parameters for soil recovery sites. This includes;

• Metals (solid concentration not leachability) in soil and stone (including As, Cd, Cr, Cu, Hg, Ni, Pb, Zn);
• Total organic carbon in soil and stone;
• Total BTEX (benzene, toluene, ethylbenzene, xylenes) in soil and stone;
• Mineral oil in soil and stone;
• Polycyclic aromatic hydrocarbons (PAHs) in soil and stone;
• Polychlorinated Biphenyls (PCBs) in soil and stone;
• Asbestos fibres in soil and stone.

The guidance requires that soils from brownfield sites should not exceed the limits for the parameters specified in Table 2.6 and 2.7. For metals limits have been specified for a range of soil types nationally separated into six domain areas.

The samples from TP06 (0.1-1.7m), TP07 (0.15-1.8m), TP09 (1.3-2.1), TP16 (0.3-1.5m), TP17 (0.1-0.9m), TP23 (1.0-1.7m), TP28 (0.5-1.7m), TP29 (0.2-1.0m), TP30 (0.5-2.0m) and TP32 (0.5-2.0m) are classified as is 17 09 04 (Construction and Demolition waste) and are therefore not suitable for soil recovery.

Table 2.6 Soil Recovery Site Criteria

Parameter	Limit for Soil Recovery Sites
Total BTEX	0.05 mg/kg
Mineral oil	50 mg/kg
Total PAHs	1 mg/kg
Total PCBs	0.05 mg/kg

The samples from TP04 (0.3-1.5m), TP08 (0.3-1.3m), TP12 (0.2-0.8m), TP17 (0.1-0.9m), TP18 (0.5-0.6m), TP19 (0.3-1.3m), TP22 (1.0-1.7m), TP23 (0.2-0.7m) and TP25 (0.4-2.0m) exceed the soil recovery criteria for PAH’s and/or Mineral Oil. These samples has therefore been classified as (B-1) suitable for disposal/recovery to inert Landfill.

The soil and stone cannot be sent to soil recovery sites if the trigger levels for a particular domain are exceeded. There is however some flexibility in applying the limits. A derogation applies where up to three parameters can exceed the limit for a sample provided the concentration in the samples is no more than 1.5 times the trigger level. The site which is subject to this investigation is located in Domain 2 and the trigger levels are listed in Table 2.7.

Table 2.7 Soil Recovery Trigger Levels

		Domain 2 Trigger Level	1.5 times Trigger Level
Arsenic	**mg/kg**	24.90	37.35
Cadmium	**mg/kg**	3.28	4.92
Chromium	**mg/kg**	50.30	75.45
Copper	**mg/kg**	63.50	95.25
Mercury	**mg/kg**	0.36	0.54
Nickel	**mg/kg**	61.90	92.85
Lead	**mg/kg**	86.10	129.15
Zinc	**mg/kg**	197.00	295.5

The samples from TP07 (1.8-2.1m), TP10 (0.3-1.4m), TP21 (0.1-0.6m), and TP27 (0.5-2.0m) exceed the 1.5 times trigger level for metal concentrations. The sample from TP07 (1.8-2.1m) and TP10 (0.3-1.4m) exceed the 1.5 times trigger level for Copper. The sample from TP08 (0.3-1.3m) exceeds the 1.5 times trigger level for Lead. The sample from TP21 exceeds the 1.5 times trigger level for Mercury and Lead. The sample from TP25 (0.4-2.0m) exceeds the 1.5 times trigger level for Arsenic. The sample from TP27 (0.5-2.0m) exceed the 1.5 times trigger level for Arsenic, Copper and Zinc. These samples have therefore been classified as (B-1) suitable for disposal to inert landfill. The samples from TP3 (0.7-1.5m), TP23 (1.0-1.7m), TP24 (0.4-1.4m) and TP30 (0.5-2.0m) exceed the 1.5 times trigger level for metals, however as these samples already exceeds the inert WAC, the soil recovery criteria do not apply. All other samples meet the soil recovery site criteria for metal concentrations.

Waste management options are summarised on Table 2.8. All are subject to approval of the waste management facility operators. Class A wastes are suitable for recovery at a permitted soils recovery facility. Class B-1 wastes are suitable for recovery/disposal to inert waste landfill. Class B-2 wastes are suitable for recovery/disposal to inert landfill with increased limits. Class C wastes are suitable for disposal to non-hazardous landfill.

Table 2.8 Waste Management Options

Sample No.	Depth	LoW Code	Category	Sample No.	Depth	LoW Code	Category
TP1	0.3-1.5	17 05 04	A	TP15	1.0-2.0	17 05 04	A
TP1	1.8-2.1	17 05 04	A	TP16	0.3-1.5	17 09 04	B-1
TP2	0.1-1.2	17 05 04	A	TP16	1.8-2.1	17 05 04	A
TP2	1.2-2.1	17 05 04	A	TP17	0.1-0.9	17 09 04	B-1
TP3	0.7-1.5	17 05 04	C	TP17	0.9-2.1	17 05 04	A
TP4	0.3-1.5	17 05 04	B-1	TP18	0.5-0.6	17 05 04	B-1
TP5	0.5-2.0	17 05 04	A	TP18	0.9-1.4	17 05 04	A
TP5	2.0-2.2	17 05 04	A	TP19	0.3-1.3	17 05 04	B-1
TP6	0.1-1.7	17 09 04	B-1	TP20	0.5-2.0	17 05 04	A
TP7	0.15-1.8	17 09 04	B-1	TP21	0.1-0.6	17 05 04	B-1
TP7	1.8-2.1	17 05 04	B-1	TP21	1.0-2.0	17 05 04	A
TP8	0.3-1.3	17 05 04	B-1	TP22	0.1-0.8	17 05 04	A
TP8	1.5-2.3	17 05 04	A	TP22	1.0-1.7	17 05 04	B-1
TP9	0.2-1.3	17 05 04	A	TP23	0.2-0.7	17 05 04	B-1
TP9	1.3-2.1	17 09 04	B-1	TP23	1.0-1.7	17 09 04	B-2
TP10	0.3-1.4	17 05 04	B-1	TP24	0.4-1.4	17 05 04	C
TP10	1.5-2.0	17 05 04	A	TP25	0.4-2.0	17 05 04	B-1
TP11	0.1-1.1	17 05 04	B-2	TP26	0.5-2.0	17 05 04	A
TP11	1.3-2.2	17 05 04	B-2	TP27	0.5-2.0	17 05 04	B-1
TP12	0.2-0.8	17 05 04	B-1	TP28	0.5-1.7	17 09 04	B-1
TP13	0.3-1.0	17 05 04	A	TP29	0.2-1.0	17 09 04	B-1
TP14	0.3-1.3	17 05 04	A	TP30	0.5-2.0	17 09 04	B-2
TP14	1.5-1.9	17 05 04	A	TP31	0.5-1.8	17 05 04	A
TP15	0.1-0.7	17 05 04	C	TP32	0.5-2.0	17 09 04	B-1

A	Classified as Non-Hazardous, 17 05 04 meets soil recovery criteria
B-1	Classified as Non-Hazardous, 17 05 04 or 17 09 04 meets inert WAC
B-2	Classified as Non-Hazardous, 17 05 04 or 17 09 04 meets inert WAC increased limits
C	Classified as Non-Hazardous, 17 05 04 exceeds inert WAC increased limits

3 CONCLUSIONS AND RECOMMENDATIONS

3.1 **Conclusions**

3.1.1 *Waste Classification*

Asbestos was not detected in any of the samples.

The samples from TP06 (0.1-1.7m), TP07 (0.15-1.8m), TP09 (1.3-2.1), TP16 (0.3-1.5m), TP17 (0.1-0.9m), TP23 (1.0-1.7m), TP28 (0.5-1.7m), TP29 (0.2-1.0m), TP30 (0.5-2.0m) and TP32 (0.5-2.0m) are classified as non-hazardous and the appropriate List of Waste Code is 17 09 04 (Construction and Demolition waste other than those mentioned in 17 09 03*).

All other samples are classified as non-hazardous and the appropriate List of Waste Code is 17 05 04 (Soil and Stone other than those mentioned in 17 05 03*).

The recovery/disposal options are discussed in Section 2.4.

3.2 **Recommendations**

OCM recommend that a copy of this report be provided in full to the relevant waste management facilities to which the made ground and subsoils will be consigned to confirm its suitability for acceptance.

APPENDIX 9A - INTRUSIVE NOISE ASSESSMENT STAGE 3
(AWN Consulting)

DUNDRUM PHASE 2 RESIDENTIAL

INTRUSIVE NOISE ASSESSMENT STAGE 3

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EXECUTIVE SUMMARY

This report summarises Stage 3 design guidance in respect of the noise intrusion into residential units associated with the Dundrum Phase 2 Residential project. There are no Irish statutory requirements in relation to acceptable levels of intrusive noise within a residential setting. In the absence of such guidance consideration has been given to the content of BS 8233: 2014: *Guidance on Sound Insulation and Noise Reduction for Buildings.*

Façade sound insulation performance requirements have been derived based on the information outlined in the previous sections. Assumed source noise levels are as per the discussions in Sections 2.2 and 4.7 respectively. The resultant requirements are summarised in Table A.

Type	Façade Mark Up	Octave Band Centre Frequency (Hz)						Nominal dB R_w
		125	250	500	1k	2k	4k	
A	**Red**	25	32	37	42	45	45	40
B	**Orange**	22	27	32	37	42	42	37
C	**Green**	21	20	26	38	37	39	32

Table A Minimum Sound Insulation Performance Requirements (Sound Reduction Index (R), dB)

Note that non glazing elements are assumed to offer sound insulation performances some 10dB higher than those detailed in Table 10.

Where is it proposed to introduce a trickle vent and / or wall vent within a space in order to provide required levels of ventilation these elements should be selected in order that the sound insulation performance of these items is sufficient in order to ensure that the overall level of sound insulation performance of the façade/glazing is preserved.

Figure A Façade Performance Requirement Key (See Table A)

CONTENTS

1.0 INTRODUCTION

This report summarises Stage 3 design guidance in respect of the noise intrusion into residential units associated with the Dundrum Phase 2 Residential project. There are no Irish statutory requirements in relation to acceptable levels of intrusive noise within a residential setting. In the absence of such guidance consideration has been given to the content of BS 8233: 2014: *Guidance on Sound Insulation and Noise Reduction for Buildings.*

A glossary of acoustic terminology is presented in Appendix A.

2.0 ADOPTED GUIDANCE

2.1 Dun Laoghaire Rathdown County Council Noise Action Plan

The *Dún Laoghaire Rathdown County Council Noise Action Plan (NAP) 2018 – 2023* is of relevance here. The NAP indicates that guidance within the *ProPG Planning and Noise: Professional Practice Guidance on Planning and Noise* document should be referred to:

> *"In the scenario where new residential development or other noise sensitive development is proposed in an area with an existing climate of environmental noise, there is currently no clear national guidance on appropriate noise exposure levels. The EPA has suggested that in the interim that Action Planning Authorities should examine the planning policy guidance notes issued in England titled, 'ProPG Planning and Noise: Professional Practice Guidance on Planning and Noise'. This has been produced to provide practitioners with guidance on a recommended approach to the management of noise within the planning system in England."*

In addition to ProPG, the *Dún Laoghaire Rathdown County Council Noise Action Plan 2018 – 2023* has been published in order to address the requirements of the European Noise Directive 2002/49/EC. This NAP produced noise maps in order to determine the population exposure to undesirably high noise levels and also to identify areas with desirably low noise that should be preserved into the future. The NAP defines the following ranges for these descriptions:

- Undesirably high external noise levels are defined as being above 55dB at night and/or above 70dB during the day, and;
- Desirably low external noise levels are defined as being below 50dB at night and/or below 55dB during the day.

It is important to note that the NAP does not recommend that residential development be restricted within areas identified as having undesirably high noise levels. Rather it recommended a range of noise mitigation measures be required for new residential developments within these areas.

2.2 BS 8233

There are no statutory guidelines or specific local guidelines relating to appropriate internal noise levels within Libraries. In this instance, reference is made to BS 8233: 2014: *Guidance on sound insulation and noise reduction for buildings.*

BS 8233 sets out recommended internal noise levels for non-domestic buildings from external noise sources such as traffic. The guidance is primarily for use by designers and hence BS 8233 may be used as the basis for an appropriate schedule of noise control measures. The recommended internal noise levels for residential developments are set out below.

Activity	Location	(07:00 to 23:00hrs)	(23:00 to 07:00hrs)
Resting	Living room	35 dB $L_{Aeq,16hr}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16hr}$	-
Sleeping (Daytime Resting)	Bedroom	35 dB $L_{Aeq,16hr}$	30 dB $L_{Aeq,8hr}$ 45 dB $L_{AFmax,T}$ *

Table 1 Summary of recommended internal noise levels from BS8233

* Note The document comments that the internal $L_{AFmax,T}$ noise level may be exceeded no more than 10 times per night without a significant impact occurring.

3.0 SUITABLY QUALIFIED ACOUSTICIAN

3.1 Definition

The current BREEAM definition of a "suitably qualified acoustician", which is considered appropriate here, is an individual that can satisfy the following requirements:

1. Holds a degree, PhD or equivalent qualification in acoustic or sound testing.
2. Has a minimum of three years relevant experience (within the last five years). Such experience must clearly demonstrate a practical understanding of factors affecting acoustics in relation to construction and the built environment; including acting in an advisory capacity to provide recommendations for suitable acoustic performance levels and mitigation measures.
3. An individual who holds a recognised acoustic qualification and membership of an appropriate professional body.

3.2 Damian Kelly BSc (Hons) MSc MIOA

Damian Kelly (Technical Director) holds a BSc from DCU and an MSc from QUB. He has over eighteen years of experience as an acoustic consultant and is a member of the Institute of Acoustics. He has extensive knowledge in the field of architectural and environmental noise modelling and prediction, having developed many of the largest and most complex examples of proprietary noise models, including complex wind turbine developments, prepared in Ireland to date. He is a sitting member of the committee of the Irish Brach of the Institute of Acoustics and the co-author of the Environmental Protection Agency document – *Guidance Note for Noise – License Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4).* He has over eighteen years' continuous experience in both environmental and building acoustics and has extensive experience in the development of detailed room acoustic computer models and BREEAM assessments.

Damian Kelly meets the BREEAM definition of a "*suitably qualified acoustician*".

3.3 AWN Consulting Limited

AWN Consulting is a multidisciplinary engineering consultancy offering specialist design advice in respect of Architectural and Building Acoustics. It is part of the Trinity Group with its Head Office in Dublin. AWN Consulting's acoustics team comprises seventeen suitably qualified engineers with a total of over 180 man years spent working in the area, making it the largest and most experienced group of its type in Ireland, uniquely positioned to undertake a wide variety of projects.

AWN Consulting is a Member of the Association of Noise Consultants.

4.0 ENVIRONMENTAL NOISE LEVELS

Noise surveys were completed by Byrne Environmental in order to quantify the existing varying noise environment across the site *i.e.* the noise environment at the facades of the nearest noise sensitive locations. It is understood all surveys were conducted in general accordance with ISO 1996-2: 2017: *Acoustics – Description and measurement and assessment of environmental noise. Part 2 – Determination of sound pressure levels*. The specific details for each of the noise surveys will be set out in the following sections.

4.1 Survey Locations

Five monitoring locations (A, B, C, D and E) were chosen in the vicinity of the site, representative of the noise climate within the development site and the facades of the nearest existing noise sensitive properties. The monitoring locations are described below and shown in Figure 1.

Figure 1 Noise Survey Locations

Location A Located at a point on the Northern boundary of the site at the junction of the Dundrum Bypass and Dundrum Main Street. Measurements were completed over 1 hour during a typical daytime period.

Location B Located at a point along the western boundary of the site that adjoins the Dundrum Bypass. Measurements were completed of a 24 hour period at this location.

Location C Located in the vicinity of the Holy Cross Church on the southern end of the site. Measurements were completed over 1 hour during a typical daytime period.

Location D Located at a point along the eastern boundary of the site that adjoins the Dundrum Main Street. Measurements were completed of a 24 hour period at this location.

Location E Located in The Laurels estate to the west of the site. Measurements were completed over 1 hour during a typical daytime period.

4.2 Survey Periods

The following survey periods are noted:

Location	Survey Period
A	22/10/2021 14:20 to 15:20 hrs
B	19/10/2021 09:33 hrs to 20/10/2021 09:00 hrs
C	22/10/2021 10:26 to 11:26 hrs
D	22/10/2021 09:55 hrs to 23/10/2021 09:00 hrs
E	22/10/2021 08:56 to 09:56 hrs

Table 2 Survey Periods

4.3 Instrumentation

The surveys were performed using the equipment listed in Table 3 below.

Measurement	Manufacturer	Equipment Model	Serial Number	Calibration date
Sound Level Meter	Brüel & Kjær	2250	2550421	SLM210126 29/01/21
			2626987	SLM210127 29/01/21
			2847279	SLM210128 29/02/21
Calibrator	Brüel & Kjær	Type 4231	2652058	AC210129 07/04/21

Table 3 Noise Monitoring Equipment Details

4.4 Measurement Parameters

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

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

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

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

The “A” suffix denotes the fact that the sound levels have been “A-weighted” in order to account for the non-linear nature of human hearing. All sound levels in this report are expressed in terms of decibels (dB) relative to $2x10^{-5}$ Pa.

4.5 Review of Results

Location A

Table 4 summarises the measured daytime noise levels for survey Location A. Subjective observations during the setup and removal of the monitoring equipment noted that the primary contributor to noise build-up was noted as road traffic noise.

Period	Sound Pressure Level (dB re. 2x10^{-5} Pa)		
	$L_{Aeq,1hr}$	L_{AFmax}	$L_{A90,1hr}$
Daytime	65	79	57

Table 4 Summary of Measured Noise Levels at Location A

At this location background noise levels are the order of 57dB L_{A90} during daytime periods.

Location B

Figure 2 presents the noise levels measured over the 24 hour monitoring period conducted at this location.

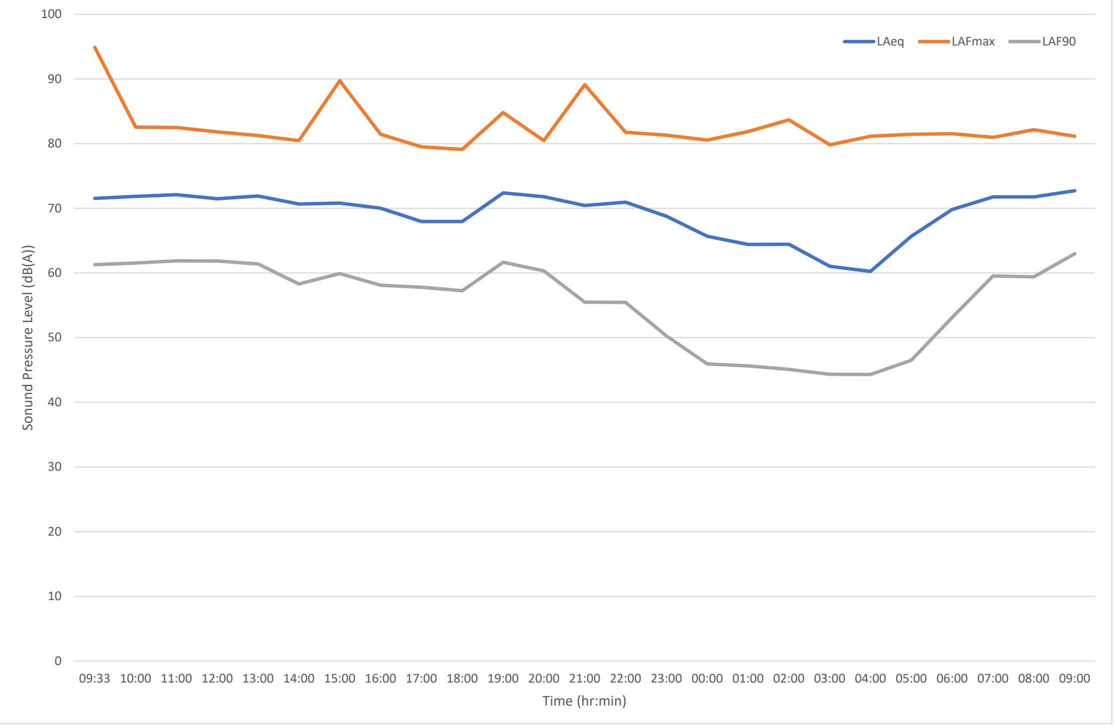


Figure 2 Noise Measurements at Location B

Table 5 summarises the measured daytime and night time noise levels for survey Location B. Subjective observations during the setup and removal of the monitoring equipment noted that the primary contributor to noise build-up was noted as road traffic noise.

At this location the lowest background noise levels are considered to be the order of 55dB L_{A90} during daytime periods and 44dB L_{A90} during night time.

Period	Sound Pressure Level (dB re. 2x10^{-5} Pa)		
	$L_{Aeq,T}$	L_{AFmax}	$L_{A90,1hr}$
Daytime (07:00 to 19:00 hrs)	Average: 71 Range: 68 to 73	79 – 95	55 – 63
Night (07:00 to 23:00 hrs)	Average: 66 Range: 60 to 70	80 – 84	44 – 53

Table 5 Summary of Measured Noise Levels at Location B

Location C

Table 6 summarises the measured daytime noise levels for survey Location C. Subjective observations during the setup and removal of the monitoring equipment noted that the primary contributor to noise build-up was noted as road traffic noise.

Period	Sound Pressure Level (dB re. 2x10^{-5} Pa)		
	$L_{Aeq,1hr}$	L_{AFmax}	$L_{A90,1hr}$
Daytime	63	83	57

Table 6 Summary of Measured Noise Levels at Location C

At this location background noise levels are the order of 57dB L_{A90} during daytime periods.

Location D

Figure 3 presents the noise levels measured over the 24 hour monitoring period conducted at this location.

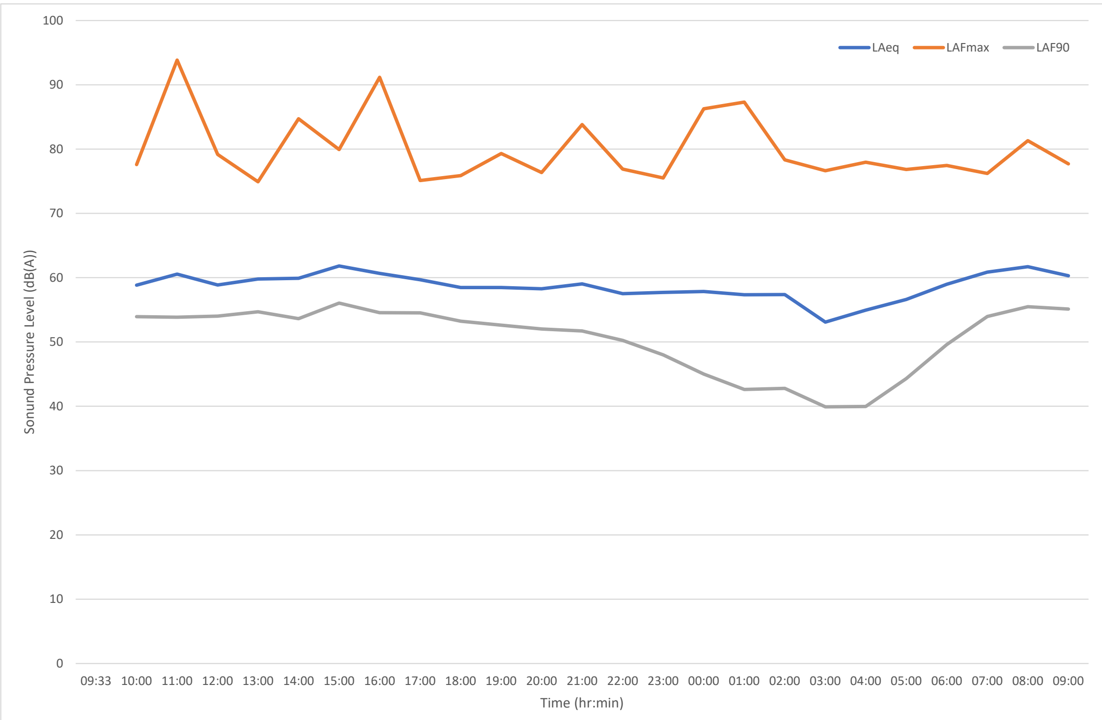


Figure 3 Noise Measurements at Location D

Table 7 summarises the measured daytime and night time noise levels for survey Location D. Subjective observations during the setup and removal of the monitoring equipment noted that the primary contributor to noise build-up was noted as road traffic noise.

At this location the lowest background noise levels are considered to be the order of 50dB L_{A90} during daytime periods and 40dB L_{A90} during night time.

Period	Sound Pressure Level (dB re. 2x10^{-5} Pa)		
	$L_{Aeq,T}$	L_{AFmax}	$L_{A90,1hr}$
Daytime (07:00 to 19:00 hrs)	Average: 60 Range: 58 to 62	75 – 94	50 – 56
Night (07:00 to 23:00 hrs)	Average: 57 Range: 53 to 59	76 – 87	40 – 50

Table 7 Summary of Measured Noise Levels at Location D

Location E

Table 8 summarises the measured daytime noise levels for survey Location E. Subjective observations during the setup and removal of the monitoring equipment noted that the primary contributor to noise build-up was noted as road traffic noise.

Period	Sound Pressure Level (dB re. 2x10^{-5} Pa)		
	$L_{Aeq,1hr}$	L_{AFmax}	$L_{A90,1hr}$
Daytime	55	73	51

Table 8 Summary of Measured Noise Levels at Location E

At this location background noise levels are the order of 51dB L_{A90} during daytime periods.

4.6 Local Authority Noise Mapping

Figures 4 and 5 present the L_{den} and L_{night} noise maps produced by Dún Laoghaire-Rathdown County Council for the area in question. Figure 6 and 7 show the equivalent rail noise maps prepared by the same body.

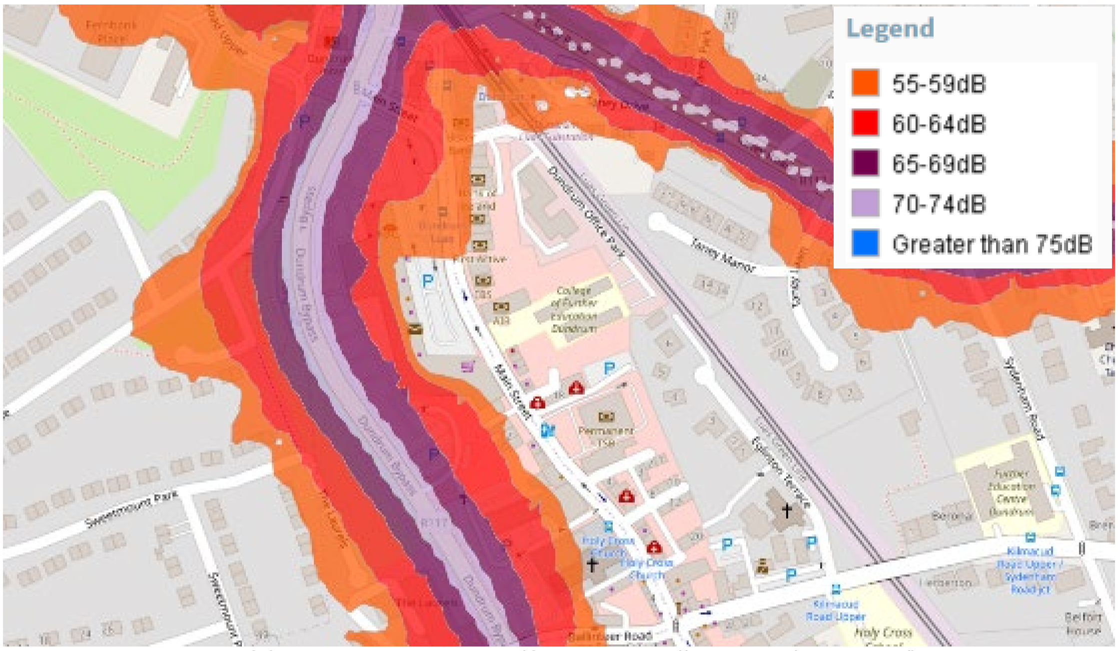


Figure 4 DLRCC L_{den} Road Noise Map (Source: https://gis.epa.ie/EPAMaps/)

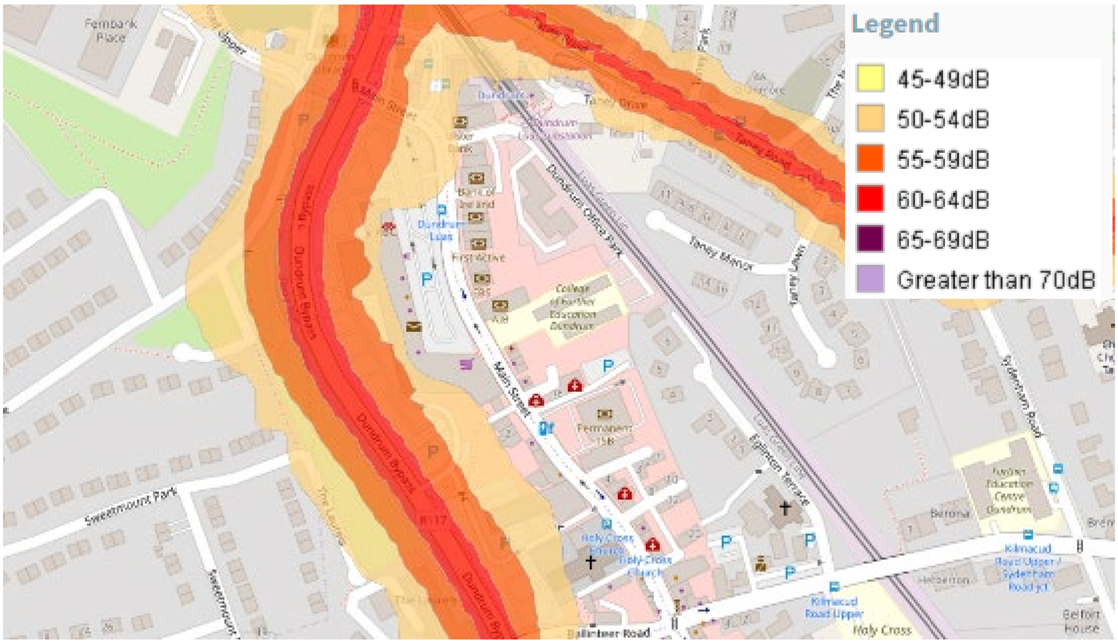


Figure 5 DLRCC L_{night} Noise Map (Source: https://gis.epa.ie/EPAMaps/)

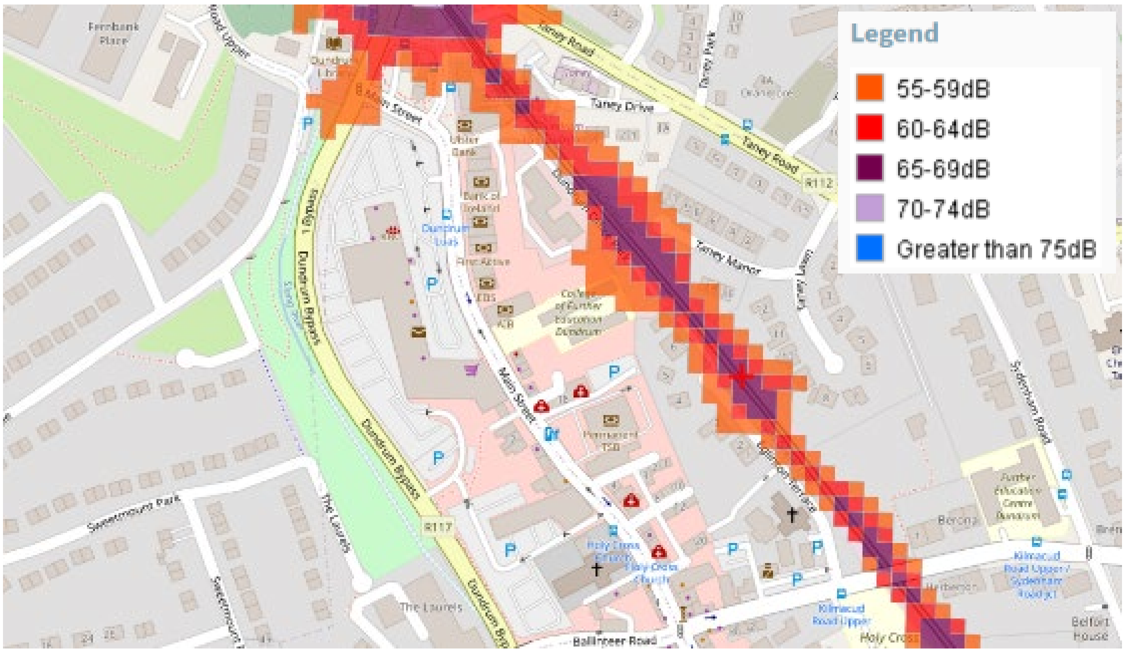


Figure 6 DLRCC L_{den} Rail Noise Map (Source: https://gis.epa.ie/EPAMaps/)

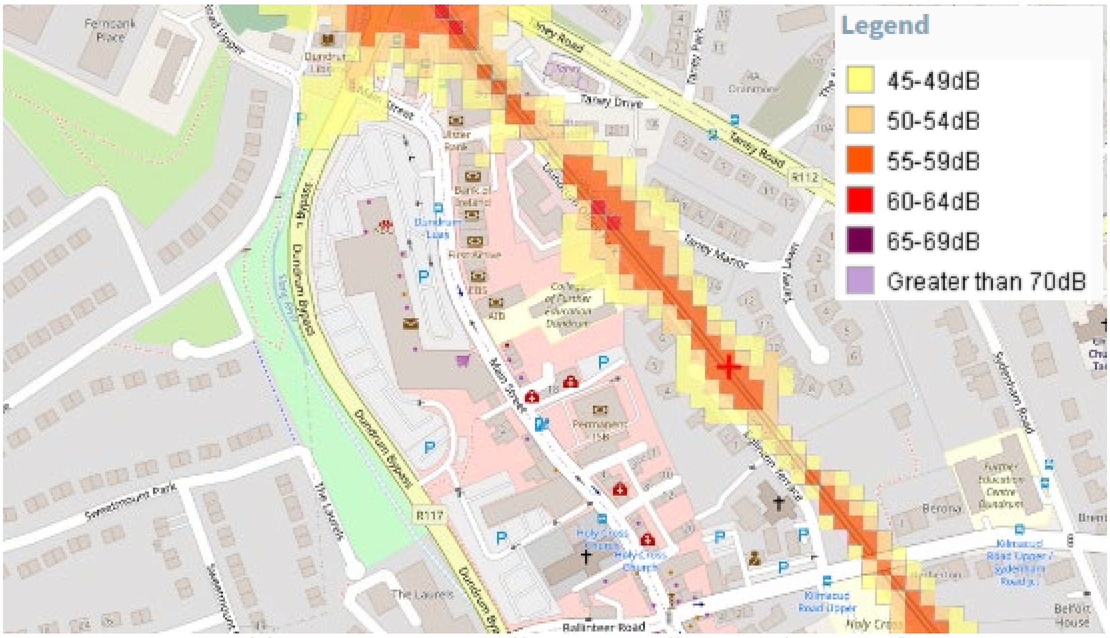


Figure 7 DLRCC L_{night} Rail Noise Map (Source: https://gis.epa.ie/EPAMaps/)

4.7 Assumed Noise Levels for Stage 3 Assessment

Based on information reviewed the following noise levels are incident on the buildings across the site:

Figure 8 Key to Assumed Noise Levels (Free Field)

Colour	Assumed Daytime Level dB $L_{Aeq,16hr}$	Assumed Night Level dB $L_{Aeq,8hr}$	Assumed dB L_{AFmax}
Red	70	65	85
Orange	60 to 65	55 to 60	75 – 80
Green	≤55	≤45	65

Table 9 Assumed Noise Levels for Stage 3 Assessment

5.0 FAÇADE PERFORMANCE REQUIREMENTS

Façade sound insulation performance requirements have been derived based on the information outlined in the previous sections. Assumed source noise levels and the are as per the discussions in Sections 2.2 and 4.7 respectively. The resultant requirements are summarised in Table 4.

Type	Façade Mark Up	Octave Band Centre Frequency (Hz)						Nominal dB R_w
		125	250	500	1k	2k	4k	
A	**Red**	25	32	37	42	45	45	40
B	**Orange**	22	27	32	37	42	42	37
C	**Green**	21	20	26	38	37	39	32

Table 10 Minimum Sound Insulation Performance Requirements (Sound Reduction Index (R), dB)

Note that non glazing elements are assumed to offer sound insulation performances some 10dB higher than those detailed in Table 10.

<u>Where is it proposed to introduce a trickle vent and / or wall vent within a space in order to provide required levels of ventilation these elements should be selected in order that the sound insulation performance of these items is sufficient in order to ensure that the overall level of sound insulation performance of the façade/glazing is preserved.</u>

Figure 9 Façade Performance Requirement Key (See Table 10)

APPENDIX A
GLOSSARY OF ACOUSTIC TERMINOLOGY

Ambient noise The totally encompassing sound in a given situation at a given time, usually composed of sound from many sources, near and far.

Absorption When sound is incident on a room surface such as a wall or ceiling, a certain fraction of the sound energy is absorbed and a certain fraction is reflected. The degree of absorption is termed the sound absorption coefficient (α). A surface with an absorption coefficient α = 0 represents 100% sound reflection and conversely a surface with an absorption coefficient α = 1 represents 100% sound absorption.

Background noise The steady existing noise level present without contribution from any intermittent sources. The A-weighted sound pressure level of the residual noise at the assessment position that is exceeded for 90 per cent of a given time interval, T ($L_{AF90,T}$).

Broadband Sounds that contain energy distributed across a wide range of frequencies.

dB Decibel – The scale in which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the RMS pressure of the sound field and the reference pressure of 20 micro-pascals (20 μPa).

dB L_{pA} An ‘A-weighted decibel’ – a measure of the overall noise level of sound across the audible frequency range (20 Hz – 20 kHz) with A-frequency weighting (i.e. ‘A’–weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.

Diffusion Large, flat sound reflective surfaces, such as plasterboard or timber ceilings, can create specular sound reflections where the angle of the reflected sound is equal to the angle of the incident sound (i.e. similar to a snooker ball bouncing off the cushion). Subjectively, this can create harshness to the sound heard by the listener. Sound diffusing treatments work by eliminating these specula reflections and spreading the reflected energy over a greater angle. This results in a more “diffuse” sound field with reflected sound energy arriving at the listener from many directions.

$D_{nT,w}$ A single number quantity which characteries the airborne sound insulation between rooms. See BS EN ISO 717-1:2020.

$D_{nT,w}$ + C_{tr} A single number quantity which characteries the airborne sound insulation between rooms using noise spectrum no. 2 as defined in BS EN ISO 717-1:2020. See BS EN ISO 717-1:2020.

Hertz (Hz) The unit of sound frequency in cycles per second.

APPENDIX A
GLOSSARY OF ACOUSTIC TERMINOLOGY (Continued…)

L_{AF90} Refers to those A-weighted noise levels in the lower 90 percentile of the sampling interval; it is the level which is exceeded for 90% of the measurement period. It will therefore exclude the intermittent features of traffic and is used to estimate a background level. Measured using the "Fast" time weighting.

$L_{Aeq,T}$ This is the equivalent continuous sound level. It is a type of average and is used to describe a fluctuating noise in terms of a single noise level over the sample period (T).The closer the L_{Aeq} value is to either the L_{AF10} or L_{AF90} value indicates the relative impact of the intermittent sources and their contribution. The relative spread between the values determines the impact of intermittent sources such as traffic on the background.

L_{AFN} The A-weighted noise level exceeded for N% of the sampling interval. Measured using the "Fast" time weighting.

$L_{Ar,T}$ The Rated Noise Level, equal to the L_{Aeq} during a specified time interval (T), plus specified adjustments for tonal character and impulsiveness of the sound.

L'_{nT} The impact sound pressure level in a stated frequency band, corrected for the reverberation time. See BS EN ISO 140-7:2020.

$L'_{nT,w}$ A single number quantity used to characterise the impact sound insulation of floors. See BS EN ISO 140-7:2020.

NRC Noise Reduction Coefficient – This is the average to the nearest multiple of 0.05, of the absorption coefficients measured in the octave bands centred on 250Hz, 500 Hz, 1kHz and 2kHz.

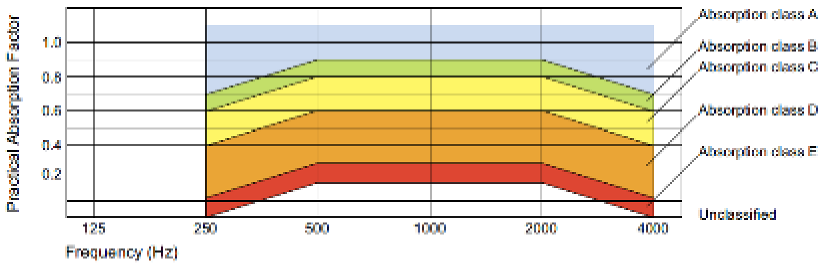


Figure A1 Absorption Classifications (According to EN ISO 11654)

Octave band A frequency interval, the upper limit of which is twice that of the lower limit. For example, the 1,000Hz octave band contains acoustical energy between 707Hz and 1,414Hz. The centre frequencies used for the designation of octave bands are defined in ISO and ANSI standards.

Rating level See $L_{Ar,T}$.

APPENDIX A
GLOSSARY OF ACOUSTIC TERMINOLOGY (Continued…)

RT *Reverberation Time* – The time which is taken for the reverberant sound energy in an enclosure to decay by 60dB after a source is turned off. Reverberation time is frequency dependent and it is customary to measure its value to octave or one-third octave bands. In this report RT's will be stated in terms of mid frequency values i.e. T_{mf}, T_{500Hz}.

R_w Weighted Sound Reduction Index – This is the value of the sound insulation performance of a partition or element measured under laboratory conditions. It is a weighted single figure index that is derived from values of sound insulation across a defined frequency spectrum. Technical literature typically presents sound insulation data in terms of the R_w parameter.

R'_w Weighted Apparent Sound Reduction Index – This is similar to R_w but is used to express *in-situ* sound insulation performance, where issues such as flanking issue noise transfer may affect the measured level. As stated previously, technical literature typically uses the R_w parameter. In order to reflect the likely *in-situ* performance of an element an appropriate correction should be applied for the expected reduction in performance. Note that in instances where significant flanking issues are present the *in-situ* performance may be further reduced.

T_{mf} Reverberation times in terms of *Tmf*, which is the arithmetic average of the reverberation times in the 500Hz,1kHz and 2kHz octave bands.

T_{500Hz} Mid frequency reverberation times in terms of *T500Hz*, which is reverberation times in the 500Hz octave band.

APPENDIX B
GLAZING SPECIFICATION
DUNDRUM PHASE 2 RESIDENTIAL DEVELOPMENT

Façade Sound Insulation Performance Specification

Reference: DK/21/12444NR03
Issue Date: 24 January 2022

1.0 INTRODUCTION

1.1 This specification contains the sound insulation performance requirements for external façade elements to be used in the Dundrum Phase 2 residential development.

1.2 The performance requirements set out herein are applicable to entire "glazing systems" and solid (i.e. opaque) elements of the façade.

1.3 For the purposes of assessing acoustic performance, "glazing system" shall be taken to mean any and all of the component parts that form part of the element under consideration, i.e. the glass, frames, seals, any openable elements, cladding material, insulation, plasterboard linings etc.

2.0 AIRBORNE SOUND INSULATION PERFORMANCE

2.1 The external glazing systems proposed for the development shall provide sound insulation performance that meets or exceeds the octave band and overall Sound Reduction Indices listed in Table 1.

Type	Façade Mark Up	Octave Band Centre Frequency (Hz)						Nominal dB R_w
		125	250	500	1k	2k	4k	
A	**Red**	25	32	37	42	45	45	40
B	**Orange**	22	27	32	37	42	42	37
C	**Green**	21	20	26	38	37	39	32

Table 1 Summary of Façade Sound Insulation Performance Requirements

2.2 Solid (i.e. opaque) elements of the façade shall provide sound insulation performance not less than 50dB R_w.

2.3 The façade contractor shall demonstrate that the proposed systems meet the relevant requirements by furnishing the results of sound insulation tests conducted in an acoustic test facility and/or the provision of detailed acoustic calculations completed by a suitably qualified acoustic consultant.

2.4 In the event that such data is not to hand, sound insulation tests should be conducted in accordance with the guidance set out in section 4.0 of this specification.

Figure 1 Façade Performance Mark Up

3.0 CONTROL OF FLANKING NOISE TRANSFER

3.1 Façades shall be designed such that values for sound insulation performance across vertical and horizontal junctions with separating partitions and floors respectively are equal to or greater than the figures given in Table 2.

Location	Weighted Flanking Normalized Level Difference ($D_{n,f,w}$, dB)
Apartments	58
Plant Rooms	58
All Other Locations	45

Table 2 Minimum Requirements for Flanking Noise Control ($D_{n,f,w}$, dB)

3.2 Sufficient data shall be furnished, in the form of test results and/or any corroborating analyses deemed necessary, in order to satisfactorily demonstrate compliance with the performance specification.

3.3 In the event that such data is not to hand, sound insulation tests should be conducted in accordance with the guidance set out in section 4.0 of this specification.

4.0 GENERAL REQUIREMENTS IN RESPECT OF LABORATORY TESTS

4.1 The guidance set out in this section is applicable in the event that it is deemed necessary to conduct sound insulation tests in order to demonstrate compliance with the performance specifications set out above.

4.2 Airborne sound insulation tests shall be conducted and reported fully in accordance with the guidance set out in BS EN ISO 10140: 2010: *Acoustics – Laboratory measurement of sound insulation of building elements – Part 2. Measurement of airborne sound insulation*.

4.3 The degree of flanking noise control afforded by the facade systems shall be demonstrated by way of laboratory measurements conducted in general accordance with BS EN ISO 10848-2: 2017: *Acoustics – Laboratory and field measurement of flanking transmission for airborne, impact and building service equipment sound between adjoining rooms – Application to Type B elements when the junction has a small influence*. The results of measurement shall be standardized to a reverberation time of 0.5 seconds and shall be weighted in accordance with BS EN ISO 717-1: 2013:

Acoustics – Rating of sound insulation in buildings and of building elements – Part 1: Airborne sound insulation.

4.4 Test samples shall be at least 10m^2 in area and shall be fully representative of all constituent components making up the element under consideration.

4.5 The acoustic test facility shall be suitably accredited or otherwise approved. Details of said facility shall be furnished at least eight weeks before the proposed test date.

4.6 Details of proposed tests shall be provided to the Architect and AWN Consulting at least eight weeks before the proposed test date.

4.7 The façade walling contractor shall provide test reports in English (or accompanied by a full English translation) demonstrating compliance with the required sound insulation performance.

4.8 Note that any and all tests may be witnessed by members of the Design Team.

5.0 IN-SITU PERFORMANCE

5.1 The glazing contractor shall ensure that the installation and workmanship is of such a standard as to ensure that the Apparent Sound Reduction Index (R') in any one octave band is no more than 2dB lower than the corresponding value as listed in Table 1.

5.2 Note that *in-situ* performance may be verified by way of tests conducted in accordance with the guidance set out in BS EN ISO 16283: 2016: *Acoustics – Field measurement of sound insulation in buildings and of building elements – Part 3: Façade sound insulation*.

5.3 The glazing and or curtain walling contractor shall undertake all works necessary to ensure that there is no significant occurrence of noise as result of creaking, rattling, whistling or any other noises due to the effects of thermal/structural movement or wind/air movement. The maxima associated with such noise shall not be permitted to exceed an in-room level of 35dB L_{AFmax}.

APPENDIX 13A: RECORD OF THE EXISTING BUILDINGS

<u>1 to 3 Glenville Terrace, Main Street Dundrum D14 KF67, D14 E6N3, D14 N6P0</u>

Architectural Description:

Roof: slated, with decorative ridge tiles. The roof comes down to an eaves supported by timber consoles.

Rainwater goods: upvc.

Walls: poly chromatic blue bricks, predominantly red with the use of darker and lighter bricks in string courses and segmental arches around the openings. Granite plinths and entrance steps. The rear elevations are rendered in pebbledash and painted in part

Windows: segmental headed two over two sash windows in segmental arched openings with granite cills. The rear windows are two over two sashed in rectangular openings, where they have not been replaced with upvc

Doors: round headed openings with fanlights (originally radial), console brackets and four panel doors. The doors to the rear have been replaced.

Interior: Internal inspection revealed surviving architectural features at ground and first floor levels.

The terrace is set back from the footpath and each of the houses have a small garden to the front that is surrounded with cast iron railings set in a granite plinth.

See Method Statement for Conservation – Appendix 13B

Plate 13B.1. 1 to 3 Glenville Terrace, Ground Floor Plan highlighting surviving architectural features

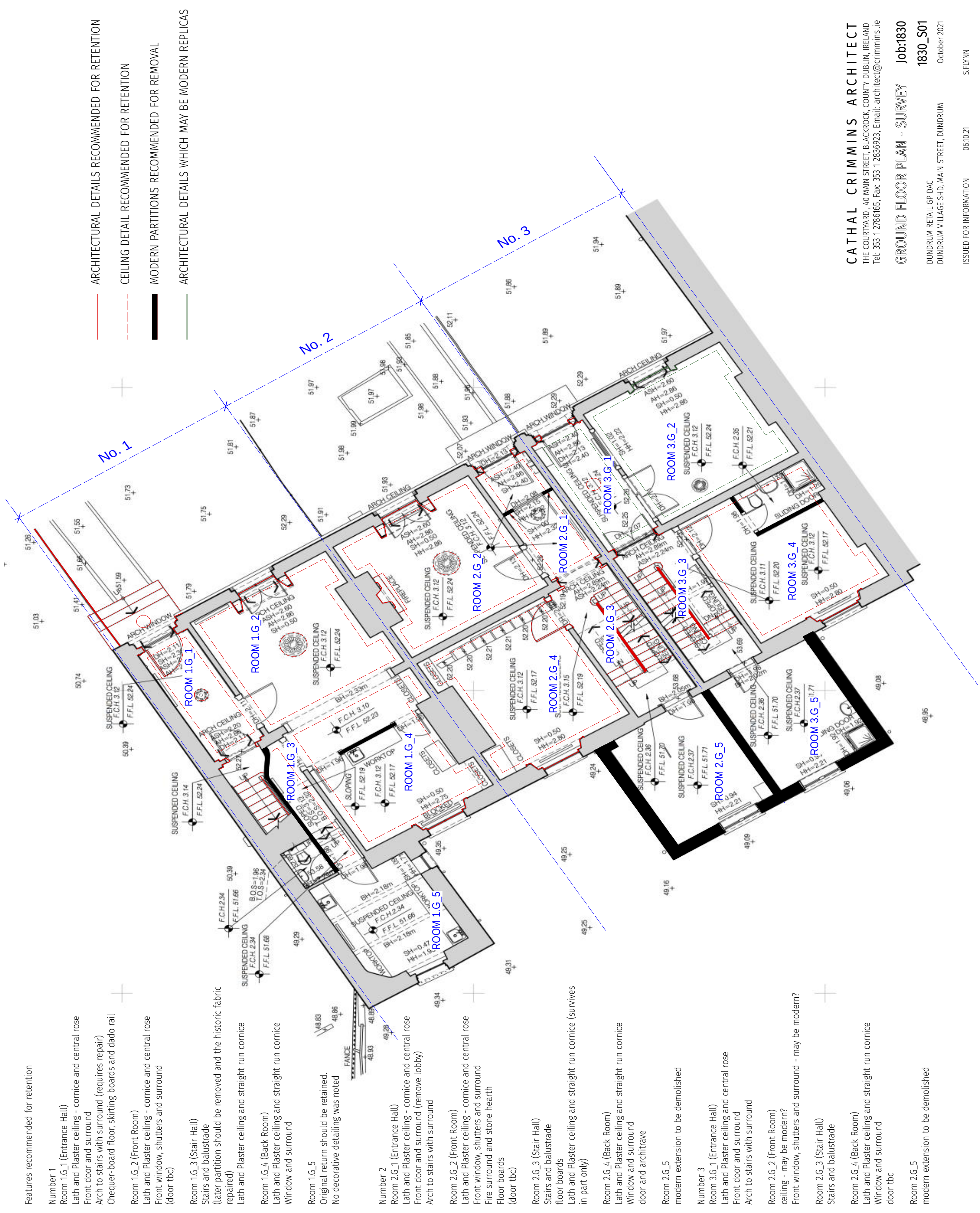
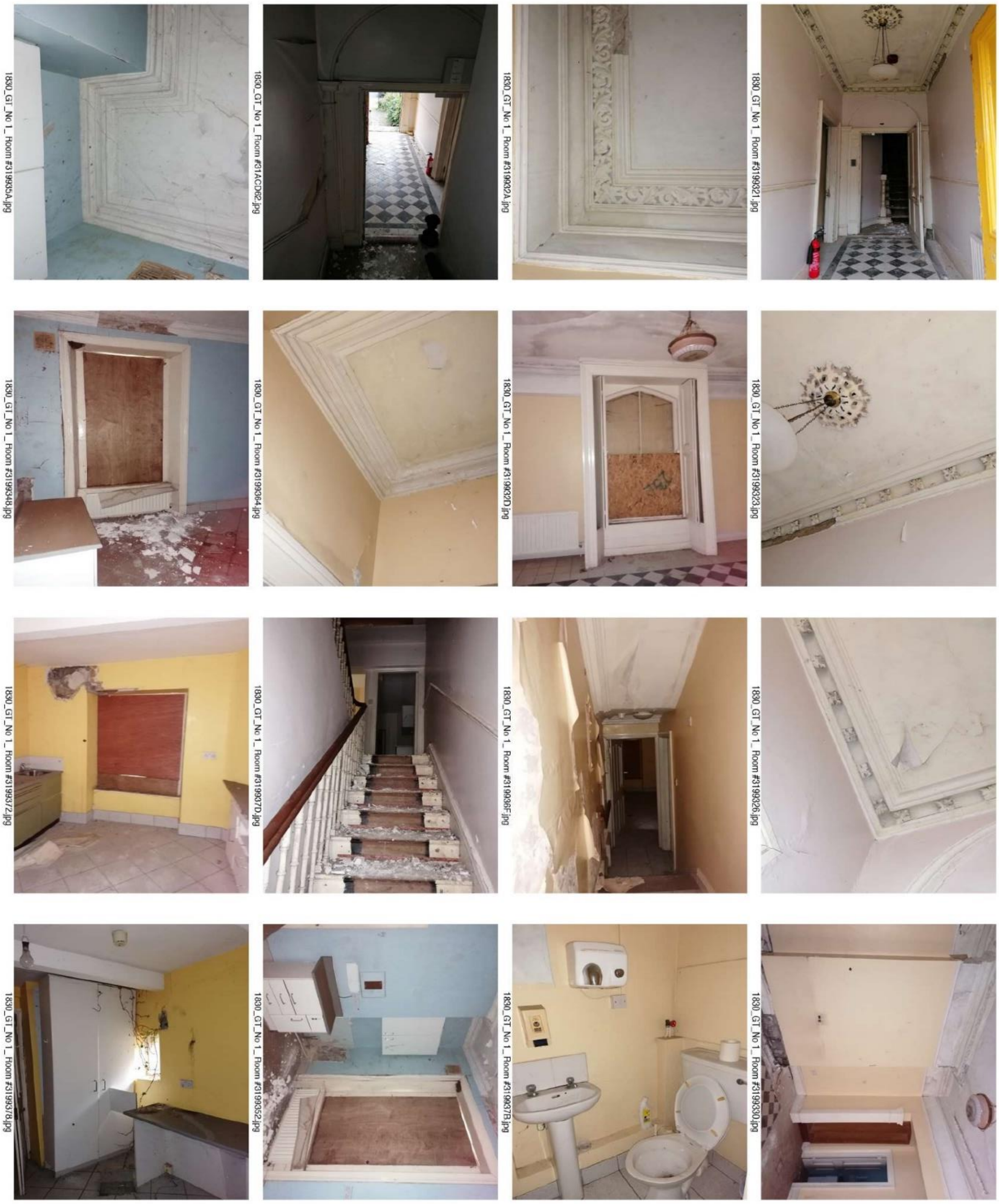


Plate 13B.2. No.1 Glenville Terrace, Ground Floor Record Photographs



1830_GT_No 1_ Room #319935A.jpg
1830_GT_No 1_ Room #31ACD62.jpg
1830_GT_No 1_ Room #319932A.jpg
1830_GT_No 1_ Room #3199321.jpg
1830_GT_No 1_ Room #3199348.jpg
1830_GT_No 1_ Room #3199364.jpg
1830_GT_No 1_ Room #319932D.jpg
1830_GT_No 1_ Room #3199323.jpg
1830_GT_No 1_ Room #3199372.jpg
1830_GT_No 1_ Room #319937D.jpg
1830_GT_No 1_ Room #319936F.jpg
1830_GT_No 1_ Room #3199326.jpg
1830_GT_No 1_ Room #3199378.jpg
1830_GT_No 1_ Room #3199352.jpg
1830_GT_No 1_ Room #319937B.jpg
1830_GT_No 1_ Room #3199330.jpg

Plate 13B.3. No.2 Glenville Terrace, Ground Floor Record Photographs


1830_GT_No 2_Room 2#31992FD.jpg


1830_GT_No 2_Room 2#319930A.jpg


1830_GT_No 2_Room 2#31992CC.jpg


1830_GT_No 2_Room 2#3199302.jpg


1830_GT_No 2_Room 2#31992E2.jpg


1830_GT_No 2_Room 2#31992F4.jpg


1830_GT_No 2_Room 2#3199304.jpg


1830_GT_No 2_Room 2#31992C9.jpg


1830_GT_No 2_Room 2#31992CF.jpg


1830_GT_No 2_Room 2#31992F9.jpg


1830_GT_No 2_Room 2#3199307.jpg


1830_GT_No 2_Room 2#31992F0.jpg

Plate 13B.4. No.3 Glenville Terrace, Ground Floor Record Photographs

Plate 13B.5. 1 to 3 Glenville Terrace, First Floor Plan highlighting surviving architectural features


1830_GT_No 1_ Room #3199387.jpg


1830_GT_No 1_ Room #31ACD4D.jpg


1830_GT_No 1_ Room #31993A0.jpg


1830_GT_No 1_ Room #319938C.jpg


1830_GT_No 1_ Room #3199381.jpg


1830_GT_No 1_ Room #31ACD51.jpg


1830_GT_No 1_ Room #31993A3.jpg


1830_GT_No 1_ Room #3199392.jpg


1830_GT_No 1_ Room #3199389.jpg


1830_GT_No 1_ Room #31ACD54.jpg


1830_GT_No 1_ Room #31993A7.jpg


1830_GT_No 1_ Room #3199396.jpg


1830_GT_No 1_ Room #31ACD5C.jpg


1830_GT_No 1_ Room #31993AE.jpg


1830_GT_No 1_ Room #3199399.jpg

Plate 13B.6. No.1 Glenville Terrace, First Floor Record Photographs


1830_GT_No 1_ Room #3199387.jpg


1830_GT_No 1_ Room #31ACD4D.jpg


1830_GT_No 1_ Room #31993A0.jpg


1830_GT_No 1_ Room #319938C.jpg


1830_GT_No 1_ Room #3199381.jpg


1830_GT_No 1_ Room #31ACD51.jpg


1830_GT_No 1_ Room #31993A3.jpg


1830_GT_No 1_ Room #3199392.jpg


1830_GT_No 1_ Room #3199389.jpg


1830_GT_No 1_ Room #31ACD54.jpg


1830_GT_No 1_ Room #31993A7.jpg


1830_GT_No 1_ Room #3199396.jpg


1830_GT_No 1_ Room #31ACD5C.jpg


1830_GT_No 1_ Room #31993AE.jpg


1830_GT_No 1_ Room #3199399.jpg

Plate 13B.7. No.2 Glenville Terrace, First Floor Record Photographs

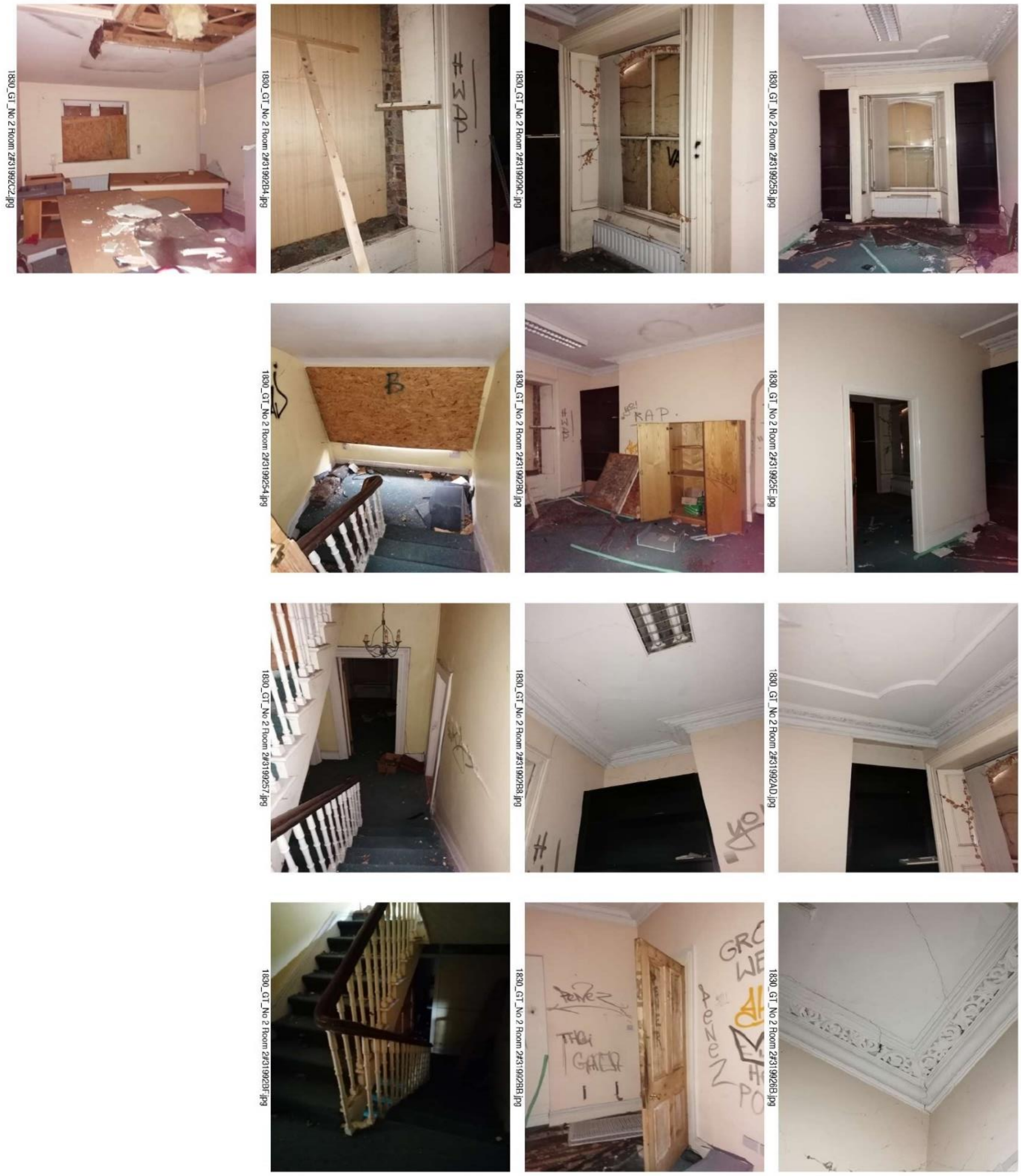
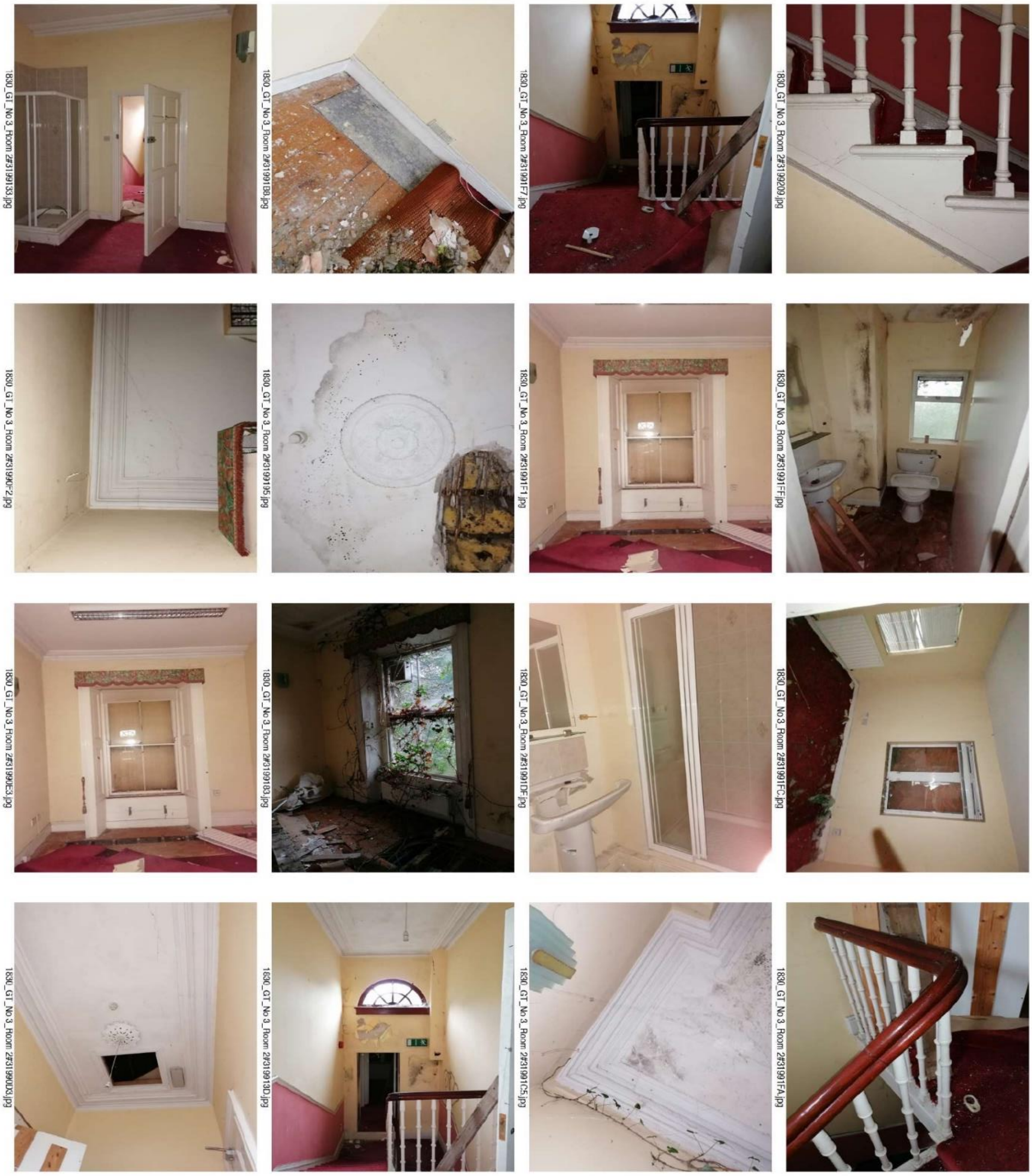


Plate 13B.8. No.3 Glenville Terrace, First Floor Record Photographs

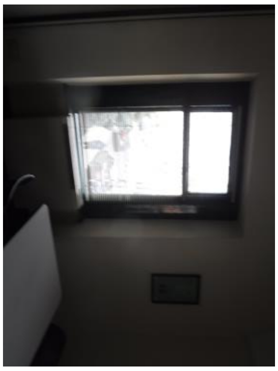


<u>4 Glenville Terrace Main Street, Dundrum D14 E261</u>

Architectural Description:

Roof:	Hipped and slated, with ridge tiles.
Walls:	The quoins at the corners have also been painted as have the moulded architraves around the windows. The cornices, quoins, reveals and architraves have been picked out in green on both the north and east elevations. The east wall is painted green and the north white. The modern extensions to the rear are plain rendered.
Openings:	There are four windows on the first floor, three on the east elevation and one on the north. All are single pane sash windows. Curiously, the central window on the front elevation is smaller, with a cill raised slightly higher than the cills on the windows on ether side. This is to facilitate the shop front below. It is not known if this is an original feature of if it has been altered deliberately. The shop front fascia is between two pairs of console brackets.
Interior:	Number 4 has been altered internally with few features of note remaining. Surviving features include the splayed window reveals.

Plate 13B.9. 4 Glenville Terrace



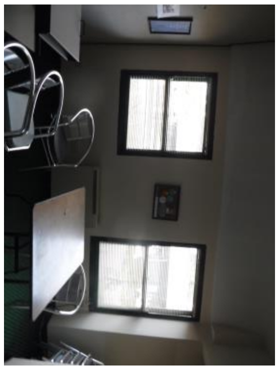
1830_GT _No 4_FF Room 2 DSCF3945.JPG

1830_GT _No 4_IMG_20210910_132246.jpg

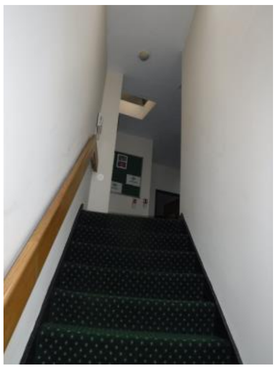
1830_GT _No 4_FF Room 3 DSCF3946.JPG

1830_GT _No 4 IMG_20210910_132140.jpg

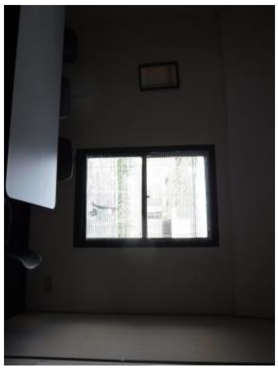
1830_GT _No 4_FF Room 4 DSCF3942.JPG



1830_GT _No 4_FF Room 1 DSCF3943.JPG



1830_GT _No 4_FF stairs DSCF3941.JPG



1830_GT _No 4_FF Room 2 DSCF3944.JPG

<u>Former Post Office, Main Street, Dundrum D14 V8K8</u>

Architectural Description:

Roof: Hipped and slated, with ridge tiles. Red brick stacks with clay pots which rise from the south elevation. The southernmost is a modern replacement. The roof of the return is pitched and runs in an east–west direction. The south side of the pitch is tiled with natural slate, while the north side has replacement asbestos tiles. Stone ridge tiles run along the spine of the pitch and a single roof light is located on each side of it. A large rendered chimney stack is centrally located at the base of the north side. This chimney stack has a cement capping on which rest four decorative clay pots.

Rainwater goods: Cast-iron. Numerous PVC and metal pipes run in a confused fashion down the south elevation of the return. A hole has been broken through the wall above the ground floor window to allow a metal pipe to exit.

Walls: partially rendered. The first floor has not been rendered and is composed of red bricks beneath which there is a red brick string course. The ground floor has been rendered with pebbledash and painted. The rear elevation is much the same, except there is no string course and yellow bricks are used. The entire return elevation is pebble-dashed. Jackie Jordan of Margaret Gowen & Co. Ltd carried out an architectural appraisal for Burke-Kennedy Doyle in 2000. In Jordan's assessment, the three bay two story building to the front is Victorian or 19th century which corresponds with the cartographic evidence. She suggests that the single storey over basement return at the rear and the ground and basement façades of the rear elevation return are earlier however, and dates to the Georgian (18th or early 19th century) period. Jordan states that the arrangement of the openings on the lower two floors of the elevation, along with the use of soft red brick as a building material, suggests an eighteenth/early nineteenth century construction date.

Openings: Windows are segmental headed single pane sash windows in segmental arched openings with granite cills on the first floor and a square headed single pane sash window in a moulded surround in the ground floor. The south-facing elevation of the return has two window opes on each floor, the east opes being much smaller than the west opes. None of the opes on the rear elevation are aligned with each other. Both basement opes have been blocked up but still retain their original granite cills. The small ope on the ground floor retains six panes of the original nine-pane fixed sash but has lost its granite cill. The larger window ope to the west has a replacement two-over-two paned sash. The rear, west-facing gabled wall has a single centrally positioned window ope on each floor. As with the other basement opes, this one is blocked up. The ground floor ope has a replacement two-over-two paned sash.

Doors: The two doors at ground level have moulded surrounds. One is obscured by a modern roller shutter. The other has a square headed fanlight and a six panel door.

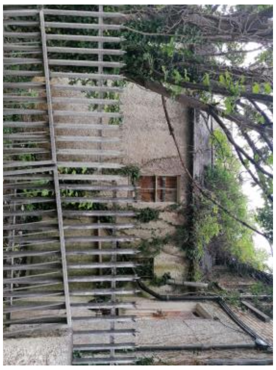
Interior: The only surviving interior joinery on the ground floor is the skirting and part of a sash window that is retained on the east side. The original skirting remains intact, as do the timber floorboards, which run in an east-west direction.

The building is set back from the footpath and the area in front is paved, with a brick wall/flower bed in front.

Plate 13B.10. Former Post Office, Main Street, Photographs

1830_MS_PO_ GF DSCF3926.JPG

1830_MS_PO_ IMG_20210910_132055.jpg



1830_MS_PO_ IMG_3118.jpeg

1830_MS_PO_ GF DSCF3927.JPG

1830_MS_PO_ DSCF3924.JPG

1830_MS_PO_ IMG_20210910_132145.jpg

1830_MS_PO_ GF DSCF3928.JPG

1830_MS_PO_ IMG_20210910_132034.jpg

1830_MS_PO_ IMG_20210910_132046.jpg

1830_MS_PO_ GF DSCF3930.JPG

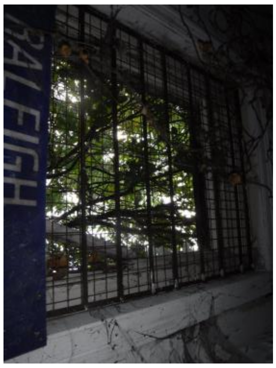
1830_MS_PO_ GF DSCF3925.JPG

1830_MS_PO_ DSCF3920.JPG

Plate 13B.11. Former Post Office, Main Street, Photographs


1830_MS_PO_ FF DSCF3939.JPG


1830_MS_PO_ FF DSCF3935.JPG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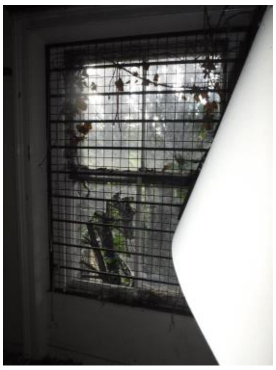
1830_MS_PO_ FF DSCF3940.JPG


1830_MS_PO_ FF DSCF3936.JPG


1830_MS_PO_ FF DSCF3932.JPG


1830_MS_PO_ FF DSCF3937.JPG


1830_MS_PO_ FF DSCF3933.JPG


1830_MS_PO_ FF DSCF3938.JPG


1830_MS_PO_ FF DSCF3934.JPG

<u>13 and 13a Main Street, Dundrum D14 A0Y0 and D14 P2X8</u>

Architectural Description:

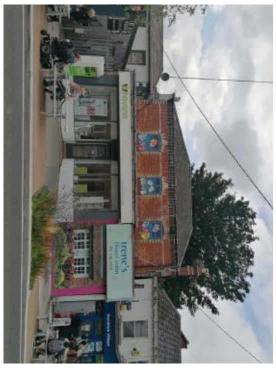
Roof:	The original building has a hipped and slated roof with a poly chromatic (mainly red) brick stack rising from the north elevation. Beneath the slates there is a poly chromatic brick cornice and gutters.
Walls:	The side and rear elevations are rendered. The front elevation is red brick with pale brick string courses, quoins, reveals and architraves. Modern shop fronts.
Openings:	The windows to the front appear to retain their single pane sash windows. The windows to the side and rear have had their windows replaced with uPVC fenestration. These appear to be in square headed or vary slightly arched openings. They probably segmental arched like the windows to the front, but this has been obscured with pebbledash. The openings are round headed with segmental poly chromatic arches and granite cills.
Interior:	

There is a poor quality single storey flat roofed extension at the north end of the rear elevation. It is rendered and has a galvanised door, so probably houses a boiler.

Plate 13B.12. 13 and 13a Main Street, Photographs


1830_MS_No 13/a_ FF DSCF3916.JPG

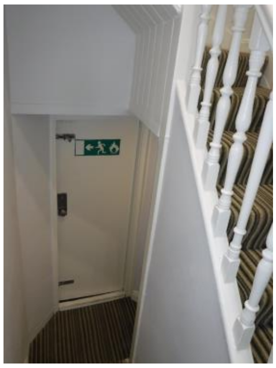

1830_MS_No 13/a_ Stairway DSCF3912.JPG

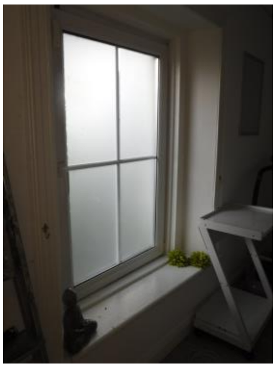

1830_MS_No 13/a_ IMG_20210910_132256.jpg

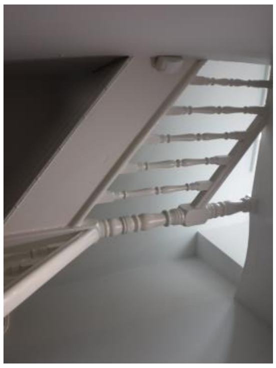

1830_MS_No 13/a_ Upper Hallway DSCF3911.JPG


1830_MS_No 13/a_ DSCF3905.JPG


1830_MS_No 13/a_ FF DSCF3913.JPG


1830_MS_No 13/a_ Stairway DSCF3909.JPG


1830_MS_No 13/a_ FF DSCF3914.JPG


1830_MS_No 13/a_ Stairway DSCF3910.JPG

<u>15A Main Street, Dundrum D14 YP78</u>

Architectural Description:

Roof: Hipped in part and gabled at the rear. There is a tall stack on the gable.

Walls: The walls of the original building to the rear have been rendered with pebbledash and painted, with the window surrounds and quoins picked out in black. The fenestration has been replaced with aluminium windows, but they retain their granite cills. There is a three storey return extending west from the rear elevation, ending in a gable with a chimney stack. There are three windows visible, one on each floor and they are similar to those on the front elevation. The return has been extended northwards with a two storey modern flat roofed extension. This obscures most of the north elevation of the return.

Openings: Windows are There is one window on the north elevation f this extension. It is similar to those on the original building.

Interior:

Plate 13B.13. 15a Main Street, Photographs


1830_MS_No 15/a_ GF DSCF3886.JPG


1830_MS_No 15/a_ DSCF3876.JPG

1830_MS_No 15/a_ IMG_20210910_132314.jpg


1830_MS_No 15/a_ GF Hall DSCF3887.JPG


1830_MS_No 15/a_ GF DSCF3882.JPG


1830_MS_No 15/a_ DSCF3873.JPG


1830_MS_No 15/a_ GF Hall DSCF3888.JPG


1830_MS_No 15/a_ GF Hall DSCF3884.JPG


1830_MS_No 15/a_ DSCF3875.JPG


1830_MS_No 15/a_ Return DSCF3889.JPG


1830_MS_No 15/a_ GF DSCF3885.JPG


1830_MS_No 15/a_ DSCF3877.JPG

Plate 13B.14. 15a Main Street, Photographs

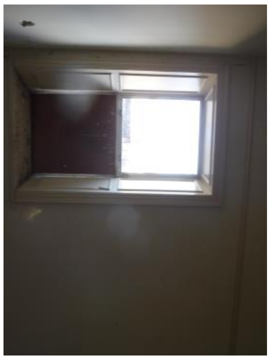
1830_MS_No 15/a_ FF Hall DSCF3890.JPG

1830_MS_No 15/a_ FF Hall DSCF3891.JPG

1830_MS_No 15/a_ FF DSCF3892.JPG

1830_MS_No 15/a_ Return DSCF3893.JPG

1830_MS_No 15/a_ FF DSCF3894.JPG



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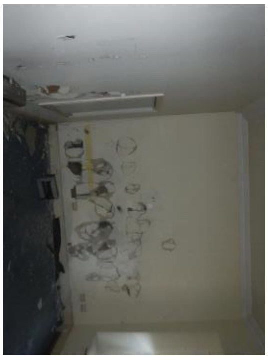
1830_MS_No 15/a_ FF DSCF3899.JPG



1830_MS_No 15/a_ FF DSCF3900.JPG

1830_MS_No 15/a_ FF DSCF3901.JPG

Rear of the Mulvey's Pharmacy and Mulveys Hardware, 16 to 17 Main Street, Dundrum D14 H0C9 and D14 A250

Architectural Description:

Roof: Replacement slate roof, the stacks having been removed

Rainwater goods: Replacement gutters and down pipes

Walls: rendered externally with a dash render on the rear elevation.

Openings: Fenestration has all been replaced with upvc casements or have been blocked up. Granite cills were evident on the rear windows to the first floor. These windows retain their splayed reveals internally. External doors are all modern replacements but timber panelled doors and their moulded surrounds were noted on both the first and ground floor levels internally

Interior: Some surviving sections of moulded cornice, and original joinery such as doors, doorcases, skirting and dado rail to the old stairway were identified. Few other features survive internally and the arrangement of the rooms has also been altered.

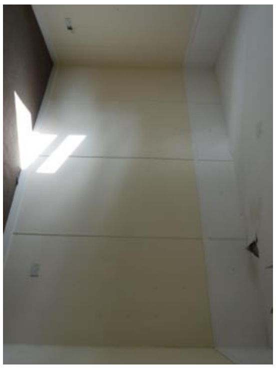
Plate 13B.15. 16 to 17 Main Street, Photographs

1830_MS_No 16/17_ FF DSCF3839.JPG

1830_MS_No 16/17_ IMG_3126.jpeg

1830_MS_No 16/17_ IMG_20210910_132347.jpg

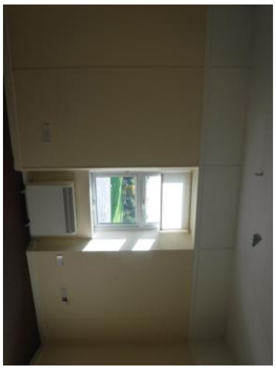
1830_MS_No 16/17_ FF DSCF3840.JPG



1830_MS_No 16/17_ DSCF3854.JPG

1830_MS_No 16/17_ Sill to front Elevation DSCF3843.JPG

1830_MS_No 16/17_ FF DSCF3841.JPG



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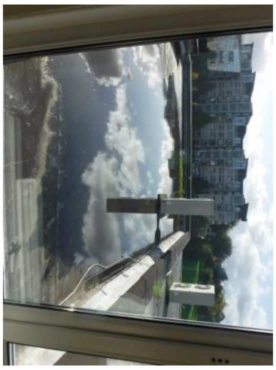


1830_MS_No 16/17_ DSCF3852.JPG

1830_MS_No 16/17_ FF DSCF3842.JPG

1830_MS_No 16/17_ DSCF3870.JPG

1830_MS_No 16/17_ DSCF3853.JPG

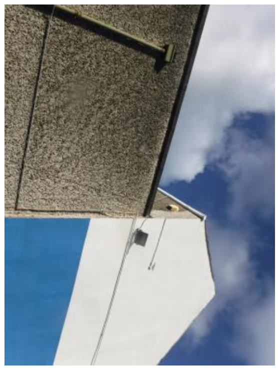


Plate 13B.16. 16 to 17 Main Street, Photographs


1830_MS_No 16/17_ GF DSCF3856.JPG

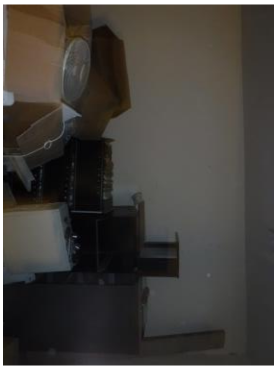

1830_MS_No 16/17_ FF DSCF3848.JPG


1830_MS_No 16/17_ FF DSCF3844.JPG


1830_MS_No 16/17_ GF DSCF3857.JPG


1830_MS_No 16/17_ FF DSCF3849.JPG


1830_MS_No 16/17_ FF DSCF3845.JPG


1830_MS_No 16/17_ GF DSCF3858.JPG


1830_MS_No 16/17_ FF DSCF3850.JPG


1830_MS_No 16/17_ FF DSCF3846.JPG


1830_MS_No 16/17_ GF DSCF3859.JPG


1830_MS_No 16/17_ GF DSCF3855.JPG


1830_MS_No 16/17_ FF DSCF3847.JPG

Plate 13B.17. 16 to 17 Main Street, Photographs


1830_MS_No 16/17_ GF DSCF3868.JPG


1830_MS_No 16/17_ GF DSCF3864.JPG


1830_MS_No 16/17_ GF DSCF3860.JPG


1830_MS_No 16/17_ GF DSCF3869.JPG

1830_MS_No 16/17_ GF DSCF3865.JPG


1830_MS_No 16/17_ GF DSCF3861.JPG


1830_MS_No 16/17_ GF DSCF3866.JPG


1830_MS_No 16/17_ GF DSCF3862.JPG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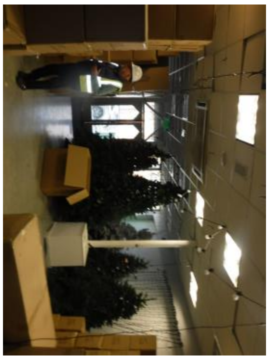
1830_MS_No 16/17_ GF DSCF3863.JPG

APPENDIX 13B: CONSERVATION METHOD STATEMENT FOR THE PROPOSED REPAIR OF NO.'s 1-3 GLENVILLE TERRACE

CONSERVATION METHOD STATEMENT
FOR THE PROPOSED REPAIR OF 1-3 GLENVILLE TERRACE

1.0 INTRODUCTION

This Conservation Method Statement and Specification has been prepared by Sinéad Flynn, MRIAI, MUBC of Cathal Crimmins Architect, RIAI Conservation Accredited Architect: Grade 1, for the proposed repair of 1-3 Glenville Terrace as part of the Dundrum Village Strategic Housing Development at Main Street, Dundrum, Dublin 14.

The development is located within a Proposed Architectural Conservation Area and involves the retention of a terrace of three houses of architectural merit.

This specification is to be read with drawings prepared by GRID Architects and briefly describes the terrace identifying the fabric to be retained in its current condition and the proposed works to repair it, setting out a Conservation Method Statement and Specification in accordance with best Conservation Practice and the 'Architectural Heritage Protection Guidelines for Planning Authorities' (2011) and Advice Series issued by the Department of the Arts, Heritage and the Gaeltacht.

1.1 ARCHITECTURAL DESCRIPTION

Glenville Terrace is an attractive late 19th century terrace of three two-storey, two bay houses, beneath a shared and continuous pitched roof, set back from the street front in Dundrum Village. The front walls are machine cut red brick in Flemish bond with very fine joints and protruding whited pointing mortar set onto a cut granite plinth. The surviving historic windows are two-over-two, up-and-down sliding sash windows with segmented arch heads and granite cills. There are also surviving timber front doors with fanlights.

The proposed development includes for the retention, repair and refurbishment of the roofs, the chimney stacks, the rainwater goods, the brick, masonry and render wall finishes. The sash windows are to be retained and refurbished where possible and are to be upgraded to double glazed units. Where retention is not feasible, windows will be replaced on a like for like basis. The surviving historic internal and external doors of number 1 will be retained and repaired. The plinths to the railings at the front are to be retained in situ within the proposed landscaping works.

As part of the development, the interiors of numbers 2 and 3 will be stripped including the removal of the party walls. The returns are to be removed and replaced. Historic fabric from the return of number 1 is to be salvaged for reuse in the rebuilt return.

1.2 GENERAL DIRECTION TO CONTRACTOR

The buildings are historic and care must be taken at all times to protect any items and any parts of the building fabric, fittings etc. that could be damaged due to the works.

The contractor will be required to carry-out an inspection of the site including a condition and structural inspection, with the conservation architect prior to the commencement of the works and to prepare a pre-works inspection report of the visit including scans, specialist inspection reports and a contractor's photographic condition survey for the approval of the conservation architect.

The main contractor will take overall responsibility for the works and for the protection of the historic fabric identified in this specification and on the accompanying drawings. Works will be advised and inspected by the conservation architect and must be carried out to his / her approval.

No taking down, opening up or removal of any feature or fitting is to be undertaken without the conservation architect's approval. The contractor is to facilitate access for the conservation architect to inspect the works and any fabric which has been removed from the building which is stored on or off site.

The contractor is to inform the workforce, other parties, sub-contractors and suppliers, of what is expected of them and to enforce good practice in relation to standards, Health and safety and waste management.

All contractor's site personnel and their staff will be required to have read this method statement. Detailed daily records including photographs are to be kept of the works at all stages and the Conservation Officer will be kept informed of progress with regular reports.

1.3 CONTRACTOR'S CONSERVATION WORKS METHOD STATEMENT

The contractor will be required to submit a detailed conservation works method statement for any and all repair works, for the approval of the conservation architect, at least 10 working days prior to the commencement of any demolitions or repair works. The method statement will include but is not limited to:

- Details for the removal of historic fabric (identified below) including (where relevant) details of the transport, storage and reinstatement of the items
- A methodology for the each item of the works indicating how fabric will be protected, labelled, stored, cleaned, repaired etc. along with a programme of work to ensure that the sequencing is compatible with the fabric.
- Details of the contractor's personnel including roles and responsibilities and the identification of specialist sub-contractors
- The pre-work inspection report

1.4 APPROVED SPECIALISTS

Specialists, experienced in working with specific elements of the historic fabric, will be required to carry out some of the repairs. A list of works to be carried out by specialists is provided below. The main contractor is to propose specialists, details to be included in the tender submission, which must be approved by the conservation architects.

Specialists required Works

Historic masonry repairs
- Rake out, repair and re-point brickwork to front wall, window and door surrounds and chimneys incl. cleaning
- Rake out, repair and re-point stonework incl. cleaning
- Rake out, repair and re-point cut stone plinths, window sills etc.
- Knock off cement based render, strip paint and repair masonry before re-rendering gables
- Plaster repairs, remedial damp works and re-plastering the inside face of the retained external walls

Sash window and existing door repairs
- Repair existing windows and doors
- Make replica sash windows to match existing detail

Cast Iron repair and re-paint
- Repair and repaint cast iron railings
- Repair and repaint cast iron rain water pipes and profiled gutters.

A list of approved specialists can be provided by the conservation architect on request.

1.5 SAMPLES

Samples will be required for approval of the design team for the repairs listed below.

- Render and internal plaster removal
- Stone and brick raking out
- Stone and brick cleaning
- Stone and brick re-pointing
- Stone and brick mortar repairs
- Lime plaster wall finish
- Sash window repairs

Samples will be required for the approval of the design team for the following replacement materials

- Replacement natural slates and ridge tiles
- Proposed roof ventilators
- Proposed sash window ironmongery
- Proposed replacement chimney pots and caps

1.6 SCAFFOLDING:

All access scaffolding to be used must be of a free-standing, self-supporting nature, i.e. 'retention scaffolding'. Scaffolding should be erected in a manner which is not reliant on a historic structure for stability. The scaffolding must not touch, lean on, or use the historic structure for support (or leverage) at any time without approval. No compression ties or reveal ties are permitted without prior approval. Through ties may be permitted through window openings, ONLY if the scaffolding does not come in to contact with the masonry at any time.

1.7 PROTECTION OF HISTORIC FABRIC

It is not permissible to fix anything such as temporary door frames etc. to the building fabric. No contact with the building is allowed and no screwing or fixing to the walls is permitted under any circumstances. Hand operated equipment only will be allowed except as agreed with the conservation architect

The contractor is required:

- to take all necessary precautions to ensure no damage occurs to the building fabric.
- to provide such protection as is necessary to prevent the ingress of rainwater and or ground/surface water to the building or staining, splashing etc;
- to confirm items and elements that are to be protected in position before commencement of work. These include historic windows and window surrounds, historic doors and door surrounds and historic skirting boards, dado and picture rails on the inside faces of external walls. Protection of these items is to be in place to the satisfaction of the conservation architect prior to the commencement of demolitions. Protection measures may include the provision of hard board, softwood or other support protections, wrapping with bubble wrap etc.
- to properly blank off or seal services such as drains, water supply etc. to prevent damage directly or indirectly to the building fabric;

2.0 DEMOLITIONS AND REMOVALS

Demolition works which come into contact with the historic fabric include: the removal of internal partitions and party walls, the removal of the returns to the rear and the removal of the abutting structures to the front and side of No. 1.

2.1 FEATURES TO BE RETAINED

The external walls (except as indicated on the drawings) including all historic openings with windows with architraves and surrounds and doors with architraves and surrounds are to be retained in position and carefully protected for the duration of the works with the chimney stacks above ceiling level including the brick detailing and simple clay pots.

2.2 FEATURES TO BE CAREFULLY REMOVED AND SET-ASIDE

The following are features of historical significance which should be carefully removed and set-aside for use as directed by the architects and or the conservation architects:

- Slates
- Granite walling where removed from the return of number 1,
- Facing bricks and cut granite thresholds and cills from the door and windows surrounds (where demolished) on the rear return of number 1
- The historic floorboards throughout the rear return of number 1
- Cast iron fireplaces from the rear return of number 1
- Original internal joinery including skirtings, doors and door surrounds

Storage and labelling of removed fabric must be approved by the conservation architect and agreed prior to its removal.

2.3 EXISTING ROOF

The roof may require repair works, subject to investigation. The existing roof is to be carefully recorded (verge, ridge, abutments and eaves). The contractor is to facilitate an inspection of the eaves and verges by the conservation architect prior to any removal of the existing coverings and eaves. The existing eaves must be recorded using photographs and measured drawings which must be submitted and agreed with the conservation architect. Any discrepancy between the drawings and found condition should be brought to the attention of the conservation architect.

Existing slate roof covering and clay ridge tiles are to be carefully removed, taking note of any diminishing courses or patterns in the slate, and set-aside for re-use. Provide for salvaging 75% of the existing natural slates and ridge tiles which appear from the ground in good condition. Original slates are to be carefully handled to minimise losses and transport and excessive handling of slates is to be avoided.

Salvaged slate is to be cleaned of all debris attached to the underside with a stiff wire brush and hose and sorted according to slate type, size and thickness. It is to be stored on-site (preferably at roof level) on-edge in batches of twenty separated by a timer batten. If slates have been previously turned or salvaged twice, they are not to be re-used.

A sound slate or a high-grade slate, when poised on the finger tips and tapped with a hammer, will emit a clear sound. A weathered or damaged slate is much less sonorous and gives off a dull thud when struck in a similar fashion.

Where large slates (up to 20 x 36 inches, the former King size) are salvaged, they should be considered a premium slate and carefully stored and protected. Large slates may not be cut down but should be re-used for forming under-cloaks and/or the eaves detail
A damaged large slate may be re-cut with a slate cutter to obtain smaller useable sizes. The edges will also need to be redressed.

2.4 REMOVAL OF THE RETURNS

Demolition of returns of 1, 2 and 3 Glenville Terrace is shown on the demolition drawings. Demolitions should take place once the roof finishes to the returns have been stripped. Dismantling l is to be carried out by the demolition contractor. The sequence of the dismantling is to be top down with hand-held power tools to be used where required, following the courses where evident.

Stones and bricks should lift easily from the lime-based mortar, though in some instances the assistance of hammer with cold chisel into the mortar may be required. In case of extremely hard mortar powered chisels may be used, but only where no damage would occur to the surfaces or edges of the masonry.
For the removal of larger stones, mortar and pinning stones on either side should be removed to clear an area sufficient for removing the stone itself. Once the stone is clear on both sides, the top and the rear it is to be prised from the masonry below sufficiently to loosen it, ensuring that it does not topple – bearing in mind that the base of the stone may not be horizontal. Where the stone is small enough for manual lifting it will be lifted by a suitable method of removing it safely to the ground, such as hoist, JCB bucket or, in cases of very small stones, by hand. Larger stones should be lifted with a sling.

Salvaged brick and stone is to be cleaned of all debris attached to the underside with a stiff wire brush, stacked in the order of removal and stored as close to their original position as practicable. Pinning stones are to be salvaged for re-use. Removed masonry is to be stored on palettes in such a way that it is stable and will not fall during storage or transport. Spars of timber or laths are to be placed between the blocks to ensure that they do not impact against each other during transit. Masonry may be placed in layers separated by timber spars or laths ensuring that the blocks are stable and not capable of falling from the palette during storage or transit.

3.0 ROOF

3.1 REINSTATING THE NATURAL SLATE ROOF

The salvaged natural slate roof and clay ridge tiles are to be re-used on a new returns to the architect's design and specification. The set-out of the supporting battens is to reference the existing pattern and accommodate the re-use of the existing slates. The deficit will be made up with replacements

3.2 SOURCING REPLACEMENT SLATES

Replacement slate is to match the existing in colour, quality, thickness and size. Samples must be provided for agreement with the conservation architect. Modern slate comes in metric sized which may not be compatible with existing coursing. Special orders of smaller sizes in Blue Bangor slate can be sourced, such as 16 x 8 inches (400 x 200mm approximately) or 14 x 7 inches (350 x 180mm approximately). Where it is not possible to source slate of an appropriate size, an abutting detail between new and old slates such as a lead divider batten roll will be required.

3.3 SOURCING REPLACEMENT RIDGE TILES

Replacement ridge tiles (to make up any deficit following the salvage of the existing) are to match the existing in colour, quality, material and size. Samples must be provided for agreement with the conservation architect. Replacement ridge tiles are to be bedded in lime mortar, NHL 3.0, 3:1 sand to lime mix.

3.4 RE-SLATING - SORTING THE SLATES

Salvaged slates are to be sorted into three or four different thicknesses The thickest grade and best quality slate is to be used for courses at the eaves of the roof, progressing up the roof towards the thinnest grade at the ridge. Where slates of different lengths are encountered, the longest slates are to be used at the eaves, diminishing towards the ridge and similarly sorted in terms of thickness. Replacement slates will generally be pre-sorted but should be further graded on-site by the roofer.

3.5 HOLING / RE-HOLING A SLATE

If holing is required then it should be from the bed side through the thinnest part of the slate, leaving the thickest part of the slate towards the tail (the exposed area of slate on a roof).

3.6 EAVES SLATING AND UNDERCLOAKS

Large slate course at eaves level to be carefully salvaged for reuse. Artificial tiles are not to be used.

3.7 INSULATION AND VENTILLATION

Roof insulation is to be provided to the architect's detail. Ensure through eave ventilation at the projecting soffit on the front elevation. Flush slate vents may be introduced at low level on the back slopes where necessary. Sample fittings are to be provided for the approval of the conservation architect.

3.8 CHIMNEY FLASHINGS:

Allow for replacing all aprons, step and cover flashings to the retained chimney stacks. New lead work is to be in accordance with the Lead Development Association instructions including maximum sheet sizes, lead specification, abutting and fixing details with laps to suit roof pitch and edge clips according to exposure. Brick surfaces and substrates are to be free of undulations. Plywood substrates are to be minimum 18mm WBP with an even, smooth and dry surface before the lead is laid. A Building paper underlay to BS1521 Class A is to be used for plywood underlays with polyester geotextile felt 200 to 230 g/m2 for uneven surfaces. A min 50mm clear ventilation is to be provided between the surface of the lead substrates and thermal insulation.

3.9 FLUES

Existing flues should be retained and reused maintaining ventilation at high and low levels. Disused flues may be used for service runs as required by the mechanical and electrical engineers.

3.10 CHIMNEY POTS

There are eighteen simple clay pots and three more ornate pots topping the stacks which are to be retained, cleaned and repaired as required. Replacement pots are to match the existing in terms of material, colour, dimension, profile and style. The existing pots are to be cleaned by spraying clean potable water in a mist before brushing with soft compact bristle brushes. Stubborn dirt may be removed with steam only as agreed with the conservation architect. Existing and replacement pots are to be capped with a stainless steel pot topper with a round clay lid for use with a round pot. Samples of the replacement pots and the pot toppers must be presented to the conservation architect for approval.

3.11 EAVE DETAIL

The eave detail to the replacement roof is to replicate the existing traditional slate detail based on the survey drawings and photographs taken by the contractor and the conservation architect during the eave and verge inspections (see above). Note: the existing front and rear details do not match.

3.12 VERGE DETAIL

The existing verge detail is to be replaced to match the detail on the north gable. The lead flashing is to be removed and a struck lime mortar packing is the be instated between the under-cloak and the slate covering. Refer to conservation architect's detail drawing for further information.

4.0 REPAIRS TO THE HISTORIC WALLS

4.1 ORGANIC GROWTH

Where plants are growing on the walls they are to be cut away and the root systems sprayed with an approved biocide and/or fungicide, applied to the manufacturer's instructions, at least one week before an attempt to remove the roots is made. This is to ensure that the root systems are dead and have released their grip on the stone and mortar materials reducing damage caused by their removal.

4.2 SERVICE REMOVAL

Remove obsolete service wires and pipes and tidy up all retained wiring.

4.3 EXISTING BRICKWORK

The existing facing brickwork on the front elevation appears in excellent condition. The front walls are faced with machine cut red clay bricks with a narrow joint of 5-8mm finished with a whitened pointing mortar. There are localised areas of staining and damage on the front elevation as well as areas where cement based pointing has been introduced – below the eaves and under the windows, which are noted on the accompanying drawings and photographs. The brick surrounds to the doors and windows on the rear elevation are in poor condition with many bricks severely deteriorated. There are also areas where brick repairs have been inserted into the granite walling, the condition of which is generally poor giving an unsightly appearance.

The pointing mortar on the front elevation sits proud of the brick surface and is soft and friable to touch. In other areas exposure has removed this finish or a different technique was applied. Mortar to the bricks and stone on the back elevation is washed out and in need of renewal.

The contractor is to provide for re-pointing all of the extant brickwork although the actual extent of re-pointing will be confirmed on-site as advised by the masonry repair specialist.

Brick cleaning, repair and re-pointing is to be carried out by an historic masonry specialist approved by the conservation architects. The contractor is to allow for a petrographic analysis of the bricks and the pointing and bedding mortars to be carried out by an approved materials specialist to properly identify the constituent materials and the appropriate re-pointing technique.

4.4 BRICK CLEANING

Sample panels of minimum size 600 x 600mm are to be prepared to test all proposed cleaning products and techniques. The location of sample panels is to be agreed with the conservation architect and is to take in bricks in various locations and conditions. Before and after photographs will be required for comparison. Sample panels will be assessed on their clean and fully dried appearance.

Generally brickwork is to be cleaned by spraying clean potable water in a mist before brushing with soft, compact bristle brushes. Ferrous metal bristle brushes are not to be used. Before washing all points where water may penetrate must be temporarily sealed

and adequate drainage provided to cope with the run-off of the excess water. Sealing open joints can be achieved by the use of twists of waxed string or mastic beads. After cleaning, these are carefully stripped-out before repointing. On large façades, intermediate catchments for water run-off should be provided to avoid saturation of lower zones of brickwork.

Stubborn dirt including algae, bitumen and modern paints and coatings may be removed using a proprietary steam system at 150 ºC on the basis of cleaning trials and only as agreed with the conservation architect.

Glass, polished, and painted surfaces in the vicinity should be carefully protected from damage during cleaning, and operatives should have full face and hand/skin protection.
Poulticing may be required for treating specific types of heavy soiling or stains, especially complex forms such as oil, grease, or paint. Surfactants, or solvents, are placed against the face of the brickwork by means of a proprietary poultice following the manufacturers' instructions.

Compressed air and abrasives are not to be used to clean the historic brickwork

4.5 PAINT REMOVAL

Mild detergents and other surfactants, with or without very dilute acids may be used to clean paint from brickwork and rubble walling, on the basis of cleaning trials and only as agreed with the conservation architect. Where chemical washes are proposed and accepted, only solutions with concentrations of below 1% are to be used, with minimum periods of contact with the historic brickwork. Brick surfaces must be pre-wetted and after the cleaning material has been on the face of the brickwork (for typically 2 to 5 minutes) it must be very thoroughly washed off. Pre-wetting and washing off should be carried out with a pressure not exceeding 2760 kPa (400-psi).

4.6 RAKING OUT:

The existing joints are extremely narrow and special care must be taken to protect the surrounding brick surface and to prevent widened during the raking out process. Raking out shall be carried out using plugging chisels, long necked jointing chisels and toothed masonry chisels, with a 1kg club hammer positioned at an oblique angle to the joint face. Cold chisels and mechanical systems using saws or discs for raking out, or hand tools such as chisels shall not used except as agreed with the conservation architect. A sample section of raking out of minimum dimension 600 x 600mm is to be prepared for agreement with the conservation architect prior to works progressing.

Joints are to be carefully raked out to remove all loose mortar and to minimum depth of 38mm from the face of the brick. Where mortar has disintegrated or where voids are discovered, grout up with lime putty and/or tamp to leave 25 to 38mm depth for pointing; cut back new tamped or grouted mortar to square face to leave required depth for pointing if necessary.

The prepared face is to be carefully cleaned out using a soft or stiff bristle brush and flushed out with clean water, avoiding unnecessary saturation. All dust and loose material must be removed, working from top to bottom of the wall. Joints are to be wetted before placing new mortar.

4.7 CUTTING OUT

Cutting-out defective bricks is to be carried out by an experienced contractor. A sample section of damaged brickwork is to be cut-out for the approval of the Conservation Architect prior to further cutting out commencing. Care is to be taken to protect surrounding sound brickwork. Cutting out is to be achieved using plugging chisels, long necked jointing chisels and toothed masonry chisels, with a 1kg club hammer and hacksaws.

4.8 REPLACING WHOLE BRICKS

Replacement of bricks is to be carried out on a brick-by-brick basis in consultation with the conservation architect. Only bricks that have been damaged or decayed to the extent that their structural integrity is in doubt are to be replaced. Replacement bricks are to be sourced from the demolition works or as otherwise agreed with the conservation architect to match the size, colour, texture, porosity, and durability of the adjacent brickwork. Reclaimed or salvaged bricks should be carefully inspected to ensure that they are deemed fit for replacement purposes, particularly with regard to external weathering.

4.9 REVERSING BRICKS

Depending on the soundness of the overall brick, it may be an option to reverse individual decayed or damaged bricks by cutting out and turning the damaged brick through 180°. As for replacement of bricks, reversing is to be carried out on a brick-by-brick basis in consultation with the conservation architect.

4.10 SETTING REPLACEMENT OR REVERSED BRICKS

Brick replacement is to be carried out by carefully inserting the new or salvaged brick on a full bed of mortar and tapping home. Excess mortar is to be raked out ready for pointing. Sample setting to be approved by the Conservation Architect prior to full reinstatement.

4.11 MORTAR OR 'PLASTIC' REPAIR OF BRICKWORK

Mortar repairs are temporary in nature and are not to be used except for areas of minor, isolated damage and localised repairs, particularly those resulting from the removal of services, at the direction of the Conservation Architect.

Cavities to be filled are to be thoroughly cleaned out and prepared, filled with individual, well compacted layers of lime mortar to conservation architect's specification, coloured to match the surrounding brickwork. Proprietary brick repair mortars are not to be used

4.12 BRICK SLIPS

Brick slips are not to be used except at the express direction of the conservation architect for individual bricks where it is not possible to remove the whole brick without causing greater damage. Brick slips should match the existing brick and be a minimum of 25mm (and preferably 50mm) thick, applied to the clean, even and pre-wetted brick surface with a bed of lime mortar, to finish flush with the adjacent brickwork to match the historic detail and profile. Epoxy resins are not to be used to fix brick slips.

4.13 RE-POINTING HISTORIC BRICKWORK

Refer to the conservation architect's drawings for locations of proposed re-pointing. These drawings were prepared for the purpose of pricing only and are based on observations and photographs taken from the ground. The conservation contractor is to provide scaffolding to the entire façade to provide access for inspection to all levels of the brickwork. Detailed decisions on the extent of brick repairs, re-pointing etc. will be made in consultation with the masonry repair specialist following this inspection.

All cement based pointing to the existing brick and stone work is to be removed.
Test panels are to be prepared, as directed by the conservation architect, to establish the appropriate tools and methodology for the removal of the cement pointing and the condition and impact on the underlying brickwork.

4.14 REPLACEMENT MORTAR

Mortar analysis is to be carried out by an approved materials specialist to generate a repair and re-pointing specification, similar in composition and physical properties to the original lime based pointing mortar.
Natural Moderately Hydraulic Lime (NHL 3.5 or as advised by the specialist) is to be used as the binder in a proportion of 2:1 Aggregate : Binder. All aggregate must be clean, well graded with limestone: quartz ratio 3:2, and particle sizes evenly spread over the size interval 5 mm – 70 microns. Limestone / Quartz sand (should be sourced locally) from Dublin Calp Limestone. The Quartz sand should be angular to sub-angular monocrystalline quartz sand.

Aggregate Proportions as follows:

- Limestone sand rounded to sub-rounded, graded 5-2mm 40% by volume
- Limestone sand rounded to sub-rounded, graded 2-<0.5mm 20% by volume
- Quartz sand, angular to sub-angular, graded 5-2mm 20% by volume
- Quartz sand, angular to sub-rounded, graded 2-<0.5mm 20% by volume

It is imperative that the sands, water content etc. are carefully monitored to ensure that air is able to permeate the mixture to achieve carbonation of the mortar. In particular, the Contractor shall ensure that the sands do not contain any material that would tend to retain water or slow the natural drying of the mortar thus interfering with the proper carbonation of the lime. To this end, trial mixes shall be prepared at the start of the contract for the Conservation Architect's approval as to colour, carbonation etc. well before the mortar is required for use.

Only hydraulic lime from an approved source will be permitted and the Contractor will be required to submit certificates confirming that no cement has been used or added to the powder. Hydraulic lime shall be delivered in bags with the manufacture's name, the contents and use by date clearly marked on the outside. It shall be stored under similar conditions as for cement. All mixes incorporating hydraulic lime shall be placed within 30 minutes (or other time stated by the manufacturer) of water being added to the mixture, any mixes not used by that time shall be disposed of and never 'knocked up' and used in the work.

4.15 JOINT PROFILE FOR REPOINTING

It is intended to replicate, or reinstate the original pointing profile, where this can be determined. For pricing purposes provide for struck / overhand struck joint profile

4.16 STACKS:

There are three tall stacks with stepped brick detail and dentilled cornice at the apex of the roofs, between Nos 1 and 2 and between Nos 4 and 5 they are topped with eight pots with a smaller stack topped with four pots between 3 and 4.

The chimneys are to be assessed in terms of their stability by the structural engineer and repairs to the structural integrity will be recommended by them. No cement flaunchings, slips, bedding or pointing mortar is to be introduced to the historic masonry under any circumstances.

Where the existing flaunchings are found to be in good condition they are to be retained. Damaged flaunchings are to be repaired on a like for like basis. Where the condition of existing flaunchings and brick cover slips requires that they are replaced, new flaunchings and slips are to be in lime based mortar, NHL 5.

The stacks are to be cleaned, repaired and re-pointed according to the specification for brick repairs above.

4.17 EXISTING WALLING

The buildings are traditional type construction comprising loadbearing masonry walls. The front wall elevations to the Main Street are red bricked faced, set in Flemish bond. The gable and rear walls are rendered. The return of No. 1 is of traditional construction similar to the main terrace. The return buildings to No.2 and 3 are of newer blockwork cavity wall construction.

Visual inspections and opening up works to investigate the on-going cracking and settlement of the floors in the return of No.1 were carried out previously under the direction of T.J. O'Connor & Associates. They identified the following:

- Structural cracking to rear gable wall of return of up to 7mm in width
- Horizontal bow in rear gable wall
- Structural cracking at intersection between return and main terrace adjacent the
- window reveals
- Previous poor quality builders work to provide service opes in south wall of return
- Fall of floors towards rear gable
- Internal cracking of liner board and window reveals
- Cracking of ceilings

The lower section of the rear gable has been previously rendered with a sand/cement render and local patches of render repair have been carried out, possibly to cover up previous cracking. These local repairs have subsequently cracked as the building has continued to move due to settlement of the foundations.

Trial pits was carried out directly adjacent the gable wall of the return of No.1 in May 2010, to investigate the formation level of the foundations to the return building and the cause of movement of the return away from the main terrace.
This trial pit identified that previous underpinning works had been carried out to the foundations, however the underpinning works were local to the rear gable wall of the return and had not been successful due to the capacity of the underlying clay to support the foundation load and the localised nature of the underpinning. The return building therefore has continued to settle and pull away from the main terrace.

T.J. O'Connor & Associates report concluded that as the structure of No.1 has been significantly compromised as a result of the poor formation for the foundations to the return, the unsuccessful underpinning and continued movement of the return, it is considered that the construction of the Lower Ground Floor would allow new foundations to be constructed and the return to No.1 Glenville to be reinstated to rectify the previous structural deficiencies and subsequent defects

Due to the poor condition of the return to No.1 and the modern construction of the returns to No.2 and No.3 it is proposed to temporarily remove and rebuild the returns of Glenville Terrace following the construction of the retaining wall of the Lower Ground Floor.

4.18 REMOVING PLASTERS AND RENDERS FROM BRICK AND RUBBLE WALLING

The cement render on the rear and side elevations is to be to be stripped and replaced. Opening up works are to be carried out on the internal plaster finish of the retained external walls to allow for an inspection of the underlying masonry and to identify and assess the condition of any timbers embedded in the walls. The contractor is to provide for a minimum of 4 tests panels per wall, of 900 x 900mm at locations to be agreed with the conservation architect, on different parts of the interior and exterior of the façade. The panels are to determine the condition of the face of the masonry, as well as its reaction to the action of removal. On removal, the contractor is to provide access to the conservation architect to inspect and record the underlying masonry.

4.19 COURSING

New work on the historic walls are to look appropriate and in-keeping with the fabric, materials and style of the original walls including following existing patterns and coursing.

4.20 REPLACEMENT STONE

There will be a supply of building stone available from the demolition works. Replacement stone from other sources is unlikely to be required. Samples of salvaged stone for specific areas of repair are to be provided for the approval of the design team.

4.21 RAKING OUT

Any pinnings (spalls) dislodged in raking out should be retrieved and reused.

Mortar should be raked out using hand tools only. Sample sections of raking out, 1m x 1m square are to be prepared for the approval of the design team.

The use of mechanical tools in the hands of specialist conservators may be appropriate for the removal of later cement repointing but this must be agreed with the design team prior to their use on the walls.

4.22 REPOINTING

New pointing should be subservient to the stonework and ribbon, weather struck or strap-pointing will not be accepted. New pointing is to match the colour, profile and texture of the original joints including the grain size, colour and shape of aggregates. Sample sections of re-pointing 1m x 1m are to be prepared for the approval of the design team.

4.23 EXISTING CUT STONE DETAILS

Existing cut-stone is generally in excellent condition requiring light cleaning only as specified in Section 4.4.
The cut-stone details include granite window sills, thresholds, quoins, and the plinth to the front and sides.
There is one cracked window sill at the north end of the rear elevation. Provide for replacing this sill with a sill salvaged during the demolition works. A decision on whether to replace or lime mortar repair the existing sill will be made on site.

4.24 AGGREGATES:

5mm Wexford beach sand (or similar approved) up to 75% of the total mix. Substitute sand will not be accepted solely on compliance with a British Standard as the grading of these sands is too wide making some sands unsuitable for making lime mortars.

In addition to sand, 6mm washed gravel from the same source is to be added, up to 5% by volume of the aggregate, with brick fragments, and other material.

Sand should be already washed clean of very fine particles of silt and free from salts. It should be well graded, with a range of particle sizes, with the highest proportion around the mid-range. · It should be ‘sharp’, that is a high proportion of angular grains, which will fit closely together, producing a well-bonded mortar.

The proportion of voids in the sand should be around 33-35%,

4.25 MAKING MORTAR AND RENDER:

Measure materials by volume using clean gauge boxes. Under no circumstances is a shovel to be used. Proportions of mixes are for dry sand; allow for bulking if sand is damp.

A conventional cement mixer can be used although a roll pan or paddle mixer is preferable. Switch the mixer on and dampen down the inside of the drum. Switch the mixer off before adding two-thirds of the water and half the sand followed by all of the lime. Switch the mixer on, allow the water to fully disperse throughout the mixture (15-20 mins) before adding the rest of the sand and more water if required.

Use mortar within about two hours of mixing at normal temperatures. Do not use after the initial set has taken place and do not re temper. Keep plant and banker boards clean at all times.

Natural hair or synthetic fibre may be added to reinforce the mix.

4.26 REPOINTING RUBBLE WALLING

Repointing has the potential to cause physical damage to the walls, radically alter their appearance and substantially detracting from their character and quality.

Repointing is only to be carried out as necessary where the existing pointing has deteriorated and is causing damage to the stonework or other fabric. Sound old pointing should be left undisturbed, as it is an essential part of the fabric and character of the historic walls which should not be removed unnecessarily.

New pointing should be subservient to the stonework and ribbon, weather struck or strap-pointing will not be accepted. New pointing is to match the colour, profile and texture of the original joints including the grain size, colour and shape of aggregates. Sample sections of re-pointing 1m x 1m are to be prepared for the approval of the design team.

4.27 SURFACE PREPARATION FOR HYDRAULIC LIME RENDERS

Remove any loose material leaving the walls clean and free of vegetation. Dub out large voids and dampen the surface with a mist spray

4.28 APPLICATION

Base coat to be laid using the normal techniques, 8-10mm thick. Leave to stiffen up before using a float over the whole area to compress the render. After 1-2hrs, scratch over using a wire comb.

The second coat is to be applied as for the above once the base coat has stiffened sufficiently. Drying out times will vary depending on temperature and may be as little as 24hrs in warm conditions. Base coat to be dampened down if found to be drying out more quickly than this. The top coat should be weaker than the background mixes and is to be applied as above and floated up as it stiffens.

4.29 PROTECTION

Spray the finishing coat with a fine mist to keep the render damp for 4-7 days following application of the final coat paying particular attention to the upper sections. Damp hession to be laid over the work throughout this period maintaining a circulation of air between the cloth and the render,

4.30 COLD WEATHER

Do not work while the air shade temperature is below 2°C on a rising thermometer or below 5°C on a falling thermometer. Ensure that temperature of coatings remains above 4°C for at least 24 hours after setting.

4.31 PAINTING

Limewash or breathable paint only to be applied over lime mortars and renders. Synthetic paints prevent carbonation of the lime and are not to be used.

4.32 DAMP TREATMENTS HISTORIC MASONRY

The existing lime plaster finish is to be removed and the underlying masonry is to be opened up for inspection by the structural engineer and the conservation architect.

A drained egg and crate or delta membrane mechanically fixed to the existing masonry is to be applied to the retained external walls. The membrane is to be applied to the manufacturer's instruction and warranty and a recessed drain to the engineer's detail is to be provided to the internal perimeter. Insulation and internal finishes to the architect's detail.

5.0 JOINERY

5.1 SASH WINDOWS

The works to the existing window openings are summarised as follows:

- Provide for replacing uPVC windows on first floor with replica sashes, retaining and repairing the existing surrounds which are assumed to be in position.
- Provide for repairing and modifying existing two-over-two arch-head sash windows to accommodate double glazing including building out the existing internal surrounds to accommodate wall insulation build-up.

Repaired windows are to be left weathertight and functioning efficiently by ensuring that paint, timber, putty, glass and ironmongery (hinges, catches, locks etc.) are in good working order. Refer to the guidance provided in the Department of the Environment, Heritage and Local Government publication : Advice Series : A Guide to the Repair of Historic Windows for further information.

5.2 INSPECTION

The contractor is to provide for the detailed inspection of all existing historic windows by an approved specialist experienced in historic window maintenance and repair.
The inspection is to include for checking the condition of putty, paint, timber and ironmongery and for testing vulnerable areas such as the junction of timber and stone sills and the lower joints and rails.

The inspection is to note

- Areas of surviving historic and modern replacement glass
- Surrounding masonry, plaster and render condition
- Areas of flaking paint
- Loose joints
- Spongy timber at the sill, bottom rail, and lower edges of the frame. (Spongy timber is to be tested with a knife or awl. Where the blade penetrates up to 3mm the timber is judged to be sound, 3-6mm it should be noted and is in need of conditioning with oil or pine resin, Where the blade penetrates more than 6mm this must be noted and repairs as detailed below and advised by the contractor's specialist may be required.)
- Loose or missing putty
- Cracked or broken glass
- Faulty locks
- Areas of condensation (top sides of the meeting rails, bottom rails and sill or on the glass)
- Water pooling on the stone sill
- The condition of past repairs
- Opening operation of the sashes or casements
- Opening operation of the shutters

5.3 WINDOW REPAIRS

Except as otherwise agreed with the conservation architect, all window repairs are to be carried out in-situ. Window frame assemblages are not to be removed from structural openings except as explicitly instructed by the architects, as advised and agreed with the conservation architect. This will only be approved where it is deemed absolutely necessary and where no realistic alternative option exists.

In-situ windows and window frame assemblages are to be protected for the duration of the works. Protective measures are to be agreed with the conservation architect.

Where required and as agreed, the removal of window frames is to be carried out immediately prior to repairs being carried out. Sashes are not to be removed from site except as agreed with the conservation architect who must approve labelling, transport and storage arrangements in advance.

5.4 REMOVING SASHES FROM THE FRAMES

Sashes are to be removed by the approved specialist only using the following methodology.

Use a wedge to jamb the chords of the bottom sash at the pully to hold the weights up allowing them to be detached from the sash. Open the meeting rail catch, prise off the staff beads with the bevelled face of a chisel and detach the chords from either side of the sash allowing it to be removed.

Holding the jammed chord, remove the wedge from the pully and run the chord up so that the weight falls gently to the bottom of the box. Tack the chord to the frame

To remove the top sash, prise off the parting bead from one side with a chisel and pull the sash down and out. Repeat the sequence to remove and secure the sash weights.

5.5 BALANCING AND EASING THE SASHES

Provide for replacing chords to all windows with new non-stretch cotton or hemp.

Rebalance sashes using existing weights where found. Weights are to be measured. The combined weight for the top sash should be 1kg heavier than the top sash and 1kg lighter than the bottom sash. Additional weight may be required to be added to the existing weights using iron washers or lead beads applied to the top of the weights to make up any deficit.

Waggle boards are to be fitted within the window box to prevent twisting of chords.

Parliament hinges are to be fitted to the weight pocket pieces to facilitate future maintenance.

Staff and parting beads are to be screwed rather than nailed back into position.

5.6 PAINTWORK

Historic paint layers are not be removed where the paintwork is in good condition.
Where paint is observed to be peeling, cracking, bubbling, or lifting it is to be brushed with cold linseed oil and left to soak for 15mins before it can be stripped back to the sound surface with a metal scraper. Chemical paint strippers, blowtorches or hot air guns are not to be used to remove paint except as agreed with the conservation architect.

Stripped timber is to be reconditioned using raw linseed oil or pine resin (Stockholm tar). Defects are to be filled and sealed using shellac or similar. Existing sound paint finishes are to be washed using a non-alkaline soap, mild detergent in water or sugar soap, rinsed and brushed with sand paper.

Historic joinery is to be repainted using an approved linseed oil, natural or traditional paint which is breathable applied in three thin coats using a special spoon type brush. Allow for drying times between applications (up to 24hrs) to supplier recommendations. Colour to be confirmed and agreed with the conservation architect. NOTE: The contractor is to provide for a different colour to the inside and outside of the frames.

Sashes are to be removed from the frames prior to repainting and allowed to dry thoroughly before re-hanging. Sides of the sashes and pulley styles are not to be painted but waxed to seal the timber and ease movement.

5.7 REPAIR AND REPLACEMENT OF GLASS

Glass is only to be removed from sashes where badly broken or where the sash needs to be repaired. Individual panes should be labelled and carefully removed for re-use in their existing position where possible.
Replacement glass is to be 2-3mm float glass cut to fit loosely into rebates allowing for the expansion of the timber. Horticultural glass may only be used as agreed with the conservation architect.

5.8 REMOVING PUTTY

Sound putty and glass in good condition is to be protected and retained in position within frames.
Putty in poor condition or putty holding cracked or modern glass is to be carefully hacked out using a chisel, avoiding glazing sprigs and taking care not to damage narrow glazing bars.

Infra-red lamps or hot air guns to a controlled heat of 50-60degrees Celsius may be used with extreme caution to soften putty without heating the glass to cracking point, allowing the putty to be scooped out and the glass removed.

5.9 REPLACMENT PUTTY

Rebates to be cleaned and a coat of shellac, boiled linseed oil or paint applied. Where used, electro-galvanised steel pins or copper sprigs are not to touch the glass and should be fully covered in putty.

Best quality, fresh traditional linseed oil putty, well kneaded and applied with a putty knife is to be used. The bedding putty is to be continuous. The finishing putty is to form a clean triangular bead sealing the glass. Putty is to be trimmed so as not to over shoot the glazing bar. Putty to be painted once the surface has set but not more than one month after application.

5.10 REPAIRING OR COMPLETING AREAS OF SOUND PUTTY

Clean the area and apply new back putty and/or finishing putty, smoothly sealing the junction with the old putty.

Older putty which is sound but shows cracking may be refurbished by applying a slurry of putty onto it (fresh putty thinned with boiled linseed oil).

5.11 WINDOW FURNITURE AND IRONMONGERY

Where it is necessary to remove historic ironmongery, individual pieces should be labelled and catalogued so they go back onto the correct window.

Existing pulleys are to be cleaned and oiled and pins are to be replaced as required. Cracked pulley wheels are to be replaced. Replacement pulleys are to be all brass, top quality cast. Timber pulleys where found are not to be removed. Where they are not working new pulleys may be fitted above or below the original.

Wrought iron and brass hinges are to be retained. Where required hinges may be turned upside down and new pins fitted. All hinges are to be cleaned and lubricated.

Replacement meeting-rail catches, lifts, eyes and handles are to be cast iron or cast brass. Samples are to be provided for approval of the conservation architect.

5.12 CAULKING OR POINTING THE WINDOW FRAME

Gaps between the masonry and frame are to be pointed or caulked with an appropriate mastic. Silicone and expanding foam are not to be used.

Voids should be packed with lime mortar (2:5 lime: sand)

5.13 TIMBER REPAIRS

LOOSE JOINTS: Where the surrounding timber is sound, loose stiles are to be cramped together and joints thoroughly re-glued using a powdered-resin glue and re-wedged. Missing pegs are to be replaced with a dense, impermeable timber dowel

REPAIRING RAILS, STILES SILLS AND GLAZING BARS: A selected original window including frame is to be removed from the building and shall be used as a template for the size and profile of timber sections for repair and replacement. Proposed replacement profiles of the old mouldings are to be accurately replicated to the satisfaction of the conservation architect.

> Decayed timber is to be cut away with the minimum amount of surrounding sound timber to obtain a strong spliced joint between new and old timber. The joint may be reinforced with pegs or screws fixed from the interior and should be angled to direct water to the exterior.

Timber used in window repairs is to be red deal to match the existing, free of shakes, fissures, warps, knots and other imperfections. Timber for use in splice repairs is to be carefully selected to match the grain density and direction of the existing.
Where a corner joint has failed and the timber is not in a good enough condition to repair it, the corner is to be cut out, a new corner spliced to fit and the joint repaired.
Replacement timber sections for bottom rails, sills, stiles or glazing bars are required where all of the timber shows signs of decay or where timbers are decayed in multiple places along their section, where timbers are broken or have split. Replacement sections are to match the profile of the existing exactly.

FRAME, ARCHITRAVE AND SHUTTER REPAIRS Frames are to be repaired in-situ, on-site without taking them apart except as agreed with the conservation architect.

SCARFING NEW ENDS TO FRAME STILES AND MULLIONS Timber stiles are only to be replaced where decay is noted to a depth of over 6mm or where timbers are badly cracked or split.
The ends of the stiles that sit on the sill are particularly vulnerable to moisture and often require new ends scarfed on the outer linings or stile. Where this is necessary, a cut is to be made to the existing stile, min 150mm above the stone sill, angled to direct water to the exterior and the replacement timber jointed tightly to the existing.

REPLACING TIMBER SILLS Timber sills are only to be replaced where decay is noted to a depth of over 6mm or where sills are badly cracked or split. Stone sills are to be checked to ensure water is not collecting and bedding is to be checked to ensure a weather tight joint. Timber sills must be replaced in-situ except as otherwise agreed with the conservation architect.

5.14 SHUTTER REPAIRS

Repair existing shutters as identified during inspection, detailed in the specialist contractor's methodology and agreed with the conservation architect. Shutter repairs include splicing new rail or stile ends, gluing split timbers, tightening and wedging the joints, replacing damaged timber behind the hinges and repairing or refitting the timbers. Stripping and re-painting shutters and surrounds is to be carried out as directed above.
Existing shutters and surrounds are to be retained in position except as otherwise agreed with the design team. Where the proposed insulation depth is incompatible with the existing surround profile, the contractor is to provide for removing and repairing the surround, adding filler pieces as required and agreed with the design team and re-instating.

5.15 DRAFT PROOFING

Draught proof strips are to be applied to the historic and replica windows – meeting rails, parting beads and baton rods in the positions indicated on the accompanying drawings. The contractor is to propose a proprietary system of silicone rubber tubes, polypropylene and nylon finned pile brushes or rubber, polyester or sprung metal fins for agreement with the conservation architect. The proposed system may involve the removal of some timber to accommodate the draft stripping.

5.16 EXISTING EXTERNAL DOORS

There are three external doors to be retained and repaired at the front entrances to Nos 1, 2 and 3.
The contractor is to provide for the detailed inspection of all existing historic doors by an approved specialist experienced in historic joinery maintenance and repair.
The inspection is to include for identification of faults to the timbers including binding, loose joints, splitting and shrinkage, physical damage, flaking paint and the presence of timber decay (this is defined as follows – timber that is spongy when tested with a knife or awl: where the blade penetrates up to 3mm the timber is judged to be sound, 3-6mm it should be noted and is in need of

conditioning with oil or pine resin; where the blade penetrates more than 6mm this must be noted and repairs as detailed below and advised by the contractor's specialist may be required);

- the location and condition of past repairs,
- opening operation of the doors,
- faulty or loose hinges and wear and tear of ironmongery and locks.

5.17 EXTERNAL DOOR REPAIRS

Except as otherwise agreed with the conservation architect, all door repairs are to be carried out in-situ. Door frame assemblages are not to be removed from structural openings except as explicitly instructed by the architects, as advised and agreed with the conservation architect. This will only be approved where it is deemed absolutely necessary and where no realistic alternative option exists.

In-situ doors and door frame assemblages are to be protected for the duration of the works. Protective measures are to be agreed with the conservation architect.

Where required and as agreed, the removal of door frames is to be carried out immediately prior to repairs being carried out. Doors are not to be removed from site except as agreed with the conservation architect who must approve labelling, transport and storage arrangements in advance.

Binding doors are to be carefully planed or sanded to allow smooth opening and closing.

Damaged boards are to be removed and replaced with appropriate moulded counterparts which should match the existing material and detail. Sample repairs will be required for the approval of the design team.

Rotten or soft wood is to be cut away and new treated timber carefully spliced into position.

Loose or worn hinges should be replaced, sample ironmongery to be approved by the design team.

Damaged screw holes are to be plugged with small glue-soaked timber dowels.

Loose joints are to be addressed by the insertion of new wedges and re-gluing, this may require the door to be taken off so that cramps can be used to apply the required pressure to tighten up the loose joint whilst the glue sets.

Split panels are to be repaired by loosening them and re-gluing the broken pieces in situ.

Excessive paint build-up is to be removed by the use of a hook scraper, taking care not to scar or gouge the timber.

Hinges are to be lightly oiled.

Original latch mechanisms are to be repaired where possible, but where renewal is necessary, the replacement lock must have an appropriate 'throw'.

New mortice locks and rimlocks may be added to the architect's specification.

5.18 REPLACEMENT DOORS

Door replacement will only be allowed as agreed with the conservation architects. The proportions, mouldings and numbers of panels of the existing doors is to be replicated along with the material, design and finish on any replacement door. All original door ironmongery is to be retained and reused.

5.19 PAINTING EXTERNAL DOORS

Historic paint layers are not be removed where the paintwork is in good condition.
Where paint is observed to be peeling, cracking, bubbling, or lifting it is to be brushed with cold linseed oil and left to soak for 15mins before it can be stripped back to the sound surface with a metal scraper. Chemical paint strippers, blowtorches or hot air guns are not to be used to remove paint except as agreed with the conservation architect.

Stripped timber is to be reconditioned using raw linseed oil or pine resin (Stockholm tar). Defects are to be filled and sealed using shellac or similar. Existing sound paint finishes are to be washed using a non-alkaline soap, mild detergent in water or sugar soap, rinsed and brushed with sand paper.

Historic joinery is to be repainted using an approved linseed oil, natural or traditional paint which is breathable applied in three thin coats using a special spoon type brush. Allow for drying times between applications (up to 24hrs) to supplier recommendations. Colour to be confirmed and agreed with the conservation architect. NOTE: The contractor is to provide for a different colour to the inside and outside of the doors and frames.

5.20 DRAFT PROOFING AND WEATHER STRIPPING EXTERNAL DOORS

Weather stripping is to be installed around the door frame. Weather stripping should not impede the movement of the door.

Brush barriers are to be fitted to the underside and bottom rail of the door
Insulating boards may be added to the panel recess on the internal face if required. The contractor is to provide samples for design team approval.

6.0 METALWORK

There are existing decorative railings to the front of Nos 1 to 3. There is also an iron gutter and downpipes to the front of the terrace with a half round gutter to the rear.

Metal work repair and painting is to be carried out by a specialist approved by the conservation architect. Metal work contractors should be experienced in this type of work and should be able to show that they have undertaken work of this nature before. Ironwork is to be repaired in-situ and only as agreed with the conservation architect. Removal of ironwork for repair may only be undertaken with written instruction.

6.1 CLEANING IRONWORK

All ironwork is to be cleaned with water and a cloth or bristle brush where soiling is light. High-pressure power hoses are not to be used and ironwork is to be thoroughly dried off after cleaning.

Localised areas of corrosion can be removed using a chisel, wire brush (preferably bronze) and sand-paper before painting over the cleaned metal. Where corrosion or paint decay are more severe, it may be necessary to clean ironwork back to bare metal to provide a suitable surface for fresh paint. Mechanical tools, flame, chemical, acid or blast cleaning may only be carried out as advised by the specialist and as specifically instructed by the conservation architect.

6.2 PAINTING METALWORK

Where the existing paint is in good condition, paint should be touched up. Only where paint is loose or rust has occurred should the paint be stripped to bare metal.

Thorough surface preparation and careful application of paint is essential to the weathering of historic ironwork. Existing paint finishes must be carefully inspected and all defective areas thoroughly cleaned of rust, dirt, grease and chemical deposits paying particular attention to the meeting surfaces of collars, finials and fixings and the difficult to reach areas which are often prone to corrosion.

Paint is to be applied in accordance with the supplier's printed instructions in thin layers by hand, with a brush. Paint must be protected from rain until completely dry to touch.

Existing paint must be coated with one layer of micaceous iron oxide before two coats of gloss paint. Bare metal should be coated with two coats of zinc-based primer or red lead primer followed by one undercoat of micaceous iron oxide and two coats of gloss paint.

6.3 RAILINGS AND GATES

The front railings consist of wrought iron bars with cast iron husks and collars held together by an upper and lower rail supported on feet fixed into large granite plinth stones. There are also simple wrought iron post and rail style railings delineating the property boundaries. There are also three pedestrian gates to the front of Nos 1, 2 and 3 with cast iron husks and collars matching the general railing.

The existing railings, with granite plinth stones and the pedestrian gates are to be removed, repaired and reinstated.

6.4 FRACTURED OR MISSING FINIALS, HUSKS AND COLLARS

Foundries that specialise in traditional casting usually have a large stock of patterns, and it is should be possible to find a match for missing cast iron embellishments.

New castings should be put in place in the traditional way. Welding new castings in place is not recommended.

Finials should never be welded in place. Finials can be slotted over the original spiked end of the wrought iron bar (if it exists) and hammered or secured in place by hot-poured lead. If the spike does not survive, the finial can be pinned in place.

The hollow interior of the finial should be well painted before being put in place to prevent the cast iron from coming into direct contact with the wrought iron.

Husks and collars below the top rail should also be available from stock patterns but are only to be replaced where the specialist proposes to dismantle the wrought iron railings.

6.5 CORROSION OF THE RAILS AND BARS

The corrosion material should be thoroughly cleaned off, taking care to clean the joint between the finial and the rail as well as possible. The rail should then be re-profiled using an epoxy resin so that it sheds water more efficiently.

When this corrosion material is removed, the bases of the bars are often found to have narrowed or 'wasted'. In many cases, there is still enough sound iron beneath the corrosion for it to remain structurally stable and consequently there is no need to replace it.

If the corrosion is severe, it may be necessary to remove the corroded areas and piece-in new wrought iron or to replace bars. If required, a methodology for the insertion of wrought iron pieces is to be prepared by the specialist for approval of the conservation architect.

6.6 SEPARATING JOINTS

Scarf joints care to be re-secured using a stainless steel pin isolated from surrounding material using a nylon sleeve or washer. New fittings to match the original straight bars hammered into rounded caps, top and bottom.

6.7 MISSING FIXINGS

Replacement fixings are to be stainless steel or phosphor bronze isolated from the surrounding ironwork by nylon sleeves or top hats to match the shape and style of the originals.

6.8 BROKEN BACKSTAYS

Wrought iron backstays should not be reattached by welding. Other stays found on the rest of the run of railings will indicate the original detail, and this should be replicated for repairs.

6.9 FIXING RAILINGS INTO MASONRY SOCKETS

Where the sockets have an unnaturally large diameter (which can occur when railings have been drilled out of the stone), new stone can be pieced in. Alternatively, while not an ideal solution, it may be preferred to use crushed stone in mortar to blend more naturally with the colour and texture of the stone coping. This method should only be used in exceptional circumstances and using a lime-based mortar. Resin should not be used to fix railings into masonry as it will cause damage to the stone due to its hardness and will be difficult to remove if problems arise at a later time.

6.10 CORROSION OF THE GATE'S SLAM BAR

Where there is evidence of slam bar corrosion, the slam bar should be removed, cleaned, and reshaped and any corrosion from the underlying ironwork thoroughly removed. Both surfaces should be painted before the slam bar is replaced.

6.11 RAINWATER GOODS

All rainwater goods to be thoroughly inspected paying particular attention to joints, bends, feet collars and fixings, to identify all areas of leaks and blockages. Gutters, hoppers and pipes are to be cleaned out. Misaligned or loosened pipes are to be repaired, and cracked pipes are to be replaced. Missing cast iron brackets, collars and bolts are to be replaced to match the originals in design and material. Ironwork is to be cleaned, prepared and re-painted (See above).

Wire balloons and leaf guards are to be fixed in place at all outlets.

6.12 REPLACEMENT RAINWATER GOODS

Replacement rainwater pipes, half-round and profiled gutters, fittings and accessories, where damaged beyond repair are to be cast iron replacements to BS EN 8530 (Formerly BS 2997) Specification for traditional-style half round, beaded half round, Victorian ogee and moulded aluminium rainwater systems; BS 460: 2002 Cast iron rainwater goods. Specification and BS 437: 2008 Specification for cast iron drain pipes, fittings and their joints for socketed and socketless systems.

Castings shall be in all respects sound, good and free from pinholes, laps or other imperfections. They shall be neatly dressed and carefully fettled and all surfaces shall be smooth. The ends shall be finished reasonably square to the axis. The thickness of the barrels of straight pipes of and the thickness of gutters shall be not less than 3mm. The thickness of fittings shall be not less than the corresponding darts of straight pipe: and gutters. Replacement cast iron holderbats and fascia brackets shall be of the dimensions to match existing. They shall be provided with brass bolts and nuts.

Every pipe shall ring clearly when struck at any point with a light hammer.