

Mirvac Green Square – Sites 8 & 19

Integrated Water Management Plan 411 Botany Road and 6 Geddes Avenue, Zetland NSW 2017

CLIENT/ Mirvac Green Square Pty Ltd

DATE/ 15/01/2026

CODE/ 22-1030

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Document Registration

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Document Author	James Clare

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1. Introduction

This report supports one of the detailed State Significant Development Applications (SSDA) (SSD- 84322496) and concurrent rezoning being lodged with the Department of Planning, Housing and Infrastructure (DPHI) for the construction of five mixed-use residential buildings and one mixed-use student accommodation building at 411 Botany Road and 6 Geddes Avenue, Zetland (the site). The site is also known collectively as Sites 8A, 8B, 8C, 8D, 19A and 19B (Sites 8A-D and 19A-B) of the Green Square Town Centre (GSTC) and is legally described as Lot 11 and 12 in DP 1225135. The proponent for the SSDA is Mirvac Green Square Pty Limited.

The proposal aims to:

- Respond to the housing challenges facing Sydney through the delivery of diverse housing types in a highly accessible location;
- Demonstrate the strategic and site-specific merit of accommodating the proposed height and FSR of development on the site;
- Contribute to the establishment of Green Square as a town centre through a mixed-use approach and use urban design principles to integrate residential and non-residential land uses;
- Improve the pedestrian connectivity throughout the site, while encouraging the direct connections to public transport and the existing street network; and
- Appropriately respond to neighbouring development and public domain within the GSTC through podium and tower forms with appropriate massing, which protect solar access and minimise environmental impacts.

1.1. Background – Housing Delivery Authority

On 19 December 2024, the Housing Development Authority (HDA) was established by DPHI to accelerate the delivery of housing across NSW, under the Environmental Planning and Assessment (Housing Delivery Authority) Order 2024. This has provided a new State Significant Development pathway in which the proposed redevelopment can be undertaken through.

The site was declared State Significant Development (SSD) pursuant to State Significant Declaration Order 2025 (No 2) issued on 26 February 2025. The order specifies development in EOI application 232525 dated 17 January 2025, including development for the purposes of mixed use development comprising commercial premises and residential accommodation with the provision for affordable housing and Build to Rent (BTR) at 960A Bourke Street, 6 Geddes Ave and 411 Botany Road, Zetland as identified in Schedule 18, is declared to be SSD.

The HDA SSD pathway has been established to accelerate delivery of housing and requires that the subject SSD is lodged within 9 months from receipt of the Secretary's Environmental Assessment Requirements (SEARs). Current SEARs for the project were issued for Early Works on 20 October 2025 (SSD-82328958) (SSDA 1), Sites 7, 17 and 18 on 15 May 2025 (SSD-83899206) (SSDA 2) and for Sites 8 and 19 on 15 May 2025 (SSD- 84322496) (SSDA 3).

The key features of the Mirvac Green Square HDA proposal are:

- Detailed development consent for the purposes of a mixed use development, with significant residential components comprising build to sell, student accommodation and build to rent dwelling stock and ground floor non-residential uses.
- Delivery of between 1,000 to 1,200 dwellings across 9 buildings in low rise and high rise tower formats.
- Delivery of Affordable Housing dwellings.
- Delivery of the components in two-stage detailed SSDA process.

In conjunction with the SSDA, a State-assessed rezoning process is intended to facilitate the proposed development.

This SSDA forms the third application as part of broader HDA declared development and forms the main works to develop Sites 8A-D and 19A-B of the GSTC.

1.2. Site Description

The site is located at 411 Botany Road and 6 Geddes Avenue, Zetland and is located within the GSTC. It is situated within the Sydney Local Government Area (LGA) and is located approximately 3.5km south of the Sydney CBD and within immediate proximity of the Green Square Railway Station. The site forms the southern component of the Mirvac HDA proposal, consisting of two lots which is legally described as Lot 11 and 12 in DP1225135. An aerial photo of the site is shown at **Figure 1** below.

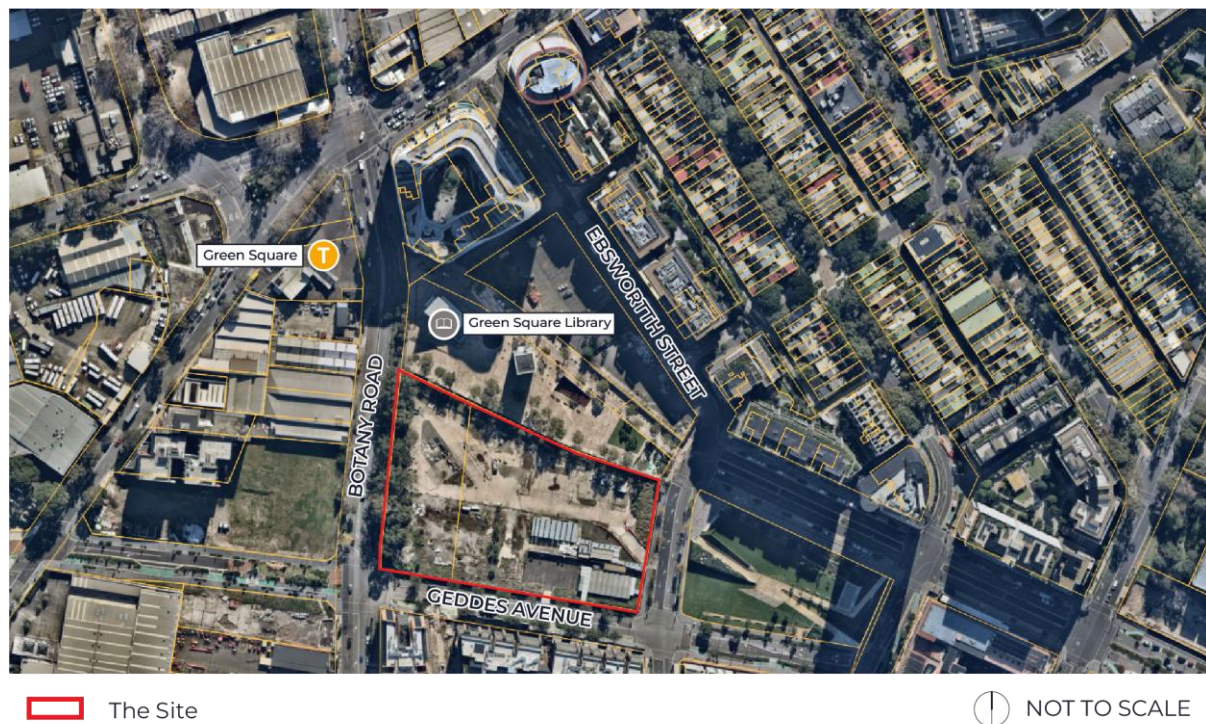


Figure 1 Sites 8A-D and 19A-B Aerial

Source: Nearmap, Colliers Urban Planning edits.

1.3. Early Works SSDA

This application is preceded by a separate SSDA for early works that prepare the site for the proposed development. SSDA (SSD-82328958) has been submitted to DPHI to seek approval for the carrying out of site preparatory, excavation, soil treatment works and civil works relating to a future mixed-use development on the site. The application also included a procedural stratum subdivision to create site 8B and the development lot, which will be further subdivided in the Main Works SSDA

1.4. Overview of the Proposed Development

The proposed development seeks to deliver the construction of five mixed-use residential buildings and one mixed-use student accommodation building which will integrate residential, retail, resident amenity and public domain uses. Specifically, the proposal seeks approval for:

- Construction of shared basement, incorporating waste facilities, servicing, 581 car spaces and bicycle spaces.
- Construction of site 8A as a mixed use residential building up to 29 storeys in height, comprising:
 - ▶ 266 dwellings including a variety of dwelling types including 1, 2,3 and four-bedroom apartments.

- ▶ Non-residential floor space including retail, food and beverage tenancies, and a resident lobby.
- Construction of site 8B as a mixed use student accommodation building up to 22 storeys in height, comprising:
 - ▶ 514 rooms (711 beds).
 - ▶ Non-residential floor space including retail, food and beverage tenancies, a residential lobby and loading dock.
 - ▶ Residential amenities including communal space.
- Construction of site 8C as a mixed use residential building up to 29 storeys in height, comprising:
 - ▶ 254 dwellings including a variety of dwelling types including 1, 2,3 and four-bedroom apartments.
 - ▶ Non-residential floor space including retail, food and beverage tenancies, a resident lobby and loading dock.
 - ▶ Residential amenities including communal space and a pool.
- Construction of site 8D as a mixed use residential building up to 8 storeys in height, comprising:
 - ▶ 51 dwellings including a variety of dwelling types including 1, 2 and three-bedroom apartments.
 - ▶ Non-residential floor space including retail, a resident lobby and loading dock.
 - ▶ Residential amenities including communal space.
- Construction of site 19A as a mixed use residential building up to 29 storeys in height, comprising:
 - ▶ 187 dwellings including a variety of dwelling types including 1, 2, 3 and four-bedroom apartments.
 - ▶ Non-residential floor space including retail, food and beverage tenancies, and a resident lobby.
 - ▶ Residential amenities including communal space and a pool.
- Construction of site 19B as a mixed use residential building up to 8 storeys in height, comprising:
 - ▶ 42 dwellings including a variety of dwelling types including 1, 2 and three-bedroom apartments.
 - ▶ Non-residential floor space including retail, and resident lobby.
- Public domain and landscaping improvements, including:
 - ▶ External pedestrian laneways, pathways and through-site links.
 - ▶ Construction of Woolpack Street and Hinchcliffe Street as a vehicular access road.
 - ▶ Tree removal, protection, new plantings and landscaping works.
- Utility and stormwater connections to support the new development.
- Staged stratum subdivision of the development lot to create the stratum lots associated with the residential buildings above.
- Concurrent amendments to the Sydney Local Environmental Plan (Green Square Town Centre) 2013 to facilitate the SSDA.

1.5. Secretary's Environmental Assessment Requirements

In accordance with section 4.39 of the Environmental Planning & Assessment Act 1979 (EP&A Act), Secretary's Environmental Assessment Requirements (SEARs) (SSD-84322496) have been issued. This report has been prepared to respond to the issued SEARs, as set out in the table below.

Table 1 SSD-84322496 SEARs

SEAR	Response / Location Addressed in Report
11. Water Management Detail the proposed drainage design and servicing infrastructure to be incorporated as part of the development	Drainage design has been discussed in detail in Section 4 of this report. Electrical, Recycled Water, sewer and potable water infrastructure is present around site on Geddes Avenue, Paul Street and Botany Road for the development to connect into. A Combined Services Plan has been prepared to demonstrate this – refer to AT&L drawing DA-1-8280.
Demonstrate how the development complies with council's drainage requirements and identify proposed stormwater treatment and water quality management measures to minimise adverse environmental impacts.	Council and Sydney Water's drainage requirements have been complied with as discussed in Section 4 of this report. On-Site Detention tanks have been designed as per Sydney Water's requirements and stormwater treatment devices have incorporated to achieve Council's pollutant reduction targets.

2. Scope of Report

The scope of this report is to discuss the water management strategy for this site, including:

- Stormwater management, including On-Site Detention (OSD);
- Water Sensitive Urban Design; and
- Sediment and Erosion Control

2.1. Supporting Documentation

The following documentation should be read in conjunction with this report:

- Architectural SSDA drawings by Mirvac Design (Ref: DA-8AC-101 to 193 and DA-19AB-000 to 190)
- Architectural SSDA drawings by DKO (Ref: DA-8BD-000 to 191)
- Landscape SSDA drawings by Oculus (Ref: LS-DA-1-8400 series)
- Civil Engineering Drawings by AT&L (Reference: DA-1-8200 series)

3. Flooding

A Flood Impact and Risk Assessment (FIRA) has been carried out by GRC Hydro (Job no. 250066, dated 04-2026). The subject site is noted as being affected by the PMF flood extents (refer Figure 2) and the general flood planning requirement is to have the building entrances connecting to the basement at the PMF flood level particularly along Woolpack Street, Geddes Avenue and Botany Road.

Non-habitable spaces such as ground floor retail spaces without connection to the basement are able to achieve a reduced Flood Planning Level of the 1% AEP flood level. This is shown in Figure 4 and demonstrates that there is no flood planning requirement for the site in this scenario.

This strategy also maintains accessibility between the buildings and the Plaza and connectivity from the proposed retail spaces and the public domain.

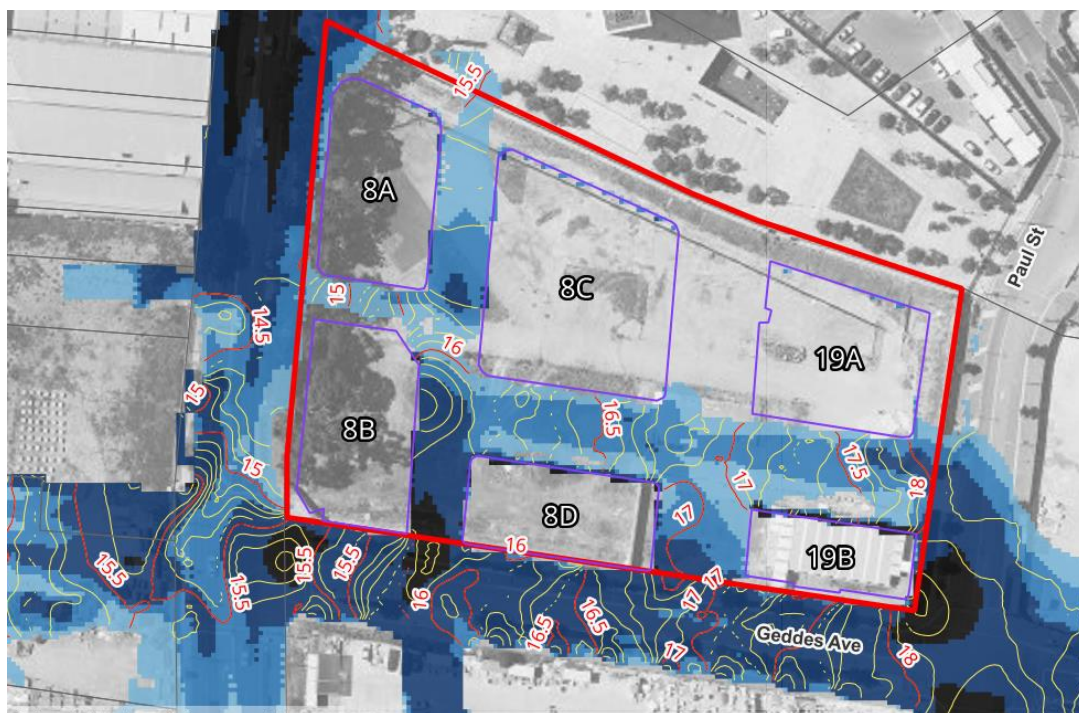


Figure 2: PMF Flood depth and Levels Map (Source: GRC Hydro January 2026)

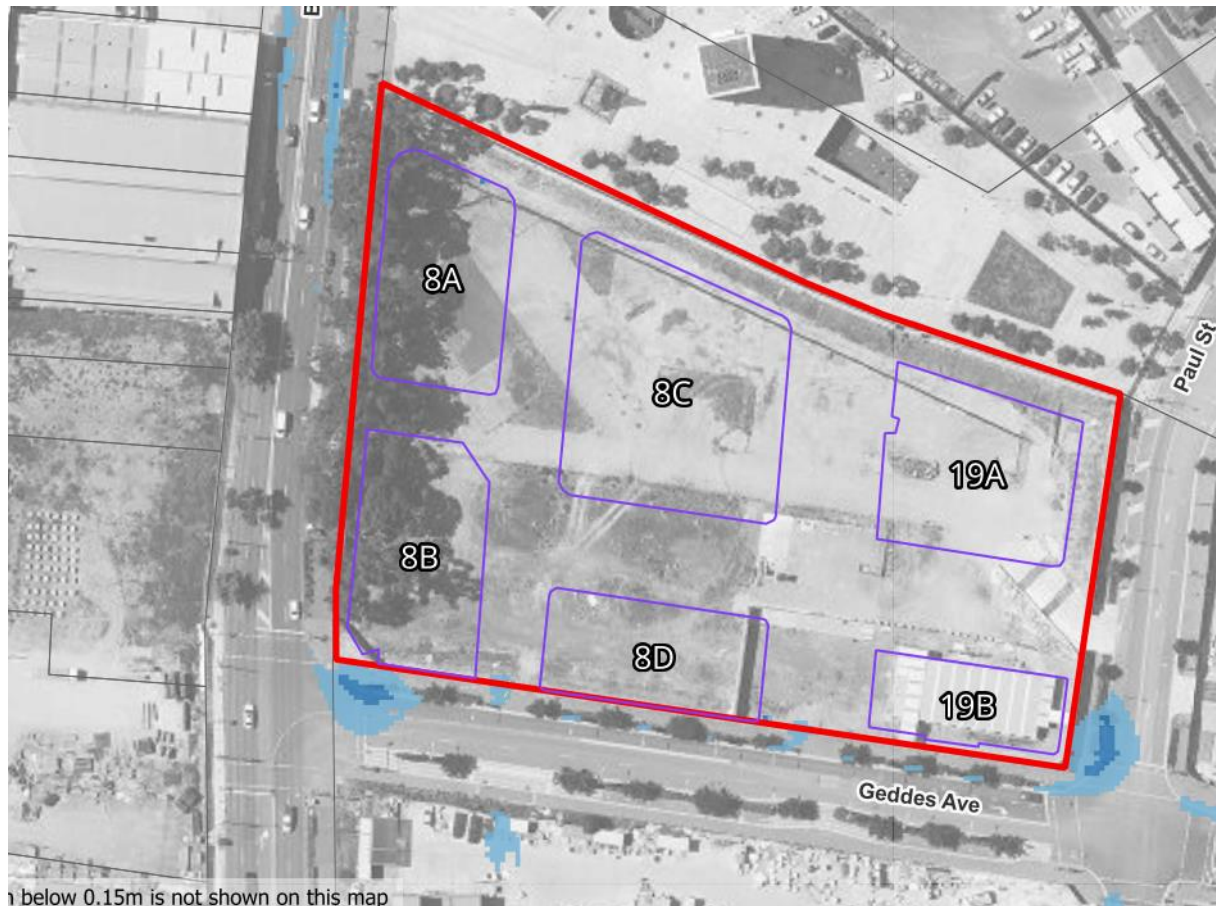


Figure 3: 1% AEP + Climate Change Flood Map (Source: GRC Hydro January 2026)

4. Stormwater Management

4.1. Design Criteria

The design criteria has been adopted from the requirements stipulated in the following documents:

- Sydney Development Control Plan 2012
- Green Square Town Centre Development Control Plan
- Sydney Streets Technical Specification (July 2025), Section A4 Stormwater Drainage Design and Section C Standard Drawings
- City of Sydney Stormwater Drainage Manual (February 2017)
- Managing Urban Stormwater Soil and Construction (2004) by Landcom ('The Blue Book')
- AS/NZS3500.3 (2025) Plumbing and Drainage
- Sydney Water On-Site Detention Guidelines
- Australian Rainfall and Runoff (ARR) 2019

4.1.1. Hydrology

As per City of Sydney Council requirements, this stormwater network has been preliminarily designed by AT&L to accommodate both a minor (5% AEP) and major (1% AEP) storm event as outlined by clause 4.7.2.1 in the Sydney Streets Technical specifications.

Watercom DRAINS is used as the hydrology and hydraulic modelling software. The ILSAX method has been utilised when modelling the stormwater network within DRAINS.

Further parameters include:

- Rainfall intensities have been sourced from Bureau of Meteorology's (BOM) rainfall IFD Data System.
- Runoff coefficients shall be calculated in accordance with the ARR.
- Blockage factors that are considered have been sourced from Table 2 in Clause 4.7.3.2 in the Sydney Streets Technical specifications document.
- 1% AEP overland flow limits for pedestrian and shared zone areas have been sourced from, table 5 in clause 4.7.3.2 in the Sydney Street Technical specifications.

4.1.2. Hydraulics

- A hydraulic grade line HGL design method shall be adopted for pipe drainage design and will be shown on long sections.
- All pipes shall be a minimum Class 4 RCP unless otherwise approved by Council Engineers.
- Minimum pipe size for public domain is to be DN375 RCP.
- All RCP pipes to be constructed to include rubber ring joints.
- Pipe cover to be minimum 600mm in roadways, and 400mm in footpath and landscaped areas.
- Minimum internal grade of 1% is to be adopted for design. A maximum of 10% is to also be adopted.
- Pipe friction coefficients to be adopted in the DRAINS model will be the standard coefficients set. See table below outlining pipe model properties.

Table 2- Pipe Details

Material	Mannings – n	Colebrook-White - k	Minimum Pipe Class U.N.O
RCP	0.013	0.3	4

- All pipes shall be designed for the ultimate service loads and where applicable, construction loads will be accounted for.

- Where tailwater level is unknown, a 150mm freeboard has been adopted for the purpose of design.
- Maximum overland flow limit for pedestrian and shared zone is 50mm deep 1.5m wide and a maximum velocity of 0.4m²/s.
-

4.2. Proposed Stormwater Drainage

4.2.1. On-Site Detention Tanks

The stormwater management strategy is to collect the stormwater from each building within On-Site Detention (OSD) tanks which will discharge stormwater via weir and orifice in a controlled manner into Council's stormwater network in Green Square Plaza and Geddes Avenue.

One below-ground OSD is proposed per lot in accordance with Sydney Water stormwater team's advice. An overview of the OSD locations is shown on Figure 4.

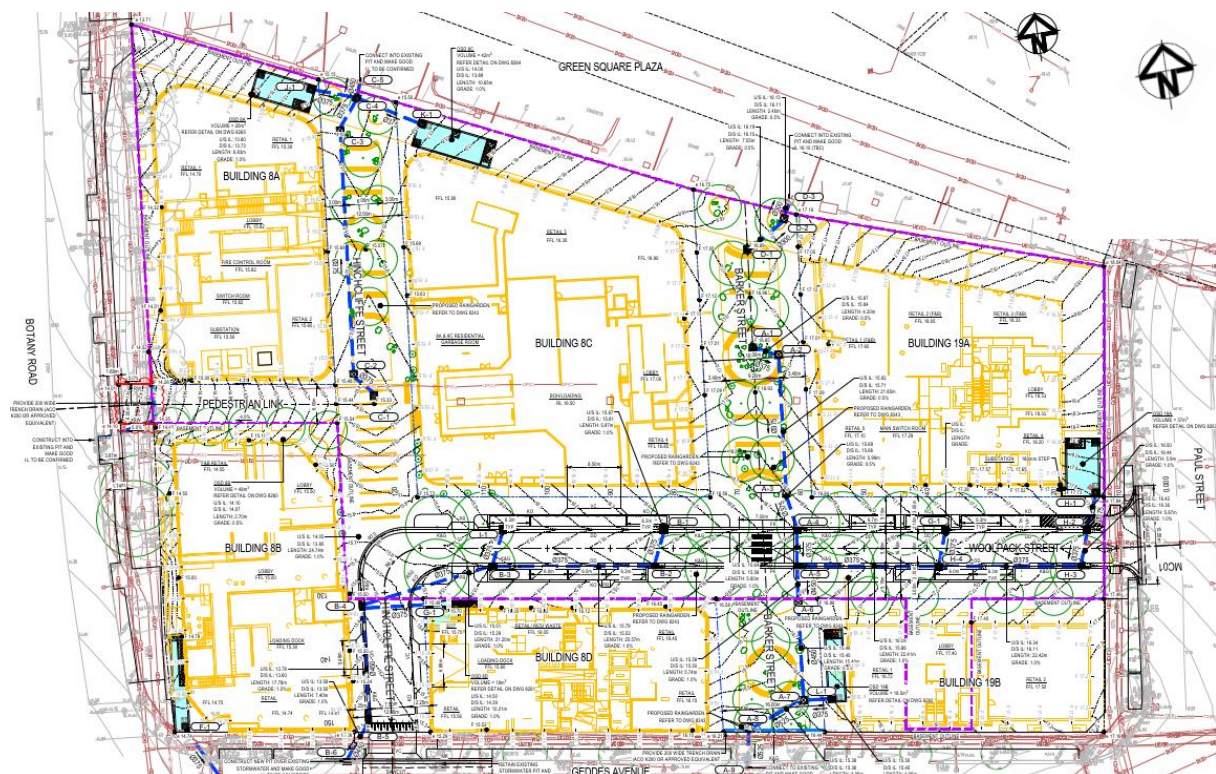


Figure 4: OSD Locations (Source: AT&L Civil Drawings)

As per Council's guidelines, compliance is required with Sydney Water's OSD requirements. Advice was sought from Sydney Water on the minimum OSD volume requirement and Permissible Site Discharge (PSD) (refer Appendix B), which was used to design the proposed OSDs. The proposed OSDs parameters are provided in Table 3 below.

Table 3: OSD Parameters

Building	Min. OSD Volume (m3) (per Sydney Water)	Permissible Site Discharge (l/s) per Sydney Water	OSD Volume Provided	5% AEP Discharge (l/s)	1% AEP Discharge (l/s)
8A	25	56	26	38	52
8B	23	51	25	24	50
8C	41	94	42	59	75
8D	16	35	18	24	34
19A	31	70	37	57	69
19B	15	34	18.5	21	34

4.2.2. Laneway Drainage

Barker Street and Hinchcliff Street North are designed with a two-way cross-fall towards the middle of the laneways, with crest and sag falls longitudinally towards the outer edges of the site. Each pedestrian thoroughfare will have raingardens, pits and pipes and trench drains as required.

The raingardens have been proposed as a Water Sensitive Urban Design measure to reduce pollutants in the runoff and is discussed further in Section 5. Refer to Figure 5 for a typical section through the laneways.

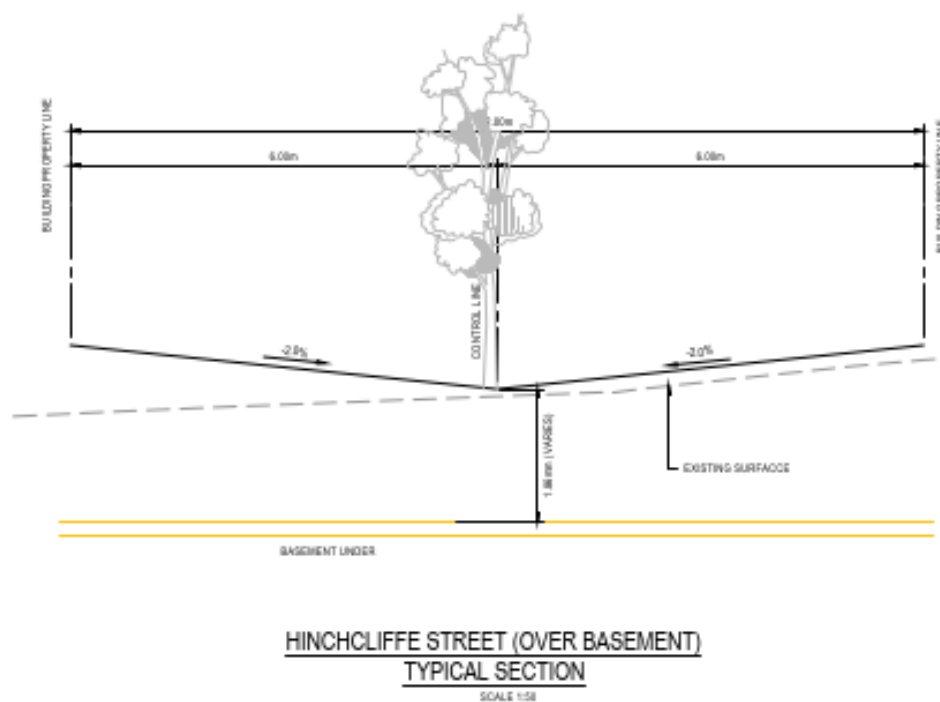


Figure 5: Typical section through Hinchcliff Street

Woolpack Street is the main thoroughfare connecting Paul Street to Geddes Avenue. This road reserve has been designed with a two way cross fall to kerb and gutter / dish drain along the nominal kerb lines with the adjacent verge and parking bays falling away from the façade line towards the kerb and gutter.

The road falls longitudinally from east to west with a continuous fall from the Paul Street site boundary through to Geddes Avenue to support overland flow and flood planning requirements. Refer Figure 6 for a typical section through Woolpack Street.

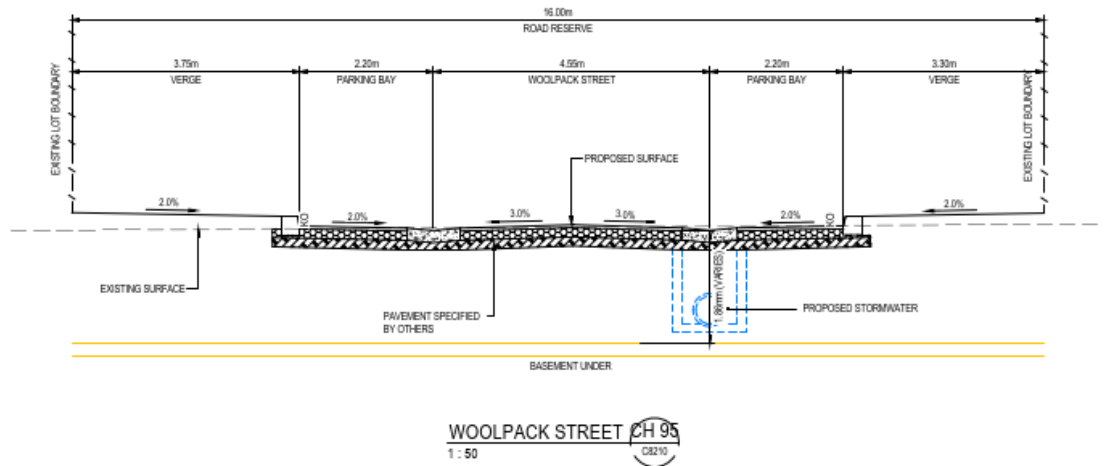


Figure 6: Typical section through Woolpack Street

5. Water Sensitive Urban Design

Water Sensitive Urban Design (WSUD) is intended to minimise the impacts of development upon the water cycle and to achieve more sustainable forms of urban development. MUSIC X software has been utilised to demonstrate that the proposed stormwater treatment meets the pollutant reduction targets required by the City of Sydney. The properties, concentration parameters and climate data are preset and remained unchanged as per the City of Sydney MUSIC-link Profile.. Refer to a conceptual view of the model and MUSIC-Link report in Appendices C and D for further information.

5.1. Water Quality Devices and Measures

A combination of pit baskets (Ocean Protect's 'Oceanguard' has been nominated) and filtration cartridges (Ocean Protect's 'Stormfilters' have been nominated) are proposed within the OSD tanks to treat runoff from the building roof and open space areas. Additionally, raingardens have been proposed within the Council-owned Woolpack Street, Barker Street and Hincliffe Street.

The site is also serviced by the Green Square recycled water system which provide a purple pipe network to the site for irrigation and other non-potable uses. Refer to Infrastructure Report (Ref: 250361_RP-0001_Revision B) by JHA for further details.

5.2. Water Quality Modelling - MUSIC X Results

The water quality modelling demonstrated that the proposed treatment measures satisfactorily meet the pollutant reduction targset set by City of Sydney. The results are shown below.

Table 4: MUSIC Modelling Results

Pollutant	Sources (Kg/yr)	Residual Load (Kg/yr)	Reduction (%)	CoS Target Reduction (%)
Total Suspended Solids	1754	246	85.97	85
Total Phosphorus	3.732	1.107	70.34	65
Total Nitrogen	31.11	13.27	57.34	45
Gross Pollutantsuiui	336.7	14.36	95.74	90

6. Sediment and Erosion Control

6.1. Sediment and Erosion Control (Construction)

This Stormwater Management Plan has been prepared in accordance with the Landcom's Managing Urban Stormwater- Soils and Construction (2004) and the relevant Council guidelines.

6.2. Sources of Pollution

The activities and aspects of the works that have potential to lead to erosion, sediment transport, siltation and contamination of natural waters include:

- Earthworks undertaken immediately prior to rainfall periods.
- Work areas that have not been stabilised.
- Clearing of vegetation and the methods adopted, particularly in advance of construction works.
- Stripping of topsoil, particularly in advance of construction works.
- Bulk earthworks and construction of pavements.
- Works within drainage paths, including depressions and waterways.
- Stockpiling of excavated materials.
- Storage and transfer of oils, fuels, fertilisers and chemicals.
- Maintenance of plant and equipment.
- Ineffective implementation of erosion and sediment control measures.
- Inadequate maintenance of environmental control measures; and
- Time taken for the rehabilitation / revegetation of disturbed areas.

6.3. Potential Impacts

The major potential impacts on the riparian environment relate to erosion of distributed areas or stockpiles and sediment transportation. Potential adverse impacts from erosion and sediment transportation can include:

- Loss of topsoil.
- Increased water turbidity.
- Decreased levels of dissolved oxygen.
- Changed salinity levels.
- Changed pH levels.
- Smothering of stream beds and aquatic vegetation.
- Reduction in aquatic habitat diversity.
- Increased maintenance costs; and
- Decrease in waterway capacity leading to increased flood levels and durations.

6.4. Construction Methodology

The following construction methodology will be followed to minimise the impact of sedimentation due to construction works:

- Diversion of "clean" water away from the disturbed areas and discharge via suitable scour protection.
- Diversion of sediment-laden water into temporary sediment control tanks/basins to capture the design storm volume and undertake flocculation (if required).

- Provision of construction traffic shaker grids and wash-down facilities to prevent vehicles carrying soil beyond the site.
- Provision of catch drains to carry sediment-laden water to sediment tanks/basins.
- Provision of silt fences to filter and retain sediments at source; and
- Provision of geofabric filters to new stormwater pits to retain sediments at source; and
- Where future construction and building works are not proposed, the rapid stabilization of disturbed and exposed ground surfaces with turf or hydro-seeding.

6.5. Site Inspection and Maintenance

The inspection and maintenance requirements outlined in this section must be carried out while either earthworks or quarrying is being conducted, and all areas re-established.

The Contractor will be required to inspect the site after every rainfall event and at least weekly, and will:

- Inspect and assess the effectiveness of the SWMP and identify any inadequacies that may arise during normal work activities or from a revised construction methodology. Construct additional erosion and sediment control works as necessary to ensure the desired protection is given to downstream lands, drainage systems, and waterways.
- Ensure that drains operate properly and to affect any repairs.
- Remove spilled sand or other materials from hazard areas, including lands closer than 5 metres from areas of likely concentrated or high velocity flows especially waterways and paved areas.
- Remove trapped sediment whenever less than design capacity remains within the structure.
- Ensure rehabilitated lands have affectively reduced the erosion hazard and to initiate upgrading or repair as appropriate.
- Maintain erosion and sediment control measures in a fully functioning condition until all construction activity is completed and the site has been rehabilitated; and
- Remove temporary soil conservation structures as the last activity in the rehabilitation.

Appendix A – Civil Drawings

Drawing No.	Revision	Document Title
ALL DRAWINGS		
DA-1-8200	B	COVER SHEET LOCALITY PLAN AND DRAWING LIST
DA-1-8201	B	NOTES SHEET
DA-1-8205	B	GENERAL ARRANGEMENT PLAN
SITEWORKS		
DA-1-8210	B	SITEWORKS AND STORMWATER DRAINAGE PLAN
DA-1-8220	B	ROAD LONGITUDINAL SECTIONS
DA-1-8230	B	ROAD TYPICAL CROSS SECTIONS
DA-1-8240	B	PAVEMENT, SIGNAGE AND LINEMARKING PLAN
DA-1-8241	B	SITEWORKS AND STORMWATER DETAILS SHEET 1
DA-1-8242	B	SITEWORKS AND STORMWATER DETAILS SHEET 2
DA-1-8243	B	SITEWORKS AND STORMWATER DETAILS SHEET 3
DA-1-8244	A	SITEWORKS AND STORMWATER DETAILS SHEET 4
STORMWATER DRAINAGE		
DA-1-8250	B	STORMWATER DRAINAGE WSUD CATCHMENT PLAN
DA-1-8251	B	STORMWATER DRAINAGE WSUD CALCULATION
DA-1-8255	B	STORMWATER DRAINAGE OSD & ROAD CATCHMENT PLAN
DA-1-8260	B	STORMWATER DRAINAGE OSD DETAIL SHEET 1
DA-1-8261	B	STORMWATER DRAINAGE OSD DETAIL SHEET 2
DA-1-8262	B	STORMWATER DRAINAGE OSD DETAIL SHEET 3
DA-1-8263	B	STORMWATER DRAINAGE OSD DETAIL SHEET 4
DA-1-8264	B	STORMWATER DRAINAGE OSD DETAIL SHEET 5
DA-1-8265	B	STORMWATER DRAINAGE OSD DETAIL SHEET 6
UTILITIES		
DA-1-8280	B	COMBINED SERVICES PLAN
DA-1-8281	B	COMBINED SERVICES SECTIONS
EROSION AND SEDIMENT		
DA-1-8285	B	EROSION & SEDIMENT CONTROL PLAN
DA-1-8286	B	EROSION & SEDIMENT CONTROL DETAILS
CONSTRUCTION STAGING		
DA-1-8290	B	CONSTRUCTION STAGING PLAN STAGE A
DA-1-8291	B	CONSTRUCTION STAGING PLAN STAGE B
DA-1-8292	B	CONSTRUCTION STAGING PLAN STAGE C
DA-1-8293	B	CONSTRUCTION STAGING PLAN STAGE D

Appendix B – Sydney Water OSD requirements

RE: [External] Green Square Stage 4 & 5 Sydney Water OSD Requirement



Stormwater <Stormwater@sydneywater.com.au>

To ● Chris Khant

Cc ✓ James Clare



You forwarded this message on 21/11/2025 9:19 AM.

Click here to download pictures. To help protect your privacy, Outlook prevented automatic download of some pictures.

The On-Site Detention requirements for the sites at Green Square Stage 4 & 5, are as follows:

Building Lot 8A

- Total Site Area 1523 Square meters
- On Site Detention 25 Cubic meters
- Permissible Site Discharge 56 L/s

Building Lot 8B

- Total Site Area 1410 Square meters
- On Site Detention 23 Cubic meters
- Permissible Site Discharge 51 L/s

Building Lot 8C

- Total Site Area 2559 Square meters
- On Site Detention 41 Cubic meters
- Permissible Site Discharge 94 L/s

Building Lot 8D

- Total Site Area 971 Square meters
- On Site Detention 16 Cubic meters
- Permissible Site Discharge 35 L/s

Building Lot 19A

- Total Site Area 1910 Square meters
- On Site Detention 31 Cubic meters
- Permissible Site Discharge 70 L/s

Building Lot 19B

- Total Site Area 938 Square meters
- On Site Detention 15 Cubic meters
- Permissible Site Discharge 34 L/s

Best Regards

Jeya Jeyadevan

Senior Capability Assessor

Water and Environment Services

Sydney Water, Level 13, 1 Smith Street, Parramatta NSW 2150

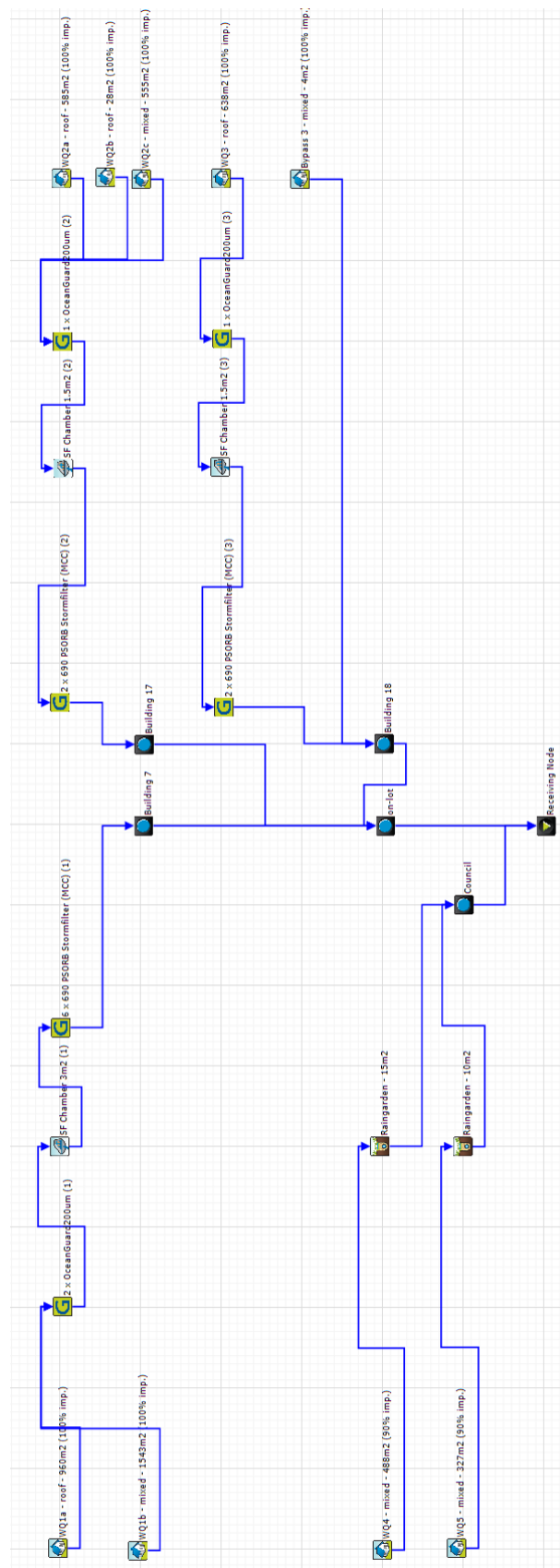


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Appendix C – MUSIC Model layout



Appendix D – MUSIC-Link Report

MUSIC-link Report

Project Details		Company Details	
Project:	Green Square Stage 4 & 5	Company:	AT&L
Report Export Date:	5/08/2025	Contact:	Chris Khant
Catchment Name:	Receiving Node	Address:	Level 10, 124 Walker Street North Sydney NSW 2060
Catchment Area:	1.2099ha	Phone:	02 9439 1777
Impervious Area*:	96.5311182742375%	Email:	chris.k@atl.net.au
Rainfall Station:	66062 SYDNEY		
Modelling Time-step:	Six minutes		
Modelling Period:	01/01/82 - 31/12/1986 11:54:00 PM		
Mean Annual Rainfall:	1278.438mm		
Evapotranspiration:	1265.834mm		
MUSICX Version:	1.50.0.13577 (5.50.0.13577)		
MUSIC-link data Version:	5.1		
Study Area:	City of Sydney		
Scenario:	City Of Sydney Development		

* takes into account area from all source nodes that link to the chosen reporting node, excluding Import Data Nodes

Treatment Train Effectiveness		Treatment Nodes		Source Nodes	
Node:	Reduction	Node Type	Number	Node Type	Number
Flow	1.661%	Bioretention Nodes	4	Urban_Roof Nodes	5
TSS	85.975%	Sedimentation Basin Nodes	5	Urban_Mixed Nodes	11
TP	70.344%	Generic Treatment Nodes	10	Urban_SealedRoad Nodes	1
TN	57.345%				
GP	95.736%				

Comments

SF Chamber parameters as per Ocean Protect

Passing Parameters					
Node Type	Node Name	Parameter	Min	Max	Actual
Bioretention	Raingarden - 10m2	Exfiltration Rate	0	None	0 mm/h
Bioretention	Raingarden - 10m2	High Flow Bypass	0	None	100 m³/s
Bioretention	Raingarden - 10m2	Orthophosphate Content of Filter Media	0	55	55
Bioretention	Raingarden - 10m2	PET Scaling Factor	2.1	2.1	2.1 proportion
Bioretention	Raingarden - 10m2	TN Content of Filter Media	1	800	800
Bioretention	Raingarden - 20m2	Exfiltration Rate	0	None	0 mm/h
Bioretention	Raingarden - 20m2	High Flow Bypass	0	None	100 m³/s
Bioretention	Raingarden - 20m2	Orthophosphate Content of Filter Media	0	55	55
Bioretention	Raingarden - 20m2	PET Scaling Factor	2.1	2.1	2.1 proportion
Bioretention	Raingarden - 20m2	TN Content of Filter Media	1	800	800
Bioretention	Raingarden - 25m2	Exfiltration Rate	0	None	0 mm/h
Bioretention	Raingarden - 25m2	High Flow Bypass	0	None	100 m³/s
Bioretention	Raingarden - 25m2	Orthophosphate Content of Filter Media	0	55	55
Bioretention	Raingarden - 25m2	PET Scaling Factor	2.1	2.1	2.1 proportion
Bioretention	Raingarden - 25m2	TN Content of Filter Media	1	800	800
Bioretention	Raingarden - 55m2	Exfiltration Rate	0	None	0 mm/h
Bioretention	Raingarden - 55m2	High Flow Bypass	0	None	100 m³/s
Bioretention	Raingarden - 55m2	Orthophosphate Content of Filter Media	0	55	55
Bioretention	Raingarden - 55m2	PET Scaling Factor	2.1	2.1	2.1 proportion
Bioretention	Raingarden - 55m2	TN Content of Filter Media	1	800	800
Generic	1 x OceanGuard200um (3)	High Flow Bypass	None	99	0.02 m³/s
Generic	1 x OceanGuard200um (5)	High Flow Bypass	None	99	0.02 m³/s
Generic	10 x 690 PSORB Stormfilter (MCC) (3)	High Flow Bypass	None	99	0.009 m³/s
Generic	10 x 690 PSORB Stormfilter (MCC) (4)	High Flow Bypass	None	99	0.009 m³/s
Generic	12 x 690 PSORB Stormfilter (MCC) (2)	High Flow Bypass	None	99	0.011 m³/s
Generic	2 x OceanGuard200um (1)	High Flow Bypass	None	99	0.04 m³/s
Generic	2 x OceanGuard200um (2)	High Flow Bypass	None	99	0.04 m³/s
Generic	2 x OceanGuard200um (4)	High Flow Bypass	None	99	0.04 m³/s
Generic	8 x 690 PSORB Stormfilter (MCC) (1)	High Flow Bypass	None	99	0.007 m³/s
Generic	8 x 690 PSORB Stormfilter (MCC) (5)	High Flow Bypass	None	99	0.007 m³/s
Receiving	Receiving Node	Flow Reduction	None	None	1.661 %
Receiving	Receiving Node	GP Reduction	90	None	95.736 %
Receiving	Receiving Node	TN Reduction	45	None	57.345 %
Receiving	Receiving Node	TP Reduction	65	None	70.344 %

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Node Type	Node Name	Parameter	Min	Max	Actual %
Sedimentation	SF Chamber 4m2 (1)	% Reuse Demand Met	None	None	0 %
Sedimentation	SF Chamber 4m2 (1)	ExfiltrationRate	0	0	0 mm/h
Sedimentation	SF Chamber 4m2 (1)	ExtendedDetentionDepth	0.25	1	0.77 m
Sedimentation	SF Chamber 4m2 (1)	High Flow Bypass Out	None	None	0 ML/y
Sedimentation	SF Chamber 4m2 (5)	% Reuse Demand Met	None	None	0 %

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Node Type	Node Name	Parameter	Min	Max	Actual
Sedimentation	SF Chamber 4m2 (5)	ExfiltrationRate	0	0	0 mm/h
Sedimentation	SF Chamber 4m2 (5)	ExtendedDetentionDepth	0.25	1	0.77 m
Sedimentation	SF Chamber 4m2 (5)	High Flow Bypass Out	None	None	0 ML/y
Sedimentation	SF Chamber 5m2 (3)	% Reuse Demand Met	None	None	0 %
Sedimentation	SF Chamber 5m2 (3)	ExfiltrationRate	0	0	0 mm/h
Sedimentation	SF Chamber 5m2 (3)	ExtendedDetentionDepth	0.25	1	0.77 m
Sedimentation	SF Chamber 5m2 (3)	High Flow Bypass Out	None	None	0 ML/y
Sedimentation	SF Chamber 5m2 (4)	% Reuse Demand Met	None	None	0 %
Sedimentation	SF Chamber 5m2 (4)	ExfiltrationRate	0	0	0 mm/h
Sedimentation	SF Chamber 5m2 (4)	ExtendedDetentionDepth	0.25	1	0.77 m
Sedimentation	SF Chamber 5m2 (4)	High Flow Bypass Out	None	None	0 ML/y
Sedimentation	SF Chamber 6m2 (2)	% Reuse Demand Met	None	None	0 %
Sedimentation	SF Chamber 6m2 (2)	ExfiltrationRate	0	0	0 mm/h
Sedimentation	SF Chamber 6m2 (2)	ExtendedDetentionDepth	0.25	1	0.77 m
Sedimentation	SF Chamber 6m2 (2)	High Flow Bypass Out	None	None	0 ML/y
Urban_Mixed	Bypass 1 - mixed - 113m2 (100% imp.)	Impervious Area	None	None	0.011 ha
Urban_Mixed	Bypass 1 - mixed - 113m2 (100% imp.)	Pervious Area	None	None	0 ha
Urban_Mixed	Bypass 1 - mixed - 113m2 (100% imp.)	Total Area	None	None	0.011 ha
Urban_Mixed	Bypass 2 - mixed - 63m2 (100% imp.)	Impervious Area	None	None	0.006 ha
Urban_Mixed	Bypass 2 - mixed - 63m2 (100% imp.)	Pervious Area	None	None	0 ha
Urban_Mixed	Bypass 2 - mixed - 63m2 (100% imp.)	Total Area	None	None	0.006 ha
Urban_Mixed	Bypass 3 - mixed - 92m2 (100% imp.)	Impervious Area	None	None	0.009 ha
Urban_Mixed	Bypass 3 - mixed - 92m2 (100% imp.)	Pervious Area	None	None	0 ha
Urban_Mixed	Bypass 3 - mixed - 92m2 (100% imp.)	Total Area	None	None	0.009 ha
Urban_Mixed	Bypass 4a - mixed - 44m2 (100% imp.)	Impervious Area	None	None	0.004 ha
Urban_Mixed	Bypass 4a - mixed - 44m2 (100% imp.)	Pervious Area	None	None	0 ha
Urban_Mixed	Bypass 4a - mixed - 44m2 (100% imp.)	Total Area	None	None	0.004 ha
Urban_Mixed	Bypass 4b - mixed - 113m2 (100% imp.)	Impervious Area	None	None	0.011 ha
Urban_Mixed	Bypass 4b - mixed - 113m2 (100% imp.)	Pervious Area	None	None	0 ha
Urban_Mixed	Bypass 4b - mixed - 113m2 (100% imp.)	Total Area	None	None	0.011 ha
Urban_Mixed	Bypass 5 - 126m2 (100% imp.)	Impervious Area	None	None	0.013 ha
Urban_Mixed	Bypass 5 - 126m2 (100% imp.)	Pervious Area	None	None	0 ha
Urban_Mixed	Bypass 5 - 126m2 (100% imp.)	Total Area	None	None	0.013 ha
Urban_Mixed	WQ2b - mixed - 580m2 (100% imp.)	Impervious Area	None	None	0.058 ha
Urban_Mixed	WQ2b - mixed - 580m2 (100% imp.)	Pervious Area	None	None	0 ha
Urban_Mixed	WQ2b - mixed - 580m2 (100% imp.)	Total Area	None	None	0.058 ha
Urban_Mixed	WQ4b - mixed - 712m2 (100% imp.)	Impervious Area	None	None	0.071 ha
Urban_Mixed	WQ4b - mixed - 712m2 (100% imp.)	Pervious Area	None	None	0 ha
Urban_Mixed	WQ4b - mixed - 712m2 (100% imp.)	Total Area	None	None	0.071 ha
Urban_Mixed	WQ6b - mixed - 944m2 (90% imp.)	Impervious Area	None	None	0.085 ha

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Node Type	Node Name	Parameter	Min	Max	Actual
Urban_Mixed	WQ6b - mixed - 944m2 (90% imp.)	Pervious Area	None	None	0.009 ha
Urban_Mixed	WQ6b - mixed - 944m2 (90% imp.)	Total Area	None	None	0.094 ha
Urban_Mixed	WQ6c - mixed - 745m2 (90% imp.)	Impervious Area	None	None	0.067 ha
Urban_Mixed	WQ6c - mixed - 745m2 (90% imp.)	Pervious Area	None	None	0.007 ha
Urban_Mixed	WQ6c - mixed - 745m2 (90% imp.)	Total Area	None	None	0.074 ha
Urban_Mixed	WQ6d - mixed - 337m2 (90% imp.)	Impervious Area	None	None	0.03 ha
Urban_Mixed	WQ6d - mixed - 337m2 (90% imp.)	Pervious Area	None	None	0.003 ha
Urban_Mixed	WQ6d - mixed - 337m2 (90% imp.)	Total Area	None	None	0.034 ha
Urban_Roof	WQ1 - roof - 1411m2 (100% imp.)	Impervious Area	None	None	0.141 ha
Urban_Roof	WQ1 - roof - 1411m2 (100% imp.)	Pervious Area	None	None	0 ha
Urban_Roof	WQ1 - roof - 1411m2 (100% imp.)	Total Area	None	None	0.141 ha
Urban_Roof	WQ2a - roof - 1916m2 (100% imp.)	Impervious Area	None	None	0.192 ha
Urban_Roof	WQ2a - roof - 1916m2 (100% imp.)	Pervious Area	None	None	0 ha
Urban_Roof	WQ2a - roof - 1916m2 (100% imp.)	Total Area	None	None	0.192 ha
Urban_Roof	WQ3 - roof - 879m2 (100% imp.)	Impervious Area	None	None	0.088 ha
Urban_Roof	WQ3 - roof - 879m2 (100% imp.)	Pervious Area	None	None	0 ha
Urban_Roof	WQ3 - roof - 879m2 (100% imp.)	Total Area	None	None	0.088 ha
Urban_Roof	WQ4a - roof - 1041m2 (100% imp.)	Impervious Area	None	None	0.104 ha
Urban_Roof	WQ4a - roof - 1041m2 (100% imp.)	Pervious Area	None	None	0 ha
Urban_Roof	WQ4a - roof - 1041m2 (100% imp.)	Total Area	None	None	0.104 ha
Urban_Roof	WQ5 - roof - 812m2 (100% imp.)	Impervious Area	None	None	0.081 ha
Urban_Roof	WQ5 - roof - 812m2 (100% imp.)	Pervious Area	None	None	0 ha
Urban_Roof	WQ5 - roof - 812m2 (100% imp.)	Total Area	None	None	0.081 ha
Urban_SealedRoad	WQ6a - sealed road - 2171m2 (90% imp.)	Impervious Area	None	None	0.195 ha
Urban_SealedRoad	WQ6a - sealed road - 2171m2 (90% imp.)	Pervious Area	None	None	0.022 ha
Urban_SealedRoad	WQ6a - sealed road - 2171m2 (90% imp.)	Total Area	None	None	0.217 ha

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Failing Parameters

Node Type	Node Name	Parameter	Min	Max	Actual
Sedimentation	SF Chamber 4m2 (1)	Nitrogen Parameters.K	500	500	1 m/y
Sedimentation	SF Chamber 4m2 (1)	Notional Detention Time	8	12	0.061 h
Sedimentation	SF Chamber 4m2 (1)	Phosphorus Parameters.K	6000	6000	1 m/y
Sedimentation	SF Chamber 4m2 (1)	Total Suspended Solids Parameters.K	8000	8000	1 m/y
Sedimentation	SF Chamber 4m2 (5)	Nitrogen Parameters.K	500	500	1 m/y
Sedimentation	SF Chamber 4m2 (5)	Notional Detention Time	8	12	0.061 h
Sedimentation	SF Chamber 4m2 (5)	Phosphorus Parameters.K	6000	6000	1 m/y
Sedimentation	SF Chamber 4m2 (5)	Total Suspended Solids Parameters.K	8000	8000	1 m/y
Sedimentation	SF Chamber 5m2 (3)	Nitrogen Parameters.K	500	500	1 m/y
Sedimentation	SF Chamber 5m2 (3)	Notional Detention Time	8	12	0.06 h
Sedimentation	SF Chamber 5m2 (3)	Phosphorus Parameters.K	6000	6000	1 m/y
Sedimentation	SF Chamber 5m2 (3)	Total Suspended Solids Parameters.K	8000	8000	1 m/y
Sedimentation	SF Chamber 5m2 (4)	Nitrogen Parameters.K	500	500	1 m/y
Sedimentation	SF Chamber 5m2 (4)	Notional Detention Time	8	12	0.06 h
Sedimentation	SF Chamber 5m2 (4)	Phosphorus Parameters.K	6000	6000	1 m/y
Sedimentation	SF Chamber 5m2 (4)	Total Suspended Solids Parameters.K	8000	8000	1 m/y
Sedimentation	SF Chamber 6m2 (2)	Nitrogen Parameters.K	500	500	1 m/y
Sedimentation	SF Chamber 6m2 (2)	Notional Detention Time	8	12	0.061 h
Sedimentation	SF Chamber 6m2 (2)	Phosphorus Parameters.K	6000	6000	1 m/y
Sedimentation	SF Chamber 6m2 (2)	Total Suspended Solids Parameters.K	8000	8000	1 m/y

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The first part of the paper discusses the importance of the research and the objectives of the study. It then presents a literature review of the existing research on the topic. The second part of the paper describes the methodology used in the study, including the data collection and analysis techniques. The third part of the paper presents the results of the study, and the fourth part discusses the implications of the findings.

The study was conducted using a quantitative research design. Data was collected from a sample of 100 participants. The data was then analyzed using statistical software. The results of the study show that there is a significant relationship between the variables studied.

The findings of the study have several implications. First, they suggest that the research is important for understanding the topic. Second, they suggest that the research can be used to inform policy and practice.

In conclusion, the study has shown that there is a significant relationship between the variables studied. The findings have several implications, including the need for further research and the potential for policy and practice changes.



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