

5.9 Water (Drainage, Supply, Flood Risk and Groundwater)

5.9.1 Introduction

This Chapter of the EIAR presents the water assessment for the Demolition, Construction and Operational Phase of the proposed development for a New City Library and Public Realm Works at Parnell Square North, Dublin 1. This Chapter has been prepared by Waterman Moylan.

The proposed development is described in detail in Chapter 3: Description of Proposed Development, of this EIAR.

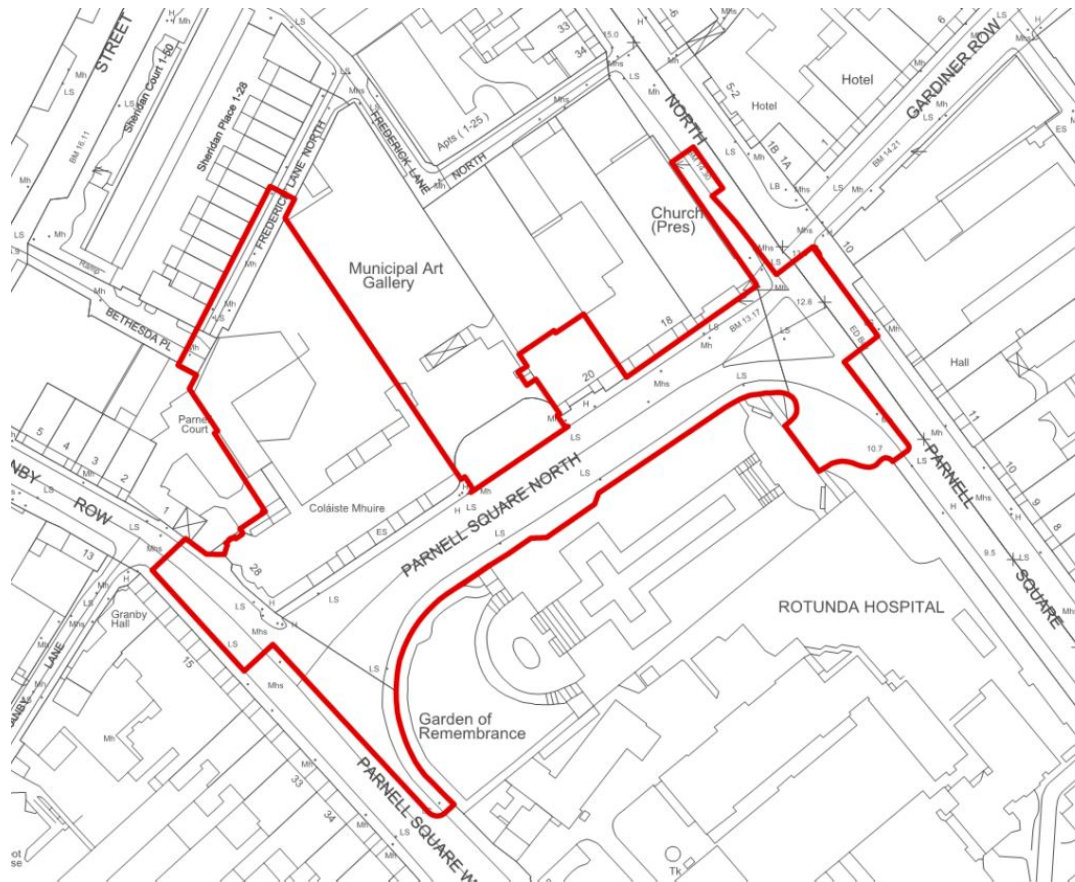


Figure 5.9.1: Location Map – Proposed Development

5.9.2 Methodology

This section of the EIAR was prepared by Waterman Moylan using the following methodology: -

1. Desktop review of the planning stage documentation provided by the project design team.
2. Review of the existing and proposed water environment from the site investigation results, watermain / drainage report, and the planning drawings received from the project design team.
3. Assessment of the impacts of the proposed development on the water environment.

The impacts of the proposed development to surface water has been assessed having regard to SI No 272 of 2009 European Communities Environmental Objectives (Surface Waters) Regulations 2009.

Flooding at the proposed development site has been assessed having regard to 'The Planning System and Flood Risk Management' – Guidelines for Planning Authorities published by the Office of Public Works in November 2009.

5.9.3 Receiving Environment (Baseline Situation)

5.9.3.1 Background

Parnell Square is located in Dublin 1 at the northern end of O'Connell Street.

In this area, Dublin City Council and more recently Irish Water operate and maintain an extensive network of underground pipes providing water supply and drainage services to their residential and commercial customers around Parnell Square.

The water services are buried under the public road and footpaths with multiple connections serving the surrounding premises.

5.9.3.2 Foul Drainage - Existing

The existing foul drainage systems within 20 – 21 Parnell Square and the former Colaiste Mhuire at 23 – 28 Parnell Square are served by internal sewers which discharge by gravity to three external public sewers.

The three existing public sewers shown on Figure 5.9.2 are:

- a) A 2,450 mm x 780mm combined sewer on Parnell Square North
- b) A 300 mm diameter combined sewer on Bethseda Place.

- c) A 300 mm diameter combined sewer on Frederick Lane North.



Figure 5.9.2: Combined Sewers - Existing

5.9.3.3 Surface Water Drainage - Existing

The existing surface water systems within 20 – 21 Parnell Square North and the former Colaiste Mhuire at 23 – 28 Parnell Square North are served by internal sewers which discharge by gravity to three external public sewers.

The three external public sewers are

- a) A 2,450 mm x 780mm combined sewer on Parnell Square North
- b) A 300 mm diameter combined sewer on Bethseda Place.
- c) A 300 mm diameter combined sewer on Frederick Lane North. See Figure 5.9.2.

Drainage from the existing public realm on Parnell Square North is discharged by gravity to the existing 2,450mm x 780mm combined sewer on Parnell Square North.

There is also a 225mm diameter surface water sewer on Parnell Street.

5.9.3.4 Water Supply - Existing

The water supply to 20 – 21 Parnell Square and the former Colaiste Mhuire at 23 – 28 Parnell Square is from the existing public mains. These are a 250 mm diameter main on Parnell Square North and a 100 mm diameter main on Frederick Lane North. See Figure 5.9.3.

There are 4 existing fire hydrants are located on Parnell Square North and 1 at Frederick Lane North.

Capacity and pressure tests carried out by Irish Water in June 2018 at the hydrant off the existing 250mm diameter main at the corner of Parnell Square North and Parnell Square East recorded a flow rate of 19 – 21 litres per second with a pressure of 2 Bar. See Figure 5.9.4

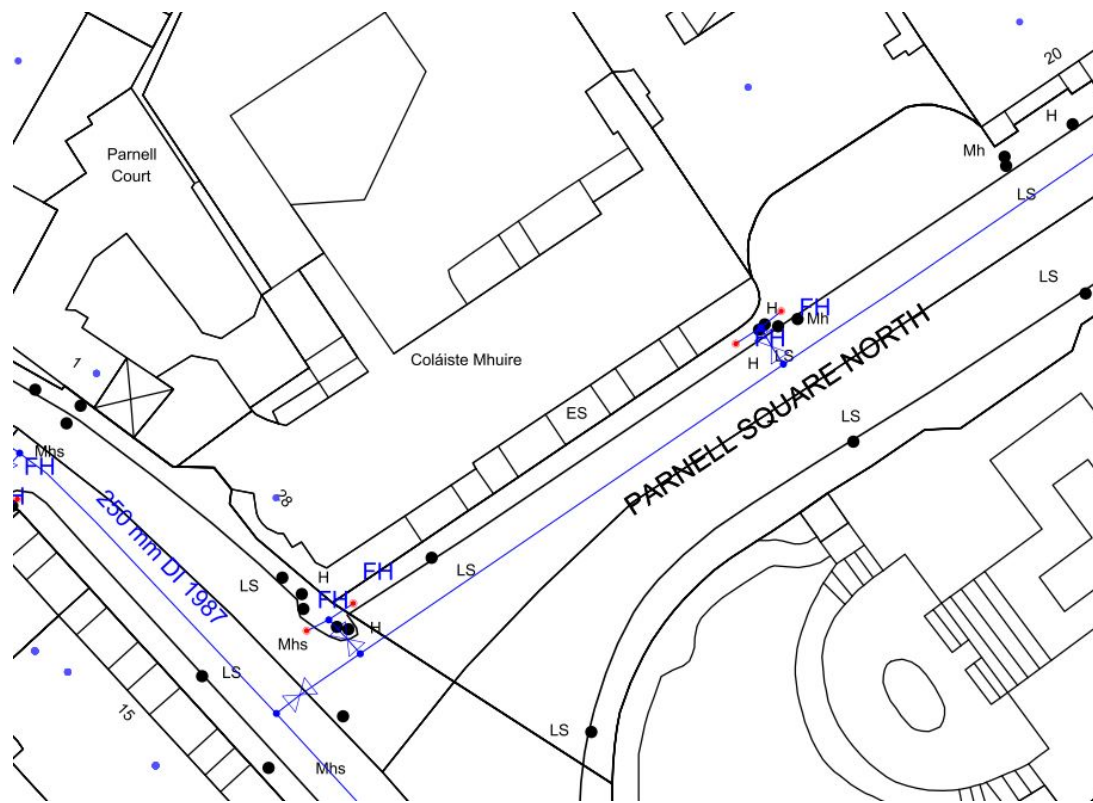


Figure 5.9.3: Watermain – Existing



Figure 5.9.4: Watermain Flow and Pressure Tests June 2018

5.9.3.5 Flooding

The existing ground levels on Parnell Square North vary from 11.5 mOD in front of No 28 up to 12.8 mOD in front of No. 20.

The ground levels on both Parnell Square East and on Parnell Square West fall away from Parnell Square North towards Parnell Street.

No flooding in the area of the proposed development has been recorded on the National Flood Hazard Mapping website, 'floodmaps.ie'. Nor is the location for the proposed development located on or near a floodplain. See Figure 5.9.5.

This website is maintained by the Office of Public Works (OPW) which is the leading state agency in relation to flood-related matters in the Republic of Ireland.

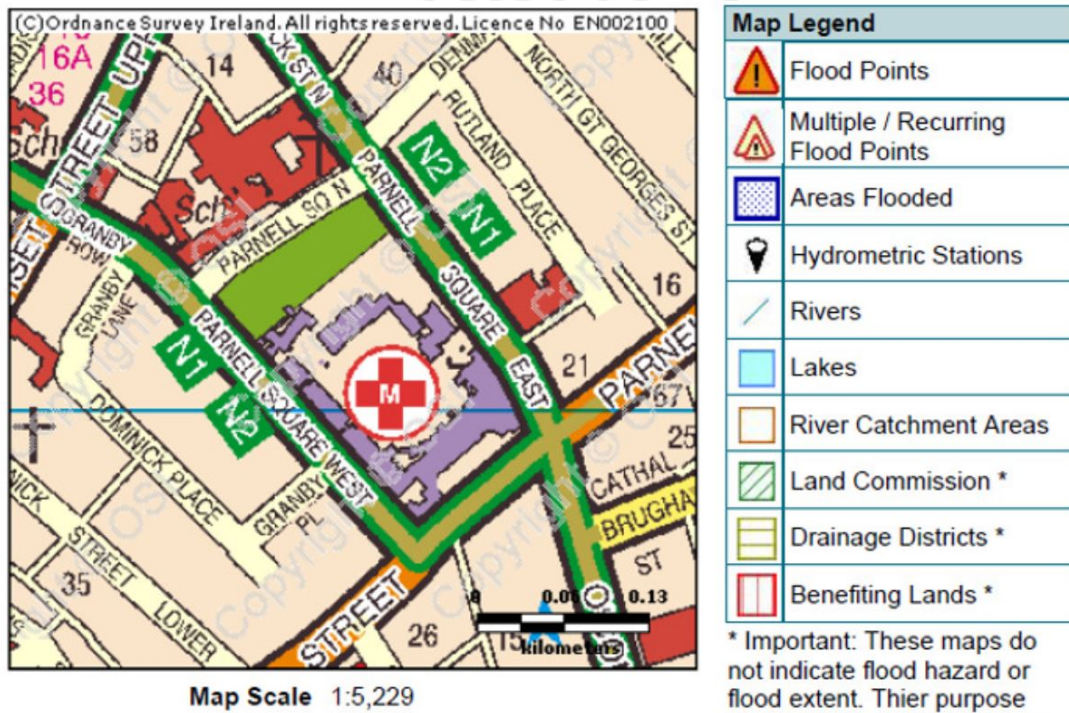


Figure 5.9.5: Extract from OPW Flood Hazard Mapping

5.9.4 Characteristics of the Proposed Development

5.9.4.1 Proposed Development

The proposed development comprises the redevelopment of 20 – 21 Parnell Square North and the former Colaiste Mhuire at 23 – 28 Parnell Square North into a New City Library as part of the Parnell Square Cultural Quarter (PSCQ). Public Realm Works also form part of the proposed development. See Figure 5.9.6.

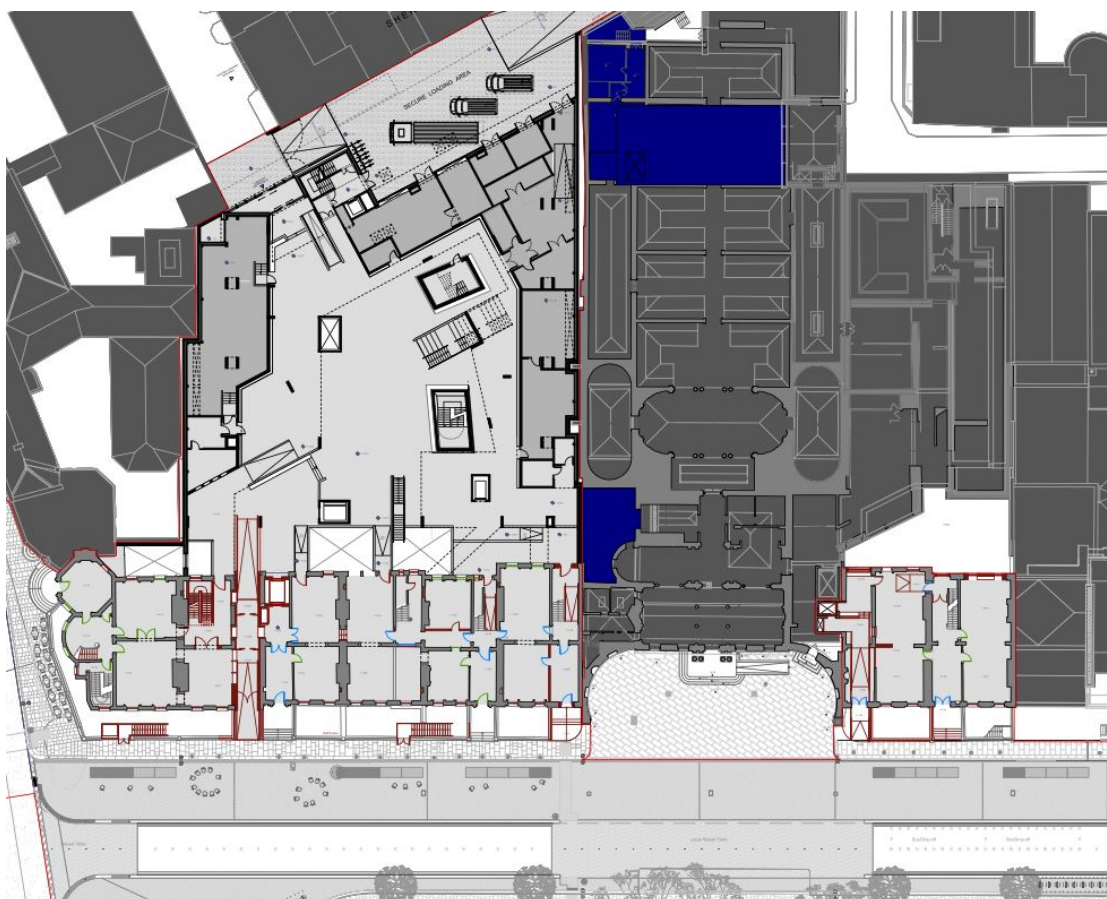


Figure 5.9.6: Ground Floor Plan – Proposed

The Proposed Development is described in detail in Chapter 3: Description of Proposed Development, of this EIAR.

The facilities of the proposed development will extend to some 11,198 sq.m and provide facilities for

- Lending and Reference Library
- Storey House Literature Centre
- Conference and Exhibition facilities
- Learning Suite
- Music and Innovation Hubs

The new buildings will have a staff of 70 persons and cater for up to 3,000 visitors per day.

The Restaurant will be located on the ground floor with kitchen, catering, staff and toilet facilities at basement level.

5.9.4.2 Foul Drainage - Proposed

During the redevelopment of the former Colaiste Mhuire at 23 - 28 Parnell Square North, it is proposed to abandon the existing largely combined drainage system within the site including the existing connections to the external public sewers. See Figure 5.9.7.

A new and separate internal collection system is to be provided catering for foul water only. This system has been designed to cater for a population of 70 staff and 3,000 visitors per day.

It will discharge by gravity to a new sump / pumping chamber at basement level. The system will include a grease separator on the sewer carrying foul water from the kitchen / canteen facilities.



Figure 5.9.7: Foul Drainage- Proposed

The 100mm diameter rising main from the sump / pump chamber will discharge to an outfall manhole at the rear of the site and thence by gravity to the existing 300 mm diameter combined sewer on Bethesda Place.

Dirty water from the Service Yard will be discharged by gravity through a Class 1 petrol interceptor to the outfall manhole.

The proposal has been approved by Irish Water without any requirement for infrastructure upgrade.

No alterations are proposed to the existing foul drainage system at 20 - 21 Parnell Square North.

5.9.4.3 Surface Water Drainage - Proposed

An integral part of the redevelopment of the former Colaiste Mhuire at 23 - 28 Parnell Square North, will be the management of the quantity and quality of surface water discharges from the development through the use of sustainable surface water measures.

These SuDS measures will have the multiple objectives of improving water quality, reducing the quantity of runoff by up to 40% and providing bio-diversity and amenity value.

The SuDS features proposed include greenroofs with rainwater butts for irrigation, permeable paving and bio-retention tree pits.

Any surface water discharges from the development will be restricted to 2 litres / second / hectare. This restricted rate will be achieved by a combination of SuDS measures including greenroofs, rainwater butts, permeable paving, bio-retention tree pits and an underground surface water attenuation tank.

The SuDS infrastructure within the public realm will include: -

- Permeable paving to southern section of public realm.
- Road gullies on the south side of the public realm discharging to bio-retention tree pits.

New surface water infrastructure to be provided to cater for any excess surface water remaining after attenuation will include

- A collection system at lower ground level with a storm tank, pump chamber, an underground attenuation storage tank and a pumped discharge to the existing combined sewer in Bethesda Place. This system will also drain the lightwells at the front of Nos. 23 – 28. The storage volume of 180 cubic metres in the attenuation tank to be located under the loading area at Frederick Lane North has been designed for a 1 in 100 year storm event with a 20% allowance for climate change.
- A new surface water sewer with silt pits under the roadway section of the public realm. This sewer will outfall to the existing 2,450 mm x 780 mm combined sewer.
- Drainage channels on the south side of the public realm discharging to the new surface water sewer.
- Road gullies on the north side of the public realm discharging

to the new surface water.

The final details of the surface water drainage system will be agreed by the design team with the Environment and Transportation Department, Dublin City Council prior to the commencement of construction.

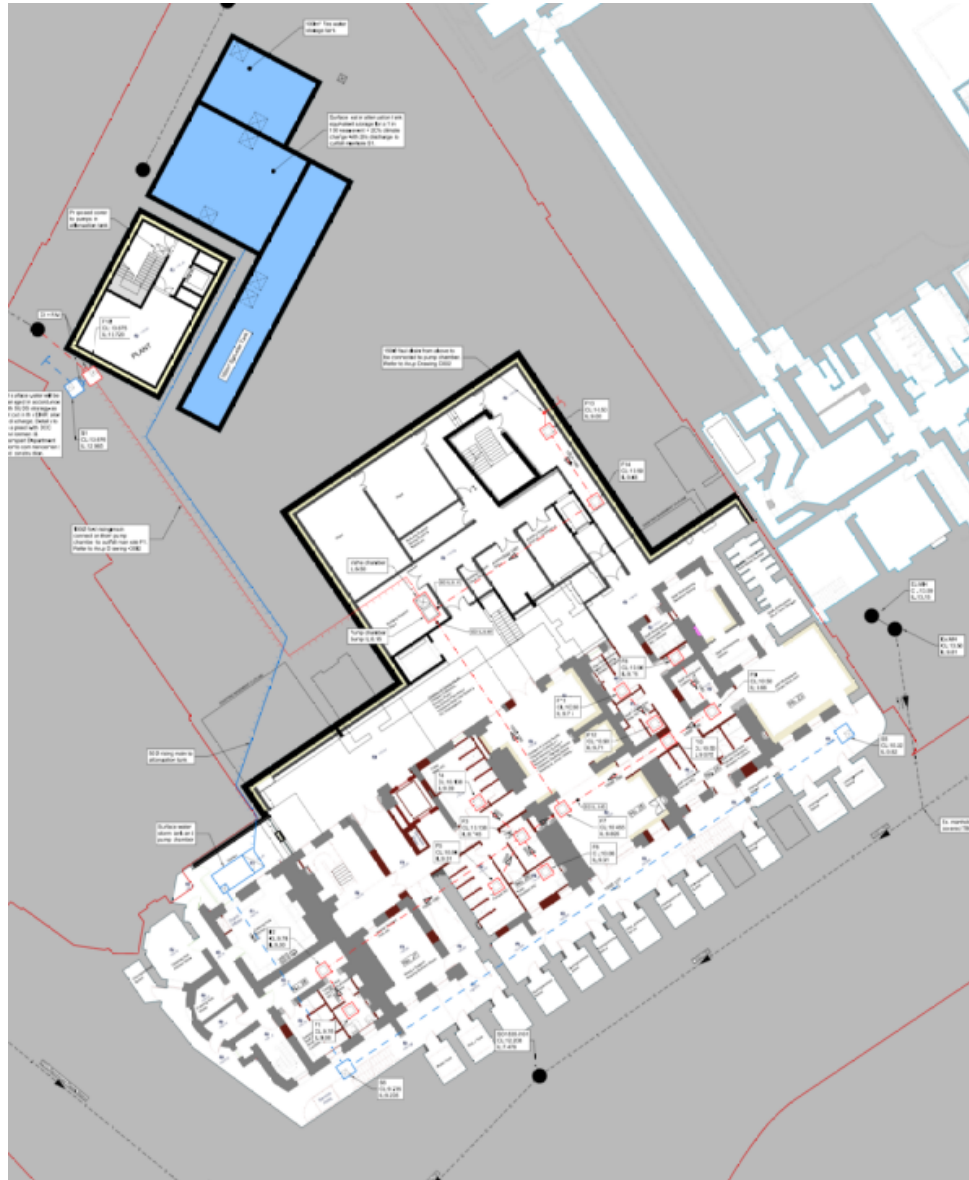


Figure 5.9.8: Proposed Surface Water Drainage – Lower Ground Floor

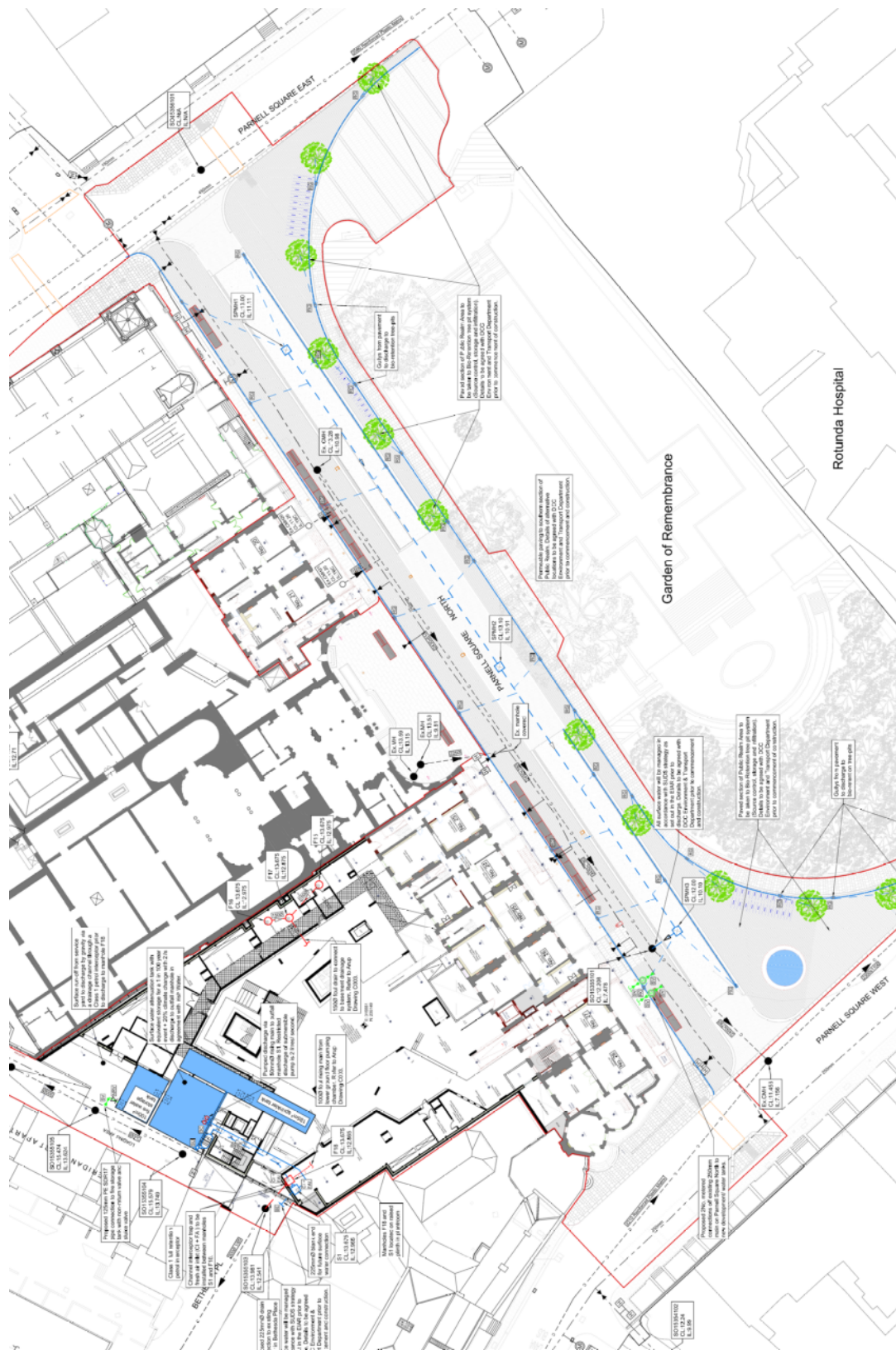


Figure 5.9.9 Surface Water Drainage for Public Realm – Proposed

5.9.4.4 Water Supply - Proposed

Proposed System

As part of the redevelopment of 20 – 21 Parnell Square North and the former Colaiste Mhuire at 23 – 28 Parnell Square North, it is proposed to remove the existing water distribution system including the existing connections to the public main(s).

For 23 – 28 Parnell Square North and the new Library buildings, a new supply, storage and distribution system will be provided to be served from the two new metred connections off the existing 250mm diameter main on Parnell Square North. See Figure 5.9.10. The system has been designed to cater for 70 staff and 3,000 visitors per day.

The peak flow demand is predicted to be 2.89 litres per second increasing to 20 l/sec for firefighting from the hydrants outside No 23 and No 28

The system will include low rate fittings to reduce demand on the existing water supply network.

No change is proposed to the existing water supply, metering or distribution system at 20 – 21 Parnell Square North.



Figure 5.9.10 Watermains - Proposed

Capacity

Capacity and pressure tests carried out by Irish Water in June 2018 at the hydrant off the existing 250mm diameter main at the corner of Parnell Square North and Parnell Square East recorded a flow rate of 19 – 21 litres per second with a pressure of 2 Bar.

Irish Water have advised that the additional demand from the proposed development can be accommodated from the existing local network.

In response to a pre-connection application from the design team, Irish Water have advised that they can supply the proposed development without any upgrade to the water supply infrastructure.

Fire Flow

The peak fire flow requirement of the propose development has been determined to be 20 litres per second.

Irish Water have advised that, while the existing system can supply the daily needs of the development, they cannot guarantee a minimum flow rate of 20 l/sec to meet the fire flow requirements.

In order to comply with the Fire Authority requirements, the project design team has proposed to provide a Life Safety System within the buildings. This will require water storage which will be provided in a new underground tank adjacent to the proposed surface water attenuation tank at the rear of the development.

5.9.4.5 Flooding

Under the classifications included in 'The Planning System and Flood Risk Management' – Guidelines for Planning Authorities published by the Office of Public Works in November 2009, the location for the proposed development is classified as Flood Zone A where the probability of flooding is low from all sources.

In addition, the proseed development falls into the classification of 'Less Vulnerable Development'

As a result, the proposed development is regarded as 'Appropriate' under the Flood Risk Management Guidelines.

No works are proposed as part of the proposed development which would increase the very low flood risk at 20 – 21 or at 23 – 28 Parnell Square North.

5.9.5 Potential Impacts of the Proposal

5.9.5.1 Demolition and Construction Phase

The potential but not significant impacts which could arise from the construction phase of the proposed redevelopment of 20 – 21 Parnell Square North and the former Colaiste Mhuire at 23 – 28 Parnell Square North are set out below:-

1. Local flooding from burst watermain(s).
2. Overground discharge of wastewater due to blockage or damage to combined sewer.
3. Local flooding due to blockage or damage to combined sewer.
4. Accidental discharge of excavated material stored temporarily on site into surface water drains or watercourses.

The proposed mitigation measures and the predicted impacts of these potential impacts are addressed below.

5.9.5.2 Operational Phase

The potential but not significant impacts which could arise from the operational phase of the proposed redevelopment of 20 – 21 Parnell Square North and the former Colaiste Mhuire at 23 – 28 Parnell Square North are set out below:-

1. The capacity of the existing watermains may not be adequate to supply the future needs of the completed development.
2. The water storage to be provided within the proposed development may not be adequate for the future fire flow needs of the development.
3. The existing combined sewer on Bethesda Place may not have adequate capacity to cater for the future foul water discharges from the proposed development and any restricted surface water discharges from the new underground surface water attenuation tank.
4. The existing combined sewer on Parnell Square North may not have adequate capacity to cater for any excess surface water runoff after attenuation.
5. The capacity of the proposed stormwater attenuation tank may not be adequate to cater for the future surface water volumes.
6. The capacity if the proposed foul water pumping system may not be adequate to cater for the future foul water volumes from the redeveloped buildings.

7. The proposed foul water pumping system may cease working if not maintained in good working order.
8. The proposed surface water measures may cease working if not maintained in good working order.

The proposed mitigation measures and the predicted impact of these potential impacts are addressed below.

5.9.5.3 Do-Nothing Impact

In the event that the proposed development does not proceed, the water environment in the surrounding area will remain as existing.

The do-nothing impact will be imperceptible.

5.9.6 Mitigation Measures

5.9.6.1 Demolition and Construction Phase

The primary mitigation measure during the demolition and construction phase will be the implementation of the Construction Management and Waste Management Plan the including the management by the Contractor of temporary local networks for water supply and drainage.

The Plan includes proposals to prevent the accidental discharge of excavated material stored temporarily on site into surface water drains or watercourses.

5.9.6.2 Operational Phase

The primary mitigation measures during the operational phase of the proposed development will be

- The operation of low rate fittings to reduce water demand.
- The operation of SuDS measures to reduce the quantity and improve the quality of surface water runoff
- The ongoing attenuation of surface water to restrict the rate surface water discharge volumes from the development.
- The ongoing maintenance of the water supply and drainage systems.

5.9.7 Predicted Impact of the Proposed Development

5.9.7.1 Demolition and Construction Phase

Water supply and wastewater facilities for construction activities, staff and sub-contractors during the construction phase will increase demand on the public watermains and sewers.

Some disruption to the collection and disposal of surface water on Parnell Square North can be expected during the development works for the public realm works.

The likely predicted impacts of the increased water demands on the existing networks during the construction phase are expected to be short term, slight and within the capacity of the existing public networks. The impacts will not be significant and will have a neutral effect.

5.9.7.2 Operational Phase

Following the completion of the proposed development, there will be

- a) An increase in demand for potable water from the public mains.
- b) An increased discharge of foul water from the proposed development to the public sewers.
- c) A reduction in the rate of surface water discharge from the site of the proposed development.

The likely predicted impact of the increased water demands on the existing networks during the operational phase are expected to be long-term, slight, within the capacity of the existing public water networks. The impacts will not be significant and will have a neutral effect.

5.9.8 Monitoring / Reinstatement

5.9.8.1 Demolition and Construction Phase

The project team for the proposed development should ensure that the temporary local networks for water supply and drainage for construction activities, staff and sub-contractors are operated by the Contractor in an appropriate manner in accordance with the Construction Management and Waste Management Plan.

5.9.8.2 Operational Phase

The management team at the proposed development should ensure that the maintenance regimes for the water supply and drainage systems are implemented on an ongoing basis.

5.9.9 Interactions

The interactions between Water (Drainage, Supply, Flood Risk and Groundwater) and the other chapters of the EIAR are set out below.

Biodiversity

During the construction phase, the Contractor will implement the Construction Management and Waste Management Plan to contain any areas at risk of contaminated runoff.

As a result, there will be no significant impact on Biodiversity due to the proposed development due to the implementation of best management construction management measures.

Soil & Geology

Excess material excavated during the installation of new water supply and drainage services will be stored, handled and disposed of as per Chapters 5.8 and 5.14 of this EIAR.

5.9.10 Cumulative Impacts

The proposed development is located in the city centre where development is continually occurring.

No other significant projects have been identified in the area of the proposed development which would result in a significant cumulative impact on Water either during the construction or operational phases.

5.9.11 Difficulties Encountered

No particular difficulties were encountered during the compilation of this chapter.

5.9.12 Consultations

Pre-planning consultations were held by the project design team with DCC Drainage Division, Irish Water and TII during the period May – July 2018.

Water and Foul Water

A pre-connection enquiry was submitted to Irish Water in July 2018. In response, Irish Water issued a Confirmation of Feasibility letter in July 2018 giving approval to connect to both the water and wastewater infrastructure without any infrastructure upgrades.

However, Irish Water included a condition requiring the provision of 'adequate fire storage within the development'.

Surface Water

Options for surface water were submitted to DCC Drainage Division in May 2018. DCC responded by requesting that the design team to manage surface water disposal from the site through the use of sustainable surface water measures.

EIAR Chapter 5.9

Discussions were also held during July and August 2018 between the designers of the Proposed Development (Arup) and the authors of this chapter (Waterman Moylan).

5.9.13 Bibliography

The following documents were consulted during the preparation of Chapter 5.9 Water.

- Irish Water record mapping for watermains and sewers Dublin City Council record mapping for sewers and watermains.
- Drainage and Watermains Planning Report, Issue 1, Arup, 12 October 2018
- Drg No C001 Issue P2 Existing Drainage and Watermain Layout, 12 October 2018, Arup
- Drg No C002 Issue P2 Proposed External Drainage Layout, 12 October 2018, Arup
- Drg No C003 Issue P2 Proposed Lower Ground Floor Drainage Layout, 12 October 2018, Arup
- Pre-connection Enquiry to Irish Water, Arup May 2018
- Irish Water response dated 6 July 2018.
- Flood Risk Assessment, Issue 1, Arup, 6 September 2018
- Outline Construction Management & Waste Management Plan, Issue 1, Arup, 4 September 2018
- SI No 272 of 2009 European Communities Environmental Objectives (Surface Waters) Regulations 2009
- SI No 9 of 2010 European Communities Environmental Objectives (Groundwater) Regulations 2009
- The Planning System and Flood Risk Management' – Guidelines for Planning Authorities, Office of Public Works in November 2009