

Chapter 8:

Water

8.0 Water

8.1 Introduction

This section of the EIAR assesses the impacts of the proposed apartment development at the Frascati Shopping Centre Blackrock, on the water in the area. This section should be read in conjunction with the architectural drawings for the development & the project description sections of this EIAR. The proposed residential extension consists of three floors of residential development above the Frascati Centre. An extra level of car parking will also be added to the existing car park structure to serve the development. A water chapter was included with the previous EIS for the rejuvenation project. Where ‘**Existing**’ is referred to in the text below it refers to the site prior to 2016 and the current Frascati Shopping Centre Blackrock Rejuvenation works which have been covered in a separate previously submitted Report.

This chapter has been prepared by John Considine, BE, MIStructE, MIEI, CEng, FConsEIM, Chartered Engineer of Barrett Mahony Consulting Engineers.

8.2 Study Methodology

This section of the EIAR assesses the impacts of the proposed apartment development at the Frascati Shopping Centre Blackrock, on surface water drainage, foul water drainage and water supply services in the area. This section should be read in conjunction with the site layout plans for the site, the project description sections of this EIAR and Chapter 7.0 detailing land and soils. Where ‘**Existing**’ is referred to in the text below it refers to the site prior to the commencement of the rejuvenation works in late 2016 already in progress and near completion Frascati Shopping Centre Blackrock Rejuvenation works which has been covered in a separate previously submitted Report.

The assessment of the potential impact of the proposed development on the water bodies was carried out according to the methodology specified by the EPA and the specific criteria set out in the Guidelines on Information to be Contained in an Environmental Impact Statement (EPA 2002 and 2017 (Draft)), EIA Directive 2014/EU/52, Advice Notes on Current Practice (in preparation of Environmental Impact Statements) (EPA 2003), Environmental Impact Assessment (EIA), Guidance for Consent Authorities Regarding Sub-Threshold Development (DoEHLG 2003), Development Management Guidelines (DoEHLG, 2007) and Guidelines for Planning Authorities and An Bord Pleanála on Carrying out Environmental Impact Assessments August 2018.

The following sources of information were used in the completion of this assessment:

- Site Visit
- Site Investigation Report
- Geological Survey of Ireland (GSI) online maps and databases
- ECFRAMS Flood Mapping from OPW
- EPA online maps and databases
- Topographical Survey
- Local authority record drawings

All drainage (surface and foul) and water supply will be provided in accordance with the requirements of Dun Laoghaire-Rathdown County Council and in particular with the following:

- Greater Dublin Regional Code of Practice for Drainage Works
- Greater Dublin Strategic Drainage Study (GSDSDS)

- Planning System and Flood Risk Management Guidelines
- Building Regulations (Part H)
- Irish Water Standard Details and Codes of Practice for Water and Wastewater Infrastructure
- CIRIA SuDS manual C753 (2015).

This chapter also encompasses knowledge obtained from site visits, drainage and water services record information received from Irish Water and the Local Authority. Additionally, information from the EPA and GSI websites has been utilised.

8.3 The Existing Receiving Environment

The site is currently occupied by the Rejuvenated Frascati Shopping Centre which occupies approximately 80% (2.24 hectares) of the total site footprint area of 3.41 hectares. The Frascati Centre is a two storey building made up of residential & restaurant space.

The rejuvenation project provided for the improvement of the current retail space within the centre, along with the inclusion of additional retail services floor space and, the provision of additional café / restaurant floor space and the provision of new / replacement car parking spaces.

The site is currently occupied by the existing Frascati shopping centre. The pre-existing culverted Priors Stream, (Figure 8.1), has been diverted successfully during the development of the existing Frascati shopping centre and now passes under the new car park.



Figure 8.1 – EPA River Network Map Extract

8.3.1 Surface Water

The surface water system for the existing Frascati shopping centre has been sized appropriately and will be sufficient for the proposed apartment extension.

8.3.2 Foul Water Drainage

The surface water system for the existing Frascati shopping centre has been sized appropriately and will be sufficient for the proposed apartment extension.

8.3.3 Water Supply

The Greater Dublin Water Supply is supplied from raw water sources at Leixlip, Roundwood, Ballyboden and Ballymore Eustace and supplies approximately 1.3 million people within the Dublin City, Fingal, Dun Laoghaire Rathdown, South Dublin, Wicklow, Kildare and Meath Council areas.

The water supply in the region comes from Roundwood Treatment Works in County Wicklow. This reservoir is fed from the Vartry River. From Roundwood the water is piped via a tunnel to the Stillorgan service reservoir.

The Greater Dublin Water Supply Strategic Study Report 1996-2016 was published in 1996 and outlined a 20 year investment strategy to address drinking water needs. One of the primary conclusions of the report was that leakage from water supply pipes in Dublin was unacceptably high, at 42.5%. This has now been reduced to 22% in the Dun Laoghaire Rathdown County Council (DLRCC) area and further reduction of leakage is one of the aims of DLRCC. Over 38% of the water mains in Dun Laoghaire Rathdown are over 50 years old. DLRCC also aim to rehabilitate/replace old defective pipework across its administration area, particularly in the older areas of the county.

The existing water supply network in the vicinity of the proposed development site is shown on the DLRCC Water Main Map in Appendix 8.1 of this Chapter.

Discussions with Dun Laoghaire Rathdown County Council (DLRCC) have indicated that there are currently no capacity or pressure problems in the public network. The public watermain on the Frascati Road currently has a pressure of between 3.0 bar (daytime) and 4.0 bar (night time). DLRCC has plans to reduce pressure in the area in the near future to between 1.5 and 2.0 bar as a water saving measure.

The water supply for the existing Frascati shopping centre has been sized appropriately and will have sufficient capacity for the proposed apartment extension of 45no. apartments.

8.4 Characteristics of the Proposed Development

Consideration of the Characteristics of the Proposed Development allows for a projection of the 'level of impact' on any particular aspect of the proposed environment that could arise. For this chapter the potential impact on Water is discussed.

The proposal is for a residential development of 45 no. apartment units over 3 no. storeys, from second to fourth floor level, over the permitted ground and first floor levels of retail / restaurant floor space and permitted lower ground floor car park. The proposal will be an extension of the Rejuvenation Scheme permitted under Reg. Ref.: D14A/0134 (which was the subject of an EIS), as amended by Reg. Ref.: D16A/0235 / ABP Ref.: PL 06D.246810, Reg. Ref.: D16A/0798, Reg. Ref.: D16A/0843 and Reg. Ref.: D17A/0599.

The proposed apartment mix consists of 3 no. 1 bed units, 36 no. 2 bed units and 6 no. 3 bed units. Balconies are provided for the residential apartments on the north eastern, north western, south eastern and south western elevations. Access to the residential units will be provided via a stair and lift core from lower ground and ground floor level. 51 no. car parking spaces within the lower ground floor car park will be allocated to the residential units. The development includes 54 no. bicycle parking spaces for the apartments, located at lower ground floor level and the proposed first floor level podium car park. The development also includes a bin store and plant area at lower ground floor level, two communal terrace areas at second floor level and roof level and plant enclosures at roof level. The proposal will result in the omission of the second floor level restaurant unit and storage floor space permitted under the existing scheme.

The proposal includes a first floor level podium car park, over the existing podium car park, located at the north west of the site, which will provide 81 no. car parking spaces. The total car parking provision for the scheme as amended by this permission will be 604 no. spaces, which comprises of 51 no. spaces for the proposed residential units and 553 no. spaces for the permitted retail and restaurant floor space.

The proposal is an extension of the existing Frascati Shopping Centre, with a site area of approximately 3.41 hectares, including the Frascati Road area included in the red line boundary of the existing application, the development site area, i.e. excluding Frascati Road, is 2.7 hectares.

8.4.1 Surface Water

Culvert Diversion

The priority stream culvert diversion has been put in place as part of the Frascati shopping centre development. No further culvert diversions will be required. The site surface water, already constructed, connects to the Priory Stream.

Separate System

A separate surface and foul water buried drainage system exists within the site which has been renewed as part of the existing development. The new surface water drainage system is designed using the Micro Drainage Windes package.

SUDS Measures

The principles of Sustainable Urban Drainage Systems (SUDS) are embodied in the recommendations of the Greater Dublin Strategic Drainage Study (GDSDS). The GDSDS addresses the issue of sustainability by requiring designs to comply with a set of drainage criteria which aim to minimize the impact of urbanisation by replicating the run-off characteristics of the greenfield site. The criteria provide a consistent approach to addressing the increase in both rate and volume of run-off as well as ensuring the environment is protected from pollution that is washed off roads and buildings.

These drainage design criteria are as follows:

- Criterion 1 – River Water Quality Protection
- Criterion 2 – River Regime Protection
- Criterion 3 – Flood Risk Assessment
- Criterion 4 – River Flood Protection

The requirements of SUDS are typically addressed by provision of the following:

- Interception storage
- Treatment storage
- Attenuation storage
- Long term storage (not required if growth factors are not applied to Qbar when designing attenuation storage)

In the case of the proposed development, the full implementation of SUDS measures is not deemed necessary because of the proximity of the site to the sea and the availability of the existing site SUDS measures in place for the existing development. These measures, rainwater harvesting, green roofs and permeable paving mean that the impact of the proposed development on the watercourse into which the site drains is minimized. It is proposed to reduce the quantity and increase the quality of the outflow from the site, compared to the existing situation by the implementation of SUDS measures on site. The proposed measures are as follows:

1. The total area of green roof on the shopping centre/apartments is less than the 60% area normally required by DLR Co Council. This and the overall SUDS strategy for the site were discussed with DLR Drainage Department in a meeting prior to the 2014 application (D14A/0134). Because of the proximity to the sea of the site surface water outfall, the normal SUDS requirements, which are provided in large part to provide river regime protection, were agreed not to apply on the Frascati site. This includes the 60% green roof requirement. A new green roof landscaped area for the apartments will provided on the new shopping centre mall roof.

Calculations indicate that the predicted outflow from the site of a 100 year storm with a 10% climate change factor applies is 325 l/s.

Pollution prevention through SUDS measures

The granular sub base and geotextiles below the new green roof area acts to improve the quality of discharge through a number of processes including; sedimentation, filtration, absorption and bio-degradation. The permeable pavement is effective in the removal of organic matter, silt, loam and heavy metals. Additionally hydrocarbons are digested within the sub base by naturally occurring microbes. The table below sets out in more detail the water quality treatment measures proposed.

Existing & Proposed Drainage Flow Paths

The proposed development will not alter the flow path from the site i.e. the gravity drainage connection to the buried culverted watercourse outlined above. By employing SUDS measures the rate, quantity and quality of the surface water will be reduced.

Overland Flow Routes for Exceedances

As described in Section 4.5.7 of the CIRIA SUDS Manual and NA 4.5.1 of BS EN 752:2008 designing for exceedances means considering the effect of what happens when rainfall intensity exceeds the capacity of the gullies or drains and storm water runs overland to low points. This can occur in short periods of heavy rainfall – up to 150mm/hr. In the case of the exceedance of gully capacity, consider the impact on the two types of area within the site:

- 'Permeable Areas': An area of a green roof are proposed for the development. The high permeability of these areas eliminates run-off as rainwater infiltrates the surface of the system at a rate of approximately 900mm/hour.

Protection from Overland Flows

Any significant risk from overflow has been covered in the existing Frascati shopping centre and will be sufficient for the proposed apartment extension.

8.4.2 Foul Water Drainage

A separate foul drainage system exists within the site. This will be maintained and extended for the new development. The current foul water drainage system will have capacity for the proposed apartment extension.

Foul Water Flow & BOD5 Calculation:

1. Existing Development:

The calculation of the flows and BOD5 quantity generated are set out below. These are based on the EPA document listed above.

(i) Retail

Take 1 staff member per 40 sq.m of net floor area, the loading per staff member is;

- With canteen:
 - 60 litres per day flow
 - 30 g per day BOD5.
- Without canteen:
 - 30 litres per day flow
 - 20 g per day BOD5.

Total Net Floor Area	=	9,240 m ²
Retail with no staff canteen	=	3,240 m ²
No. of Staff	=	81
Retail with staff canteen (M&S & Debenhams)	=	6,000 m ² (approx.)
No. of Staff	=	150
Total Flow (81x30 + 150x60)/1,000	=	11.43 m ³ /day
Total BOD5 (81x20 + 150x30)/1,000	=	6.12 kg/day

(ii) Restaurants (McDonalds & Debenhams Café)

Total Net Area	=	740 m ²
No. of Restaurant seats (740/1.5) (1 per 1.5 m ²)	=	493 m ²
Assume 2 full dinner per seat/day	=	986
Flow per diner	=	15 L/day
BOD5 per diner	=	15 g/day
Total Flow (980x15)/1,000	=	14.70 m ³ /day
Total BOD5 (980x15)/1,000	=	14.70 kg/day

(iii) Total for the Existing Development: Retail & Restaurant combined

Total Foul Water Outflow (11.43 + 14.70)	=	26.13 m ³ /day
Total BOD5 (6.12 + 14.70)	=	20.82 kg/day
Peak Foul Outflow / Water Demand (6 x 26.13)/86.4	=	1.8 l/s

Note:

In summary, the existing development will generate a foul water flow of 26,130 litres per day resulting in an estimated peak foul flow of 1.8 l/sec (6 times the dry weather flow) compared to the estimated existing peak flow of 1.2 l/sec.

2. Proposed Development:

(i) Apartments

Total no. of Apartments	=	45
Total Population (45 x 2.1) (2.7 residents per apt)	=	94.5
Flow per resident	=	150 L/day
Additional 10% Infiltration of Flow ((150/100) x 10)	=	15 L/day
BOD5 per resident	=	60 g/day
Total Flow (94.5x (150 + 15)) /1,000	=	15.59 m ³ /day
Total Flow (94.5x60)/1,000	=	5.67 kg/day

(ii) New Development: Apartment & Existing

Total Foul Water Outflow (15.59 + 26.13)	=	41.72 m ³ /day
Total BOD5 (5.67 + 20.87)	=	26.54 kg/day
Peak Foul Outflow / Water Demand (6 x 41.72)/86.4	=	2.9 l/s

In summary, the proposed development will generate a foul water flow of 41,720 litres per day resulting in an estimated peak foul flow of 2.9 l/sec (10 times the dry weather flow) compared to the estimated existing peak flow of 1.2 l/sec.

8.4.3 Water Supply

The apartments will connect to the shopping centre ring main which connects to the 150 diameter public watermain on the Frascati Road. The approximate daily demand and peak flow figures are as above.

8.5 Potential Impact of the Proposed Development

The following provides an assessment of the potential impact on the water environment of the proposed development without mitigation measures being incorporated into the detailed design and construction phase. The mitigation measures and predicted impact of the proposed development are set out below in Section 8.8.

8.5.1 Surface Water

Construction Phase

The following are the potential impacts of the proposed scheme during the construction stage:

- Mobilisation of sediments and harmful substances during the construction phase, due to exposed soil and earth movement/excavation, which may be flushed into the culverted stream during rainfall events;
- Accidental spills of harmful substances such as petrol/diesel or oil during the delivery and storage of harmful substances or by leakages from construction machinery;
- Potential for building materials or silts to be washed into the surface water system, causing blockages and pollution.

Operational Phase

There is no foreseeable negative impact on the surface water regime in the area due to the new development given the fact that site is located so close to the nearby sea.

The potential impact from the operational phase on surface water is likely to be long term and low. The potential impact on water quality does not arise during the operation phase.

There is the continued potential for flooding at the low point of the Frascati Road.

8.5.2 Foul Water Drainage

As part of the existing works foul sewers have already been installed. The potential impact of the proposed development on the local foul sewerage network during the construction phase of the development would therefore be none or minimal.

Construction Phase

The following are the potential impacts of the proposed scheme during the construction stage:

- Mobilisation of sediments and harmful substances during the construction phase, due to exposed soil and earth movement, which may be flushed into the culverted stream during rainfall events;
- Accidental spills of harmful substances such as petrol or oil during the delivery and storage of harmful substances or by leakages from construction machinery.

Operational Phase

The development will result in an increase in the waste water discharged from the site to the public sewer system.

There exists a minor risk associated with the possibility of leakage from damaged foul sewers and drains within the development site. Any foul water leakage could result in minor contamination of groundwater in the area.

The potential impact from the operational phase of the development is therefore likely to be long term and minimal.

8.5.3 Water Supply

Construction Phase

During the connection of new mains to existing mains on site there is a small risk that contamination of the existing supply may occur. The potential impact on the local public water supply network would be short term and imperceptible.

Operational Phase

The Frascati Shopping Centre will result in an increased demand for water from the municipal water supply system, estimated to be approximately 41,720 litres per day compared to the estimated existing demand of 26,130 litres per day. The calculations for these figures are set out in Section 8.4.

8.6 Potential Cumulative Impacts

Given the scale of the proposed residential development, and the capacity of the surrounding environment to accommodate a development of this nature, it is not likely to give rise to any significant effects cumulatively or, in combination with, other developments in the area.

8.7 Do Nothing Impact

8.7.1 Surface Water

If the proposed development were not constructed there would be no effect on the existing surface water network and storm water from the lands will continue to be discharged to the culverted watercourse.

8.7.2 Foul Water Drainage

If the proposed development were not constructed there would be no effect on the existing foul water network and foul water from the site would continue to be discharged to the 825mm diameter foul sewer on Frascati Road.

8.7.3 Water Supply

If the proposed development were not to go ahead there would be no increase in the demand on the existing water supply network.

8.8 Remedial and Mitigation Measures

Remedial and mitigation measures describe any corrective measures that are either practicable or reasonable, having regard to the potential impacts discussed above. This includes avoidance, reduction and remedy measures as per the guidance set out in Section 4.7 of the Development Management Guidelines 2007 to reduce or eliminate any significant adverse impacts identified.

8.8.1 Surface Water

Construction Phase

The following remedial or reductive measures to mitigate the impact of the construction phase on the existing environment are proposed with reference to water:

Surface Water Construction Stage Measures to be Implemented:

- A method statement for all works to be carried out will be prepared by the contractor and agreed with Dun Laoghaire Rathdown County Council prior to commencement of works to outline what measures are to be taken to ensure there is no loss of service during the works;
- Dewatering measures should only be employed where necessary;
- If concrete mixing is carried out on site, the mixing plant should be sited in a designated area with an impervious surface;

- Existing surface drainage channels within the lands that serve adjacent lands should be retained where possible to prevent causing increased flooding impacts;
- Construction methods used should be tailored to reduce, as much as possible, dust and noise pollution;
- Comprehensive traffic management procedures, including the provision of access to all roads, and access/egress points should be prepared and agreed with the Local Authority. These traffic management measures should be implemented at times when traffic disruption may be experienced;
- Road sweeping and/or wheel wash facilities should be provided, as required;
- All oils/diesel stored on site for construction equipment are to be located in appropriately bunded areas;
- Filters and silt traps will be used to prevent rain washing silts and other materials into the surface water network and creating blockages.
- Adjacent watercourses/groundwater need to be protected from sedimentation and erosion due to direct surface water runoff generated onsite during the construction phase. To prevent this from occurring surface water discharge from the site will be managed and controlled for the duration of the construction works until the permanently attenuated surface water drainage system of the proposed site is complete. A temporary positive drainage system shall be installed prior to the commencement of the construction works to collect surface water runoff from the site during construction. A series of geotextile lined cascading, high level outfall, settling basins will be installed upstream of the agreed discharge point. This temporary surface water management facility will throttle runoff and allow suspended solids to be settled out and removed before being discharged in a control manner to the agreed outfall. Inlet to the cascading settling basins will be riprapped to prevent scour and erosion in the vicinity of the inlet.

Operational Phase

The following mitigation measures are proposed for the operational phase of the proposed development with reference to water:

Surface Water Operational Stage Measures to be Implemented:

- Water Quality: The green roof for the apartments on the shopping centre roof will improve the quality of surface water run from the site.

8.8.2 Foul Water Drainage

Construction Phase

Effluent generated on the site from the contractor's sanitary facilities will be discharged to a holding tank and removed off site by a certified waste removal contractor in accordance with the requirements of the Waste Management Act of 1996 and 2001. Any other arrangements would be subject to agreement with DLRCC Drainage Division.

The following remedial or reductive measures to mitigate the impact of the construction phase on the existing environment are proposed:-

Foul Water Drainage Construction Stage Measures to be Implemented:

- Road sweeping and/or wheel wash facilities should be provided, as required;
- All onsite sewers should be tested and surveyed prior to connection to the public sewer to prevent any possibility of ingress of ground water;
- All sewers will be inspected and where necessary sealed to ensure that uncontrolled ground water inflow does not occur;

- Any leakage from the foul sewer will be cordoned off and the contaminated effluent and soil collected and disposed by licensed contractors.

Operational Phase

Foul Water Drainage Operational Stage Measures to be Implemented:

- Dual & low flush toilets and water economy outlets will be used to reduce flows from the development.

8.8.3 Water Supply

Construction Phase

None. Watermain connection already exists.

Operational Phase

Water Supply Operational Stage Measures to be Implemented:

- The site water main system will be metered as directed by the Council to facilitate detection of leakage and the prevention of water loss.
- Dual & low flush toilets, water economy outlets and rainwater harvesting will all be considered to reduce the water demand.

8.9 Predicted Impacts of the Proposed Development

8.9.1 Surface Water

Construction Phase

Provided that the proposed remedial or reductive measures are implemented, the impact of the proposed development during the construction stage will be of a temporary nature and will be minimised.

Operational Phase

There will be a decrease in surface water run-off from the new development due to the SUDS measures proposed. Surface water run-off will also improve in quality due to these measures.

'Worst-case' scenario

The worst case scenario is that flooding occurs on-site and in the surrounding area due to this development. The design of the new drainage system ensures that the pipe sizes, gradients etc. will be more than adequate for the anticipated stormwater flows. The depth, size, gradient and proximity to the sea of the receiving culverted watercourse means that blockage downstream of the site is not conceived to be a risk.

8.9.2 Foul Water Drainage

Construction Phase

Provided that the proposed remedial or reductive measures are implemented, the impact of the proposed development during the construction stage will be of a temporary nature and will be minimised.

The contractors operations will result in the generation of effluent and sanitary waste from facilities provided for the workforce on site.

Operational Phase

The increase in water consumption and resulting foul water flow is a function of the usage of the development.

'Worst-case' scenario

A 'worst-case' scenario resulting from the construction of the development would result in the contamination of groundwater and the local streams by foul effluent from the development. However the mitigation measures outlined will ensure that this should not occur.

8.9.3 Water Supply

Construction Phase

Provided that the proposed remedial or reductive measures are implemented, there will be no appreciable impact of the proposed development during the construction stage on the water supply in the area.

Operational Phase

The increase in water consumption is a function of the usage of the development.

The installation of water saving devices will further reduce the impact of the re-development on the existing water supply network.

'Worst-case' scenario

The 'worst case' scenario would be the pollution of the water supply by an accidental spillage or contamination. However, the mitigation measures proposed should ensure that this will not occur. Prior to connection to the public watermain, all watermains in the development will be tested and cleaned to the requirements of Dun Laoghaire Rathdown County Council.

8.10 Monitoring

All surface water drainage works will be approved by Dun Laoghaire Rathdown County Council, Sanitary Services Division, and will be carried out in accordance with the GDR COP (Greater Dublin Regional Code of Practice for Drainage Works). Foul and water works will be carried out in accordance with Irish Water Codes of Practice.

8.10.1 Hydrogeology

Although no specific monitoring will be required as part of the proposed development it is envisaged that EPA Monitoring will continue in the area through the life of the development.

8.10.2 Surface Water

Construction Phase

Monitoring during the Construction Phase of the development should consist of the following:

- Normal quality control inspection of the works
- Monitoring of possible discharges to the existing culverted watercourse at its outfall may also be required by DLRCC to ensure that no unauthorised discharges are occurring.
- Pressure testing and CCTV inspections of the surface water drains following completion of stages of the construction is recommended to ensure that the required construction standards are being maintained.
- Upon completion of the development, monitoring of the discharges from the development will be undertaken as required.

Operational Phase

Monitoring during the operational phase of the development is recommended as follows:

- All filters, silt traps, hydro-brakes and overflows should be inspected regularly and in particular after heavy rainfall events to ensure that they are not blocked.
- Gullies in the public road should be inspected and cleaned as required
- Pollutants which accumulate within the oil petrol interceptor on site should be regularly monitored and removed as necessary.

8.10.3 Foul Water Drainage

Construction Phase

Monitoring during the Construction Phase of the development should consist of the following:

- Normal quality control inspection of the works;
- Monitoring of possible discharges to the existing culverted watercourse is also required by Dun Laoghaire Rathdown County Council to ensure that no unauthorised discharges are occurring;
- Pressure testing and CCTV inspections of the foul sewers following completion of stages of the construction is recommended to ensure that the required construction standards are being maintained;
- Upon completion of the development, monitoring of the discharges from the development will be undertaken as required.

Operational Phase

No monitoring of foul effluent from the development is considered to be necessary.

8.10.4 Water Supply

Metering will allow the water supply to the development to be monitored, this is to be done to the requirements of Dun Laoghaire Rathdown County Council.

8.11 Reinstatement

8.11.1 Hydrogeology

No specific reinstatement measures are required.

8.11.2 Surface Water

Construction Phase

Reinstatement at completion of the works will involve:

- The cleaning of the existing sewers in the vicinity of the development as required.
- All excavations will be fully reinstated to the requirements of Dun Laoghaire-Rathdown County Council.
- Leaving the area in a neat and clean condition, removing all deleterious materials that may have been deposited during construction works.

Operational Phase

Following completion of the development no reinstatement works are envisaged.

8.11.3 Foul Water Drainage

Construction Phase

Reinstatement at completion of the works will involve:

- The cleaning and sterilisation of the existing sewers in the vicinity of the development as required;
- All excavations will be fully reinstated to the requirements of Dun Laoghaire Rathdown County Council; and
- Leaving the area in a neat and clean condition, removing all deleterious materials that may have been deposited during the construction works.
-

Operational Phase

No reinstatement works are envisaged upon completion of the development.

8.11.4 Water Supply

All excavations will be fully reinstated to the requirements of Dun Laoghaire Rathdown County Council.

8.12 Interactions

None anticipated.

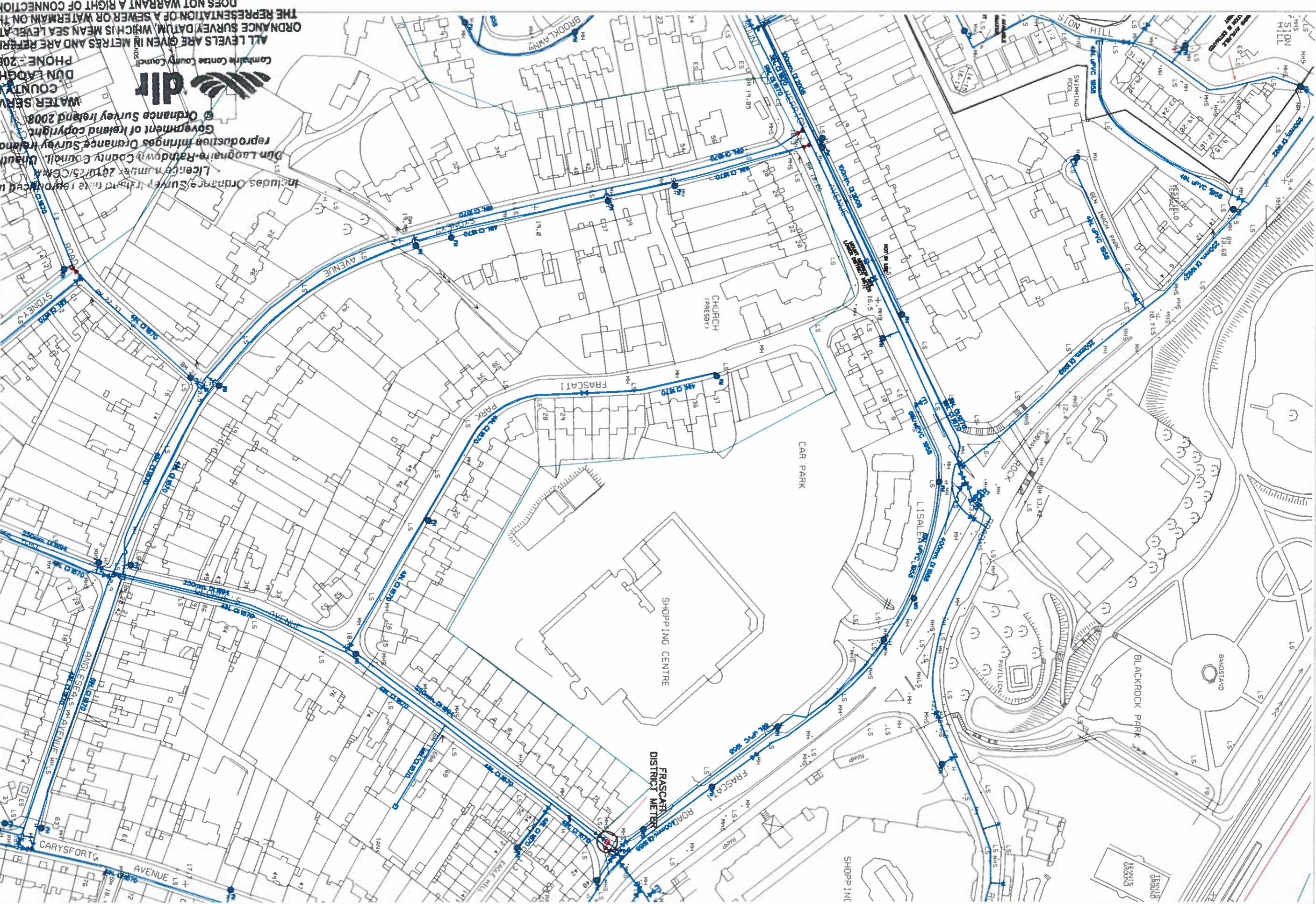
8.13 Difficulties Encountered in Compiling

None.

8.14 References

- Guidelines on the information to be contained in Environmental Impact Statements (EPA 2002) and Advice Notes on Current Practice in the preparations of Environmental Impact Statements (EPA 2003)
- BS EN 752:2008 “Drain and Sewer Systems outside Buildings”
- Part H of the Building Regulations
- Greater Dublin Strategic Drainage Study
- Ciria C697 “The SUDS Manual”
- Sewers for adoption: 6th Edition
- Guidelines on the information to be contained in Environmental Impact Statements (EPA 2002) and Advice Notes on Current Practice in the preparations of Environmental Impact Statements (EPA 2003)
- BS EN 752:2008 “Drain and Sewer Systems outside Buildings”
- Part H of the Building Regulations
- Greater Dublin Strategic Drainage Study
- Ciria C697 “The SUDS Manual”
- Sewers for adoption: 6th Edition
- Guidelines on the information to be contained in Environmental Impact Statements (EPA 2002) and Advice Notes on Current Practice in the preparations of Environmental Impact Statements (EPA 2003).
- Dun Laoghaire Rathdown County Council Water Main Map.

APPENDIX 8.1- Public Water Main Map in the vicinity of the site



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Water and Drainage
 Dept.,
 Dunlaoghaire
 Rathdown
 Council, Level 3,
 County Hall, Harrier
 Road, Dunlaoghaire
 PH:01-2054700

Sep 23 2013
 Scale: 1:1750
 Legend:
 - S-Slice Valve
 - P-Pressure Reducing Valve
 - M-Meter
 - B-Bulk Meter
 - H-Hydrant
 - C-Cap End
 - V-Air Valve
 - X-Stop Tap
 - - Existing Main
 - - Proposed Abandoned Main