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Engineering Services Report

Proposed Strategic Housing Development, Waterfront South Central ABP 306158-19

North Wall Quay, Dublin 1

Client: Waterside Block 9 Developments Limited

Job No. R064

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ENGINEERING SERVICES REPORT

PROPOSED STRATEGIC HOUSING DEVELOPMENT, WATERFRONT SOUTH CENTRAL ABP 306158-19, NORTH WALL QUAY, DUBLIN 1

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R064 ESR 2021.01.05 SHD

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1.0 INTRODUCTION

Cronin & Sutton Consulting Engineers (CS Consulting) have been commissioned by Waterside Block 9 Developments Limited to prepare an Engineering Services Report to accompany a planning application for a proposed Strategic Housing Development at North Wall Quay, Dublin 1, within City Block 9 as identified in the *North Lotts and Grand Canal Dock Planning Scheme 2014*.

This report assesses the proposed development under the following headings:

- Foul Drainage Infrastructure;
- Stormwater Drainage Infrastructure; and
- Potable Water Infrastructure.

In preparing this report, CS Consulting has made reference to the following:

- Dublin City Development Plan 2016–2022;
- Dublin City Strategic Flood Risk Assessment, 2016 – 2022;
- Regional Code of Practice For development works, Version 6;
- Irish Waters Code of Practice for Water Infrastructure;
- Irish Waters Code of Practice for Wastewater Infrastructure;
- Greater Dublin Strategic Drainage Study;
- North Lotts and Grand Canal Dock Strategic Development Zone.

The Engineering Services Report is to be read in conjunction with the engineering drawings and documents submitted by CS Consulting and with the various additional information submitted by the other members of the design team.

2.0 SITE LOCATION AND PROPOSED DEVELOPMENT

2.1 Site Location

The site of the proposed development forms part of City Block 9 within the *North Lotts and Grand Canal Dock SDZ Planning Scheme, 2014* and is bounded by Mayor Street Upper to the north; North Wall Quay to the south; North Wall Avenue to the east; and Castleforbes Road to the west. City Block 9 has a total area of approx. 1.95ha and is located in the administrative jurisdiction of Dublin City Council. The site of the SHD application is 1.1ha as shown in figure 2.

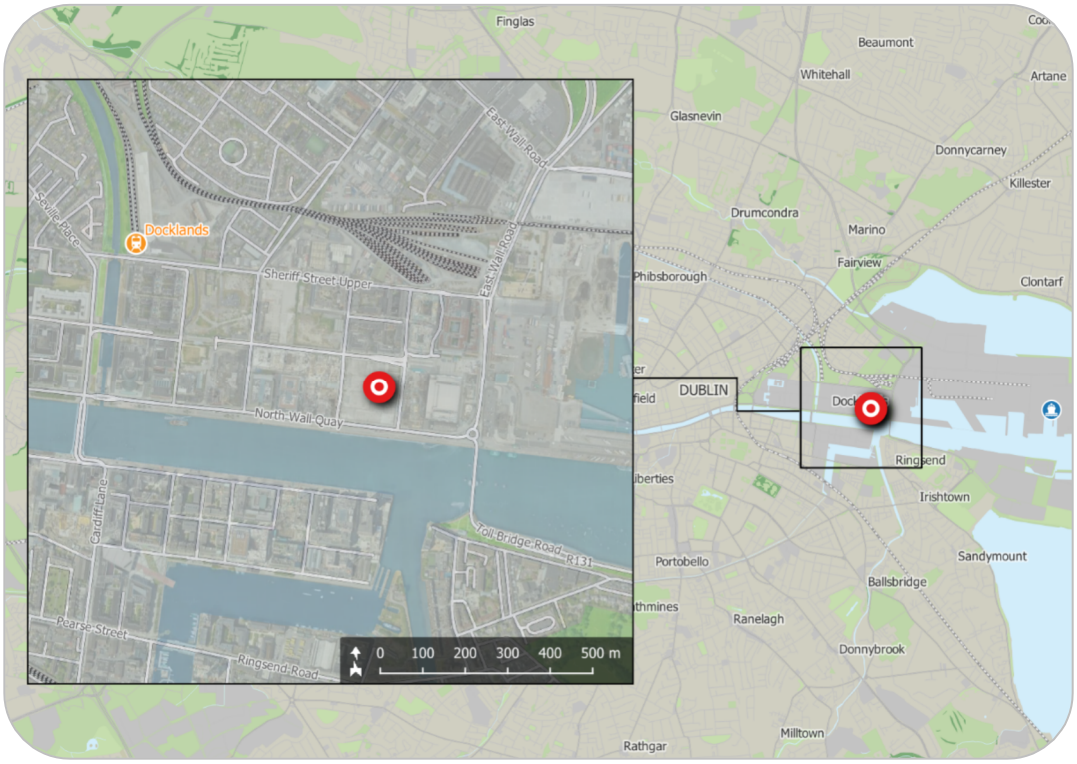

Figure 1 – Location of proposed development site
(*map data & imagery: EPA, OSi, OSM Contributors, Google*)

The location of the proposed development site is shown in Figure 1 above; the indicative extents of the development site, as well as relevant elements of the surrounding road network, are shown in more detail in Figure 2.

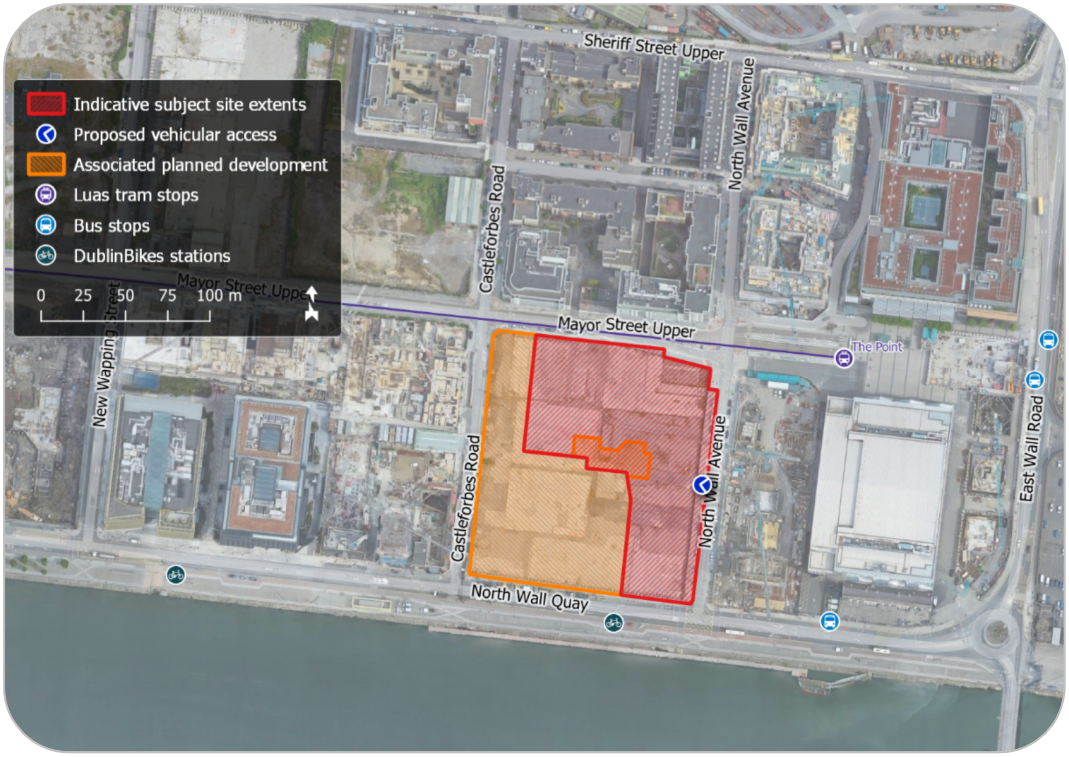

Figure 2 – Site extents and environs
(*map data & imagery: NTA, OSM Contributors, Google*)

2.2 Existing Land Use

The subject site is brownfield and predominantly occupied by existing hardstanding areas. The subject lands have no water courses passing through it and the average ground level is 4.00mAOD. the site falls from south to north.

Proposed Development

The scheme, totalling 125,388 sq m, provides 22,499 sq m at basement levels, with 102,889 sq m from ground upwards. The development will consist of the:

1. Construction of 1,005 No. residential units (with balconies and winter gardens) arranged in 3 No. blocks ranging in height from 8 No. storeys to 45 No. storeys over a triple-level basement, the former comprising: Block A (8-

14 No. storeys (with extended core to access roof level); with an apartment mix of: 116 No. 1-bed; and 92 No. 2-bed; with landscaped terraces at Level 1 (south east elevation), Level 8 (south west elevation), Level 11 (south west elevation) and Level 14 (north east elevation)); Block B (8-41 No. storeys (with extended core to access roof terrace); with an apartment mix of: 172 No. 1-bed; and 247 No. 2-bed; with landscaped terraces at Level 5 (south west levation), Level 8 (north west elevation and south west elevation), Level 11 (north elevation), Level 12 (west elevation), Level 13 (east elevation), Level 14 (east elevation), and at Level 41 (roof level)); and Block C (11-45 No. storeys (with extended core to access roof level); with an apartment mix of: 207 No. 1-bed; 168 No. 2-bed; and 3 No. 3-bed units; with landscaped terraces at Level 11 (north elevation), Level 24 (south elevation), Level 32 (south elevation), and Level 45 (roof level), incorporating a public viewing deck at Levels 44 and 45).

2. Provision of ancillary residential amenities and support facilities including: live/work suites (321 sq m), a gym/spa reception (52 sq m), a residents' games room (91 sq m), a residents' common room (110 sq m), a residents-only social space (193 sq m), a management office (96 sq m), a security office (50 sq m), concierge spaces (GFA of c. 381 sq m) all located at ground floor level; a residents' games room (90 sq m) located at Level 1 of Block B; a residents' common room (86 sq m) located at Level 14 of Block B; a residents' wellness club and common room (408 sq m) located at Level 24 of Block C;

3. Construction of triple height basement which will comprise double basement with mezzanine plant level (total basement area 22,499 sq m), accommodating: waste storage areas (659 sq m), plant rooms (4,228 sq m), maintenance / management offices (GFA of 92 sq m), residents' courier / parcel rooms (GFA of 210 sq m), residents' laundry rooms (GFA of 138 sq m), ancillary residential storage (GFA of 291 sq m), residents' WCs (65 sq m), a residents' gym / spa (1,529 sq m) and ancillary gym storage room (100 sq

m), residents' screening rooms (240 sq m), a residents' indoor plant cultivation room (356 sq m), 176 No. car parking spaces, 10 No. motorcycle parking spaces and 1,693 No. bicycle parking spaces, with vehicular access provided by ramp from North Wall Avenue.

4. Provision of "other uses" as defined by the Planning and Development (Housing) and Residential Tenancies Act 2016, comprising: a childcare facility (450 sq m), a restaurant (110 sq m), an indoor Farmer's Market/foodhall (299 sq m), an external market area, a winter garden/seating area (130 sq m), and 3 No. café units (110 sq m, 167 sq m and 261 sq m, respectively), all located at ground floor level; a restaurant (609 sq m) located at Level 32 of Block C; office use (1,894 sq m) from Floor Level 41 to 43 inclusive at Block C; and a public bar / function room (407 sq m) located at Level 44 of Block C. The total area of "other uses" provided is 4,307 sq m.

5. Provision of a pocket park and new pedestrian lanes from North Wall Quay, North Wall Avenue and Mayor Street Upper to the center of the site.

6. All enabling and site development works, landscaping (including living walls), lighting, services and connections, waste management and all other ancillary works above and below ground including the use of existing secant piling permitted under Reg. Ref. DSDZ3779/17 and DSDZ3780/17 (as amended by DSDZ3042/19

3.0 FOUL DRAINAGE

3.1 Existing Foul Arrangements

Dublin City Council's drainage records indicate:

- A 450mm diameter vitrified clay combined sewer to the south, flowing east to west on North Wall Quay, into a pumping station on Castleforbes Road, which a 150mm diameter cast iron is place on Castleforbes Road towards a 225mm diameter vitrified clay foul sewer on Mayor Street Upper;
- Discussions with Irish Water & Dublin city Council indicates that the pumping station on Castleforbes Road is not current in operation,
- A 375mm diameter concrete foul sewer to the north, flowing east to west on Mayor Street Upper, connects into a 1420mm concrete on Castleforbes Road, which is also direct to the pump station on Castleforbes Road.

Previous granted planning application (DSDZ3780/17) also indicates a 300mm diameter foul sewer flowing south to north on North Wall Avenue.

See **Appendix A** for Irish Water Records.

3.2 Proposed Outfall

All foul effluent generated from the proposed development from the uppers floors of all proposed block apartments shall be collected in separated foul pipes and flow by gravity into the existing 225mm diameter foul sewer on North Wall Avenue via a new connection. Refer to drawing **R064/201**.

3.3 Proposed Effluent Generation

The Completed foul system will not no offered to be vested to Irish Water. The proposed development is to consist commercial & retail space of 4309m^2 gross floor area in addition to 1005No. apartments.

- For the commercial space:

  ⇒ 4309m^2 ÷ 7.5 m^2/person = 574 persons

  ⇒ 574 persons x 100l/person/day = 57,440 l/day = 57.44m^3/day

  ⇒ 0.665 l/s Average effluent generation;

  ⇒ 1.994 l/s Peak effluent generation (5 times average for a population between 1,001 and 5,000).

- For the apartments:

  ⇒ 1005 X 446 l/day/unit = 44,8230 l/day: 448.23 m^3/day

  ⇒ 5.18 l/s Average effluent generation;

  ⇒ 15.56 l/s Peak effluent generation (3 times average for a population between 1,001 and 5,000).

  Overall effluent generation:

  ⇒ Average: 5.845 l/sec (5.18 + 0.665)

  ⇒ Peak: 17.554 l/sec (15.56 + 1.994)

Therefore, the proposed development will generate wastewater in order of 505.67 m^3/day, which equates to:

⇒ 6.51 l/sec Average flow; and

⇒ 19.548 l/sec Peak Flow.

3.4 Proposed Foul Drainage Arrangements

The drainage network for the development will be in accordance with Part H of the Building Regulations and to the requirements and specifications of Irish Water.

As part of the development three levels of basement are proposed. These would provide car parking, bicycle storage, bin storage, laundry facilities, relaxation zones/studios and residents health club and spa. Foul generated in the basement shall collected and then flow by gravity to a pump sump located at the lowest level, where all foul effluent shall be pumped via a rising main to the external gravity network.

A Pre-Connection Enquiry has been submitted to Irish Water based on the foul flows for an initial proposed number of 1005No. apartment units and 55,538 m^2 retail unit and (The proposed development is to consist commercial & retail space of 4309m^2 gross floor area in addition to 1005 No. apartments) we have received a response acceptance, see **Appendix B** for a copy of the confirmation of feasibility letter & letter of Design Acceptance.

The proposed foul water drainage infrastructure and routing plan is shown on drawings **R064-201, R064-202** and **R064-203** included with this submission and the proposed connection to the Irish Water Network can be accommodated.

4.0 STORMWATER DRAINAGE

4.1 Existing Storm Water Arrangements

Dublin City Council's drainage records indicate:

- A 225mm diameter stormwater sewer and a 225-375mm diameter concrete stormwater sewer to the south, flowing east to west on North Wall Quay connecting with a 1090mmx920mm brick stormwater sewer, flowing north to south on Castleforbes Road, which flows into River Liffey.

- A 225mm diameter concrete stormwater sewer to the north, flowing east to west on Mayor Street Upper into the 1090mmx920mm brick stormwater sewer;

- A 450mm diameter vitrified clay combined sewer to the south, flowing east to west on North Wall Quay, into a pumping station on Castleforbes Road, which a 150mm diameter cast iron is place on Castleforbes Road towards a 225mm diameter vitrified clay foul sewer on Mayor Street Upper;

Previous granted planning application (DSDZ3780/17) also indicates 2No. 225mm diameter storm water sewer flowing south to north on North Wall Avenue and a small section of 225mm diameter storm water sewer flowing north to south at the junction between North Wall Avenue.

4.2 Proposed Storm Water Arrangements

The proposed new storm water drainage arrangements will be designed and carried out in accordance with:

i) The Greater Dublin Strategic Drainage Study Volume 2,
ii) The Greater Dublin Regional Code of Practice for Drainage Works,

iii) BS EN – 752:2008, Drains & Sewer Systems Outside Buildings,

iv) Part H, Building Drainage of The Building Regulation.

4.3 Proposed Attenuation Arrangements

In accordance with the requirements of the *North Lotts and Grand Canal Dock SDZ Planning Scheme, 2014* all new developments in the SDZ are to limit their storm water discharge to 2l/s/Ha. The sites area of 1.10Ha and it has been considered as that the entire site area shall be hardstanding.

The attenuation volume to be retained on site for a 1–in–100-year extreme storm event, increased by 20% for the predicated effects of climate change indicates that a volume of 1024m^3 will be required to be provided.

Therefore, all storm water events will restrict flow from the development to 2.2l/s by way of using a flow control device. The attenuation volume will be provided in an attenuation tank sized to retain storm volumes predicated.

See CS Consulting Drawing **R064-201, R064-202 and R064-203** for drainage details, & **Appendix C** which contains the attenuation calculation, the SAAR Value & the Attenuation calculations for the1-in-100 storm events.

4.4 Proposed Sustainable Urban Drainage System, SuDS

A further requirement of the local authority is to adopt, where achievable elements into the design which conform to the general principles of Sustainable Urban Drainage systems. The aim is to increase the overall quality of storm water before it leaves the site and enters the public network. To achieve this a number of SuDS proposals are being implemented.

i) The use of green roofs on applicable roof space for the apartment blocks is proposed. Please refer to Landscape Layout for proposed details;

ii) The use of low water usage sanitary appliances to reduce the reliance on potable water supplies;

iii) Where feasible local footpaths, hardstanding areas will be directed into tree pits or landscaped areas to allow for local infiltration;

iv) Road gullies will be trapped to allow for the removal of grit and other potentially harmful material entering the storm network.

Interception Storage shall be provided via the use of the green roofs on the apartment buildings and by the use of local drainage into landscaped areas & tree pits where applicable.

5.0 POTABLE WATER

5.1 Existing Potable Water System

Records obtained from Dublin City Council indicate a 300mm ductile public watermain adjacent to the development site on North Wall Avenue. See **Appendix A.**

5.2 Proposed Potable Water System

The potable water network will not be vested to Irish Water. The proposed development is to consist commercial & retail space of 4309m^2 gross floor area in addition to 1005No. apartments.

Based on Irish Water guidelines, the water demand will be shall be:

- For the commercial space:
  - ⇒ 4309m^2 ÷ 7.5 m^2/person = 574 persons
  - ⇒ 574 persons x 100l/person/day = 57,400 l/day = 57.40 m^3/day
  - ⇒ 0.664 l/s Average water demand;
  - ⇒ 1.993 l/s Peak water demand (5 times average water demand for a population between 1,001 and 5,000).
- For the apartments:
  - ⇒ 1005 X 405 l/day/unit = 407,025 l/day: 407.03 m^3/day
  - ⇒ 4.71 l/s Average water demand;
  - ⇒ 14.13 l/s Peak water demand (3 times average water demand for a population between 1,001 and 5,000).

Overall potable demand:

⇒ Average water demand: 5.374 l/sec (4.71 + 0.664)

⇒ Peak water demand: 16.123 l/sec (14.13 + 1.993)

A Pre-Connection Enquiry has been submitted to Irish Water based on the water demand for an initial proposed number of 1005 No. apartment units and 55,538 m^2 retail units (The proposed development is to consist commercial & retail space of 4309 m^2 gross floor area in addition to 1005 No. apartments) and we have received a response, see **Appendix B** for a copy of the confirmation of feasibility letter.

The proposed watermain infrastructure and routing plan is shown on **R064-203** included with this submission.

Appendix A: Dublin City Council Records

UISCE ÉIREANN : IRISH WATER

Legend

- Unknown Meter ; Other Meter
- PRV
- Sluice Valve Open
- Sluice Valve Closed
- Butterfly Valve Open
- Sluice Valve Closed
- Scour Valves
- Double Air Control Valve

Water Hydrants

Hydrant Function

- Fire Hydrant
- Telemetry Kiosk
- Cap
- Other Fittings

Water Distribution Mains

Owned By

- Irish Water
- Irish Water
- Pump Station
- Gravity - Combined
- Gravity - Foul
- Gravity - Overflow
- Pumping - Combined
- Pumping - Foul
- Gravity - Foul

Storm Manholes

Manhole Type

- Standard
- Lamphole
- Other; Unknown

Storm Discharge Points

Discharge Type

- Outfall
- Surface Gravity Mains
- Surface Gravity Mains Private

Storm Inlets

Inlet Type

- Gully

1:500 at A0

Last edited: 03/10/2018

Metres

0 25 50 100

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Appendix B: Irish Water Confirmation of Feasibility & Design Acceptance Letter

Gessica Silva
CS Consulting
19-22 Dame Street
Dublin 2
Dublin
Ireland
D02E267

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

7 November 2019

Dear Gessica Silva,

Re: Connection Reference No CDS19003611 pre-connection enquiry -
Subject to contract | Contract denied

Connection for 1,005 apartment units and 55,538m^2 retail unit at North Wall Quay, Mayor Street Upper, Dublin.

Irish Water has reviewed your pre-connection enquiry in relation to a Water & Wastewater connection at North Wall Quay, Mayor Street Upper, Dublin.

Based upon the details that you have provided with your pre-connection enquiry and on the capacity currently available in the network(s), as assessed by Irish Water, we wish to advise you that, subject to a valid connection agreement being put in place, your proposed connection to the Irish Water network(s) can be facilitated.

Water:

- New connection to the existing network is feasible without upgrade.

Wastewater:

- Separate storm and foul water connection services should be provided for the Development.
- New connection of foul water into the existing combine sewer network is feasible without upgrade.
- The storm water connection into the existing storm water sewer should be agreed with Dublin City County Council Drainage Division.

Strategic Housing Development
Irish Water notes that the scale of this development dictates that it is subject to the Strategic Housing Development planning process. Therefore:

- In advance of submitting your full application to An Bord Pleanala 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. All infrastructure should be designed and installed in accordance with the Irish Water Codes of Practice and Standard Details.
- You are advised that this correspondence does not constitute an offer in whole or in part to provide a connection to any Irish Water infrastructure and is provided subject to a connection agreement being signed and appropriate connection fee paid at a later date.

- All infrastructure should be designed and installed in accordance with the Irish Water Codes of Practice and Standard Details.

A connection agreement can be applied for by completing the connection application form available 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.

If you have any further questions, please contact Marina Zivanovic Byrne from the design team on 01 89 25991 or email mzbyrne@water.ie. For further information, visit **www.water.ie/connections.**

Yours sincerely,

Maria O'Dwyer

Connections and Developer Services

Gessica Silva
CS Consulting
19-22 Dame Street
Dublin 2
Dublin, Ireland D02E267

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

10 November 2020

Re: Design Submission for North Wall Quay, Mayor Street Upper, Dublin (the "Development")
(the "Design Submission") / Connection Reference No: CDS19003611

Dear Gessica Silva,

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: Marina Zivanovic Byrne
Phone: 01 89 25991
Email: mzbyrne@water.ie

Yours sincerely,

Yvonne Harris

Yvonne Harris
Head of Customer Operations

Appendix A

Document Title & Revision

- R064-006 Watermain Layout
- R064-004 Drainage Ground Level
- R064-005 Drainage Basement

Standard Details/Code of Practice Exemption: N/A

*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.

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Appendix C: Green Roof Specification

BAUDER

GREEN ROOFS

BIODIVERSE, EXTENSIVE AND INTENSIVE SYSTEMS

OUR COMPANY

Who We Are

Bauder is one of Europe's leading manufacturers of flat roof waterproofing membranes and insulation products that has been owner-operated for over 150 years across 13 countries. We have an enviable reputation and track record for delivering the highest quality materials and service through supplying and project managing the installation of premier flat roof systems.

Our comprehensive portfolio of flat roof waterproofing systems, green roofs and photovoltaic energy delivers an extensive range of solutions to meet individual project needs without compromise.

"Manufacturing the highest quality roofing materials is one thing, but here at Bauder it is our total commitment and passion to work closely together with our clients to successfully deliver every product to the highest possible standard, that sets us above the rest."

Andrew Mackenzie
Managing Director
Bauder Ltd

What We Do

Bauder is fully committed to providing a complete service with an unrivalled level of support on all roofing projects, whether it's for a new build project or the refurbishment of an existing building.

Technical Expertise

Our large team of regionally based technical managers and site technicians will be on hand throughout the process, from specification design through to inspection of the installation and project completion to ensure a defect free finish.

Our technical department is the envy of the industry, providing a comprehensive and superior service with bespoke specifications individual to each project. Our support services ensure that products and materials all arrive on site when required providing an efficiency that all our clients demand.

Assured Quality

To ensure a consistent and proficient service, Bauder approved contractors are the only people fully trained and certified to install our products. We only approve contracting companies that possess the technical expertise and the organisational capacity to maintain an efficient and well-run site.

We have always operated a policy where we train and approve the individual installer and not just the company they work for. By taking installers with proven experience and demonstrating the techniques particular to our system, we can ensure the quality of workmanship that meets our clients' expectations.

Every operative receives an identity badge providing proof of competence, which is available for inspection at all times.

Guaranteed Satisfaction

Bauder is noted throughout the industry for the range of guarantees we offer that can cover design, products and installation. We unreservedly issue our guarantees on all projects because we monitor quality every step of the way from manufacture to finished installation.

GREEN ROOF SYSTEMS











Committed to utilising the very latest manufacturing technology, Bauder invests in a programme of continuous research and development to ensure every product and installation is ahead of industry standards, and that the needs of the environment are always kept in focus.

GREEN ROOF SYSTEMS

Each green roof brings back a piece of nature and on some buildings a recreational space can be created for people to access and enjoy.

A Bauder green roof combines the finished planting scheme and all its supportive components with a high quality and secure waterproofing system to give you the best results every time.

Designing a green roof can be complex and your local technical manager is best placed to advise you on the implications your green roof will have on the building and its construction as well as the ongoing maintenance of the vegetation and roof.

We have produced a design considerations guidw for green roofs which can be downloaded from our website.

bauder.co.uk/technical-centre/design-guides

Recreational Gardens, Terraces and Spaces Accessed Intensive Green Roofs

Rooftops where the design may include flowerbeds, lawns, shrubs and trees intermixed with paths, driveways and patios. The combinations of finishes will impact on the design, construction, drainage and components used to deliver to each element's requirements.

Sedum System Non-Accessed Extensive Green Roof

Lightweight, all in one vegetation system comprising mature sedums pre-grown on an integrated multifunctional water retention and filter layer with 20mm of extensive substrate. The system has been developed for use directly over the waterproofing without the need for a secondary layer of substrate.

Substrate Roofs
Non-Accessed Extensive Green Roofs

Substrate green roofs are designed to be comparatively lightweight, work towards providing some storm water mitigation and support a wide variety of low maintenance plant species which are generally self-sustaining, and wind, frost and drought tolerant. They are primarily used for their ecological benefits and not intended for general access or for leisure purposes.

Biodiverse Habitats

A natural living habitat to encourage a wider spread of birds, insects and plant species into the area and generally replicates the ecological environment of the site upon which construction development is taking place, particularly if a Biodiversity Action Plan (BAP) is to be met with priority species.

Precultivated Vegetation Blankets

Lightweight option with precultivated vegetation for instant planting of the roof. Two options are available; XF118 wildflower blanket contains a mixture of 24 species of annual and perennial native wildflowers and XF300 incorporates perennial sedums with some grasses and mosses.

Plug Planted Systems

Individually planted roof usually incorporating sedums, grasses, herbs, succulents and wildflowers. These can be planted to accommodate location and expected weather conditions, colour or layout designs to the client's preference.

Seeded Roofs

The vegetation is grown and colonised entirely on the roof from seed with full plant establishment taking between 18-24 months. The plant selection can incorporate native and priority species to gain BREEAM points and meet a BAP.

BioSOLAR Roofs

Combining a substrate green roof with a solar PV array where the substrate and vegetation provide the ballast for the installation. The mounting system raises the modules above the substrate to allow liberal growing room for the plants, which are specified explicitly so that their maximum height does not block light to the array that would otherwise reduce the efficiency of the panels.

ENVIRONMENTAL CREDENTIALS

Aiding Biodiversity and Meeting a Biodiversity Action Plan (BAP)

A green roof can provide a natural habitat specifically designed to support a particular species of plant or wildlife. Created for the local ecology, in which vegetation will establish and provide a home for smaller elements of wildlife as well as insects and invertebrates. The provision of a healthy habitat in a place that could otherwise be empty encourages wildlife to remain in the area, provides support for the natural colonisation of locally arising plants, birds and small animals, boosting a wider spread of species in the area.

Our vegetation options include our XF118 wildflower blanket and Flora Seed Mixes, which are all specifically devised to meet BAP criteria through their inclusion of species within the RHS 'Perfect for Pollinators' and Flora Locale 'native origins criteria'.

Storm Water Management

Green roofs are one method of retaining rainwater by inception storage in the substrate, drainage/reservoir board and plants. This water is then used by the vegetation or evaporates back into the atmosphere.

Improving Air Quality of Local Surroundings

Localised air quality is improved as the vegetation assists in reducing both gaseous pollutants and dust particles by removing a proportion of them from the immediate environment, effectively purifying the air.

Urban Heat Island Effect

The urban heat island effect is reduced because the substrate of a green roof will absorb some of this heat and the natural evaporation of water from both the plants and soil helps to cool and humidify the air, thus lowering the ambient air temperature.

Recycled Content of Green Roof Components

Many recycled or waste materials are used within our green roof build ups to enable us to provide environmental solutions to the industry.

Water Retention and Drainage Layers

Our DSE 20, 40 and 60 boards are manufactured from recycled high density polyethylene.

Protection Layers

Our protection layers FSM600 and FSM1100 for extensive green roofs are made from a mixture of two recycled materials, reground polyester and polypropylene fibre.

Our ProMat for intensive green roofs is made of granulate from recycled shredded tyres.

Our Ecomat product is created from mechanically bonded recycled Polyester clothing and fabric.

Substrates and Growing Mediums

Our substrates are based around recycled crushed brick and composted organic material.

Separation and Slip Layer

Our PE Foil is manufactured from recycled polyethylene granulate.

Recycling and Reusing Green Roof Components

The level of recycled content within our components clearly demonstrates that these products are then easily returned to the conventional recycling processes at the end of their required lifespan.

BREEAM 2014 Accreditation

The BREEAM assessment method evaluates the sustainability of built environments through the different stages of their life cycle. The schemes include:

Our green roofs have the potential to count towards these sections of BREEAM:

Land Use and Ecology

LE 03 Mitigating Ecological Impact.
Criteria 1&2
Potential credit 1

LE 04 Enhancing Site Ecology.
Criteria 1&2
Potential credit 1

LE 05 Long Term Impact on Biodiversity
Criteria 8
Potential credit 1

Our green roofs can be specified with our XF118 native species wildflower blanket or Bauder Flora seed mixes 3,5,7,9,11 which are accredited by the RHS as 'Perfect for Pollinators' and certified by Flora Locale.

Health and Wellbeing

Hea 05 Acoustic performance
Criteria 2
Potential credit 1

Our XF301 sedum system on a metal deck has been tested in accordance with BS EN ISO 140-18: 2006. The sedum plants intercept the impact of rainfall and mitigate the noise so that a figure of 33.5 dB was achieved.

Management

Man 04 Stakeholder Participation
Criteria 12
Potential credits 1

Green roofs for fully accessible recreational use provide facilities that can be shared by the relevant parties.

Energy

Ene 04 Low and Zero Carbon Technologies
Compliance CN10
Potential credits 2

A Bauder BioSOLAR Green Roof PV array creates local energy generation from renewable sources which can supply a compliant

TECHNICAL CREDENTIALS

Adopting Standards
Throughout Europe, the standards most widely recognised as comprehensively covering green roofs are those of the Forschungsgesllschaft Landschaftsentwicklung Landschafttsbau (FLL), which is a research society for the development of the landscape.

We have adopted these well respected standards, which cover all aspects of waterproofing, root protection, landscaping, installation and maintenance and we will continue to do so whilst also working in conjunction with the GRO Code of Best Practice for the UK.

Protection of the Waterproofing
A green roof protects the waterproofing from UV damage and thermal movement. Research has shown that the life expectancy of the waterproofing is significantly extended and in many cases may last the estimated design life of the building, which can eliminate future replacement costs.

Fire Testing
Bauder XF301 was the first sedum blanket in the UK to be awarded an EXT. F.AA fire rating by the Building Research Establishment.

The full XF 301 sedum system, including the vegetation waterproofing, and insulation was tested, and awarded an EXT. F.AA.

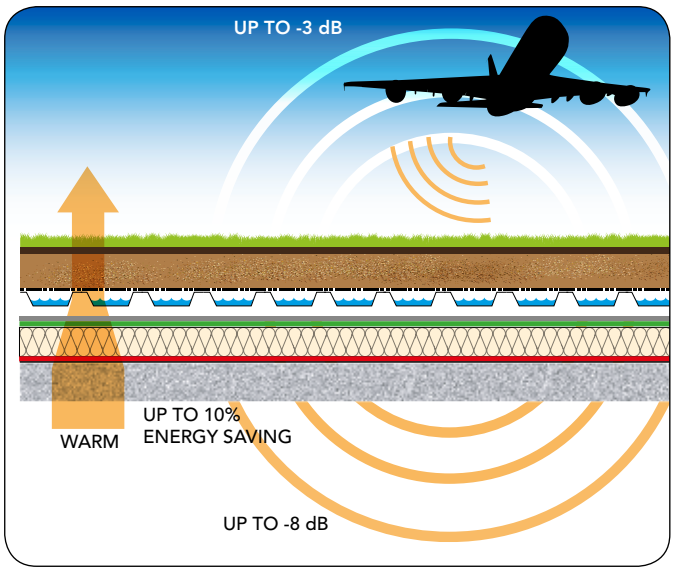
The same system was tested in a sloped orientation to ensure that the fire behaviour is not affected by roof slope and is also classified EXT.S.AA.

Increased Efficiency and Output of a BioSOLAR PV Array
A green roof helps to maximise solar energy generation as the vegetation preserves ambient rooftop temperatures, keeping the modules at optimal output. The cooling effect increases panel output by up to 5-7%.

Productivity in the Workplace
Research has shown that people working in offices that overlook green spaces have a higher productivity and a reduction in stress levels than those with a poorer outlook on a hard, impervious buildings.

Health
Hospitals are greening overlooked roofs or incorporating rooftop garden areas for the benefit of patients as they find that this speeds recovery.

Reduction of external noise within the building
Green roofs have excellent acoustic qualities for both external sound (up to 3dB) and internal noise (up to 8dB). This can prove to be both economically and environmentally effective when used on structures close to airports or industrial developments.



Reduced Building Running Costs
The enhanced thermal performance provided by a green roof provides a more balanced temperature within the building. This reduces heating costs in the winter and air conditioning expenses during the summer.

Reduced Lifecycle Costs
The main reduction in lifecycle costs comes from the green roof providing protection from the damaging effects of the weather, which effectively 'ages' the waterproofing, thus the time span between replacement is extended significantly, and in many cases replacement will become unnecessary.

Aid to Planning Consent
Many local authorities favour planning proposals that incorporate green roofs within the application, particularly if it meets their policies towards a sustainable environment or supports priority species.

Offset Construction Costs
In large construction projects a green roof can mean that storm water holding tanks are reduced in size or no longer required, as the roof itself will retain a proportion of the rainfall.

Creates an Amenity Space
The roof is often an under utilised asset of a building, as it offers the unique potential to replace the land lost to the construction as reusable space. Large roof areas covering underground car parks can provide parkland or sports facilities.

Increases Property Value
As an additional dimension is created, the property will maximise the potential available for the sites, and so increase the value.

RECREATIONAL GREEN ROOFS

Intensive green roofs provide recreational gardens and amenity spaces at roof level, with all the benefits usually associated with ground level landscaping. Typically they will feature landscapes combining shrubs, perennial and herbaceous plants, grassed areas, trees or hard landscaping for foot or vehicular traffic.

When to Specify

Maximising the full potential of a building by utilising all available space to deliver leisure spaces. Typically created on new build roof constructions, over underground car parks and podiums. The landscape variations are practically limitless for both design and use.

Key Features

These features are in addition to those associated with all green roofs.

- Assists in maximising the building's potential.
- Provides valuable recreational space.
- Offers storm water management benefits due to the depths of substrate used, particularly when specified in conjunction with permeable paving.
- Increases the overall value of the property.

The plants used make a heavy demand on the green roof and will require maintenance, irrigation and management throughout the year to ensure the upkeep of the landscape and allow the vegetation to flourish.

It is important to first establish the landscape finish you are looking to achieve. There is little to restrict the scope for design, other than the overall weight of the system dictating the construction of the supporting structure and the height and level of exposure of the roof.

All our green roof systems meet with FLL Guidelines

Specification Support

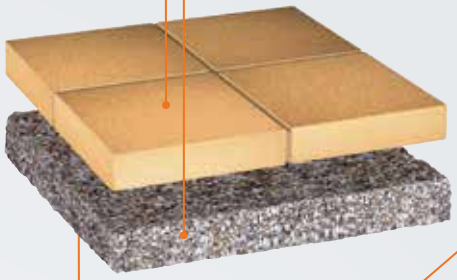
Specification downloads:
www.bauder.co.uk/technical-centre

Telephone helpline:
0845 271 8800

Example System Configuration

Our lightweight substrates combined with specially developed water storage and drainage components all ensure that the modern green roof can replicate a traditional landscape at roof level at only a fraction of the weight and with a substantially shallower build up.

It is crucial that an integrated approach is taken to the design and specification of both the waterproofing and landscaping components, so that the desired outcomes are achieved. We can work with you from the earliest design stage to ensure that your green roof project is successful.



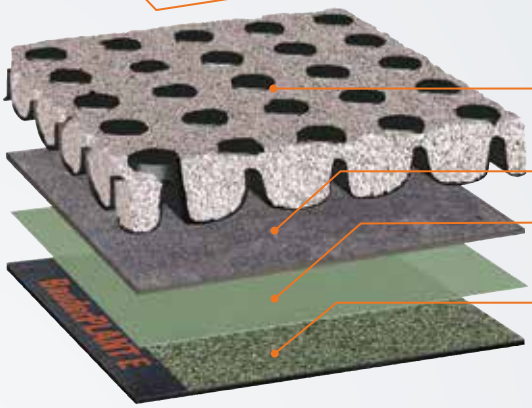
Paving/Pebble Ballast

Granite Chipping Base

Vegetation
specifically selected for each individual roof, from turf to trees.

Bauder Intensive Substrate
lightweight growing medium manufactured to meet FLL guidelines.

Bauder Filter Fleece
filtration layer that prevents substrate fines from washing into the drainage layer.



Bauder DSE60
60mm thick, water storage and drainage layer, infilled with Bauder Mineral Drain for structural stability.

Bauder FSM 1100 Protection Mat
recycled polyester and polythene fibre mix.

Bauder PE Foil
polythene foil separation and slip layer manufactured from recycled granules.

Bauder Plant E or AP2
root resistant, SBS modified bitumen membrane reinforced with 250g/m^2 recycled spunbond polyester.

SUBSTRATE GREEN ROOFS

These extensive green roof systems are primarily used for their ecological benefits or aesthetic appearance rather than for general access or for leisure purposes.

A traditional extensive substrate green roof system provides a depth of growing medium usually around 80-120mm to allow for the specification of a broader range of species and planting schemes. The plants are generally low maintenance, wind, frost and drought resistant and can be installed by different methods, including plug planting, vegetation mat and seeding.

When to Specify

The system is lightweight and offers the advantage of a bespoke vegetation finish with a substrate depth to support the plants, suitable for new build construction and retrofit or refurbishment projects.

Key Features

- Comparatively lightweight.
- Plants chosen to suit the project and location.
- Significant scope for creating a natural habitat to encourage plants and small wildlife to remain, so aiding biodiversity.
- Can be designed specifically to support particular flora and fauna.
- Aid to planning consent as biodiversity roofs help to meet local authority policies towards a sustainable environment.
- Aid to meeting BREEAM requirements of a development through points secured by the use of accredited native species plants.
- Develop another dimension through a unique opportunity to maximise the potential of the building to support the environment.
- Good levels of rainwater attenuation, depending on substrate depth.
- Cost effective on large roof areas.

Creating a Biodiverse Roof

This specific type of green or 'living' roof typically either tries to replicate as closely as is practical the ecological environment of the site where construction has taken place or sets out to create a natural habitat to support a variety of flora and fauna so aiding biodiversity.

When to Specify

Biodiverse roofs can be created on new build construction and refurbishment or retrofit projects. Ideal for meeting biodiversity action plans (BAP) and delivering to BREEAM and planning requirements.

All our green roof systems comply with FLL Guidelines.

Specification Support

Specification downloads:
www.bauder.co.uk/technical-centre

NBS Plus BIM DWG

Telephone helpline:
0845 271 8800

BALI gro ECO PLATFORM EPD EN 15804 VERIFIED

flora LOCALE RHS PERFECT FOR POLLINATORS bre

Example System Configuration

Substrate-based extensive green roofs can incorporate a variety of vegetation finishes.

Vegetation Mats

The installation of a precultivated vegetation mat allows instant coverage of the roof. Native species wildflower blanket XF118 meets the growing demand to satisfy the requirements of BREEAM and to meet a biodiversity action plan for the site.

Sedum Blanket XF300 provides dense sedum foliage featuring up to 11 species of sedum with some mosses and grasses for plant diversity.

Plug Planting

This method gives the client both a much greater choice of plant species and the opportunity to plan the layout. The individual immature plants or 'plugs' are planted out into the substrate by hand, which can then grow on to give good cover over the next two full growing seasons.

Seeding

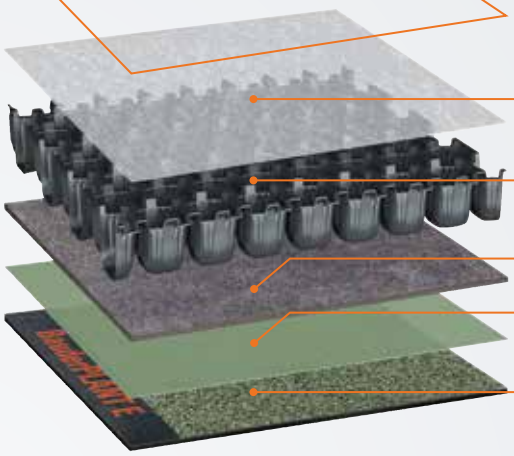
This is an economical and practical method for vegetating larger roof areas. Plant establishment and full coverage will take between 18-24 months, depending upon the time of year sowing takes place and the weather conditions during the period of establishment.

Vegetation Mat

Seeded Roof

Plug Plants

Biodiverse Habitat



Bauder Filter Fleece
filtration layer that prevents substrate fines from washing into the drainage layer.

Bauder DSE40
40mm water storage layer that provides multi directional drainage.

Bauder FSM600 Protection Mat
recycled polyester and polypropylene fibre mix.

Bauder PE Foil
polyethylene foil separation and slip layer manufactured from recycled granules.

Bauder Plant E or AP2
root resistant, SBS modified bitumen membrane reinforced with 250g/m^2 recycled spunbond polyester.

Substrate Pitch Roof Systems - Configurations Over 10°

An extensive substrate system on a pitch greater than 10° requires a water retention and storage board that will hold the substrate firmly in place and be sufficiently rigid to prevent board flexure and manage the imposed sheer load.

The extensive or biodiverse substrate is applied directly to the profiled surface of the board so that the green roof is stabilised whilst retaining sufficient levels of water to support the vegetation.

Sedum Vegetation on Bauder Extensive Substrate
variety of sedum species with some grasses and moss.

Vegetation on Bauder Biodiverse Substrate
generally provided through plug planting, vegetation mat or seeding. Selected species can be chosen to suit the project and location.

Bauder Substrate
applied directly to the profiled surface of the reservoir board.

Bauder Reservoir Board
lightweight rigid expanded polystyrene water storage and drainage layer.

Bauder FSM600 Protection Mat
polyester and polypropylene fibre mix.

Bauder PE Foil
polyethylene foil separation and slip layer manufactured from recycled granules.

Bauder Plant E or AP2
root resistant, SBS modified bitumen membrane reinforced with 250g/m² recycled spunbond polyester.

www.bauder.co.uk/technical-centre

BioSOLAR Green Roof System

Bauder BioSOLAR is a revolutionary solar PV mounting system for biodiverse or extensive green roofs. Well suited to new build applications where environmentally friendly solutions are required to meet planning and BREEAM requirements. Our BioSOLAR system can also be retrofitted on many existing roofs without the need for any structural modification to the building.

A key element is that the front edge of the PV panel is set 300mm above the level of the substrate, which allows liberal growing room for the vegetation without blocking light to the array that would otherwise reduce the efficiency of the panels. This height setting also enables light and moisture to reach beneath the panel to support the plants below.

Vegetation Mats

Native Species Wildflower Blanket XF118 meets the growing demand for a native species vegetation blanket to satisfy the requirements of BREEAM and to meet a biodiversity action plan for the site.

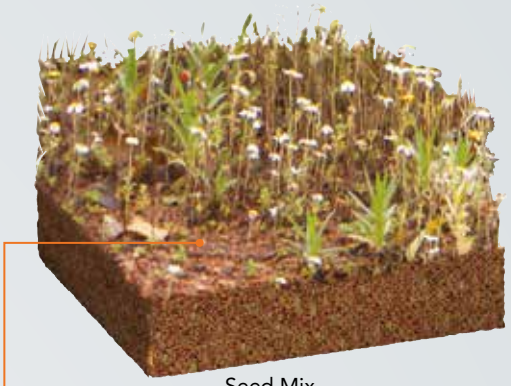
Sedum Blanket XF300 provides dense sedum foliage cover featuring up to 11 species of sedum with some mosses and grasses for plant diversity.

Plug Planting

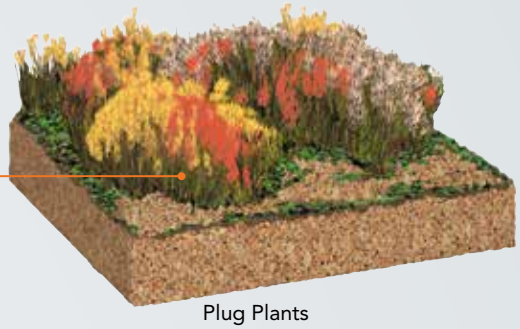
Individual immature plants or 'plugs' are planted out into the substrate by hand to give a variety of species, which can then grow on to give good cover over the next two full growing seasons.

Bauder Flora 3 Seed Mix

Ideal for vegetating large roof areas with species selected for their maximum growing height that meet BREEAM requirements.

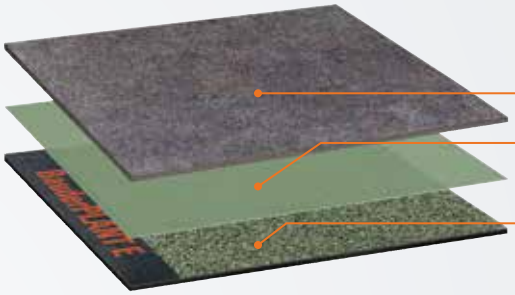


Seed Mix



Plug Plants

Vegetation Mat



Bauder FSM600 Protection Mat
recycled polyester and polypropylene fibre mix.

Bauder PE Foil
polyethylene foil separation and slip layer manufactured from recycled granules.

Bauder Plant E or AP2
root resistant, SBS modified bitumen membrane reinforced with 250g/m^2 recycled spunbond polyester.

www.bauder.co.uk/technical-centre

LIGHTWEIGHT SEDUM SYSTEM

Bauder XF301 extensive sedum blanket system is constructed using low maintenance planting (succulents) that provide excellent cover and increased protection to the waterproofing system.

When to Specify

The Xero Flor sedum blanket is a very versatile green roof system and is suitable for both new build and refurbishment projects. It is ideal for buildings where weight loading is a consideration or planning requirements stipulate the inclusion of a green roof.

Key Features

- The Xero Flor sedum blanket is installed as a complete system
- The most lightweight green roof system available, making it ideal for retrofitting or refurbishment projects
- Delivers instant greening of a roof with sedums and other species able to flourish in our climate
- Ideal solution where a green roof needs to be specified to meet planning requirements
- Cost effective
- Sedum blankets are grown on our farm in the UK and delivered to site within 24 hours of harvesting
- Blanket features up to 11 species of sedums, some mosses and grasses to ensure plant diversity

The plants are grown on a 'blanket' that is harvested like turf and installed by rolling out on top of the waterproofing and any other landscaping components required. The blankets are very lightweight, easy to maintain and provide instant greening to the roof.

All our green roof systems comply with FLL guidelines.

Specification Support

Specification downloads:
www.bauder.co.uk/technical-centre

Telephone helpline:
0845 271 8800

System Configuration

The multi-functional XF301 sedum system combines the vegetation support layer with a moisture retention fleece to provide the perfect base for all roofing scenarios with a labour efficient installation.

Our patented geo-textile carrier fleece with its ultraviolet resistant nylon loops provides a support base for the specially developed substrate growing medium and gives stability to the established vegetation whether on a low pitch flat roof or a 25° slope.

The pre-attached fleece is a unique feature of our XF301 sedum system, retaining moisture after rainfall and thus allowing the plants to take up the water for future use. The sedums are grown to maturity before being harvested, thus ensuring that they acclimatise quickly to their new rooftop location.

We currently cultivate 60,000m^2 of XF301 and are able to harvest the sedum and deliver to site within 24 hours.

Bauder XF301 Sedum System
pre-cultivated vegetation blanket on a patented nylon loop and geo-textile base carrier with special substrate and a pre-attached integral 8mm moisture retention fleece.

Bauder SDF Mat
multifunctional drainage, filtration and protection layer manufactured from ultraviolet resistant nylon woven loops which are thermally bonded to geo-textile filter fleece facings.

System Installation

Long length rolls being craned into position and installed.

Short 2m rolls of XF301 Sedum System installed by hand.

BAUDER PLANTING & VEGETATION

XF118 Native Species Wildflower Blanket

This vegetation blanket meets the growing demand for native species plants to satisfy the requirement of BREEAM. The 24 species of wildflowers and herbs incorporated into the blanket have been selected to provide a viable and vibrant plant that will be present on most of the biodiversity action plan lists that project specific ecology reports now demand.

XF300 Sedum Blanket and XF301 Sedum System

Both of these vegetation blankets provide dense sedum foliage cover featuring up to 11 species of sedum with some mosses and grasses for plant diversity.

The plants provide a lot of colour and are selected to suit our climate, and provide 90% ground coverage at installation.

Plug Planting

The use of small seedling plants have a number of advantages, each individual species can be chosen and the location and density of the planting can be controlled.

We supply a wide range of British provenance plug plant species for a Bauder green roof project.

Seeding

Seeding is a proven way to establish vegetation, however at roof level, the environment makes this a challenge without the correct provisions.

We supply a range of British and Scottish provenance seed mixes which have a unique blend of seed species, adhesive to bind the seed to the substrate, organic fertiliser for nutrients and mycorrhizal fungi to increase the root surface area and establish the plants as they grow.

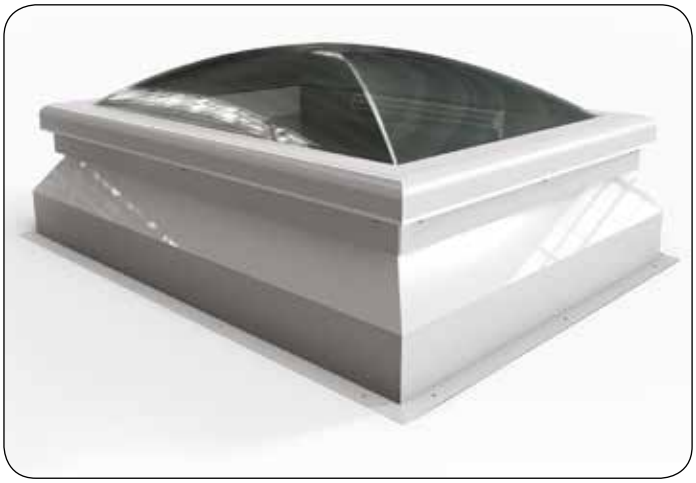
COMPLETING THE PACKAGE

As a responsible manufacturer and specialist, it is important to us to work with other key manufacturers that produce accompanying rooftop products that may affect the integrity of our waterproofing, such as rooflights, outlets and trims.

All these items need securing to the roof, which means finding a solution to roof details and working with the approved roofing contractor to ensure the installation is precise, accurate and robust.

Rooflights

Bauder Euroglaze and BauderDOME are the most advanced rooflight designs available. With high standards of illumination, insulation and ventilation, Bauder offers rooflights for all flat roofed buildings. All these glazing products are fully compatible with our roof waterproofing systems and the standard products all hold BBA certification. They are installed with a comprehensive guarantee to give total confidence and complete peace of mind.

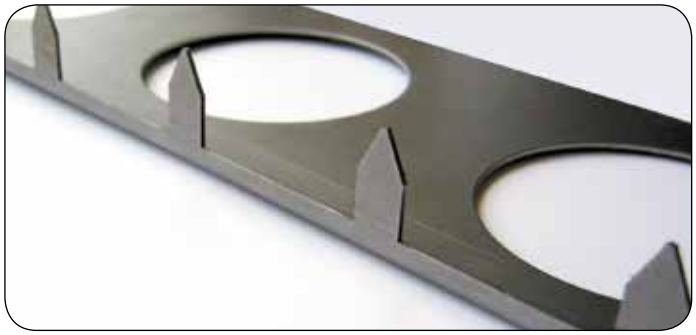


BBA BRITISH BOARD OF AGRÉMENT 05/4297

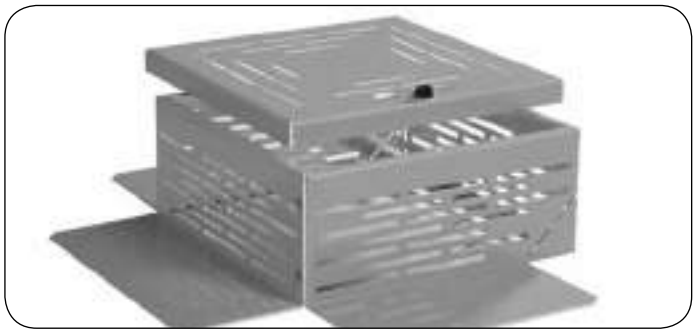
Accessories

Our full range of accessories complement a Bauder green roof and give a single point of contact for all elements required in the design. These are some examples of our range.

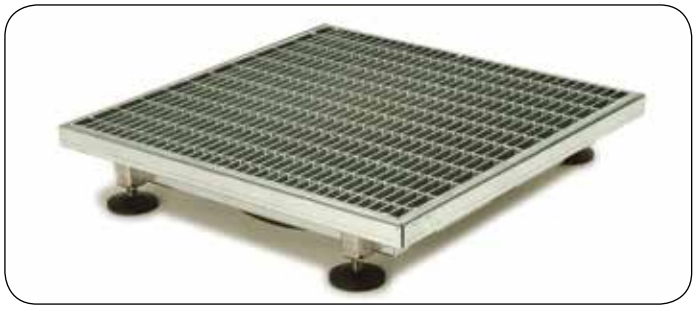
Bauder AL40 Sedum Blanket Edge Trim



Sedum Blanket Retention Strip



Inspection Chamber ALU250



Linear Drain Rainwater Outlet Access Cover

OUR SERVICE

Your project is important to us and our service is dedicated to providing a green roof solution that fully understands all the individual issues of the project, answers the waterproofing requirement and satisfies the needs of the vegetation.

New Build and Refurbishment Projects

Your green roof design can be complex, so we work with you to ensure all the roof detailing is robust and accurate. Our technical managers will meet you and from your plans they will produce, alongside our technical department, a specification package ready for the tendering process.

A typical specification and report package can include the following:

- Building type and usage.
- Recommended system configuration.
- Detailed specification.
- Green roof construction and design.
- Thermal analysis and calculations.
- Falls and drainage design.
- Wind uplift and restraint calculations.
- Detailing on all roof penetrations.
- Roof plans and tapered insulation layouts.
- Recommended approved contractors.

Creating a Biodiverse Landscape

We support the architect in the design and development of the biodiverse roof, ensuring it complies with the ecological requirements for maximum BREEAM credits and fulfils all the planning requirements.

Our technical team can produce comprehensive specifications for the roof and, if required, detailed roof plans and management plans for the design to satisfy both BREEAM inspection and local planning authorities.

Biodiverse Roof Plans

In discussions with architects we can interpret the ecological requirements to show a detail 'layout' drawing for the mounding of substrate and location of planting and surface finishes, ensuring the loading of the roof is compatible with the roof structure.

Biodiverse Green Roof Management Plans

Increasingly, local authorities require 3-5 year site specific management plans to ensure the roof establishes correctly and produces the habitat it was designed to deliver.

We offer a project specific management programme which enables the planning requirements to be discharged with our maintenance and monitoring team carrying out the work.

Vegetation

All BAP's are focused on the enhancement of the local ecosystems, to this end the provenance and suitability of the plant stock is key.

Our vegetation blankets are grown in the UK and all wildflower plugs are of British provenance.

Our Flora Seed Mix range uses seed from sources who are signatures to the Flora Locale code of practice.

Bauder Flora Seed Mix Range

Bauder Flora 3: General Purpose Mix
Bauder Flora 5: Urban Seed Mix
Bauder Flora 7: Chalk Grassland
Bauder Flora 9: Coastal Mix
Bauder Flora 11: Scottish Mix

SIX STEPS

1: Brief and Consultation
You give us your remit and together we discuss the green roof project; site suitability, level of access required, falls and drainage, weight loadings, performance expectations, preferred system application, your budget and how the works can be formulated.

2: Roof Review
Upon determining which green roof and vegetation finish is suitable for your building we will perform a detailed appraisal of all roof areas to fully assess the structural and design considerations, and propose the appropriate green roof components.

3: Report, Design and Specification Service
Designing to protect the building's construction and flat roof waterproofing is vital when delivering a green roof as many forces can affect the structure. Your detailed report and specification package takes into account these factors and will answer your original brief.

4: Contractor Selection
The Bauder approved contractors best placed to deliver your green roof will competitively tender for your project. Our national network of contractors undergo a rigorous selection process and their installers are trained specifically in the application of our systems, so you are ensured an expert installation.

5: Green Roof Installation
Once the Bauder approved contractor has been appointed, a pre-contract meeting will make sure the project delivery is well coordinated. The works are closely monitored by Bauder site technicians to ensure quality and waterproof integrity of the roof and correct installation of the green roof components.

6: Sign Off, Guarantee and Maintenance
A full final inspection is completed on the works by our site technician team following rigorous approval criteria before the guarantee is issued.

BAUDER INSTALLATIONS

Installations

You can be assured that the waterproofing, PV and green roof installation performed on your building's roof will be of the absolute highest quality, as we only allow fully trained and certified Bauder approved contractors to install our roofing solutions.

Approved Contractors

Our national network of approved contractors are given all the training, support and expert advice they need in order to deliver a high quality roof installation that we are proud to put our name to.

We look to build strong working relationships with all of our approved contractors, as we recognise just how essential the quality and experience of the installing operative is to ensuring a successful project.

Badged Operatives

Excellent workmanship is crucial to the guarantee that accompanies Bauder installations and so we have always operated a policy to train and approve the individual installer, and not simply the contracting roofing company. Each individual fixer is required to display their approved operative badge at all times showing photographic identification, name, badged operative number and the systems that they are trained to install.

Bauder Site Technicians

Once your roofing works commence, our experienced team of site technicians will monitor and inspect the workmanship at key stages to ensure that the standards required to meet our guarantee are fulfilled, as well as providing you with easy to understand reports on how the works are progressing.

Our national team is the largest of all the manufacturer-suppliers, ensuring all our sites receive the attention they deserve.

QUALITY GUARANTEED

Guarantees

A full final inspection is undertaken by our site technician team on completion of the waterproofing before the installation of the green roof commences.

Your completed roof package will be backed up by what we can confidently claim to be the most comprehensive guarantee range in today's roofing industry, giving you total reassurance with regards to the future performance of your building's roof.

Unlike others in the market, Bauder offers a full range of guarantees that map to the building's and client's requirements. Our guarantee provides you with complete satisfaction and will be bespoke to your project and its requirements.

We issue our guarantees unreservedly as part of our service because we monitor quality every step of the way from manufacture to installation.

Guarantee Options

- Products supplied by Bauder (exclusions exist).
- Workmanship and installation of Bauder products by our approved contractors.
- Design, advice, formula and specification where Bauder products are concerned.
- Financial loss from building damage due to faulty manufacture or installation of Bauder products.
- Consequential damage through Bauder waterproofing system failure due to faulty manufacture or installation of Bauder products.

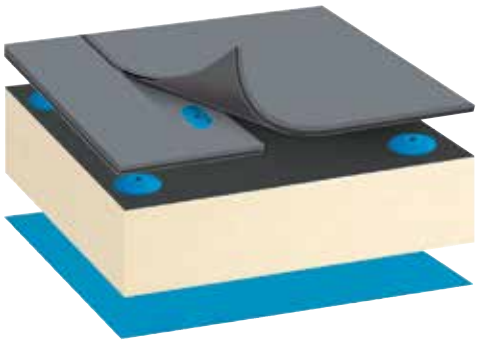
WATERPROOFING OPTIONS

Our portfolio of waterproofing systems ensures we impartially match the right solution for every project whether new build or refurbishment.

Single Ply Systems

Our single roofing systems are ideal for lightweight, fast track and cost effective construction projects. The systems provide solutions that are durable, resistant to the natural elements and are able to support extensive green roofs.

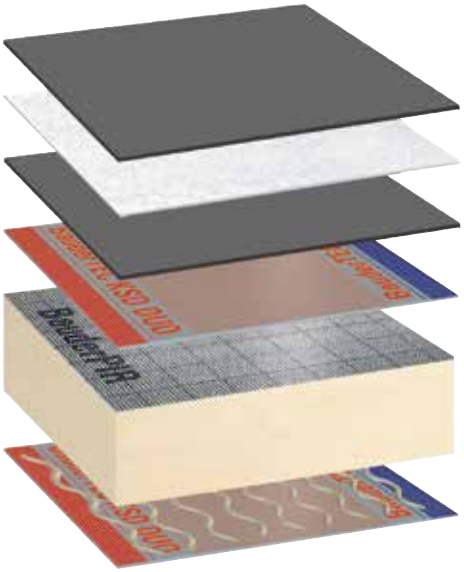
- Projects: New build or refurbishment.
- Construction: Warm, cold and inverted roofs.
- Upgrades: Extensive Green roofs and BauderSOLAR
- Certification: BBA, FM Approval.
- Guarantees: Full range.



Cold Liquid Applied Waterproofing

Our cold liquid applied systems are based on the most advanced PMMA technology. Simple to install, fast curing and long lasting; they are suitable for use in all kinds of flat roof, balcony, walkway, and terrace waterproofing and surfacing applications.

- Projects: New build or refurbishment.
- Construction: Warm, cold and inverted roofs.
- Upgrade: Extensive Green Roofs
- Certification: BBA
- Guarantees: Full range.



Bitumen Membrane Systems

Our long-established and fully integrated roof systems incorporate SBS modified elastomeric bitumen membranes and highly efficient PIR insulation to give a robust waterproofing solution with long-term durability and life-expectancy. These systems are ideal for all types of green roof scenarios and solar PV.

- Projects: New build or refurbishment.
- Construction: Warm, cold and inverted roofs.
- Upgrades: Green roofs and BauderSOLAR flat roof or BioSOLAR photovoltaics.
- Certification: BBA.
- Guarantees: Full range.

Hot Melt Structural Waterproofing

The Bauder Hot Melt Structural Waterproofing System can be installed on decks with zero degree falls.

- Projects: New build.
- Construction: Cold and inverted roofs.
- Upgrades: Green roofs and BioSOLAR photovoltaics.
- Certification: BBA
- Guarantees: Full range to accompany BioSOLAR PV system.

ONLINE TECHNICAL RESOURCES

bauder.co.uk/technical-centre

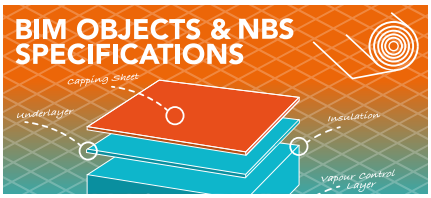
Get your specification right

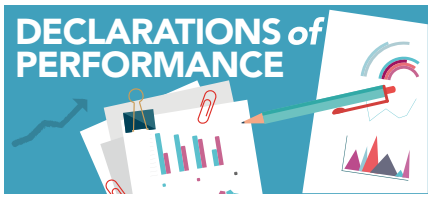
Online technical resources for your flat roof project

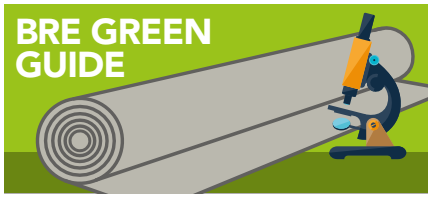
At Bauder our service is free to you and covers all elements for a successful project delivery from initial concept or site survey, through to specification package with bespoke drawings and calculations, on site monitoring and final sign-off and handover.

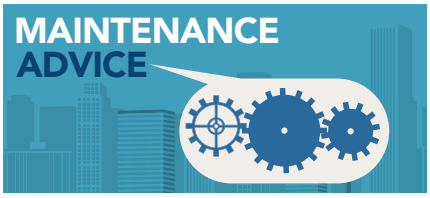
We appreciate that there are times when you need resources to get your project started and the Bauder Online Technical Centre will support you.

Technical Centre
BIM objects and NBS specifications
CAD detail drawings
System summaries
Certification
Declarations of Performance
Products
Design guides
Brochures
BRE Green Guide
Maintenance advice
Technical CPD seminars









Specification Hotline: 0845 271 8800

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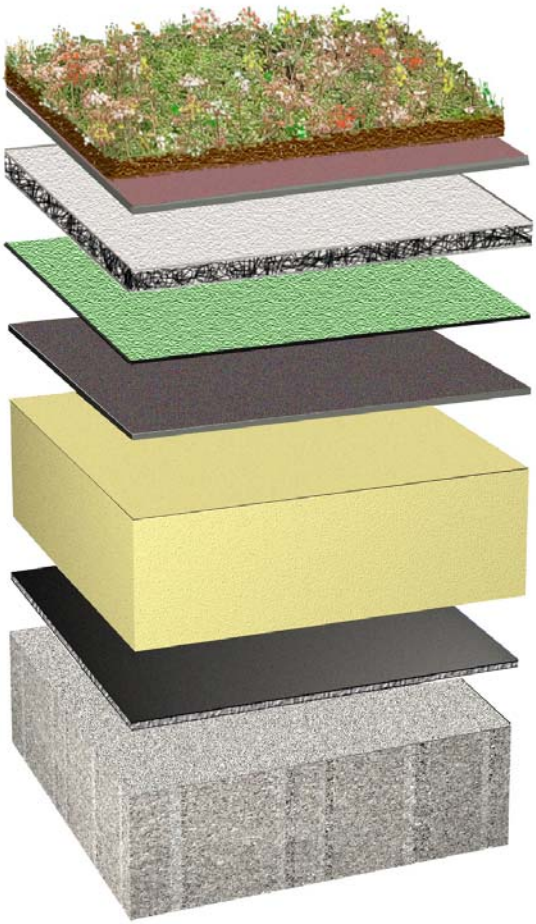
Date: 11-02-2005

TECHNICAL DATA SHEET

Xero Flor sedum blanket system – Construction and Saturated loading
Insulated with roof fall of 1°-2°



Bauder Xeroflor XF301
Sedum combination blanket

Bauder SDF mat

Bauder Plant-E capping sheet

Bauder G4E

Bauder PIR insulation

Bauder DS1 DUO vapour barrier

Specification Build-up	Thickness / mm	Weight kgs / m²
Vapour barrier – DS1 DUO	3.5	4.3
Insulation	140	5.32
G4E Underlayer	4	4.8
Plant-E capping sheet	5	6.0
SDF Mat	20	0.6
XF301 sedum blanket	33	43.8
System build-up	185.5	
Overall saturated weight in kgs / m²		64.06

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BAUDER

SERVICE

GREEN ROOF MAINTENANCE

GREEN ROOF MAINTENANCE

A green roof is a real asset to a building and for it to continue to deliver the environmental and aesthetic benefits for which it was originally designed, it is important to carry out maintenance on a regular basis.

A well maintained green roof will:

- Look at its best and ensure the optimum range of species for maximum coverage and longer flowering periods
- Sustain healthy plant growth to provide a habitat for wildlife
- Improve air quality by reducing airborne dust and help local air cooling
- Offer protection to the waterproofing beneath
- Help conserve and control rainwater runoff
- Maximise the building's asset value

Common Problems

Lack of Nutrients can lead to unhealthy plants and loss of vegetation coverage, resulting in bare patches and a reduction in the variety of species present.

Invasive Weeds, Fallen Leaves and Debris can spoil the aesthetic appearance and function of your green roof, and in some circumstances can even damage the waterproofing. The removal of leaf litter from overhanging trees and other accumulated debris is essential to prevent plants from being suffocated.

Impeded Drainage can be detrimental to plant health and roof performance. For example, when the growing medium is not free-draining it can become wet and lead to root rot or invasive grasses and weeds. Regular maintenance and inspection checks ensure that the outlets and areas surrounding outlet inspection chambers remain clear and perform as intended.

Health & Safety Considerations

Following health and safety best practice is essential to all successful green roof maintenance and should be carried out by fully trained personnel who should be:

- Familiar with working at rooftop levels
- Able to carry out risk assesments
- Inspecting mansafe equipment prior to use
- Competent users of all apparatus
- Wear all necessary personal protective equipment

OUR SERVICE

With over 35 years' experience in the design and supply of green roofs throughout the UK and Ireland, we offer unparalleled knowledge and horticultural expertise for rooftop vegetation and green roof maintenance.

Our national coverage assures you of a prompt reliable service to fully meet your requirements and comprises a full inspection and evaluation of your green roof.

Our experienced maintenance team will fully comply with relevant health and safety legislation throughout the duration of the work to access the roof with suitable edge protection or fall protection systems; carry out pre-use inspections of all maintenance equipment, wear personal protective equipment where necessary; and risk assess all works prior to commencement.

Following each visit you will be provided with a bespoke report that highlights the work carried out, the condition of the roof and any necessary future works to be considered.

Call our team for a no obligation quote.

Green Roof Maintenance Team

Telephone: 0845 271 8802

Email: greenmaintenance@bauder.co.uk

Sedum Roof Maintenance

It is a common misconception that extensive green roofs are maintenance free, but this is not the case and annual maintenance is required. Our sedum maintenance service typically concentrates on:

- Ensuring adequate fertilisation of the sedum blanket
- Evaluating colour and growth rate of vegetation
- Removal of leaves, debris and any unwanted invasive weeds
- Repairing of any bare patches
- Clearance of outlets and testing of irrigation

Biodiverse & Wildflower Maintenance

The level of maintenance of the horticultural element of this type of green roof varies significantly depending on the species of vegetation incorporated, and our biodiverse and wildflower maintenance service typically focuses on:

- Ensuring a suitable balance of species on the roof
- Removal of leaves, debris and any unwanted invasive weeds
- Strimming back of vegetation and sward growth where applicable
- Ensuring adequate fertilisation of the vegetation
- Examining and testing of irrigation

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CS CONSULTING

GROUP

Appendix D: Attenuation & Storm Calculations

Project: City Block 9
Project No.: R064 - SHD
Calculation: Attenuation 100-year
Calcs By: DD
Checked By:
Date: 20.11.2020

CS CONSULTING GROUP
DUBLIN - LONDON - LIMERICK

Site Location:	Dublin		
Design Storm Return Period:	100 years		
Climate Change Factor:	20 %		
Soil Type:	3		
Total Site Area:	1.100 ha		
Hardstand Area:	1.100 ha	.....@	100% Impervious
Softstand Area:	0.000 ha	.....@	0% Impervious
Effective Impermeable Area:	1.100 ha		

Allowable Outflow	**Calculate**	
IH124: QBAR = 0.00108 x AREA$^{0.89}$ x SAAR$^{1.17}$ x SOIL$^{2.17}$		
AREA:	0.0110 km^2	
SAAR:	705 mm	
SOIL:	0.37	
QBAR/ha	2.00 l/s/ha	
Allowable Outflow	**2.2 l/s**	Smallest Allowable Discharge Rate

Storage required =	**1024 m^3**	

Duration (min)	Rainfall 100-Year (mm)	Rainfall 100-Year with CCF (mm)	Intensity (mm/hr)	Discharge (Q = 2.71iA) (l/s)	Proposed Runoff (m^3)	Contiguous Land Runoff (m^3)	Total Runoff (m^3)	Allowable Outflow (m^3)	Storage Required (m^3)
5	14.9	17.9	214.6	640	192	0	192	1	191
10	19.8	23.8	142.6	425	255	0	255	1	254
15	23.3	28.0	111.8	333	300	0	300	2	298
30	28.8	34.6	69.1	206	371	0	371	4	367
60	35.6	42.7	42.7	127	458	0	458	8	451
120	44.1	52.9	26.5	79	568	0	568	16	552
180	49.9	59.9	20.0	60	643	0	643	24	619
240	54.5	65.4	16.4	49	702	0	702	32	670
360	61.7	74.0	12.3	37	795	0	795	48	747
540	69.8	83.8	9.3	28	899	0	899	71	828
720	76.2	91.4	7.6	23	981	0	981	95	886
1080	86.3	103.6	5.8	17	1111	0	1111	143	969
1440	***94.3***	***113.2***	***4.7***	***14***	***1214***	***0***	***1214***	***190***	***1024***
2880	104.7	125.6	2.6	8	1348	0	1348	380	968
4320	113.5	136.2	1.9	6	1462	0	1462	570	891
5760	121.3	145.6	1.5	5	1562	0	1562	760	802
8640	135.0	162.0	1.1	3	1739	0	1739	1140	598
11520	146.8	176.2	0.9	3	1890	0	1890	1521	370
14400	157.6	189.1	0.8	2	2030	0	2030	1901	129
17280	167.5	201.0	0.7	2	2157	0	2157	2281	-124
23040	185.6	222.7	0.6	2	2390	0	2390	3041	-651
28800	201.9	242.3	0.5	2	2600	0	2600	3802	-1202
36000	220.7	264.8	0.4	1	2842	0	2842	4752	-1910

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