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Civil Planning Report

Templar Place SHD, Balbriggan, Co Dublin

July 2021

Civil Planning Report

Document Control Sheet

Client:	Rhonellen Developments Ltd.
Document No:	201_321-ORS-XX-XX-RP-C-13a-001

Revision	Status	Author:	Reviewed by:	Approved By:	Issue Date
P01	S2	MH	CG	JB	04/12/2020
P02	S2	MH/AK	CG	JB	20/07/2021

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1 Introduction

This report outlines the Civil Engineering deliverables completed for the planning application associated with the proposed residential development at Balbriggan, Co. Dublin.

The proposed development comprises a Build to Rent (BTR), Strategic Housing Development (SHD) as follows:

Demolition of the existing buildings (former shopping centre and associated structures). Construction of 3 no. apartment blocks (Blocks A - C) ranging in height from 3 to 6 storeys (with Block B over 3 no. lower courtyard floors) providing a total of 101 units (19 no. studios, 41 no. 1-beds, 41 no. 2-beds). Provision of Resident Support Facilities/Resident Services and Amenities, 2 no. retail units, car parking (at ground floor), cycle parking, ESB substation/switch room, plant, bin stores, open space, landscaping, boundary treatments, all associated site works and services provision.

A general outline of the proposed development is provided in Figure 1.1 below.

Figure 1.1 – Proposed Architectural Site Layout

2 Design Codes & Standards

The civil engineering works presented in this report and the accompanying drawings have been designed in accordance with the following codes of practice and standards:

- "Irish Building Regulations Technical Guidance Documents" Department of the Environment and Local Government
- "Greater Dublin Strategic Drainage Study" published under the National Development Plan
- CIRIA Report "C697 – Sustainable Drainage Systems"
- EPA - Wastewater Treatment Manuals – Treatment Systems for Small Communities, Business, Leisure Centres and Hotels
- Guidance on the Authorisation of Discharges to Groundwater (EPA, 2011)
- EPA – Groundwater Protection Responses for On-site Wastewater Systems for Single Houses
- EPA - Guidance on the Authorisation of Discharges to Groundwater
- European Communities Environmental Objectives (Surface Water) Regulations, 2009
- DMURS - Design Manual for Urban Roads and Streets.

3 Site Location and Description

The site is located centrally within Balbriggan Town and is bound by Quay Street to the northwest and High Street to the East. There is an existing two storey retail building located on the north of the site fronting Quay Street, this was a former Tesco store but has been vacant for some time. There is a single storey building located to the southeast fronting High Street and this is trading as a bicycle store. Currently, vehicle access is provided off High Street to the site.

The total area of the site is circa 0.42 hectares. The proposed development consists of 101 residential units, 2 retail units, car parking, amenities and all associated infrastructure. An approximate outline of the subject site is provided in 3.1 below.

Figure 3.1 – Site Location (Approximate area of the subject site in red)

This report should be read in conjunction with ORS Reports & Drawings:

Reports

- 201_321-ORS-XX-XX-RP-TR-7d-001 Traffic & Transport Assessment
- 201_321-ORS-XX-XX-CO-Z-7a-001 Structural Intent Report – Retaining Wall Solution
- 201_321-ORS-XX-XX-RP-C-13k-001 Ground Condition Assessment Report

Civil Drawings

- 201_321-ORS-Z0-00-DR-C-400
- 201_321-ORS-XX-XX-DR-C-401
- 201_321-ORS-Z0-RF-DR-C-402
- 201_321-ORS-Z0-ZZ-DR-C-403

Traffic Drawings

- 201_321-ORS- Z0-00-DR-TR-700

Structural Drawings

- 201_321-ORS-Z0-00-DR-S -500
- 201_321-ORS-Z0-00-DR-S-501

3.1 Site Topography

A topographical survey was carried out on the site in August 2020. There is a significant change in levels across the site, the street level fronting the site at High Street is approximately 13.6mOD while at Quay Street it is approximately 4.2mOD. This results in a level change of approximately 9.4m across the site.

The design intent is such that the majority of the ground floor of Blocks A, B and C will be set at 4.7mOD and the ground floor carpark will also be set at approximately 4.7mOD. No residential apartment units are proposed at ground floor level, instead this level will contain shared amenity rooms, plant rooms, bin and bike stores. Block A will have 2 retail units at footpath level on Quay Street with finished floor levels of 4.0mOD and 4.55mOD.

Refer to the Traffic Layout drawing number 201_321-ORS-Z0-00-DR-C-700 for existing levels and proposed ground floor levels.

3.2 Ground Conditions

Ground conditions at the site have been reviewed based on a desk study of publicly available information and local investigations carried out in June 2021. Refer to ORS “Ground Condition Assessment Report” (201_321-ORS-XX-XX-RP-C-13k-001) in full for details.

4 Water and Wastewater Services

4.1 Irish Water Correspondence

ORS have liaised with Irish Water in relation to the proposed water supply and wastewater connections for the development. A pre-connection enquiry was lodged with Irish Water in October 2020 and a confirmation of feasibility letter from Irish Water dated October 19th, 2020 confirmed that there is sufficient capacity in the existing water and wastewater networks to service the proposed development in its entirety. A copy of the confirmation of feasibility letter from Irish Water is attached in Appendix A.

The original pre connection application was for a total of 109 residential units and 1 commercial/retail unit while the actual number of units now proposed has reduced to 101 residential units and 2 retail units. The net water demand and wastewater load is now less on the current proposal than the original 110 units which was confirmed as feasible by Irish Water.

As part of the preliminary design of the Watermain, ORS liaised with Irish Water during a design vetting process and obtained a statement of design acceptance from Irish Water for the development, a copy of this document is attached in Appendix A.

4.2 Water Supply

The proposed water supply for Blocks A and C will connect to the existing 101.6mm cast iron watermain in Quay Street while the water supply for Block B will connect to the existing 101.6mm cast iron watermain in High Street. A services map in Appendix B shows details of the existing watermain services in the vicinity of the site. The service connections for each building will extend from the existing watermains in the respective streets into a plant or services room in each building where they will feed a manifold system. All individual service connections to all residential and retail units will extend from these manifold systems.

The anticipated water demand for the development, has been calculated in accordance with Irish Water – Code of Practice for Water Infrastructure. For the residential units, the water usage per person has been taken as 150 litres per day. The maximum number of people in the residential units was taken to be 284. Therefore, the anticipated water demand for the residential units was estimated to be approximately 42.60 m³/day. For the retail units, the water usage per staff member has been taken as 90 litres per day. The maximum number of staff in the retail units was taken to be 2 per unit. Therefore, the anticipated water demand for the retail units was estimated to be approximately 0.36 m³/day. Proposed Water Demand Calculations are attached in Appendix C.

The watermain shall have a minimum cover of 900mm and shall be overlain with tape containing a tracer wire. The watermain shall also be located a minimum of 3m away from any structure as per Irish Water Code of Practice requirements. Air valves to BS5159 and sluice valves to BS5163 where required shall be installed on site. All watermain infrastructure shall be designed and constructed in accordance with Irish Water documents “Code of Practice for Water Infrastructure” and “Water Infrastructure Standard Details”.

Please refer to ORS drawing no. 201_321-ORS-Z0-00-DR-C-400 for details of the proposed water supply infrastructure.

4.3 Wastewater Drainage

It is proposed to make a single wastewater connection to the existing 525mm diameter gravity sewer in Quay Street which will serve the entire development. A services map in Appendix B shows details of the existing wastewater sewers in the vicinity of the site. This map incorrectly labels the proposed sewer that it is intended to connect to, as 225mm diameter however a survey and subsequent liaison with Irish Water have confirmed the sewer to be 525mm diameter.

The proposed internal wastewater sewer will be predominantly 225mm diameter pipe falling at a grade of 1 in 200 minimum and 150mm diameter falling at a grade of 1:100 minimum. All internal wastewater drainage will be separate to surface water drainage infrastructure in accordance with Irish Water standards.

All wastewater infrastructure shall be designed and constructed in accordance with Irish Water documents “Code of Practice for Wastewater Infrastructure” and “Wastewater Infrastructure Standard Details”.

Please refer to ORS drawing no. 201_321-ORS-Z0-00-DR-C-400 for details of the proposed wastewater drainage infrastructure.

5 Surface Water Drainage

5.1 Existing Infrastructure

There is an existing Local Authority owned surface water drainage manhole and dedicated 225mm diameter gravity surface water drainage pipe within Quay Street near the northmost point of the subject site. This surface water sewer appears to outfall directly to the Bracken River.

The surface water drainage from the existing site does not appear to be attenuated and is likely to be discharging directly into either the dedicated surface water sewer in Quay Street or into a combined sewer (the existing foul sewer is 525mm diameter in Quay Street and may be acting as a combined sewer carrying both foul and surface water drainage).

A services map in Appendix B shows details of the existing combined sewers in the surrounding area of the site.

5.2 Proposed Surface Water Drainage

5.2.1 Drainage Strategy

The proposed development will result in the entire site area being developed. The plan area of the developed site will comprise of flat roofs and terraces to the apartment blocks at varying levels, a central landscaped podium courtyard area at first floor level which will link all buildings and an area of ground level paving to the southwest of block A.

The proposed surface water drainage strategy for the development will include collection and attenuation of surface water runoff from the developed site via a blue roof system located on a number of the building flat roofs and on the vast majority of the podium slab area. The blue roof systems proposed will be planted where appropriate and will be supplemented by green roof systems which will be provided to all non-accessible roof areas.

The outlets from the blue roof attenuation storage system will be flow controlled to limit discharge rates to existing greenfield runoff rates. Following interception and attenuation, surface water will discharge at controlled rates into a piped gravity drainage system which will be installed below the ground floor level carpark and will connect to the existing 225mm diameter surface water drainage sewer in Quay Street as described in section 5.1 above.

All surface water pipes have been designed to achieve a minimum self-cleansing velocity of 0.75m/s.

5.2.2 Catchment and Attenuation System (Blue Roof)

A breakdown of the drainage areas on the site is included below in Table 5.1.

Table 5.1 Drainage Areas

Description	Area (Ha)
Diverse Green Roof	0.072
Diverse Blue Roof	0.220
Permeable Paving Ground Level	0.023
Roof Terraces, parapets and paved areas	0.100
Total	0.415

Blue roof systems are proposed to be provided to the sixth floor and first floor roofs on block A, at podium level (first and third floor) and on the roof of Block C. The blue roof systems will have an attenuation storage cell layer of between 112 and 162mmm thick (depending on location). The attenuation cells proposed have 95% voids which allow for 95 litres of storage per 100mm thick layer.

The areas of blue roof on blocks A and C will provide attenuation storage for their own roof areas only and will have a storage cell layer depth of 112mm. The blue roof on the podium level will cater for attenuation storage from the podium and all other green roof areas and impermeable areas such as terraces and parapets. This storage cell depth in the podium will be 162mm. Runoff from all green roofs and terrace areas will be directed into the podium storage area via internal pipe runs.

The attenuation storage volume provided has been sized to cater for the runoff from a 1:100-year storm event of critical duration and includes a 20% allowance for climate change. The outlets from the blue roof provide flow control and will ensure discharge off site is restricted to greenfield runoff rates (circa 2L/sec). It is noted however that due to the quantity of green roof and planting proposed in the development, discharge volumes of surface water from the site are likely to be very low and will only occur following significant rainfall events.

The inaccessible roofs that are not proposed as blue roof systems will be fitted with a green roof system. The green roofs and inaccessible blue roofs will have a diverse planting type while the podium level amenity areas are likely to have a more intensive planting. Details of the planting proposals will be provided by the landscape architect.

Stormwater drainage attenuation calculations for the blue roofs are provided in Appendix D and typical details of the proposed blue and green roof systems by Bauder are provided in Appendix E.

5.3 Compliance with Sustainable Urban Drainage Systems

At present, the surface water runoff from the site which is (except for a small vacant plot to the northeast) entirely covered in impermeable areas, discharges unattenuated and untreated flow off site.

To reduce and attenuate the flow, the proposed development has been designed in accordance with the principles of Sustainable Urban Drainage Systems (SUDS) as expressed 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 minimise the impact of urbanisation by replicating the runoff characteristics of a greenfield site. The criteria provide a consistent approach to addressing both rate and volume of run-off as well as ensuring the environment is protected from pollution that is washed off roads and buildings.

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

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

In the case of the subject site, interception storage will be provided, and growth factors will not be applied to the allowable discharge for the 100-year event. This means that both treatment storage and long term storage (neither of which would be practical on this site) are not required. Attenuation storage is provided and is outlined in section 5.2.2 above.

5.3.1 Interception Storage

Interception storage for the development will be provided by the planting on the green and blue roofs which totals approximately 1,350 m^2 and the landscaped areas of the podium totalling approximately 500m^2. There is a drainage board within the green and blue roof build-ups which stores up to 13.5mm of rainfall, this together with the planting substrate will far exceed the recommendations of GDSDS to intercept the first flush (5 to 10mm).

5.3.2 Permeable Paving

The paved areas of the ground floor courtyard to the southwest of Block A will be constructed with permeable paving which will be designed for pedestrian loadings only and will consist of selected paving blocks on a 50mm layer of 2/6.3mm laying course, on approved geotextile on a 250mm layer of 4/20mm coarse graded aggregate.

The 250mm coarse graded aggregate layer in the permeable paving will provide an attenuation storage. Based on 30% voids in the material, the 250mm thick layer will provide 75 litres of storage per square metre of paving. the area of paving is approximately 160m2 which equates to approximately 12m^3 storage for the entire paved area. As per recommendations of the GDSDS the first flush should be intercepted (i.e. the first 5mm to 10mm of rainfall). Based on 10mm of rainfall, a total storage volume required would be 1.6m^3. The volume of storage provided far exceeds the volume of storage required for interception.

Further to the above, based on the storage provided, the permeable paving would be capable of storing up to 75mm of rainfall in the coarse aggregate layer which would cater for the runoff from a 1:100 year storm event of critical duration. The permeable paving will also be provided with an overflow to accommodate any extreme rainfall events which will connect to the proposed surface water drainage gravity pipe system within the carpark.

5.3.3 Flow Controls and Bypass Interceptor

A number of downpipes will be provided from the blue roofs which will allow discharge to the gravity surface water drainage in the carpark at ground level. Each of the downpipes will be fitted with flow control mechanisms to limit flow to greenfield runoff rates. Typical details of a proposed flow control to a blue roof are shown in figure 5.1 below.

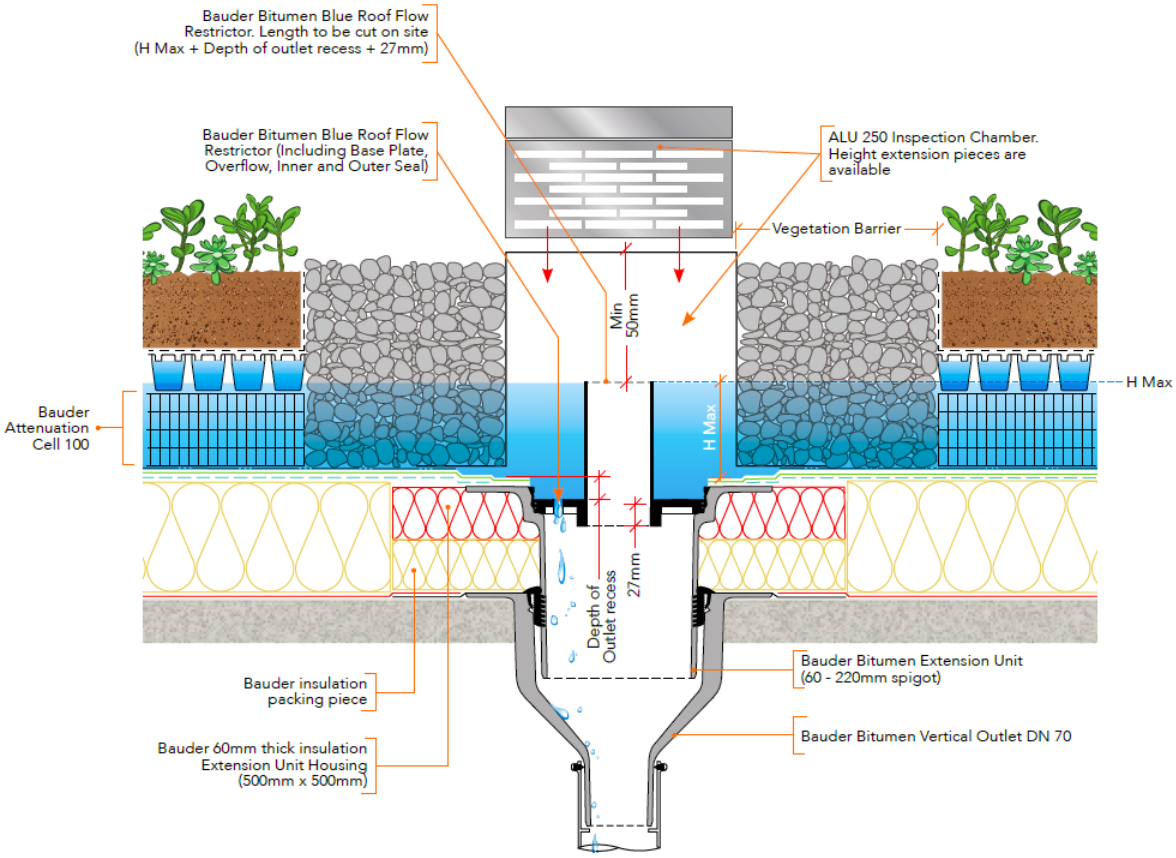


Figure 5.1 – Typical flow controlled outlet detail (Courtesy of Bauder)

Although the vast majority of the carpark at ground floor level will be covered, there will be a number of open areas to the podium above for natural ventilation purposes which will allow some rainfall into the carpark. It is proposed to install a number of gullies centrally in the carpark to cater for the low level of surface water drainage required. To prevent possible contamination in the event of an oil spillage a class 1 bypass separator will be provided on the surface water outlet from the ground level carpark.

6 Flood Risk

A stage 3 flood risk assessment was carried out on the site by JBA Consulting Engineers, refer to the report in full for details.

As part of the flood risk assessment a site specific hydraulic model was developed to investigate the flood risk to the site. This model was run for various flooding scenarios and concluded that the key areas of the proposed residential dwellings will not be impacted by any of the modelled flood events. Refer to the flood risk assessment in full for further information.

7 Traffic and Transport Assessment

As part of the preliminary design process, ORS has carried out a Traffic and Transport Assessment (TTA) in relation to the proposed development.

Please refer to ORS report **201_321-ORS-XX-XX-RP-TR-7d-001** for this report in its entirety.

8 DMURS Engineering Criteria

Guidance has been taken from DMURS for the engineering design of streets and footpaths in the development, the following criteria are addressed in sections 8.1 and 8.2 below. It should be noted that the only vehicular access to the development will be to the below ground carpark.

8.1 Sightline Availability

Sightlines have been checked on the proposed carpark entrance off Quay Street. 49m sightlines can be achieved at this entrance in both directions which complies with the minimum requirements outlined in DMURS which is 49 metres for 50km/hour zones.

Refer to drawings **201_321-ORS-Z0-00-DR-TR-700** for details of sightlines.

8.2 Street Frontage

The existing kerb alignments on both Quay Street and High Street which front the site will be retained and unchanged post development. The finishes and design of footpaths will be in keeping with the existing surrounding pavements. All kerb and pavement finishes will in accordance with the requirements of the Local Authority.

9 Health and Safety

ORS understand their health and safety responsibilities as set out in the Health and Safety at Work (Construction) Regulations 2013.

Appendix A – Irish Water Correspondence

Stephen Grant

ORS
Block A
Marlinstown Business Park
Mullingar
Co. Westmeath
N91W5NN

Uisce Éireann
Bosca OP 448
Oifig Sheachadta na
Cathrach Theas
Cathair Chorcaí

Irish Water
PO Box 448,
South City
Delivery Office,
Cork City.

www.water.ie

19 October 2020

Re: CDS20006483 pre-connection enquiry - Subject to contract | Contract denied

Connection for Housing Development of 110 units at High Street/Quay Street, Balbriggan, Co. Dublin

Dear Sir/Madam,

Irish Water has reviewed your pre-connection enquiry in relation to a Water & Wastewater connection at High Street/ Quay Street, Balbriggan, Co. Dublin (the **Premises**). Based upon the details you have provided with your pre-connection enquiry and on our desk top analysis of the capacity currently available in the Irish Water network(s) as assessed by Irish Water, we wish to advise you that your proposed connection to the Irish Water network(s) can be facilitated at this moment in time.

SERVICE	**OUTCOME OF PRE-CONNECTION ENQUIRY** **THIS IS NOT A CONNECTION OFFER. YOU MUST APPLY FOR A CONNECTION(S) TO THE IRISH WATER NETWORK(S) IF YOU WISH TO PROCEED.**
Water Connection	Feasible without infrastructure upgrade by Irish Water
Wastewater Connection	Feasible without infrastructure upgrade by Irish Water
SITE SPECIFIC COMMENTS	
Water Connection	This Confirmation of Feasibility to connect to the Irish Water infrastructure also does not extend to your fire flow requirements. Please note that Irish Water cannot guarantee a flow rate to meet fire flow requirements and in order to guarantee a flow to meet the Fire Authority requirements, you may need to provide adequate fire storage capacity within your development. In order to determine the potential flow that could be delivered during normal operational conditions, an onsite assessment of the existing network is required.
Wastewater Connection	Separated foul flow can be accommodated to the 525mm sewer on Quay Street.

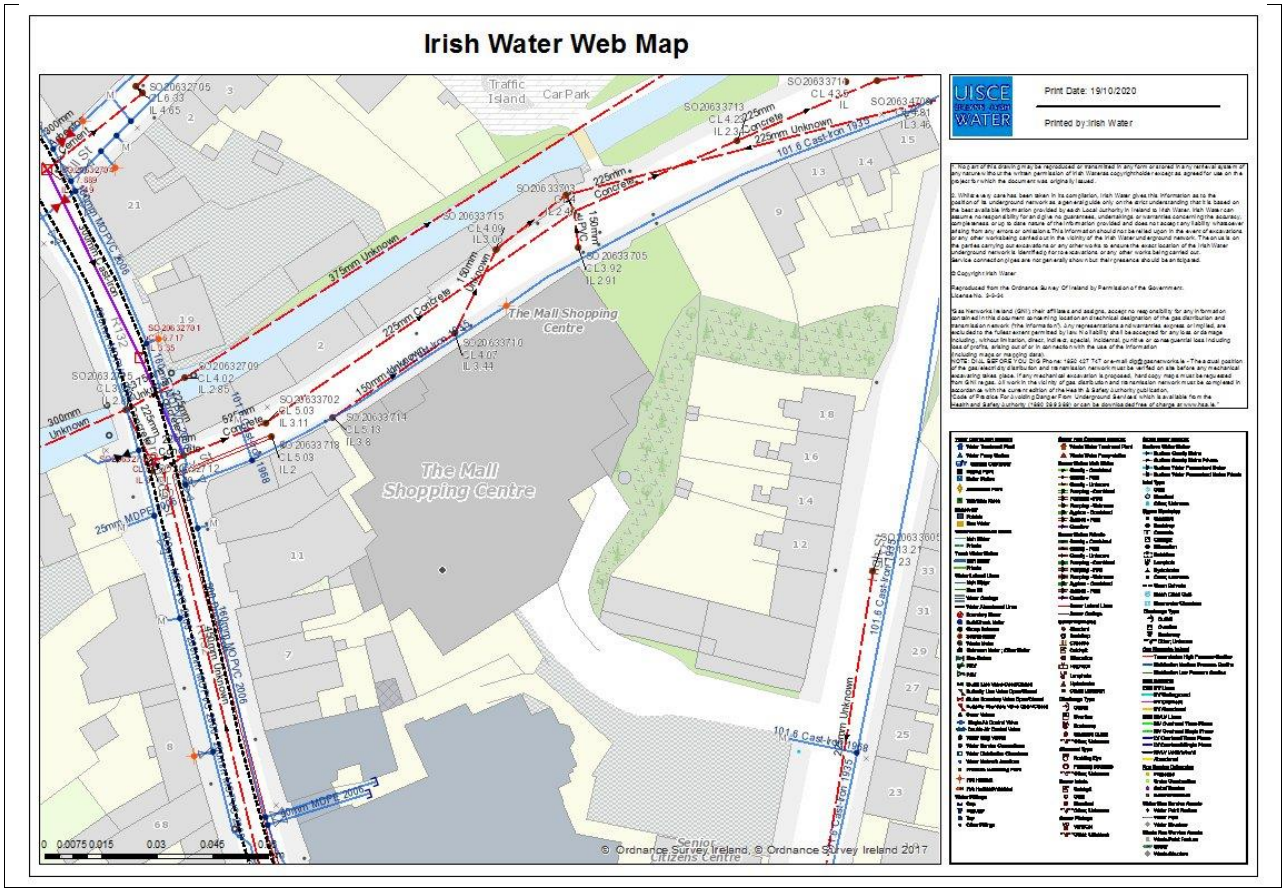
	No surface water from the proposed development shall enter the Irish Water network. Please contact the LA Drainage Division for details on the Surface Water network in the area.

Strategic Housing Development:

Irish Water notes that the scale of this development dictates that it is subject to the Strategic Housing Development planning process. In advance of submitting your full application to An Bord Pleanála for assessment, you must have reviewed this development with Irish Water and received a Statement of Design Acceptance in relation to the layout of water and wastewater services.

The design and construction of the Water & Wastewater pipes and related infrastructure to be installed in this development shall comply with the Irish Water Connections and Developer Services Standard Details and Codes of Practice that are available on the Irish Water website. Irish Water reserves the right to supplement these requirements with Codes of Practice and these will be issued with the connection agreement.

The map included below outlines the current Irish Water infrastructure adjacent to your site:



Reproduced from the Ordnance Survey of Ireland by Permission of the Government. License No. 3-3-34

Whilst every care has been taken in its compilation Irish Water gives this information as to the position of its underground network as a general guide only on the strict understanding that it is based on the best available information provided by each Local Authority in Ireland to Irish Water. Irish Water can assume no responsibility for and give no guarantees, undertakings or warranties concerning the accuracy, completeness or up to date nature of the information provided and does not accept any liability whatsoever arising from any errors or omissions. This information

should not be relied upon in the event of excavations or any other works being carried out in the vicinity of the Irish Water underground network. The onus is on the parties carrying out excavations or any other works to ensure the exact location of the Irish Water underground network is identified prior to excavations or any other works being carried out. Service connection pipes are not generally shown but their presence should be anticipated.

General Notes:

1) The initial assessment referred to above is carried out taking into account water demand and wastewater discharge volumes and infrastructure details on the date of the assessment. **The availability of capacity may change at any date after this assessment.**
2) This feedback does not constitute a contract in whole or in part to provide a connection to any Irish Water infrastructure. All feasibility assessments are subject to the constraints of the Irish Water Capital Investment Plan.
3) The feedback provided is subject to a Connection Agreement/contract being signed at a later date.
4) A Connection Agreement will be required to commencing the connection works associated with the enquiry this can be applied for at https://www.water.ie/connections/get-connected/
5) A Connection Agreement cannot be issued until all statutory approvals are successfully in place.
6) Irish Water Connection Policy/ Charges can be found at https://www.water.ie/connections/information/connection-charges/
7) Please note the Confirmation of Feasibility does not extend to your fire flow requirements.
8) Irish Water is not responsible for the management or disposal of storm water or ground waters. You are advised to contact the relevant Local Authority to discuss the management or disposal of proposed storm water or ground water discharges
9) To access Irish Water Maps email datarequests@water.ie
10) All works to the Irish Water infrastructure, including works in the Public Space, shall have to be carried out by Irish Water.

If you have any further questions, please contact Deirdre Ryan from the design team on 022 54620 or email deiryan@water.ie. For further information, visit **www.water.ie/connections.**

Yours sincerely,

Maria O'Dwyer

Connections and Developer Services

Stephen Grant
Block A
Marlinstown Business Park
Mullingar, Co. Westmeath

Uisce Éireann
Bosca OP 448
Oifig Sheachadta na
Cathrach Theas
Cathair Chorcaí

Irish Water
PO Box 448,
South City
Delivery Office,
Cork City.

www.water.ie

27 July 2021

Re: Design Submission for High Street/ Quay Street, Balbriggan, Co. Dublin (the "Development")
(the "Design Submission") / Connection Reference No: CDS20006483

Dear Stephen Grant,

Many thanks for your recent Design Submission.

We have reviewed your proposal for the connection(s) at the Development. Based on the information provided, which included the documents outlined in Appendix A to this letter, Irish Water has no objection to your proposals.

This letter does not constitute an offer, in whole or in part, to provide a connection to any Irish Water infrastructure. Before you can connect to our network you must sign a connection agreement with Irish Water. This can be applied for by completing the connection application form at www.water.ie/connections. Irish Water's current charges for water and wastewater connections are set out in the Water Charges Plan as approved by the Commission for Regulation of Utilities (CRU)(https://www.cru.ie/document_group/irish-waters-water-charges-plan-2018/).

You the Customer (including any designers/contractors or other related parties appointed by you) is entirely responsible for the design and construction of all water and/or wastewater infrastructure within the Development which is necessary to facilitate connection(s) from the boundary of the Development to Irish Water's network(s) (the "**Self-Lay Works**"), as reflected in your Design Submission. Acceptance of the Design Submission by Irish Water does not, in any way, render Irish Water liable for any elements of the design and/or construction of the Self-Lay Works.

If you have any further questions, please contact your Irish Water representative:
Name: Alvaro Garcia
Email: agarcia@water.ie

Yours sincerely,

Yvonne Harris

Yvonne Harris
Head of Customer Operations

Appendix A

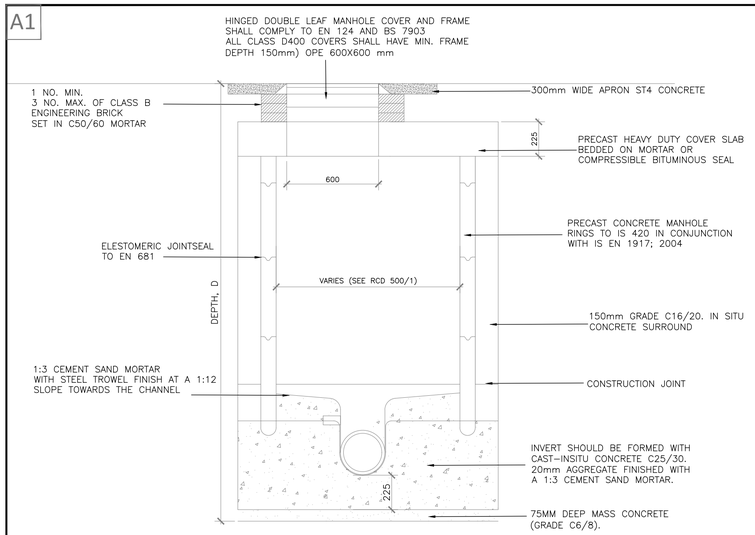
Document Title & Revision

201_321-ORS-XX-XX-DR-C-401
201_321-ORS-Z0-00-DR-C-400
201_321-ORS-Z0-RF-DR-C-402
201_321-ORS-Z0-ZZ-DR-C-403

*For further information, visit **www.water.ie/connections***

Notwithstanding any matters listed above, the Customer (including any appointed designers/contractors, etc.) is entirely responsible for the design and construction of the Self-Lay Works. Acceptance of the Design Submission by Irish Water will not, in any way, render Irish Water liable for any elements of the design and/or construction of the Self-Lay Works.

A1



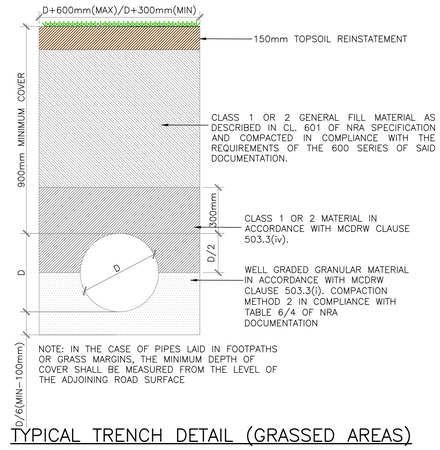
PLEASE NOTE THE CONTRACTOR SHALL REFER TO NRA DETAIL RCD/500/5

TYPICAL MANHOLE DETAIL (TYPE C)

SCALE 1:20

CHAMBER TYPES

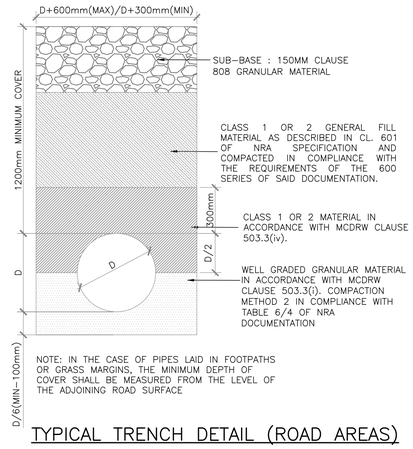
DEPTH (m)	PIPE DIAMETER								
	225mm	300mm	375mm	450mm	525mm	600mm	675mm	750mm	900mm
0–1m	A 975x1350	A 975x1350	A 975x1350	A 975x1350	B1135Ox1690	B1135Ox1690	B1135Ox1690	B1135Ox1690	B1135Ox1690
1–3m	C 1050	C 1050	C 1050	C 1050	C 1200	C 1200	C 1350	C 1350	C 1500
3–6m		D 1050	D 1050	D 1050	D 1200	D 1200	D 1350	D 1500	D 1500
6–12m		E 1500	E 1500	E 1500	E 1500	E 1500	E 1500	E 1500	E 1500



NOTE: IN THE CASE OF PIPES LAID IN FOOTPATHS OR GRASS MARGINS, THE MINIMUM DEPTH OF COVER SHALL BE MEASURED FROM THE LEVEL OF THE ADJOINING ROAD SURFACE

TYPICAL TRENCH DETAIL (GRASSED AREAS)

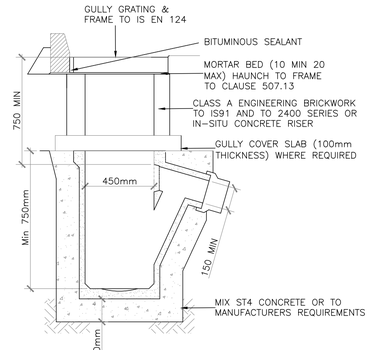
SCALE 1:20



NOTE: IN THE CASE OF PIPES LAID IN FOOTPATHS OR GRASS MARGINS, THE MINIMUM DEPTH OF COVER SHALL BE MEASURED FROM THE LEVEL OF THE ADJOINING ROAD SURFACE

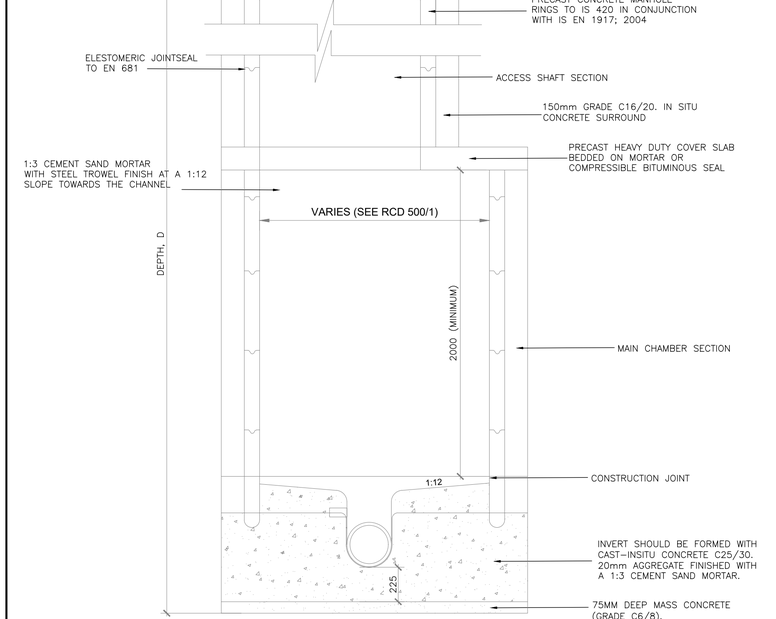
TYPICAL TRENCH DETAIL (ROAD AREAS)

SCALE 1:20



TYPICAL PRECAST ROAD GULLY

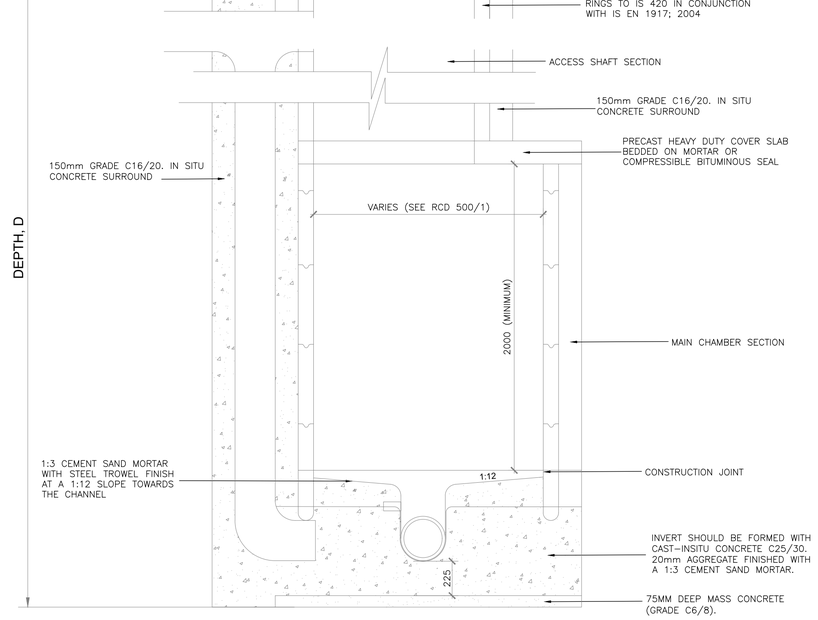
SCALE 1:20



PLEASE NOTE THE CONTRACTOR SHALL REFER TO NRA DETAIL RCD/500/5

TYPICAL MANHOLE DETAIL (TYPE D)

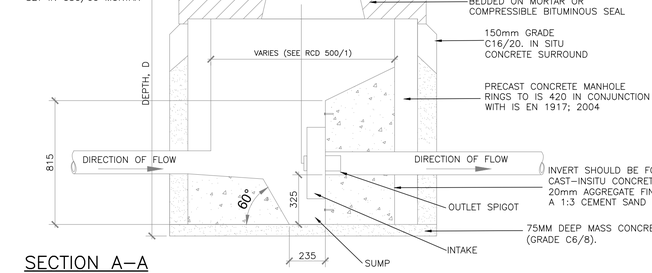
SCALE 1:20



PLEASE NOTE THE CONTRACTOR SHALL REFER TO NRA DETAIL RCD/500/5

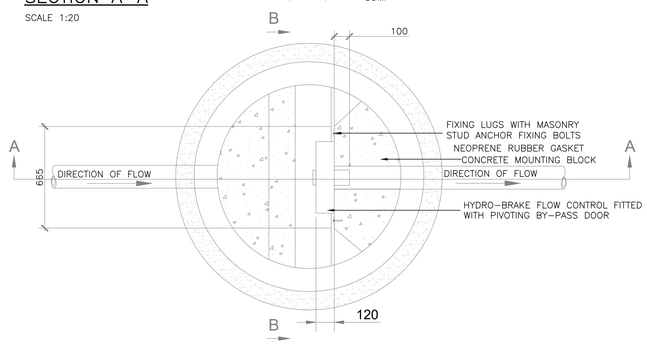
TYPICAL BACKDROP MANHOLE DETAIL

SCALE 1:20



SECTION A–A

SCALE 1:20



TYPICAL FLOW CONTROL MANHOLE

SCALE 1:20

INFORMATION

REV NO:	DATE:	REVISION NOTE:	DWN BY:	CKD BY:
P01	08/12/2020	ISSUED FOR INFORMATION	SG	MH

UNCONTROLLED

CLIENT:	RHONELLEN DEVELOPMENTS LTD.
PROJECT:	TEMPLAR PLACE DEVELOPMENT SHD
TITLE:	TYPICAL SURFACE WATER MANHOLE DETAILS

DRAWN:	CHECKED:	APPROVED:	JOB NO:	REV:
SG	MH	CG	201_321	P01
DATE: 08/12/2020	SCALE: 1:50		DRAWING NO: 201_321-ORS-XX-XX-DR-C-401	

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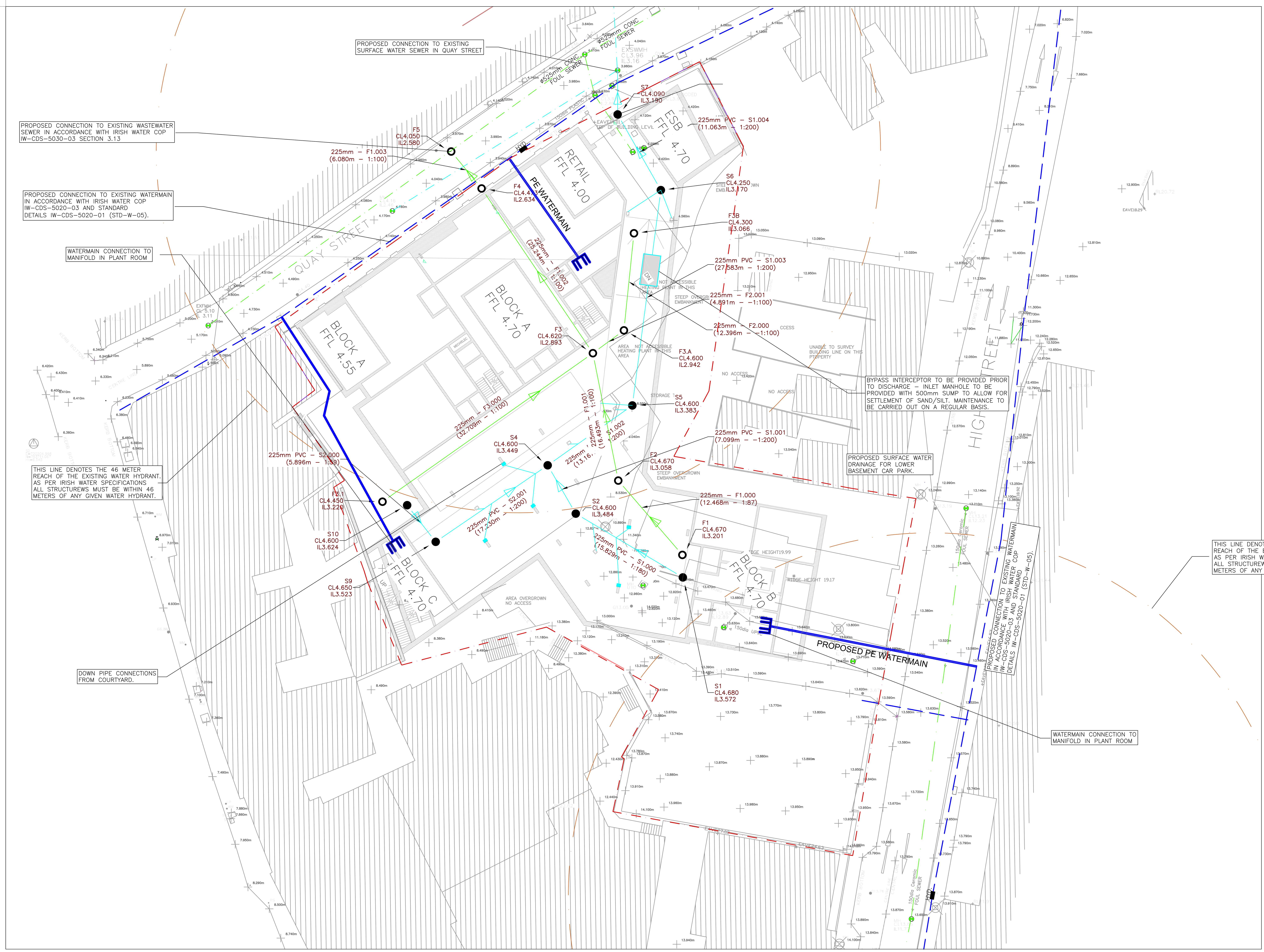
A1



	LEGEND
	GULLY
	PROPOSED TWIN WALL SURFACE WATER PIPES
	EXISTING SURFACE WATER PIPES
	PROPOSED PVC FOUL SEWER PIPES
	EXISTING FOUL SEWER PIPES
	PROPOSED ø125mm PE WATERMAIN
	EXISTING WATERMAIN
	BOUNDARY LINE
●	PROPOSED SURFACE WATER MANHOLE
o	PROPOSED FOUL SEWER MANHOLE
	EXISTING MANHOLE
	PROPOSED MANIFOLD SUPPLY
	PROPOSED AJ CHAMBER
C.L.	COVER LEVEL
I.L.	INVERT LEVEL
	ANCHOR/THRUST BLOCK
S.V.	SLUICE VALVE
Sc.V.	SCOUR VALVE
	HYDRANT
DRM	DRY RISING MAIN
A.V.	AIR VALVE
W.M	WATER METER
DP/MH	DROP MANHOLE
EP	ELECTRIC POLE
TP	TELEPHONE POLE
LP	LAMP POST

NOTES:
ALL LEVELS RELATE TO MALIN HEAD DATUM.

NOTES :-

1. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH ALL RELEVANT ENGINEER'S AND ARCHITECT'S DRAWINGS AND SPECIFICATIONS.
2. ALL LEVELS ARE IN METRES TO ORDNANCE DATUM, MALIN HEAD UNLESS NOTED OTHERWISE.
3. THE POSITION OF EXISTING SERVICES AS SHOWN ON THE DRAWING MAY NOT BE ACCURATE. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR LOCATING ALL EXISTING SERVICES ON THE SITE AND SHOULD CONTACT THE RESPECTIVE UTILITY PROVIDERS AND AUTHORITIES FOR THE MOST UP-TO-DATE INFORMATION BEFORE COMMENCING THE WORKS.
4. EXISTING LEVELS ARE INDICATIVE ONLY AND MUST BE CHECKED AND VERIFIED ON SITE PRIOR TO COMMENCEMENT.
5. PROPOSED MANHOLE COVER LEVELS ARE APPROXIMATE AND SHOULD BE ADJUSTED TO SUIT LOCAL FINISHES.
6. ALL SURFACE WATER DRAINAGE INFRASTRUCTURE SHALL BE CONSTRUCTED IN ACCORDANCE WITH LOCAL AUTHORITY REQUIREMENTS.
7. LOCKABLE TYPE GULLY TRAPS TO BE USED ON ALL SURFACE WATER DRAINS.
8. GULLY POSITIONS ARE APPROXIMATE ONLY AND SHOULD BE LOCATED AT LOW POINTS.
9. REFER TO ARCHITECTS' DRAWINGS FOR ALL ROOF DRAINAGE, STRIP DRAINS AND GULLY TRAPS BENEATH DOWNPIPES.
10. WHERE IT IS NOT POSSIBLE TO ACHIEVE MINIMUM COVER, PIPES SHOULD BE BEDDED AND SURROUNDED IN CONCRETE 150MM THICK, CLASS E IN ACCORDANCE WITH TII STANDARD CONSTRUCTION DETAIL CC-SCD-00521.
11. ALL WASTEWATER DRAINAGE INFRASTRUCTURE SHALL BE CONSTRUCTED IN ACCORDANCE WITH IRISH WATER STANDARDS. REFER TO IRISH WATER PUBLICATIONS "WASTEWATER INFRASTRUCTURE STANDARD DETAILS – IW-CDS-5030-01" AND "CODE OF PRACTICE FOR WASTEWATER INFRASTRUCTURE – IW-CDS-5030-03"
12. HYDRANTS TO BE ACCORDANCE WITH IRISH WATER STANDARD DETAILS STD-W-16 TO STD-W-19.
13. THRUST BLOCK ARRANGEMENTS SHALL COMPLY WITH IRISH WATER STANDARD DETAILS STD-W-28
14. REFER TO MECHANICAL AND ELECTRICAL ENGINEER'S DRAWINGS FOR INTERNAL DRAINAGE AND DETAILS OF SOIL AND VENT PIPES LEADING TO WASTEWATER DRAINAGE AJS.
15. ALL WATER INFRASTRUCTURE SHALL BE CONSTRUCTED IN ACCORDANCE WITH IRISH WATER STANDARDS. REFER TO IRISH WATER PUBLICATIONS "WATER INFRASTRUCTURE STANDARD DETAILS – IW-CDS-5020-01" AND "CODE OF PRACTICE FOR WATER INFRASTRUCTURE – IW-CDS-5020-03"
16. ALL PLANTING & TREES TO COMPLY WITH SEPERATION DISTANCES AS PER IRISH WATER STANDARD DETAILS FOR WASTEWATER, STD-WW-06 AND STD-WW-06A AND FOR WATER, STD-W-12 AND STD-W-12A

S2 - INFORMATION

Figured dimension only to be taken from this drawing.
All dimensions to be checked on site.
Consultants to be informed immediately of any discrepancies before work proceeds.

REV NO:	DATE:	REVISION NOTE:	DWN BY:	CKD BY:
P01	02/10/2020	ISSUED FOR INFORMATION	SG	MH
P02	09/12/2020	ISSUED FOR INFORMATION	SG	MH
P03	21/07/2021	ISSUED FOR INFORMATION	SG	MH

N

CLIENT:	RHONELLEN DEVELOPMENTS LTD.
PROJECT:	TEMPLAR PLACE SHD
TITLE:	COMBINED CIVIL SERVICES LAYOUT @ GROUND FLOOR LEVEL

DRAWN:	CHECKED:	APPROVED:	JOB NO:	REV:
SG	MH	CG	201_321	P03
DATE: 02/10/2020	SCALE: 1:250		DRAWING NO: 201_321-ORS-Z0-00-DR-C-400	

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A1

PROPOSED GREEN ROOF

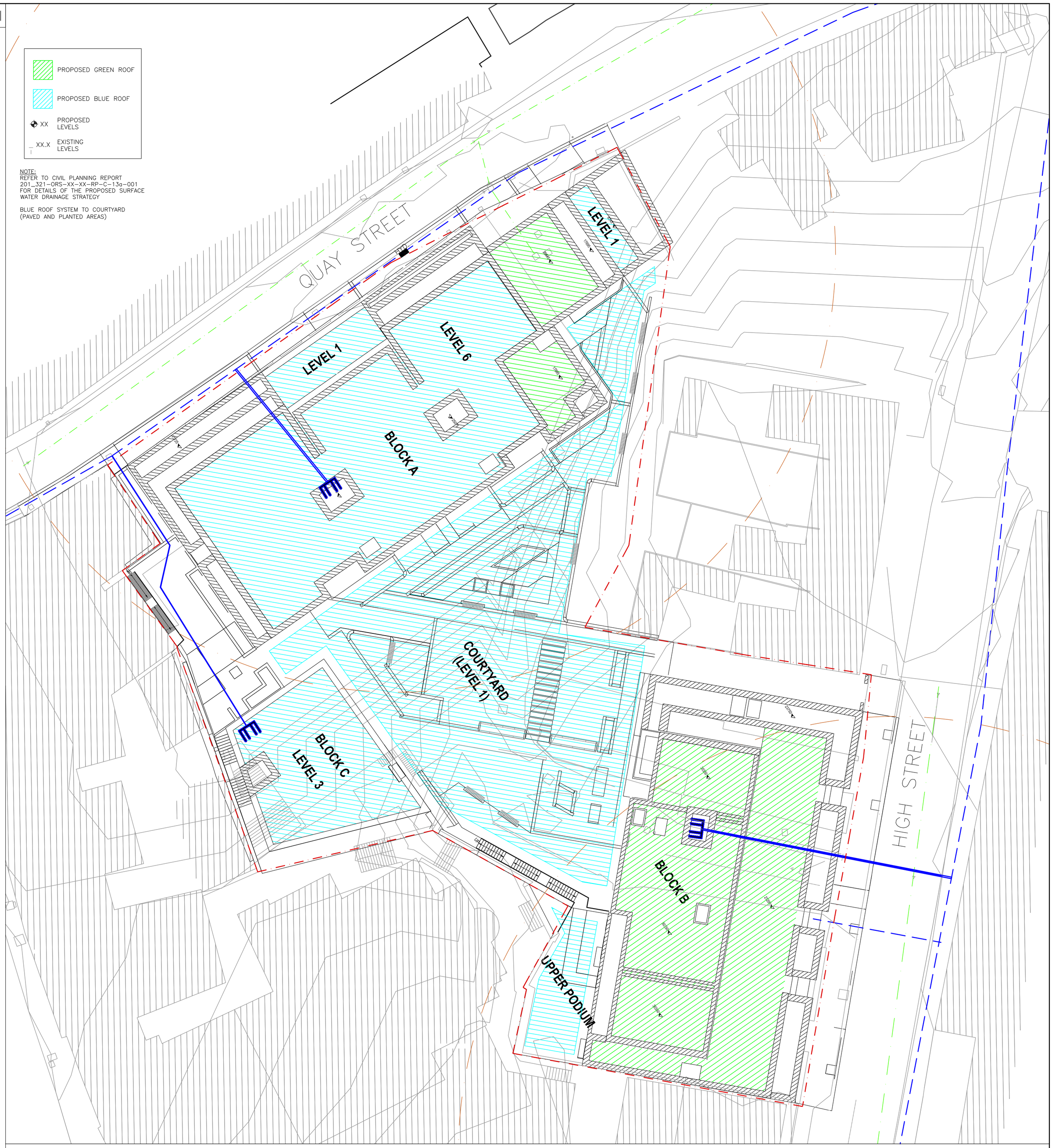
PROPOSED BLUE ROOF

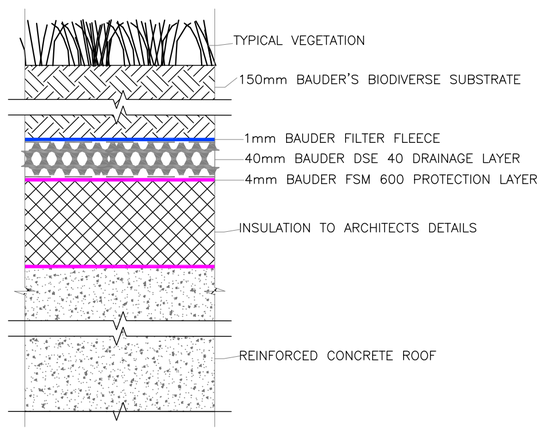
XX PROPOSED LEVELS

XX.X EXISTING LEVELS

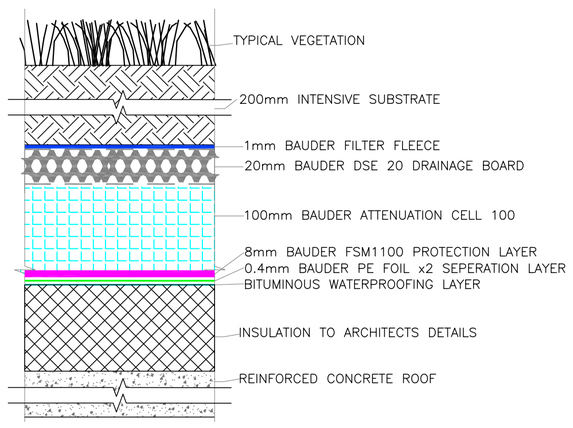
NOTE:
REFER TO CIVIL PLANNING REPORT 201_321-ORS-XX-XX-RP-C-13a-001 FOR DETAILS OF THE PROPOSED SURFACE WATER DRAINAGE STRATEGY

BLUE ROOF SYSTEM TO COURTYARD (PAVED AND PLANTED AREAS)





EXTENSIVE GREEN ROOF BUILD UP
SCALE 1:5



EXTENSIVE BLUE ROOF BUILD UP
SCALE 1:5

S2 - INFORMATION

REV NO:	DATE:	REVISION NOTE:	DWN BY:	CKD BY:
P01	21/07/2021	ISSUED FOR INFORMATION	SG	MH

CLIENT:	RHONELLEN DEVELOPMENTS LTD.
PROJECT:	TEMPLAR PLACE SHD
TITLE:	SURFACE WATER BLUE/GREEN ROOF LAYOUT

DRAWN:	CHECKED:	APPROVED:	JOB NO:	REV:
SG	MH	CG	201_321	P02
DATE: 21/07/2021	SCALE: 1:200		DRAWING NO: 201_321-ORS-Z0-RF-DR-C-402	

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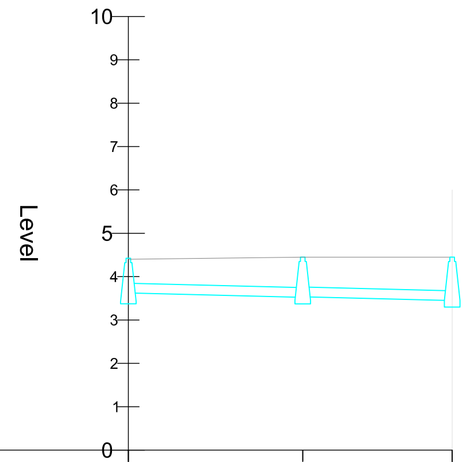
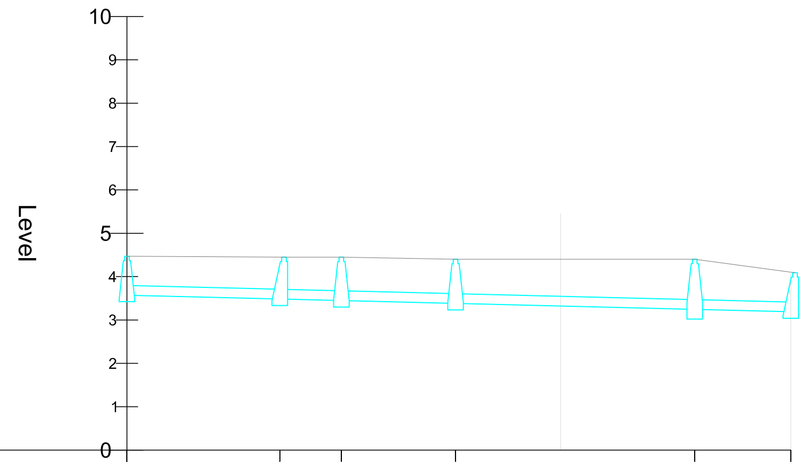
A1

RUN S2 - LONGSECTION
SCALE: H 1:500,V 1:100. DATUM: 0.000



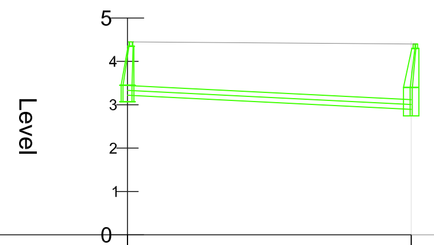
Cover Level	4.42	4.45		4.45
Invert Level	3.62	3.52		3.45
Chainage	0.000	10.000	20.000	30.000 37.339

S1 RUN - LONGSECTION
SCALE: H 1:500,V 1:100. DATUM: 0.000



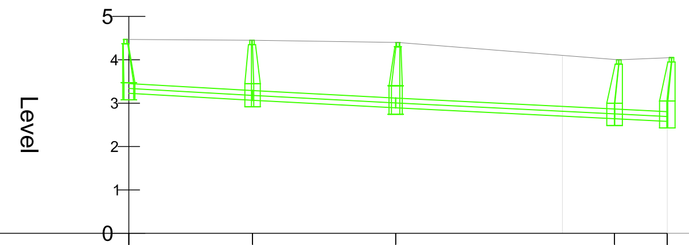
Cover Level	4.47	4.45	4.45	4.40		4.40		4.09
Invert Level	3.57	3.48	3.45	3.38		3.17		3.19
Chainage	0.000	10.000	20.000	30.000	40.000	50.000	60.000	70.000 76.535

F3 RUN - LONGSECTION
SCALE: H 1:500,V 1:100. DATUM: 0.000



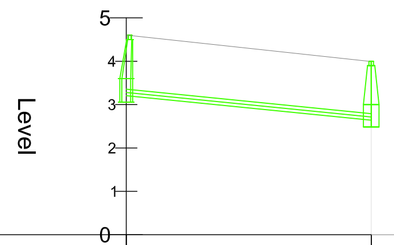
Cover Level	4.45			4.40
Invert Level	3.22			2.89
Chainage	0.000	10.000	20.000	30.000 32.709

F1 RUN - LONGSECTION
SCALE: H 1:500,V 1:100. DATUM: 0.000



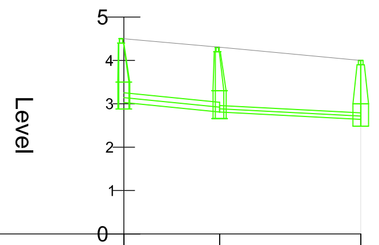
Cover Level	4.47	4.45	4.40		4.00		4.05
Invert Level	3.23	3.07	2.89		2.63		2.58
Chainage	0.000	10.000	20.000	30.000	40.000	50.000	60.000 62.091

F4 RUN - LONGSECTION
SCALE: H 1:500,V 1:100. DATUM: 0.000



Cover Level	4.60			4.00
Invert Level	3.21			2.63
Chainage	0.000	10.000	20.000	28.251

RUN F5 - LONGSECTION
SCALE: H 1:500,V 1:100. DATUM: 0.000



Cover Level	4.50	4.30		4.00
Invert Level	3.03	2.81		2.63
Chainage	0.000	10.000	20.000	27.320

S2 - INFORMATION

REV NO:	DATE:	REVISION NOTE:	DWN BY:	CKD BY:
P01	24/06/2021	ISSUED FOR INFORMATION	SG	MH

N

CLIENT:	RHONELLEN DEVELOPMENTS LTD.
PROJECT:	TEMPLAR PLACE DEVELOPMENT SHD
TITLE:	SURFACE WATER AND WASTEWATER LONGITUDINAL SECTIONS

DRAWN:	CHECKED:	APPROVED:	JOB NO:	REV:
SG	MH	CG	201_321	P01
DATE: 02/10/2020	SCALE: 1:500		DRAWING NO: 201_321-ORS-Z0-ZZ-DR-C-403	

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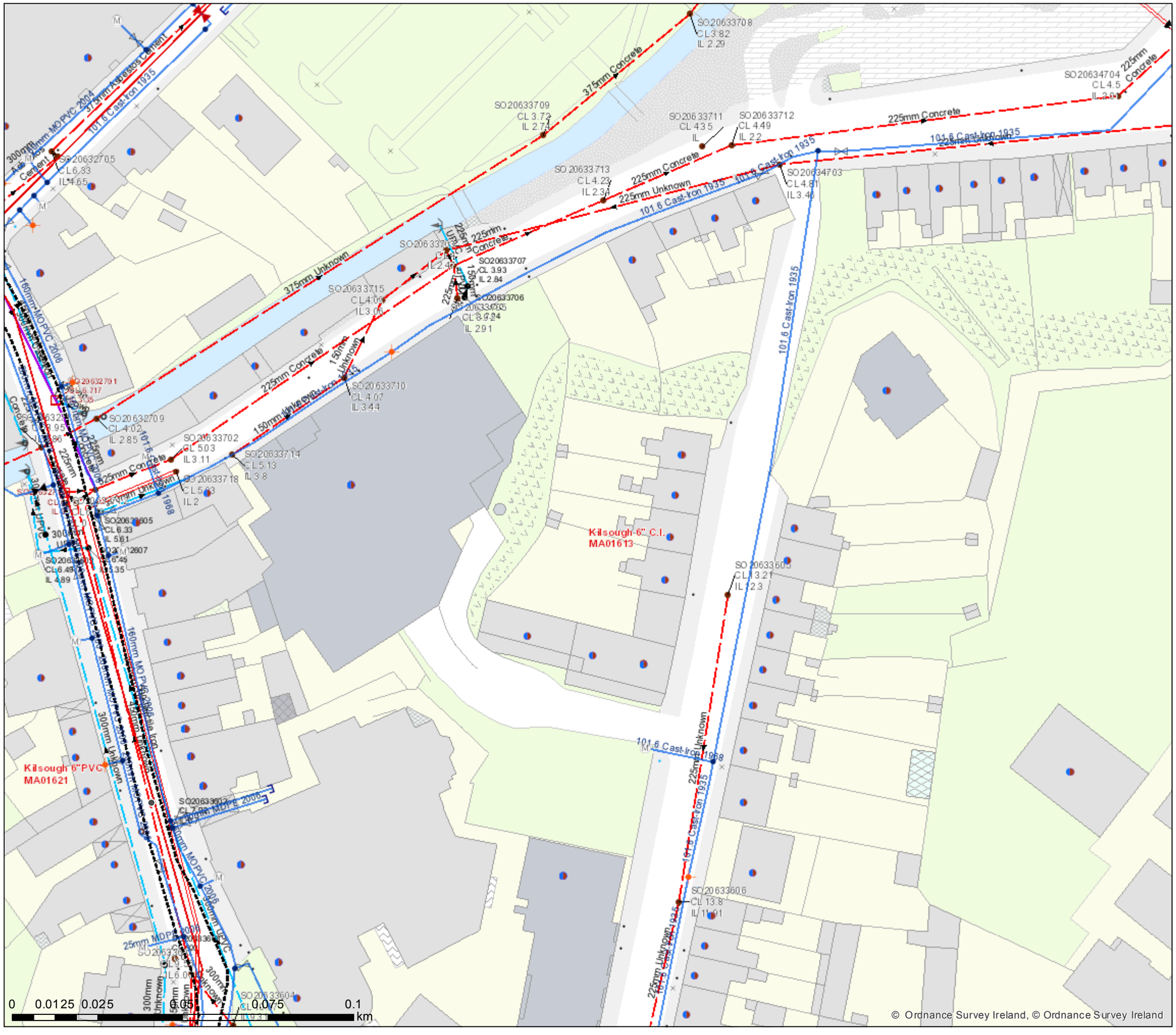
Appendix B –Water and Wastewater Infrastructure Map

Irish Water Quay St_High St Balbriggan



UISCE ÉIREANN : IRISH WATER

Print Date: 18/08/2020

Printed by:Irish Water

Water Distribution Network
- Water Treatment Plant
- Water Pump Station
- Storage Cell/Tower
- Dosing Point
- Meter Station
- Abstraction Point
- Telemetry Kiosk

Reservoir
- Potable
- Raw Water

Water Distribution Mains
- Irish Water
- Private

Trunk Water Mains
- Irish Water
- Private

Water Lateral Lines
- Irish Water
- Non IW
- Water Casings
- Water Abandoned Lines
- Boundary Meter
- Bulk/Check Meter
- Group Scheme
- Source Meter
- Waste Meter
- Unknown Meter ; Other Meter
- Non-Return
- PRV
- PSV
- Sluice Line Valve Open/Closed
- Butterfly Line Valve Open/Closed
- Sluice Boundary Valve Open/Closed
- Butterfly Boundary Valve Open/Closed
- Scour Valves
- Single Air Control Valve
- Double Air Control Valve
- Water Stop Valves
- Water Service Connections
- Water Distribution Chambers
- Water Network Junctions
- Pressure Monitoring Point
- Fire Hydrant
- Fire Hydrant/Washout

Water Fittings
- Cap
- Reducer
- Tap
- Other Fittings

Sewer Foul Combined Network
- Waste Water Treatment Plant
- Waste Water Pump station

Sewer Mains Irish Water
- Gravity - Combined
- Gravity - Foul
- Gravity - Unknown
- Pumping - Combined
- Pumping - Foul
- Pumping - Unknown
- Syphon - Combined
- Syphon - Foul
- Overflow

Sewer Mains Private
- Gravity - Combined
- Gravity - Foul
- Gravity - Unknown
- Pumping - Combined
- Pumping - Foul
- Pumping - Unknown
- Syphon - Combined
- Syphon - Foul
- Overflow
- Sewer Lateral Lines
- Sewer Casings

Sewer Manholes
- Standard
- Backdrop
- Cascade
- Catchpit
- Bifurcation
- Hatchbox
- Lamphole
- Hydrobrake
- Other; Unknown

Discharge Type
- Outfall
- Overflow
- Soakaway
- Standard Outlet
- Other; Unknown

Cleanout Type
- Rodding Eye
- Flushing Structure
- Other; Unknown

Sewer Inlets
- Catchpit
- Gully
- Standard
- Other; Unknown

Sewer Fittings
- Vent/Col
- Other; Unknown

Storm Water Network

Surface Water Mains
- Surface Gravity Mains
- Surface Gravity Mains Private
- Surface Water Pressurised Mains
- Surface Water Pressurised Mains Private

Inlet Type
- Gully
- Standard
- Other; Unknown

Storm Manholes
- Standard
- Backdrop
- Cascade
- Catchpit
- Bifurcation
- Hatchbox
- Lamphole
- Hydrobrake
- Other; Unknown
- Storm Culverts
- Storm Clean Outs
- Stormwater Chambers

Discharge Type
- Outfall
- Overflow
- Soakaway
- Other; Unknown

Gas Networks Ireland
- Transmission High Pressure Gasline
- Distribution Medium Pressure Gasline
- Distribution Low Pressure Gasline

ESB Networks

ESB HV Lines
- HV Underground
- HV Overhead
- HV Abandoned

ESB MVLV Lines
- MV Overhead Three Phase
- MV Overhead Single Phase
- LV Overhead Three Phase
- LV Overhead Single Phase
- MVLV Underground
- Abandoned

Non Service Categories
- Proposed
- Under Construction
- Out of Service
- Decommissioned

Water Non Service Assets
- Water Point Feature
- Water Pipe
- Water Structure

Waste Non Service Assets
- Waste Point Feature
- Sewer
- Waste Structure

Appendix C – Watermain and Wastewater Loading Calculations

PROPOSED WATER DEMAND CALCULATIONS

ORS Ref: **201_321**

CLIENT:	**Rhonellen Developments Ltd.**
PROJECT DESCRIPTION:	**Templar Place SHD, Balbriggan**
DRAWING REFERENCE:	**201_321-ORS-Z0-00-DR-C-400**

Unit Type:	*Number of:*	*Flow (l/day/person):*	*Persons per Dwelling:*	*Total Flow (l/day)*
Residential (Studio Apt)	19	150	2	5700
Residential (1 Bedroom Apt)	41	150	2	12300
Residential (2 Bedroom Apt - 4 person)	41	150	4	24600
Commercial - Retail	2	90	2	360

Residential

	Total Flow (l/day):	42600	*Total Flow (m³/day):*	42.6
	Average Hour Water Demand		**0.49**	*l/s*
	Peak Hour Water Demand (Average Hour Water Demand x 5)		**2.47**	*l/s*

Commercial

	Total Flow (l/day):	360	*Total Flow (m³/day):*	0.36
	Average Hour Water Demand		**0.004**	*l/s*
	Peak Hour Water Demand (Average Hour Water Demand x 5)		**0.02**	*l/s*

PROPOSED FOUL SEWER DESIGN CALCULATIONS

ORS Ref: **201_321**

CLIENT:	**Rhonellen Developments Ltd.**
PROJECT DESCRIPTION:	**Templar Place SHD, Balbriggan**
DRAWING REFERENCE:	**201_321-ORS-Z0-00-DR-C-400**

Unit Type:	*Number of:*	*Flow (l/day/person):*	*BOD (g/day/person)*	*Persons*	*Total Flow (l/day)*	*BOD (g/day/person)*	*P.E.*
Residential (Studio Apt)	19	150	60	38	5700	2280	38
Residential (1 Bedroom Apt)	41	150	60	82	12300	4920	82
Residential (2 Bedroom Apt - 4 person)	41	150	60	164	24600	9840	164
Commercial - Retail	2	90	60	2	360	240	4
Total Residential					42600	17040	284
Total Commercial					360	240	4

Residential Total Flow per day	**42600.00**	***litres/day***
Residential Dry Weather Flow (DWF)	**0.49**	***litres/second***
Peak Dry Weather Flow	**2.96**	***l/s @ 6 x DWF***

Commercial Total Flow per day	**360.00**	***litres/day***
Commercial Dry Weather Flow (DWF)	**0.004**	***litres/second***
Peak Dry Weather Flow	**0.02**	***l/s @ 4.5 x DWF***

Appendix D – Surface Water Drainage Calculations

BlueRoofDesign Software

Bauder Ltd, 70 Landseer Road, Ipswich, IP3 0DH. T: +44 (0)1473 257671 e: info@bauder.co.uk

Date: 30/06/2021 **Revision:** C

Client:	ORS
Project:	Templar Place
Location:	Dublin
Roof Location:	Block A L6

Roof Details:

BlueRoof	601 m²	x 100 %
Additional Area	0 m²	x 100 %
Effective Area	601 m²	

Storage Details:

Length	601 m
Width	1 m
Depth	112 mm
Porosity	95 %

Rainfall Details - FSR Method:

Return Period	100 years
Climate Change Factor	20 %
r value	0.27
M5-60	16 mm

Summer Storm Profile

Duration	Intensity mm	mm/h	Required storage(m³)
5 min	10.7	128.9	6.4
10 min	16.6	99.8	9.9
15 min	20.8	83.1	12.4
30 min	28.9	57.8	17.0
45 min	34.0	45.4	19.9
60 min	37.8	37.8	22.0
2 hours	47.9	24.0	27.1
6 hours	67.7	11.3	34.7
24 hours	102.4	4.3	39.2

Outflow Details:

Attenuation Control	BlueRoof Outlet
Control	3 holes
Sump Depth	None
Discharge rate	0.48 l/s
Outlet	2 No
Flow Per Outlet	0.24 l/s

Result:

Outcome	**Pass**
Critical Storm Duration	24.72 hrs
Hmax	69 mm
Required Volume	39.2 m³
Time to half empty	11.4 hrs
Roof Loading	65.22 Kg/m²

All results based on input data. Please check that input data has been correctly interpreted.

The Bauder Blue Flat Roof Rainwater Calculation Software will perform calculations in accordance with industry best practice for blue roof design based upon provided data relating to a specific building's dimensions geographical location and the flow rate performance of the selected Bauder rainwater outlet product.

Whilst the information contained herein is to the best of our knowledge true and accurate we specifically exclude any liability for errors omissions or otherwise arising therefrom.

Details practices principles values and calculations should be verified for accuracy and suitability for the required purpose for use.

NOTE: These calculations are valid for a zero fall roof with minimal variation in levels. Any significant variation will affect the volume of water stored and the roofs ability to attenuate extreme rain events. Typically variations in roof level should be less than 0 to +30mm with no back falls. The H-Max is measured from the mean roof level

Bauder Ltd, 70 Landseer Road, Ipswich, IP3 0DH. T: +44 (0)1473 257671 e: info@bauder.co.uk

Date: 30/06/2021 **Revision:** C

Client:	ORS
Project:	Templar Place
Location:	Dublin
Roof Location:	Block A L1

Roof Details:

BlueRoof	44 m²	x 100 %
Additional Area	0 m²	x 100 %
Effective Area	44 m²	

Storage Details:

Length	44 m
Width	1 m
Depth	112 mm
Porosity	95 %

Rainfall Details - FSR Method:

Return Period	100 years
Climate Change Factor	20 %
r value	0.27
M5-60	16 mm

Summer Storm Profile

Duration	Intensity mm	mm/h	Required storage(m³)
5 min	10.7	128.9	0.5
10 min	16.6	99.8	0.7
15 min	20.8	83.1	0.9
30 min	28.9	57.8	1.2
45 min	34.0	45.4	1.4
60 min	37.8	37.8	1.5
2 hours	47.9	24.0	1.8
6 hours	67.7	11.3	2.1
24 hours	102.4	4.3	2.0

Outflow Details:

Attenuation Control	BlueRoof Outlet
Control	1 hole
Sump Depth	None
Discharge rate	0.07 l/s
Outlet	1 No

Result:

Outcome	**Pass**
Critical Storm Duration	11.03 hrs
Hmax	52 mm
Required Volume	2.2 m³
Time to half empty	4.4 hrs
Roof Loading	50 Kg/m²

All results based on input data. Please check that input data has been correctly interpreted.

The Bauder Blue Flat Roof Rainwater Calculation Software will perform calculations in accordance with industry best practice for blue roof design based upon provided data relating to a specific building's dimensions geographical location and the flow rate performance of the selected Bauder rainwater outlet product.

Whilst the information contained herein is to the best of our knowledge true and accurate we specifically exclude any liability for errors omissions or otherwise arising therefrom.

Details practices principles values and calculations should be verified for accuracy and suitability for the required purpose for use.

NOTE: These calculations are valid for a zero fall roof with minimal variation in levels. Any significant variation will affect the volume of water stored and the roofs ability to attenuate extreme rain events. Typically variations in roof level should be less than 0 to +30mm with no back falls. The H-Max is measured from the mean roof level

Bauder Ltd, 70 Landseer Road, Ipswich, IP3 0DH. T: +44 (0)1473 257671 e: info@bauder.co.uk

Date: 30/06/2021 **Revision:** C

Client:	ORS
Project:	Templar Place
Location:	Dublin
Roof Location:	Block C

Roof Details:

BlueRoof	196 m²	x 100 %
Additional Area	0 m²	x 100 %
Effective Area	196 m²	

Storage Details:

Length	196 m
Width	1 m
Depth	112 mm
Porosity	95 %

Rainfall Details - FSR Method:

Return Period	100 years
Climate Change Factor	20 %
r value	0.27
M5-60	16 mm

Summer Storm Profile

Duration	Intensity mm	mm/h	Required storage(m³)
5 min	10.7	128.9	2.1
10 min	16.6	99.8	3.2
15 min	20.8	83.1	4.0
30 min	28.9	57.8	5.6
45 min	34.0	45.4	6.5
60 min	37.8	37.8	7.2
2 hours	47.9	24.0	8.8
6 hours	67.7	11.3	11.3
24 hours	102.4	4.3	12.7

Outflow Details:

Attenuation Control	BlueRoof Outlet
Control	2 holes
Sump Depth	None
Discharge rate	0.16 l/s
Outlet	1 No

Result:

Outcome	**Pass**
Critical Storm Duration	24.72 hrs
Hmax	68 mm
Required Volume	12.7 m³
Time to half empty	11.1 hrs
Roof Loading	64.8 Kg/m²

All results based on input data. Please check that input data has been correctly interpreted.

The Bauder Blue Flat Roof Rainwater Calculation Software will perform calculations in accordance with industry best practice for blue roof design based upon provided data relating to a specific building's dimensions geographical location and the flow rate performance of the selected Bauder rainwater outlet product.

Whilst the information contained herein is to the best of our knowledge true and accurate we specifically exclude any liability for errors omissions or otherwise arising therefrom.

Details practices principles values and calculations should be verified for accuracy and suitability for the required purpose for use.

NOTE: These calculations are valid for a zero fall roof with minimal variation in levels. Any significant variation will affect the volume of water stored and the roofs ability to attenuate extreme rain events. Typically variations in roof level should be less than 0 to +30mm with no back falls. The H-Max is measured from the mean roof level

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Date: 30/06/2021 **Revision:** C

Client:	ORS
Project:	Templar Place
Location:	Dublin
Roof Location:	Podium

Roof Details:

BlueRoof	1300 m²	x 100 %
Additional Area	1934 m²	x 100 %
Effective Area	3234 m²	

Storage Details:

Length	1300 m
Width	1 m
Depth	162 mm
Porosity	95 %

Rainfall Details - FSR Method:

Return Period	100 years
Climate Change Factor	20 %
r value	0.27
M5-60	16 mm

Summer Storm Profile

Duration	Intensity mm	mm/h	Required storage(m³)
5 min	10.7	128.9	34.4
10 min	16.6	99.8	53.1
15 min	20.8	83.1	66.1
30 min	28.9	57.8	91.1
45 min	34.0	45.4	106.3
60 min	37.8	37.8	117.1
2 hours	47.9	24.0	143.9
6 hours	67.7	11.3	182.3
24 hours	102.4	4.3	199.4

Outflow Details:

Attenuation Control	BlueRoof Outlet
Control	10 holes
Sump Depth	80 mm
Discharge rate	2.49 l/s
Outlet	2 No
Flow Per Outlet	1.25 l/s

Result:

Outcome	**Pass**
Critical Storm Duration	21.57 hrs
Hmax	161 mm
Required Volume	199.4 m³
Time to half empty	11.1 hrs
Roof Loading	153.38 Kg/m²

All results based on input data. Please check that input data has been correctly interpreted.

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Appendix E – Green and Blue Roof Details

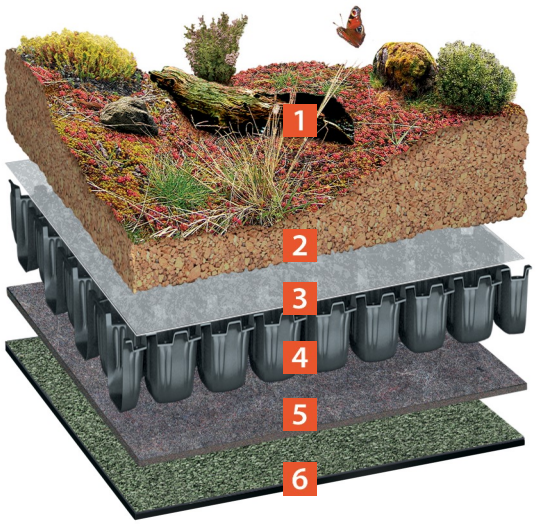
Revision: November 2020 V2

SYSTEM SUMMARY

Bauder Extensive Biodiverse Green Roof Solution

Biodiverse green roof system

This specific type of biodiverse (or brown roof) is designed to incorporate as many types of habitat as possible giving a home and food source to invertebrates and pollinators which in turn are food for many birds and bat species. The roof is typically sown or plug planted with a very broad range of plant species. Additional habitat features such as dead wood, stone/sand piles and dew ponds can also be incorporated into the design. The Bauder "Green Roof Promise" is available for this system.



Product	Description	thickness	Saturated weight
1 Vegetation *	Typically Bauder's range of native seed and plug mixes are used in combination with other habitat features.	Thickness and weight varies with season	
2 Bauder Biodiverse Substrate	Bauder's Biodiverse substrate is a lightweight growing medium tested to BS 8616 and designed to meet GRO and FLL guidelines, these are often contoured to give differing habitats	Varies typically 100-150mm	120-180 Kg/m²
3 Bauder Filter Fleece	Filtration layer that prevents substrate fines from washing into the drainage and water storage layer.	1mm	0.13Kg/m²
4 Bauder DSE 40 Drainage Layer	DSE40 is a 40mm drainage board, holding 13.5 ltr/m2. The light weight board is made from 100% Recycled	40mm	15.3Kg/m² (water filled)
5 Bauder FSM 600 Protection Layer	Is 100% recycled Polyester and polypropylene fibre mix protection layer to prevent mechanical damage to the underlying waterproofing.	4mm	3.6Kg/m²
6 Bauder's Underlying Waterproofing System	Options for Bituminous Membrane, Hot Melt, Single-ply or Cold applied liquid systems.	Not Included	Not Included
Green Roof System Build up (fully saturated, excludes waterproofing & vegetation)		**145-195 mm**	**139-189 Kg/m²**

Please note: All green roofs require water during times of drought. Bauder recommend that the watering and maintenance of this roof is considered and addressed during its design.

*Bauder also produce a biodiverse wildflower blanket solution

Where to specify:

Primarily used when Biodiversity and habitat creation are the primary goals, such as for BREEAM or to comply with a local planning requirement.

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Revision: November 2020 V1

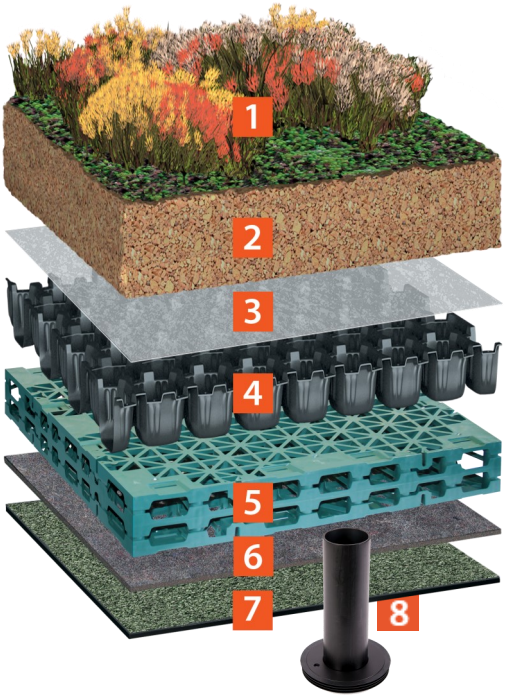
SYSTEM SUMMARY

Bauder Blue Roof - Sedum on substrate system

Green / Blue Roof Solution

Green roofs are an ideal partner for blue roofs as they will naturally delay and reduce rain water run-off from the roof. Green roofs when combined with the blue roof system (Bauder's Attenuation Cell 100) and flow restrictors allow the precise control of the roofs discharge rate and enable large volumes of water to be attenuated at roof level.

A sedum blanket system offers a low maintenance green roof. Laying Bauder's mature SB sedum blanket on a bed of Bauder's extensive substrate gives the system both rooting depth and water retention to make it the most resilient of green roof finishes.



Product	Description	thickness	weight
1 Bauder SB Sedum Blanket *	Typically sown with 17 species of sedums and grown by Bauder for around 12 months before it is harvested.	25mm	24.0Kg/m²
2 Bauder Extensive Substrate	A lightweight, low nutrient growing material tested to BS8616 and manufactured to meet both GRO and FLL guidelines.	80mm	96Kg/m²
3 Bauder Filter Fleece	Filtration layer that prevents substrate fines from washing into the drainage and water storage layer.	1mm	0.125Kg/m²
4 Bauder DSE 20 Drainage Layer	A 20mm drainage board, holding 7.4 ltr/m2. It is manufactured from 100% recycled HDPE.	20mm	8.6Kg/m² (water filled)
5 Attenuation Cell 100	A high strength void element which is 95%+ void. This can hold 95 litres per m2. Allowing it to slowly discharge through the flow restrictor (fitted to the outlet).	100mm	8.06 kg/m2
6 Bauder FSM 600 Protection Layer	Is 100% recycled Polyester and polypropylene fibre mix protection layer to prevent mechanical damage to the underlying waterproofing.	4mm	0.6Kg/m²
7 Underlying Waterproofing System	Bauder's BTGRS Bituminous Membrane or Bauder Hot melt, Bituminous Waterproofing system.	N/A	N/A
8 Bauder Blue Roof Flow Restrictor	A combined restrictor plate and overflow, enabling discharge flow rates to be altered for SUDS requirements.	N/A	N/A
Blue & Green Roof Build up (fully saturated excluding the water held in the Attenuation Cell during a rain event and the underlying waterproofing)		**230mm**	**137Kg/m²**

Note: *Bauder Blue roof systems require bespoke flow rate calculations please contact Bauder's technical department*

*Bauder also produce Wildflower and seeded solutions

When to specify

Where an immediate vegetated finish is required on completion. Bauder SB sedum blanket gives instant ground cover and a low maintenance solution. Ideal for very exposed roof environment.

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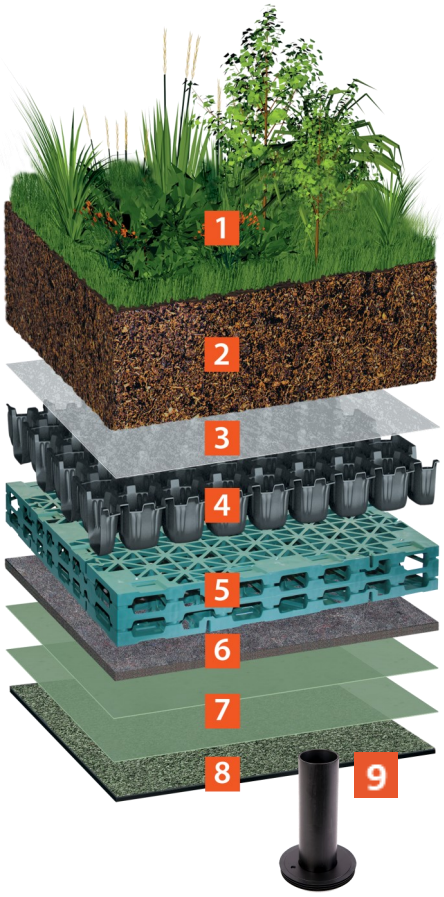
Revision: November 2020 V1

SYSTEM SUMMARY

Bauder Blue Roof—Intensive Landscape System

Blue roof / Intensive Landscape Solution

Intensive landscapes are often specified above blue roofs, the landscaped areas will naturally delay and reduce rain water run-off, this combined with the blue roof void (Bauder's Attenuation Cell 100) and flow restrictors allows precise control of the roofs discharge rate and enable large volumes of water to be attenuated at roof level.
The landscape variations are practically limitless for this accessible green roof with options to create a mixture of both hard and soft landscaping. The system enables lawns, shrubs and trees as well as walkways, paving and terraced areas.



Product	Description	thickness	weight
1 Intensive Planting	Specifically selected for each individual roof, from fine lawns to woody shrubs and trees.	Specifically selected for each individual roof	
2 Intensive Substrate	Light-weight, man-made intensive substrate suitable to support most vegetation types, including trees, shrubs and herbaceous planting.	200mm+	250Kg/m²+
3 Bauder Filter Fleece	Filtration layer that prevents substrate fines from washing into the drainage and water storage layer.	1mm	0.13Kg/m²
4 Bauder DSE 40	DSE 40 is a light weight water storage and drainage layer made of 100% recycled HDPE, 40mm thick.	40mm	15.3Kg/m² (water filled)
5 Bauder Attenuation Cell 100	A high strength void element which is 95%+ void. This can hold 95 litres per m2. Allowing it to slowly discharge through the flow restrictor (fitted to the outlet).	100mm	8.06 kg/m²
6 Bauder FSM1100 Protection Layer	Polyester and polypropylene fibre mix protection layer to prevent mechanical damage to the underlying waterproofing.	8mm	7.1Kg/m²
7 Bauder PE Foil x 2 Separation Layer	Polyethylene foil separation and slip layer manufactured from recycled granules.	0.4mm	0.38kg/m²
8 Underlying Waterproofing system	Bauder's BTGRS Bituminous Membrane or Bauder Hot melt, Bituminous Waterproofing system.	N/A	N/A
9 Bauder Blue Roof Flow Restrictor	A combined restrictor plate and overflow, enabling discharge flow rates to be altered for SUDS requirements.	N/A	N/A
Blue & Green Roof Build up (fully saturated excluding the water held in the Attenuation Cell during a rain event and the underlying waterproofing)		**349mm +**	**281Kg/m² +**

Note:
Bauder Blue roof systems require bespoke flow rate calculations please contact Bauder's technical department.

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