

CRONIN & SUTTON CONSULTING (part of the CS Consulting Group)
19-22 Dame Street, Dublin 2, D02 E267, Ireland

T | 353 1 5480863

E | info@csconsulting.ie

W | www.csconsulting.ie

**CS CONSULTING
GROUP**
DUBLIN - LONDON - LIMERICK

An Bord Pleanála
64 Marlborough Street
Dublin 1
D01 V902

Job Ref: T059

A - GL

Date: 7-Jul-22

**RE: Proposed Strategic Housing Development
Lands at Stradbroke Road, Mountashon, Blackrock, Co Dublin
Independent Stormwater Report Audit**

Dear Sir/Madam,

Please find attached a copy of the Independent Stormwater Audit carried out by JBA Consulting Engineers for the proposed development at Stradbroke Road, Blackrock, Co Dublin.

We trust the above and attached is in order. Should you have any queries please do not hesitate to contact this office.

Gary Lindsay B.E CEng, MIEI

Associate

Chartered Civil Engineer

Limerick Office:
45 O'Connell Street
Limerick, V94 XE18
Ireland

T: 353 (0)61 594988
E: info@csconsulting.ie
W: www.csconsulting.ie

London Office:
45 Beech Street
London, EC2Y 8AD
UK

T: +44 (0) 207 070 3660
E: info@csconsultinguk.com
W: www.csconsultinguk.com



PK & Associates Consulting Engineers Ltd. T/A Cronin & Sutton Consulting
Directors: K. Cronin, D. Rehill, O. Sullivan, P. Sutton
Associate Directors: N. Barrett, R. Fitzmaurice, M. McEntee, L. McNamee
Registered Office: 1st Floor, 19-22 Dame Street, Dublin 2, D02 E267, Ireland | Company No. 505303

Associates: C. Twomey, C. Barry

STORMWATER AUDIT (STAGE 1)

JBA Project Code 2022s0769
Contract Stradbroke Road SHD, Mountashton, Blackrock Co. Dublin
Client Tetrarch Residential Limited
Prepared by Chris Wason
Subject Stormwater Audit Stage 1 Report



Revision History

| Issue | Date | Status | Issued to |
|--------|-------------|-------------|---------------|
| S3-P01 | 7 July 2022 | First issue | CS Consulting |
| | | | |
| | | | |

1 Introduction

JBA Consulting have been contracted to undertake a Stage 1 SW Audit of the surface water drainage design prepared by CS Consulting (CSC) for the proposed SHD residential development at Stradbroke Road Mountashton, Blackrock, Co. Dublin on behalf of Tetrarch Residential Ltd. As instructed by CSC the audit has been completed in accordance with Dún Laoghaire Rathdown County Council's (DLRCC) Stormwater Audit Procedure (Rev 0, Jan 2012) as set out below rather than the latest audit procedures as set out in the 2022-28 Development Plan.

The subject of this Stage 1 stormwater audit is to review the proposed surface water drainage design and sustainable urban drainage system (SuDS) proposals for the proposed development. This audit was undertaken in advance of a Strategic Housing Development (SHD) planning submission to An Bord Pleanála.

Stage 1 – Pre Planning Stage: A Stage 1 audit shall be carried out of the Stormwater Impact Assessment (SIA) prepared by the applicant. The audit will focus on the SUDS management train and whether the applicant has carefully considered all known SUDS techniques and applied the most appropriate type(s) for the site that will ensure improved water quality, biodiversity and volume control.

1.1 Report Structure

The Feedback Form in Appendix A identifies queries raised in this report which are to be answered by the Design Engineers. Once an 'Acceptable' status is achieved for each query the audit is deemed to be closed out.

The results of the audit are set out hereunder, where items raised in the feedback form are shown in **bold** within this report.

1.2 Relevant Studies and Documents

The following documents were considered as part of this surface water audit:

- Greater Dublin Strategic Drainage Strategy (GDSDS);
- Dun Laoghaire Rathdown County Council Development Plan (2016 – 2022)
- Dun Laoghaire Rathdown County Council Development Plan (2022 – 2028)
- Greater Dublin Regional Code of Practice for Drainage Works;
- The SUDs Manual (CIRIA C753).
- BRE Digest 365
- Current Development Plan

1.3 Key Considerations and Benefits of SuDS

The key benefits and objectives of SuDS considered as part of this audit and listed below include:

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- Water Quantity
- Water Quality
- Amenity
- Biodiversity

Which can be achieved by;

- Storing runoff and releasing it slowly (attenuation)
- Harvesting and using the rain close to where it falls
- Allowing water to soak into the ground (infiltration)
- Slowly transporting (conveying) water on the surface
- Filtering out pollutants
- Allowing sediments to settle out by controlling the flow of the water

1.3.1 SuDs Management Train

A SuDs Management Train is a robust pollutant removal strategy. The treatment train can comprise four stages:

1. Prevention
2. Source Control
3. Site Control
4. Regional control

2 Proposed Development

The proposed development site is located on the grounds of the existing car park to Blackrock College RFC off the Stradbroke Road, Blackrock Co. Dublin, approximately 360m to the southeast of the junction to the Stradbroke Road and Rowan Park (R827). The site is located in the administrative jurisdiction of Dún Laoghaire-Rathdown County Council and has a total area of approximately 0.4813 ha.

The development comprises the demolition of existing buildings and surface car park, and the construction of 108 No. Build-to-Rent serviced residential senior living apartments (83 No. 1-bed apartments and 25 No. 2-bed apartments), with balconies / winter gardens at all elevations, across 2 No. blocks ranging between 3 to 7-stories with set back at sixth-floor level and additional basement.

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JBA
consulting

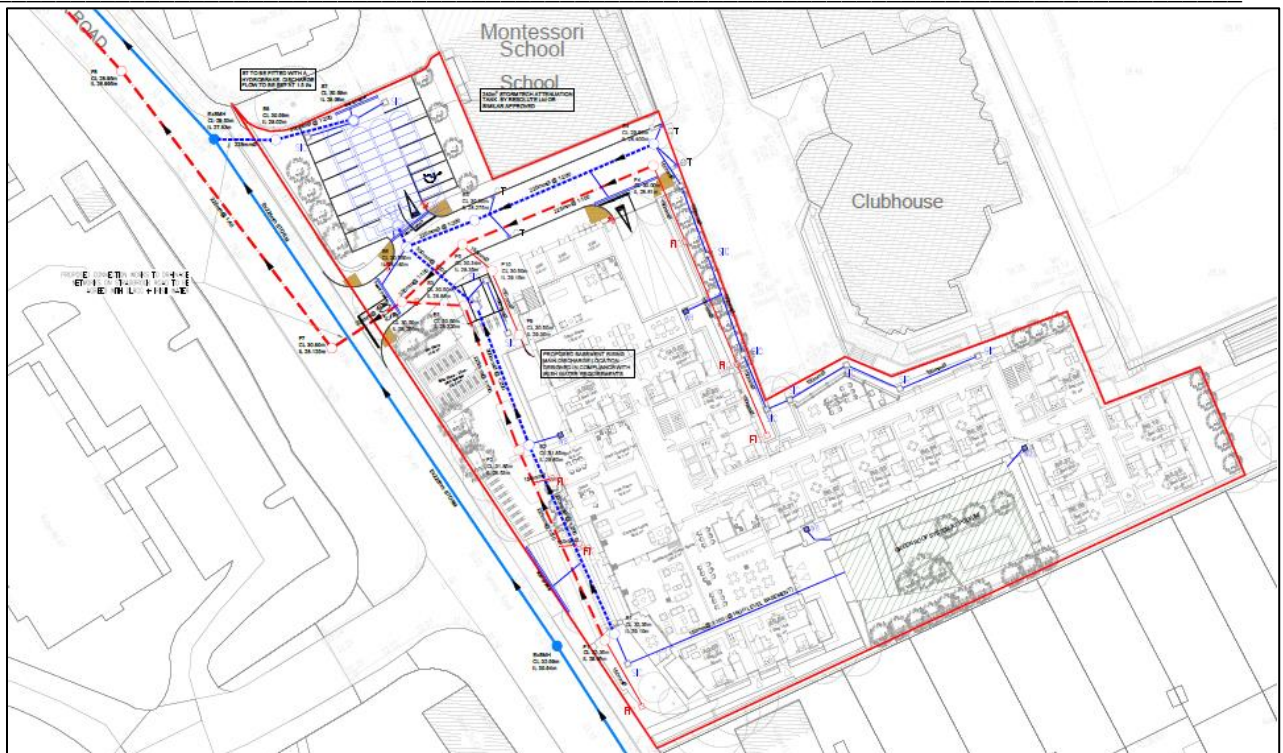


Figure 1 - Drainage Layout and SuDS Proposals

2.1 Review of SW Drainage Proposals

The review is based on the following documents provided by CSC;

- BLK-CSC-ZZ-XX-DR-C-0003_Drainage Plan Layout.pdf
- Hydrobrake Details.pdf
- Met Eireann Data.pdf
- T059 Engineering Services Report 2022 06 245.pdf
- T059 WinDES MD Results (30% CC).pdf
- BLK-CSC-ZZ-XX-DR-C-0013_SUDs Layout.pdf

2.1.1 Site Characteristics

The development site is at present occupied by an existing car park, a commercial building and car parking associated to an adjoining creche.

Following a review of Irish Water drainage records, there is an existing 225mm diameter stormwater drain flowing north on Stradbroke Road towards Rowan's Park Road (R827). The storm line increases in size to a 300mm and 450mm diameter pipe as it flows north.

2.1.2 Ground Investigation

No site investigation information has been provided and it is understood that no field tests have been undertaken to date. A SOIL index of 3 (SPR 0.37) has been adopted which is generally typical of the grounds in the south Dublin area and consist of clayey soils with relatively poor infiltration. As no ground investigation has been carried out the winter ground water level is unknown and how this might impact on the proposed infrastructure.

It is recommended that site investigation be carried out and the ground water table established prior to detailed design stage.

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2.2 Design Parameters

Rainfall parameters can be estimated using Met Eireann data, using the Flood Studies Report (FSR) values or the values in the GSDS. The Met Eireann method can be more representative of a site if selected correctly. CSC have adopted local values which are confirmed by JBA as shown below:

| Rainfall parameters | Designer values | JBA Comment |
|---------------------|-----------------|--------------------|
| M5_60 | 16.3 | Ok – Met Eireann |
| Ratio R | 0.273 | Ok – Met Eireann |
| SAAR (mm) | 771 | Ok – Met Eireann |
| Qbar l/s | 1.5 l/s | Ok – 1.5 (UK SuDS) |

The above is based on the total area of 0.4813ha.

An allowance of 30% for climate change has been allowed and CSC state that 10% has been allowed for urban creep which exceed the requirements of the Development Plan.

3 Surface Water Drainage Strategy

3.1.1 Site Drainage Strategy

The drainage layout and SuDS proposal are shown on drawings 0003/P03 and 0013/P02 respectively. The SuDS drawing provides details proposed of areas of surfacing and interception/treatment parameters.

All flow is collected to the north of the site before being discharged to the existing DN225 storm sewer in the public road. A hydrobrake flow control and Stormtech attenuation tank control the outflow to Qbar limits and store excess flows to prevent flooding in the 100 year storm.

3.1.2 SuDS Measures Considered

| SuDS Technology | Comments |
|---|---|
| Green/Blue Roofs | Green roofs in excess of the 60% requirement of the 2016-22 Development Plan are provided. |
| Swale, Filter Drain, Infiltration Trench | None proposed |
| Tree Pits, Bioretention Areas, Rain Gardens | Water butts are proposed. |
| Permeable Paving | Permeable paving will be provided at external car park spaces and in landscaped areas. Porous asphalt is to be used on external roadways. No details are provided and whether systems are lined or unlined or how flow is collected into the sw network. Road gullies and Aco channels are also shown as part of the road collection systems but it is not clear if these are just for excess flow situations or not. |
| Soakaways | None proposed |
| Detention Basins, Retention Ponds, | None proposed. |

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| | |
|----------------------|--|
| Stormwater Wetlands | |
| Rainwater Harvesting | Water butts are proposed. |
| Petrol Interceptor | A fuel separator is to be provided in the basement car park which will be discharged to the foul network. |
| Attenuation | <p>Stormtech attenuation unit provided for the development. 240m³ allowed for to include for urban creep as well.</p> <p>A flow control device (Hydro-brake optimum vortex control unit) is to be provided immediately downstream of attenuation systems. The flow rate for the proposed development would be no greater than 1.5 l/s (Qbar).</p> <p>The flow control chamber should be fitted with a penstock valve at the inlet and a pivoting bypass door at the outlet, to allow for easy access and maintenance.</p> <p>Details of type of Stormtech attenuation units have not been provided to show how these will interact with the 1.6m design head. Please provide a typical Stormtech attenuation detail. Are the units to be lined or unlined?</p> |
| Other | n/a |

3.1.3 Review of drainage drawings and SuDS drawings

The drainage drg 0003/P03 shows the connectivity of the SW network. It shows gullies and channels located on the road, which is comprised of porous asphalt. It is not clear how this system is supposed to work as no details of the make-up of the porous asphalt and permeable pavement are provided and how these systems are connected back into the SW network.

Details of the permeable paving and porous asphalt should be provided to show how runoff is collected into the sw network and clarify the use of road gullies and Aco channels.

FFL of the buildings should be provided to ensure 500mm clearance during the 100-year storm event.

3.1.4 Review of Hydraulic Model

The proposed surface water system has been designed in accordance with the regulations and guidelines outlined in Section 1.2, using Microdrainage Design software:

- A 30% allowance for climate change has been included in the design. This exceeds the old and new Development Plan requirements of 10% and 20% respectively.
- CSC state in their report that an allowance of 10% for urban creep has been provided for by increase in the required tank volume by 10%.
- Cv values of 0.75 (summer) and 0.84 (winter) have been used in the design.
- The total impermeable area modelled is 0.367ha which is different from the areas given on drg 0013/P02 of 0.4735ha. and these should be clarified. It is noted that runoff factors have been agreed with DLRCC for different surfaces but default Cv factors in the model reduce the runoff further. Is this acceptable?
- The tank has been modelled at 1.5m depth but has not been closed off. An extra line is required at 1.501m to close the tank. The hydrobrake is modelled at 1.6m head but this difference is not significant.

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The model and drainage layout drawing are not fully compatible and some mh references and pipe attributes show slight differences although it is considered that these are relatively minor and can be rectified at detailed design stage.

The impermeable area used in the model and that shown on drg 0013/P02 are different and need to be clarified. If areas have been modified for different surfaces should the default values in the Windes model be changed to 1?

The tank in the model should be closed out at 1.501m for zero area otherwise the tank is assumed to go to ground level. The hydrobrake head and available tank storage should match

The attenuation tanks have been sized in Windes for 210m³ and increased in size to 240m³ to allow for urban creep.

The proposed hydrobrake flow control has an orifice of DN50 which is considered to be acceptable.

3.1.5 Interception/Treatment

Interception of runoff is intended to prevent any runoff for small rainfall events which are less than 5mm (and up to 10mm if possible). Treatment of 15mm is required if interception is not provided.

Table 24.6 of the CIRIA manual provides indication of deemed to satisfy criteria and it is considered that this should be complied with. All sources of runoff should also be intercepted where possible. A high level of Interception provided for some parts of the site is not to be considered as adequate compensation for a low degree of interception provision for other locations. Compliance is required for the whole site, or at least for road/paved areas, for it to be considered effective. Interception mechanisms are based on runoff retention. This can be achieved using rainwater harvesting or using soil storage and evaporation. Either infiltration or transpiration rates can dispose of the runoff from minor events to enable the next event to be captured.

Drg 0013/P01 lists the interception of flows using volumetric calculations for the whole of the site but this is not considered an appropriate methodology. However, by observation the extent of green roofs, permeable paving and porous asphalt areas would be deemed to comply with table 24.6 in the CIRIA C753 manual.

How non-green roofs are intercepted would need to be demonstrated.

The stormtech attenuation tank has also been proposed to provide for interception of flow but this can only be suitable if infiltration to ground is provided for.

Infiltration and ground water level have not been established therefore the tank may need to be lined if ground water is within 1m of the base. As interception is not deemed necessary within the tank these issues could be resolved at detailed design stage if acceptable to DLRCC.

3.2 Health & Safety and Maintenance Issues

The proposed drainage system comprises SuDS devices, traditional road gullies, manholes, attenuation systems, oil interceptors and underground pipes. These elements are considered acceptable from a Health & Safety perspective once supplier/manufacturers guides are followed and complied with during the detailed design, construction, and operation.

Optimum performance of the SUDs treatment train is subject to the frequency of maintenance provided. At detailed design stage, it is recommended that a maintenance regime be adopted.

Particular consideration is required at detailed design stage to the design, maintenance requirements and whole life plan (and replacement) of the SuDS system as a whole.

Regular maintenance of the hydrobrake will be required to remove any blockages, particularly in the wake of heavy rainfall events or local floods.

It is recommended that the oil interceptors be fitted with an audible high-level silt and oil alarm for maintenance and safety purposes. Regular inspection and maintenance is recommended for the oil interceptors.

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Please note that silt and debris removed from the oil interceptor during maintenance will be classified as contaminated material and should only be handled and transported by a suitably licensed contractor and haulier and disposed of at a suitably licensed landfill only.

3.3 Audit Report sign Off

Audit Report

Prepared by:

A handwritten signature in black ink, appearing to read 'Chris Wason'.

Chris Wason BEng CEng MICE
Principal Engineer

Approved by:

A handwritten signature in black ink, appearing to read 'Leanne Leonard'.

Leanne Leonard BEng (Hons)
Design Engineer

Note:

JBA Consulting Engineers & Scientists Ltd. role on this project is as an independent reviewer/auditor. JBA Consulting Engineers & Scientists hold no design responsibility on this project. All issues raised and comments made by JBA are for the consideration of the Design Engineer. Final design, construction supervision, with sign-off and/or commissioning of the surface water system so that the final product is fit for purpose with a suitable design, capacity and life-span, remains the responsibility of the Design Engineers.

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Appendix A – Audit Feedback Form



| JBA Consulting Stormwater Audit - Stage 1 Feedback Form | |
|---|--|
| Project: | Stage 1 SWA, SHD Stradbroke Road, Blackrock, Co Dublin |
| Date: | 07/07/2022 |
| JBA Reviewers | Chris Wason |
| Status | S3/P01 |
| Project Number: | 2022s0769 |

| Item No. | JBA Review Comment | Comment/Clarification Request/Suggested Mitigation | Response from Client/Client Representative | Acceptable / Not Acceptable |
|----------|---|---|--|---|
| | 07/07/2022 | 07/07/2022 | | 07/07/2022 |
| Ref Docs | <ul style="list-style-type: none"> •BLK-CSC-ZZ-XX-DR-C-0003_Drainage Plan Layout.pdf •Hydrobrake Details.pdf •Met Eireann Data.pdf •059 Engineering Services Report 2022 06 245.pdf •059 WinDES MD Results (30% CC).pdf •BLK-CSC-ZZ-XX-DR-C-0013_SUDs Layout.pdf | | | |
| 1 | No SI has been undertaken to verify the SOIL type 3 assumed or ground water table | It is recommended that site investigation be carried out and the ground water table established prior to detailed design stage. | The development site is currently a live car park and office building. A SI shall be carried out following a grant of permission once building and car park is decanted. Calculations can be amended and submitted for clarification at compliance stage to DLRCC. | Acceptable |
| 2 | Stormtech attenuation units are proposed but no details are provided. | Details of type of Stormtech attenuation units and calculations should be provided to verify the plan layout and show how the proposed units will interact with the 1.6m design head flow control. Please provide a typical Stormtech attenuation detail. | Drawings of the tanks are provided and were submitted to DLRCC as part of a presubmission pack and no issues were raised. | Acceptable final details to be submitted and agreed at detailed design stage |
| 3 | are the Stormtech units to be lined or unlined? | CSC to advise | We would assume for now the tanks are to be lined. Clarification can be sought following receipt of an SI | Acceptable |
| 4 | The drainage layout proposes porous asphalt but also shows traditional road gullies and channels to collect runoff. | Details of the permeable paving and porous asphalt should be provided to show how runoff is collected into the sw network and CSC to clarify the use of road gullies and Aco channels. | Cross-sectional build up provided. Gullies are provided as a secondary outlet to cover for an extreme rainfall event. | Acceptable |
| 5 | FFL are not shown | FFL of the buildings should be provided to ensure 500mm clearance from TWL in the attenuation tank | The FFL of the adjacent building is 30.25. Top level of tank shall be from 29.2m to 29.1m. Therefore a freeboard of 1.0m is provided. | Acceptable |
| 6 | <p><u>Microdrainage Model</u></p> <p>1 - The model and drainage layout drawing are not fully compatible and some mh references and pipe attributes show slight differences although it is considered that these are relatively minor and can be rectified at detailed design stage</p> <p>2 - The impermeable area used in the model and that shown on drg 0013/P02 are different and need to be clarified.</p> <p>3 - If areas have been modified for different surfaces, as agreed with DLRCC, should the default values in the Windes model be changed to 1?</p> <p>4 - the tank as modelled should be closed of at 1.501m for zero area, otherwise this volume is available to surface level - see TWL results in WinDES</p> <p>5 - The hydrobrake head (1.6m) and available storage in the tank should be compatible (also refer to 4 above)</p> | <p>1 - CSC to clarify</p> <p>2 - CSC to clarify</p> <p>3- CSC to clarify</p> <p>4 - CSC to comment</p> <p>5 - CSC to comment</p> | <p>1. Drawings and model have been updated, following receipt of SI and confirmation of infiltration rates etc areas can be confirmed at detailed design and compliance stage.</p> <p>2. We have assumed 10% of permeable areas shall infiltrate during a storm event, final areas and voulemns can be confirmed following receipt of SI.</p> <p>3. Calculations were submitted to DLR as a presubmission pack and no issues raised.</p> <p>4&5 WinDES model can be adjusted to suit at detail design stage.</p> | Acceptable |

| JBA Consulting Stormwater Audit - Stage 1 Feedback Form | |
|---|--|
| Project: | Stage 1 SWA, SHD Stradbroom Road, Blackrock, Co Dublin |
| Date: | 07/07/2022 |
| JBA Reviewers | Chris Wason |
| Status | S3/P01 |
| Project Number: | 2022s0769 |

| Item No. | JBA Review Comment | Comment/Clarification Request/Suggested Mitigation | Response from Client/Client Representative | Acceptable / Not Acceptable |
|----------|--|--|--|-----------------------------|
| | 07/07/2022 | 07/07/2022 | | 07/07/2022 |
| 7 | <p><u>Interception</u></p> <p>1 - no details of non green roof drainage are provided</p> <p>2 - CSC state that some interception of runoff will be accommodated in the StormTech units. However, these units may need to be lined if GW is within 1m</p> | <p>1 - CSC to clarify how non-green roofs runoff is to be intercepted.</p> <p>2 - CSC to clarify</p> | <p>1. Non Green Roof Drainage can discharge via the adjacent permeable paving areas to act as interception</p> <p>2. Run-off from hardstanding areas can be passed through the porous asphalt and permeable paving build-ups to act as interception if GW conditions are found not to be favourable.</p> | Acceptable |