
Appendix W

Integrated water management plan

Parramatta Over and Adjacent Station Development Integrated Water Management Plan

Appendix W

September 2022

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Glossary

Term	Definition
AEP	Annual exceedance probability
ARI	Average recurrence interval
ARR	Australian rainfall and runoff
AS	Australian Standard
ASA	Asset Standards Authority
ASD	Adjacent station development
Catchments	The land area draining through the mainstream, as well as tributary streams, to a particular site. It always relates to an area above a specific location.
CBD	Central business district
Concept and Stage 1 CSSI Application	Application SSI-10038, including all major civil construction works between Westmead and The Bays, including station excavation and tunnelling, associated with the Sydney Metro West line
Concept SSDA	A concept development application as defined in section 4.22 of the EP&A Act. It is a development application that sets out the concept for the development of a site, and for which detailed proposals for the site or for separate parts of the site are to be the subject of a subsequent development application or applications
Council	City of Parramatta Council
CSSI	Critical state significant infrastructure
DCP	Development control plan
DPE	NSW Department of Planning and Environment
EIS	Environmental impact statement
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
EPA	NSW Environment Protection Authority
ESD	Ecologically sustainable design
EY	Exceedances per year
GFA	Gross floor area
GPT	Gross pollutant trap
IECM	Infrastructure Engineering and Construction Manual
LGA	Local government area
MUSIC	Model for Urban Stormwater Improvement Conceptualisation
OSD	Over station development
PMF	Probable maximum flood

Term	Definition
PSD	Permissible site discharge
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy
SSR	Site storage requirement
Stage 2 CSSI Application	Application SSI-1938057, including major civil construction works between The Bays and Hunter Street Station
Stage 3 CSSI Application	Application SSI-22765520 including rail infrastructure, station, precincts and operation of the Sydney Metro West line
Sydney Metro West	Construction and operation of a metro rail line and associated stations between Westmead and the Sydney CBD as described in section 1.1
The site	The site which is the subject of the Concept SSDA
TN	Total nitrogen
TP	Total phosphorus
TSS	Total suspended solids
UPRCT	Upper Parramatta River Catchment Trust
WQ	Water quality treatment
WRAMS	Water Reclamation and Management Scheme
WSUD	Water sensitive urban design

Executive summary

This Integrated Water Management and Water Quality Plan supports a Concept State Significant Development Application (Concept SSDA) submitted to the Department of Planning and Environment (DPE) pursuant to Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The Concept SSDA is made under Section 4.22 of the EP&A Act.

Sydney Metro is seeking to secure concept approval for an over station development (OSD) and adjacent station development (ASD) on the Parramatta metro station site (referred to as the 'proposed development'). The proposed development will comprise three new commercial office buildings (Buildings A, C, D), and one new residential building (Building B).

The Concept SSDA seeks consent for a building envelope and mixed-use purposes, maximum building height, a maximum gross floor area (GFA), pedestrian and vehicular access, circulation arrangements and associated car parking, and the strategies and design parameters for the future detailed design of the proposed development.

The Integrated Water Management and Water Quality Plan involved the analysis of the existing stormwater quantity and quality conditions for the proposed development to support a Concept SSDA. This report aims to provide a hydraulic and water quality analysis as well as design of on-site detention systems and water quality treatment measures to demonstrate the feasibility of the proposed development from a stormwater and water quality perspective at a conceptual level.

The report provides analysis of the proposed development under existing conditions as well as post development conditions including sensitivity analysis for climate change. The baseline investigations involved analysing the existing drainage network, catchment and topography, and the existing stormwater performance. This analysis was supported by the site flood modelling (Appendix Y Flooding Assessment of the EIS). The requirements for site storage and permissible site discharge were determined by the Council conditions within the Upper Parramatta River Catchment Trust handbook.

The size of stormwater detention tanks has been calculated using the Upper Parramatta River Catchment Trust (UPRCT) calculation sheets. The arrangement and location of the tanks within the proposed development will be dependent on coordination with the architectural design.

Water sensitive urban design elements are proposed as part of the treatment train that will provide an adequate level of detention and treatment to achieve the stormwater quality targets.

The report evaluates the potential for adoption of an integrated water cycle management approach at the proposed development which includes rainwater harvesting, reuse and recycled water to achieve the best possible outcomes for a Green Star accreditation.

1 Introduction

1.1 Sydney Metro West

Sydney Metro West will double rail capacity between Greater Parramatta and the Sydney Central Business District (CBD), transforming Sydney for generations to come. The once in a century infrastructure investment will have a target travel time of about 20 minutes between Parramatta and the Sydney CBD, link new communities to rail services and support employment growth and housing supply.

Stations have been confirmed at Westmead, Parramatta, Sydney Olympic Park, North Strathfield, Burwood North, Five Dock, The Bays, Pyrmont and Hunter Street (Sydney CBD).

Sydney Metro West station locations are shown in Figure 1-1.

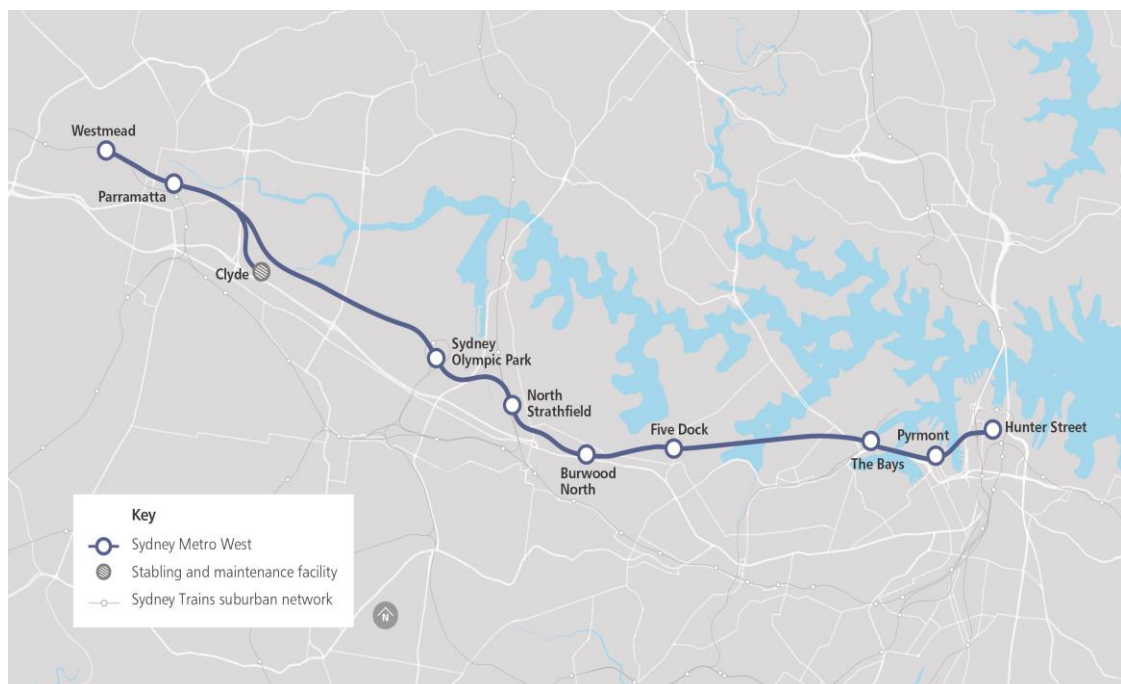


Figure 1-1 Sydney Metro West

1.2 Background and planning context

Sydney Metro is seeking to deliver Parramatta metro station under a two-part planning approval process. The station fit-out infrastructure is to be delivered under a Critical State Significant Infrastructure (CSSI) application subject to provisions under division 5.2 of the *Environmental Planning and Assessment Act 1979* (EP&A Act), whereas the over and adjacent station developments are to be delivered under a State Significant Development (SSD) subject to the provisions of part 4 of the EP&A Act.

1.2.1 Critical State Significant Infrastructure

The State Significant Infrastructure (SSI) planning approval process for the Sydney Metro West metro line, including delivery of station infrastructure, has been broken down into a number of planning application stages, comprising the following:

- Concept and Stage 1 CSSI Approval (SSI-10038) – All major civil construction works between Westmead and The Bays including station excavation, tunnelling and demolition of existing buildings (approved 11 March 2021).

- Stage 2 CSSI Application (SSI-19238057) – All major civil construction works between The Bays and Hunter Street Station (approved 24 August 2022).
- Stage 3 CSSI Application (SSI- 22765520) – Tunnel fit-out, construction of stations, ancillary facilities and station precincts between Westmead and Hunter Street Station, and operation and maintenance of the Sydney Metro West line (under assessment, lodged).

1.2.2 State Significant Development Application

The SSD will be undertaken as a staged development with the subject Concept State Significant Development Application (Concept SSDA) being consistent with the meaning under section 4.22 of the EP&A Act and seeking conceptual approval for a building envelope, land uses, maximum building heights, a maximum gross floor area, pedestrian and vehicle access, vertical circulation arrangements and associated car parking. A subsequent Detailed SSDA is to be prepared by a future development partner which will seek consent for detailed design and construction of the development.

1.3 Purpose and scope

This Integrated Water Management and Water Quality Plan supports a Concept SSDA submitted to the Department of Planning and Environment (DPE) pursuant to Part 4 of the EP&A Act. The Concept SSDA is made under Section 4.22 of the EP&A Act.

This report has been prepared to specifically respond to the Secretary's Environmental Assessment Requirements (SEARs) issued for the Concept SSDA on 22 February 2022 which states that the environmental impact statement is to address the following requirements shown in Table 1-1.

Table 1-1 SEARs and where this is addressed in this SSD report

Key issue	SEARs	Addressed in
8. Ecologically Sustainable Development	Demonstrate how the development minimises greenhouse gas emissions (reflecting the Government's goal of net zero emissions by 2050) and consumption of energy, water (including water sensitive urban design) and material resources.	Sections 3 and 4
12. Ground and Water Conditions	Provide an assessment of the potential impacts on surface and groundwater resources (quality and quantity), including related infrastructure, hydrology, aquatic and groundwater dependent ecosystems, drainage lines, downstream assets and watercourses.	Sections 3 and 4

Key issue	SEARs	Addressed in
13. Stormwater and Wastewater	<p>Provide an Integrated Water Management Plan for the development that:</p> <p>is prepared in consultation with the local council and any other relevant drainage or water authority details the proposed drainage design for the site including any on-site treatment, reuse and detention facilities, water quality management measures, and the nominated discharge points demonstrates compliance with the local council or other drainage or water authority requirements and avoids adverse impacts on any downstream properties.</p> <p>Where drainage infrastructure works are required that would be handed over to the local council, or other authority, provide full hydraulic details and detailed plans and specification of proposed works that have been prepared in consultation with, and comply with the relevant standards, the local council or other drainage or water authority.</p>	Sections 3 and 4

The purpose of this report is to identify the background conditions for water resources likely to be affected by the development and to outline the drainage and water quality approach and objectives for the proposed development.

2 The site and proposal

2.1 Site location and description

The subject application is in the Parramatta CBD, in the City of Parramatta Local Government Area (LGA). It is within the city block bounded by George Street, Church Street, Smith Street, and Macquarie Street.

The site presents a 164m long frontage to Macquarie Street, 125m frontage to George Street, 48m frontage to Church Street, and 15.5m frontage to Smith Street (in the form of Macquarie Lane).

The site location is shown in Figure 2-1 and Table 2-1.

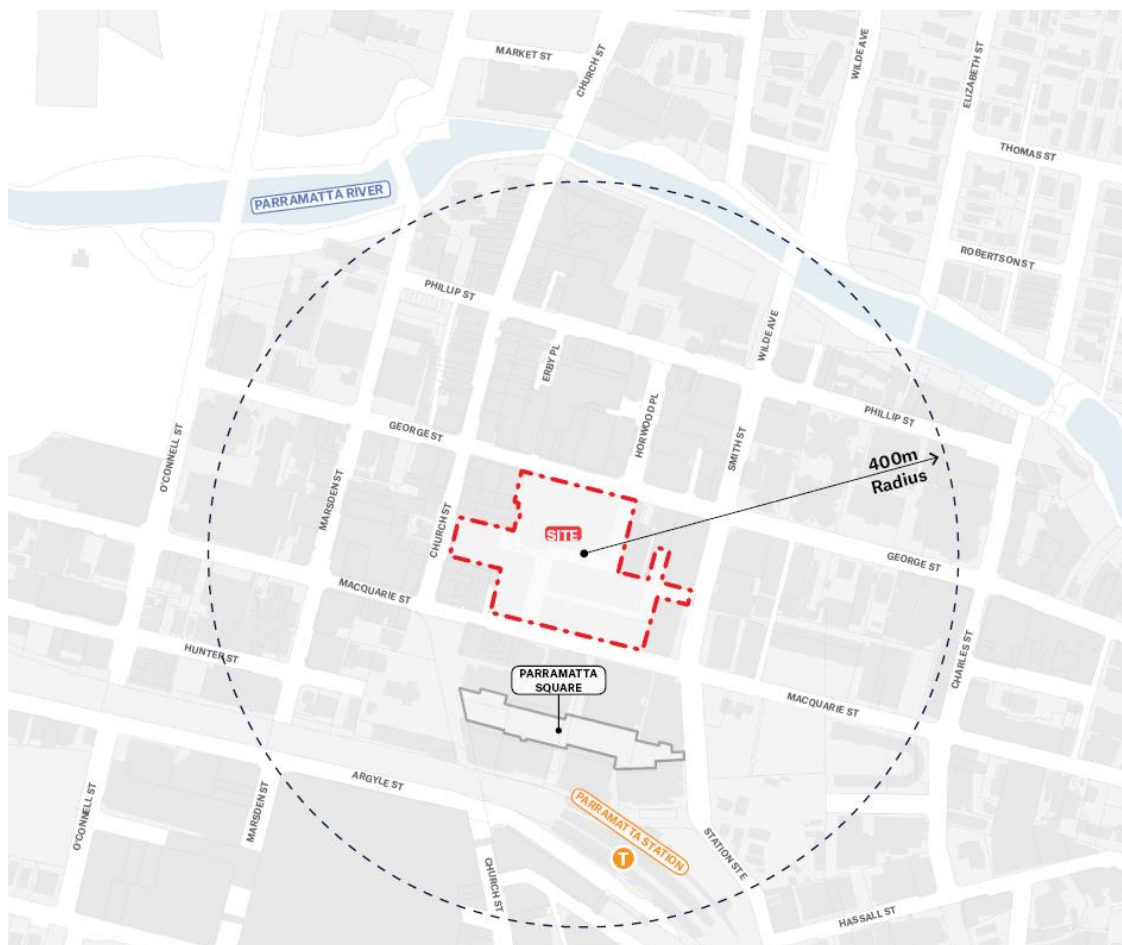


Figure 2-1 Parramatta metro station precinct location

As described in Table 2-1, the site comprises fourteen different allotments of varying sizes. It is irregular in shape, with a total area of approximately 24,899m².

Table 2-1 Site description

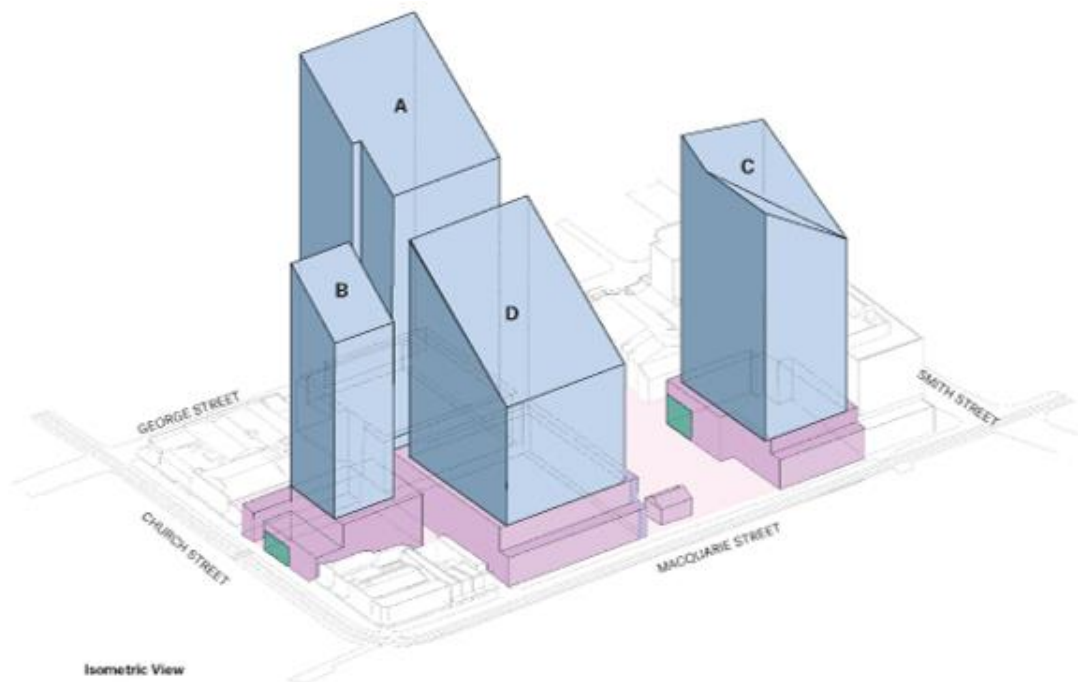
Street address	Legal description
41-59 George Street	Lot 10 in DP858392
45A George Street	Lot 2 in DP701456
61B George Street	Lot 1 in DP607181
71 George Street	Lot 100 in DP607789
220 Church Street	Lot 1 in DP1041242
222 Church Street	Lot 1 in DP702291
232 Church Street	Lot 1 in DP651992
236 Church Street	Lot 1 in DP128437
238 Church Street	Lot 2 in DP591454
48 Macquarie Street	Lot B in DP394050
58-60 Macquarie Street	Lot 1 in DP399104
62-64 Macquarie Street	Lot AY in DP400258
68 Macquarie Street	Lot 1 in DP711982
70 Macquarie Street	Lot E DP 402952
72 Macquarie Street	Lot 3 in DP218510
74 Macquarie Street	Lot H in DP405846

2.2 Overview of this proposal

The Concept SSDA will seek consent for four building envelopes as detailed in Table 2-2 and Figure 2-2.

Table 2-2 Parramatta metro station development overview

Item	Description
Building use	Building A: Commercial and retail Building B: Residential and retail Building C: Commercial Building D: Commercial and retail
Building Height (Number of storeys)	Building A: 38 storeys Building B: 33 storeys Building C: 26 storeys Building D: 25 storeys
Gross Floor Area (m ²)	Building A: 78,700 Building B: 20,000 Building C: 35,950 Building D: 55,350 TOTAL: 190,000
Car parking spaces	455



Legend

- | | |
|---|--|
| <p> Parramatta Station CSSI Approval - Includes structure and building infrastructure and space for lift cores, access, parking, retail and building services for future OSD & ASD</p> <p> OSD & ASD Concept SSD Building Envelope - Includes OSD & ASD Areas inside the CSSI 'shell' below ground and in the podium levels</p> | <p> Metro Station Entry and Box (Indicative)</p> <p> 3m Podium Articulation Zone - refer to Design Guidelines.</p> <p> Heritage Interface Zone - refer to Design Guidelines.</p> |
|---|--|

Figure 2-2 Proposed Concept SSDA development and CSSI scope

3 Scope of assessment

This Integrated Water Management and Water Quality Plan has been undertaken to satisfy the planning requirements of the State Significant Development Guidelines and the SEARs. The scope of this report is to summarise existing stormwater and water quality conditions and detail required upgrades, infrastructure and protection measures required to satisfy the relevant stormwater and water quality standards.

The stormwater and water quality requirements are summarised below along with the location where they have been addressed within this report:

- stormwater quantity and detention in accordance with City of Parramatta Council Development Control Plan (DCP) and UPRCT OSD Handbook
- stormwater quality in accordance with City of Parramatta Council DCP Water sensitive urban design (WSUD).

This assessment relates to the works required for the Concept SSDA. Works associated with the Sydney Metro West project are not included within this report except where utility coordination is required. The Sydney Metro West project is assessed under the CSSI application/s.

The report identifies preliminary development staging and stormwater consultation, the final staging and delivery of stormwater, water quality and flooding infrastructure will form part of subsequent design stages.

The integrated water management and water quality assessment involved:

- undertaking a desktop review of publicly available data to characterise existing surface water (baseline) conditions at the proposed development site including climate, catchment history, topography, hydrology, the soil landscape and environmental values
- reviewing relevant legislation, plans, policies and guidelines for water management within NSW and the City of Parramatta Council
- identifying the types of surface water impacts which may occur due to the proposed development
- identifying mitigation measures to address potential surface water impacts.

A separate Flooding Assessment report (Appendix Y of the EIS) has been prepared for this proposed development site along with a separate Ecologically Sustainable Development (ESD) report (Appendix S of the EIS). Key sustainability initiatives that might be applicable for this proposed development site include:

- efficient toilets, urinals, handwash basins, taps, showers, dishwashers and clothes washers
- dual plumbing systems
- 30kL rainwater tank and treatment system to meet a proportion of the non-potable water demands
- closed circuit cooler plant
- landscape design, irrigation and water sensitive urban design (WSUD)
- fire protection system that does not expel water during testing.

4 Analysis

4.1 Standards and basis of design

4.1.1 Design standards

The design has been undertaken in compliance with the Asset Standards Authority (ASA), relevant Australian standards and local government guidelines. Key documents used as guidance for the design are summarised below in Table 4-1.

Table 4-1 Drainage design standards

Document No.	Document name	Version or date
City of Parramatta Council		
N/A	Development Engineering Design Guidelines	June 2018
DCP-2011-Part 3	Development Principles Part 3	2011
N/A	Upper Parramatta River Catchment Trust (On-site Stormwater Detention Handbook)	Fourth Edition
Austroads Guidelines		
AGRD05-13	Guide to Road Design Part 5: Drainage - General and Hydrology Considerations	February 2021
AGRD05A-13	Guide to Road Design Part 5A: Drainage - Road Surface, Networks, Basins and Subsurface	May 2013
AGRD05B-13	Guide to Road Design Part 5B: Drainage - Open Channels, Culverts and Floodways	May 2013
Austroads Guide to Road Design		
RMS 17.055	Part 5 Supplement	2013
RMS 17.053	Part 5A Supplement	2013
RMS 17.054	Part 5B Supplement	2013
Australian Standard		
AS 3500.3:2021	Plumbing and Drainage - Stormwater Drainage	2021
General		
N/A	Australian Rainfall and Runoff: A Guide to Flood Estimation	2019

4.1.2 Basis of design

In developing the civil concept design, information from a large variety of sources has been used. A summary of this information is contained below in Table 4-2.

Table 4-2 Drainage design inputs

Document No.	Document name	Version or date
NA	Upper Parramatta River Catchment Trust (On-site Stormwater Detention Handbook)	Fourth Edition December 2005
NA	Rainfall data, Bureau of Meteorology Nearest Station 33.8125 S 151.0125 E	2021

4.1.3 Assumptions, dependencies and constraints

The assumptions, dependencies and constraints for Parramatta metro station are contained within the Sydney Metro West RAIDOC register for Sydney Metro West Concept and Stage 1 Design.

These have been used in developing the stormwater, water quality and flooding design, and detail future design work that is required in future stages.

4.1.4 Consultation

The following authorities and stakeholder will be considered for future consultation:

- City of Parramatta Council (Council)
- Transport for NSW (TfNSW)
- Utility service providers
- Continued co-ordination and consultation would be undertaken in future design stages to provide a design which is in accordance with each authority and stakeholder requirements.

Preliminary consultation with Council is included in Appendix A Authority consultation.

4.1.5 Design criteria

The design criteria applied to the stormwater works are summarised in Table 4-3.

Table 4-3 Drainage design criteria

Item	Standard	Adopted
Hydrology & Hydraulics		
Site Storage Requirement	UPRCT 4 th Edition	455m ³ /ha Total 300m ³ /ha Extended Storage
Site Reference Discharge	UPRCT 4 th Edition	40 L/s/ha Primary outlet 150 L/s/ha Secondary outlet
Hydrological Model	N/A	ILSAX
Minor Design Storm	Development Engineer Design Guidelines	20yr Average Recurrence Interval (5% AEP)
Major Design Storm	Development Engineer Design Guidelines	100yr Average Recurrence Interval (1% AEP)
Design Rainfall	Development Engineer Design Guidelines	AR&R 2016 values (Existing Condition) AR&R 2016 values + Climate Change factor (Proposed development)
Urban Rainfall Losses	ARR Datahub	Pervious IL = 5mm Pervious CL = 2.5mm/h Imperv. IL = 1mm Imperv. CL = 0.0mm/h
Max Pipe Depth	Austroads Guide to Road Design Part 5A Table 6.1	Footpaths: rigid pipes 450mm; flexible pipes 600mm Road Carriageways: rigid pipes 600mm; flexible pipes 750mm

Item	Standard	Adopted
Pipe Size	Development Engineer Design Guidelines AS 3500.3	Min 100mm diameter
Min Pipe Grade	Austrroads Guide to Road Design Part 5A Supplement Clause 6.5.4	Table 6.3
Min Pit Size	AS3500.3:2021	Table 7.5.2.1
Pit Spacing	Development Engineer Design Guidelines	Max 30m
Pit Losses	Development Engineer Design Guidelines	Missouri Charts
Pit Blockage Factors	AGRD05-13: Table 5.4	Sag: Kerb Inlet - 80% Grated - 50% On-Grade: Kerb Inlet - 80% Longitudinal Bar Grated - 60% Transverse Bar Grated - 50%
Access covers and grates for use in vehicular and pedestrian areas	Austrroads Guide to Road Design Part 5A Supplement Clause 5.2.8	Side entry inlets: Class C Loading and grated gully inlets: Class D
Overland Flow Safety Criteria	AR&R	Max Depth x Velocity 0.4m ² /s
Water Quality		
Pollution reduction targets	Council DCP – 2011 – Part 3 Development principles	Gross Pollutants 90% TSS 85% TP 60% TN 45%

4.2 Baseline investigations

4.2.1 Existing site description

The proposed development site location is a heavily urbanised commercial area in the heart of Parramatta CBD. Horwood Place is a bi-directional single lane road which is aligned through the site, connecting George Street to the north and Macquarie Street to the south, with a high point approximately half-way along the road. Horwood Place provides access to several small commercial stores and also provides access to the existing multi-storey car park.

Key roads near the proposed development construction site include O'Connell Street (sub-arterial road), Macquarie Street (collector road), Pitt Street (sub-arterial road), George Street (collector road) and Church Street (collector road). O'Connell Street operates in both directions north of Macquarie Street, and south of Macquarie Street it operates in the southbound direction only. Macquarie Street operates one-way in an eastbound direction. Prior to November 2019, George Street operated one-way in an eastbound direction however was recently converted to two-way operation between O'Connell Street and Harris Street as part of network modifications to accommodate Parramatta Light Rail (Stage1).

The existing topography is relatively flat, with a predominant fall towards the north-east for stormwater discharge into the Parramatta River. Elevations vary across the site from approximately RL 8.5 to RL10.8.

Horwood Place, between Macquarie and George streets, will be closed as part of the delivery of the Concept and Stage 1 Critical State Significant Infrastructure (CSSI) approval. The street will be re-aligned to dissect the proposed development site, running north-south along the eastern frontage of Building A and D.

4.2.2 Catchment and topography

Existing drainage network

A combination of feature and utility survey, DBYD data, City of Parramatta Council as-built drawings and assumptions have been used to develop an understanding of the existing drainage network and catchments. City of Parramatta Council is the service authority responsible for the existing stormwater infrastructure servicing the site area. The existing drainage network includes kerb channels, pits and pipes, refer to Figure 4-1. The City of Parramatta Council network drains to the Parramatta River, approximately 300m to the north. It should be noted that various assumptions have been made in regard to the existing drainage network to allow design progression including the invert levels of existing stormwater pipes.



Engineering Design Services - Metro West

Parramatta metro station existing stormwater network

Source: City of Parramatta Council, Parramatta Light Rail project and DBYD

LEGEND

- | | |
|---------------------------|---------------|
| Concept SSDA Boundary | Station box |
| SSI Construction site | Drainage Pipe |
| Concept SSDA Developments | Drainage Pit |

Figure 4-1 Parramatta metro station existing stormwater network (source: Council maps and DBYD)

4.2.3 Existing catchment

The existing proposed development site is almost 100% impervious with the majority of runoff originating from building roofs and surrounding paved areas. The existing drainage network has been split into the following catchment areas:

- Macquarie Lane – Smith Street
- Macquarie Street
- Church Street
- George Street.

The catchment areas are labelled by their discharge point to the Council drainage network and comprise both private property/roofed areas as well as public spaces such as roads and footpaths. These catchments are represented in Figure 4-2. A short description of each catchment is provided below.

Macquarie Lane – Smith Street

The eastern catchment, yellow area in Figure 4-2, comprises the City Centre Carpark building, Macquarie Lane on-grade carpark as well as Macquarie Lane. This area drains via Macquarie Lane to the Council drainage network on Smith Street. The Smith Street trunk main is a DN1050 pipe.

Macquarie Street

The southern catchment, purple area in Figure 4-2, comprises the buildings located on the northern side of Macquarie Street as well as the southern end of Horwood place, a paved road. The properties drain to the Council drainage network in Macquarie Street. The Macquarie Street trunk main is a DN900 pipe.

Church Street

The western catchment, orange area in Figure 4-2, comprises buildings on the eastern side of Church Street. The buildings drain to the Council drainage network in Church Street. The connections are assumed to be buried pipe connections. The Church Street trunk main is a DN750 pipe.

George Street

The northern catchment, green area in Figure 4-2, comprises the buildings on the southern side of George Street as well as the northern end of Horwood place. The properties drain to the Council drainage network on George Street via kerbs outlets.

It is noted that the stormwater discharge locations and arrangements at some of the existing buildings are still to be confirmed with Council.



Figure 4-2 Existing catchment areas and assumed discharge points to council network

Impacts from CSSI Works

The existing drainage network on Horwood Place will be decommissioned when the street is closed as part of the Sydney Metro West Concept and Stage 1 CSSI approval. The re-aligned street will require new drainage infrastructure which may need to accommodate stormwater run-off from the proposed development.

4.3 Stormwater quantity

4.3.1 Existing stormwater network and constraints

The existing City of Parramatta Council stormwater network, described in section 4.2 above, extends around the entirety of the proposed development site and therefore direct buried connection to existing Council drainage pipe network is generally feasible.

For flood modelling of the existing and developed site conditions, refer to Flooding Assessment report (Appendix Y of the EIS). The flood modelling of the existing condition and current design has shown that the proposed development site is inundated by floodwaters from the local and Parramatta River catchments in the Probable Maximum Flood (PMF) flood event, causing a maximum flood depth in excess of one metre. The proposed development site is also affected by shallow ponding and flooding from the local catchment in the 5% Annual Exceedance Probability (AEP) and 1% AEP climate change flood event, however there is no significant conveyance through the site. Notwithstanding, the ponding in the 1% AEP event will constrain the stormwater strategy by impacting the location of any on-site detention. On-site detention flood storage will need to be located above the 1% AEP level i.e., above ground, to maintain effective storage.

An assessment of the peak flow rates from the existing catchments was undertaken to support the CSSI application, however, is not detailed in this report as it is not relevant to the SSD.

4.3.2 Proposed stormwater criteria

Hydraulic criteria

City of Parramatta Council (the authority responsible for the downstream drainage network) stipulates the design of any on-site detention development in accordance with UPRCT OSD Handbook 4th Edition. In accordance with the UPRCT OSD Handbook, UPRCT Calculation Sheet and the City of Parramatta Council DCP 2011, the following storage and discharge capacities, shall be incorporated into the design for the buildings:

Site storage requirements (SSR)

- extended detention storage: 300 m³/ha
- total detention storage: 455 m³/ha (520 m³/ha if non-HED outlet installed)

Site reference discharge (SRD):

- primary outlet: 40L/s/ha
- secondary outlet: 150 L/s/ha

The goals of the SSR and SRD requirements are to:

- limit peak flows throughout the catchment, in a 1 in 100 year Average Recurrence Interval (ARI) event, to estimated peak flows under 1999 conditions
- reduce post development peak flows, through the catchment, in the 1 in 1.5 year ARI event to be as close to natural flow rates as possible.

4.3.3 Hydrology criteria

The design rainfall intensities in the vicinity of the study area have been generated using the Bureau of Meteorology IFD program (BoM, 2011b) which is based on the methodology outlined Australian Rainfall and Runoff (AR&R, 2016).

Adjustment to rainfall intensities has been made to account for climate change for the proposed drainage analysis, however the existing analysis has not accounted for climate change. This has been carried out to provide a conservative approach.

The design approach for the collection and disposal of stormwater is different between the private buildings (roof catchments) and public domain (external ground level catchment). The following section describes these approaches in detail. A summary of the proposed stormwater strategy is presented in Appendix C.

Roof catchment collection

- The rainwater from the roofs (100% impervious) will be collected and conveyed via the downpipe system to the rainwater harvesting tanks. The downpipe system shall be provided with a first flush device prior to the rainwater entering the tank. Excess water from the rainwater harvesting tank will be transferred to the on-site detention tank system.
- The harvested rainwater will supply the buildings and station non-potable water system, such as water for toilet flushing. The tank will be supplemented by the main pressure supply.

- Other surface runoff collected above ground level will be collected and conveyed via the down pipe system and directed to the building rainwater harvesting and on-site detention system. The location of the on-site detention is under development based on co-ordination with the station building architects.

The roof areas are summarised in Table 4-4 and schematically presented in Figure 4-3.

Table 4-4 Proposed development building roof catchments and assumed point of discharge

Development	Roof catchment area (m ²)	Proposed discharge point
Building A	3810	Existing inlet pit on George Street, invert level 7.86 mAHD. Extension to the existing pipes in the council drainage network will be required.
Building B	2005	Existing pit on Church Street, invert level unknown
Building C	2740	Existing inlet pit on Smith Street, invert level 7.55 mAHD
Building D	4455	Existing inlet pit on Macquarie Street, invert level unknown.

Roof catchment storage and disposal

The runoff collected from the roof structures will be discharged from the proposed development site by:

- An orifice plate fixed to the on-site detention outlet pipe which controls the discharge equivalent to the SRD. A primary and secondary orifice plate will be provided. Refer to section 4.1.5 for further details of the on-site detention system.
- The outlet from the on-site detention will connect to a Gross Pollutant Trap (GPT) for treatment prior to discharging into the Council drainage network via a buried pipe connection.
- All connections to the Council drainage network will be made in accordance with the section 3.2 of the Engineering Design Guidelines 2018.
- An extension to the existing pipe in the Council drainage network on George Street is required to drain Building A. Approximately 40m extension is required as well as the installation of a new junction or inlet pit at the building discharge point to the council network.

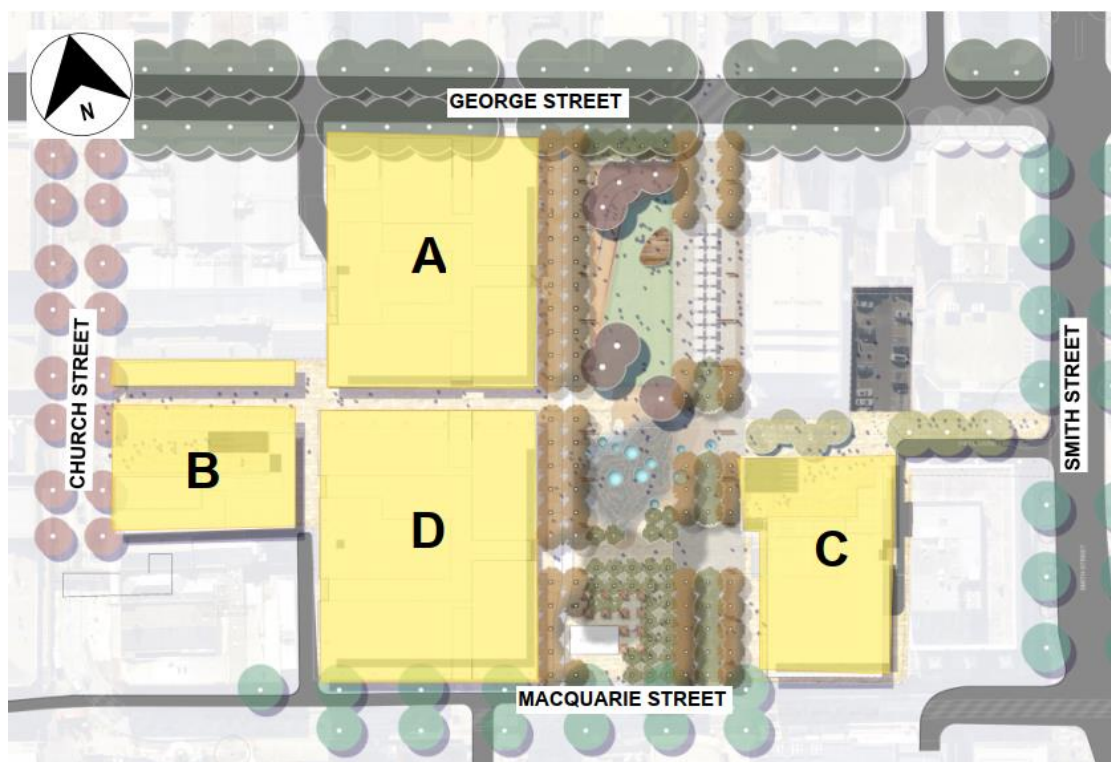


Figure 4-3 Proposed development precinct building catchments

4.4 External ground level catchment area

4.4.1 Collection and disposal

Areas external to the roofs include public domain spaces and through-site links. The areas are a mixed of paved and landscaped area including mature trees. The surface profiles will be graded away around all building perimeters. The external areas are summarised below and depicted indicatively in Figure 4-4:

- Northern external catchment – The northern portion of the public domain (Civic Link) will drain north to the existing City of Parramatta Council pipe network in George Street. The Civic Link will be delivered under the CSSI application/s.
- Southern external catchment – The southern portion of the public domain (Civic Link) which will be delivered as part of the CSSI application/s includes the area between Building C and Building D. The area falls to the south, draining towards the Council drainage network on Macquarie Street.
- Eastern external catchment – The eastern catchment comprises a fully paved area surrounding the south-east corner of the Roxy Theatre. The catchment falls to the east towards Smith Street, where the area will discharge to the Council drainage network.
- Western catchment – The western catchment comprises a fully paved area through-site link which grades to the west where it discharges to the City of Parramatta Council pipe network in Church Street.

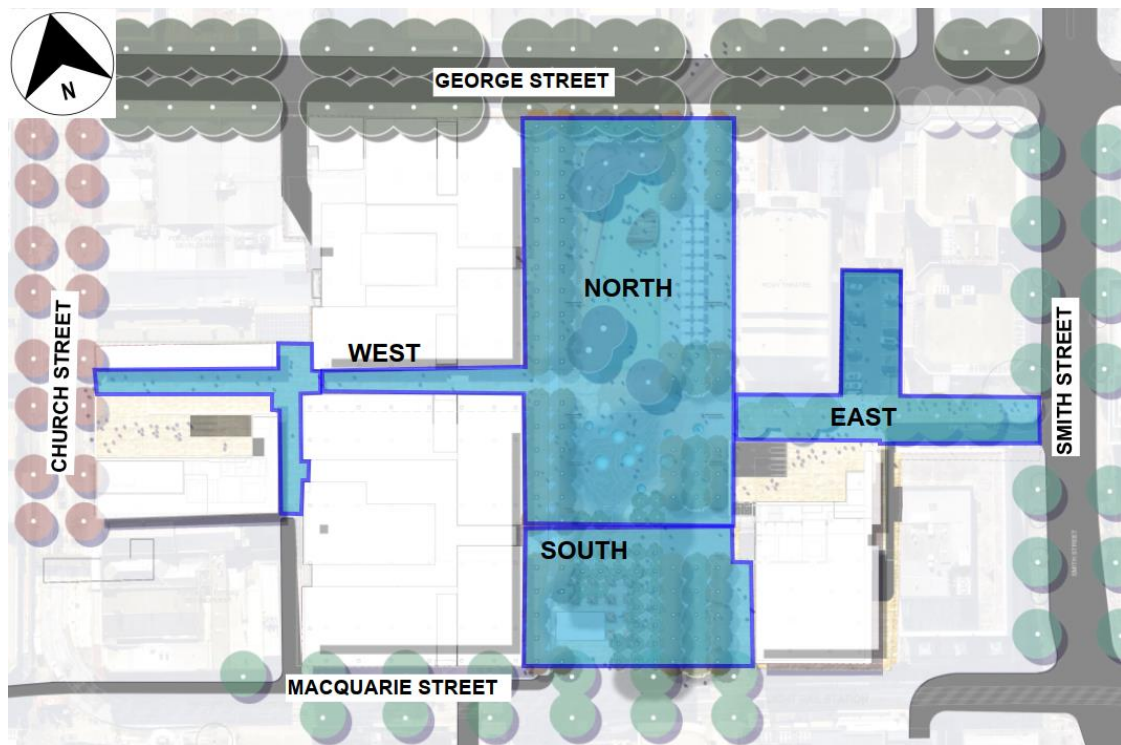


Figure 4-4 Parramatta indicative external catchments

The design approach for the public domain, including discharge conditions and detention requirements, is pending consultation with Council. Due to the high tailwater levels resulting from the 1% AEP storm event, any detention storage for external areas would comprise a combination of below ground and surface storage systems to prevent the inundation of the storage areas by backflow from the Council drainage network in large storm events.

As previously noted, all public domain work including the portion of the Parramatta Civic Link which runs through the proposed development site, will form part of the CSSI applications. Public domain works are not subject to approval under this Concept SSDA but are an important consideration in the requirements for on-site detention within buildings.

4.4.2 On-site detention

Building catchments

An on-site detention system is proposed to cater for all the buildings catchment areas.

The on-site detention storage capacities have been designed in accordance with the UPRCT On-site Stormwater Detention Handbook 4th Edition, UPRCT Calculation Sheet and City of Parramatta Council's DCP.

The on-site detention system receives discharge from the building roof catchment areas (via the rainwater harvesting tank). The on-site detention system treats the water with water filtration cartridges and then discharges via the on-site detention's orifice plates into the discharge chamber. This discharge chamber then connects to the various City of Parramatta Council stormwater pipe networks on George Street, Smith Street, Macquarie Street and Church Street.

It is assumed that the on-site detention storage can be located above the 1% AEP flood levels (varies across site) so the outlet is not submerged and can maintain a free discharge condition. Refer to Table 4-5 for indicative sizing of the on-site detention tanks and orifice sizing.

Table 4-5 Proposed development preliminary on-site detention volumes & orifice sizing

Catchment area	Total on-site detention volume (m ³) ¹	Extended storage volume (m ³)	Flood storage volume (m ³)	Primary orifice size (mm) ²	Secondary orifice size (mm) ³
Building A	174	115	59	85	162
Building B	92	60	32	62	117
Building C	125	82	43	72	137
Building D	203	134	69	92	175

Notes:

1. The total On-Site Detention volume is the combine volume of the extended storage and the flood storage
2. The primary orifice controls the extended storage volume and limits the discharge from the site in 'normal' conditions to the natural levels 1 in 1.5 year 5 minute storm event (40L/s/ha, UPRCT OSD Handbook)
3. The secondary orifice controls the flood storage volume in large storm events up to the 1% AEP (150L/s/ha, UPRCT OSD Handbook).

A conceptual layout of the on-site detention system is shown in Figure 4-5.

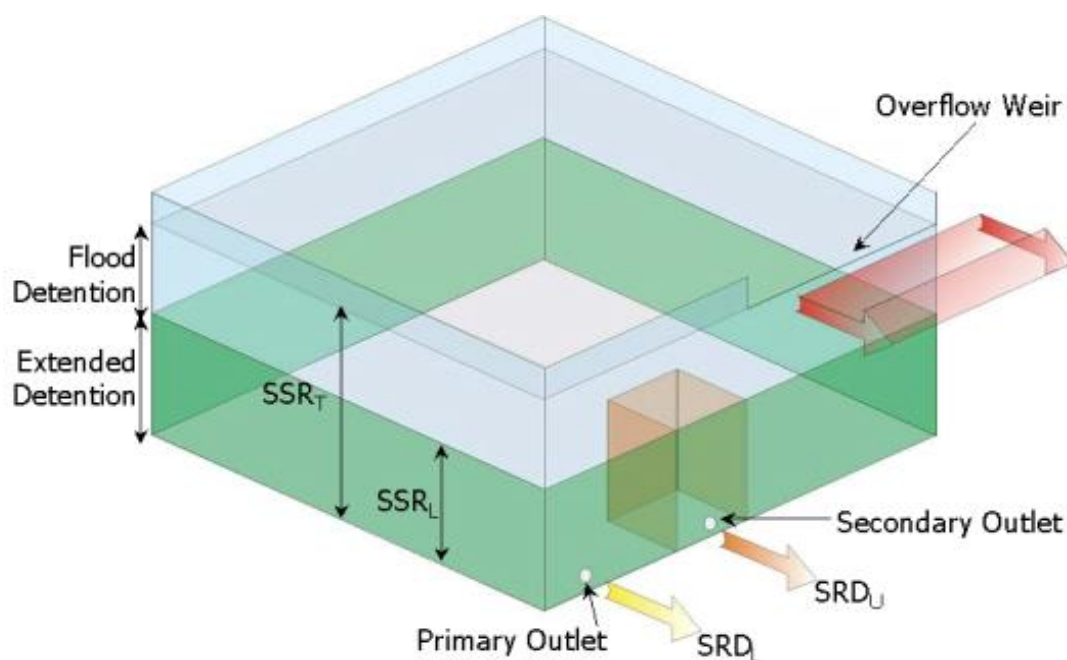


Figure 4-5 Proposed development on-site detention concept arrangement
(source: UPRCT OSD Handbook, 4th Edition)

The on-site detention systems will need to be located above the 1% AEP level to prevent inundation during high rainfall events. This also necessitates that each building will contain a separate on-site detention system as the 1% AEP levels in the surrounding streets means that a combined buried or below ground tank is not feasible.

Public domain and external catchment areas

The areas external to the buildings are currently 100% impervious with no known storage or water treatment.

On-site detention provisions for the public domain spaces and areas outside the building roof catchments are being considered and will form part of the CSSI application/s. The UPRCT handbook does not address provision for public spaces.

4.5 Construction

A Construction Soil and Water Management Plan would be required as part of the Detailed SSDA(s) and should consider the stormwater behaviour and flooding within and outside the proposed development site boundaries against the 100 year and PMF flooding events.

4.6 Stormwater quality

4.6.1 Existing site

The existing site largely consists of office and commercial buildings, carparks and surrounding paved surfaces. Based on a visual observation and desktop information, the various existing buildings and paved areas do not have a formal water treatment system.

4.6.2 Stormwater quality requirements

The design has looked to promote water sensitive urban design (WSUD) and fully ensure compliance with City of Parramatta Council DCP. Water quality treatment reduction targets required for the proposed development are listed in Table 4-6.

Table 4-6 Council DCP 2011 Stormwater quality reduction targets for developments

Water quality parameter	Development % reduction
Total suspended solids (TSS)	85
Total phosphorous (TP)	60
Total nitrogen	45
Gross pollutants	90

4.6.3 Precinct wide strategy

Preliminary WSUD treatment trains have been identified for the proposed development's indicative concept design as submitted with the EIS. The following treatments are proposed to be implemented within the proposed development site area:

- Soft Landscaping to promote infiltration
- Tree Pits (assumed 2x2m surface dimension)
- rainwater tanks
- on-site detention with primary and secondary outlets
- water filtration cartridges with the on-site detention
- Ocean Protect Storm filters
- Ocean Protect Ocean Guard.

The preliminary WSUD Concept Plan is shown in Appendix E.

Based on the Model for Urban Stormwater Improvement Conceptualisation (MUSIC), proposed treatment system for proposed catchments is providing stormwater quality compatible with CoP development principle which is listed in design criteria at section 4.1.5. Figure 4-6 and Table 4-7 show the current MUSIC configuration and current treatment results. The WSUD design will be updated in the next design stages to separate the model for the buildings and public domain.

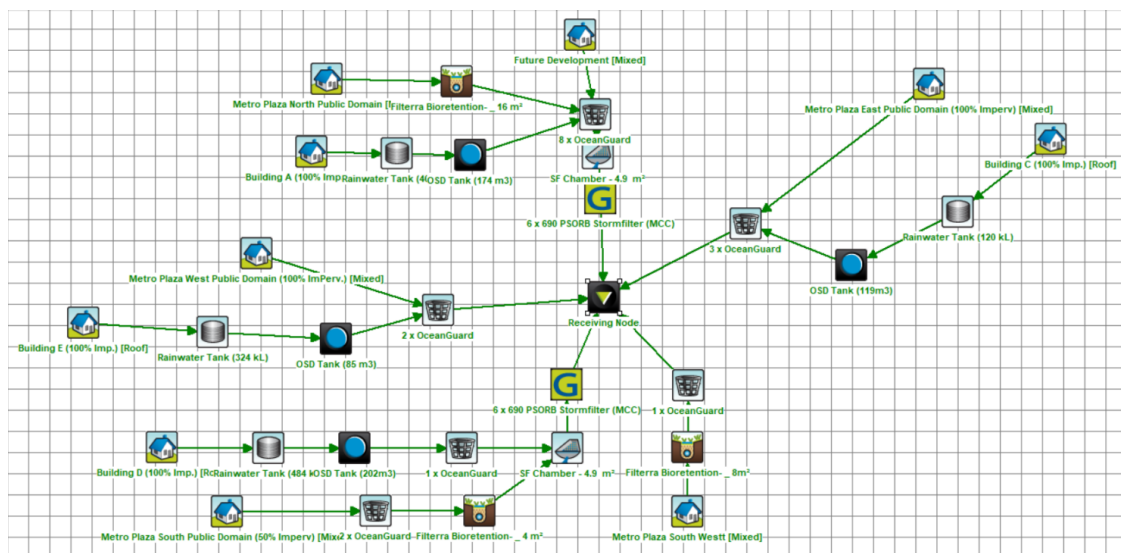


Figure 4-6 Preliminary MUSIC water sensitive urban design tool for Parramatta metro station

Table 4-7 Preliminary MUSIC water sensitive urban design tool results

Water quality parameter	Sources	Residual load	Reduction (%)	Reduction target (%)
Total suspended solids (TSS)	2340	267	88.6	85
Total phosphorous (TP)	5.84	1.87	67.9	60
Total nitrogen	53.2	25.6	51.9	45
Gross pollutants	558	0.2	100	90

It should be noted that the proposed development will not change the catchment characteristics when compared to the existing site conditions and therefore is unlikely to change the volume of pollutants generated.

4.7 Integrated water cycle management

This section evaluates the potential for adoption of an integrated Water Cycle Management approach for the proposed development which includes rainwater harvesting, reuse and recycled water to achieve the best possible outcomes for a Green Star accreditation.

4.7.1 Water and wastewater demand

This section should be read in conjunction the Utilities and Infrastructure Report (refer Appendix EE in the EIS).

Potable water demand

A high-level demand assessment was undertaken based on the indicative building development yield, this development yield was used for the purposes of utilities infrastructure assessments only and the final architectural designs should be used to confirm the building details Table 4-8.

Table 4-8 Potable water demand criteria

Land use	Design criteria	Unit	Demand rate	Source
Apartments	Max Day Demand	kL/unit/day	0.8	WSA 03-2011
Commercial	Max Day Demand	kL/ha/day	63	WSA 03-2011
Retail	Max Day Demand	kL/ha/day	41	WSA 03-2011
BASIX reduction (apartments only)	N/A	%	40	Building Sustainability Index

The proposed potable water demand based on the development profile is estimated to be between 1600 – 2160 kL/day including BASIX reduction for residential only.

Wastewater demand

An assessment of estimated sewer loading resulting from the proposed development has been undertaken to assist in determining the required infrastructure upgrades. Demand forecasting and profiles have been based on the average number of residential dwellings, and GFA for retail and commercial development based on the development yields in section 2.2.

The design criteria used to forecast future sewer loading are taken from the Sydney Water Area Planning Design Criteria Guide: WSA 02-2014-3.1 (Sewer Code of Australia) and is expressed as an Equivalent Population for a particular land use. The BASIX reduction has been taken from the Building Sustainability Index targets; these are summarised below in Table 4-9.

In accordance with the Sydney Water criteria guide, Parramatta has been classified as comprising of 'high density dwellings' and 'local commercial' development with an Equivalent Population (EP) per dwelling of 2.5 and EP/ha of 75. The Average Dry Weather Flow (ADWF) per Equivalent Population (EP) has been taken as 150 L/day or 0.0017L/s ($ADWF(L/s) = 0.0017 * EP$).

Under BASIX requirement, new residential developments are required to reduce wastewater loading by 40% (since the BASIX amendment was introduced in 2006) compared to the average NSW dwelling.

Table 4-9 Building sustainability targets

Land use	Unit	Potable water demand	Source
High Density Residential	EP/dwelling	2.5	WSA 02-2002
Local Commercial	EP/ha	75	WSA 02-2002
ADWF	L/s	0.0017	
BASIX reduction (apartments only)	%	40	Building Sustainability Index

The proposed wastewater demand based on the development profile is estimated to be between 14 – 18 L/s including BASIX reduction for residential only.

4.7.2 Water balance and Ecological Sustainable Development

Detailed building water balance analysis has been developed for each building in accordance with the relevant protocols. Reference can be made to the Ecological Sustainable Development report for further information (refer Appendix S in the EIS). The following water efficiency measures have been incorporated in the water strategy assessment:

- efficient toilets, urinals, handwash basins, taps, showers, dishwashers and clothes washers
- dual plumbing systems
- 30kL rainwater tank and treatment system to meet a proportion of the non-potable water demands
- closed circuit cooler plant
- landscape design and irrigation
- fire protection system that does not expel water during testing.

Sustainability initiatives

There are a range of potential sustainability initiatives that are being considered for the development works that may impact the stormwater quantity and quality assessments. Further investigation of potential sustainability initiatives that could influence stormwater, water quality and flooding design, will be undertaken as part of the final design of the buildings and in the Detailed SSDAs.

5 Conclusion

This Integrated Water Management and Water Quality Assessment has concluded that the water quality and stormwater designs are suitable for the proposed development:

- The stormwater quantity design has been developed in accordance with the City of Parramatta Council DCP and UPRCT guidelines, providing storage within the building developments and connection to the existing City of Parramatta Council network. There is no provision for on-site detention in the public domain spaces as these spaces will form part of the CSSI application/s.
- The stormwater quality design has been developed in accordance with the Council DCP and proposed WSUD measures have achieved the required water quality treatment reduction targets.

Once the Concept SSDA is determined, the SSD will be subject to further design development with future developers as part of the preparation of Detailed SSDAs. Future work that is required to finalise the stormwater, water quality and flooding design includes:

- finalise onsite detention requirements based on the finalised architectural scheme
- consult with Council regarding the extension of pipes in the Council drainage network on George Street to facilitate drainage of Building A
- co-ordinate with hydraulic engineers for design of integrated on-site detention and rainwater tanks
- further utilities and feature survey to identify invert levels and location of the existing drainage network
- refine the proposed water quality treatments to ensure a value for money solution.

Appendix A Authority consultation

SDDS Sydney Metro General Correspondence

Reference No: SMWSDDS-SMD-SMD-GEN-003126

Project Title: Sydney Metro West Scoping & Definition and Early Works

Contract No.: SDDS - Scoping and Definition Design Services

Sub Contract: -

Orig Ref No: SMWSTEDS-SMD-SN200-SD-RFI-0440

DLM:

Date:	23 July 2021, 03:45 PM	Response required by: 06 August 2021
From:	Jennifer Finn, Sydney Metro	
To:	Md Mahbubur Rahman, Sydney Metro	
CC:	Demi Tascas, Sydney Metro Tania Page, Sydney Metro Mohini Nair, Sydney Metro Chen Wang, Sydney Metro Saif Kibria, Sydney Metro Aidan Potter, Sydney Metro Adrian Bonanni, Sydney Metro	
Subject:	Request for Information: SMWSTEDS-SMD-SN200-SD-RFI-044003 - Parramatta's existing buildings OSD connections	

Afternoon,

Please find attached RFI for your action,

Kind regards,

Jennifer Finn
Senior Document Controller
Metro West
0497107508

Design Series:

Discipline:

Design Lots:

Location:


Attachments

Existing Catchment.pdf (820 KB), Proposed Catchment Plan.pdf (882 KB), SMWSTEDS-SMD-SN200-SD-RFI-044003.docx (3 MB)

REQUEST FOR INFORMATION



RFI Number	SMWSTEDS-SMD-SN200-SD-RFI-044003	EDS Work Package #	44
RFI Subject	Parramatta's existing buildings OSD connections		
RFI Initiator	Omid Alavi		
Discipline	Drainage	Location	Parramatta
Attention			
Responding Company	City of Parramatta	Respond By Date	06/08/2021
Request Type (select as appropriate)	<input checked="" type="checkbox"/> Clarification:	The information we have is unclear or contradictory. We are seeking clarification.	
	<input checked="" type="checkbox"/> Confirmation:	The information we have is preliminary. We are seeking confirmation to use it.	
	<input type="checkbox"/> Incomplete:	The information we have is incomplete.	
	<input checked="" type="checkbox"/> No Information:	We have no information in this area.	
	<input type="checkbox"/> Other:		
RFI Request details	<p>As part of the Sydney Metro West project we are developing the proposed drainage network for the planned Parramatta station precinct. To enable further design progression, it would be appreciated if the City of Parramatta (COP) could provide information on the following items:</p> <ol style="list-style-type: none"> To help with determining On-Site Detention (OSD) requirements, it would be valuable to know whether the existing buildings within the construction footprint incorporate their own OSD systems. Preliminary advice from a conversation with a COP officer suggested that older buildings will typically not have any OSD and that discharge is typically directly to the kerb and channel. Further investigation using google maps also shows existing kerb outlets along George Street and Macquarie Street which further suggests runoff is discharged directly to the kerb and channel via downpipes. Property discharge points along Church street could not be identified. Refer to snips 1 and 2 in the "Supporting Information" section. <p>Given the preliminary advice received from the COP, can you please confirm the assumption that the existing buildings do not have any OSD is reasonable, and that the methodology of modelling the existing buildings as entirely impervious is acceptable for purposes of estimating existing runoff flow rates. If this assumption is not correct, can COP please advise how the existing buildings should be modelled for purposes of pre and post development flow rate comparison (certain area impervious or allowable discharge rates etc.).</p> <p>Existing buildings within the construction footprint are listed below as well as identified within the snip 3 as a supporting document (refer next section).</p> <ul style="list-style-type: none"> 48-52 Macquarie St , 18-24 Horwood Pl 60-74 Macquarie St 69-71 Horwood Pl (City Centre Car Park) 55-69 George St (Parramall Shopping Centre) 		

	<ul style="list-style-type: none"> • 43-47 George St • 230-238 Church St <ol style="list-style-type: none"> Confirmation of the existing building (same as the above list) drainage discharge points to the road drainage network as indicated on snip 3. Note the discharge locations shown on the snip are Sydney Metros currently assumed locations. It is acknowledged COP may not have this information, but any comments on the assumed locations or further insight is appreciated. If the assumption in item 1 is not valid (i.e. existing buildings do have OSD and the proposed building developments are expected to detain water to a certain flow rate), can COP confirm whether detention of the proposed building runoff (if required) can occur in the public realm and not within the building line. This would result in OSD tanks within the public plaza areas which detain private runoff and takes the approach of treating the entire metro site as one development and does not distinguish between public and private responsibility for purposes of stormwater detention.
Supporting Information (files/screenshot s etc)	<p>Refer to the follwong attachment:</p> <ul style="list-style-type: none"> • "Existing Catchment".pdf <p><u>Snip 1</u></p>  <p><u>Snip 2</u></p>



Snip 3



Response

REQUEST FOR INFORMATION



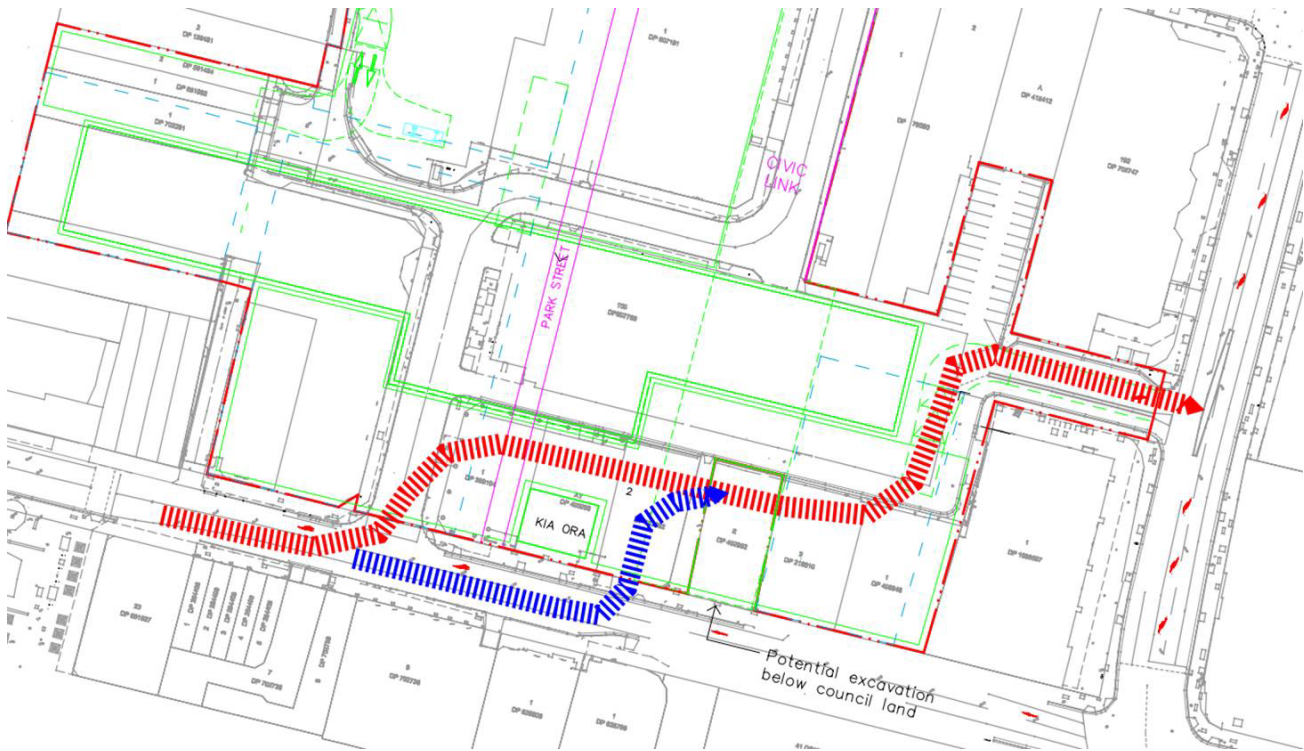
RFI Closed	Y / N	Closed Date	
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Aidan Potter

From: Chen WANG <chen.wang@smec.com>
Sent: Monday, 17 May 2021 4:46 PM
To: Aidan Potter
Cc: Lisa Karwoski; Atif Bilgrami; Saif Kibria
Subject: FW: Parramatta Station - George Street Construction Access Alignment Meeting - Presentation and actions
Attachments: P0054433-REF-0000-RD-MQLINK-TD-C.PDF; P0054433-REF-0000-RD-MQLINK-SEMI-ISO.PDF

Hi Aidan,eh

Not sure whether you were involved in the discussion regarding to this topic previously. Basically, we need to test whether our current station design allow for a temp vehicle link from Macquarie St to Smith Street before shutting off Horwood Place. Refer to the figure below:



Can you please organise the cad file (survey + station box) as per the request from Daniel below? The file I sent to you previously contains the station box is not from an accurate input. Please organise a direct output from our current BIM 360 model to ensure the accuracy if you haven't done so.

Also, would you please test the design vehicles adopted in the sketch plans attached (truck and dog @ 15km/h) to ensure the space between our station box and the site boundary / Kia Ora (heritage building) can accommodate the turning path requirement without having a more detailed temp road design.

Cheers,
Chen Wang

From: Daniel O'shaughnessy <Daniel.O'shaughnessy@transport.nsw.gov.au>
Sent: Wednesday, 12 May 2021 4:17 PM
To: Chen WANG <chen.wang@smec.com>

Cc: Atif Bilgrami <Atif.Bilgrami2@transport.nsw.gov.au>; Lindsay Baker <Lindsay.Baker2@transport.nsw.gov.au>; Saif Kibria <Saif.Kibria@mottmac.com>
Subject: RE: Parramatta Station - George Street Construction Access Alignment Meeting - Presentation and actions

This Message Is From an External Sender

This message came from outside your organization.

Hi Chen

Design vehicle for the Macquarie Link is a 19m Truck and Dog.
The attached sketches indicate the two way operation of a truck and dog and a light vehicle accessing the carpark. A 19m Semi-trailer can use the access under traffic control. Attached are two plans indicating the swept path of the design scenario and the Semi under traffic control.

Can you please provide a plan of the extended station box in CAD? Can you please provide it in GDA94 instead of GDA2020. Attached are two plans indicating the swept path of the design

Regards
Dan

Daniel O'Shaughnessy
Project Manager – Roads (Technical),
Enabling Works (Third Parties Delivery)
Sydney Metro West

M 0431 949 859

sydneymetro.info
680 George Street, Sydney NSW 2000



From: Chen WANG [<mailto:chen.wang@smec.com>]
Sent: Wednesday, 12 May 2021 2:46 PM
To: Daniel O'shaughnessy <Daniel.O'shaughnessy@transport.nsw.gov.au>
Cc: Atif Bilgrami <Atif.Bilgrami2@transport.nsw.gov.au>; Lindsay Baker <Lindsay.Baker2@transport.nsw.gov.au>; Kibria, Saif <Saif.Kibria@mottmac.com>
Subject: RE: Parramatta Station - George Street Construction Access Alignment Meeting - Presentation and actions

CAUTION: This email is sent from an external source. Do not click any links or open attachments unless you recognise the sender and know the content is safe.

Hi Daniel,

Any updates on the information request below?

Regards,

Chen Wang

From: Chen WANG

Sent: Monday, 3 May 2021 4:28 PM

To: Daniel O'shaughnessy <Daniel.O'shaughnessy@transport.nsw.gov.au>

Cc: Atif Bilgrami <Atif.Bilgrami2@transport.nsw.gov.au>; Lindsay Baker <Lindsay.Baker2@transport.nsw.gov.au>;

Saif Kibria <Saif.Kibria@mottmac.com>

Subject: RE: Parramatta Station - George Street Construction Access Alignment Meeting - Presentation and actions

Hi Daniel,

Can we clarify the **design vehicles** for the Macquarie St to Smith St temporary link? We are extending the station box excavation works towards the south and therefore would need to assess the available space between the Kia Ora and the Station excavation.

Thanks.

Chen Wang
Design Manager – SOP & PTA Stations

Engineering Design Solutions
Sydney Metro

M 0422 178493

sydneymetro.info



From: Daniel O'shaughnessy <Daniel.O'shaughnessy@transport.nsw.gov.au>

Sent: Wednesday, 28 April 2021 10:51 AM

To: Andrew Allan <andrew.allan@transport.nsw.gov.au>; Phillip Kelly <Phillip.Kelly2@transport.nsw.gov.au>; Matthew Pate <Matthew.Pate2@transport.nsw.gov.au>; Daniel Taylor <Daniel.Taylor3@transport.nsw.gov.au>; Sunny Singh <Sunny.Singh@transport.nsw.gov.au>; Lindsay Baker <Lindsay.Baker2@transport.nsw.gov.au>; Chen WANG <chen.wang@smec.com>

Cc: Sunny Singh <Sunny.Singh@transport.nsw.gov.au>; Atif Bilgrami <Atif.Bilgrami2@transport.nsw.gov.au>

Subject: Parramatta Station - George Street Construction Access Alignment Meeting - Presentation and actions

Hello everyone,

Thank you for your attendance at yesterday's meeting. Attached is the slide pack presented in the meeting.

Meeting Actions / clarifications

- TfNSW to progress with 1 Signalised intersection design at Horwood Place, seek approvals from Network Op's and inform relevant stakeholders
- TfNSW 80% detailed design to document Civil works for the intersection to the property boundary only. TCS design to include internal access requirements to complete the TCS.
- TfNSW to provide concept of civil works required beyond the property boundary to accommodate the TCS. Works within the construction site to be delivered by WTP.
- Interface between TfNSW contractor and WTP contractor re the finalisation of the TCS (commissioning of TCS by TfNSW following construction of internal access) to be further clarified.
- EDS to develop Interim Civic Link concept considering TfNSW Horwood Place intersection position. Any future modifications of the TCS to accommodate Civic Link or any other interim station design requirement is the responsibility of EDS.

Regards
Dan

Daniel O'Shaughnessy
Project Manager – Roads (Technical),
Enabling Works (Third Parties Delivery)
Sydney Metro West

M 0431 949 859

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680 George Street, Sydney NSW 2000



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Appendix B Existing stormwater assessment

EXISTING DRAINAGE ANALYSIS - FOR CITY OF PARRAMATTA COUNCIL

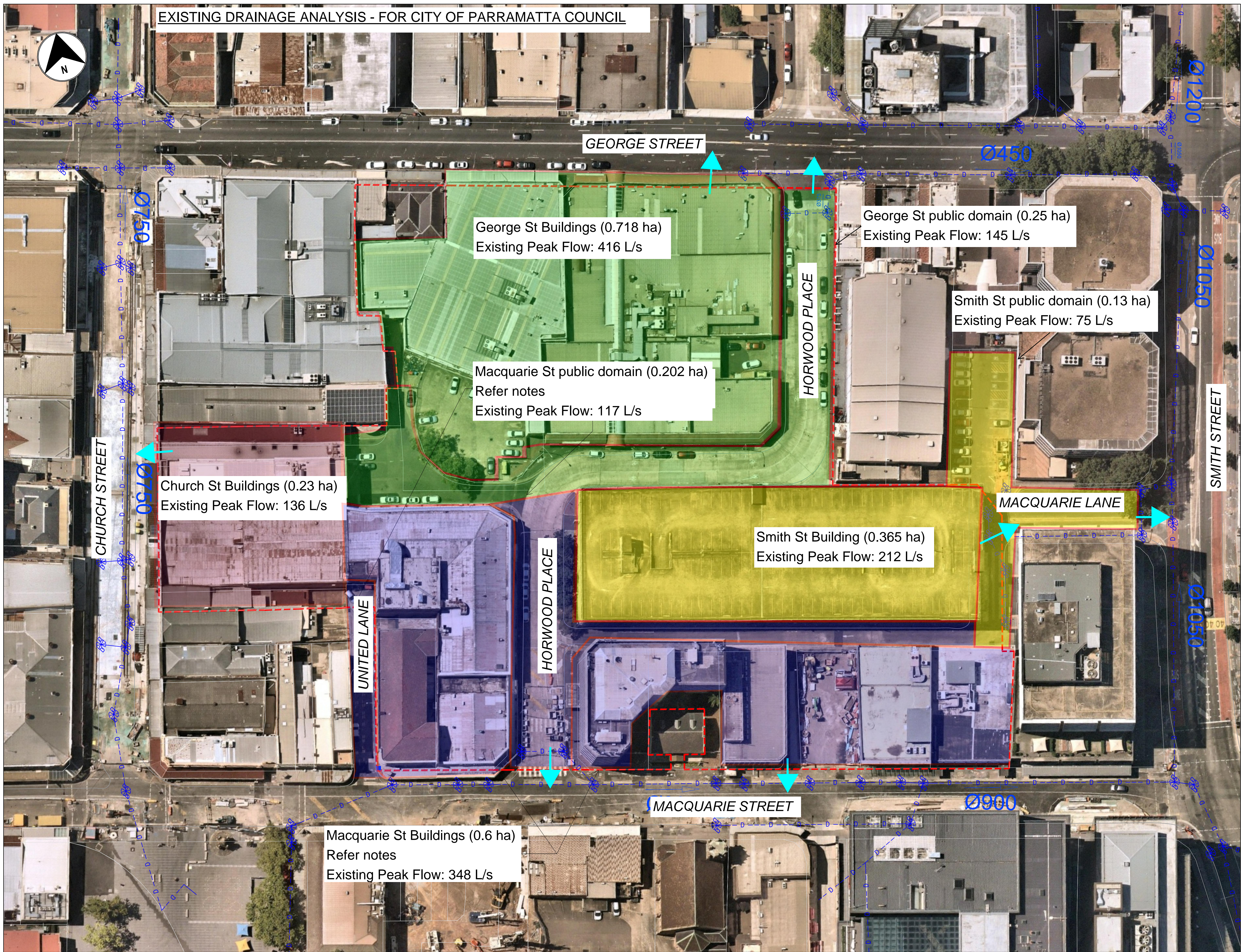


TABLE 1: SUMMARY OF EXISTING DRAINAGE ON SITE DETENTION (OSD) AND PEAK FLOW

BUILDINGS			
Catchment	Area (m²)	OSD Storage (m³) (*)	1% AEP Peak Flow (L/s)
George Street	718	0	416
Smith Street	365	0	212
Macquarie Street	600	0	348
Church Street	230	0	136
Total	1222	0	1112
PUBLIC DOMAIN			
Catchment	Area (m²)	OSD Storage (m³) (8)	1% AEP Peak Flow (L/s)
George Street	142	0	145
Smith Street	610	0	75
Macquarie Street	210	0	117
Church Street	NA	NA	NA
Total	962	0	337

NOTE: (*) NO KNOWN OSD WITHIN ANY OF THE EXISTING BUILDINGS, CARPARKS OR PUBLIC SPACES

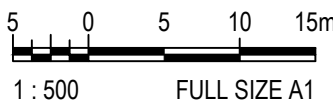
NOTES:

1. CO-ORDINATE SYSTEM IS TO MAP GRID AUSTRALIA MGA94 ZONE 56.
2. ALL LEVELS ARE TO THE AUSTRALIAN HEIGHT DATUM (AHD).
3. ALL CATCHMENTS MODELLED AS 100% IMPERVIOUS
4. ALL CATCHMENTS LABELLED BY THEIR STREET OUTLET LOCATION
5. EXISTING FLOW RATES CALCULATED USING ILSAX METHOD IN DRAINS SOFTWARE
6. PEAK FLOWS PRESENTED FOR THE 1% ANNUAL EXCEEDANCE PROBABILITY
7. THE EXISTING DRAINAGE IS BASED ON CLASS D SURVEY AND INPUTS FROM THE PARRAMATTA LIGHT RAIL PROJECT.
8. MACQUARIE STREET BUILDING PEAK FLOW INCLUDES 2 AREAS (WEST SIDE AND EAST SIDE OF THE HORWOOD PLACE)
9. MACQUARIE STREET PUBLIC DOMAIN PEAK FLOW INCLUDES 2 AREAS (HORWOOD PLACE AND UNITED LANE)

OFFICIAL

REV.	AMENDMENT DESCRIPTION	Design by	Verified by	Approved by	Date
A1	Original				

SCALE: 1:500



A1 Original Co-ordinate System: GDA2020/MGAZONE 56 Height Datum: AHD This sheet may be prepared using colour and may be incomplete if copied NOTE: Do not scale from this drawing.

CLIENT:



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DRAWN	EDS	26/10/2021
DESIGNED	EDS	26/10/2021
DRG CHECK		
DESIGN CHECK		
APPROVED		

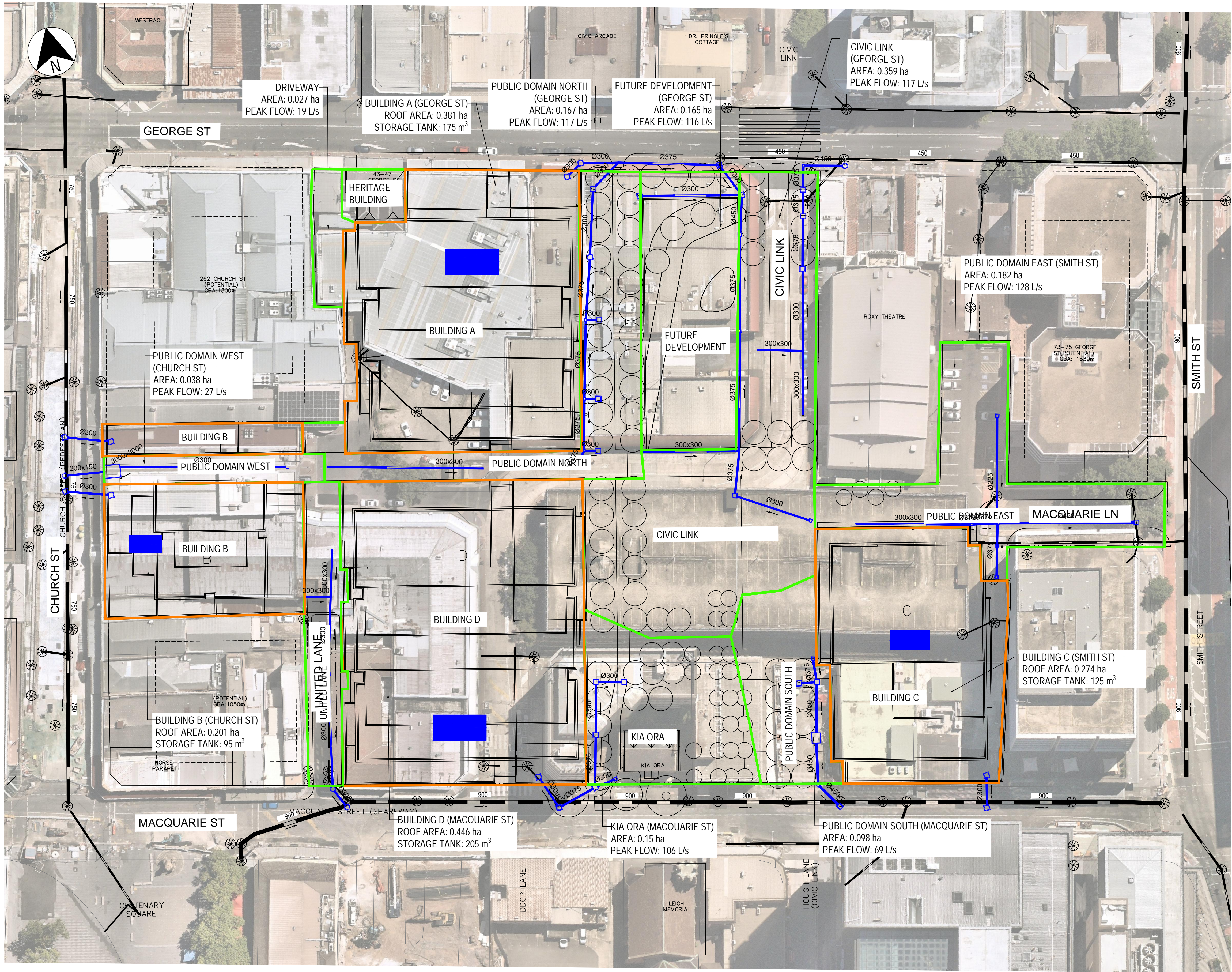
Design company Name
AEO Discipline Description

SYDNEY METRO WEST
PARRAMATTA PARK STATION
CIVIL
EXISTING DRAINAGE CATCHMENT PLAN

FILE No:	
STATUS:	
DRG No:	

Appendix C Proposed stormwater strategy

100mm AT FULL SIZE Plot Date & Time: 21/03/22 - 18:30



PROPOSED DRAINAGE ARRANGEMENT
SCALE 1:500

TABLE 1: SUMMARY OF PROPOSED DRAINAGE ON SITE DETENTION (OSD) AND PEAK FLOW			
BUILDINGS			
Catchment	Ar (²)	OSD Storage (³)	1% AEP Peak Flow (L/s)
Building A	3810	175	15.24
Building B	2005	95	8.02
Building C	2740	125	10.96
Building D	4455	205	17.82
Total	13010	600	52.04

PUBLIC DOMAIN			
Catchment	Ar (²)	OSD Storage (³)	1% AEP CC Peak Flow (L/s)
Future Development	1650	NA	116
Public Domain North	1670	NA	117
Public Domain East	1820	NA	128
Public Domain South	980	NA	69
Public Domain West	380	NA	27
Civic Link	3585	NA	117
United Lane	690	NA	49
Kia Ora	1500	NA	106
Building A Driveway	265	NA	19
Heritage Building	470	NA	33
Total	13010	NA	781

NOTE: (*) PEAK FLOW FOR BUILDINGS BASED ON UPRCT CONDITIONS, 40L/HA AND 150L/HA FOR PRIMARY AND SECONDARY OUTLETS RESPECTIVELY

NOTES:

- BUILDING OSD CALCULATIONS ARE BASED ON THE UPPER PARRAMATTA RIVER CATCHMENT TRUST 4TH EDITION.
- PUBLIC DOMAIN CATCHMENTS PEAK FLOW CALCULATIONS ARE BASED ON 1% AEP EVENT IN ADDITION TO 21.3% OF CLIMATE CHANGE FACTOR CALCULATED BY DRAINS.
- LAYOUT BASED ON ARCHITECTURAL DESIGNS SUBJECT TO CHANGE.
- LATEST SURFACE GRADING SUBJECT TO CHANGE.
- INDICATIVE OSD TANK LOCATIONS ARE SHOWN ASSUMING 1m DEEP TANK, SUBJECT TO CHANGE.
- FOR BUILDING STORMWATER DISPOSAL, EXTENSION TO COUNCIL PIT AND PIPE NETWORK MAY BE REQUIRED.
- BUILDING B AREA COMBINES STRUCTURES ON THE NORTH AND SOUTH SIDE OF PUBLIC DOMAIN WEST.
- CATCHMENT NOT INDICATED AS BUILDINGS INDICATE THE AREA IS NOT ROOFED.
- PUBLIC DOMAIN AREA ARE CONSIDERED AS 100% IMPERVIOUS TO BE CONSERVATIVE AT CURRENT DESIGN STAGE. VALUES TO BE UPDATED IN LATER STAGES FOLLOWING LANDSCAPE AMENDMENTS.

LEGEND

- EXISTING DRAINAGE
- PROPOSED DRAINAGE
- PROPOSED ON SITE DETENTION TANK

FOR INFORMATION

B	ISSUED FOR INFORMATION ONLY	JZ	HW	LK	21/03/22
A	ISSUED FOR INFORMATION ONLY	OA	HW	LK	30/11/21
REV.	AMENDMENT DESCRIPTION	Design by	Verified by	Approved by	Date

SCALE:
5 0 10 20m
SCALE 1:500 FULL SIZE A1

NOTE: Do not scale from this drawing.



CLIENT:	
DRAWN	WINSTON PHAN
DESIGNED	OMID ALAWI
DRG CHECK	HEATHER WALKER
DESIGN CHECK	LISA KARWOSKI
APPROVED	CHEN WANG

SYDNEY METRO WEST			
PARRAMATTA STATION			
PROPOSED DRAINAGE ARRANGEMENT			
FILE No:		SHEET: 1 OF 1	©
STATUS:		EDMS No:	EDMSNo.
DRG No: SMWSAEDS-SMD-PTA-CV-000020.dwg		REV B	VER .01

Appendix D UPRCT calculations

On-Site Detention Calculation Sheet for Upper Parramatta River Catchment HED Secondary Outlet

Project:	Metro West - Parramatta Station				
Site Address	Building A				
Job No:					
Designer:	Jerry Zhang				
Telephone:					

Site Data					
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OSD Area:	Upper Parramatta River Catchment				
L.G.A	Parramatta City Council				
Site Area	0.381	ha	3,810	m ²	
Total Roof Area	0.3809	ha	3,809	m ²	
Area of Site draining to OSD Storage	0.381	ha	3,810	m ²	Satisfactory
Residual Site Area (Lot Area - Roof Area)	0.000	ha			
Area Bypassing Storage	0	ha			
Area Bypassing / Residual Site Area	0.0%				Satisfactory 30% Max
No. of Dwellings on Site	4				Satisfactory
Site Area per Dwelling	0.095	ha			
Roof Area per Dwelling	0.095	ha			

Basic OSD Parameters					
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			Extended Detention			Detention
Basic SSR Vols	Ext Detention Storage	300	m ³ /ha	Total Storage	455	m ³ /ha
Basic SRDs	Primary Outlet	40	L/s/ha	Secondary Outlet	150	L/s/ha

OSD Tank Bypass					
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Residual Lot Capture in OSD Tank	100%				
Adjusted SRDs	40	L/s/ha		150	L/s/ha

OSD Calculations					
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			Extended Detention			Detention
Basic SSR Volume	Ext Detention Storage	114.30	m ³	Total Storage	173.36	m ³
Total Rainwater Tank Credits		0.08	m ³		0.07	m ³
Storage Volume				Total	173.28	m ³
Storage Volume	Ext Detention Storage	114.22	m ³	Flood Detention Storage	59.06	m ³
OSD Discharges	Primary Outlet	15.24	L/s	Secondary Outlet	57.15	L/s
RL of Top Water Level of Storage	10.100	m		10.300	m	
RL of Orifice Centre-line	9.100	m		9.000	m	
Number of Orifices	1			1		
Estimated Downstream Flood Level	9.00	1.5 yr ARI		9.00	100 yr ARI	
Downstream FL - RL of Orifice Cente-line	-0.10	Satisfactory		Satisfactory	0.00	m
Design Head to Orifice Centre	1.000	m		TWL Ext Detn Storage - RL Orifice	1.100	m
Calculated Orifice Diameter	85	mm	Satisfactory	Satisfactory	162	mm

Overflow Weir & Freeboard Calculation					
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RL of Minimum Habitable Floor Level	10.600	m			
RL of Minimum Garage Floor Level	10.500	m			
Length of Overflow Weir	2.00	m			
Site Runoff Coefficient	Parramatta City Council	0.75			
Storm Intensity (5 min 100 yr ARI)	206	mm/h			
Peak Flow over Weir	163.5	L/s			
Depth of Flow over Weir	136	mm			
Freeboard to Habitable Floor	Unacceptable - Min Freeboard = 200 mm	164	mm		
Freeboard to Garage Floor	Unacceptable - Min Freeboard = 100 mm	64	mm		

On-Site Detention Calculation Sheet for Upper Parramatta River Catchment HED Secondary Outlet

Project:	Metro West - Parramatta Station				
Site Address	Building B				
Job No:					
Designer:	Jerry Zhang				
Telephone:					

Site Data					
OSD Area:	Upper Parramatta River Catchment				
L.G.A	Parramatta City Council				
Site Area	0.2005	ha	2,005	m ²	
Total Roof Area	0.2004	ha	2,004	m ²	
Area of Site draining to OSD Storage	0.2005	ha	2,005	m ²	Satisfactory
Residual Site Area (Lot Area - Roof Area)	0.000	ha			
Area Bypassing Storage	0	ha			
Area Bypassing / Residual Site Area	0.0%				Satisfactory
No. of Dwellings on Site	4				Satisfactory
Site Area per Dwelling	0.050	ha			
Roof Area per Dwelling	0.050	ha			

Basic OSD Parameters					
			Extended Detention	Detention	
Basic SSR Vols	Ext Detention Storage	300	m ³ /ha	Total Storage	455 m ³ /ha
Basic SRDs	Primary Outlet	40	L/s/ha	Secondary Outlet	150 L/s/ha

OSD Tank Bypass			
Residual Lot Capture in OSD Tank	100%		
Adjusted SRDs	40	L/s/ha	150 L/s/ha

OSD Calculations					
			Extended Detention	Detention	
Basic SSR Volume	Ext Detention Storage	60.15	m ³	Total Storage	91.23 m ³
Total Rainwater Tank Credits		0.22	m ³		0.21 m ³
Storage Volume				Total	91.02 m ³
Storage Volume	Ext Detention Storage	59.93	m ³	Flood Detention Storage	31.08 m ³
OSD Discharges	Primary Outlet	8.02	L/s	Secondary Outlet	30.08 L/s
RL of Top Water Level of Storage		10.100	m		10.300 m
RL of Orifice Centre-line		9.100	m		9.000 m
Number of Orifices		1			1
Estimated Downstream Flood Level		9.00	1.5 yr ARI		9.00 100 yr ARI
Downstream FL - RL of Orifice Cente-line		-0.10	Satisfactory	Satisfactory	0.00 m
Design Head to Orifice Centre		1.000	m	TWL Ext Detn Storage - RL Orifice	1.100 m
Calculated Orifice Diameter		62	mm	Satisfactory	Satisfactory

Overflow Weir & Freeboard Calculation			
RL of Minimum Habitable Floor Level		10.600	m
RL of Minimum Garage Floor Level		10.500	m
Length of Overflow Weir		2.00	m
Site Runoff Coefficient	Parramatta City Council	0.75	
Storm Intensity (5 min 100 yr ARI)		206	mm/h
Peak Flow over Weir		86.0	L/s
Depth of Flow over Weir		88	mm
Freeboard to Habitable Floor	Satisfactory	212	mm
Freeboard to Garage Floor	Satisfactory	112	mm

On-Site Detention Calculation Sheet for Upper Parramatta River Catchment HED Secondary Outlet

Project:	Metro West - Parramatta Station				
Site Address	Building C				
Job No:					
Designer:	Jerry Zhang				
Telephone:					

Site Data					
OSD Area:	Upper Parramatta River Catchment				
L.G.A	Parramatta City Council				
Site Area	0.274	ha	2,740	m ²	
Total Roof Area	0.2739	ha	2,739	m ²	
Area of Site draining to OSD Storage	0.274	ha	2,740	m ²	Satisfactory
Residual Site Area (Lot Area - Roof Area)	0.000	ha			
Area Bypassing Storage	0	ha			
Area Bypassing / Residual Site Area	0.0%				Satisfactory 30% Max
No. of Dwellings on Site	4				Satisfactory
Site Area per Dwelling	0.069	ha			
Roof Area per Dwelling	0.068	ha			

Basic OSD Parameters					
			Extended Detention		
Basic SSR Vols	Ext Detention Storage	300	m ³ /ha	Total Storage	455 m ³ /ha
Basic SRDs	Primary Outlet	40	L/s/ha	Secondary Outlet	150 L/s/ha

OSD Tank Bypass					
Residual Lot Capture in OSD Tank	100%				
Adjusted SRDs	40	L/s/ha		150	L/s/ha

OSD Calculations					
			Extended Detention		
Basic SSR Volume	Ext Detention Storage	82.20	m ³	Total Storage	124.67 m ³
Total Rainwater Tank Credits		0.13	m ³		0.13 m ³
Storage Volume				Total	124.54 m ³
Storage Volume	Ext Detention Storage	82.07	m ³	Flood Detention Storage	42.48 m ³
OSD Discharges	Primary Outlet	10.96	L/s	Secondary Outlet	41.10 L/s
RL of Top Water Level of Storage	10.100	m		10.300	m
RL of Orifice Centre-line	9.100	m		9.000	m
Number of Orifices	1			1	
Estimated Downstream Flood Level	9.00	1.5 yr ARI		9.00	100 yr ARI
Downstream FL - RL of Orifice Centre-line	-0.10	Satisfactory		Satisfactory	0.00 m
Design Head to Orifice Centre	1.000	m		TWL Ext Detn Storage - RL Orifice	1.100 m
Calculated Orifice Diameter	72	mm	Satisfactory	Satisfactory	137 mm

Overflow Weir & Freeboard Calculation					
RL of Minimum Habitable Floor Level		10.600	m		
RL of Minimum Garage Floor Level		10.500	m		
Length of Overflow Weir		2.00	m		
Site Runoff Coefficient	Parramatta City Council	0.75			
Storm Intensity (5 min 100 yr ARI)		206	mm/h		
Peak Flow over Weir		117.6	L/s		
Depth of Flow over Weir		109	mm		
Freeboard to Habitable Floor		Unacceptable - Min Freeboard = 200 mm	191	mm	
Freeboard to Garage Floor		Unacceptable - Min Freeboard = 100 mm	91	mm	

On-Site Detention Calculation Sheet for Upper Parramatta River Catchment HED Secondary Outlet

Project:	Metro West - Parramatta Station				
Site Address	Building D				
Job No:					
Designer:	Jerry Zhang				
Telephone:					

Site Data					
OSD Area:	Upper Parramatta River Catchment				
L.G.A	Parramatta City Council				
Site Area	0.4455	ha	4,455	m ²	
Total Roof Area	0.4454	ha	4,454	m ²	
Area of Site draining to OSD Storage	0.4455	ha	4,455	m ²	Satisfactory
Residual Site Area (Lot Area - Roof Area)	0.000	ha			
Area Bypassing Storage	0	ha			
Area Bypassing / Residual Site Area	0.0%				Satisfactory 30% Max
No. of Dwellings on Site	4				Satisfactory
Site Area per Dwelling	0.111	ha			
Roof Area per Dwelling	0.111	ha			

Basic OSD Parameters					
			Extended Detention		
Basic SSR Vols	Ext Detention Storage	300	m ³ /ha	Total Storage	455 m ³ /ha
Basic SRDs	Primary Outlet	40	L/s/ha	Secondary Outlet	150 L/s/ha

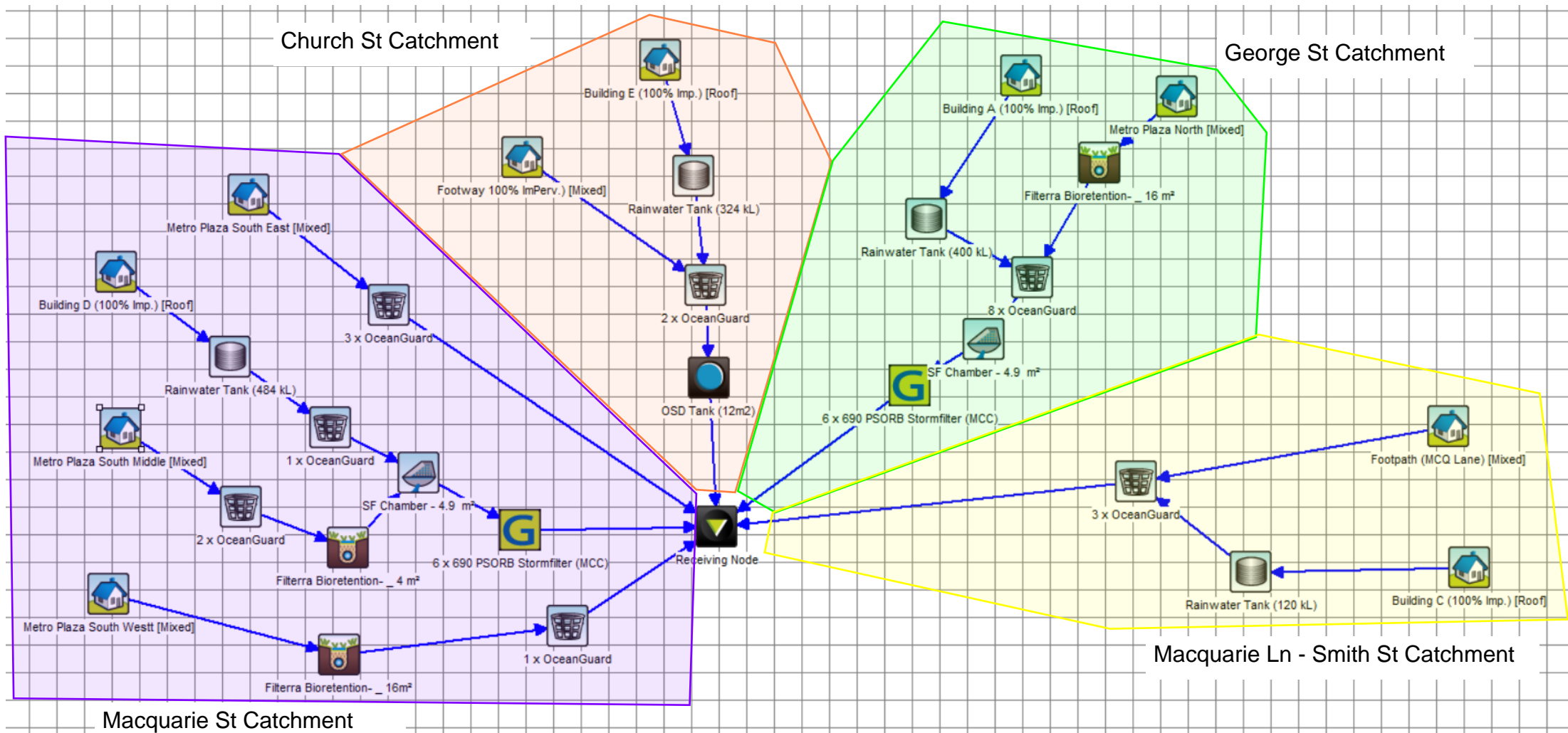
OSD Tank Bypass					
Residual Lot Capture in OSD Tank	100%				
Adjusted SRDs	40	L/s/ha		150	L/s/ha

OSD Calculations					
			Extended Detention		
Basic SSR Volume	Ext Detention Storage	133.65	m ³	Total Storage	202.70 m ³
Total Rainwater Tank Credits		0.06	m ³		0.06 m ³
Storage Volume				Total	202.65 m ³
Storage Volume	Ext Detention Storage	133.59	m ³	Flood Detention Storage	69.06 m ³
OSD Discharges	Primary Outlet	17.82	L/s	Secondary Outlet	66.83 L/s
RL of Top Water Level of Storage	10.100	m		10.300	m
RL of Orifice Centre-line	9.100	m		9.000	m
Number of Orifices	1			1	
Estimated Downstream Flood Level	9.00	1.5 yr ARI		9.00	100 yr ARI
Downstream FL - RL of Orifice Centre-line	-0.10	Satisfactory		Satisfactory	0.00 m
Design Head to Orifice Centre	1.000	m		TWL Ext Detn Storage - RL Orifice	1.100 m
Calculated Orifice Diameter	92	mm	Satisfactory	Satisfactory	175 mm

Overflow Weir & Freeboard Calculation					
RL of Minimum Habitable Floor Level		10.600	m		
RL of Minimum Garage Floor Level		10.500	m		
Length of Overflow Weir		2.00	m		
Site Runoff Coefficient	Parramatta City Council	0.75			
Storm Intensity (5 min 100 yr ARI)		206	mm/h		
Peak Flow over Weir		191.2	L/s		
Depth of Flow over Weir		151	mm		
Freeboard to Habitable Floor	Unacceptable - Min Freeboard = 200 mm	149	mm		
Freeboard to Garage Floor	Unacceptable - Min Freeboard = 100 mm	49	mm		

Appendix E WSUD concept plan

Parramatta Station Proposed Drainage WSUD Model Summary



Proposed Stormwater Quality

	Sources	Residual Load	% Reduction
Flow (ML/yr)	16.8	16.6	1.2
Total Suspended Solids (kg/yr)	1890	129	93.2
Total Phosphorus (kg/yr)	4.43	1	77.4
Total Nitrogen (kg/yr)	40.9	16.8	59
Gross Pollutants (kg/yr)	443	0.005	100