

Integrated Water Cycle Management Plan

The King's School Masterplan

Prepared for The King's School c/o TSA Management Pty Ltd/ 24 October 2023

221272 CAAB

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1.0 Introduction

Taylor Thomson Whitting (TTW) have been engaged by TSA Management to provide Civil engineering consultancy services for the proposed The King's School Masterplan development. This Integrated Water Cycle Management Plan (IWCMP) has been prepared as part of a State Significant Development (SSD) for the approval of the proposed works.

This State Significant Development Application (SSDA) seeks consent for the staged redevelopment of The King's School, including:

- **Concept Proposal for the provision of new and upgraded facilities, including:**
 - Building envelope for a new Sports Pavilion within the western sports field precinct (subject to further detailed approval).
 - Building envelope for a new Boarding House within the northern residential precinct to the north of the Doyle Sports Fields and adjacent building envelope for Staff Quarters (subject to further detailed approval).
 - Building envelope for a new Day Boy House between Dalmas House and Burkitt House, including the associated relocation of Ryrie Road (subject to further detailed approval).
 - Earthworks and the associated demolition of existing buildings and structures, and removal of trees and landscaping.
 - Staged increase in staff and student numbers.
 - Detailed Stage 1 works (as outlined below).
- **Detailed Stage 1 works, including:**
 - Earthworks and the associated demolition and existing buildings and structures.
 - Traffic upgrade works including the construction of a new vehicular entrance into the site from Masons Drive, new drop-off pick up facilities, internal access roads and increased car parking and bus parking.
 - The construction of a new Staff Residence Building comprising residences for staff and their families within the Senior School Boarding Precinct.
 - The construction of a new building for Science, Technology, Engineering, Arts and Maths (the 'STEAM building') within the Senior School and associated landscaping.
 - The staged construction of new buildings required to upgrade the Preparatory School, including:
 - Construction of a new Performing Arts and Music Centre comprising a dedicated performance space and music practice rooms to the northwest of Horrocks Road.
 - Construction of a new General Learning Unit building comprising additional classrooms / general learning spaces adjacent to the existing dam.
 - Upgrades to pedestrian access throughout the school.
 - Staged increase in staff and student numbers.
 - The removal and replacement of trees and associated landscaping.

An overall site plan is shown below in Figure 1.

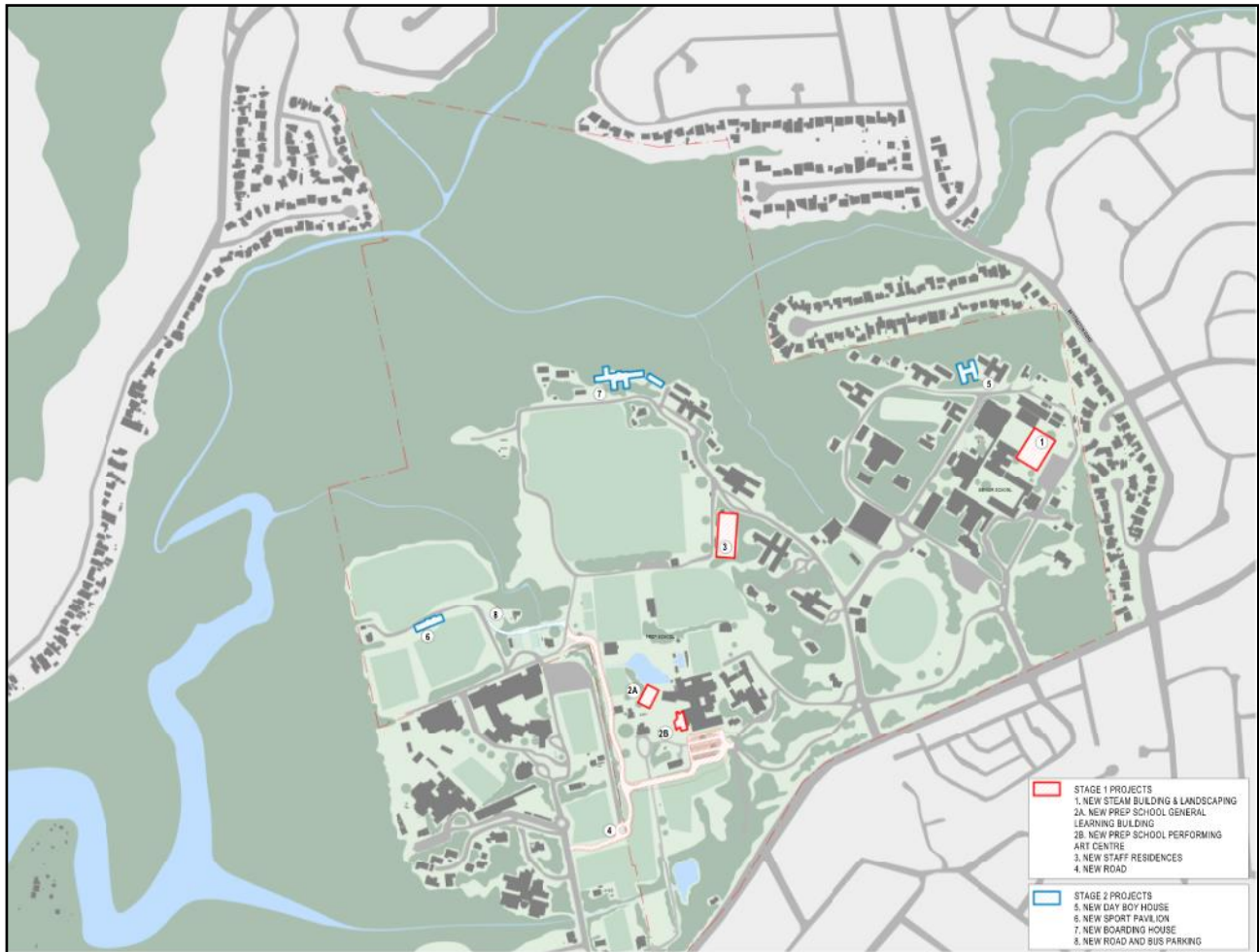


Figure 1: Overall Site Plan (Source: BVN)

1.1 Reference Documents

The civil engineering components of this report has been prepared in accordance with the following documents, guidelines, and policies:

- City of Parramatta Development Control Plan (2023);
- City of Parramatta Local Environmental Plan (2023);
- City of Parramatta Council's Stormwater Disposal Policy (2020);
- City of Parramatta Council's Development Design Guidelines (2018), Policies and Engineering Specification;
- Upper Parramatta River Catchment Trust (UPRCT): On Site Stormwater Detention (OSD) Handbook (2005, 4th edition);
- WSUD Technical Guidelines for Western Sydney (2004);
- Draft NSW MUSIC Modelling Guidelines (2010);
- Australian Standard AS3500.3 Plumbing and Drainage: Stormwater Drainage;
- Managing Urban Stormwater – Soils and Construction 'Blue Book', Volume 1, 4th Edition, Landcom;
- Australian Rainfall and Runoff (2019);

- Survey by Rygate Surveyors Dated 24 January 2023 (Ref. No. 80160);
- Architectural Drawings by BVN;
- Landscape Drawings by Taylor Brammer;
- Flood Assessment Report by TTW;
- Stormwater Reuse Audit Report by Storm Consulting and Craig & Rhodes Dated (April 2022);
- Utilities Management Report by NDY Dated 18 August 2023;
- Landscape Report by Taylor Brammer Dated 03.08.2023;
- Sustainable Design Report by Steensen Varming Dated 06 October 2023.

2.0 Relevant SEARs

This IWCMP addresses the following relevant Secretary's Environmental Assessment Requirements (SEARs) SSD48497708 set out in the **Table 1** below:

Table 1 – Relevant Secretary's Environmental Assessment Requirements

Item	SEARS	Location in Report
C13/A19. Stormwater and Wastewater		
	Provide an Integrated Water Management Plan for the development that:	Section 4.0, Appendix B, Appendix E
	Is prepared in consultation with the local council and any other relevant drainage or water authority.	
	Includes details of the overall proposed concept drainage design for the site including any on-site treatment, reuse and detention facilities, water quality measures, and the nominated discharge points.	Section 4.0, 41, 4.1.1, 4.2, 4.2.2-4.2.4, 4.3, Appendix A
	Demonstrates compliance with the local council or other drainage or water authority requirements and avoids adverse impacts on any downstream properties, including during construction.	Section 4.0, 4.3, Appendix B
	Considers climate change impacts, including increased rainfall intensity.	Section 5.0, separate Flood report by Flood Consultant
	Outlines any sustainability initiatives that will minimise/reduce the demand for drinking water, including any alternative water supply and end uses of drinking and non-drinking water that may be proposed.	Section 4.2.1, 4.2.2, separate report by ESD Consultant
	Demonstrates water sensitive urban design (principles are used), and any water conservation measures that are likely to be proposed.	Section 4.2.2-4.2.5
C14/A20. Water Infrastructure Requirements		
	Provide details that demonstrate satisfactory arrangements for future drinking water, wastewater, and recycled water (if required).	Separate report by ESD/Hydraulic Consultant
	Demonstrate that the development does not adversely impact on any existing water, wastewater or stormwater main, or other Sydney Water asset, including any easement or property.	Section 4.0
	Demonstrate that the chosen tree species will not cause cracking or blockage of Sydney Water pipes.	Section 4.0, Separate report by Landscape consultant
A10. Sediment, Erosion and Dust Controls		
	Detail measures and procedures to minimise and manage the generation and off-site transmission of sediment, dust, and fine particles.	Section 4.4, Appendix A

3.0 Site Location and Context

The King's School is located at 87-129 Pennant Hills Road, North Parramatta and is approximately 122ha, which comprises of Lot A/DP329288, Lot 10/DP812772, Lot 1/DP57491, Lot 1/DP64765, Lot 1/DP59169, Lot A/DP321595, Lot 1/DP581960, B/DP329288 and 2/DP235857. The site is within The City of Parramatta (CoP) Local Government Area (LGA) and is zoned R2 Low Density Residential and SP2 Infrastructure Educational Establishment under the Parramatta LEP.

The extent of the master planning works is shown in Figure 1. The site is bounded by vegetated areas and Hunts Creek to the north and west, low-density residential buildings to the east and south along Bettington Road and Pennant Hills Road. Several sports fields, agricultural pastures, open grass areas, and large tracts of forested riparian corridor to the north are all part of the site. The main administrative and educational complexes are located along the Pennant Hills Road entrances in the south.

3.1 Existing Services

3.1.1 New Steam Building & Landscaping (Site 1)

Dial Before You Dig (DBYD) information provided by Endeavour Energy indicates an underground high voltage line and a substation near the southern boundary of the site. The underground cables run within an easement with a minimum width of 1 metre. An easement of 5.5 metres by 2.75 metres minimum size protects the substation. Although the services are outside of the proposed works, they must be taken into account for the design of any proposed landscaping or external works. For reference, the existing high-voltage location is shown in Figure 2.

Refer to a separate Utilities Management Report by NDY for more information on existing services and authority consultation where required.

3.1.2 New Prep School General Learning Building (Site 2A)

The site survey includes information of existing stormwater and underground electrical services east of the proposed building footprint that appears to be school-owned. It is recommended that services be physically located prior to design development to identify any clash points with proposed building and in-ground infrastructures.

Refer to a separate Utilities Management Report by NDY for more information on existing services and authority consultation where required.

3.1.3 New Prep School Performing Art Centre (Site 2B)

The survey plan by Rygate shows a number of existing stormwater pipes, underground electrical and water main runs along the proposed building location that appears to be school-owned. It is recommended that services be physically located prior to design development to identify any clash points with proposed building and in-ground infrastructures.

Refer to a separate Utilities Management Report by NDY for more information on existing services and authority consultation where required.

3.1.4 New Staff Residences (Site 3)

The site survey does not show any existing services within the vicinity of the proposed building.

3.1.5 New Road (Site 4)

An authority-owned (Sydney Water) 100mm diameter cast iron, cement lined watermain runs at the edge of one section of the proposed road, as per DBYD. AARNET fibre optic assets were also found running along and across the proposed new road. Refer to Figure 2 for approximate location of these existing services. It is recommended that services be physically located prior to design development to identify any clash points with the proposed road and in-ground infrastructures.

For further information on existing services and authority consultation where required, refer to a separate NDY Utilities Management Report. Refer to Appendix D for a correspondence with the services consultant regarding potential clashes to these existing services as part of the new road works.

3.1.6 New Day Boy House (Site 5)

The site survey includes information of existing electrical and communication services that appears to be school-owned. It is recommended that services be physically located prior to design development to identify any clash points with proposed building and in-ground infrastructures.

Refer to a separate Utilities Management Report by NDY for more information on existing services and authority consultation where required.

3.1.7 New Sport Pavilion (Site 6)

The site survey does not show any existing services within the vicinity of the proposed sports pavilion.

3.1.8 New Boarding House (Site 7)

The site survey includes information of existing stormwater, electrical, water, and communication services that appears to be school-owned. It is recommended that services be physically located prior to design development to identify any clash points with proposed building and in-ground infrastructures.

Refer to a separate Utilities Management Report by NDY for more information on existing services and authority consultation where required.

3.1.9 New Road and Bus Parking (Site 8)

The site survey includes information of two existing septic tanks located northeast and southwest of the proposed bus parking area, as well as some electrical services. It is recommended that services be physically located prior to design development to identify any clash points with proposed building and in-ground infrastructures.

Refer to a separate Utilities Management Report by NDY for more information on existing services and authority consultation where required.



Figure 2: Overall Existing Authority-Owned Services Location

4.0 Stormwater Management

The stormwater design of the site is designed to comply with the requirements of CoP Council's Stormwater Disposal Policy (2020), CoP Council's Development Design Guidelines (2018), Policies and Engineering Specification, Upper Parramatta River Catchment Trust (UPRCT): On Site Stormwater Detention (OSD) Handbook (2005, 4th edition), Australian Standards and National Construction Codes 2015.

All new developments are required by Council to demonstrate that an appropriate stormwater management system is provided, which incorporates controls for the rate of flow of discharge from the site to not increase downstream drainage peak flow rates or adversely impact adjoining or downstream properties. In addition, as per the Council's correspondence in Appendix B, On-site detention (OSD) is not necessary if the development is within the overland flow path, close to the creek, and located in the lower catchment. However, it will be required and must adhere to the UPRCT guidelines where the development is located in the upstream catchment and unaffected by flooding. Furthermore, Council has confirmed that any development that increases impervious area generally necessitates an on-site detention system to address any additional hard surface, unless it can be demonstrated that this is not feasible, in which case an alternate system may be considered. Council also requires water sensitive urban design (WSUD) for any developments on the King's School campus.

In light of the above, the sites that require OSD tanks are listed in Table 2 and were sized using the On-Site Detention Calculation Sheet (UPRCT OSD Handbook). It is designed to store and control the site discharge flow rate from the site for storms up to and including 100-year ARI, to avoid stormwater peak quantity/flood impacts to neighbouring or downstream properties.

The proposed WSUD measures for each site are listed in Table 4, with results provided in Section 4.2.5, demonstrating improved stormwater runoff quality and achieving Council's water quality targets, to avoid adverse stormwater quality impacts to any neighbouring or downstream properties.

All proposed stormwater design requires the connection to the school's existing in-ground stormwater system. There is no proposed connection to a Council or authority-owned asset, nor are there any proposed works or tree species that would cause cracking or blockages in authority-owned pipes. Refer to Appendix A for details of the stormwater management and nominated discharge points for each development site.

4.1 Stormwater Quantity

The UPRCT provide guidelines to the requirements for on-site detention (OSD) for development within the LGA. The requirements for the permissible site discharge (PSD), site storage requirement (SSR), as well as the sizing of the OSD were calculated using the UPRCT OSD calculation spreadsheet that was provided by the Council. Refer to Appendix C for the OSD sizing calculation spreadsheet for each proposed development.

4.1.1 On-Site Detention

A summary of the preliminary OSD requirements for each site area tabulated in Table 2 below:

Table 2 – OSD Volume Requirements

Site	Approximate Site Area (m ²)	Provisional Roof Area (m ²)	Provisional Area Draining to OSD Tank (m ²)	Provisional OSD Volume Requirement (m ³)
STM	3,411	2,039	3,411	155

GLU	697	511	-	N/A (Draining to the Main Dam)
PAB	1,089	907	-	N/A (Draining to the Main Dam)
STF	2,575	1,374	2,540	118
ROD	13,357	-	4,644	282
DBH	1,200*	916*	1,126*	55*
PVA	586*	569*	586*	27*
BRD	2,528*	1,811*	2,315*	115*
ROD-BP	13,357	-	4,644*	282*

* This will require to be updated as the design gets developed to ensure that the site, roof areas, and catchment draining to the OSD are accurate, and the required OSD tank volume size are provided accordingly.

4.2 Stormwater Quality

Stormwater on site must be treated to comply with the requirements of CoP Council. New developments must ensure the implementation of appropriate water quality treatment for stormwater runoff in order to minimise the discharge of pollutants from paved and other impermeable surfaces into waterways and Council drainage systems.

Council's DCP stipulates that the stormwater discharge must meet the following standards set out in Figure 3 below.

Table 5.1.2.2 – Water Pollution reduction targets

Parameter	Water pollution reduction targets
Gross Pollutants	90% Reduction in the post development mean annual load of total gross pollutants load (greater than 5mm).
Total Suspended Solids	85% reduction in the post development mean annual load of Total Suspended Solids (TSS).
Total Phosphorus	65% reduction in the post development mean annual load of Total Phosphorus (TP).
Total Nitrogen	45% reduction in the post development mean annual load of Total Nitrogen (TN).
Hydrocarbons, motor oils, oil and grease	90% reduction in the post development mean annual load of hydrocarbons, oils, and grease.

Note: Reductions in pollutant loads are relative to the pollution generation from the same development without treatment.

Figure 3: Extract of CoP Council's Water Pollution Reduction Targets (Source: CoPC DCP 2023)

Stormwater management for the proposed development will have beneficial effect on runoff quality as compared with existing conditions. The existing site consists of catchments with no known stormwater quality improvement devices other than the existing reuse infrastructures at the site. The proposed development will utilise water quality treatment devices to treat the stormwater runoff from the site. This will effectively reduce the source pollutant loads produced within the catchments. The proposed treatment of the stormwater runoff was designed using the Model for Urban Stormwater Improvement Conceptualisation (MUSIC) to demonstrate that the proposed stormwater treatment devices achieve the required stormwater treatment targets.

4.2.1 Rainwater Harvesting and Reuse

Storm Consulting and Craig & Rhodes completed a stormwater reuse audit report including a desktop study, investigation, water balance model and options analysis as part of the improvement of water security to meet the reuse demand of the existing and future sports fields. There are three existing stormwater reuse infrastructures: the Main Dam (5ML capacity), the Reserve Dam (5ML capacity, depth of 1.5-3m approx), and the White Oval RWT (0.5ML capacity). It is noted that the White Oval RWT serves primarily as a buffer tank to replenish the Main Dam, whereas the Reserve Dam serves as a supplementary storage to provide reuse supply to the Main Dam during storms, which is the primary reuse source for the sports field. An existing 160kL RWT east of Doyle Fields, a disused Dam located downstream of the Main Dam, and absence of any gross pollutant traps were also identified in the report. For the location of the dams and existing reuse strategy, refer to Figure 4 below.



*Figure 4: Extract of Dam Location and Existing Scenario Reuse Strategy
(Source: Storm Consulting and Craig & Rhodes)*

Further, the current catchment areas draining to the stormwater reuse infrastructures, identified site 2A as part of the Reserve Dam catchment, while site 2B of the Main Dam catchment. A water balance results indicate that the Main Dam and Reserve Dam have insufficient capacity to meet the adopted reuse demand of 30ML/year. Three options were then proposed to determine the most suitable reuse strategy for the school site which maximise reuse supply to meet current reuse demand, minimise extended emptying of the dams, provide at least 90% reuse demand and reduce reliance on potable water reuse. For further detail, refer to the original report by Storm Consulting and Craig & Rhodes.

4.2.2 Proposed Rainwater Tank

Council requires the provision of a rainwater tank to serve 80% of the water reuse demands of toilets, laundry, as well as irrigation on site. For preliminary modelling purposes, the proposed rainwater tanks have initially been sized to meet 80% of the toilet demand for the site. Rainwater tank sizing and reuse demands for toilets, laundry and irrigation are to be confirmed by the Hydraulic consultant. A correspondence with the services consultant is attached in Appendix D with the aim to corroborate this information. TTW is still currently waiting for their confirmation. The purpose of sizing this rainwater tank is to include rainwater tank reuse system as part of water sensitive urban design (WSUD) masterplan strategy in compliance with Council's stormwater pollution targets.

A daily rate reuse of 0.06 kL/year/toilet was adopted for design purposes. It is assumed that the first 0.2mm of rain is not used as per Basix Rainwater Harvesting Guideline as this initial capture of rainwater typically contains the highest concentration of pollutants.

In light of the above, a table summarising the minimum rainwater tank requirements for each site is shown below.

Table 3 – Rainwater Volume Requirements

Site	Approximate Site Area (m ²)	Provisional Roof Area (m ²)	Provisional Number of Toilets	Provisional Minimum RWT Volume Requirement (kL)
STM	3,411*	2,039*	16*	50* (Confirmed by Hydraulic Consultant-NDY)
GLU	697*	511*	9*	N/A (Part of Reserve Dam Catchment)
PAB	1,089*	907*	-	N/A (Part of Main Dam Catchment)
STF	2,575*	1,374*	29*	41*
ROD	13,357*	-	4,644*	N/A (Proposed New Road)
DBH	-	-	-	25*
PVA	1,200*	916*	18*	18*
BRD	586*	569*	12*	12*
ROD-BP	13,357*	-	4,644*	N/A (Proposed New Road and Bus Parking)

** This will require to be updated as the design progresses to ensure that the site, roof areas, number of toilets and water demands are accurate, and the required rainwater tank volume and water quality measures be adjusted accordingly.*

4.2.3 MUSICX Modelling

The effectiveness of the combination of treatment train measures has been assessed using the numerical modelling within MUSICX.

MUSIC simulates the performance of a group of stormwater management measures, configured in series or in parallel to form a “treatment train” against historic rainfall event data sets. It is the industry standard water quality modelling software developed by the MUSIC development team of the Cooperative Research Centre for Catchment Hydrology (CRCCH).

The MUSICX user manual suggests that the time-step should not exceed the time of concentration of the smallest sub-catchment however, due consideration must also be made regarding the shortest detention time of nodes within the treatment train.

MUSICX uses different event mean concentrations (EMC) to determine the pollutant loads generated by different land uses. The standard EMCs adopted withing MUSICX were based on research undertaken by Duncan (1999) through the CRCCH and the results are reproduced in Australian Runoff Quality – A Guide to Water Sensitive Urban Design (ARQ).

4.2.4 Proposed Treatment Train

A MUSICX model was used to conceptualise stormwater treatment measures. The proposed treatment train utilises rainwater tank reuse, Ocean Protect’s Ocean Guard, 690mm PSorb Stormfilter and a Jellyfish Filter to treat most of the stormwater runoff. The MUSICX model also includes the proposed rainwater reuse tanks as part of the treatment train. This was developed to assist in analysis of the benefit of the proposed stormwater management system which determined that reuse rate for the site. However, rainwater tank sizing and reuse demands are to be further confirmed by the Hydraulic consultant during detailed design phase.

The MUSICX model layout for the whole site is shown in Figure 5 below, while Figure 6-13 shows the treatment train effectiveness for each site.

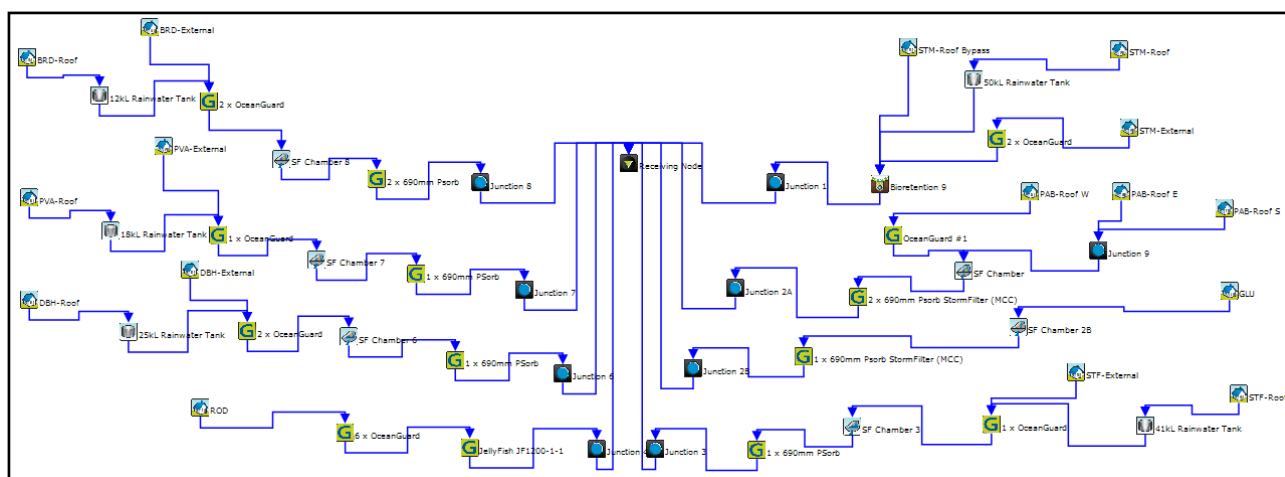


Figure 5 – MUSIC Model Layout

The Water Sensitive Urban Design (WSUD) required treatment train system for each site includes the following measures tabulated below:

Table 4 – Catchment Details and Respective Treatments

Catchment	Approximate Area (m ²)	Approximate % Impervious	Provisional Treatment Measures
STM	3,411	100	50kL RWT, 2 x OceanGuard, Bioretention
GLU	697	100	Storm Filter Chamber with 1 x 690mm Psorb
PAB	907	100	Storm Filter Chamber with 2 x 690mm Psorb, 1 x OceanGuard
STF	2,575	100	41 kL RWT, 1 x OceanGuard, Storm Filter Chamber with 1 x 690mm Psorb
ROD	13,357	100	6 x OceanGuard, 2 x Jellyfish Filter (JF2250-8-2)
DBH	1,200*	100*	25 kL RWT, 2 x OceanGuard, Storm Filter Chamber with 1 x 690mm Psorb*
PVA	586*	100*	18 kL RWT, 1 x OceanGuard, Storm Filter Chamber with 1 x 690mm Psorb*
BRD	2,528*	100	12 kL RWT, 2 x OceanGuard, Storm Filter Chamber with 2 x 690mm Psorb*
ROD-BP	13,357	100	6 x OceanGuard, 2 x Jellyfish Filter (JF2250-8-2)

** This will require to be updated as the design progresses to ensure that the site, roof areas, number of toilets and water demands are accurate, and the required rainwater tank volume and water quality measures be adjusted accordingly.*

4.2.5 Treatment Train Effectiveness

The results of the MUSICX modelling effectiveness are also shown below in Figures 5-12.

	Sources	Residual Load	% Reduction
Flow (ML/yr)	2.798	2.533	9.47
Total Suspended Solids (kg/yr)	231.1	15.7	93.21
Total Phosphorus (kg/yr)	0.5698	0.1174	79.39
Total Nitrogen (kg/yr)	6.139	2.658	56.7
Gross Pollutants (kg/yr)	74.02	0	100

Figure 6 – MUSIC Modelling Results: STM

	Sources	Residual Load	% Reduction
Flow (ML/yr)	0.7831	0.7831	0.0009514
Total Suspended Solids (kg/yr)	64.89	4.288	93.39
Total Phosphorus (kg/yr)	0.1597	0.03469	78.28
Total Nitrogen (kg/yr)	1.723	0.7422	56.93
Gross Pollutants (kg/yr)	20.63	0	100

Figure 7 – MUSIC Modelling Results: GLU

	Sources	Residual Load	% Reduction
Flow (ML/yr)	0.5022	0.5021	0.003683
Total Suspended Solids (kg/yr)	13.04	0.7718	94.08
Total Phosphorus (kg/yr)	0.07684	0.01018	86.75
Total Nitrogen (kg/yr)	1.103	0.4694	57.42
Gross Pollutants (kg/yr)	13.39	0	100

Figure 8 – MUSIC Modelling Results: PAB

	Sources	Residual Load	% Reduction
Flow (ML/yr)	2.154	1.643	23.72
Total Suspended Solids (kg/yr)	208.1	24.66	88.15
Total Phosphorus (kg/yr)	0.4676	0.1365	70.8
Total Nitrogen (kg/yr)	4.725	1.917	59.42
Gross Pollutants (kg/yr)	56.56	0	100

Figure 9 – MUSIC Modelling Results: STF

	Sources	Residual Load	% Reduction
Flow (ML/yr)	10.72	10.72	0
Total Suspended Solids (kg/yr)	2015	170.1	91.56
Total Phosphorus (kg/yr)	3.173	1.194	62.38
Total Nitrogen (kg/yr)	23.55	10.95	53.51
Gross Pollutants (kg/yr)	276.2	6.24	97.74

Figure 10 – MUSIC Modelling Results: ROD

	Sources	Residual Load	% Reduction
Flow (ML/yr)	1.021	0.699	31.54
Total Suspended Solids (kg/yr)	62.72	6.107	90.26
Total Phosphorus (kg/yr)	0.1866	0.04504	75.87
Total Nitrogen (kg/yr)	2.241	0.7929	64.62
Gross Pollutants (kg/yr)	27.03	0	100

Figure 11 – MUSIC Modelling Results: DBH

	Sources	Residual Load	% Reduction
Flow (ML/yr)	0.5063	0.2919	42.34
Total Suspended Solids (kg/yr)	15.67	1.105	92.95
Total Phosphorus (kg/yr)	0.07888	0.01231	84.39
Total Nitrogen (kg/yr)	1.113	0.2988	73.16
Gross Pollutants (kg/yr)	13.49	0	100

Figure 12 – MUSIC Modelling Results: PVA

	Sources	Residual Load	% Reduction
Flow (ML/yr)	2.143	1.932	9.883
Total Suspended Solids (kg/yr)	147.7	21.07	85.73
Total Phosphorus (kg/yr)	0.4121	0.1403	65.94
Total Nitrogen (kg/yr)	4.704	2.307	50.96
Gross Pollutants (kg/yr)	56.65	0	100

Figure 13 – MUSIC Modelling Results: BRD

Pollutant loads from the proposed development have been significantly reduced relative to existing. The stormwater management for the proposed development is seen to have beneficial effect on runoff quality by altering the type of catchment and reducing pollutants in discharge from the site through utilising rainwater harvesting and water quality treatment devices. As such, best practice WSUD goals of reducing stormwater runoff, improving water quality, and reducing potable water usage were addressed.

The assumed impervious areas and catchment sizes are subject to adjustment following the development of the design. Catchment details and water quality modelling are subject to further development during future design phases.

4.3 Summary of Compliance

We understand that each individual project can be delivered independently. As such, below are the details and summary of compliance for each site.

Site	OSD Volume Requirement (m³)	Provisional OSD Volume Provided (m³)	Permissible Site Discharge (PSD) (L/s)	Water Quality Targets		Compliance
STM	155	155	51	CoP's Required Reduction (%)	Modelled Reduction (%)	YES
				85	93.21	
				65	79.39	
				45	56.7	
				90	100	
GLU	N/A	N/A	N/A	CoP's Required Reduction (%)	Modelled Reduction (%)	YES
				85	93.39	
				65	78.28	
				45	56.93	
				90	100	
PAB	N/A	N/A	N/A	CoP's Required Reduction (%)	Modelled Reduction (%)	YES
				85	94.08	
				65	86.75	
				45	57.42	
				90	100	
STF	117	118	37.12			YES

				<table><tr><th>CoP's Required Reduction (%)</th><th>Modelled Reduction (%)</th></tr><tr><td>85</td><td>88.15</td></tr><tr><td>65</td><td>70.8</td></tr><tr><td>45</td><td>59.42</td></tr><tr><td>90</td><td>100</td></tr></table>	CoP's Required Reduction (%)	Modelled Reduction (%)	85	88.15	65	70.8	45	59.42	90	100	
CoP's Required Reduction (%)	Modelled Reduction (%)														
85	88.15														
65	70.8														
45	59.42														
90	100														
ROD	281	282	61.94	<table><tr><th>CoP's Required Reduction (%)</th><th>Modelled Reduction (%)</th></tr><tr><td>85</td><td>91.56</td></tr><tr><td>65</td><td>62.38</td></tr><tr><td>45</td><td>53.51</td></tr><tr><td>90</td><td>97.74</td></tr></table>	CoP's Required Reduction (%)	Modelled Reduction (%)	85	91.56	65	62.38	45	53.51	90	97.74	YES
CoP's Required Reduction (%)	Modelled Reduction (%)														
85	91.56														
65	62.38														
45	53.51														
90	97.74														
DBH	55	55	11.75	<table><tr><th>CoP's Required Reduction (%)</th><th>Modelled Reduction (%)</th></tr><tr><td>85</td><td>90.26</td></tr><tr><td>65</td><td>75.87</td></tr><tr><td>45</td><td>64.62</td></tr><tr><td>90</td><td>100</td></tr></table>	CoP's Required Reduction (%)	Modelled Reduction (%)	85	90.26	65	75.87	45	64.62	90	100	YES
CoP's Required Reduction (%)	Modelled Reduction (%)														
85	90.26														
65	75.87														
45	64.62														
90	100														
PVA	27	27	8.79	<table><tr><th>CoP's Required Reduction (%)</th><th>Modelled Reduction (%)</th></tr><tr><td>85</td><td>92.95</td></tr><tr><td>65</td><td>84.39</td></tr><tr><td>45</td><td>73.16</td></tr><tr><td>90</td><td>100</td></tr></table>	CoP's Required Reduction (%)	Modelled Reduction (%)	85	92.95	65	84.39	45	73.16	90	100	YES
CoP's Required Reduction (%)	Modelled Reduction (%)														
85	92.95														
65	84.39														
45	73.16														
90	100														
BRD	115	115	22.9	<table><tr><th>CoP's Required Reduction (%)</th><th>Modelled Reduction (%)</th></tr><tr><td>85</td><td>85.73</td></tr><tr><td>65</td><td>65.94</td></tr><tr><td>45</td><td>50.96</td></tr><tr><td>90</td><td>100</td></tr></table>	CoP's Required Reduction (%)	Modelled Reduction (%)	85	85.73	65	65.94	45	50.96	90	100	YES
CoP's Required Reduction (%)	Modelled Reduction (%)														
85	85.73														
65	65.94														
45	50.96														
90	100														

ROD- BP	281	282	61.94	CoP's Required Reduction (%)	Modelled Reduction (%)	YES
				85	91.56	
				65	62.38	
				45	53.51	
				90	97.74	

4.4 Erosion and Sediment Control

The disturbance of the site during construction must be controlled through erosion prevention and sediment control measures. Erosion and sediment control devices must comply with:

- City of Parramatta Council's Development Control Plan 2023;
- Landcom's Managing Urban Stormwater: Soils and Construction Volume 1.

The disturbance of the site during construction must be controlled through erosion prevention and sediment control measures. A silt fence will be installed to prevent silt and waste being washed into the proximity of the site and neighbouring properties. A catch drain with hay bales will be utilised to carry and treat site runoff which will then be captured by a sedimentation basin that will be installed at the lowest point of site excavation. As the existing surface is a combination of asphalt and concrete, the existing pits on site will require sandbags or geotextile pit insert until the surface has been demolished. After demolition, silt barriers can be installed. At the point of entry to site, cattle grids will be provided to ensure that vehicles and machinery leave the site with clean wheels.

Additionally, the builder will be required to implement dust and noise control measures in order to minimise disruption to the neighbouring properties. The contractor will be required to demonstrate the proposed works equipment to be within acceptable limits for noise and vibration as determined by a registered acoustic consultant.

Refer to Appendix A for details of the erosion and sediment control plan for each development site.

4.5 Operations and Maintenance

Regular maintenance of stormwater infrastructure, particularly the on-site detention tank and stormwater quality treatment devices will be required to ensure they function as intended for the design life. Access roads will need to be assessed to ensure maintenance vehicles such as vacuum trucks are able to access the detention tank and stormwater quality devices.

Any proposed OSD or water quality tank will need to be designed with an adequate number of access hatches in accordance with Australian Standards and the local Council requirements. This will limit the positioning of the OSD as access will not be permitted within classrooms.

5.0 Climate Change

A separate flood report has been prepared to consider the impacts of climate change. For more details regarding climate change-related design considerations, refer to the separate flood report by TTW.

6.0 Conclusion

This report provides a summary of the IWCMP requirements to supplement the SSDA submission and address the relevant SEARs for the development at The King's School Masterplan. The proposed development complies with the IWCMP-related element of the SEARS and relevant stormwater-related standards and requirements of CoP Council.

The findings in this statement are based on current available information, regulations and correspondence undertaken at the time of writing.

Prepared by
TTW (NSW) PTY LTD



JEMA LOPEZ
Civil Engineer

Authorised By
TTW (NSW) PTY LTD



NEMESIO BIASON JR.
Associate Director

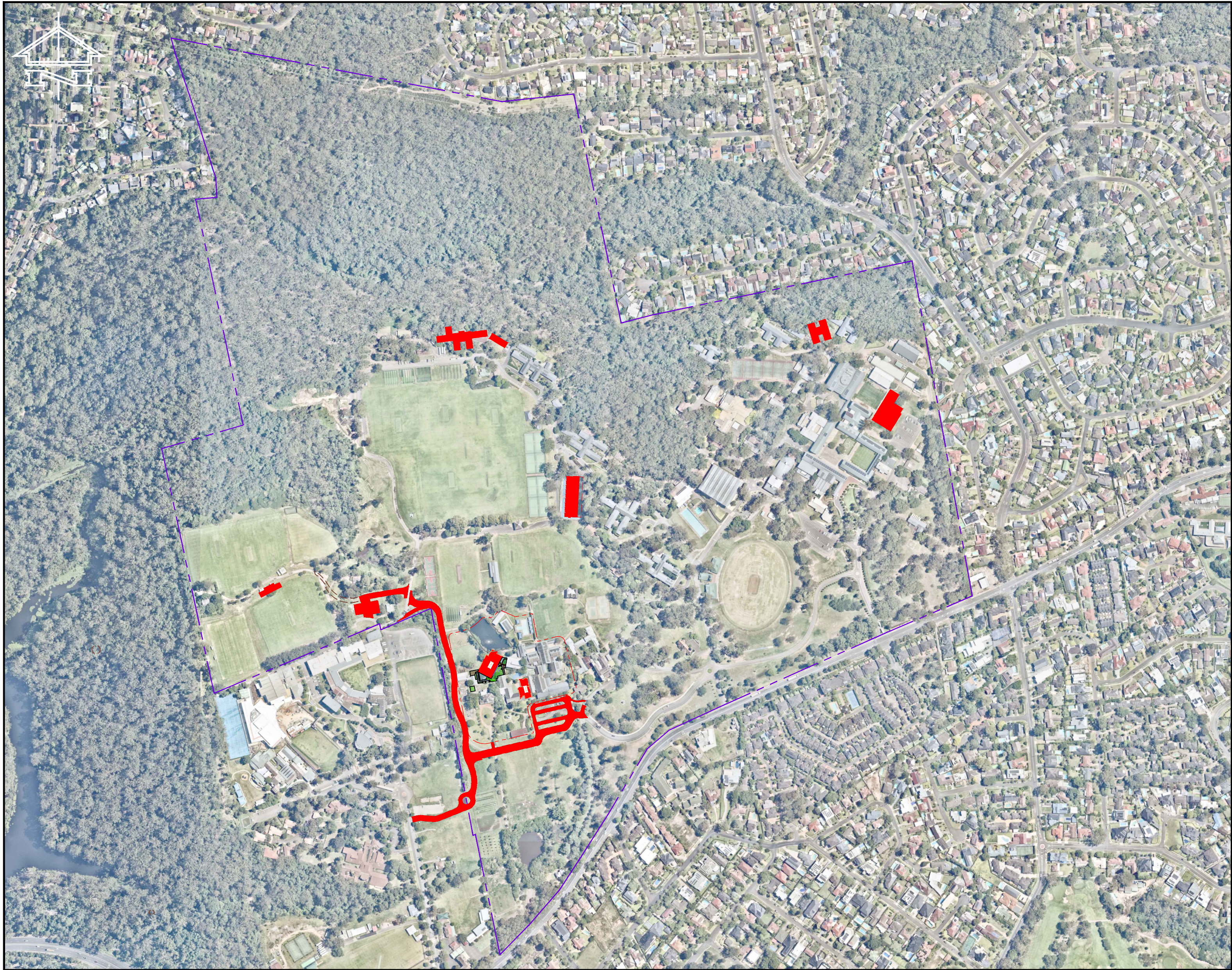
P:\2022\2212\221272\Reports\TTW\Civil\IWCMP\231024 Integrated Water Cycle Management Plan.docx

Appendix A

Stormwater Management and Erosion & Sediment Control Plan

THE KING'S SCHOOL - MASTERPLAN

CIVIL WORKS



LOCALITY PLAN
SCALE 1:2000

DRAWING SCHEDULE	
DRAWING NUMBER	DRAWING NAME
MAR-CV-00	COVER SHEET, LOCALITY PLAN AND DRAWING SCHEDULE
MAR-CV-01	GENERAL NOTES AND LEGENDS
MAR-CV-03	SHEET KEY PLAN
MAR-CV-04	STORMWATER AND SEDIMENT & EROSION CONTROL PLAN, SHEET 1 SITE 2A GLU
MAR-CV-05	STORMWATER AND SEDIMENT & EROSION CONTROL PLAN, SHEET 2 SITE 2B PAB
MAR-CV-06	STORMWATER AND SEDIMENT & EROSION CONTROL PLAN, SHEET 3 SITE 6 PAV
MAR-CV-07	STORMWATER AND SEDIMENT & EROSION CONTROL PLAN, SHEET 4 SITE 7 BRD
MAR-CV-08	STORMWATER AND SEDIMENT & EROSION CONTROL PLAN, SHEET 5 SITE 5 DBH
MAR-CV-09	STORMWATER AND SEDIMENT & EROSION CONTROL PLAN, SHEET 6 SITE 1 STM
MAR-CV-10	STORMWATER AND SEDIMENT & EROSION CONTROL PLAN, SHEET 7 SITE 3 STF
MAR-CV-11	STORMWATER AND SEDIMENT & EROSION CONTROL PLAN, SHEET 8 SITE 4 & 8 ROAD AND PARKINGS
MAR-CV-20	TYPICAL DETAILS
MAR-CV-30	OSD TANK DETAILS

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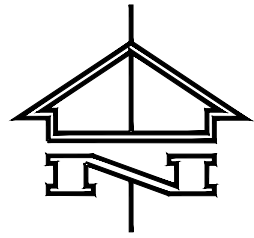
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			ARCHITECT:			ENGINEER:			PROJECT:			DRAWING NAME:			SCALE : A1			DRAWN BY			AUTHORISED BY		
									THE KING'S SCHOOL - MASTERPLAN			COVER SHEET, LOCALITY PLAN AND DRAWING SCHEDULE			1:2000			LA			NB		
									PENNANT HILLS ROAD, NORTH PARRAMATTA NSW 2151						PROJECT No			DRAWING No			REVISION		
P1 ISSUED FOR INFORMATION			NB LA 18.08.23									221272			MAR-CV-00			P1					
REV DESCRIPTION			CHK DR DATE			REV DESCRIPTION			CHK DR DATE			Plot File Created: Aug 18, 2023 - 2:42pm											

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TTW Structural
Civil
Traffic
Façade
612 9439 7288 | Level 6, 73 Miller Street, North Sydney, NSW 2060



- STAGE 1 PROJECTS**
- 1. NEW STEAM BUILDING & LANDSCAPING
 - 2A. NEW PREP SCHOOL GENERAL LEARNING BUILDING
 - 2B. NEW PREP SCHOOL PERFORMING ART CENTRE
 - 3. NEW STAFF RESIDENCES
 - 4. NEW ROAD
- STAGE 2 PROJECTS**
- 5. NEW DAY BOY HOUSE
 - 6. NEW SPORT PAVILION
 - 7. NEW BOARDING HOUSE
 - 8. NEW ROAD AND BUS PARKING

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P2	ISSUED FOR INFORMATION	SF	LA	14.03.23	
P1	ISSUED FOR INFORMATION	SF	LA	10.03.23	
REV	DESCRIPTION	CHK	DR	DATE	REV

ARCHITECT:

BVN

ENGINEER:

TTW Structural
Civil
Traffic
Façade

PROJECT:

THE KING'S SCHOOL - MASTERPLAN

PENNANT HILLS ROAD,
NORTH PARRAMATTA NSW 2151

DRAWING NAME:

SHEET KEY PLAN

SCALE : A1

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PROJECT No

221272

DRAWING No

MAR-CV-03

REVISION

P3

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P2	ISSUED FOR INFORMATION	SF	LA	14.03.23										
P1	ISSUED FOR INFORMATION	SF	LA	10.03.23										

ARCHITECT:

BVN

ENGINEER:

TTW Structural
Civil
Traffic
Façade
612 9439 7288 | Level 6, 73 Miller Street, North Sydney, NSW 2060

PROJECT:

THE KING'S SCHOOL - MASTERPLAN
PENNANT HILLS ROAD,
NORTH PARRAMATTA NSW 2151

DRAWING NAME:

**STORMWATER AND SEDIMENT &
EROSION CONTROL PLAN,
SHEET 1 SITE 2A GLU**

SCALE : A1

1:200

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LA

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PROJECT No

221272

DRAWING No

MAR-CV-04

REVISION

P3

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SITEWORKS LEGEND:

PROPOSED WORKS

- BUILDING FOOTPRINT
- ROOF OUTLINE
- APPROXIMATE DOWNPIPE RETICULATION
- STORMWATER LINE
- STORMWATER PIT

EXISTING

- BUILDING TO BE DEMOLISHED
- SURFACE CONTOUR
- PROPERTY BOUNDARY
- EASEMENT BOUNDARY

EXISTING SERVICES

- eW WATER MAIN
- eEU ELECTRICAL MAIN
- eT TELECOMS
- eG GAS MAIN
- eS SEWER MAIN
- eSW STORMWATER PIPE

SEDIMENT AND EROSION CONTROL LEGEND:

- BATTER
- SILTATION FENCE
- STORMWATER PIT WITH
GEOTEXTILE FILTER SURROUND
- HAY BALE BARRIERS
- SANDBAG SEDIMENT TRAP
- CATCH DRAIN
- OVERLAND FLOW PATH

APPROXIMATE SITE AREA= 697m²
APPROXIMATE ROOF AREA= 591m²

- NO OSD TANK IS PROPOSED.

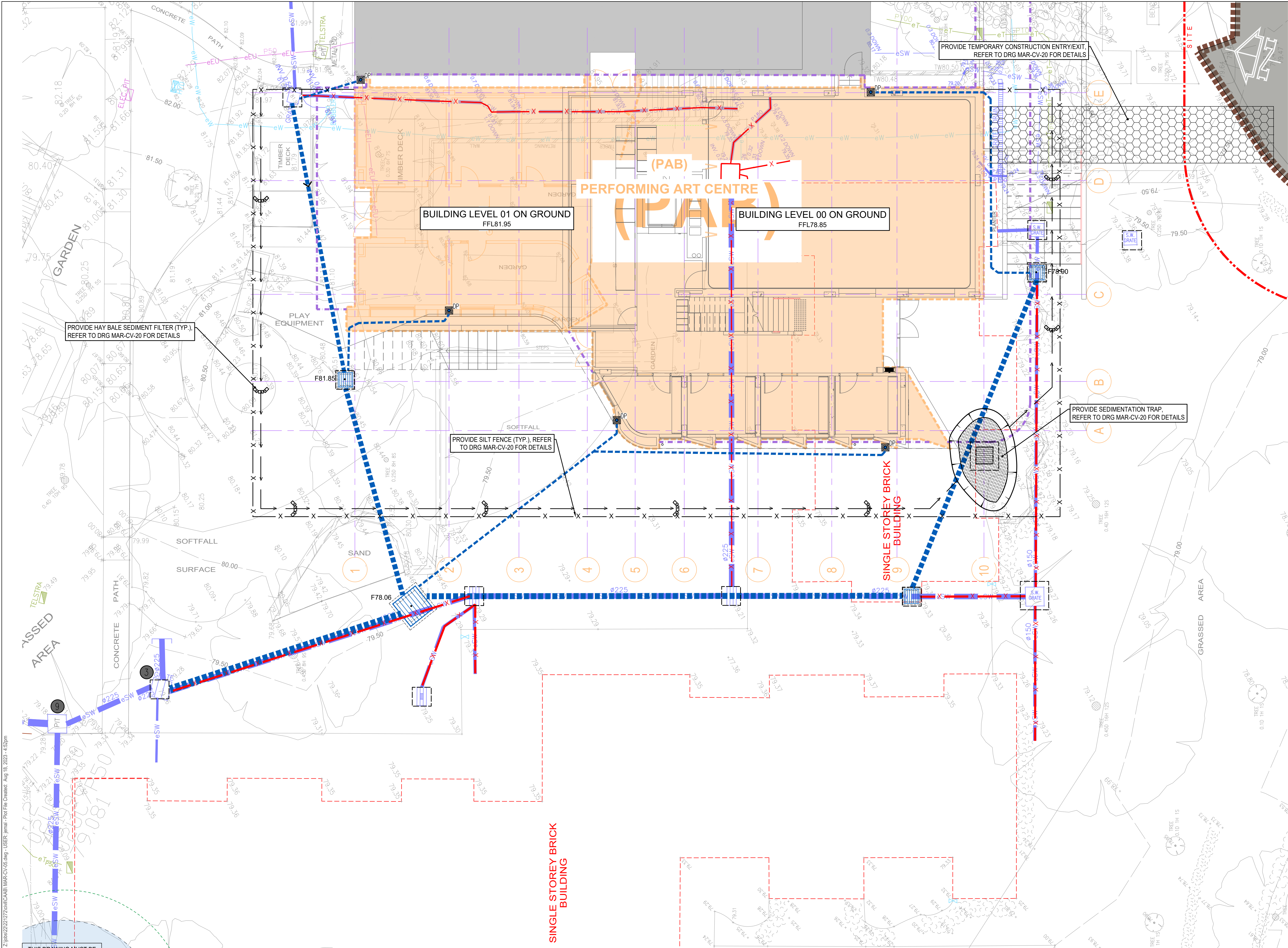
NO RWT IS PROPOSED

- WATER QUALITY (WQ) MEASURES:
-STORMFILTER CHAMBER WITH 1 x 690mm
PSORB

NOTE: This will require to be updated as the
design progresses to ensure that the site area,
roof area, number of toilets and water demands
are accurate, to ensure that the required water
quality measures be adjusted accordingly.

0 2 4 6 8 10 12 14 16m
1:200 A1 1:400 A3

FOR INFORMATION ONLY



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SITEWORKS LEGEND:

- PROPOSED WORKS**
- BUILDING FOOTPRINT
 - ROOF OUTLINE
 - APPROXIMATE DOWNPIPE RETICULATION
 - STORMWATER LINE
 - STORMWATER PIT

EXISTING

- BUILDING TO BE DEMOLISHED
- SURFACE CONTOUR
- PROPERTY BOUNDARY
- EASEMENT BOUNDARY

EXISTING SERVICES

- eW WATER MAIN
- eEU ELECTRICAL MAIN
- eT TELECOMS
- eG GAS MAIN
- eS SEWER MAIN
- eSW STORMWATER PIPE

SEDIMENT AND EROSION CONTROL LEGEND:

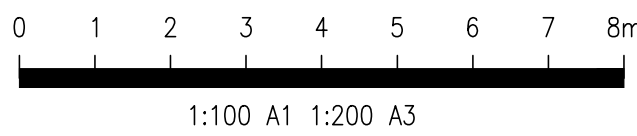
- BATTER
- SILTATION FENCE
- STORMWATER PIT WITH GEOTEXTILE FILTER SURROUND
- HAY BALE BARRIERS
- SANDBAG SEDIMENT TRAP
- CATCH DRAIN
- OVERLAND FLOW PATH

APPROXIMATE SITE AREA= 1,089m²
APPROXIMATE ROOF AREA= 907m²

- NO OSD TANK IS PROPOSED.

- NO RWT IS PROPOSED
- WATER QUALITY (WQ) MEASURES:
 - 1 x OCEAN GUARD
 - STORMFILTER CHAMBER WITH 2 x 690mm PSORB

NOTE: This will require to be updated as the design progresses to ensure that the site area, roof area, number of toilets and water demands are accurate, to ensure that the required water quality measures be adjusted accordingly.



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P2	ISSUED FOR INFORMATION	SF	LA	14.03.23										
P1	ISSUED FOR INFORMATION	SF	LA	10.03.23										

ARCHITECT:

BVN

ENGINEER:

TTW Structural
Civil
Traffic
Façade

PROJECT:

THE KING'S SCHOOL - MASTERPLAN

PENNANT HILLS ROAD,
NORTH PARRAMATTA NSW 2151

DRAWING NAME:

**STORMWATER AND SEDIMENT &
EROSION CONTROL PLAN,
SHEET 2 SITE 2B PAB**

SCALE : A1

1:100

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PROJECT No

221272

DRAWING No

MAR-CV-05

REVISION

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P1	ISSUED FOR INFORMATION	SF	LA	10.03.23										

ARCHITECT:

BVN

ENGINEER:

TTW Structural
Civil
Traffic
Façade

612 9439 7288 | Level 6, 73 Miller Street, North Sydney, NSW 2060

PROJECT:

THE KING'S SCHOOL - MASTERPLAN

PENNANT HILLS ROAD,
NORTH PARRAMATTA NSW 2151

DRAWING NAME:

STORMWATER AND SEDIMENT &
EROSION CONTROL PLAN,
SHEET 3 SITE 6 PAV

SCALE : A1

1:200

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SITWORKS LEGEND:

PROPOSED WORKS

- BUILDING FOOTPRINT
- ROOF OUTLINE
- APPROXIMATE DOWNPIPE RETICULATION
- STORMWATER LINE
- STORMWATER PIT

EXISTING

- BUILDING TO BE DEMOLISHED
- SURFACE CONTOUR
- PROPERTY BOUNDARY
- EASEMENT BOUNDARY

EXISTING SERVICES

- eW WATER MAIN
- eEU ELECTRICAL MAIN
- eT TELECOMS
- eG GAS MAIN
- eS SEWER MAIN
- eSW STORMWATER PIPE

SEDIMENT AND EROSION CONTROL LEGEND:

- BATTER
- SILTATION FENCE
- STORMWATER PIT WITH
GEOTEXTILE FILTER SURROUND
- HAY BALE BARRIERS
- SANDBAG SEDIMENT TRAP
- CATCH DRAIN
- OVERLAND FLOW PATH

APPROXIMATE SITE AREA= 586m²
APPROXIMATE ROOF AREA= 569m²

- APPROXIMATE AREA DRAINING TO
OSD=586m²
- PROVISIONAL OSD VOLUME
REQUIREMENT= 27m³

NOTE: This will require to be updated as the design progresses to
ensure that the site area, roof area, and catchment draining to the
OSD are accurate, and the required OSD tank volume and location
be adjusted accordingly.

WATER QUALITY (WQ) MEASURES:

- PROVISIONAL RWT VOLUME
REQUIREMENT= 18kL
- 1 x OCEAN GUARD
- STORMFILTER CHAMBER WITH 1 x
690mm PSORB

NOTE: This will require to be updated as the design progresses to
ensure that the site area, roof area, number of toilets and water
demands are accurate, to ensure that the required rainwater tank
volume and water quality measures be adjusted accordingly.

0 2 4 6 8 10 12 14 16m
1:200 A1 1:400 A3

FOR INFORMATION ONLY

SITWORKS LEGEND:

 BUILDING FOOTPRINT
 ROOF OUTLINE
 APPROXIMATE DOWNPIPE RETICULATION
 STORMWATER LINE
 STORMWATER PIT

- - - - - BUILDING TO BE DEMILISHED
 _____ SURFACE CONTOUR
 — — — — — PROPERTY BOUNDARY
 _____ EASEMENT BOUNDARY

eW	WATER MAIN
eEU	ELECTRICAL MAIN
eT	TELECOMS
eG	GAS MAIN
eS	SEWER MAIN
eSW	STORMWATER PIPE

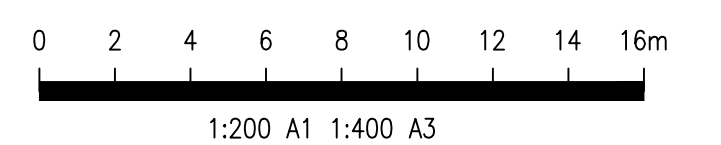
	BATTER
	SILTATION FENCE
	STORMWATER PIT WITH GEOTEXTILE FILTER SURROUND
	HAY BALE BARRIERS
	SANDBAG SEDIMENT TRAP
	CATCH DRAIN
	OVERLaid FLOW PATH

- APPROXIMATE AREA DRAINING TO OSD=2,315m²
- PROVISIONAL OSD VOLUME REQUIREMENT= 115m³

WATER QUALITY (WQ) MEASURES:

- PROVISIONAL RWT VOLUME REQUIREMENT= 12kL RWT
- 2 x OCEAN GUARD
- STORMFILTER CHAMBER WITH 2 x 690mm PSORB

NOTE: This will require to be updated as the design progresses to ensure that the site area, roof area, number of toilets and water demands are accurate, to ensure that the required rainwater tank volume and water quality measures be adjusted accordingly.



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										ARCHITECT:		ENGINEER:		PROJECT:		DRAWING NAME:		SCALE : A1		DRAWN BY		AUTHORISED BY	
														THE KING'S SCHOOL - MASTERPLAN		STORMWATER AND SEDIMENT & EROSION CONTROL PLAN, SHEET 4 SITE 7 BRD		1:200		LA		NB	
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SITeworks LEGEND:

- PROPOSED WORKS
- BUILDING FOOTPRINT
 - ROOF OUTLINE
 - APPROXIMATE DOWNPIPE RETICULATION
 - STORMWATER LINE
 - STORMWATER PIT

EXISTING

- BUILDING TO BE DEMOLISHED
- SURFACE CONTOUR
- PROPERTY BOUNDARY
- EASEMENT BOUNDARY

EXISTING SERVICES

- eW WATER MAIN
- eEU ELECTRICAL MAIN
- eT TELECOMS
- eG GAS MAIN
- eS SEWER MAIN
- eSW STORMWATER PIPE

SEDIMENT AND EROSION CONTROL LEGEND:

- BATTER
- SILTATION FENCE
- STORMWATER PIT WITH GEOTEXTILE FILTER SURROUND
- HAY BALE BARRIERS
- SANDBAG SEDIMENT TRAP
- CATCH DRAIN
- OVERLAND FLOW PATH

APPROXIMATE SITE AREA= 1,200m²
APPROXIMATE ROOF AREA= 916m²

- APPROXIMATE AREA DRAINING TO OSD= 1,126m²
- PROVISIONAL OSD VOLUME REQUIREMENT= 55m³

NOTE: This will require to be updated as the design progresses to ensure that the site area, roof area, and catchment draining to the OSD are accurate, and the required OSD tank volume and location be adjusted accordingly.

WATER QUALITY (WQ) MEASURES:

- PROVISIONAL RWT VOLUME REQUIREMENT= 25kL
- 2 x OCEAN GUARD
- STORMFILTER CHAMBER WITH 1 x 690mm PSORB

NOTE: This will require to be updated as the design progresses to ensure that the site area, roof area, number of toilets and water demands are accurate, to ensure that the required rainwater tank volume and water quality measures be adjusted accordingly.

0 2 4 6 8 10 12 14 16m
1:200 A1 1:400 A3

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P2	ISSUED FOR INFORMATION	SF	LA	14.03.23										
P1	ISSUED FOR INFORMATION	SF	LA	10.03.23										

ARCHITECT:

BVN

ENGINEER:

TTW Structural Civil Traffic Façade
612 9439 7288 | Level 6, 73 Miller Street, North Sydney, NSW 2060

PROJECT:

THE KING'S SCHOOL - MASTERPLAN
PENNANT HILLS ROAD,
NORTH PARRAMATTA NSW 2151

DRAWING NAME:

STORMWATER AND SEDIMENT & EROSION CONTROL PLAN,
SHEET 5 SITE 5 DBH

SCALE : A1

1:200

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PROJECT No

221272

DRAWING No

MAR-CV-08

REVISION

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SITWORKS LEGEND:

 BUILDING FOOTPRINT
 ROOF OUTLINE
 APPROXIMATE DOWNPIPE RETICULATION
 STORMWATER LINE
 STORMWATER PIT

- - - - - BUILDING TO BE DEMILISHED
 _____ SURFACE CONTOUR
 - - - - - PROPERTY BOUNDARY
 _____ EASEMENT BOUNDARY

—eW—	WATER MAIN
—eEU—	ELECTRICAL MAIN
—eT—	TELECOMS
—eG—	GAS MAIN
—eS—	SEWER MAIN
—eSW—	STORMWATER PIPE

BATTER

SILTATION FENCE

STORMWATER PIT WITH
GEOTEXTILE FILTER SURROUND

HAY BALE BARRIERS

SANDBAG SEDIMENT TRAP

CATCH DRAIN

OVERLAND FLOW PATH

- APPROXIMATE AREA DRAINING TO OSD= 3,411m²
- PROVISIONAL OSD VOLUME REQUIREMENT= 155m³

WATER QUALITY (WQ) MEASURES:

- PROVISIONAL RWT VOLUME REQUIREMENT= 50kL
- 2 X OCEANGUARD
- BIORETENTION

A horizontal graphic scale bar. The top part is a black bar with white tick marks at intervals of 2 units, labeled 0, 2, 4, 6, 8, 10, 12, 14, and 16m. Below the bar, the text '1:200 A1' is centered under the first 8 units, and '1:400 A3' is centered under the entire 16-unit bar.

FOR INFORMATION ONLY

												ARCHITECT:				ENGINEER:				PROJECT:				DRAWING NAME:				SCALE : A1		DRAWN BY		AUTHORISED BY	
																				THE KING'S SCHOOL - MASTERPLAN				STORMWATER AND SEDIMENT & EROSION CONTROL PLAN, SHEET 6 SITE 1 STM				1:200		LA		NB	
P4 ISSUED FOR INFORMATION SF LA 01.09.23																				PENNANT HILLS ROAD, NORTH PARRAMATTA NSW 2151								PROJECT No		DRAWING No		REVISION	
P3 ISSUED FOR INFORMATION SF LA 18.08.23																												221272		MAR-CV-09		P2	
P2 ISSUED FOR INFORMATION SF LA 14.03.23																																	
P1 ISSUED FOR INFORMATION SF LA 10.03.23																																	
REV DESCRIPTION				CHK DR DATE		REV DESCRIPTION				CHK DR DATE		REV DESCRIPTION				CHK DR DATE										Plot File Created: Sep 01, 2023 - 10:21am							

NOTE: This will require to be updated as the design progresses to ensure that the site area, roof area, number of toilets and water demands are accurate, to ensure that the required rainwater tank volume and water quality measures be adjusted accordingly.

THIS DRAWING MUST BE
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P4	ISSUED FOR INFORMATION	SF	LA	01.09.23										
P3	ISSUED FOR INFORMATION	SF	LA	18.08.23										
P2	ISSUED FOR INFORMATION	SF	LA	14.03.23										
P1	ISSUED FOR INFORMATION	SF	LA	10.03.23										
REV	DESCRIPTION	CHK	DR	DATE	REV	DESCRIPTION	CHK	DR	DATE	REV	DESCRIPTION	CHK	DR	DATE

BVN

TTW Structural
Civil
Traffic
Façade

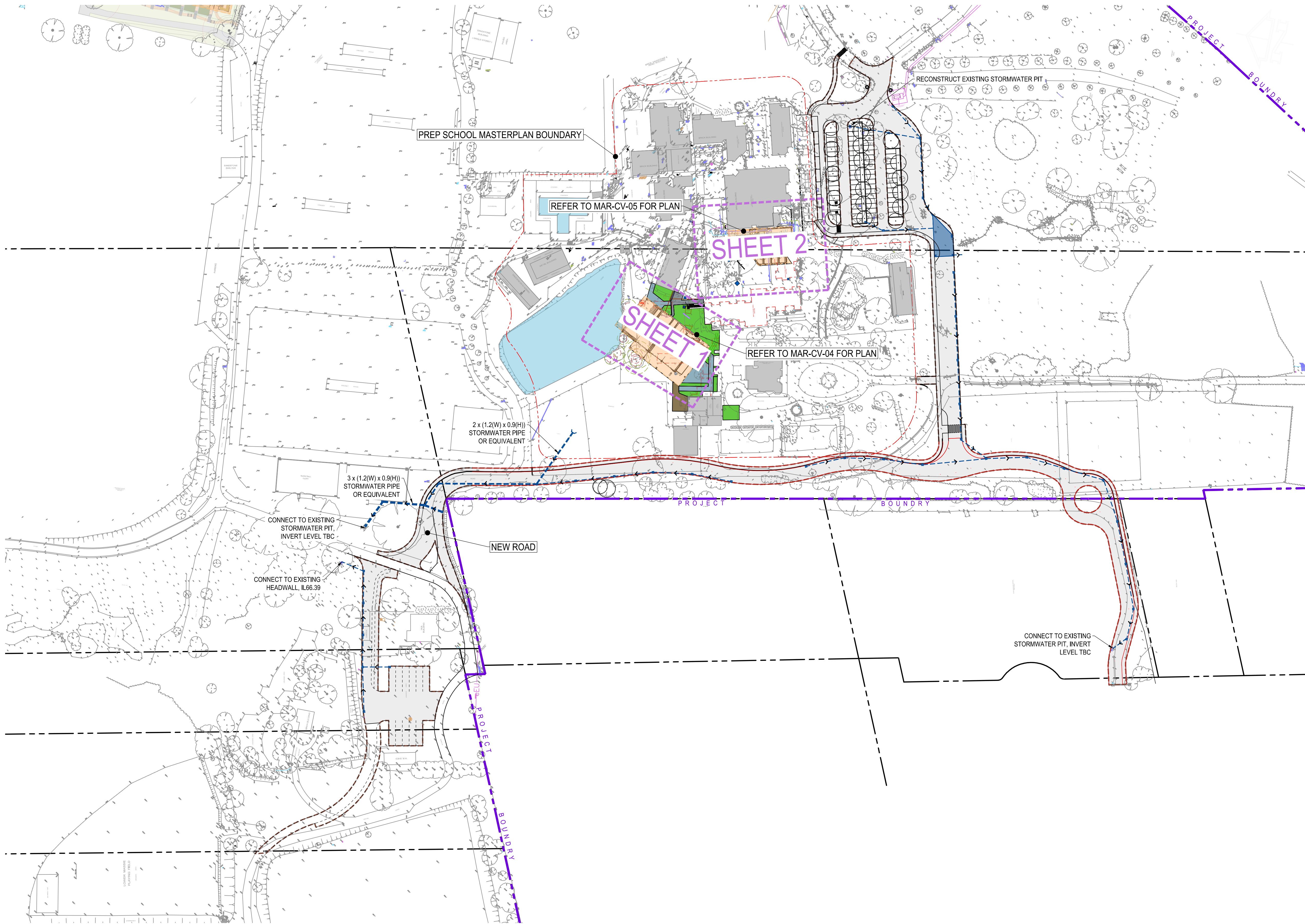
PENNANT HILLS ROAD,
NORTH PARRAMATTA NSW 2151

P2

Plot File Created: Sep 01, 2023 - 12:13pm

FOR INFORMATION ONLY

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THIS DRAWING IS COPYRIGHT AND IS THE PROPERTY OF TAYLOR THOMSON WHITTING (NSW) PTY LTD AND MUST NOT BE USED WITHOUT AUTHORISATION. THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT NOTES ON DRAWING MAR-CV-01

SITeworks LEGEND:

- PROPOSED WORKS
- BUILDING FOOTPRINT
 - ROOF OUTLINE
 - APPROXIMATE DOWNPIPE RETICULATION
 - STORMWATER LINE
 - STORMWATER PIT

- EXISTING
- BUILDING TO BE DEMOLISHED
 - SURFACE CONTOUR
 - PROPERTY BOUNDARY
 - EASEMENT BOUNDARY

- EXISTING SERVICES
- eW WATER MAIN
 - eEU ELECTRICAL MAIN
 - eT TELECOMS
 - eG GAS MAIN
 - eS SEWER MAIN
 - eSW STORMWATER PIPE

SEDIMENT AND EROSION CONTROL LEGEND:

- BATTER
- SILTATION FENCE
- STORMWATER PIT WITH GEOTEXTILE FILTER SURROUND
- HAY BALE BARRIERS
- SANDBAG SEDIMENT TRAP
- CATCH DRAIN
- OVERLAND FLOW PATH

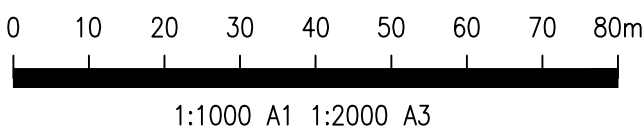
APPROXIMATE SITE AREA= 13,357m²

NOTE: THE PROPOSED STORMWATER FOR THE NEW ROAD IS DRIVEN BY THE FLOODING REQUIREMENTS. DRAINAGE AND OVERLAND FLOW PATH WILL BE PROVIDED TO CATER FOR THE 1% ANNUAL EXCEEDANCE PROBABILITY (AEP) EVENT.

WATER QUALITY MEASURES:

- 6 x OCEAN GUARD
- 1 x JELLYFISH FILTER (JF2250-8-2)

NOTE: This will require to be updated as the design progresses to ensure that the site area, roof area, number of toilets and water demands are accurate, to ensure that the required rainwater tank volume and water quality measures be adjusted accordingly.



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FOR INFORMATION ONLY

REV	DESCRIPTION	CHK	DR	DATE	REV	DESCRIPTION	CHK	DR	DATE	REV	DESCRIPTION	CHK	DR	DATE
P2	ISSUED FOR INFORMATION	NB	LA	01.09.23										
P1	ISSUED FOR INFORMATION	NB	LA	18.08.23										

ARCHITECT:

BVN

ENGINEER:

TTW Structural Civil Traffic Façade

612 9439 7288 | Level 6, 73 Miller Street, North Sydney, NSW 2060

PROJECT:

THE KING'S SCHOOL - MASTERPLAN

PENNANT HILLS ROAD,
NORTH PARRAMATTA NSW 2151

DRAWING NAME:

STORMWATER AND SEDIMENT & EROSION CONTROL AND PLAN, SHEET 8 SITE 4 & 8 ROAD AND PARKINGS

SCALE : A1

1:1000

PROJECT No

221272

Plot File Created: Sep 01, 2023 - 9:44am

DRAWN BY

LA

AUTHORISED BY

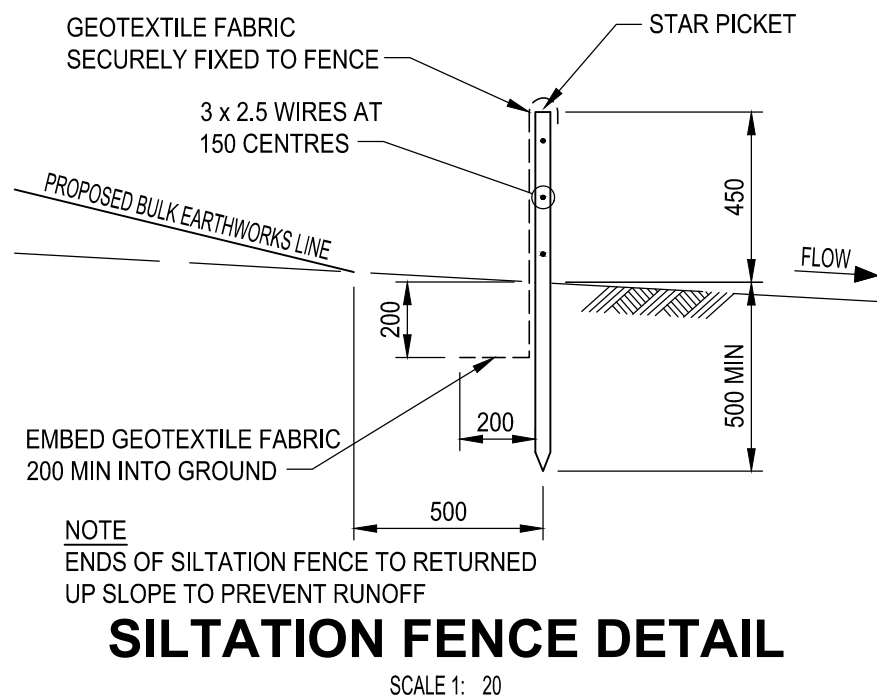
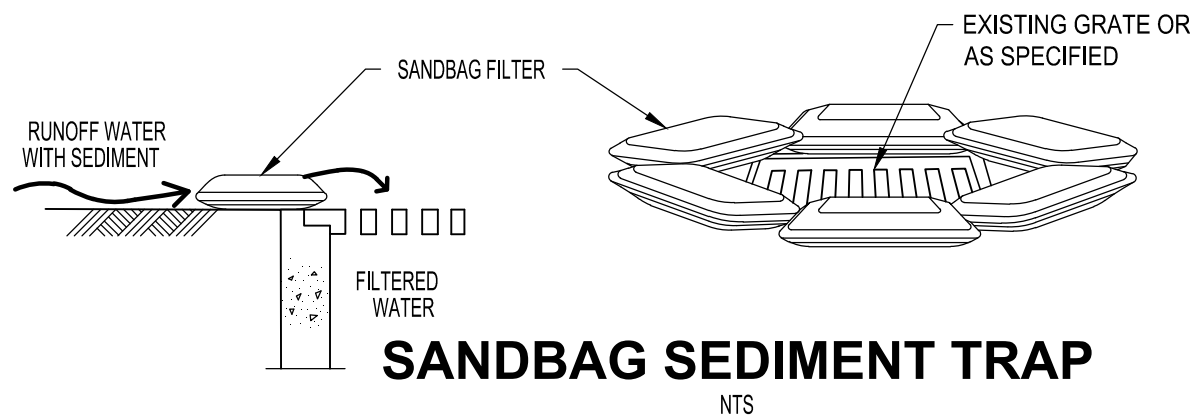
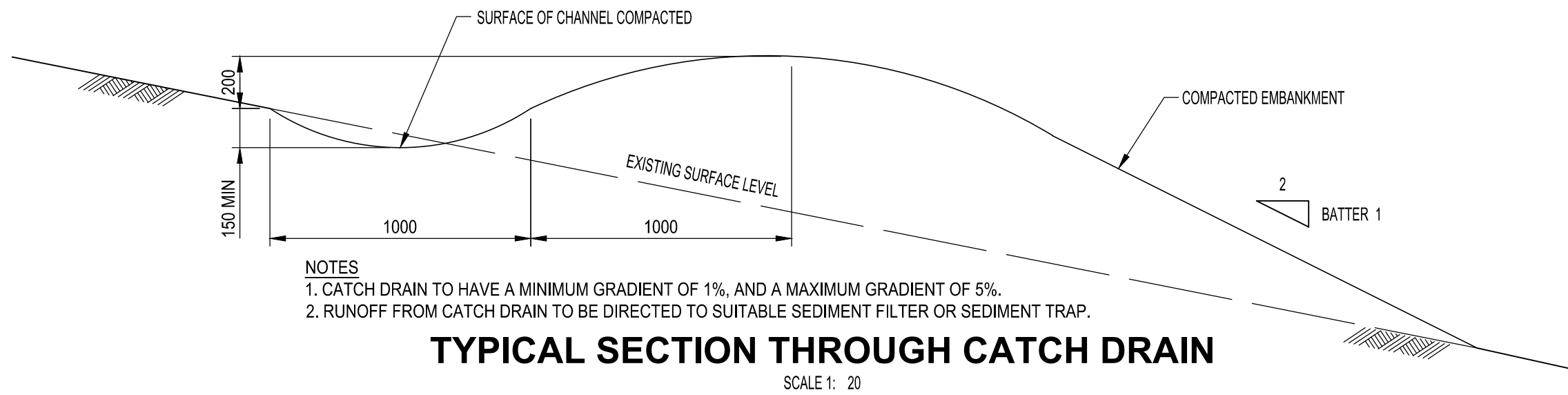
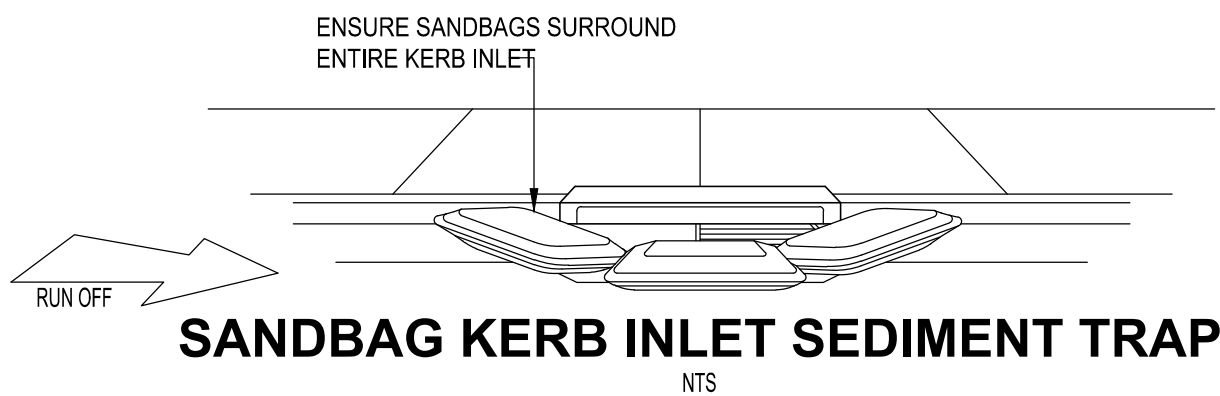
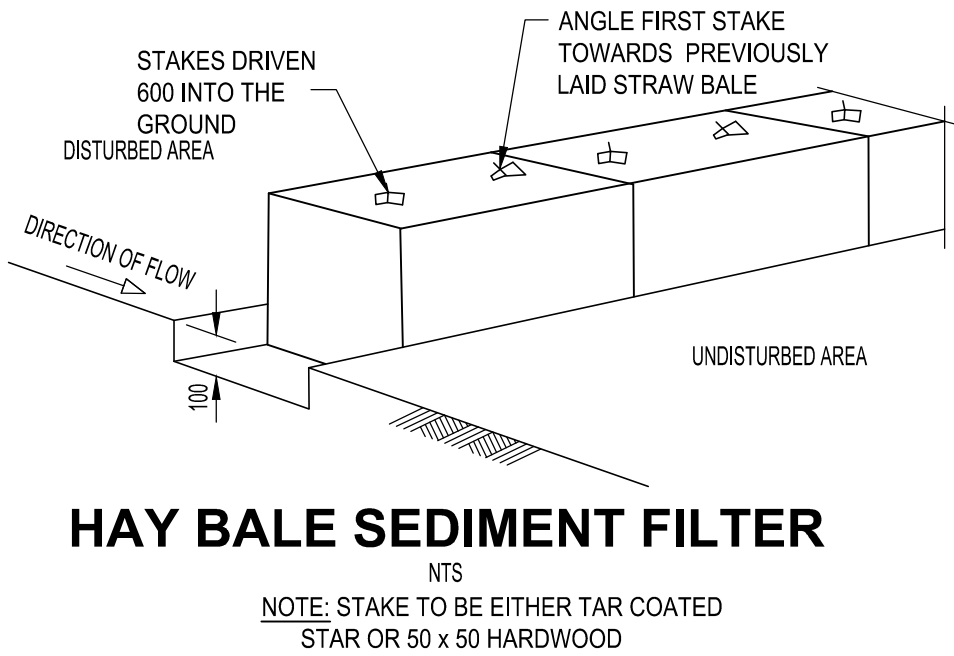
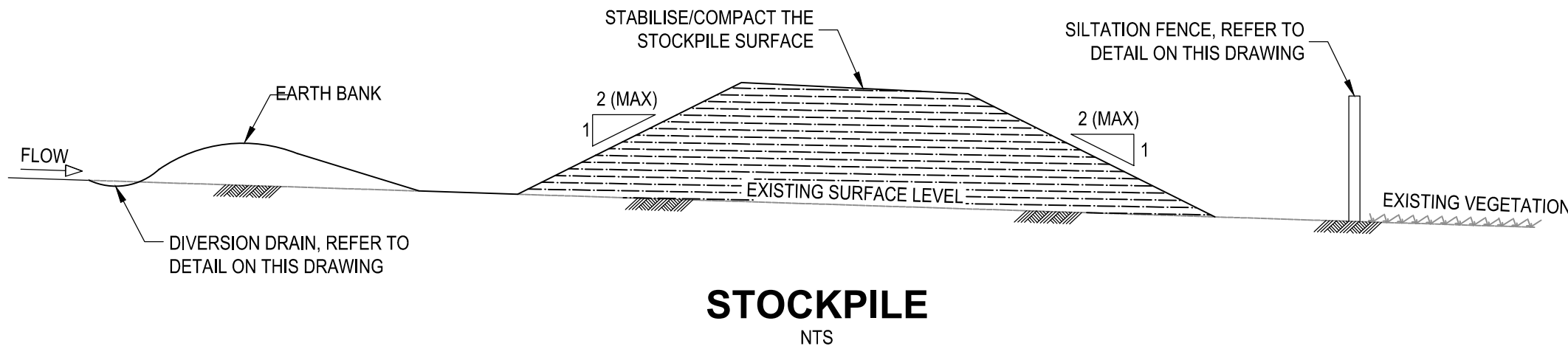
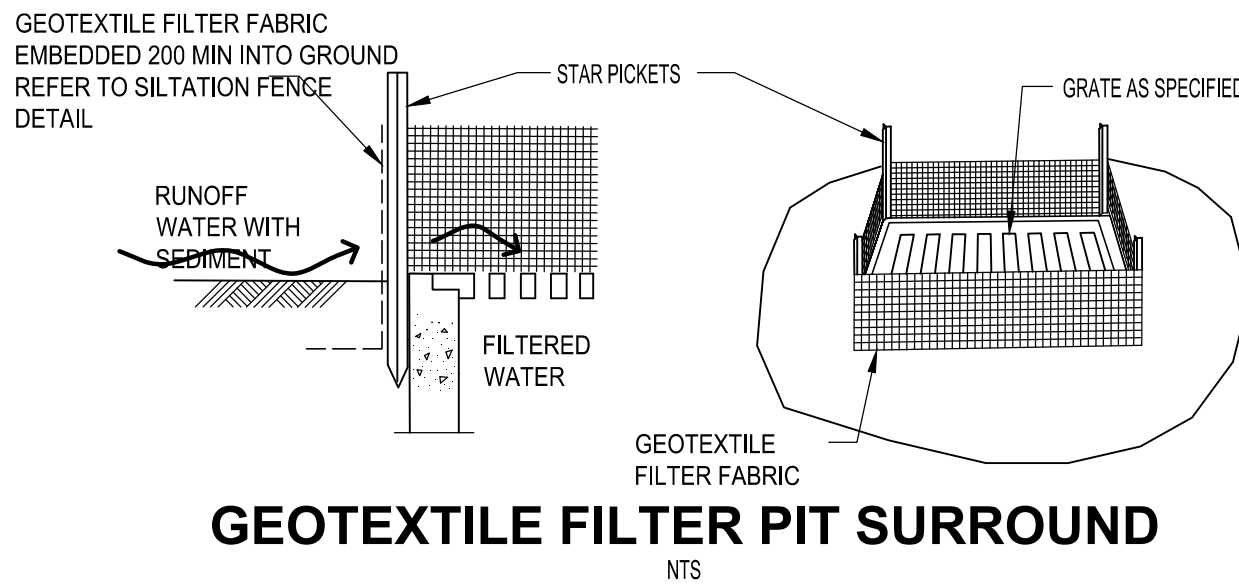
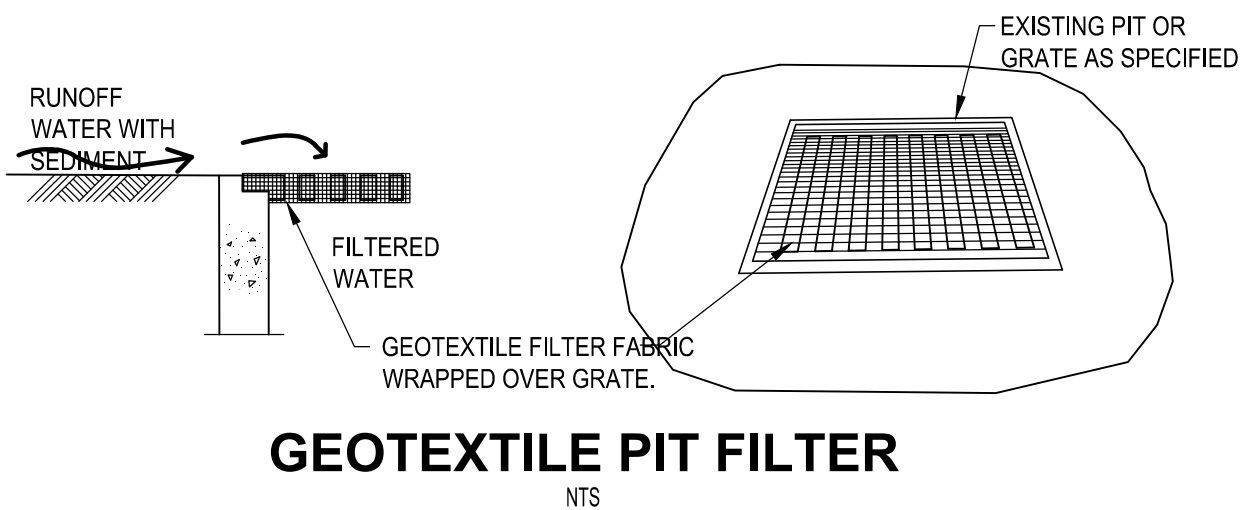
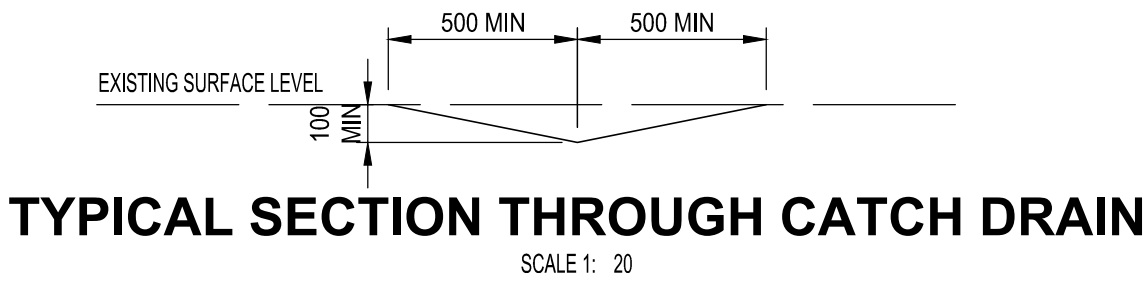
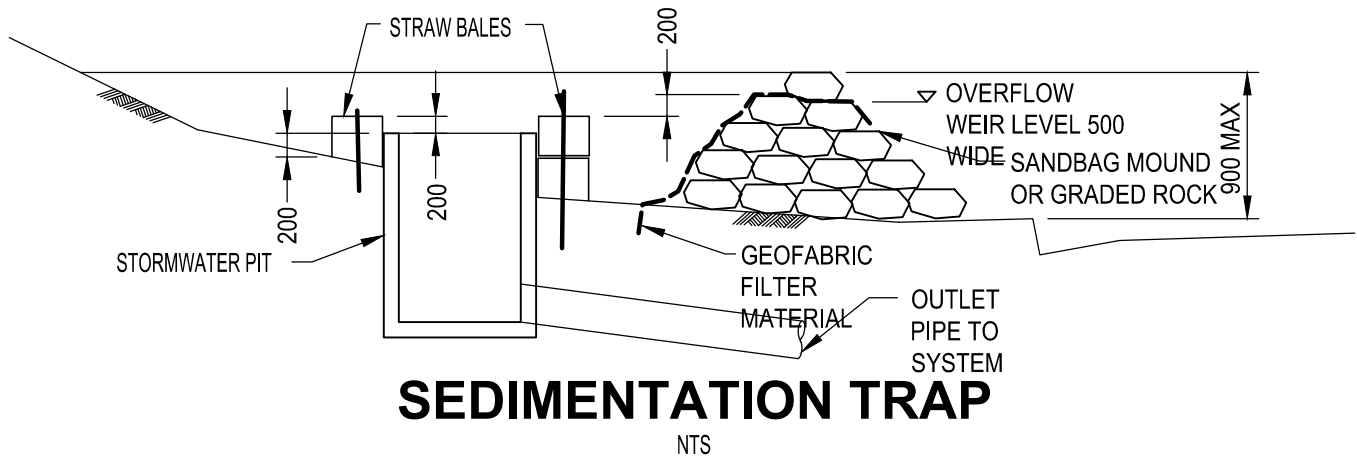
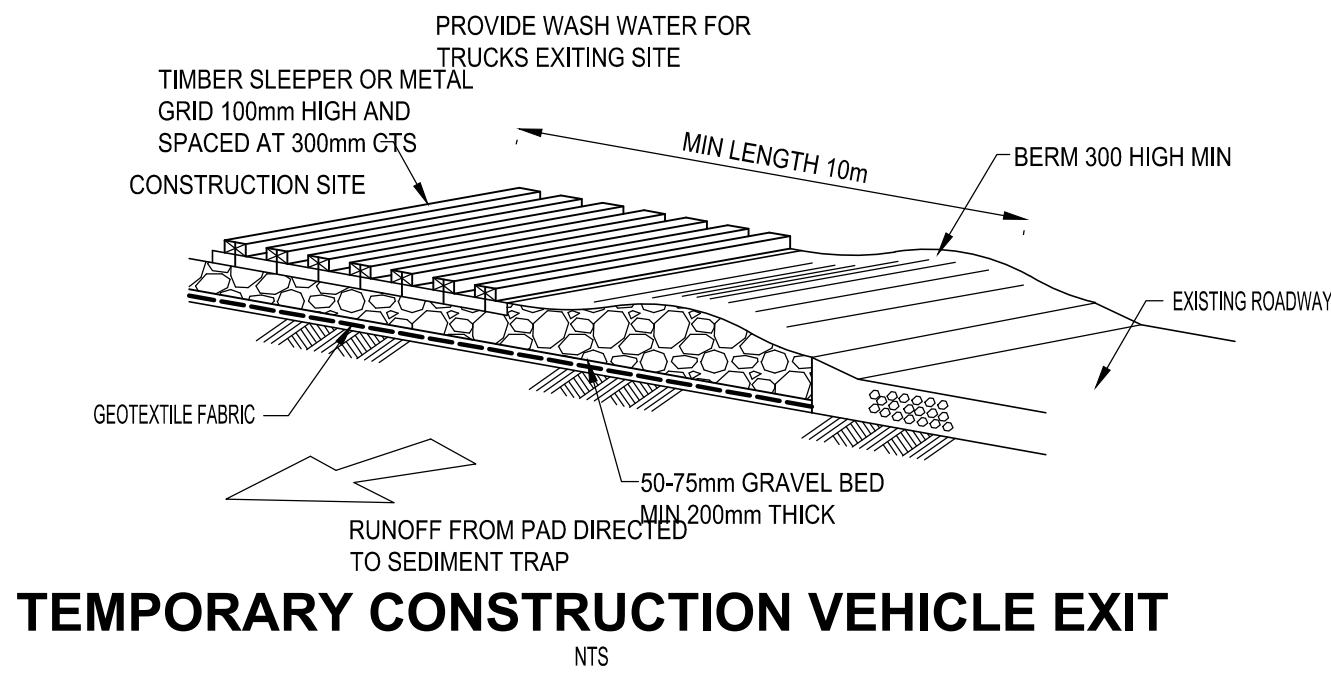
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DRAWING No

MAR-CV-11

REVISION

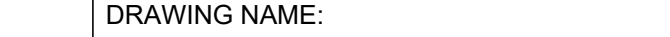
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FILENAME: \\na\d\stl\work\p0221727\dwg\0448 MAR-CV-20.dwg - USER: agphr - Plot File Created: Aug 18, 2023 - 2:46pm

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FOR INFORMATION ONLY

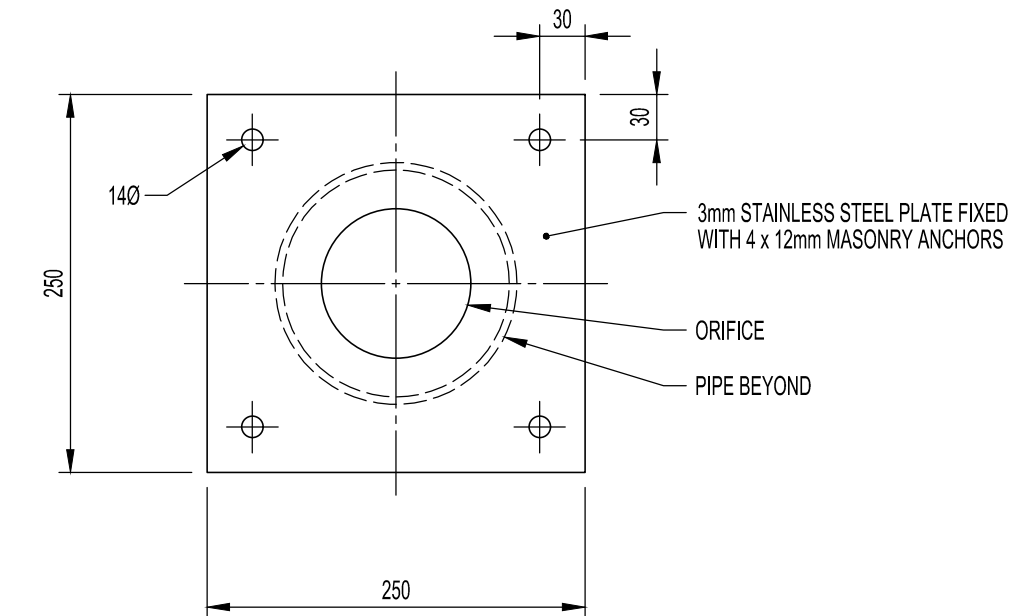
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TTW Structural Civil Traffic Façade
612 9439 7288 | Level 6, 73 Miller Street, North Sydney, NSW 2060

PENNANT HILLS ROAD,
NORTH PARRAMATTA NSW 2151

FILENAME: \\ttw\dfs\tt\cadd\jobs\22\221272\civil\CAAB\ MAR-CV-30.dwg - USER: aprilv - Plot File Created: Aug 18, 2023 - 4:30pm



Technical drawing of a 3D welded mesh box. The drawing shows a perspective view of the box with dimensions: 100 (height), 600 (width), and 800 (depth). The material is specified as WELDLOK A40/203, HOT DIPPED GALVANISED OR EQUIVALENT. An orifice plate is shown installed in the top face, with a label pointing to it: ORIFICE PLATE BEYOND REFER DETAIL.

Technical drawing showing a square plate with dimensions and labels:

- Dimensions:**
 - Total width: 250
 - Total height: 250
 - Distance from top edge to center: 140
 - Distance from right edge to center: 30
 - Radius of central circle: 80
- Labels:**
 - 3mm STAINLESS STEEL PLATE FIXED WITH 4 x 12mm MASONRY ANCHORS
 - ORIFICE
 - PIPE BEYOND

WELDLOK A40/203
HOT DIPPED GALVANISED OR
EQUIVALENT

ORIFICE PLATE BEYOND
REFER DETAIL

100

600

600

800

PIT IN CONCRETE PAVEMENT REFER DETAIL D
 PIT IN FLEXIBLE PAVEMENT REFER DETAIL E
 LANDSCAPE AREAS REFER DETAIL F

REMOVABLE TRIANGULAR TRASH SCREEN
 HOT DIPPED GALVANISED LYSAGHT
 MAXIMESH TYPE RH3030 WITH HANDLE

HIGH EARLY DISCHARGE WEIR

450

20 MIN.

150mm Ø NON-RETURN
 PVC FLAP VALVE

1% FALL MIN

DETENTION TANK
 VOLUME PROVIDED = 282 m³

PIT IN CONCRETE PAVEMENT REFER DETAIL D
 PIT IN FLEXIBLE PAVEMENT REFER DETAIL E
 LANDSCAPE AREAS REFER DETAIL F

PAVEMENT AS SPECIFIED

REFER ORIFICE PLATE DETAIL
 FOR PLATE SIZES AND DIMENSIONS

2 x 90mm Ø RELIEF DRAIN WITH GRAVEL SURROUND
 WRAPPED IN GEOTEXTILE FABRIC.

WATER PROOF MEMBRANE

125
 200

TANK ACCESS GRATE REFER
 SCHEDULE FOR SIZES

RECESS TO SUIT
 FRAME OR COVER

PIT IN CONCRETE REFER
 DETAIL D TYPICAL

PVC PIPE
 DISCHARGE LINE

FOR INFORMATION ONLY

										ARCHITECT:										ENGINEER:										PROJECT:										DRAWING NAME:										SCALE : A1										DRAWN BY										AUTHORISED BY									
										BVN										TTW										THE KING'S SCHOOL - MASTERPLAN										OSD TANK DETAILS										AS SHOWN										LA										NB									
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Appendix B

Council Correspondences

From: Jema Lopez
Sent: Thursday, 12 October 2023 9:53 AM
To: Shafi Joyia; PCC Council; Md Hoque; Greg Gavel; Paul Clark
Subject: RE: The King's School - OSD requirements TTW_221272

Good day Shafi,

Thank you for your email.

We will follow the general rule as indicated below regarding OSD and WSUD for all sites.

Best regards,
Jema

From: Shafi Joyia <SJoyia@cityofparramatta.nsw.gov.au>
Sent: Wednesday, October 11, 2023 10:05 AM
To: Jema Lopez <jema.lopez@ttw.com.au>; PCC Council <council@cityofparramatta.nsw.gov.au>; Md Hoque <AHoque@cityofparramatta.nsw.gov.au>; Greg Gavel <GGavel@cityofparramatta.nsw.gov.au>; Paul Clark <PClark@cityofparramatta.nsw.gov.au>
Subject: RE: The King's School - OSD requirements TTW_221272

[External Email]: Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hi Jemma,

We had held PL meeting in the past and provided advice on where OSD tanks will or will not be required. But general rule is where the development is within the flow path, located close to the creek and down in the catchment we don't as for OSD. But where its located higher up in the catchment, not affected by flooding we require OSD as per the UPRCT guidelines . In terms of WSUD it is required for all developments within Kings School.

Kind regards

Shafi Joyia | Development Engineer

City of Parramatta

PO Box 32, Parramatta NSW 2124

☎ (02) 9806 5365

✉ sjoyia@cityofparramatta.nsw.gov.au

Links | www.cityofparramatta.nsw.gov.au/development/development-application-da/application-requirements



**CITY OF
PARRAMATTA**

From: Jema Lopez <jema.lopez@ttw.com.au>
Sent: Wednesday, 11 October 2023 8:47 AM

To: PCC Council <council@cityofparramatta.nsw.gov.au>; Md Hoque <AHoque@cityofparramatta.nsw.gov.au>; Shafi Joyia <SJoyia@cityofparramatta.nsw.gov.au>; Greg Gavel <GGavel@cityofparramatta.nsw.gov.au>; Paul Clark <PClark@cityofparramatta.nsw.gov.au>
Subject: RE: The King's School - OSD requirements TTW_221272

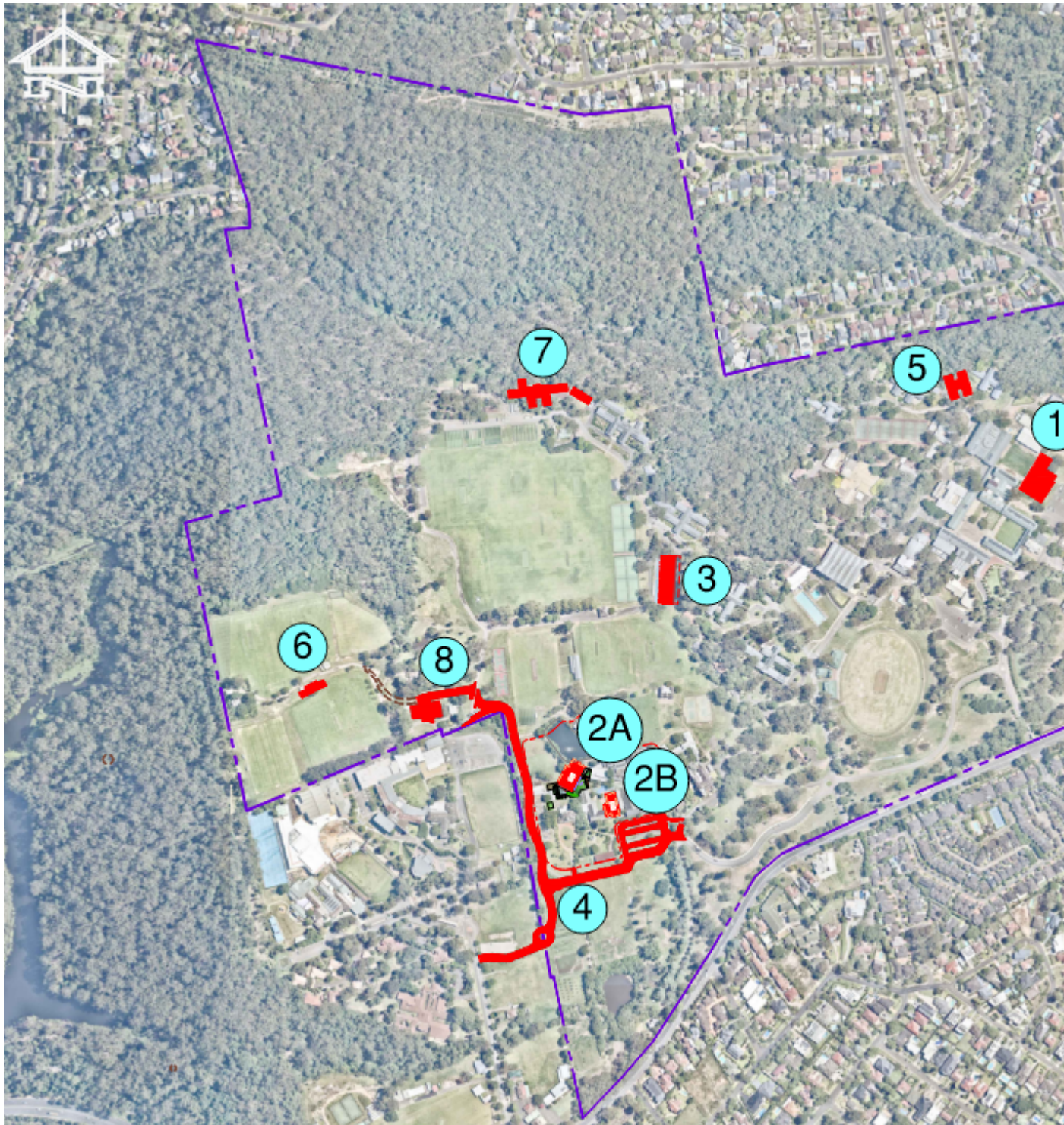
***[EXTERNAL EMAIL] Stop and think before opening attachments, clicking on links or responding.

Good day Council,

I hope everyone has been well.

I would like to make an inquiry regarding the stormwater requirements for proposed works within The King's School, North Parramatta. Please see below aerial view where the red area shows the proposed works. I understand that sites 1, 2A and 2B have been queried in the below email trail. However, could you please confirm whether on-site detention will be required for sites 3-8, noting that sites 3,5-7 are proposed buildings and sites 4 and 8 are road works (bus car parking, widening etc.)? And, if so, that these are to be sized according to the UPRCT OSD calculation spreadsheet?

In regards to water quality, the proposed development will utilise water quality treatment measures to treat the stormwater runoff from the site. This will include utilisation of the existing dams, rainwater reuse tanks, swales and proprietary water quality treatment devices. Could you please confirm that these are all acceptable for these developments?



Thank you and regards,



Jema Lopez | Civil Engineer

+61 426 053 329 | +61 2 9067 5017 | jema.lopez@ttw.com.au

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From: Shafi Joyia <SJoyia@cityofparramatta.nsw.gov.au>
Sent: Friday, July 21, 2023 12:48 PM
To: Stephen Fok <stephen.fok@ttw.com.au>
Cc: Greg Gavel <GGavel@cityofparramatta.nsw.gov.au>; Paul Clark <PClark@cityofparramatta.nsw.gov.au>
Subject: FW: The King's School - OSD requirements TTW_221272

You don't often get email from sjoyia@cityofparramatta.nsw.gov.au. [Learn why this is important](#)

[External Email]: Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hi Stephen,

As discussed over the phone, I suggest you engage in a pre-lodgement meeting with Council regarding the proposed development so Council engineers can give you detailed advice after a preliminary investigation. Depending on the site hydrological assessment Council will then be able to provide clear advice regarding the requirement for OSD. Please advise Council via a pre-lodgement meeting once you have done a detailed analysis of the hydrological aspects.

Kind regards

Shafi Joyia | Development Engineer

City of Parramatta

PO Box 32, Parramatta NSW 2124

☎ (02) 9806 5365

✉ sjoyia@cityofparramatta.nsw.gov.au

Links | www.cityofparramatta.nsw.gov.au/development/development-application-da/application-requirements



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From: Greg Gavel <GGavel@cityofparramatta.nsw.gov.au>
Sent: Thursday, 20 July 2023 2:43 PM
To: Shafi Joyia <SJoyia@cityofparramatta.nsw.gov.au>
Subject: FW: The King's School - OSD requirements TTW_221272

Shafi,

Can you please have a read of the email trail below and respond to Stephen Fok....this afternoon.
Thanks

I know you've had previous involvement with Kings School.....you're the best person.

Regards,

Greg Gavel

Team Leader Engineering Assessment
Technical Specialists | Development Services

Phone: 02 9806 5600

Email: ggavel@cityofparramatta.nsw.gov.au

City of Parramatta

126 Church Street, Parramatta NSW 2150

PO Box 32, Parramatta, NSW 2124

cityofparramatta.nsw.gov.au



From: Stephen Fok <stephen.fok@ttw.com.au>

Sent: Thursday, 20 July 2023 2:35 PM

To: Greg Gavel <GGavel@cityofparramatta.nsw.gov.au>

Cc: PCC Council <council@cityofparramatta.nsw.gov.au>

Subject: RE: The King's School - OSD requirements TTW_221272

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Hi Greg,

Could you please provide the advice as requested? Let me know if you need more information. Happy to discuss this over the phone if preferred, my number is 8437 7239.

Regards,

Stephen



Stephen Fok | Senior Civil Engineer

+61 2 9439 7288 | | stephen.fok@ttw.com.au

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From: Stephen Fok

Sent: Wednesday, July 12, 2023 5:00 PM

To: Greg Gavel <GGavel@cityofparramatta.nsw.gov.au>

Cc: PCC Council <council@cityofparramatta.nsw.gov.au>

Subject: RE: The King's School - OSD requirements TTW_221272

Hi Greg,

Following up on the below query. Appreciating if you could provide your advice.

Regards,
Stephen

From: Stephen Fok

Sent: Thursday, July 6, 2023 9:39 AM

To: Greg Gavel <GGavel@cityofparramatta.nsw.gov.au>

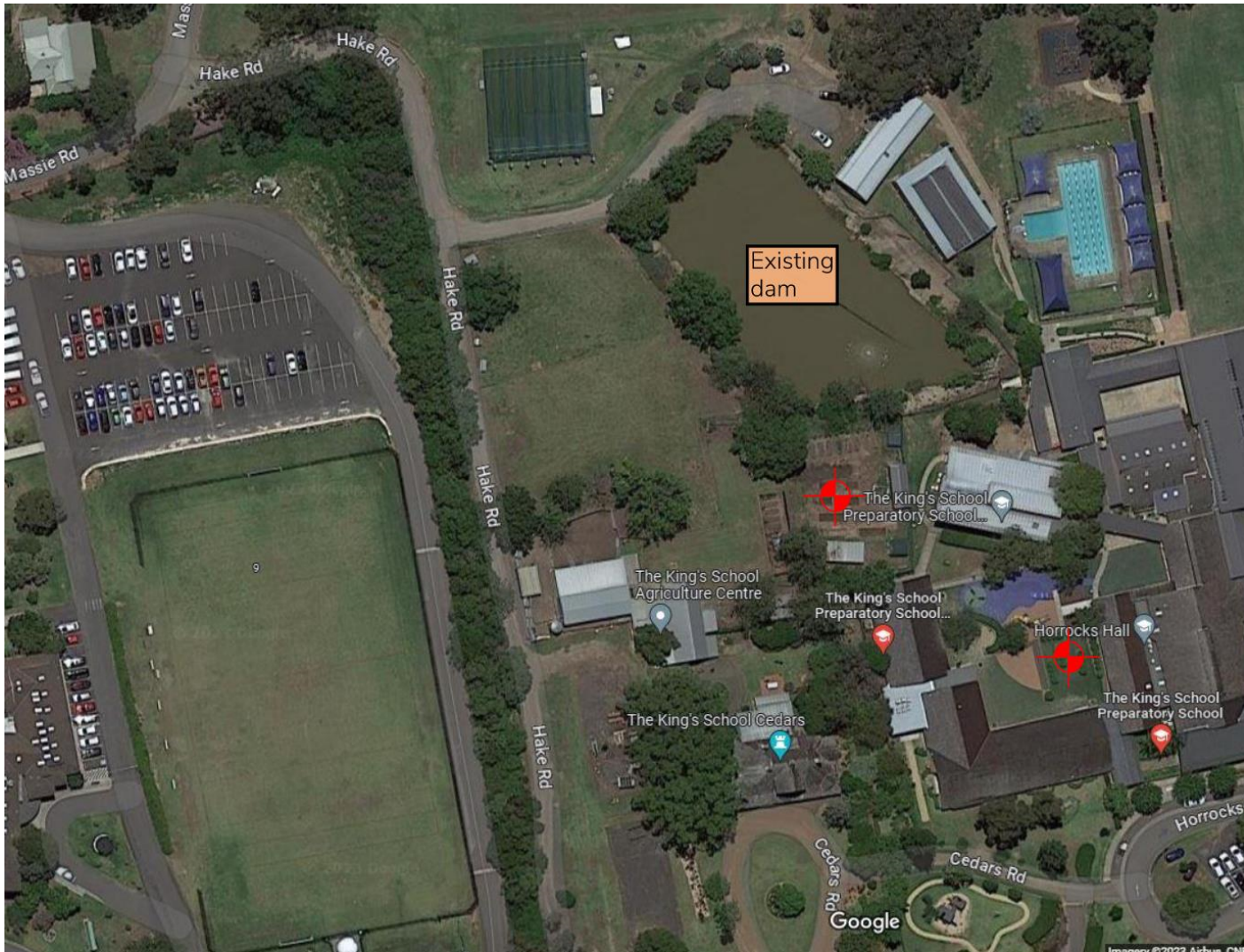
Cc: PCC Council <council@cityofparramatta.nsw.gov.au>

Subject: RE: The King's School - OSD requirements TTW_221272

Hi Greg,

I'm hoping to get some more specific advice to another site we are looking at within The King's School Preparatory School – see below Google Maps and two crosshairs marked. We are proposing two new buildings in these locations which would drain by inground pipe to the existing dam to the north. We are not proposing to provide OSD given its proximity to the dam. Could you please confirm if this approach is ok?

Also, I understand with Site B previously discussed, Council requested inclusion of a bioretention basin. Would the same approach be required for these two sites or proprietary water quality treatment measures ok?



Appreciating your advice.

Regards,
Stephen

From: Greg Gavel <GGavel@cityofparramatta.nsw.gov.au>
Sent: Tuesday, June 27, 2023 2:31 PM
To: Stephen Fok <stephen.fok@ttw.com.au>
Cc: Md Hoque <AHoque@cityofparramatta.nsw.gov.au>
Subject: RE: The King's School - OSD requirements TTW_221272

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Afternoon Stephen,

Apologies for the delay in getting back to you.

Any development that increases impervious area generally requires a stormwater system and again generally an on-site detention system. However the OSD proposed for site 'B' was located in a flow

path and was considered impractical. On this occasion an eco retention system was considered more practical.

Similarly for site 'A' an OSD system would be required to address any addition hard surface/impervious areas unless it is demonstrated that it could not achieve its design outcomes whereupon an alternate system may be a consideration.

Regards,

Greg Gavel

Team Leader Engineering Assessment
Technical Specialists | Development Services
Phone: 02 9806 5600

Email: ggavel@cityofparramatta.nsw.gov.au
City of Parramatta

126 Church Street, Parramatta NSW 2150
PO Box 32, Parramatta, NSW 2124
cityofparramatta.nsw.gov.au



From: Stephen Fok <stephen.fok@ttw.com.au>
Sent: Tuesday, 27 June 2023 12:36 PM
To: Greg Gavel <GGavel@cityofparramatta.nsw.gov.au>
Cc: Md Hoque <AHoque@cityofparramatta.nsw.gov.au>; PCC Council
<council@cityofparramatta.nsw.gov.au>
Subject: RE: The King's School - OSD requirements TTW_221272

***[EXTERNAL EMAIL] Stop and think before opening attachments, clicking on links or responding.

Hi Greg,

Just following up on the below. Let me know if you need more information in order to advise on the OSD requirements.

Regards,
Stephen



Stephen Fok | Senior Civil Engineer

+61 2 9439 7288 | | stephen.fok@ttw.com.au

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From: Stephen Fok
Sent: Thursday, June 22, 2023 11:01 AM
To: Greg Gavel <GGavel@cityofparramatta.nsw.gov.au>
Cc: Md Hoque <AHoque@cityofparramatta.nsw.gov.au>
Subject: RE: The King's School - OSD requirements TTW_221272

Thanks Aziz,

Greg, appreciating if you could advise. Let me know if you need more information.

Regards,
Stephen

From: Md Hoque <AHoque@cityofparramatta.nsw.gov.au>
Sent: Thursday, June 22, 2023 10:55 AM
To: Stephen Fok <stephen.fok@ttw.com.au>
Cc: Greg Gavel <GGavel@cityofparramatta.nsw.gov.au>
Subject: RE: The King's School - OSD requirements TTW_221272

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Hi Stephen,
Please contact with Council's Development Service Section to get the requirements of OSD in the proposed development location. Please contact with Greg Gavel of Council's Development Team.

Regards

Aziz Hoque | Catchment Management Engineer
City of Parramatta
PO Box 32, Parramatta NSW 2124
☎ (02) 9806 8253 ✉ ahoque@cityofparramatta.nsw.gov.au
Links | www.cityofparramatta.nsw.gov.au



**CITY OF
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From: Stephen Fok <stephen.fok@ttw.com.au>
Sent: Thursday, 22 June 2023 10:29 AM
To: Md Hoque <AHoque@cityofparramatta.nsw.gov.au>
Cc: PCC Council <council@cityofparramatta.nsw.gov.au>
Subject: RE: The King's School - OSD requirements TTW_221272

***[EXTERNAL EMAIL] Stop and think before opening attachments, clicking on links or responding.

Hi Aziz,

Hope you've been well.

I'm following up on a query by my colleague quite a while ago for a development site within the King's School in North Parramatta. I just wanted to confirm whether OSD is required as I understand another site within the school is exempt from providing OSD. The location I refer to is Site A in the below image and I understand Site B was exempt from providing OSD. Let me know if you need more information.



Site

Masons Dr

The King's
School, School
Grounds

Ryrie Rd

Ryrie Rd

stone Rd

Regards,
Stephen



Stephen Fok | Senior Civil Engineer

+61 2 9439 7288 | | stephen.fok@ttw.com.au

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From: William Bever <william.bever@ttw.com.au>
Sent: Wednesday, November 2, 2022 3:17 PM
To: Aziz Hoque <AHoque@cityofparramatta.nsw.gov.au>
Cc: Stephen Fok <stephen.fok@ttw.com.au>
Subject: RE: The King's School - Bioretention

Hi Aziz,

Just following up on the below.

Thanks,
Will

From: William Bever
Sent: Tuesday, 1 November 2022 10:19 AM
To: Aziz Hoque <AHoque@cityofparramatta.nsw.gov.au>
Cc: Stephen Fok <stephen.fok@ttw.com.au>
Subject: RE: The King's School - Bioretention

Hi Aziz,

It is intended to be a permanent OSD/bioretention basin and will be fenced-off within the school.

Thanks,
Will

From: Aziz Hoque <AHoque@cityofparramatta.nsw.gov.au>
Sent: Tuesday, 1 November 2022 10:17 AM
To: William Bever <william.bever@ttw.com.au>
Cc: Stephen Fok <stephen.fok@ttw.com.au>
Subject: RE: The King's School - Bioretention

[External Email]: Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hi William,

Please confirm whether in future any use of the OSD and bio retention area or just use as a garden.

Regards

Aziz Hoque | Catchment Management Engineer

City of Parramatta

PO Box 32, Parramatta NSW 2124

☎ (02) 9806 8253 ✉ ahoque@cityofparramatta.nsw.gov.au

Links | www.cityofparramatta.nsw.gov.au



**CITY OF
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From: William Bever <william.bever@ttw.com.au>

Sent: Monday, 31 October 2022 2:16 PM

To: Aziz Hoque <AHoque@cityofparramatta.nsw.gov.au>

Cc: Stephen Fok <stephen.fok@ttw.com.au>

Subject: The King's School - Bioretention

***[EXTERNAL EMAIL] Stop and think before opening attachments, clicking on links or responding.

Hi Aziz,

I hope you've been well.

We are looking at designing a combined OSD and bioretention basin at The King's School.

What are Council's conditions for allowing ponding depths greater than 0.3m?

Thanks,
Will

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Appendix C

OSD Calculation Sheet

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

Project:	The King's School Master Plan: STM			
Site Address	The King's Master Plan, North Parramatta, NSW 2151			
Job No:	221272 CAAB			
Designer:	JL			
Telephone:	(02) 9439 7288			
Site Data				
OSD Area:	Upper Parramatta River Catchment			
L.G.A	Parramatta City Council			
Site Area	0.3411 ha	3,411 m ²		
Total Roof Area	0.2039 ha	2,039 m ²		
Area of Site draining to OSD Storage	0.3411 ha	3,411 m ²	Satisfactory	
Residual Site Area (Lot Area - Roof Area)	0.137 ha			
Area Bypassing Storage	0 ha			
Area Bypassing / Residual Site Area	0.02	Satisfactory		30% Max
No. of Dwellings on Site	1	Satisfactory		
Site Area per Dwelling	0.341 ha			
Roof Area per Dwelling	0.204 ha			
Basic OSD Parameters				
xtended Detention				
Basic SSR Vols	Ext Detention Storage	300 m ³ /ha	Total Storage	455 m ³ /ha
Basic SRDs	Primary Outlet	40 Ltr/ha	Secondary Outlet	150 Ltr/ha
OSD Tank Bypass				
Residual Lot Capture in OSD Tank	100%			
Adjusted SRDs	40 Ltr/ha		150 Ltr/ha	
OSD Calculations				
xtended Detention				
Basic SSR Volume	Ext Detention Storage	102.33 m ³	Total Storage	155.20 m ³
Total Rainwater Tank Credits		0.07 m ³		0.07 m ³
Storage Volume			Total	155.13 m ³
Storage Volume	Ext Detention Storage	102.26 m ³	Flood Detention Storage	52.87 m ³
OSD Discharges	Primary Outlet	13.64 Ltr	Secondary Outlet	51.17 Ltr

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

Project:	The King's School Master Plan: STF			
Site Address	The King's Master Plan, North Parramatta, NSW 2151			
Job No:	221272 CAAB			
Designer:	JL			
Telephone:	(02) 9439 7288			
Site Data				
OSD Area:	Upper Parramatta River Catchment			
L.G.A	Parramatta City Council			
Site Area	0.2575 ha	2,575 m ²		
Total Roof Area	0.1374 ha	1,374 m ²		
Area of Site draining to OSD Storage	0.254 ha	2,540 m ²	Satisfactory	
Residual Site Area (Lot Area - Roof Area)	0.120 ha			
Area Bypassing Storage	0.0035 ha			
Area Bypassing / Residual Site Area	2.92	Satisfactory		30% Max
No. of Dwellings on Site	1	Satisfactory		
Site Area per Dwelling	0.258 ha			
Roof Area per Dwelling	0.137 ha			
Basic OSD Parameters				
Extended Detention				
Basic SSR Vols	Ext Detention Storage	300 m ³ /ha		
Basic SRDs	Primary Outlet	40 Ltr/ha		
Detention				
	Total Storage	455 m ³ /ha		
	Secondary Outlet	150 Ltr/ha		
OSD Tank Bypass				
Residual Lot Capture in OSD Tank	97%			
Adjusted SRDs	39 Ltr/ha		144 Ltr/ha	
OSD Calculations				
Extended Detention				
Basic SSR Volume	Ext Detention Storage	77.25 m ³		
Total Rainwater Tank Credits		0.14 m ³		
Storage Volume				
Storage Volume	Ext Detention Storage	77.11 m ³		
OSD Discharges	Primary Outlet	10.07 Ltr		
Detention				
	Total Storage	117.16 m ³		
		0.15 m ³		
	Total	117.01 m ³		
	Flood Detention Storage	39.90 m ³		
	Secondary Outlet	37.12 Ltr		

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

Project:	The King's School Master Plan: ROD			
Site Address	The King's Master Plan, North Parramatta, NSW 2151			
Job No:	221272 CAAB			
Designer:	JL			
Telephone:	(02) 9439 7288			
Site Data				
OSD Area:	Upper Parramatta River Catchment			
L.G.A.	Parramatta City Council			
Site Area	0.6189 ha	6,189 m ²		
Total Roof Area	0 ha	0 m ²		
Area of Site draining to OSD Storage	0.4644 ha	4,644 m ²	Satisfactory	
Residual Site Area (Lot Area - Roof Area)	0.619 ha			
Area Bypassing Storage	0.1545 ha			
Area Bypassing / Residual Site Area	25.0%	Satisfactory		30% Max
No. of Dwellings on Site	1	Satisfactory		
Site Area per Dwelling	0.619 ha			
Roof Area per Dwelling	0.000 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 Ltr/ha	Secondary Outlet	150 Ltr/ha
OSD Tank Bypass				
Residual Lot Capture in OSD Tank	75%			
Adjusted SRDs	33 Ltr/ha		100 Ltr/ha	
OSD Calculations				
	Extended Detention		Detention	
Basic SSR Volume	Ext Detention Storage	185.67 m ³	Total Storage	281.60 m ³
Total Rainwater Tank Credits		#DIV/0! m ³		#DIV/0! m ³
Storage Volume			Total	#DIV/0! m ³
Storage Volume	Ext Detention Storage	#DIV/0! m ³	Flood Detention Storage	#DIV/0! m ³
OSD Discharges	Primary Outlet	20.12 Ltr	Secondary Outlet	61.94 Ltr

Note: The error in total rainwater tank credits and extended detention storage is due to the total roof area being zero, since the proposed works for this site are road and car park only.

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

Project:	The King's School Master Plan: DBH			
Site Address	The King's Master Plan, North Parramatta, NSW 2151			
Job No:	221272 CAAB			
Designer:	JL			
Telephone:	(02) 9439 7288			
Site Data				
OSD Area:	Upper Parramatta River Catchment			
L.G.A	Parramatta City Council			
Site Area	0.12	ha	1,200	m ²
Total Roof Area	0.0316	ha	316	m ²
Area of Site draining to OSD Storage	0.1126	ha	1,126	m ²
Residual Site Area (Lot Area - Roof Area)	0.028	ha	Satisfactory	
Area Bypassing Storage	0.0074	ha		
Area Bypassing / Residual Site Area	26.1%		Satisfactory 30% Max	
No. of Dwellings on Site	1			
Site Area per Dwelling	0.120	ha	Satisfactory	
Roof Area per Dwelling	0.032	ha		
Basic OSD Parameters				
xtended Detention				
Basic SSR Vols	Ext Detention Storage	300	m ³ /ha	
		455	m ³ /ha	
Basic SRDs	Primary Outlet	40	Ltr/ha	
		150	Ltr/ha	
Detention				
OSD Tank Bypass				
Residual Lot Capture in OSD Tank	74%			
Adjusted SRDs	32	Ltr/ha	98	Ltr/ha
OSD Calculations				
xtended Detention				
Basic SSR Volume	Ext Detention Storage	36.00	m ³	
		54.60	m ³	
Total Rainwater Tank Credits	0.18	m ³		
Storage Volume			54.39	m ³
Storage Volume	Ext Detention Storage	35.82	m ³	
		18.58	m ³	
OSD Discharges	Primary Outlet	3.86	Ltr	
		11.75	Ltr	
Detention				

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

Project:	The King's School Master Plan: PYA			
Site Address	The King's Master Plan, North Parramatta, NSW 2151			
Job No:	221272 CAAB			
Designer:	JL			
Telephone:	(02) 9439 7288			
Site Data				
OSD Area:	Upper Parramatta River Catchment			
L.G.A	Parramatta City Council			
Site Area	0.0586 ha	586 m ²		
Total Roof Area	0.0569 ha	569 m ²		
Area of Site draining to OSD Storage	0.0586 ha	586 m ²	Satisfactory	
Residual Site Area (Lot Area - Roof Area)	0.002 ha			
Area Bypassing Storage	0 ha			
Area Bypassing / Residual Site Area	0.0%	Satisfactory		30% Max
No. of Dwellings on Site	1	Satisfactory		
Site Area per Dwelling	0.059 ha			
Roof Area per Dwelling	0.057 ha			
Basic OSD Parameters				
	xtended Detentio		Detention	
Basic SSR Vols	Ext Detention Storage	300 m ³ /ha	Total Storage	455 m ³ /ha
Basic SRDs	Primary Outlet	40 Ltr/ha	Secondary Outlet	150 Ltr/ha
OSD Tank Bypass				
Residual Lot Capture in OSD Tank	100%			
Adjusted SRDs	40 Ltr/ha		150 Ltr/ha	
OSD Calculations				
	xtended Detentio		Detention	
Basic SSR Volume	Ext Detention Storage	17.58 m ³	Total Storage	26.66 m ³
Total Rainwater Tank Credits		0.30 m ³		0.36 m ³
Storage Volume			Total	26.31 m ³
Storage Volume	Ext Detention Storage	17.28 m ³	Flood Detention Storage	9.03 m ³
OSD Discharges	Primary Outlet	2.34 Ltr	Secondary Outlet	8.79 Ltr

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

Project:	The King's School Master Plan: BRD			
Site Address	The King's Master Plan, North Parramatta, NSW 2151			
Job No:	221272 CAAB			
Designer:	JL			
Telephone:	(02) 9439 7288			
Site Data				
OSD Area:	Upper Parramatta River Catchment			
L.G.A	Parramatta City Council			
Site Area	0.2528 ha	2,528 m ²		
Total Roof Area	0.1811 ha	1,811 m ²		
Area of Site draining to OSD Storage	0.2315 ha	2,315 m ²		Satisfactory
Residual Site Area (Lot Area - Roof Area)	0.072 ha			
Area Bypassing Storage	0.0213 ha			
Area Bypassing / Residual Site Area	29.7%			Satisfactory 30% Max
No. of Dwellings on Site	1			Satisfactory
Site Area per Dwelling	0.253 ha			
Roof Area per Dwelling	0.181 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 Ltr/ha	Secondary Outlet	150 Ltr/ha
OSD Tank Bypass				
Residual Lot Capture in OSD Tank	70%			
Adjusted SRDs	31 Ltr/ha		91 Ltr/ha	
OSD Calculations				
	Extended Detention		Detention	
Basic SSR Volume	Ext Detention Storage	75.84 m ³	Total Storage	115.02 m ³
Total Rainwater Tank Credits		0.07 m ³		0.07 m ³
Storage Volume			Total	114.95 m ³
Storage Volume	Ext Detention Storage	75.77 m ³	Flood Detention Storage	39.18 m ³
OSD Discharges	Primary Outlet	7.86 Ltr	Secondary Outlet	22.90 Ltr

Appendix D

Services Consultant Correspondence

From: Malcolm Taylor <malcolm.taylor@tsamgt.com>
Sent: Friday, 20 October 2023 12:42 PM
To: Jema Lopez; Lam, Chau; Underwood, Jarrad
Cc: Nemesio Biason Jr
Subject: RE: TTW_221272 The King's Masterplan: Existing Authority-Owned Services (Sydney Water and AARNet)

[External Email]: Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hi Jema,

The below is correct

Regards,

Malcolm Taylor
Assistant Project Manager



Level 15, 207 Kent Street, SYDNEY, NSW 2000
Land of the Gadigal people of the Eora nation
M:+61 400 951 961 / O:+61 2 9276 1400
malcolm.taylor@tsamgt.com / www.tsamgt.com

I acknowledge the Traditional Owners and Custodians of the lands on which I live and work and pay my respect to Elders past, present and future.

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From: Jema Lopez <jema.lopez@ttw.com.au>
Sent: Friday, October 20, 2023 12:01 PM
To: Lam, Chau <c.lam@ndy.com>; Underwood, Jarrad <J.Underwood@ndy.com>
Cc: Malcolm Taylor <malcolm.taylor@tsamgt.com>; Nemesio Biason Jr <Nemesio.BiasonJr@ttw.com.au>
Subject: RE: TTW_221272 The King's Masterplan: Existing Authority-Owned Services (Sydney Water and AARNet)

Good day Chau, Jarrad,

Thank you for taking the time to speak with me earlier. As discussed, NDY's report will cover information on consultation/approvals with relevant statutory authorities (where required) regarding works within the vicinity of existing services, as well as rainwater tank volume requirements for the sites. However, this will be detailed at a later stage and has been discussed with TSA.

We initially nominated rainwater tank sizes for the sites for modelling purposes; however, once confirmed with NDY, we will update our report and modelling to ensure that Council's stormwater quality criteria are still met.

Could you please confirm back in writing and let me know if I have missed anything or misinterpreted any of the above?

Thank you, and feel free to call me if you wish to discuss.

Best regards,
Jema

From: Jema Lopez <jema.lopez@ttw.com.au>
Sent: Thursday, October 12, 2023 3:48 PM
To: Lam, Chau <c.lam@ndy.com>
Cc: Malcolm Taylor <malcolm.taylor@tsamgt.com>; Nemesio Biason Jr <Nemesio.BiasonJr@ttw.com.au>; Underwood, Jarrad <J.Underwood@ndy.com>
Subject: RE: TTW_221272 The King's Masterplan: Existing Authority-Owned Services (Sydney Water and AARNet)

Thank you Chau.

Would you also be able to confirm the rainwater tank volumes for each of the site so that we can incorporate it on our report?

From NDY's report, it appears that only the Sports Pavilion was noted to have a proposed rainwater tank (2x 50kL).

Best regards,
Jema

From: Lam, Chau <c.lam@ndy.com>
Sent: Thursday, October 12, 2023 3:22 PM
To: Jema Lopez <jema.lopez@ttw.com.au>
Cc: Malcolm Taylor <malcolm.taylor@tsamgt.com>; Nemesio Biason Jr <Nemesio.BiasonJr@ttw.com.au>; Underwood, Jarrad <J.Underwood@ndy.com>
Subject: RE: TTW_221272 The King's Masterplan: Existing Authority-Owned Services (Sydney Water and AARNet)

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Hi Jemma,

Thanks for your email.

We will update our report to reflect these clashes. Will let you know if we need to coordinate this further.

Please let me know if there are any further questions.

Kind regards,

NDY
A TETRA TECH COMPANY

Chau Lam
Project Engineer

T +61 2 9928 6800 | M +61 410 126 413
E c.lam@ndy.com | [LinkedIn](#)

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From: Jema Lopez <jema.lopez@ttw.com.au>

Sent: Wednesday, October 11, 2023 4:45 PM

To: Lam, Chau <c.lam@ndy.com>

Cc: Malcolm Taylor <malcolm.taylor@tsamgt.com>; Nemesio Biason Jr <Nemesio.BiasonJr@ttw.com.au>

Subject: FW: TTW_221272 The King's Masterplan: Existing Authority-Owned Services (Sydney Water and AARNet)

You don't often get email from jema.lopez@ttw.com.au. [Learn why this is important](#)

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Hi Chau,

I hope you are well.

I just wanted to touch base if you have had the chance to speak with your project leader regarding our queries below?

Thank you and feel free to contact me if you wish to discuss.

Best regards,
Jema

From: Jema Lopez

Sent: Tuesday, October 10, 2023 3:21 PM

To: c.lam@ndy.com

Subject: RE: TTW_221272 The King's Masterplan: Existing Authority-Owned Services (Sydney Water and AARNet)

Additionally, from NDY's report dated 18 August 2023, it appears that only the Sports Pavilion includes a proposed rainwater tank (2x 50kL). Could you please also confirm the proposed rainwater tank volume for each of the remaining sites?

Thank you and regards,

From: Jema Lopez

Sent: Tuesday, October 10, 2023 3:13 PM

To: 'c.lam@ndy.com' <c.lam@ndy.com>

Subject: TTW_221272 The King's Masterplan: Existing Authority-Owned Services (Sydney Water and AARNet)

Hi Chau,

Thanks again for your time on the phone. As discussed, we have identified potential clashes with Sydney Water and AARNet's assets for the proposed new road.

I have attached our report for your reference and also a mark-up overlay of our plan and authorities' DBYD plans.

Best regards,



Jema Lopez | Civil Engineer

+61 426 053 329 | +61 2 9067 5017 | jema.lopez@ttw.com.au

TTW Engineers | Sydney

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Appendix E

Sydney Water Correspondence

From: NewCustomerConnections
<newcustomerconnections@sydneywater.com.au>
Sent: Friday, 20 October 2023 3:20 PM
To: Jema Lopez
Subject: FW: #E-4616321 - FW: Plumbing, building & developing - Ask a question
[E-Mail Ref:E-4616318]
Attachments: [pastedImage1](#)

You don't often get email from newcustomerconnections@sydneywater.com.au. [Learn why this is important](#)

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Good Afternoon,

You will need to submit an application on the Sydney Water Tap In Portal and apply for a building plan application.

Please include the stamped building plan documents to your application. It will be best to request the application based of the Lot/DP or alternatively the property number available on your Sydney Water Bill.

You can find more information on the Sydney Water Website regarding Building Plan Approvals. I do highly recommend also reading the Technical Guidelines on the bottom of the website (.pdf document - Essential references) regarding building over or adjacent to pipe assets

[Building plan approvals \(sydneywater.com.au\)](https://www.sydneywater.com.au/building-plan-approvals)

[Tap in \(sydneywater.com.au\)](https://www.sydneywater.com.au/tap-in)

Kind Regards,

Camila Stanley

Developer Consultant

City Growth & Development | Business Development Group

Sydney Water, 1 Smith Street, Parramatta NSW 2150

Customer Contact

Original Text

From: jema.lopez@ttw.com.au

To: customerservice@sydneywater.com.au

CC:

Sent: 10.10.23 15:50:26

Subject: Plumbing, building & developing - Ask a question

Details of the request from \${application}

=====

Request Type : Plumbing, building & developing - Ask a question

First Name: Jema

Last Name: Lopez

Phone: 0426053329

Account number or Payment number or Property address: \${accountNumber}

Email: jema.lopez@ttw.com.au

Comments : Good afternoon Sydney Water, I would like to inquire regarding the requirements for works over a Sydney Water asset along Masons Drive, North Parramatta, as part of a proposed road works within The King's School. It includes widening of the existing road within the school site which is proposed to match existing levels along Masons Drive. Thank you, and please let me know if you need any further information. Best regards, Jema Lopez | Civil Engineer +61 426 053 329 | +61 2 9067 5017 | jema.lopez@ttw.com.au TTW Engineers | Sydney



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