Education
School Infrastructure

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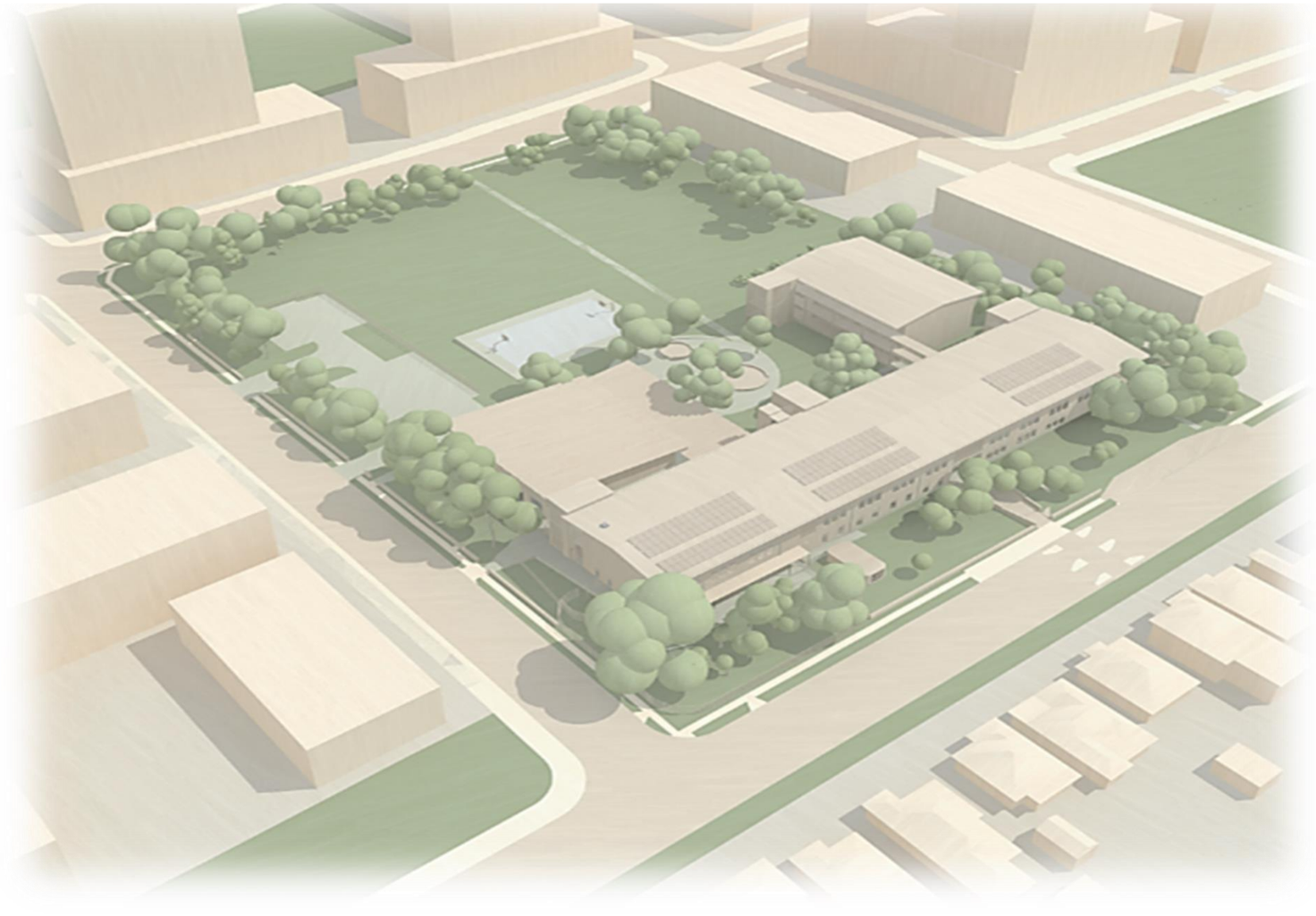
UPGRADES TO MELROSE PARK PUBLIC SCHOOL

CIVIL ENGINEERING REF REPORT



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By: **en**struct group pty ltd (member of WSP)
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UPGRADES TO MELROSE PARK PUBLIC SCHOOL

enstruct group pty (Member of WSP)

ISSUE AUTHORISATION

PROJECT: Melrose Park Public School

Project No: 7042

Rev	Date	Purpose of Issue / Nature of Revision	Prepared by	Reviewed by	Issue Authorised by
001	30/04/24	Issue as DRAFT	ASE	PAL	PAL
002	10/12/24	Issue for DRAFT REF	JAF	JAF	PAL
003	14/02/24	Issue for REF	SCO	JAF	PAL
004	01/04/25	Reissue for REF	SCO	JAF	PAL
005	11/04/25	Reissue for REF	JAF	JAF	PAL

Executive Summary

enstruct have been engaged by Department of Education (DoE) to provide Civil Engineering consultancy services and design development for the Upgrades to Melrose Park Public School (hereafter MPPS).

This report relates to the Civil Engineering elements of the design and supports the submitted Development Application documentation.

The key items include:

- Erosion and Sediment Control (ESC)
- Water Sensitive Urban Design (WSUD)
- Stormwater, Overland Flow and On-Site Detention (OSD)
- Pavements

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1 Introduction

This Civil Engineering Report has been prepared to accompany a Review of Environmental Factors (REF) for an activity proposed by the Department of Education under Part 5 of the Environmental Planning and Assessment Act 1979 (EP&A Act) and State Environmental Planning Policy (Transport and Infrastructure) 2021 (SEPP TI).

This document has been prepared in accordance with the Guidelines for Division 5.1 assessments (the Guidelines) by the Department of Planning, Housing and Infrastructure.

This report examines and takes into account the relevant environmental factors in the Guidelines and *Environmental Planning and Assessment Regulations 2021* under Section 170, Section 171 and Section 171A of the EP&A Regulation as outlined in **Table 1.**

Table 1 – Summary of Relevant Section of the Part 5 Guidelines and EP&A Regulation

Regulation / Guideline Section	Requirement	Response	Report Section
2a	**Any environmental impact on the community**	**The proposed development will have negible environmental effect on the community during construction and post construction.**	**2-4**
2h	**Any long term effects on the environment**	**The proposed development will have neglible long term impacts on the environment**	**2-4**
2j	**Risk to safety of the environment**	**The proposed development will have negligible impacts to the saftyof the environment**	**2-4**
2l	**Any pollution of the environment**	**The proposed development will have negligible pollution impacts**	**2-4**

Table 1: Summary of Relevant Section of the Part 5 Guidelines and EP&A Regulation

1.1 Site Description

1.1.1 Activity site

Melrose Park Public School is located at 110 Wharf Road, Melrose Park and is legally known as Lot 3 in DP 535298 with an approximate site area of 2.5 hectares. The site has a frontage to Wharf Road (east), Mary Street (south), and Waratah Street (west). The site is adjoined by 2-3 storey light industrial development to the north, 1-2 storey industrial and commercial developments to the south, residential dwellings to the east and industrial and commercial development to the west. An aerial photograph of the site is provided in Figure 1 below.

Figure 1: Site Aerial Photograph

The subject site belongs within the Local Government Area (LGA) of the City of Parramatta Council (COPC). The site is currently occupied by the existing Melrose Park Public School which is proposed to be demolished for the new development.

1.1.2 Survey

A topographical survey was undertaken by “SDG”, Ref 8942, dated Nov 2023. Datum: AHD, Coordinates: MGA2020

1.1.3 Neighbouring Properties

As per the NSW Planning portal, to the north, the zoning is E4 - General Industrial. This is similar to the west along Waratah Street. On the eastern frontage along Wharf Road low-rise residential houses zoning R2. To the south, high-density R4.

Figure 2: Site Classification

(Source: NSW Planning portal)

1.1.4 General Topography

There is a crest towards the northeast of the site, and from there, the land falls out west, south and east. However, most of the site slopes down to the west at a relatively constant slope of 1:20. The maximum level is approximately RL 16.5 (m AHD) and the minimum level is approximately RL 9.5 (m AHD).

1.1.5 Geotechnical Investigations

A geotechnical investigation was conducted by “ADE Consulting Group”, dated 14/12/2023. Some of the relevant results include:

a) Residual Soil is described as Silty CLAY with medium to high plasticity.

b) The site can be classified as “Class H1”, where H1 is described as “highly reactive clay sites, which may experience high ground movement from moisture changes”.

c) California Bearing Ratio (CBR) of 1.5% can be adopted for the preliminary design of any proposed pavement or pedestrian walkways.

The report does not mention any contamination present on site.

Further geotechnical investigations might be required for the new carpark extents.

1.2 Existing Infrastructure

An investigation into the existing assets surrounding the site was undertaken through an enquiry to “Before You Dig Australia” (BYDA), also known as “Dial Before You Dig” (DBYD). Although the extent of this report is limited to stormwater services only, the query, Job ID 36521154, resulted in the following asset owners that might be present on site:

- Ausgrid
- City of Ryde
- Endeavour Energy
- Jemena
- NBN
- Optus
- Sydney Water
- Telstra
- TPG
- Viva Energy

The public domain surrounding the site currently consists of pedestrian footpaths, kerb and gutters along Mary Street and Wharf Road, to the south and east of the existing site respectively. Additionally, the existing site includes two vehicle entry driveways along Mary Street alongside one vehicle entry driveway along Wharf Road.

It is understood additional public domain infrastructure has been proposed as a part of this design development. This infrastructure includes:

- A proposed Wharf Road Gardens circulation corridor to connect to the existing active transport network,
- Public school entry and forecourts to Wharf Road,
- Maintenance of tree planting to the site perimeter to enhance the public domain outside the school’s secure perimeter.

2 Proposed Development

2.1 Activity description

The activity is for upgrades to Melrose Park Public School within a one to three-storey built form, including:

- Demolition of existing school buildings;
- Site preparation works including tree removal;
- Construction of the following buildings:
  - **Block A**: One (1) storey building comprising:
    - universal pre-school;
    - outdoor play area for the UPS; and
    - detached storeroom;
  - **Block B1**: Two (2) storey building comprising:
    - staff and administration areas;
    - library;
    - 4 special programs rooms;
    - Pedestrian bridge to Block B2;
  - **Block B2**: Three (3) storey building comprising:
    - 24 classrooms;
    - amenities/services cores; and
    - pedestrian bridge to Block B3;
  - **Block B3**: Three (3) storey building comprising:
    - 10 classrooms; and
    - amenities/services cores;
  - **Block C**: One (1) storey building comprising:
    - hall;
    - amenities;
    - canteen;
    - OSHC; and
    - COLA;
- Construction of two (2) car parking areas; and
- Landscaping works.

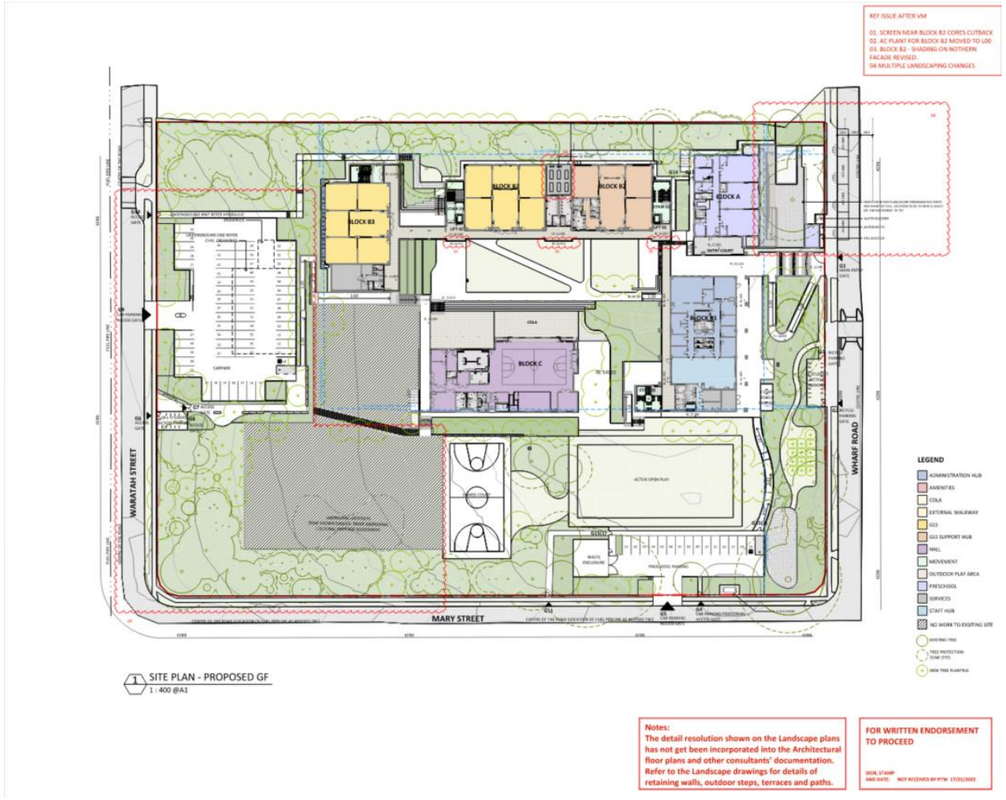


Figure 3: Proposed site plan

(Source PTW architects - 2025)

2.2 Standards list

The following list indicates the relevant design guidelines and standards to be considered:

Engineering Specific:

- Australian Rainfall & Runoff
- Austroads: Guide to Road Design
- Austroads: Guide to Pavement Technology
- AS1428.1 Design for Access & Mobility
- AS2890.1 Parking Facilities: Off–street car parking
- AS2890.2 Parking Facilities: Off-street commercial parking
- AS2890.5 Parking Facilities: On-street parking
- AS2890.6 Parking Facilities: Off-street for people with disabilities

- AS3500.3 Plumbing and Drainage: Stormwater Drainage
- Managing Urban Stormwater: Soils and Construction, "The Blue Book" – 4th edition 2004.
- Concrete Pipe Selection and Installation - Concrete Pipe Association 1990.
- NSW MUSIC Modelling Guidelines 2015

Government Specific:

- City of Parramatta Development Control Plan (DCP)
- City of Parramatta Development Engineering Design Guidelines 2018
- City of Parramatta Technical Design Guide – Stormwater Cartridge Filters
- City of Parramatta Public Domain Guidelines
- Upper Parramatta River Catchment Trust On Site Detention Handbook 4th Edition
- Parramatta Local Environment Plan (LEP) 2023
- Educational Facilities Standards and Guidelines (ESFG)

Schools Specific

The following are the relevant sections for civil engineering related to the project:

- Design Guide
  - DG95 Stormwater
  - DG96 Civil Works
- Design Framework
  - Master planning for schools
  - Site selection and development
  - Safety in design
  - Sustainability
- Specification Guide
  - SG221 Preparation & Ground Work - Site Management
  - SG222 Preparation & Ground Work - Earthwork
  - SG221 Preparation & Ground Work - Service Trenching
  - SG272 Pavement - Asphaltic Concrete
  - SG277 Pavement - Pavement Ancillaries
  - SG274 Pavement - Concrete Pavement
  - SG272 Pavement - Roadwork Ancillaries
  - SG311 Concrete - Formwork
  - SG311 Concrete - In Situ
  - SG821 Stormwater

2.3 Departures

The following is a departure from EFSG requirement number 0224.0.04: "where an above-ground OSD or adsorption system is preferred, where practical". Due to the topography of the site, an above-ground detention system is not favourable because this type of system will require a greater ponding structure and perimeter fencing, disrupting visual aesthetics and introducing drowning risks. Alternatively, an underground OSD tank can be safely placed underground in lieu of an above-ground OSD or adsorption system.

2.4 Integrated Water Management Plan

The integrated water management plan is a holistic and collaborative approach to the water cycle and considers elements such as Potable water, Rainwater reuse, Recycled water, Surface stormwater, Groundwater, Stormwater detention, and Water quality, among others.

In this report, Enstruct has covered the elements related to surface stormwater, stormwater quality and stormwater detention. For potable water, rainwater storage and reuse, refer to the Hydraulics engineering report and drawings. For groundwater refer to the geotechnical engineering report.

2.5 Mitigation Measures

The table below is a summary of the mitigation measures that are to be implemented. These are described later in the report.

Table 2 – Mitigation Measures

Mitigation Number/ Name	When is Mitigation Measure to be complied with D – Design C – Construction O - Operation	Mitigation Measure	Reason for Mitigation Measure
1	D, C	Erosion and Sediment control measures	Erosion and Sediment Control (ESC) plans are provided to avoid polluting the neighbouring sites, the water or blocking the stormwater network downstream.
2	D, C, O	Stormwater Quantity Control Measures	On-Site Detention (OSD) tank is proposed following Council standards to ensure the development is not worsening the flow conditions for the downstream communities.
3	D, C, O	Stormwater Quality Control Measures	Water Sensitive Urban Design (WSUD) treatments are placed to ensure Council quality requirements/targets are met so that the water discharged downstream of the site is of adequate standard and quality.

Table 2: Mitigation Measures Summary

3 Stormwater

3.1 Contributing catchments

The site is at a relatively high elevation in relation to its catchment, as depicted in the figure below. Most of the site falls southwest and the most critical area is located towards the western boundary.

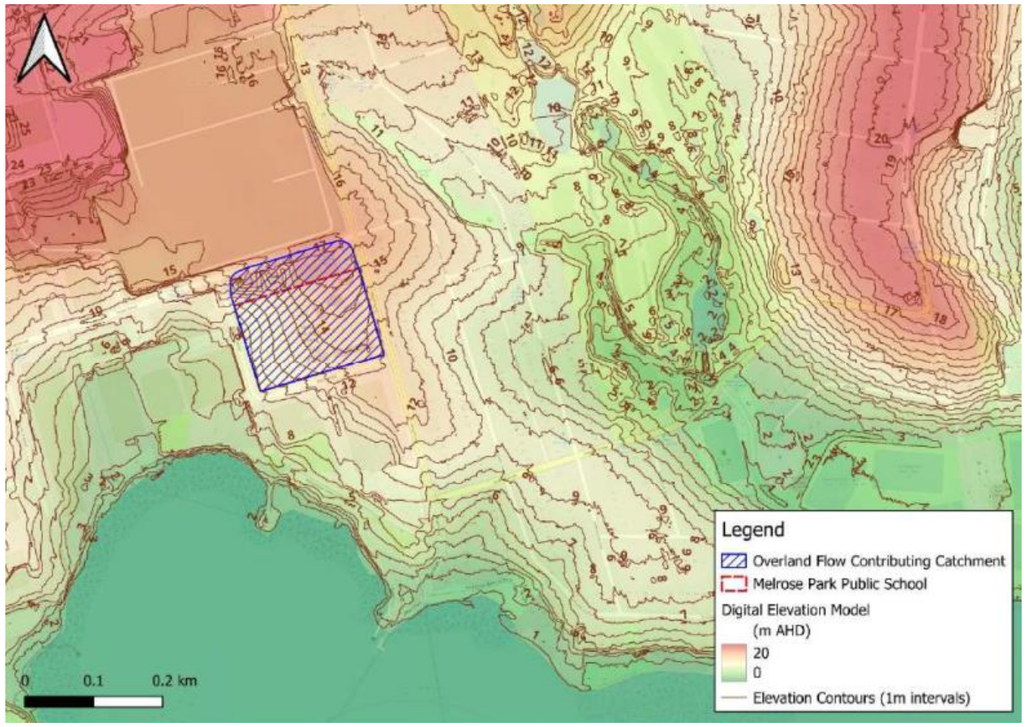


Figure 4: Existing DEM contours

(Source: TTW due diligence report)

3.2 Rainfall data

The following information was obtained from the AR&R online data and the BOM.

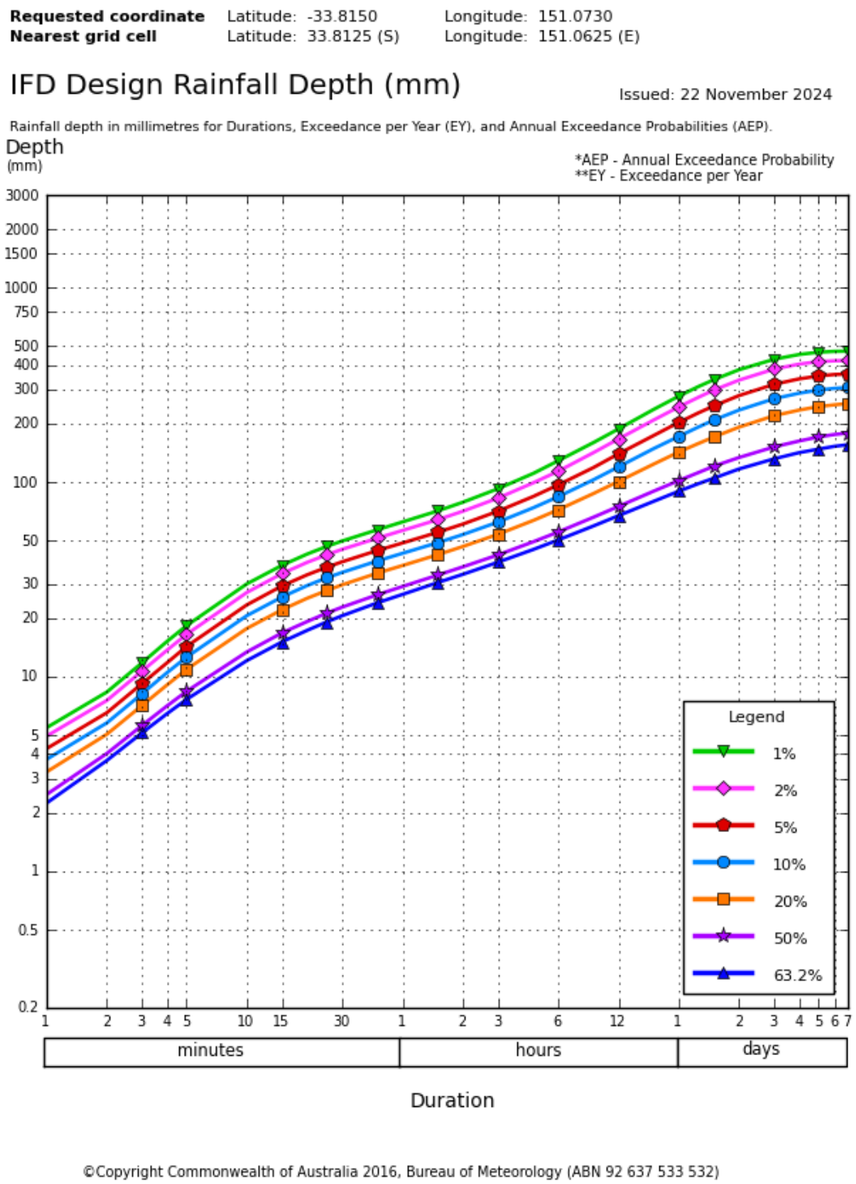


Figure 5: IFD curves

(Source: BOM)

3.3 *Existing Stormwater assets*

As per the survey information available, in conjunction with the BYDA information, the following can be stated:

- No kerb inlet pits or any other type of surface pit was discovered to the east or south roads.
- There are three kerb inlet pits on Waratah Street, at its lowest location.
- It is understood that the drainage network drains west from here.

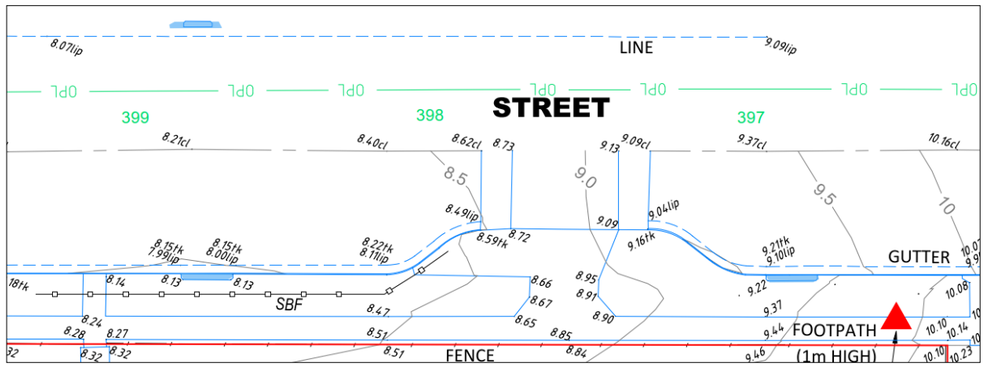


Figure 6: Existing Stormwater Assets on Waratah St
(Source: SDG survey)

Additionally, a concept stormwater strategy study was undertaken by “Lyall & Associates” for Melrose Park North Masterplan, adjacent to the proposed Melrose Park Public School site. Based on this study, it is understood that there are existing COPC stormwater assets at the site’s western boundary, at Waratah Street. It is noted that this stormwater asset line connects to an existing stormwater network further along Waratah Street, as seen in the Figure below. Additionally, it is understood that there is an existing stormwater asset on Wharf Road, opposite the southeast corner of the site.

3.4 *Legal point of discharge*

The selected point of discharge for the site corresponds to the existing Council pipeline on Wharf Street, as noted in the previous section.

3.5 *Proposed Stormwater*

The stormwater design must be in accordance with the Australian Standards, City of Parramatta Development Control Plan (2023), City of Parramatta Development Engineering Design Guidelines (2018), Australian Rainfall and Runoff (2019) and the ESFG guidelines.

Pipes and pits will need to be designed to satisfy the minimum provisions of AS 3500.3. They must be designed to convey, at least, the 5% Annual Exceedance Probability (AEP) flows as per ESFG guidelines.

Where pipe capacity is exceeded i.e., greater than 5% AEP, stormwater will be conveyed as overland flow. Overland flow paths are to be designed to convey at the minimum 1% AEP stormwater flows with a Velocity x Depth to be less than 0.4m^2/s.

The pits loading class is to be designed in accordance with AS 3996. The grates must be heel-safe and locked.

All new roof stormwater will be collected in roof gutters, and conveyed by downpipes to the in-ground rainwater tank system, designed by the hydraulics engineers. Surface stormwater will be collected through pits and grated drains, which then will be connected to the water quality control devices.

3.6 *Onsite Stormwater Detention (OSD)*

Generally, COPC requires OSD for all multi-unit residential development, including dual occupancies, all commercial development and all community-focused facilities.

City of Parramatta Development Engineering Design Guidelines (2018) stipulate that all OSD systems must be designed in accordance with the Upper Parramatta River Catchment Trust (UPRCT) OSD Handbook. As the site lies outside of the extent of the of the COPC catchments, it has been assumed that the minimum OSD storage be based upon the closest geographical catchment of Subiaco Creek which requires 438m^3/ha. Based on the proposed site area, not including the sports fields and existing vegetated areas, it is expected that an OSD tank of around 507.3m^3 will be required excluding any volume required for water quality.

The OSD must be designed and constructed to control stormwater runoff from development sites such that, for all peak stormwater events up to and including 1%AEP discharges from the site do not exceed pre-development stormwater discharges.

The ESFG notes the preference for open and absorption storage systems, this is equivalent to a fenced pond. While this might sound effective for a big site, this system requires further investigation. Therefore, currently, an underground OSD is proposed.

OSD storage volume shall be provided such that the total OSD discharge and bypass flow from the site does not exceed the maximum permissible site discharge.

A preliminary OSD modelling has been developed using the Non-UPRCT spreadsheet to assess the ability of the single (1) proposed OSD tank to manage stormwater flows from the site to below predevelopment site flow rates. Preliminary calculations indicate that a 508m^3 OSD tank will be required. This size tank may be reduced with the introduction of a rainwater tank to offset the on-site detention. Please refer to Appendix B for calculations.

3.7 *Overland Flow Paths*

If the piped in-ground stormwater system fails due to blockage or other obstruction, stormwater flows must be conveyed as overland flow. The overland flow is to be directed away from buildings and towards the site's boundary.

Overland flow paths will be sized to accommodate up to the 1% AEP storm flows, which should not exceed safe Depth x Velocity products of 0.4m^2/s for pedestrians and vehicles.

The existing overland flow path is in an east-west direction. This configuration will be kept for the proposed works.

3.8 Flooding

The following information is considered relevant in relationship to the flood for the site:

- Melrose Park Public School Due diligence report, dated 24/11/2023, by "TTW".
- City of Parramatta – Parramatta River Flood Study Full Report 13/06/2024 by "Stantec".

Limitations: Flooding is not part of the scope of this report. For relevant and detailed flood information refer to "Melrose Park Public School Due diligence report". The analysis provided is to ensure the proposed civil works for the site are congruent with relevant constraints.

3.8.1 1:100-year event

The 1%AEP event was checked to ensure that all potential overland flow paths are safe during this major event, in case of stormwater blockage of the stormwater network.

The 1%AEP flood levels provided are used to check that the OSD tank can still work up to this major event, and that adequate overflow is provided for any excess beyond this event.

The information provided notes that the site itself might not be affected by this event within the property boundaries. It also notes that the access/egress routes are safe, category H1 based on the Flood hazard map, City of Parramatta River Flood Study, refer to the Image below.

Figure 7: Parramatta River Flood Study– 1% Flood Hazard

(Source: City of Parramatta River Flood Study)

The proposed on-grade carparks, both western and eastern locations, will be above the flood extents and no other underground carparks or basements will be proposed for this development.

3.8.2 PMF event

Based on the COPC's Draft Flood Study 2023 (Stantec flood maps), it is understood that a small fraction of the existing site might be subject to PMF flood depths along the site's western boundary on Waratah Street, as depicted in the Image below. Nevertheless, none of the buildings are located within this envelope nor its vicinity.

The proposed western carpark, located at the western boundary on Waratah St, will not be flooded in the case of a PMF event, however, TTW's report noted that the access will be inundated and the neighbouring routes might be hazardous to traverse during this extreme event.

Figure 8: Melrose Park Public School - PMF Flood hazard maps

(Source Stantec 2023 PMF hazard maps)

3.9 Water Sensitive Urban Design (WSUD)

Water Sensitive Urban Design typically includes stormwater reuse, pollutant removal via natural systems, and the minimisation of hard structures to control stormwater and improve aesthetic and recreational appeal.

Where open space exists, an attempt to incorporate WSUD principles into the stormwater design should be made. Although, as standing water +poses waterborne health risk, careful attention to the WSUD type and how it is incorporated is required.

3.9.1 Stormwater Quality Targets

Part 8.2.6.7.5 of COPC's DCP sets out the requirements for the treatment of the stormwater prior to discharge into the Council system. The guidelines require all developments to achieve a minimum percentage reduction of the post-development average annual load of pollutants. The targets for stormwater treatment are available in Table 3 below.

Pollutant	Performance Requirement	Performance Result
Gross Pollutants	90%	97.67%
Total Suspended Solids	85%	92.6%
Total Phosphorus	60%	72.0%
Total Nitrogen	45%	54.9%

Table 3: Pollutant Reduction Targets Requirements as per Council's DCP

The safety of the school population is to be considered when designing the stormwater treatment train. Consequently, mechanical (in lieu of natural removal) pollutant removal devices may need to be incorporated to remove gross pollutants, suspended solids, reduce nutrient runoff including nitrogen and phosphorous.

The pollution control devices will require on-going maintenance. Pollutant removal devices will require at least a yearly inspection and maintenance.

It is proposed that a series of pollution control devices will need to be provided to remove contamination from stormwater runoff to the required level prior to discharge. It is expected that the devices will include, litter screens in all pits and an end of line treatment device to remove nitrogen & phosphorus contaminants etc., prior to discharge to the Authority's stormwater system. This system is preferred as it will be able to achieve pollutant reductions required, is easily maintained, and does not require large open areas or pose safety risk to the school population.

3.9.2 Stormwater Quality Model

A MUSIC Model has been developed in accordance with the NSW 'WSUD Developer Handbook' 2015 to indicate the suitability of the proposed WSUD measures on the site.

The proposed water quality control devices for the site are:

- A bio-retention swale with filter media, for collection and filtration of run-off from the open play areas,
- Twelve GPT Pit basket inserts 'OceanGuard' (or approved equivalent), located sitewide as per the stormwater drawings,
- Grassed (buffer) strips,
- 25kL Rainwater tank (by hydraulics engineer),
- Twenty '690mm ZPG stormfilter' cartridges (or approved equivalent), located within a 11m^3 chamber, as the end-of-line treatment measure before discharge into Council's system.

Also, some grassed areas of the site will be kept, maintaining their current pervious configuration. This will help retain a big percentage of the site as pervious. Such vegetated areas will bypass the treatment as no work will be undertaken such to disturbem them. These areas fit within the 'Norbe' approach.

The results of the MUSIC model confirmed the ability of the above measures to reduce the pollutants discharged from the site to below the requirements described by council. The specified products are a suggestion based on the properties required, and they can be replaced for other brands provided the treatment is equivalent or better than what is specified.

4 Erosion and Sediment Control

During construction and while the site is disturbed, erosion prevention and sediment control measures will be required. Erosion prevention generally involves managing stormwater by diverting overland flow around construction areas as well as collecting stormwater within the construction zone and directing it to sediment control devices. Devices likely to be incorporated are silt removal fences, hay bales, catch drains, and water flow dissipation and discharge control devices such as sandbags, pollution mattresses, and sedimentation basins.

Erosion prevention and sediment removal strategies need to be inspected regularly during construction works, cleaned, and maintained after storm events, and modified to suit construction work progress, decanting and demolition.

Erosion and sediment controls are to be designed, constructed, and installed in accordance with Managing Urban Stormwater: Soils and Construction - Volume 1 and maintained until the site is fully stabilised to prevent pollution of the receiving environment. An erosion and sediment control plan will be provided in the civil drawing set.

Measure	Location	Purpose
Sediment Fence	Near the site boundary along the downstream side of the site.	To prevent sediment from leaving the site with stormwater runoff. Stormwater will pass through the fence but the fence will trap the sediment.
Shaker Grid and Wash Down	At the construction exit from the site.	To remove ground materials from the construction vehicle wheels prior to the vehicle leaving the site and discharging material onto the public roadway.
Sand Bag Sediment Traps	Directly upstream of all stormwater kerb inlet structures located in close proximity of the site.	To prevent sediment discharged from the site from entering the stormwater inlet structure and contaminating the water course.
Inlet Sediment Trap	Around any stormwater surface inlet structures	To prevent sediment discharged from the site from entering the stormwater inlet structure and contaminating the water course.
Sediment Basin	At the downstream end of the site near the boundary.	To store sediment on site during the construction phase. Basins to be cleaned out prior to the completion of the landscaping in the basins.

Table 4: Erosion and sediment control measures

5 Earthworks

Earthworks should be carried out in accordance with AS3798. Allowance should be made for the construction of a working platform, for construction vehicles and heavy machinery. For subgrade and batter slopes refer to the geotechnical report. A traffic management plan may implemented for the movement of construction vehicles.

6 Pavements

6.1 Pavement requirements

Pavement design is to meet the requirements of future geotechnical studies, alongside, ESFG and Austroads guidelines for vehicular pavements. The following items are applicable:

- All pavements are to be designed for a 25-year life
- All pavements trafficked by buses and trucks are to be designed for a minimum of 5E5 repetitions of a standard axle load, as defined by AUSTROADS and ESFG, for other pavements, the repetitions are 1E5
- Allow for movements in the foundations caused by moisture variations and mine subsidence.
- Design rigid pavements so there is no vertical differential movement between panels at joints.
- For truck turning areas pavements shall be rigid in construction and finished with a reinforced concrete surface.
- For other areas, pavements may be either flexible or rigid in construction. For flexible construction finish with a surface coat of asphaltic concrete.
- Breccia or dolerite is not to be used in road base or concrete mix.
- Non-skid finish for vehicular trafficked pavements
- Non-slip finish for pedestrian trafficked pavements, including carpark
- AC for roads and parking to be AC10 and have a minimum thickness of 40mm or greater as the design requires.
- AC for games courts to be AC5 and have a minimum thickness of 25mm levelling course plus 25mm surface course or greater as the design requires.
- Limit fly ash content to 20% of cementitious content of the mix by weight.
- For roads and parking areas concrete shall have a minimum 32 MPa characteristic compressive strength.
- For rigid method of construction finish with a reinforced concrete surface.
- Concrete pavements for vehicles shall be a minimum of 150mm thick and reinforced with not less than SL92 mesh at top and 100 mm thick road base.
- Other concrete pavements shall be a minimum 100mm thick and reinforced with no less than SL72 mesh at top.
- Provide a thicker pavement and heavier mesh as the design requires and to meet durability requirements for minimum cover to reinforcement.
- For flexible construction finish with a surface coat of asphaltic concrete.
- Paving is to fall away from the buildings and covered areas.
- Finished vertical grades to be limited to < 1 in 10. Provide vertical curves where a change of grade exceeds 3%. Provide cross-falls, as required.

Integration with all engineering and building systems, including services and traffic components, will continue to be coordinated through the upcoming phases. All stormwater drainage will be outside of the building's extent and will require no structural penetrations.

6.2 Pavement analysis

The pavement design is to meet the requirements of the geotechnical investigation provided by “ADE Consulting Group”, dated December 2023, in conjunction with ESFG and Austroads guidelines.

6.2.1 Subgrade CBR

A California Bearing Ratio (CBR) of 1.5% is to be adopted in the pavement design based on the provided geotechnical report. Given the weakness and potential reaction of the “H1 Highly reactive clay” subgrade, an improvement is required. To improve this subgrade, a controlled subgrade layer has been included in the design models.

6.2.2 Traffic loading

The minimum life expectancy of the pavement is 25 years, and the minimum design traffic loading is 5E5 repetitions of a standard axle load for trucks and buses, and 1E5 for other pavements, based on ESFG guidelines.

6.2.3 Pavement design

Flexible asphalt pavement is adopted for the carparks. This was loaded on CIRCLY, based on the above inputs. A lime-stabilised subgrade will be utilised to bring up the subgrade quality.

Refer to the civil drawings for the designed pavement package and pavement plans.

Disclaimer and limitations: it is important to note that, the pavement design is based on boreholes that might not necessarily represent the soil properties of the whole site. Additional boreholes were requested for confirmation.

7 Evaluation of Environmental Impacts

Based on the identification of potential issues, and after an assessment of the nature and extent of the impacts of the proposed development, it is determined that:

- Potential impacts can be appropriately mitigated or managed through the use of the recommended measures, to ensure that it is unlikely to have a significant impact on the environment.

- The extent and nature of potential impacts are low and unlikely to have a significant impact on the locality, community and/or the environment.

8 Conclusion

The civil works associated with the design and construction of the Upgrades to Melrose Park Public School will be carried out in accordance with engineering standards and will meet the requirements of relevant authorities.

Erosion and sediment control measures are to be in place during construction to prevent impacts downstream.

An OSD system will be provided to meet adequate stormwater runoff discharge rates from the site, taking into consideration flood levels downstream.

WSUD systems will ensure the stormwater discharged to the network is of high quality and meets council standards.

Subject to implementing the recommendations/mitigation measures noted in this report, it can be concluded that the proposed Activity is not likely to significantly affect the environment in relation to the presented topics.

Supporting Information and External References

Before You Dig Australia
https://www.byda.com.au/

ESFG
https://efsg.det.nsw.edu.au/design
https://efsg.det.nsw.edu.au/spec
https://education.nsw.gov.au/about-us/efsg/design-framework

Six Maps NSW
https://maps.six.nsw.gov.au/

NSW LGA boundaries map
https://portal.spatial.nsw.gov.au/portal/home/webmap/viewer.html

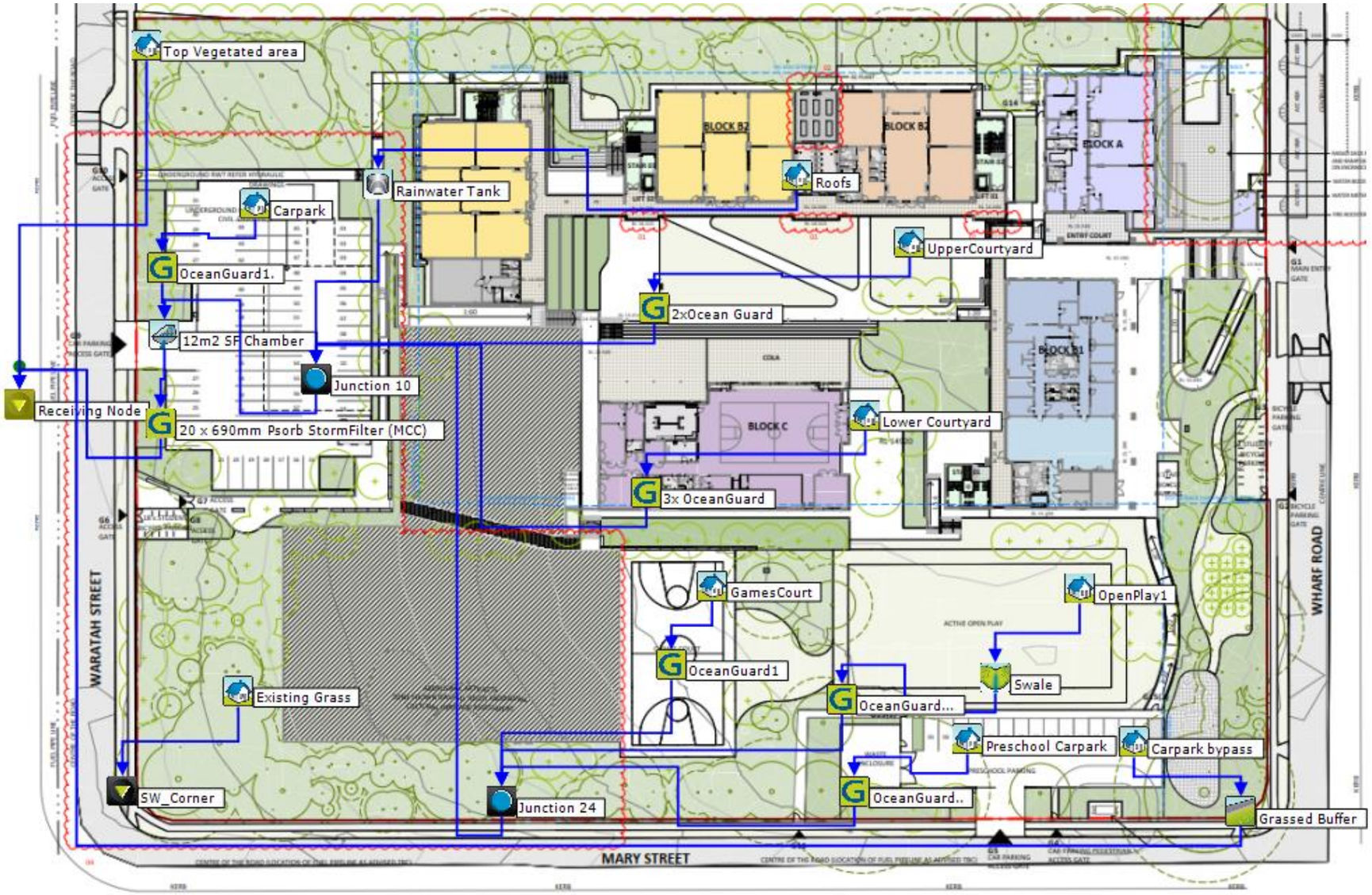
NSW Planning Portal
https://www.planningportal.nsw.gov.au/spatialviewer/#/find-a-property/address

Parramatta LGA flood maps
https://www.cityofparramatta.nsw.gov.au/flooding/2024-parramatta-river-flood-study/full-report
https://www.cityofparramatta.nsw.gov.au/sites/council/files/2024-06/prfs-file_4b.pdf
https://www.cityofparramatta.nsw.gov.au/sites/council/files/2024-06/prfs-file_9.pdf
https://www.cityofparramatta.nsw.gov.au/sites/council/files/2024-06/prfs-file_10.pdf
https://www.cityofparramatta.nsw.gov.au/sites/council/files/2024-06/prfs-file_11.pdf

Glossary of words

Annual Exceedance Probability (AEP)	*Refers to the probability or risk of a flood of a given size occurring or being exceeded in a given year.*
Australian Height Datum (AHD)	*A common national surface level datum approximately corresponding to mean sea level.*
Average Recurrence Interval (ARI)	*The average or expected value of the period between exceedances of a given rainfall total accumulated over a given duration e.g. 100-year ARI flood is expected to be exceeded once every 100 years on average (taken to be equivalent to 1% AEP). It is implicit in this definition that the periods between exceedances are generally random.*
Catchment	*Area draining to a site. It always relates to a particular location and may include the catchment tributaries as well as mainstream.*
Council	*The City of Parramatta Council (COPC)*
Development Control Plan (DCP)	*Council document that sets out the criteria that all developments must adhere to.*
Design Storm	*Is the probabilistic or statistical estimate, being generally based on some form of probability analysis of flood or rainfall data.*
Discharge	*The rate of flow of water measured in terms of volume over time.*
ESFG	*Educational Facilities Standards and Guidelines*
Flood	*A relatively high stream flow which overtops the natural or constructed watercourse or drainage system such as a stream, river, estuary, lake, canal or pipe drainage network.*
Fraction Impervious	*Ratio of impervious to total site area.*
Hydrograph	*A graph that shows the discharge to time relationship of a hydraulic flow at a particular location.*
Hydrology	*The term given to the study of the rainfall and runoff process as it relates to the derivation of hydrographs for given floods.*
Intensity Frequency Duration (IFD) Table	*A table which outlines the rainfall intensities for a given storm event over various storm durations.*
Major Storm Event	*The design storm event conveyed at surface level via the designated overland flow path.*
Minor Storm Event	*The design storm event conveyed undergound via the proposed stormwater pit and pipe network.*
Norbe	*Neutral or beneficial*
Onsite Stormwater Detention (OSD)	*The practice of temporarily storing stormwater on site during a storm and releasing it slowly to reduce flow.*
Overland Flow Path	*The route taken by stormwater flowing over the ground surface.*
Peak Flow	*The maximum discharge during a flood event.*
Point of Stormwater Discharge	*The point at which the proposed stormwater network connects into the existing stormwater system.*
Rational Method	*Hydrological method used to assess the design peak flow rate (peak discharge) of stormwater generated onsite.*
Coefficient of Runoff	*The coefficient used in the Rational Method. Is the ratio of the peak rate of run-off to the average rainfall intensity during the critical rainfall period for the catchment area under consideration.*
Stormwater Harvesting	*The practice of capturing and storing stormwater runoff generated and reusing it on site.*
Time of Concentration	*The time required for the stormwater runoff to flow from the furthest part (relative to time) of the catchment to its outlet.*
Water Sensitive Urban Design (WSUD)	*The practice of treating and reusing stormwater runoff generated on site to improve the quality of stormwater discharge and reduce the impact on downstream waterways caused by urban developments.*

APPENDIX A: MUSIC MODEL



	Sources	Residual Load	% Reduction
Flow (ML/yr)	9.682	7.894	18.46
Total Suspended Solids (kg/yr)	3790	282	92.56
Total Phosphorus (kg/yr)	3.262	0.9133	72
Total Nitrogen (kg/yr)	21.6	9.753	54.86
Gross Pollutants (kg/yr)	232.4	5.409	97.67

APPENDIX B: OSD CALCULATIONS

On-Site Detention Calculation Sheet for
Catchments outside Upper Parramatta River Catchment
Non-HED Secondary Outlet
(Due to Elevated Downstream 100 yr ARI Flood Level)

Project:	**UPRCT Handbook Demonstration Example**
Site Address	**A Place, South Wentworthville**
Job No:	**W4574-2**
Designer:	**JC**
Telephone:	**(02) 9891 4633**

Site Data

OSD Area:	**Upper Parramatta River Catchment**				
L.G.A	**Parramatta City Council**				
Site Area	**1.1581**	ha	**11,581**	m^2	
Total Roof Area	**0.5784**	ha	**5,784**	m^2	
Area of Site draining to OSD Storage	**1.1581**	ha	**11,581**	m^2	**Satisfactory**
Residual Site Area (Lot Area - Roof Area)	**0.580**	ha			
Area Bypassing Storage	**0**	ha			
Area Bypassing / Residual Site Area	**0.0%**				**Satisfactory** — **30% Max**
No. of Dwellings on Site	**5**				**Satisfactory**
Site Area per Dwelling	**0.232**	ha			
Roof Area per Dwelling	**0.116**	ha			

Basic OSD Parameters

		Extended Detention			Detention	
Basic SSR Vols	Ext Detention Storage	**284**	m^3/ha	Total Storage (1.14 x SSR_{THED})	**438**	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	**328.90**	m^3	Total Storage	**507.25**	m^3
Total Rainwater Tank Credits		**0.15**	m^3		**0.13**	m^3
Storage Volume				Total	**507.12**	m^3
Storage Volume	Ext Detention Storage	**328.75**	m^3	Flood Detention Storage	**178.36**	m^3
OSD Discharges	Primary Outlet	**46.32**	L/s	Secondary Outlet	**173.72**	L/s
RL of Top Water Level of Storage		**8.820**	m		**9.370**	m
RL of Orifice Centre-line		**8.060**	m		**8.530**	m
Number of Orifices		**1**			**1**	
Estimated Downstream Flood Level		**8.06**	1.5 yr ARI		**8.53**	100 yr ARI
Downstream FL - RL of Orifice Cente-line		**0.00**	**Satisfactory**	**Satisfactory**	**0.00**	
Design Head to Orifice Centre		**0.760**	m	TWL Detn Storage - RL Orifice	**0.840**	m
Calculated Orifice Diameter		**160**	mm	**Satisfactory** — **Satisfactory**	**301**	mm

Overflow Weir & Freeboard Calculation

RL of Minimum Habitable Floor Level			**12.500** m
RL of Minimum Garage Floor Level			**12.500** m
Length of Overflow Weir			**3.60** m
Site Runoff Coefficient		**Parramatta City Council**	**0.75**
Storm Intensity (5 min 100 yr ARI)			**219** mm/h
Peak Flow over Weir			**528.4** L/s
Depth of Flow over Weir			**201** mm
Freeboard to Habitable Floor		**Satisfactory**	**2929** mm
Freeboard to Garage Floor		**Satisfactory**	**2929** mm

Rainwater Tank Calculations (per Dwelling)

Only Complete this Section if a Rainwater Tank Airspace Credit is Claimed

The calculations assume that the same size rainwater tank is installed on each dwelling

				Min	Max
% of Roof draining to Rainwater Tank	**80.0%**		**Satisfactory**	**5.7%**	**100%**
Total Rainwater Tank Volume	**5.00**	kL	**Tank Volume OK**		
Min Volume that triggers Top-up	**0.00**	kL	**Note - Min Vol in Tank < 10% Total Tank Vol**		
Total Tank Vol - Min Top-up Vol	**5.00**	kL			

Dedicated Airspace

Dedicated Airspace	**0.00**	kL	**Satisfactory**		
	Extended Detention			**Detention**	
Dedicated Airspace Credit	**0.00**	kL		**0.00**	kL
Maximum Tank PSD	**40**	L/s/ha			
Maximum Tank Discharge	**0.0**	L/s			
Maximum Head to Centre of Tank Orifice	**0.000**	m	**No Dedicated Airspace**		
Calculated Orifice Diameter	**0**	mm	**No Dedicated Airspace**		

Dynamic Airspace

Maximum Dynamic Storage (Nett Vol)	**5.00**	kL	**Controls minimum % Roof to Rainwater Tank**		
Daily Demand on Rainwater Tank	**0.657**	kL/d	**Satisfactory**		
Dynamic Airspace at start of Storm	**1.34**	kL			
	Extended Detention			**Detention**	
Dynamic Airspace Credit	**0.03**	kL		**0.03**	kL
Combined Rainwater Tank Credit	**0.03**	kL		**0.03**	kL
Maximum Rainwater Tank Credit	**5.00**	kL		**5.00**	kL
Rainwater Tank Credit per Dwelling	**0.03**	kL		**0.03**	kL
Rainwater Tank Credit for the Site	**0.15**	m^3		**0.13**	m^3

Signature: _____ **Date:** _____