

Renovation and extension of No. 9 George's Place and  
the former Wash House, Kelly's Avenue, Dún Laoghaire.

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## Engineers Services Report

February 2025





## Document Verification

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**Client:** Dún Laoghaire Rathdown County Council

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## 1. INTRODUCTION

STEM Consulting Engineers have been appointed to prepare the following engineering services report and flood risk assessment for the proposed works renovation and extension works at No. 9 George's Place and of the former Wash House, Kelly's Avenue, Dún Laoghaire.

The proposed project involves the renovation and extension of two vacant protected structures on a corner site at George's Place and Kelly's Avenue, Dún Laoghaire to provide a creative hub. The renovation will consist of upgrading and extending the buildings to improve energy efficiency, provide universal access and to bring the buildings back into use. No. 9 George's Place is a two-storey over basement, four-bay building built in 1831 as a hotel building (484 sqm). There is a two-storey lean-to extension to the north-west of no. 9 George's Place which is in poor condition. The detached, two-storey, red-brick washhouse was built in 1915 on a tripartite plan with central staircase (161 sqm). The existing two-storey lean-to extension to the north-west of no. 9 George's Place will be demolished and replaced with a new four-storey extension to accommodate the new use and to provide universal access. Upgrading will be required to the former Wash House building to accommodate the new use and provide universal access. A small two-storey extension to facilitate a new lift will be required to rear of the Wash House building. The external courtyard between the two buildings will be retained as a courtyard space to facilitate access and circulation between the two buildings. The future use of the building is currently to be determined through public consultation. It is planned to be a non-residential educational /creative use with community benefit.

The property is under the authority and ownership of Dun Laoghaire-Rathdown County Council. It proposed to reuse the existing foul and surface water connections where possible, and adding a new foul water connection for the new extension. No pumping of foul water or surface water is proposed.

Surface Water Drainage will be designed to meet the SuDS requirements as set out in Dun Laoghaire-Rathdown County Development Plan - Appendix 7 Sustainable Drainage System Measures. The site has an area of approximately 812m<sup>2</sup> with the existing buildings and surrounds having a 100% impermeable surface area i.e. no permeable surfaces are present at the moment.

Currently the Wash House foul drainage flow exits the rear of the building and flows to the 225mm diameter public sewer which runs below Kellys Avenue, we propose to reuse this

connection and route. However, repairs are necessary based on the CCTV drainage survey, details of which are shown in the Opus Drainage Survey Extract in Appendix D.

Currently the building at No. 9 Georges Place has foul connections which no longer function, the building was previously connected to the same 225mm diameter public sewer running below Kellys Avenue as the Wash House building. As the new extension will house the new toilet facilities, we propose to provide a new foul route and connection to the existing manhole on Georges Lane.

The proposed surface water design will incorporate SuDS elements such as Permeable Paving (with an attenuation stone sub-base percolating into the sub-soil), Bio-retention Planters and a section of green roof on the new extension to the side of the property on Georges Lane. Little or no surface water will enter the public combined mains. Potential a high level overflow will be required should the sub-soil percolation tests results be poor. Refer to **Appendix A** for proposed drainage plan.

The exact location of the property and site can be seen in Figure 1 below. The lowest proposed floor level of the new dwelling is at 10.50m OD, with the Irish Sea at a straight-line distance of approximately 175m.



Figure 1: Site Location [Ref: OSI maps]

## 2. SCOPE

This report was compiled by reviewing available data from the design team, Local Authority sources and national bodies, i.e. Flood mapping site ([www.floodinfo.ie](http://www.floodinfo.ie)) and GSI (Geological Survey Ireland).

This report addresses:

- Foul Water Drainage;
- Stormwater Drainage;
- Potable Water Supply;

All design calculations will be accordance with:

- Local Authority requirements;
- BS EN 752 – Drainage Outside Buildings;
- The Building Regulations – Technical Guidance Document 'H';
- Recommendations for Site Development Works for Housing Areas, Dept. of Environment, 1998;
- Office of Public Works, The Planning System and Flood Risk Management, November 2009.
- The SuDS Manual, CIRIA Report C753
- Dún Laoghaire / Rathdown County Development Plan - Appendix 7 Sustainable Drainage System Measures

Other elements of the application pertaining to landscaping/planning or architectural issues are covered by other members of the design team.

### 3. FOUL WATER

At present the Wash House foul drainage flow exits the rear of the building and flows into the 225mm diameter public sewer running along Kellys Avenue, we propose to reuse this connection and route. However repairs are necessary based on the CCTV drainage survey. This pipe has been surveyed by Opus Environmental, see survey extract in **Appendix D**.

Currently No. 9 Georges Place has foul connections which no longer function, the building was previously connected to the same 225mm diameter public sewer running along Kellys Avenue as the Wash House building. As the proposed extension will house new toilet facilities, we propose to provide a new foul route and connection to the existing manhole on Georges Lane.

All foul water from the proposed floors will fall via gravity to an outfall manhole at the site boundary, then fall via gravity into the existing manhole on Georges Lane.

The above foul water drainage proposal is outlined in the Proposed Drainage Plan in **Appendix A**, while **Appendix B** shows the Uisce Eireann (UE) sewer network map.

The following calculation shows the foul water expected to be generated from the new development.

From Uisce Éireann "Code of Practice for Wastewater Infrastructure" the recommended flow per person is 50 litres/day for an education development with no canteen cooking on site. The proposed drainage scheme is designed and detailed in accordance with the Greater Dublin Regional Code of Practice for Drainage Works.

Any additional requirements from the Drainage Department of Dún Laoghaire County Council will be accommodated where possible.



Figure 2: Extract from Uisce Eireann Sewer Network Map



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**Flow Rates for Design**

<b>Per person / activity / day (unless otherwise specified)</b>	<b>FLOW (Litres)</b>
<b>DOMESTIC DWELLINGS</b>	
Standard residential	<b>150</b>
Mobile home type caravans with full services	<b>150</b>
<b>INDUSTRIAL</b>	
Office / Factory without canteen	<b>50</b>
Office / Factory with canteen	<b>100</b>
Open industrial site, e.g. construction, quarry, without canteen	<b>60</b>
*Full-time Day Staff	<b>90</b>
*Part-time Staff (4 hr shift)	<b>45</b>
<b>SCHOOLS</b>	
Non-residential with canteen cooking on site	<b>90</b>
Non-residential without a canteen	<b>50</b>
Boarding school (i) residents	<b>175</b>
Boarding school (ii) day staff (including mid-day meal)	<b>90</b>
<b>HOTELS, PUBS &amp; CLUBS</b>	
Hotel Guests	<b>250</b>
Residential Training/Conference Guest (inclusive all meals)	<b>350</b>
Non residential Conference Guest	<b>60</b>
Public House Patrons	<b>12</b>

Figure 3: Wastewater Domestic – Loading Rates



## 4. SURFACE WATER DRAINAGE

### 4.1. Introduction

The following surface water drainage review has been prepared to demonstrate the proposed development site's use of Sustainable Urban Drainage Systems (SuDS) to adequately manage rainfall runoff on the site and prevent any rainfall generated on-site from entering the combined foul water mains sewer to the front of the property.

Therefore, we propose the following surface water design to comply with the Dun Laoghaire / Rathdown County Council's Development policies and objectives set out in the County Development Plan, Appendix 7 Sustainable Drainage System Measures. As set out in The SuDS Manual Ciria C753, the SuDS design elements in the project were chosen under the headings of the Four Pillars of SuDS Design.

All new paved areas within the proposed development will consist of permeable paving with attenuation stone below, this and the other SuDS measures outlined below will reduce the impermeable surfaces from 100% to approx. 60%, below is a comparison table showing the difference in impermeable areas between the existing and proposed development.

#### Existing Development

- Impermeable Area = 811m<sup>2</sup> (100% non-permeable)

#### Proposed Development

- Existing roofs and existing surfaces (impermeable) = 500m<sup>2</sup>
- Surfaces with SuDS treatment = 311m<sup>2</sup>
  - o Broken down as follows:
    - Paving Area (Permeable) with attenuation below = 165m<sup>2</sup>
    - New roof (Green) = 47m<sup>2</sup>
    - New roof (Non-green) = 67m<sup>2</sup>
    - Planter & flower beds = 16m<sup>2</sup>
    - Bio-retention planters = 15m<sup>2</sup>

## 4.2. Four Pillars of SuDS Design

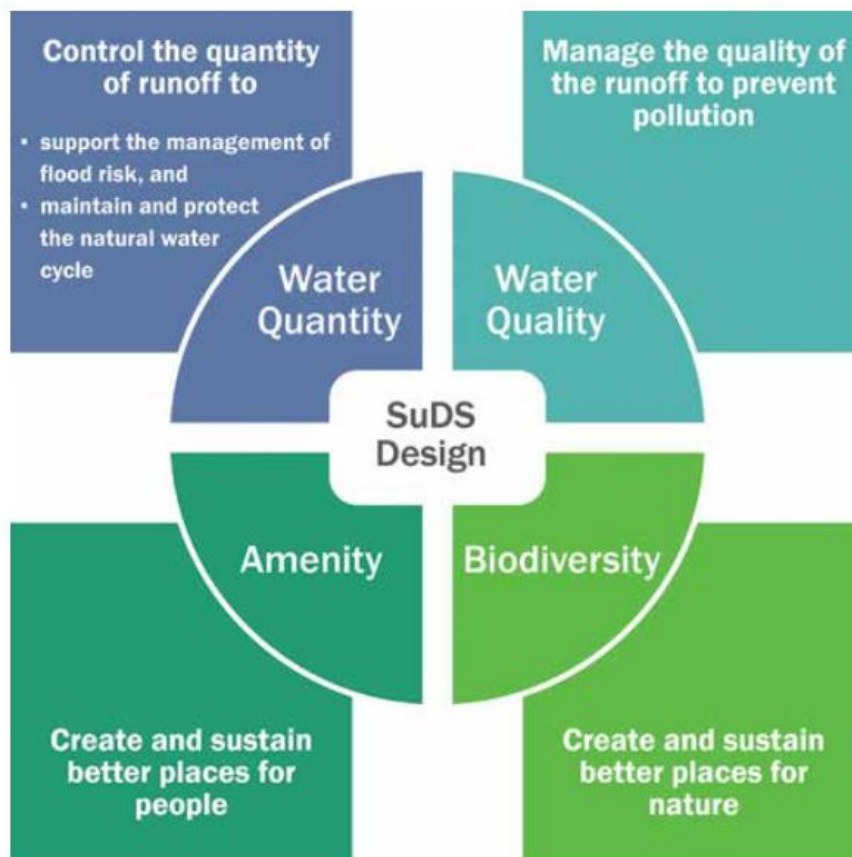


Figure 4: Four pillars of SuDS Design (Ref: FCC Appendix 11 SuDS Guidance)

1. **Water Quantity:** Water quantity is controlled by the inclusion of bio-retention planters and permeable paving which eliminate or slow run-off rates. As this is an urban development, soak pits are unsuitable as we cannot achieve the necessary clearance to buildings due to the density of the site.
2. **Water Quality:** A filtering effect occurs as the rainwater passes through the soil medium present in each SuDS element; the bio-retention planter and the coarse fill below the permeable paving.
3. **Amenity:** The bio-retention planters within of the development will provide a visual and natural amenity which will support biodiversity. By providing permeable paving to the front of the proposed site in lieu of the existing concrete, the visual amenity of the site will be enhanced.
4. **Biodiversity:** The bio-retention planter to the front of the development will support biodiversity with the provision of a diverse range of vegetation.

### 4.3. SuDS Treatment Train Selection for Development

In accordance with County Development Plan 2022-2028 Section 10.2.2.6 Policy Objective EI6: Sustainable Drainage Systems the following SuDS elements were chosen:

1. **Green Roofs** – Extensive Green roofs are provided for a considerable proportion of the new roof area of the proposed development, this will provide some storage and evaporation of the rainwater falling on the roof. The soil layer will provide filtration to the rainwater and slow the rate of discharge from the roof. There are additional benefits such as increased biodiversity and visual amenity.
2. **Permeable paving** – It is proposed to provide permeable paving to the front and side of the No. 9 Georges Place in accordance with the requirements of Section 12.4.8 of the DLR County Development Plan 2022-2028. The existing site has no permeable surfaces due to the concrete surfaces used throughout. In the new development, it is proposed to increase the permeable area by 100m<sup>2</sup>. This will be achieved by replacing the existing concrete hardstanding with a new permeable surface, along with the addition of raised planters and green areas, thus reducing the existing impermeable hardstanding, while increasing the biodiversity and visual amenity of the development.
3. **Restricted surface water outflow and attenuation** – It is proposed to provide a layer of attenuation stone below the permeable paving surface. This will store the temporarily rainwater while it is released slowly into the ground. We will carry out percolation test to ensure the attenuation stone layer is adequately sized. Should the ground be unsuitable to handle large quantities of rainwater we will include a high level overflow to drain excess flows. An impermeable barrier will be incorporated close to the building to avoid the water percolating into the ground affecting the existing foundations. This method will reduce the pressure on the surrounding sewer network by limiting peak outflow, the stone aggregate will also have a filtering and cleaning effect on the surface water flow.
4. **Bio-retention planter** – Two large bio-retention planters are proposed for the development. One for the wash house and the other for No. 9. It is proposed to divert the rainwater from the higher roof levels into these planters through rainwater downpipes to slow the water during a heavy rainfall event. At detailed design stage the bio-retention planters will be checked against the formula as shown in Figure 7 below:

**EQ. 18.1 Calculating required bioretention surface area**

$$A_f = \frac{V_t L}{k(h + L)t}$$

where:

$A_f$  = surface area of filter bed (m<sup>2</sup>)

$V_t$  = volume of water to be treated (m<sup>3</sup>) (for a 1:1 year critical duration rainfall event)

$L$  = filter bed depth (m)

$k$  = coefficient of permeability of filter media for water (m/s)

$h$  = average height of water above filter bed (half maximum height) (m)

$t$  = time required for water quality treatment volume to percolate through filter bed (s)

For design purposes, the surface area and filter bed depth are normally chosen, and the equation rearranged to calculate the time required for the volume of water to pass through the system. This should be 24–48 hours. Note that an overflow or exceedance flow route is required for events that exceed the capacity of the system.

**Figure 5: Bio-retention Calculation (Ref: Ciria C753 SuDS Manual)**

## 5. POTABLE WATER SUPPLY

It is proposed to re-use the existing water connection to the front of the wash house building property which connects to the existing 160mm (2012) water main running below Kelly's Avenue.

To reduce the level of water consumption it is intended to install water reduction devices throughout the property. These will include the following:

- Dual flush cisterns;
- Aerated spray taps with variable flow rate;
- Shower heads that limit the volume of water used.

The following outlines the expected potable water supply demand for the development. Any additional requirements from the Drainage Department of Dún Laoghaire County Council will be accommodated where possible.

### Potable Water Supply Demand calculation

#### Population Equivalent:

Maximum occupancy (both buildings)                      50 people

#### Flow Allocation:

Standard Residence (Irish Water guidelines)                      50 l/person/day

#### **Average Daily Demand (ADD):**

50 people X 50l/person/day = 2.5m<sup>3</sup>

**Average flowrate (over 8-hour duration):**                      0.09 litres/sec

**Estimated peak flow (5 DWF):**                      0.45 litres/sec

**Estimated Average Day/Peak Week (1.25 ADD):** 3.13m<sup>3</sup>/day

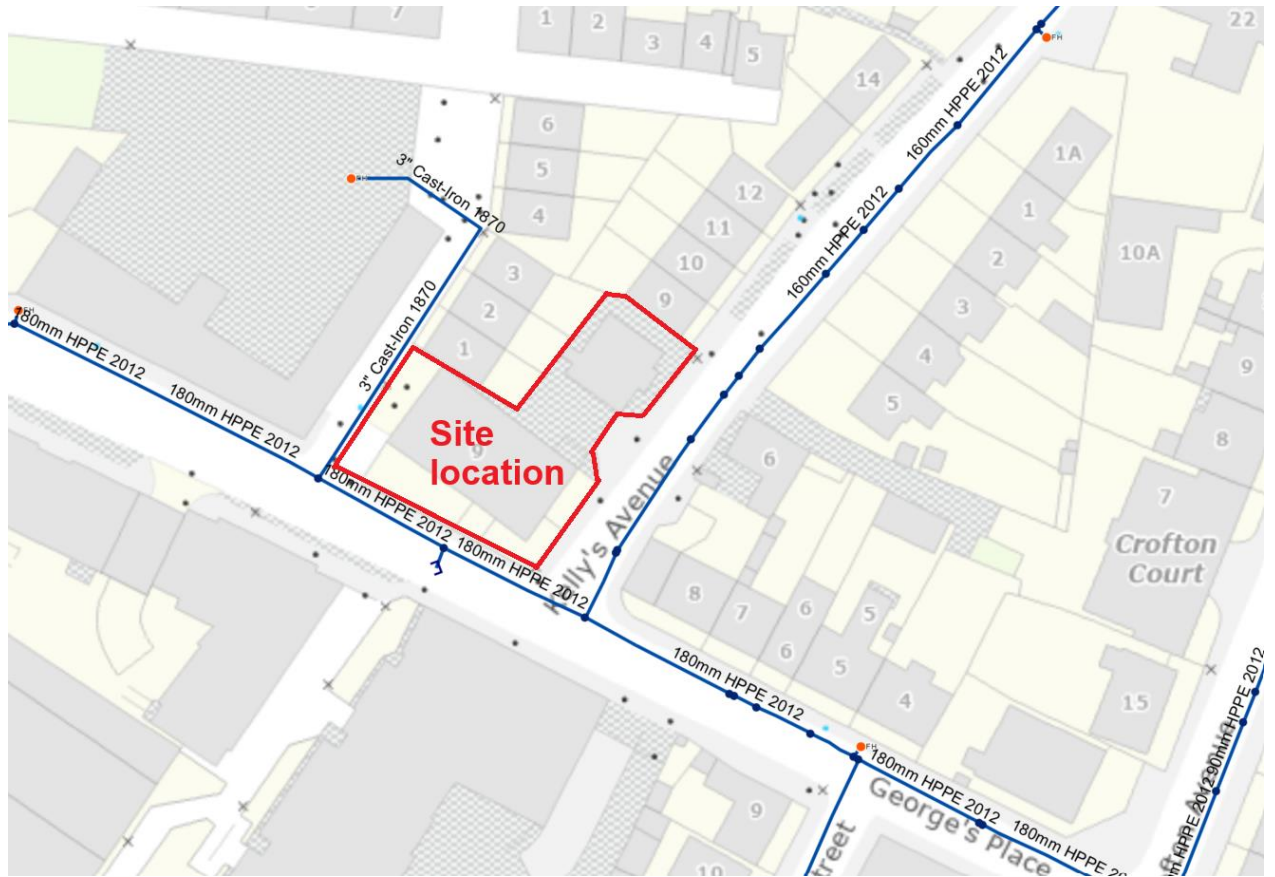


Figure 6: Extract from Uisce Eireann Water Distribution Map



## **6. FLOOD RISK ASSESSMENT**

### **6.1. Tidal Flood Risk**

As the lowest proposed finished floor level of the new development is +10.50mAOD there is no risk from tidal flooding to the proposed development. The proposed development is outside the Tidal Flood map zones indicated in the OPW Tidal Flood maps and the Dún Laoghaire Rathdown County Development Plan (2022-2028) flood maps. See Appendix C for the DLR Co. Co. Development Plan flood map.

### **6.2. Fluvial Flood Risk**

A review of the Dún Laoghaire Rathdown County Development Plan (2022-2028) Flood maps, OPW Flood maps Website and the OPW Flood Risk Report indicate that there are no rivers or streams in the vicinity of the development site. See Appendix C for the DLR Co. Co. Development Plan flood map.

### **6.3. Pluvial Flooding**

A review of the Dún Laoghaire Rathdown County Development Plan (2022-2028) Flood maps, OPW Flood maps Website and the OPW Flood Risk Report indicate that there is no risk of Pluvial Flooding in the vicinity of the development site. See Appendix C for the DLR Co. Co. Development Plan flood map.

### **6.4. Potential for Site to Contribute to off-site Flooding**

The proposed re-development will significantly reduce the peak outflow of surface water during storm events via the inclusion of the various SuDS systems which are detailed above.

Any additional requirements from the Drainage Department of Dún Laoghaire County Council will be accommodated where possible.

## 7. REFERENCES

- Greater Dublin Regional Code of Practice for Drainage Works Version 6.0
- 'Recommendations for Site Development Works for Housing Areas' by the Department of the Environment and Local Government (November 1998);
- 'Wastewater Infrastructure Standard Details' by Uisce Eireann
- 'Water Infrastructure Standard Details' by Uisce Eireann
- BRE Digest 365 (2007) - Soakaway Design - Building Research Establishment
- CIRIA Report C697– The SUDS Manual – Construction Industry Research Association
- CIRIA Report C522 – Sustainable Urban Drainage Systems – Design Manual for England and Wales - Construction Industry Research Association
- Greater Dublin Strategic Drainage Study – Regional Drainage Policies Technical Documents – Dublin Drainage
- Technical Guidance Document H (2010) – Drainage and Wastewater Disposal – Department of the Environment, Community and Local Government
- Dun Laoghaire / Rathdown County Development Plan - Appendix 7 Sustainable Drainage System Measures
- The SuDS Manual, CIRIA Report C753

**APPENDIX A – Proposed Drainage Drawings**

**APPENDIX B – Public Drainage Record Drawings**

**APPENDIX C – Dún Laoghaire Rathdown County Council flood map**

**APPENDIX D – Opus Environmental Drainage Survey**