REAP 3 Limited

PLOTS 4 AND 5, CENTRAL SQUARE, CITY CENTRE, CARDIFF

Drainage Strategy

4485-WSP-XX-XX-RP-D-000

AUGUST 2025

PUBLIC

REAP 3 Limited

PLOTS 4 AND 5, CENTRAL SQUARE, CITY CENTRE, CARDIFF

Drainage Strategy

PUBLIC

PROJECT NO. 0040270.4485

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1. INTRODUCTION

1.1. BACKGROUND

This report has been prepared by WSP in support of the detailed planning application being submitted by REAP 3 Limited ('the Applicant') to Cardiff Council ('the Council') in support of a full planning application for the development of Plots 4 and 5, Central Square, City Centre, Cardiff ('the site') (Postcode circa: CF10 1XR).

This application seeks full planning permission for the following description of development:

"Mixed-use development to provide residential accommodation, flexible non-residential uses, cycle parking, landscaping and other associated works"

The site sits at the heart of the wider 'Central Square' regeneration area in Cardiff City Centre. Central Square is a strategically important area which the Council considers to be a gateway to the City, and an opportunity to showcase the best that Cardiff has to offer. Given the strategic importance of the location, the Council envisages that the regeneration of Central Square, towards which this development will contribute significantly, will play a key role in attracting investment on other strategically important development sites in the City.

The proposed development provides the opportunity to make a significant positive contribution to the ongoing regeneration of this part of the Cardiff. The proposed development will build upon the success of the wider Central Square area, proposing a development of exceptional architectural and residential quality. The Applicant is fully committed to the delivery of the site, and it is their ambition to create a new iconic landmark for Cardiff and Wales.

As well as the delivery of much needed high-quality homes to address the Council's housing need, the proposed development brings with it a wide range of enhanced planning and public benefits. The benefits include the delivery of a strategically important City Centre site, new flexible non-residential floorspace that will activate Central Square, a publicly accessible bike hub and cafe, a new pavilion building that can accommodate a restaurant, extensive public realm landscaping in and around the buildings, highly sustainable and energy efficient buildings, and other significant economic and social benefits for the City.

The objectives of this report are to:

- Review the existing drainage arrangements on site for both surface and foul water;
- Assess the options for the disposal of foul water from the development;
- Provide an outline strategy for surface water (SuDS) systems including indicative sizing of storage/attenuation features and major conveyance through the development.
- Assess the feasibility of Sustainable Drainage Systems (SuDS) features within the development to control and discharge surface water runoff to comply with the requirements of the statutory National Standards for Sustainable Drainage System;
- Provide an outline strategy for foul water including indicative conveyance through the development and hydraulic assessment.

The following tasks have been undertaken to complete this report:

- Outline solutions for foul and surface water management.

- Determine the approximate area of impermeable surfaces that will be added by the proposed development and estimate the equivalent run-off rates of these areas;
- Assess the feasibility of using infiltration as a disposal method, based on available ground conditions information and investigations undertaken that the site;
- Estimate the volume of storm water attenuation storage needed to manage run-off from the site post-development and incorporate into the masterplan.
- Define preliminary foul drainage routing through the development, identify suitable outfall into existing public sewer network and diversions required.

1.2. LIMITATIONS

WSP has prepared this report in accordance with the instructions of their client, REAP 3 Limited for their sole and specific use relating solely to the above site. Any person who uses any information contained herein does so at their own risk and shall hold WSP harmless in any event. Whilst this report was prepared using the reasonable skill and care ordinarily exercised by engineers practicing under similar circumstances and reasonable checks have been made on data sources and the accuracy of the data, WSP accepts no liability in relation to the report should any data, information or condition be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to WSP. In any event, WSP shall not be liable for any loss or damages arising under or in connection to the use of this report.

2. EXISTING SITE

2.1. SITE LOCATION

The Site is located on Wood Street, Cardiff, at an approximate National Grid Reference of 318130, 176020. This locates the site immediately north of Wood Street and south of both Rose Lane and circa 105m east of the Afon Taff. The site has an area of approximately 0.21 hectares.

The site is currently a vacant brownfield site. Having recently been used as a commercial block, it was demolished in 2018 as part of the wider redevelopment of Central Square.

The site boundary is shown in Figure 2-1 below.

Figure 2-1 - Site Location

Main River (Afon Taff)

Study Area Boundary

2.2. SITE DESCRIPTION

The site sits within the administrative area of Cardiff Council ('the Council'), who is the relevant Local Planning Authority when determining any planning applications on the site.

The site is 0.21ha and comprises a cleared rectangular plot of land, alongside two smaller parcels of land located to the north of Wood Street within the public realm (these smaller parcels will accommodate public cycle parking spaces). The site is bound by Wood Street to the south, Scott

Road to the west, Park Street Lane to the north-west, and a public square to the east. The site was formerly occupied by St David's House, until it was demolished in late 2018.

The site benefits from full planning permission for the following development (Ref: 21/02984/MJR), which was granted by the Council on 2nd May 2024:

'Full planning application for a mixed-use building providing commercial uses at ground floor/mezzanine level (Use Classes A1/A2/A3/B1/D1/D2) and residential accommodation above (Use Class C3 and including non C3 Use Class residential), a pavilion (Use Classes A1/A2/A3), public realm, cycle parking, access, drainage and other infrastructure works required for the delivery of Central Square Plots 4 and 5.'

The site sits within the Cardiff Central Square Masterplan area. Whilst this masterplan was never formally adopted, it has catalysed significant development and has led to the transformation of the area in and around Cardiff Central Station. The prevailing building heights ranges between 7 to 25 storeys, which includes buildings of a variety of land uses and architectural styles.

The Media Wales office building is located at 6 Park Street, immediately adjacent to the north west of the site. The HMRC building is located immediately adjacent to the north east of the site. The Millennium Plaza leisure complex is located immediately to the west. To the south cross Wood Street lies the Cardiff University School of Journalism, Media and Culture, and the BBC Cymru building. The Principality Stadium is located further to the north and can be accessed via Central Square.

The Site is not within a Conservation Area and does not include any Listed Buildings. The Natural Resources Wales ('NRW') Flood Map for Planning ('FMfP') identifies the site to be at risk of flooding and falls into Flood Zone 3 (Rivers and Sea) (albeit located in a 'TAN15 defended zone')

2.3. TOPOGRAPHY

A topographical survey is yet to be undertaken. Receipt of a topographical survey will aid in identifying site levels and gradients.

2.4. EXISTING WATERCOURSES AND DRAINAGE

Based on available mapping information, it has been identified that the site is located circa 105 m east of the Afon Taff some 2.5 km upstream of where it discharges in Cardiff Bay.

Given the nature of the surrounding floodplain, the flood risk from these sources is linked, available data from NRW identify that the risk of fluvial flooding to the site is generally Low, noting this takes into account defences.

It is worth noting that NRW's Flood Map for Planning identifies that the site is wholly within the TAN15 Defended Zone (Zone 3) Public sewer records from Dwr Cymru Welsh Water (DCWW) indicate that the proposed site is bordered by a network of foul, surface and combined water sewers. Diameters of these sewers vary from 150 to 450mm. The combined sewer runs along the northern and southern boundaries of the site. The surface water network runs south of the site within Wood Street and east of the site within the Central Square development. The foul water networks are located south of the site in Wood Street.

It is also understood that there is a drainage network owned by the Council within proximity to the site. Further communication with the Council should be established to identify the network.

It is also recommended that a utilities survey be undertaken to capture any other unidentified utilities within or near the site.

3. PROPOSED DEVELOPMENT

3.1. OVERVIEW

The development proposals are as follows:

- A landmark 50 storey building with a maximum height of up to 177.85m AOD.
- 528 new homes (Class C3) comprising a mix of 1-bed and 2-beds.
- A pavilion building within Central Square comprising up to 601 sqm of flexible non-residential floorspace (flexible Class A1 and A3).
- 2,856.5 sqm of high quality internal and external amenity space through provision of roof terraces, lounges, coworking, gym and other wellbeing spaces.
- A basement level providing ancillary residential floorspace.
- A car free development with 528 cycle parking spaces within proposed building, including 5% accessible spaces, and a publicly accessible bike hub and café. Additionally, 52 public cycle spaces are provided within adjacent square provided as Sheffield stands.

As stated in section 1.1, the development description is as follows:

"Mixed-use development to provide residential accommodation, flexible non-residential uses, cycle parking, landscaping and other associated works"

3.2. PLANNING POLICY CONTEXT

This section of the report summarises local policy and guidance relevant to this Outline Drainage Strategy for the Site.

3.2.1. NATIONAL PLANNING POLICY FRAMEWORK

The updated National Planning Policy Framework (NPPF) was published in July 2021 and sets out the Government's national policies for flood risk management in a land use planning context within England. Paragraph 159 of the NPPF states:

> *"Inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk (whether existing or future). Where development is necessary in such areas, the development should be made safe for its lifetime without increasing flood risk elsewhere."*

The guidance further states that local planning authorities should "ensure that flood risk is not increased elsewhere."

As such, the proposed development's surface water drainage strategy should ensure that flood risk to others due to surface water discharge, or exceedance flows, does not increase.

3.2.2. PLANNING POLICY WALES 12TH EDITION 2024

'The climate emergency is likely to increase the risk of flooding as a result of sea-level rises, increased storminess and more intense rainfall. Flooding as a hazard involves the consideration of the potential consequences of flooding, as well as the likelihood of an event occurring. Planning authorities should adopt a precautionary approach of positive avoidance of development in areas of flooding from the sea or from rivers.'

3.2.3. FUTURE WALES: THE NATIONAL PLAN 2040

Policy 8 of the *Future Wales: the National Plan 2040 (FWtNP)*[1] concerns flooding. The priorities and process described are of interest in delivering sustainable growth to support an existing settlement.

'Flood risk management that enables and supports sustainable strategic growth and regeneration in National and Regional Growth Areas will be supported. The Welsh Government will work with Flood Risk Management Authorities and developers to plan and invest in new and improved infrastructure, promoting nature-based solutions as a priority. Opportunities for multiple social, economic and environmental benefits must be maximised when investing in flood risk management infrastructure. It must be ensured that projects do not have adverse impacts on international and national statutory designated sites for nature conservation and the features for which they have been designated.'

and

'The Welsh Government favours nature-based flood risk management over engineered solutions wherever possible, working in harmony with aspirations to develop green infrastructure and to provide a net benefit for biodiversity. Flood risk management authorities and other developers of flood risk management infrastructure are required to maximise opportunities to develop multiple public benefits including improved public realm, active travel facilities and securing green infrastructure. Places in flood warning areas are considered at risk of flooding from rivers or the sea.'

3.2.4. TECHNICAL ADVICE NOTE 15 (TAN15) MARCH 2025

'This TAN provides technical guidance which supplements the policies set out in PPW and Future Wales in relation to flooding and coastal erosion. It provides a framework within which the flood risks arising from rivers, the sea and surface water, and the risk of coastal erosion can be assessed. It also provides advice on the consequences of the risks and adapting to and living with flood risk. It does not take precedence over other Technical Advice Notes and should be considered alongside other planning policies.'

STATUTORY STANDARDS FOR SUSTAINABLE DRAINAGE SYSTEMS – DESIGNING, CONSTRUCTING, OPERATING AND MAINTAINING SURFACE WATER DRAINAGE SYSTEMS 2018

'The Flood and Water Management Act 2010 (Schedule 3), which comes into effect in Wales on 7 January 2019, requires new developments to include Sustainable Drainage Systems (SuDS) features that comply with national standards.'

3.2.5. LOCAL PLANNING POLICY

The following local planning policy is relevant to the Proposed Development:

[1] Welsh Government (Aug 2019) *Future Wales: The National Plan 2040* Rev. Feb 2021. Welsh Government

- Framework: Future Wales 2040 (February 2021)
- Cardiff Local Development Plan 2006-2026 (2016).
- Proposals Map (2016)
- Constraints Map (2016)
- Strategic Flood Consequences Assessment 2020 Guidance

3.2.6. GUIDANCE / BEST PRACTICE

In addition to national and local policy, the assessment has been undertaken with national and local guidance including but not limited to the following:

- CIRIA C624 (2004) 'Development and flood risk'
- CIRIA C753 (2015) 'The SuDS Manual'
- Sustainable Drainage (SuDS) Statutory Guidance (2019)
- Other Environmental Designations
- Sewers for Adoption 7th edition
- Planning Policy Wales (Edition 12) (February 2024)
- Building Better Places: The Planning System Delivering Resilient and Brighter Futures (July 2020)

3.2.7. EMERGING PLANNING POLICY

The Council has started to prepare a new draft Cardiff Replacement Local Development Plan, guiding development up to 2036. Consultation on the strategic options paper ran from November to February 2022. Consultation of the Preferred Strategy and Candidate Sites took place from July to October 2023.

Consultation on the Deposit Plan took place from February to April 2025. It is anticipated to be submitted for Examination in September 2025 and adopted in April 2026.

3.3. SURFACE WATER DRAINAGE

The aim of the surface water drainage strategy is to mimic the natural catchment processes as closely

as possible and adopt the principles of water management scheme as stated in section 2 of the

statutory "Sustainable Drainage Systems Standards for Wales" (SDSSW) document 2018.

From the 7th January 2019 Schedule 3 of the Flood and Water Management Act has been implemented by the Welsh Government which requires any development of more than 1 unit or where the

construction area is greater than 100m² to comply with the SuDS Approving Bodies (SAB's) design guidance and ministers standards which will require all sites to adopt SuDs in their design. The standards are listed below;

- S1 – Surface Water Runoff Destination
- S2 – Surface Water Runoff Hydraulic Control
- S3 – Water Quality
- S4 – Amenity

- S5 – Biodiversity
- S6 – Design of Drainage for Construction, Operation and Maintenance

The Standards listed will need to be met by the design in order to comply with the SDSSW. S1 is hierarchy standard with standards S2-S6 being fixed.

3.3.1. S1 – SURFACE WATER RUNOFF DESTINATION

In determining a suitable method for disposal of surface water flows from this development, it is necessary to explore the technical options outlined under Standard S1 of the SDSSW 2018 document published by Welsh Government. This states that disposal should be made through the hierarchical approach which are, in order of preference; surface water runoff collected for use, infiltration methods, discharge to surface water body, discharge to a surface water sewer, highway sewer or another drainage system and finally discharge to a combine sewer. Each of these options are considered below.

Collected for Use

The suitability of this option will depend on the proposed water usage of the development, if the development has low grey water demand, as is typical of residential developments the collection of water for reuse would not be economical or feasible, however if the demand for grey water is deemed to be high then rainwater harvesting would be an appropriate solution for parts of the development. The use of rainwater harvesting would need to be used in conjunction with one of the below methods of discharge in order to cater for exceedance flows in extreme rainfall events where the rainfall volume exceeds the volume of surface water storage provided by the rainwater harvesting tanks. The use of rainwater harvesting will be considered further at reserved matters stage.

Infiltration

Based on historic use of the site and its brownfield status, infiltration is not deemed a suitable method of surface water management.

It is recommended that further ground investigation is carried out prior to detailed design to confirm this

Discharge to Surface Water Body

Sequentially, the next consideration in the hierarchical approach is discharge to a surface water body. The nearest watercourse identified is a stream located approximately 105 metres west

of the site. This watercourse is the Afon Taff. Discharging surface water to these watercourses has been disregarded due to the technical and financial feasibility of a viable solution, alongside the need to cross amounts of third-party land, utilities and high associated costs.

Discharge to Surface Water Sewer or Combined Sewer

It is proposed that all flows from the development discharge into the existing DCWW sewers surrounding the site as identified in section 2.4. There is also scope to connect into the existing Council owned network subject to further communication and information received.

Regardless, further on-site surveys should be pursued as the site progresses to determine actual connections, levels, and gradients of any sewers/connections proposed to be reused or in question.

3.3.2. S2 – SURFACE WATER RUNOFF HYDRAULIC CONTROL

This standard requires surface water to be managed to prevent, as far as possible, any discharge from the development for rainfall events of less than 5mm and that the surface water runoff rate and volume for up to a 1 in 100-year return period should be managed to protect people, properties and the receiving water body.

Interception of Runoff

Interception will need to be considered under the statutory standards. Interception aims to mimic greenfield runoff conditions by preventing runoff from the majority of all small rainfall events. This can contribute to reducing pollution load to receiving surface water bodies. Meeting the Interception criterion is not expected during particularly wet periods, when permeable surfaces and subsoils are saturated, so a suggested target is that 80% compliance should be achieved during the summer and 50% in winter. Refer to table G2.1 in the Statutory Standards for Sustainable Drainage Systems 2018 document published by Welsh Government for details of interception mechanisms and their assumed compliance with the standards. This site will meet interception demands via the use of above ground SuDS features such as permeable paving, greed and blue roofs. The location and details of these features are to be defined at a later stage.

Hydraulic Control and Attenuation Storage

The total site area is circa 0.21ha, which is currently Brownfield. The brownfield run-off rates have been calculated using UK SuDS Greenfield runoff rate estimation tool which utilises the IH124 Method.

As per Cardiff Council Guidance, 'If the system is not known, then the Brownfield run-off should be calculated using the Greenfield run-off models but with a Soil Type 5'.

Table 3-1 below summarises the brownfield runoff off rates for each return period (Qbar, 30-year & 100-year).

Table 3-1 – Brownfield runoff rates

Return Period	Brownfield Rate (l/s)
QBar	1.8
30 year	3.5
100 year	4.3
100 year + 30% betterment	3.0

In accordance with statutory guidelines, the development of the site should not increase flood risk elsewhere and as such, all runoff from areas on site should be contained within the site boundary for up to and including a 1 in 100-year design period storm, plus 40% climate change.

The proposed development will be split into several hydraulic drainage catchments, all of which will have an independent drainage network, allowance discharge rate and outfall where necessary.

These catchments areas have been derived using the areas provided by the architect based on their drainage method. Since the outfall is yet to be confirmed, the storage volumes identified are based on a 2.5 l/s discharge rate.

The required storage volumes were calculated using the Infodrainage "Quick Storage Estimate" module for the 1-in-100 year +40% climate change flood event. Calculations supporting the design development including specific drainage method parameters can be seen within the appendix.

It should be noted that storage volumes provided are a worst-case scenario based on the 2.5l/s discharge rate which may be subject to change following communication with DCWW and Cardiff Council.

A summary of the catchment type, associate drainage method and storage volumes have been provided in Table 3-2.

Table 3-2 – Catchment Areas

SuDS method	Required attenuation capacity (m3)	Catchment area (m2)	Attenuation capacity provided (m3)
Green roof	130	350	48
Blue roof	130	550	77
Vehicle access permeable paving	2	83	4
Pedestrian permeable paving	24	332	35

Note that due to the nature for the development, urban creep has not been accounted for within the attenuation requirements.

Exceedance Flows and Flood Pathways

Flood-flow pathways should be designed to convey the overland flows from rainfall events above a 1 in 100-year return period to suitable areas of open space, such as landscaped areas, car parking areas and other hard surfaced areas, in order to protect properties against flooding. Consideration should also be given to exceedance pathways from storage areas in the event of extreme rainfall or failure with allowance made to convey flows away from properties both on and off the site. These should be considered as part of the detailed drainage and levels design of the development. The overarching site strategy of providing swales adjacent to roads would allow the road areas to become conveyance routes in exceedance events.

Flood Risks to People

The source of existing flood risk has been defined and considered in the Flood Consequences Assessment report.

3.3.3. S3 – WATER QUALITY

This standard requires treatment of surface water runoff to prevent negative impacts on the receiving water sources.

The SuDS Manual (CIRIA C753) states the SuDS Management Train is a central design concept for SuDS. SuDS should not be thought of as an individual component, but as an interconnected system designed to manage, treat and make best use of surface water, from where it falls as rain to the point at which it is discharged into the receiving environment beyond the boundaries of the site.

There are six specific functions provided by SuDS components (rainwater harvesting, pervious surface systems, infiltration systems, conveyance systems, storage systems and treatment systems), which are not independent with one component being able to provide more than one function.

There are many types of SuDS components which means that SuDS can be delivered anywhere, tailored to individual local contexts. Wherever possible, runoff should be managed at source with residual flows then conveyed downstream to further storage or treatment components.

Figure 3-1 below provides a typical example of a management train.

Figure 3-1 - SuDS Management Train Example

Treatment design should implement SuDS components that use a range of treatment processes to reduce contaminant level in runoff to acceptable levels. This can be facilitated by the SuDS management train of a number of components in series that provide a range of treatment processes, delivering gradual improvement in water quality and providing an environmental buffer for accidental spills or unexpected high pollutant loadings from the site

The above has been considered in applying SuDS into the proposed development to help provide, prevention in terms of pollution, source control and site controls.

The proposed development will utilise permeable paving, green and blue roofs to provide ecological and opportunities and amenities.

Permeable pavements are proposed to provide source control within the parking bays and footpaths. Parking aisles are to be constructed using conventional bituminous pavements that have been designed to slope towards the permeable pavements within the parking bays. Flows drained to the permeable pavements are captured through the block paving joints, where flows filtrate through the bedding layer into the voided clean stone sub-base. Water quality benefits are obtained through filtration as well as pollutants being left at the surface of the permeable paving where UV rays break them down. Any further pollutants are treated by microbial action within the sub-base from microbes that are located on the surface of the aggregate.

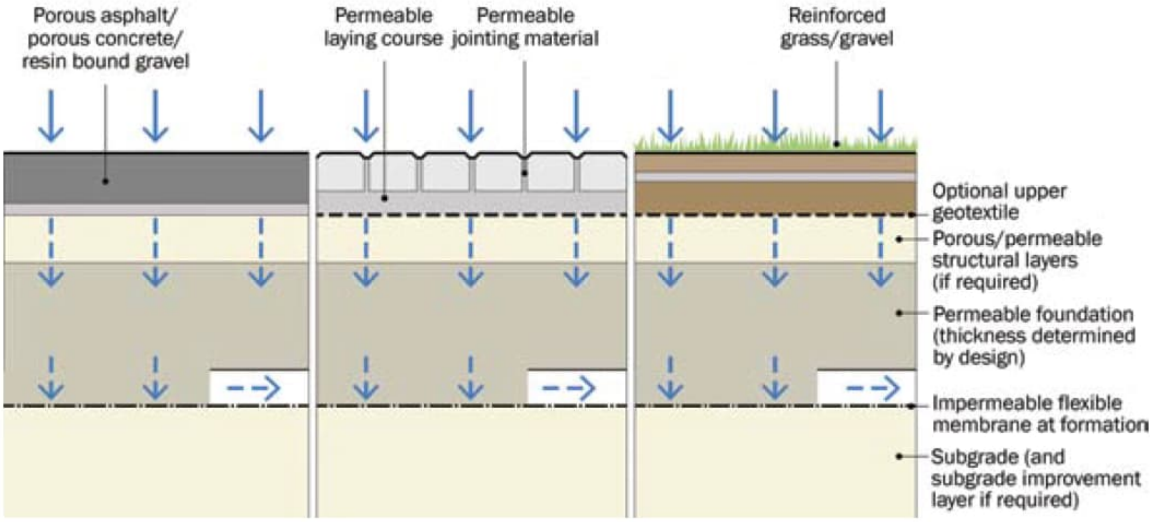


Figure 3-1 - Pervious Pavement System Type C - No Infiltration (CIRIA SuDS Manual, Chapter 20)

Given that the footprint of the proposed development is mainly compromised by the structure, both green and blue roofs have been proposed. The proposed development will feature flat roof area that can adopt a ‘green roof’ system to enhance biodiversity. The green roof will provide limited amenity due to the lack of access, however, rainfall landing on these areas will be treated by filtration through the planting media and underlying bedding material, enhancing water quality significantly.

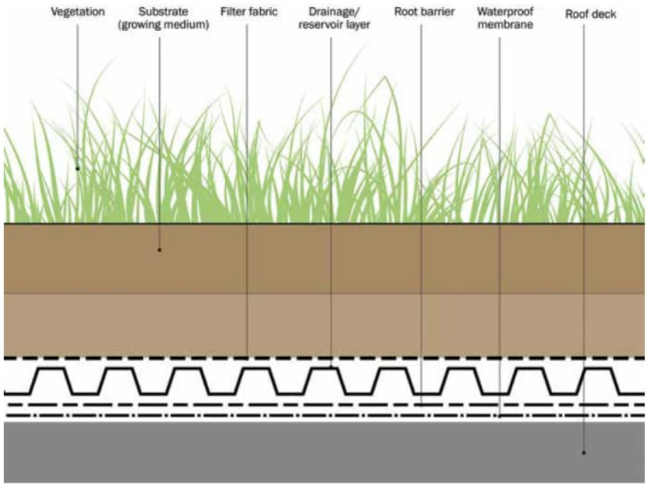


Figure 3-2 - Typical Green Roof Components (CIRIA SuDS Manual, Chapter 20)

Furthermore, a blue roof has also been proposed. This is a roof design that is explicitly intended to store water. This storage can be designed as attenuation storage (with water released in a controlled manner), as storage for use such as irrigation (potentially of adjacent green roof areas), cooling water (for use in reducing the temperature of the roof on hot days, or for internal cooling plant) or non-potable use within the building, and/or for recreational opportunities. Blue roofs can include open water surfaces, storage within or beneath a porous medium or modular surfaces, or below a raised decking surface or impermeable cover. Green roofs that include reservoir storage zones beneath the growing medium could also be termed “blue roofs”.

In line with the most recent masterplan, the soil thickness of the green and blue roof units have been increased from 0.25m to 0.3m to ensure the storage requirements identified in Table 3-2 can be achieved whilst there is an overall reduction areas allocated for sustainable roof systems.

3.3.4. S4 – AMENITY

This standard requires that the design of the surface water management system should maximise amenity benefits.

The primary amenity focus of the SuDS scheme should be to improve the health and well-being of the residents. The scheme will need to be based on natural forms that mimic natural landscapes found within the region and the vegetated swales and attenuation areas are designed with natural slope forms, safe and accessible paths and locally contextual species that will encourage natural colonisation. Other key amenity benefits should include improving air quality around the development, increasing carbon sequestration and improving water quality through removal of pollutants via vegetated swales & attenuation basins.

3.3.5. S5 – BIODIVERSITY

This standard requires that the surface water management system should maximise biodiversity benefits.

The SuDS scheme biodiversity strategy should revolve around the creation of significant and varied habitat to increase the overall biodiversity of the site and ecological value.

The plant species selected should be both locally contextual and appropriate for the varied habitat zones including primary characteristics that shall ensure:

- Good soil binding and filtration species
- Minimised erosion
- Improved filtration via dense root and stem species
- Tolerance to seasonal variations including droughts and inundations
- Good suspended-solids retention
- Pollutant tolerant
- Emergent and pioneering species for natural ecological colonisation
- The creation of diverse, self-sustaining, and resilient ecosystems for high species biodiversity
- Support for local and regional habitat strategies

3.3.6. S6 ‑ DESIGN OF DRAINAGE FOR CONSTRUCTION AND MAINTENANCE AND STRUCTURAL INTEGRITY

The proposed surface water drainage system will likely be offered for adoption where it serves more than one property and therefore the Cardiff SAB will be responsible for the maintenance of the system to ensure it continues to comply with SuDS standards. For the drainage system to be adopted it must be designed and constructed in accordance with the SDSSW document and any conditions of approval stipulated by the SAB.

Information with regards to the construction methodology and requirements of the proposed system will be developed as part of the detailed design stage of the project.

3.4. FOUL WATER DRAINAGE

3.4.1. EXISTING FOUL WATER DRAINAGE REGIME

Network sewerage plans have been sought from DCWW and identify existing network of foul and surface water sewers which border the site. As noted in Section 2.4, proposed site is bordered by a network of foul, surface and combined water sewers. Diameters of these sewers vary from 150 to 450mm. The combined sewer runs along the northern and southern boundaries of the site. The surface water network runs south of the site within Wood Street and east of the site within the Central Square development. The foul water networks are located south of the site in Wood Street.

3.4.2. NETWORK CAPACITY AVAILABILITY

Further communication is to be carried out with DCWW regarding suitable connection points and capacity within their network for their foul water network located within proximity the site.

3.4.3. PROPOSED FOUL FLOWS

Peak design discharges have been calculated based on the current development criteria as described in Section 3.1 of this report and for the following:

- Residential: 4,000 litres/ dwelling/ day (peak)
- Commercial: 0.6 litres/ second/ hectare (DWF, multiply by 6 for peak, i.e. 3.6 litres/ second/ hectare)

A summary of the proposed peak foul flow calculation is shown in Table 3-6 below.

Table 3-3 - Proposed Peak Foul Flow Rates

Type of Development	No./ Floor Area	Peak Flow per Dwelling Unit/ Commercial Area	Peak Foul Flow (l/s)
Residential	1no.	4,000 l/ dw/ day	24.44

Commercial	0.25 ha	3.6 l/ s/ ha	0.89
Total	**-**	**-**	**25.33**

4. CONCLUSIONS

4.1. SURFACE WATER DRAINAGE

The aim of the surface water drainage strategy is to mimic the natural catchment processes as closely as possible. It is anticipated that the proposed surface water system will be adopted by the SAB and the proposed system will need to be designed in accordance with the statutory "Sustainable Drainage Systems Standards for Wales" (SDSSW) document 2018, local authority's SAB requirements and CIRIA's C753 SuDS Manual.

The proposed development will be split into several surface water catchments, each with a separate drainage network, dependant on their SuDS drainage method.

Surface water disposal will be via discharging to a surface water or combined sewer. The exact connection detail and discharge rates are to be confirmed with Cardiff Council and DCWW.

Surface water will be managed on the site for all rainfall events up to and including the 1 in 100 year + 40% climate change.

Sustainable drainage features (SuDS) are to be used across the development to comply with hydraulic control and water quality requirement. Interception and treatment are to be considered during detailed design.

4.2. FOUL DRAINAGE

Foul water disposal will be via discharging to a foul water or combined sewer located near the site. The exact connection detail and discharge rates are to be confirmed with Cardiff Council and or DCWW.

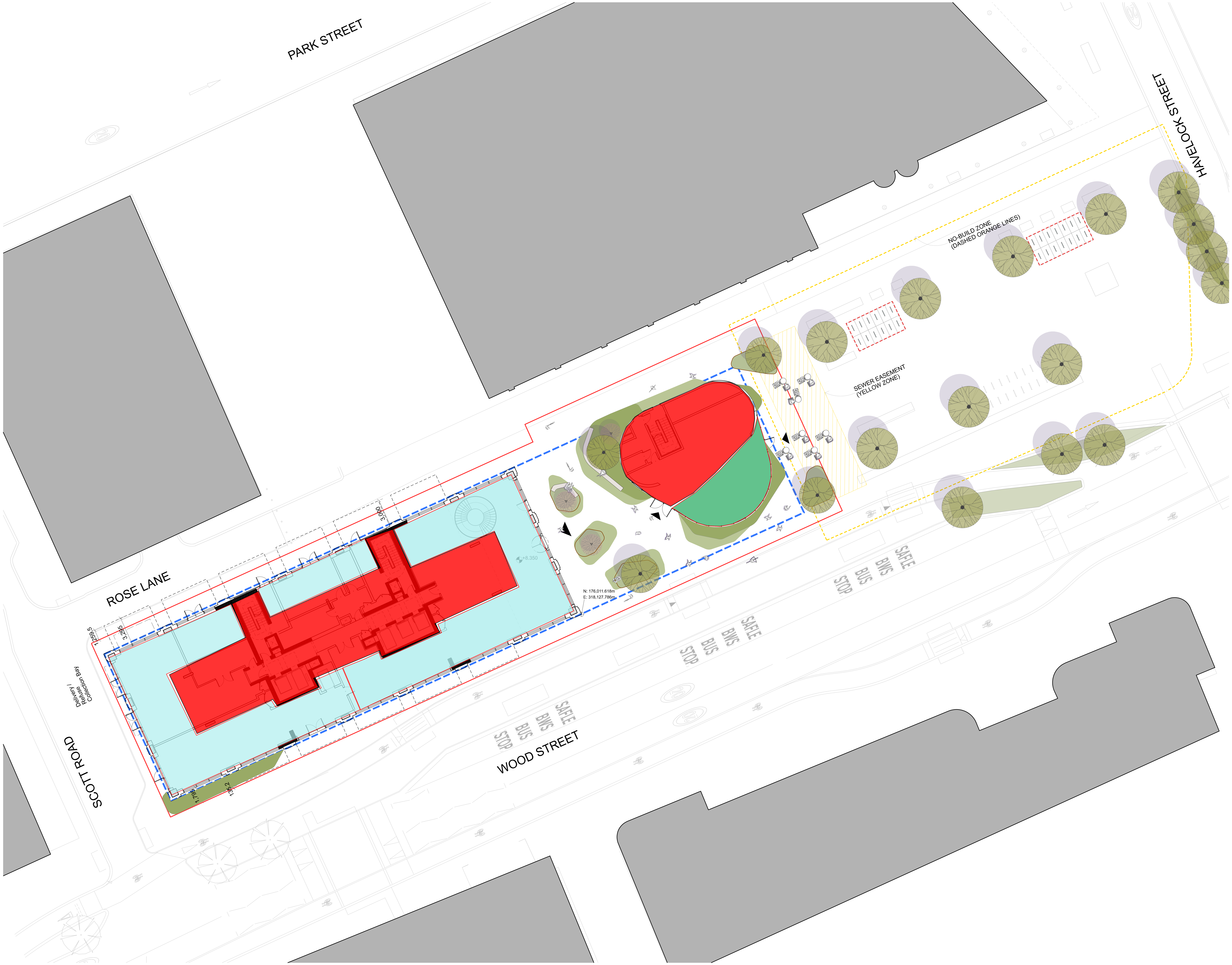
Further communication is required with the relevant statutory undertakers to advise on foul network connection points and capacity.

Appendix A

SURVEY INFORMATION

Appendix B

SCHEME DRAWINGS



All contractors must visit the site and be responsible for taking and checking all dimensions relative to their work.
5plus architects are to be advised of any variation between drawings and site conditions.

Electronic data/ drawings issued as 'read only' and should not be interrogated for measurement.
All dimensions and levels should be 'read only' from those values stated in text, on the drawings

KEY PLAN:

- APPLICATION BOUNDARY
- APPLICATION BOUNDARY - PROPOSED LANDSCAPE TBC
- SEWER EASEMENT
- NO BUILD ZONE
- PROPOSED BASEMENT
- PROPOSED ENTRANCE

Blue Green Roof Area

Green Roof Area

Impermeable roof Area

All other remaining areas within the application boundary to feature permeable paving with attenuation crates

REV:	DATE:	DETAILS:
00	27/06/25	Issue for Information.

5plus

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PROJECT:
Central Square
Cardiff

TITLE:
Site Plan
Proposed Buildings

SCALE:	ORIGIN DATE:	DRAWN:	CHECKED:
1:200@A1	18.06.25	AG	PN

STATUS:
Information

PROJECT	DRAWING NO:	REV:
06159	5PA-MP-00-DR-A-001200	0

Appendix C

RUNOFF RATES

Greenfield runoff rate estimation tool

www.uksuds.com | Greenfield runoff rate estimation tool (https://www.uksuds.com/)

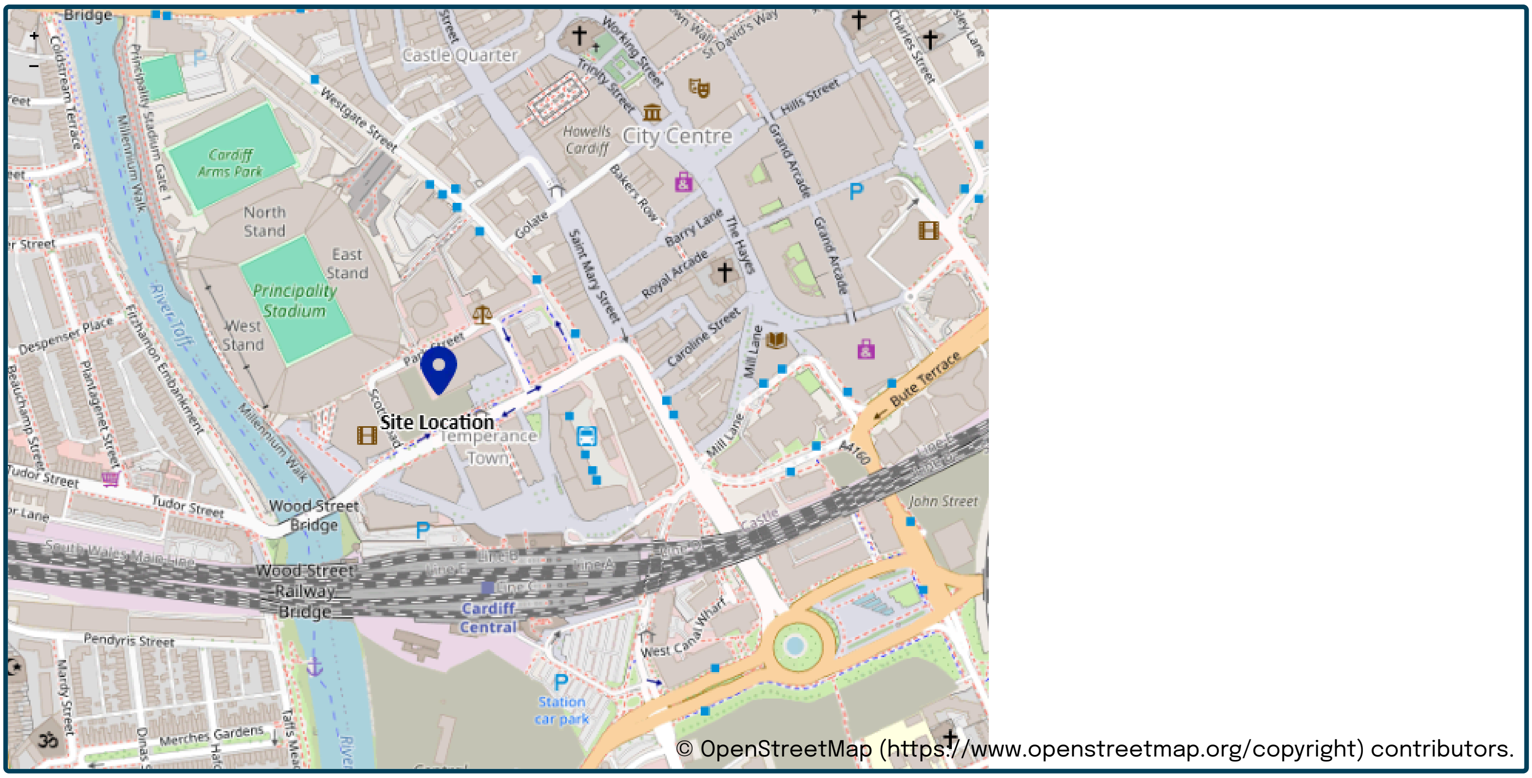
This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Project details

Date	21/07/2025
Calculated by	Ammar Alkadry
Reference	
Model version	2.0.1

Location

Site name	Central Tower
Site location	



Site easting	318115
Site northing	176016

Site details

Total site area (ha)	0.2 ha

Greenfield runoff

Method

Method	IH124

IH124

	My value		Map value
SAAR (mm)	1020 mm		1020
How should SPR be derived?	WRAP soil type		
WRAP soil type	5		4
SPR	0.53		
QBar (IH124) (l/s)	1.9 l/s		

Growth curve factors

	My value		Map value
Hydrological region	9		9
1 year growth factor	0.88		
2 year growth factor	0.93		
10 year growth factor	1.42		
30 year growth factor	1.78		
100 year growth factor	2.18		
200 year growth factor	2.46		

Results

Method	IH124
Flow rate 1 year (l/s)	1.7 l/s
Flow rate 2 year (l/s)	1.8 l/s
Flow rate 10 years (l/s)	2.8 l/s
Flow rate 30 years (l/s)	3.5 l/s
Flow rate 100 years (l/s)	4.2 l/s
Flow rate 200 years (l/s)	4.8 l/s

Disclaimer

Appendix D

DRAINAGE CALCULATIONS

Greenroof			
Parameter	**Value**	**Units**	**Notes**
Required Attenuation Capacity	130	m^3	This is based on a 1:100 storm event +40% climate change allowance and a discharge rate of 2.5 l/s.
Total Available Area	360	m^2	
Crates Volume	0.02	m^3/m^2	
Soil Volume (void ratio)	45%	%	
Soil Thickness	0.3	m	The soil thickness can be increased up to 0.3 m to increase capacity.
Soil Total Volume	108	m^3	
Crates Total Attenuation Capacity	8	m^3	
Soil Total Attenuation Capacity	49	m^3	
Total Attenuation Capacity	56	m^3	

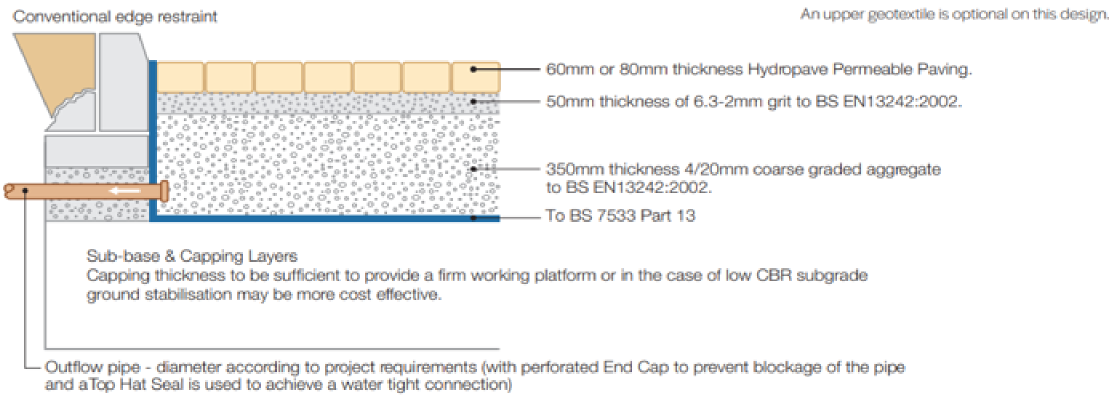
Blueroof			
Parameter	**Value**	**Units**	**Notes**
Required Attenuation Capacity	130	m^3	This is based on a 1:100 storm event +40% climate change allowance and a discharge rate of 2.5 l/s.
Total Available Area	431	m^2	This is based on the assumption that 100% of the roof is a green roof.
Soil Volume (void ratio)	560	l/m^3	
Soil Thickness	0.3	m	The soil thickness can be increased up to 0.3 m to increase capacity.
Soil Total Volume	129	m^3	
Soil Total Attenuation Capacity	72	m^3	
Total Attenuation Capacity	72	m^3	

Greenroof			
Parameter	**Value**	**Units**	**Notes**
Required Attenuation Capacity	124	m^3	This is based on a 1:100 storm event +40% climate change allowance and a discharge rate of 3 l/s. brownfield discharge rate + 30%
Total Available Area	360	m^2	
Crates Volume	0.02	m^3/m^2	
Soil Volume (void ratio)	45%	%	
Soil Thickness	0.3	m	The soil thickness can be increased up to 0.3 m to increase capacity.
Soil Total Volume	108	m^3	
Crates Total Attenuation Capacity	8	m^3	
Soil Total Attenuation Capacity	49	m^3	
Total Attenuation Capacity	56	m^3	

Blueroof			
Parameter	**Value**	**Units**	**Notes**
Required Attenuation Capacity	124	m^3	This is based on a 1:100 storm event +40% climate change allowance and a discharge rate of 3 l/s. brownfield discharge rate + 30%
Total Available Area	431	m^2	This is based on the assumption that 100% of the roof is a green roof.
Soil Volume (void ratio)	560	l/m^3	
Soil Thickness	0.3	m	The soil thickness can be increased up to 0.3 m to increase capacity.
Soil Total Volume	129	m^3	
Soil Total Attenuation Capacity	72	m^3	
Total Attenuation Capacity	72	m^3	

Footpath Permeable Paving 2.5l/s			
Parameter	**Value**	**Units**	**Notes**
Required Attenuation Capacity	24	m^3	This is based on a 1:100 storm event +40% climate change allowance and a discharge rate of 2.5 l/s.
Total Available Area	332	m^2	based on the assumption that 80% of the paved area will be footway with occasional crossover
Sub Soil Volume (void ratio)	30%	%	Based on specification document from Marshalls.co.uk
Sub Soil Thickness	0.35	m	
Sub Soil Total Volume	116.2	m^3	
Sub Soil Total Attenuation Capacity	34.86	m^3	
Total Attenuation Capacity	34.86	m^3	

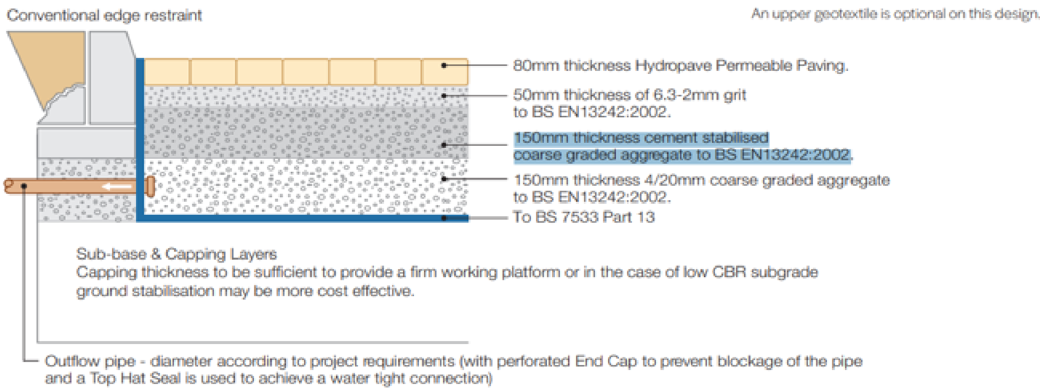
LOADING CATEGORY B: 1-5% CBR



B/Car Parking	100	Emergency vehicles only	• Car parking bays and aisles • Railway station platforms • External car showrooms • Sports stadium pedestrian routes • Footways with occasional overrun • Private drives • Footway crossover

Vehicle Access Permeable Paving 2.5l/s			
Parameter	**Value**	**Units**	**Notes**
Required Attenuation Capacity	2	m^3	This is based on a 1:100 storm event +40% climate change allowance and a discharge rate of 2.5 l/s.
Total Available Area	83	m^2	based on the assumpotion that 20% of the paved area will be acceccable by HGV
Sub Soil Volume (void ratio)	30%	%	Based on specification document from Marshalls.co.uk
Sub Soil Thickness	0.15	m	
Sub Soil Total Volume	12.45	m^3	
Sub Soil Total Attenuation Capacity	3.74	m^3	
Total Attenuation Capacity	3.74	m^3	

LOADING CATEGORY D: 1-5% CBR



D/Shopping	0.15msa	10 large HGV/week	• Retail development delivery access route • School/college access route • Office block delivery route • Garden centre delivery route • Deliveries to small residential development • Fire station yard • Airport car park with bus to terminal • Sports stadium access route/forecourt

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