STORMWATER MANAGEMENT REPORT

Roseville College SWELL Centre

Prepared for: Roseville College

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Revisions

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1.0 INTRODUCTION

ACOR Consultants has been engaged by Roseville College to prepare civil and stormwater design documentation in support of a State Significant Development Application (SSDA) for a proposed Student Wellness (SWELL) Centre at 27-29 Bancroft Avenue, Roseville ("the subject site").

This report documents the methodology involved in determining the design of the proposed stormwater drainage system for the proposed development and how *Ku-ring-gai DCP Part 24 – Water Management* requirements are satisfied, including the stormwater quantity and quality management, rainwater reuse initiatives for steam flow management and ecologically sustainable development and stormwater disposal.

This report must be read in conjunction with the ACOR concept civil drawings accompanying this SSDA submission.

1.1 Criteria

The stormwater system has been designed to comply with the following standards and local authority requirements:

a) Bureau of Meteorology IFD data – sourced from http://www.bom.gov.au/

b) Australian Rainfall and Runoff 2016

c) Ku-ring-gai DCP (2016) – specifically DCP Part 24 – Water Management

d) Ku-ring-gai Council MUSIC Modelling Guidelines and MUSIC-Link parameters

e) AS3500.3-2018

2.0 EXISTING SITE CONDITIONS

2.1 Site Description

The Roseville College SWELL Centre site ("the subject site") consists of a re-development of two lots, being:

- The existing on-grade sports courts within the Roseville College site (No. 27-29 Bancroft Avenue); and
- Consolidation of the neighbouring residential lot at No. 37 Bancroft Avenue.

Figure 1. Existing Site Aerial Photograph and Locality Map

The site is bounded by Bancroft Avenue to the north, an existing residential dwelling (No 39 Bancroft Avenue) to the east, the existing Roseville College site to the west and Recreation Avenue to the south.

The subject site occupies a total calculated "area of works" of 3,893m^2.

The existing site is relatively flat, with the on-grade sports courts incorporating a slight fall towards Bancroft Avenue to the north, with the remaining grassed area to the south of the sports courts falling towards Recreation Avenue to the south.

The site is located within the Moores Creek Catchment (MC1) and is classified as a "Location A" development, as it drains by gravity to recognised drainage systems within Recreation Avenue and Bancroft Avenue. The Permitted Site Discharge and Site Storage Requirement for this catchment has been adopted for the proposed On-Site-Detention (OSD) system design, described in a subsequent section of this report.

3.0 PROPOSED DEVELOPMENT

3.1 Site Characteristics

The proposed development will involve demolition of the existing sports courts, residential dwellings and ancillary structures on-site and construction of a three-storey SWELL Centre.

The SWELL Centre will incorporate two levels of off-street carparking, an 8-lane heated swimming pool with amenities facilities, general learning areas and rooftop tennis courts.

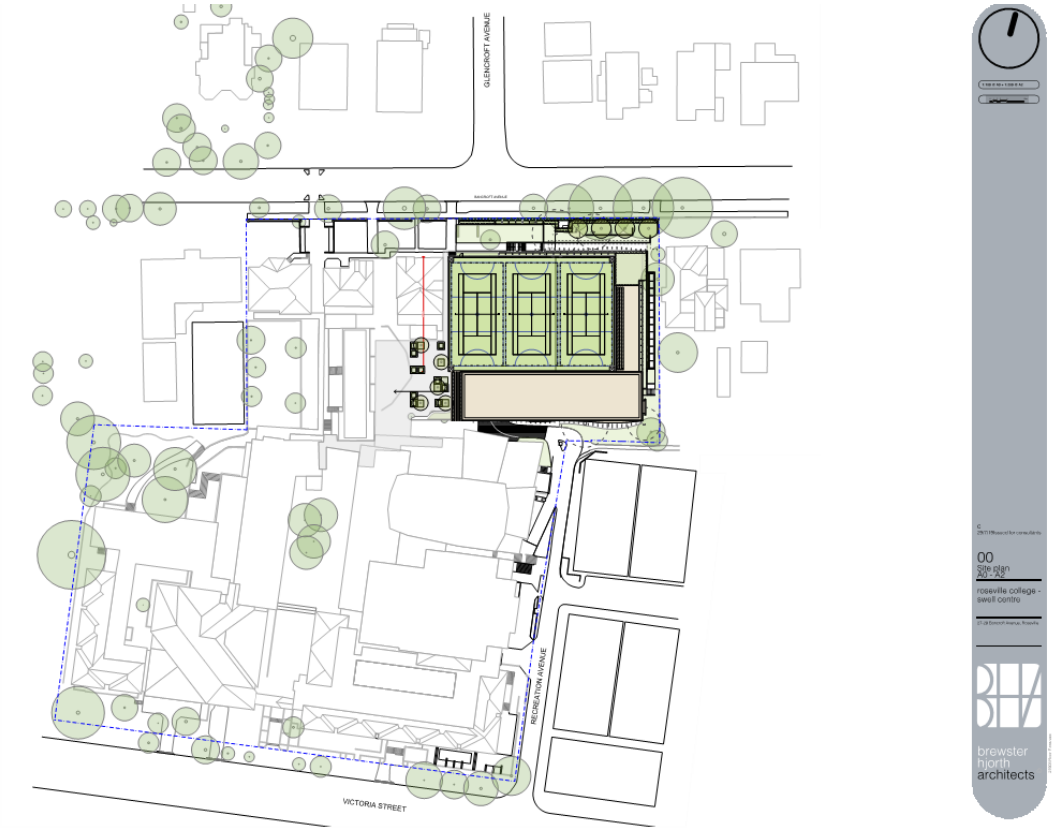

Figure 2. Proposed SWELL Centre Architectural Site Plan. Source: Brewster Hjorth Architects

The proposed development is classified as a Type 6 – Business, Commercial or Retail Premises, in accordance with *Ku-ring-gai DCP Part 24*.

It is noted that Level 1 carpark, swimming pool and amenities facilities will be located within the lowest level of the proposed SWELL centre and thus in cut. Basement drainage for groundwater seepage is outlined in the Report on Geotechnical Investigation prepared by Douglas Partners and is outside the scope of this report.

New driveway access will be provided from the south of the SWELL Centre, which will connect to the northern turning head of Recreation Avenue. Construction of the new SWELL Centre will also involve widening of Recreation Avenue to improve site access by service vehicles. The details of the Recreation Avenue road widening are the subject of a separate Section 138 Roads Act approval and thus outside the scope of this report.

3.2 Stormwater Drainage System

Stormwater runoff from all pervious and impervious surfaces within the proposed development will generally be collected by an in-ground pit and gravity pipe system. The in-ground pit and pipe system has been sized to accommodate the 5% AEP storm flows for the site (for a 5-minute rainfall intensity-frequency-duration of 201mm/hr based on BOM IFD data and AR&R2016).

In the event of the in-ground system blockage or a major storm event greater than the 5% AEP, overland flow paths have been provided around the SWELL Centre building envelope to safely convey flows. Overland flow paths include the following:

- Overflow from the on-site detention (OSD) tank surcharge grate via the existing asphalt driveway for the school, draining to Bancroft Avenue;
- Site grading of the landscaped area to the east of the building footprint will promote overland flows towards Bancroft Avenue and Recreation Avenue.
- Overland surcharge flows from the northern landscaped area to Bancroft Avenue; and
- Overland flows from southern hardstand and landscaped areas to Recreation Avenue.

Overland flow paths for the site have been documented on civil concept drawings C3.02 and C3.03.

Roof water runoff from non-trafficable roof areas over the Level 3 general learning areas and covered spectator areas will be collected by eaves gutters and downpipes to drain into a 20m^3 rainwater storage tank.

Roof water runoff from trafficable roof areas such as the tennis courts and uncovered walkways will be collected by rainwater outlets and grated drains to discharge into the OSD system. Roof water from trafficable roof areas will bypass the rainwater tank due to the high level of contaminants that will be collected compared to non-trafficable roofs.

A site drainage catchment plan has been developed. This has been documented on civil concept drawing C3.15, also shown in Figure 3 below.

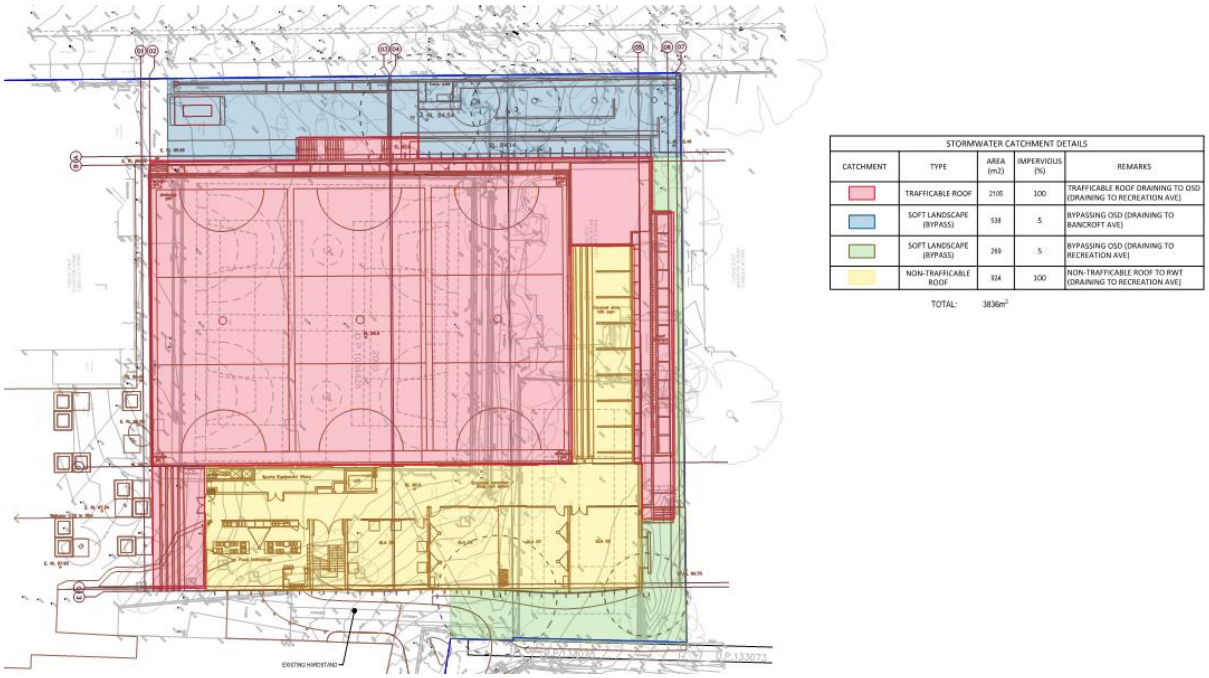

Figure 2. Drainage Catchment Plan Summary for SWELL Centre Development

Stormwater disposal for attenuated OSD runoff from the SWELL Centre building footprint will be by gravity connection to an existing private stormwater pit within Recreation Avenue, which accepts flows

from other areas of Roseville College. This private stormwater pit within Recreation Avenue drains to the existing Council system within Recreation Avenue, before draining to an existing Sydney Water stormwater channel.

Advice has been sought from Sydney Water to determine whether there are any additional stormwater disposal controls other than Ku-ring-gai Council OSD controls. Correspondence from Sydney Water has been enclosed as Appendix C to this report confirming that Ku-ring-gai Council OSD controls will be the relevant design parameters.

3.3 Post-Development Flows and On-site Detention (OSD)

The proposed stormwater system is to store and release stormwater so that the post-developed flows leaving the site achieve the Permitted Site Discharge (PSD) and Site Storage Requirement (SSR) nominated by *Ku-ring-gai DCP Part 24 – Water Management* for the Moores Creek Catchment, MC1.

The proposed OSD system will consist of a storage tank within the SWELL Centre building envelope, located above the Level 2 floor slab.

The OSD tank has been incorporated within the building footprint due to the limited available options for an in-ground detention tank within the landscape setbacks to Bancroft Avenue and Recreation Avenue. The close proximity of the landscape setbacks to the downstream drainage connection points will restrict OSD tank depth and thus ability to comply with the SSR.

A site area of 3,029m^2 has been applied to OSD calculations for PSD and SSR. This area represents the total building footprint area that will be re-developed.

For clarity, the soft landscaped areas that will be renewed have been excluded from OSD calculations. We refer to correspondence with Ku-ring-gai Council dated 19 July 2019 confirming this methodology as acceptable.

Similarly, existing hardstand areas to Recreation Avenue have been excluded from OSD calculations for PSD and SSR.

For the Moores Creek Catchment, MC1, the following PSD and SSR controls have been applied to the OSD system:

- PSD = 0.0136 L/sec/m^2. This equates to a total site PSD = 41.19 L/sec for a site area of 3,029m^2.
- SSR = 0.0315 m^3/m^2. This equates to a total SSR = 95.41 m^3 for a total site area of 3,029m^2.

As all roof areas of the SWELL Centre building (i.e. the site area) will drain to the OSD system, no bypass flows will occur for the developable site area.

In accordance with *Ku-ring-gai DCP Part 24C.5 – Control 6(iii)*, an offset has been applied to the SSR for the proposed 20m^3 rainwater tank. A maximum reduction of 10% of the SSR, being 9.54m^3, has been applied to the SSR. The resultant required SSR will be 85.87m^3.

An orifice plate has been designed with a 106mm hole to achieve the above PSD.

A summary of key OSD system elements is as follows:

- The proposed OSD tank will provide an OSD storage volume of 89.85 m^3, which is satisfies the SSR requirement of 86.42m^3 for the site.
- In the event of OSD tank overflow, surcharge will occur through the 900x900 grated opening, located within the courtyard external to the building envelope. Site grading will direct overflows safely away from the building entries and to the existing overland flow path along the driveway to Bancroft Avenue.

The Ku-ring-gai Council OSD Calculation Sheet has been enclosed as Appendix B to this report.

Further calculations and details in the OSD design are provided on concept civil drawings C1.06 and C3.03.

3.4 Stormwater Quality Management

Ku-ring-gai DCP Part 24C.6 requires that stormwater discharge leaving the site is treated to meet allocated percentage reduction targets for pollutants.

A MUSIC model has been created using the Ku-ring-gai Council MUSIC-Link rainfall, PET and node parameters, as well as proprietary data and parameters for treatment products from Ocean Protect (formerly Stormwater360).

Table 1 – Ku-ring-gai Percentage Reduction Targets

Pollutant	Percentage Reduction
Gross Pollutants	70%
Total Suspended Solids (TSS)	80%
Total Phosphorus (TP)	65%
Total Nitrogen (TN)	45%

A Water Sensitive Urban Design (WSUD) catchment plan has been created to show the different site sub-catchments and how they will be treated, shown in Figure 3 below.

The proposed stormwater quality treatment train can be summarised as follows:

- A 20m^3 volume rainwater tank will be provided for rainwater collection from non-trafficable roof areas (924m^2 area) for reuse in toilets and irrigation. Further details of rainwater reuse sizing and demand are detailed in a subsequent section of this report.
- OceanGuard pit inserts by Ocean Protect will be provided to all in-ground stormwater pits, to provide primary treatment of surface runoff.
- A secondary filtration chamber will be provided downstream of the OSD tank to house 14x 690mm head-loss PSORB filtration cartridges by Ocean Protect. The filter cartridges will treat all runoff from the building footprint, existing hardstand areas along Recreation Avenue and landscaped areas draining to Recreation Avenue. The landscaped area draining to Bancroft Avenue will bypass the filter cartridges and will only be treated by OceanGuard primary treatment.

The above treatment train configuration satisfies Ku-ring-gai DCP requirements. The MUSIC-Link summary report has been enclosed as Appendix A to this report.

3.5 Rainwater Reuse and Stream Flow Controls

Ku-ring-gai DCP Part 24C.3 Stream Flow Controls requires that the number of runoff days from the site must be reduced by 50% compared to the post-development base case.

Table 2 – Ku-ring-gai DCP Part 24C4-1 Mandatory Rainwater Tank Requirement for Development Type 6

Type	Description	Minimum Tank Storage Volume	Minimum Use of Retained Water
Type 6	Business, Commercial, Retail	The minimum tank storage volume is that required to meet the 50% reduction in runoff days specified in control 24B.3-4, or compliance with BASIX or the Green Star Rating, whichever is the greater.	Number of connections required to meet the specified target. Must be connected to garden, podium plantings, and any green roofs and walls.

To achieve the above performance requirement, a water balance model has been created for the non-trafficable roof catchment of 924m^2 to calculate the required rainwater storage tank size to satisfy this 50% reduction in runoff days for a given non-potable water demand.

Trafficable roof areas such as walkways and tennis courts have been excluded from the water balance model and calculations, as it is not feasible to collect, treat and reuse these areas due to the high level of contaminants that will be collected compared to non-trafficable roofs.

The water balance model incorporates the following rainwater reuse demands for the site, assuming 350m^2 of landscaping irrigation will be connected to the rainwater harvesting system.

- Water demand for irrigation = 1.08kL per day (990m^2 of landscaping x 0.4kL/year/m^2, divided by 365 days)
- Water demand for toilet flushing = 1.2kL per day (12 toilets x 0.1kL/day)
- Total water demand = 2.28kL/day

A rainwater storage tank volume of 20m^3 will be incorporated into the design, which will be located adjacent to the OSD tank and within the building envelope of Level 2.

Based on the above parameters, there will be a 74% reduction in rainfall runoff days in the post-development case. This exceeds *Ku-ring-gai DCP Part 24C.3 Stream Flow Controls* requirements.

4.0 REVIEW OF FLOOD CONTROLS

There is no available flood study documenting overland or mainstream flood affectation to the subject site.

We refer to Ku-ring-gai Council's response to a request for SEARs comments for Roseville College SWELL Centre (SSD 9912) dated 8 March 2019, which is enclosed as Appendix D to this report.

Ku-ring-gai Council have advised that Council will soon be commencing a flood study for the part of the LGA that the subject site is located within.

At the time of writing this report the subject site has not been identified as affected by overland or mainstream flooding. Further advice from Council may be provided depending on the timing of the

SWELL Centre development relative to flood study outcomes, at which time we assume that any controls will be provided as part of the SSDA development conditions.

5.0 CONCLUSION

The proposed Roseville College SWELL Centre development at 27-29 Bancroft Avenue, Roseville incorporates measures to address both stormwater quality and quantity requirements set out in Ku-ring-gai DCP Part 24.

On-site detention will be provided to achieve the Permitted Site Discharge and Site Storage Requirement for developments located within the Moores Creek catchment, MC1.

WSUD initiatives will be implemented by proprietary stormwater quality improvement devices (gross pollutant pit inserts, filter cartridges and rainwater reuse) to achieve the percentage reduction targets for pollutants required by Ku-ring-gai DCP Part 24.

Stream flow controls will be managed through implementation of an 20m^3 rainwater storage tank for irrigation of a minimum 990m^2 of landscaping and toilet flushing of 12 toilets. This will achieve a 74% reduction in runoff days from the non-trafficable roof catchment of 924m^2 and thus satisfies Ku-ring-gai DCP Part 24 requirements.

The above measures achieve the requirements set out by the following documents:

- Bureau of Meteorology IFD data – sourced from http://www.bom.gov.au/
- Australian Rainfall and Runoff 2016
- Ku-ring-gai DCP (2016) – specifically DCP Part 24 – Water Management
- Ku-ring-gai Council MUSIC Modelling Guidelines and MUSIC-Link parameters
- AS3500.3-2018

Appendix A

Ku-ring-gai MUSIC-Link Summary Report

KU-RING-GAI COUNCIL

MUSIC-*link* Report

Project Details		Company Details	
Project:	Roseville College SWELL Centre	**Company:**	ACOR Consultants Pty Ltd
Report Export Date:	6/09/2019	**Contact:**	Matthew Buttarelli
Catchment Name:	SY190030_MUSIC Model	**Address:**	33 Herbert Street, ST LEONARDS NSW 2065
Catchment Area:	0.399ha	**Phone:**	(02) 9438 5098
Impervious Area*:	80.61%	**Email:**	mbuttarelli@acor.com.au
Rainfall Station:	66062 SYDNEY		
Modelling Time-step:	6 Minutes		
Modelling Period:	1/01/1963 - 31/12/1993 11:54:00 PM		
Mean Annual Rainfall:	1275mm		
Evapotranspiration:	1261mm		
MUSIC Version:	6.3.0		
MUSIC-link data Version:	6.32		
Study Area:	Ku-ring-gai Council		
Scenario:	Ku-ring-gai		

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

Treatment Train Effectiveness		Treatment Nodes		Source Nodes	
Node: Receiving Node	**Reduction**	**Node Type**	**Number**	**Node Type**	**Number**
Flow	11.3%	Sedimentation Basin Node	1	Urban Source Node	5
TSS	85.8%	Rain Water Tank Node	1		
TP	75.8%	GPT Node	3		
TN	54.5%	Generic Node	1		
GP	100%				

Comments

Reuse demand requirements have been satisfied in accordance with KMC stream flow controls (50% reduction in runoff days). Refer to submitted water balance model summary.

Stormfilter uncategorised parameters have been adopted based on Supplier node parameters (Ocean Protect - formerly Stormwater360).

Passing Parameters

Node Type	Node Name	Parameter	Min	Max	Actual
GPT	1 x OceanGuard	Hi-flow bypass rate (cum/sec)	None	None	0.02
GPT	1 x OceanGuard	Hi-flow bypass rate (cum/sec)	None	None	0.02
GPT	1 x OceanGuard	Hi-flow bypass rate (cum/sec)	None	None	0.02
Receiving	Receiving Node	% Load Reduction	None	None	11.3
Receiving	Receiving Node	GP % Load Reduction	70	None	100
Receiving	Receiving Node	TN % Load Reduction	45	None	54.5
Receiving	Receiving Node	TP % Load Reduction	45	None	75.8
Receiving	Receiving Node	TSS % Load Reduction	80	None	85.8
Sedimentation	SF Chamber	% Reuse Demand Met	None	None	0
Sedimentation	SF Chamber	High Flow Bypass Out (ML/yr)	None	None	0
Urban	Hardstand to Recreation Ave	Area Impervious (ha)	None	None	0.015
Urban	Hardstand to Recreation Ave	Area Pervious (ha)	None	None	0
Urban	Hardstand to Recreation Ave	Total Area (ha)	None	None	0.015
Urban	Landscaping to Bancroft Ave	Area Impervious (ha)	None	None	0.002
Urban	Landscaping to Bancroft Ave	Area Pervious (ha)	None	None	0.051
Urban	Landscaping to Bancroft Ave	Total Area (ha)	None	None	0.054
Urban	Non-Trafficable Roof	Area Impervious (ha)	None	None	0.092
Urban	Non-Trafficable Roof	Area Pervious (ha)	None	None	0
Urban	Non-Trafficable Roof	Total Area (ha)	None	None	0.092
Urban	Residual Area to Rec Ave	Area Impervious (ha)	None	None	0.001
Urban	Residual Area to Rec Ave	Area Pervious (ha)	None	None	0.025
Urban	Residual Area to Rec Ave	Total Area (ha)	None	None	0.027
Urban	Trafficable Roof & Landing	Area Impervious (ha)	None	None	0.211
Urban	Trafficable Roof & Landing	Area Pervious (ha)	None	None	0
Urban	Trafficable Roof & Landing	Total Area (ha)	None	None	0.211

Only certain parameters are reported when they pass validation

Failing Parameters

Node Type	Node Name	Parameter	Min	Max	Actual
Rain	20kL RWT	% Reuse Demand Met	80	None	55.40
Sedimentation	SF Chamber	Notional Detention Time (hrs)	8	12	0.108
Sedimentation	SF Chamber	Total Nitrogen - k (m/yr)	500	500	1
Sedimentation	SF Chamber	Total Phosphorus - k (m/yr)	6000	6000	1
Sedimentation	SF Chamber	Total Suspended Solids - k (m/yr)	8000	8000	1

Only certain parameters are reported when they pass validation

Appendix B

Ku-ring-gai Council OSD Calculation Sheet

24R.4 ON-SITE DETENTION CALCULATION SHEET

Address ROSEVILLE COLLEGE SWELL CENTRE - 27-29 BANCROFT AVE, ROSEVILLE

Catchment Detail				
1.	Catchment Name MC1 - MOORES CREEK			
2.	Catchment Discharge Rate	0.0136	l/sec/m^2	**A**
3.	Catchment Storage Rate	0.0315	m^3/m^2	**B**
Site Details				
4.	Site Area 3029 m^2 ^ 60% of site area	-	m^2	**C**
5.	Area(s) not draining to the detention system 0 m^2			
6.	Total impervious area (roofs, driveways, paving, etc.)	3029	m^2	**D**
7.	Impervious area bypassing detention system	0	m^2	**E**
Permitted Site Discharge				
8.	**C** [3029 m^2] x **A** [0.0136 l/sec/m^2] =	41.19	l/sec	**Flow 1**
9.	Adjustment for any uncontrolled impervious flow **E** / **D** =	0	(<0.25)	**F**
10.	**Flow 1** [41.19 l/sec] x **F** [0] =	0	l/sec	**Flow 2**
11.	**Flow 1** [41.19] – **Flow 2** [0] =	41.19	**l/sec**	**PSD**
Site Storage Requirement				
12.	**C** [3029 m^2] x **B** [0.0315 m^3/m^2] =	95.41	**m^3**	**SSR1**
13.	If the storage is in a landscaped basin, **SSR1** x 1.2 =	N/A	**m^3**	**SSR2**
Outlet Control				
14.	Height difference between top water surface level and the centre of the orifice	3.0	m	**G**
15.	Orifice Diameter $21.8 \times \sqrt{\frac{PSD}{\sqrt{G}}}$	106	**mm**	**OD**

PSD = Permitted Site Discharge
SSR1 = Site Storage Requirement (except for landscaped basins)
SSR2 = Site Storage Requirement (landscaped basins) **(Note: Use only SSR1 or SSR2)**
OD = Orifice Diameter

Signature.. ..... **Name** Matthew Buttarelli

Qualifications BEng BBus MIEAust **Date** 06/09/2019

Appendix C

Sydney Water Correspondence Confirming OSD Controls

Matthew Buttarelli

From: Stormwater <Stormwater@sydneywater.com.au>
Sent: Tuesday, 6 August 2019 8:19 AM
To: Matthew Buttarelli
Subject: RE: Roseville College SWELL Development - Request for PSD and SSR

Matthew,

Out side of City of Sydney council, Sydney Water only determine On Site Detention and Permissible Site Discharge, only if you make direct stormwater connection to Sydney Water's stormwater system.

As your proposed direct stormwater connection is to Council system, there will not be any Sydney Water's stormwater requirements and you only need to satisfy council stormwater requirements as per their policy and guidelines.

Best Regards

Jeya Jeyadevan | **Senior Capability Assessor**
Liveable City Solutions | Sydney Water
Level 7, 1 Smith St Parramatta NSW 2150
PO Box 399 Parramatta NSW 2124
T 8849 6118 | **Mobile** 0409 318 827 | **Email**
jeya.jeyadevan@sydneywater.com.au
sydneywater.com.au

From: Matthew Buttarelli <MButtarelli@acor.com.au>
Sent: Friday, 2 August 2019 5:13 PM
To: Stormwater <Stormwater@sydneywater.com.au>
Subject: Roseville College SWELL Development - Request for PSD and SSR

Hi Jeya,

Trust you are well since we last spoke.

We are currently assisting Roseville College with civil / stormwater design for a proposed Student Wellness (SWELL) Centre. The proposed development area is where the existing on-grade tennis courts are located within the school, as well as consolidating the adjacent property that the School has purchased (No. 37 Bancroft Ave).

The development will be undertaken as State Significant Development. Sydney Water has provided previous SSD comments, which are attached for your reference.

After discussions with Ku-ring-gai Council, spatial allowances within the development indicate that the on-site detention system will need to be located within the building footprint, adjacent to Recreation Avenue. The intention is to drain to the existing Council drainage system within Recreation Avenue.

However, it is our understanding is that this Council drainage system in Recreation Ave eventually drains into an existing 1500x1000 Sydney Water stormwater channel.

As such, will we need to obtain Sydney Water Approval and subsequently PSD / SSR requirements for on-site detention? Our design currently incorporates Ku-ring-gai Council OSD requirements. Attached is Ku-ring-gai Council's OSD design spreadsheet which specifies the volume of OSD required as 88.67m^3. Our expectation is that unless Sydney Water's OSD requirements are more onerous, we will be using Ku-ring-gai's OSD design sheet. Please confirm.

Key development information for your assessment:

- Siteworks area for new SWELL development (excluding soft landscaping being retained and draining to Council's system in Bancroft Ave) = **2815m^2**
- Pre-development impervious area = **500m^2** (assuming artificial tennis courts are considered pervious)
- Siteworks area can be assumed to be **100% impervious** (2815m^2) in the post-development scenario

If any further information is required, please let us know.

Regards,

Matthew Buttarelli | **Associate Senior Civil Engineer**

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Appendix D

Ku-ring-gai Council Response to Request for SEARs Comments

Matthew Buttarelli

From: Brian O'Connell <boconnell@kmc.nsw.gov.au>
Sent: Friday, 19 July 2019 12:04 PM
To: Matthew Buttarelli
Cc: Selwyn Segall
Subject: Roseville College SWELL Centre (SSD 9912) - Stormwater Management

Matthew,

Please see my responses to your questions in red below.

Happy to answer any further queries.

Regards

Brian O'Connell | Team Leader Engineering Assessment | Ku-ring-gai Council
P: 9424 0891
E: boconnell@kmc.nsw.gov.au | www.kmc.nsw.gov.au

From: Matthew Buttarelli [mailto:MButtarelli@acor.com.au]
Sent: Friday, 21 June 2019 5:32 PM
To: Brian O'Connell
Cc: Selwyn Segall; Rus Manaf; Maddy Ryan; Matthew Alder
Subject: HPRM: Roseville College SWELL Centre (SSD 9912) - Stormwater Management

Hi Brian,

Further to our recent correspondence with your colleague Selwyn Segall this week, we have reviewed Council's SEARs comments relating to stormwater engineering matters (Council comments attached for reference as **Attachment 1**).

We would like to start discussing with Council the approach to stormwater management for the site, to ensure we meet Council's expectations for managing stormwater and drainage disposal.

For clarity, we have classified the proposed development as a Type 6 – Business / Commercial Premises and a Location A property – draining to a Council or Sydney Water Asset.

Some items we would like to receive clarification from Council's Engineering Team are as follows:

1. Rainwater Storage and Reuse

- The proposed development's roof level will incorporate a mix of trafficable areas (synthetic sports courts and walkways) and non-trafficable awnings. **Attachment 2** shows the roof level coverage for trafficable and non-trafficable areas.
- Council's DCP Part 24C.4 requires the development to have a minimum 50% reduction in runoff days. This will be unachievable assuming the trafficable roof area will not drain to a rainwater tank, due to the quality of runoff and pollutant sources. - Acceptable
- We are proposing to have all non-trafficable roof areas drain into a rainwater tank to supply irrigation of approximately 400m^2 of soft landscaping areas. Current sizing indicates that 10m^3 of rainwater storage would be an efficient size of this tank (i.e. 1,000L for every 100m^3 of non-trafficable roof area). The remaining

trafficable roof will drain to the proposed stormwater quality improvement device (SQID) and OSD. Can Council provide feedback if this is an acceptable alternative approach? –
You are proposing 900m2 of no-trafficable roof. In order to contribute to environmental sustainability and apply Water Sensitive Urban Design (WSUD) principles, rather than just connecting this reuse to irrigation, you shall investigate connecting rainwater reuse tanks to new toilets in the development. This will lead to: larger tanks, higher reuse rates, and less stormwater runoff.

2. On-site Detention

- Can Council please confirm if the OSD calculations should include the soft landscaping areas along Bancroft Avenue when determining **OSD storage volume** required for the development? We would typically assume that as these areas will be landscaped with high level of infiltration, these could be exempt from OSD volume calculations. Please advise. –
  It shall be noted that there is an existing on site detention system on the site (DA0262/16). This existing system may be modified/enlarged to account for this proposed development. The OSD will be designed based upon the proposed built upon area (100% of proposed built upon area rather than 60% of site area). There must be gravity fall from the overflow from the on-site detention to Councils stormwater network. The soft landscaping areas can be exempt from OSD calculations.

3. Stormwater Disposal

- The majority of the development site drains towards Bancroft Avenue, with a minor portion of the site draining towards Recreation Avenue. **Attachment 3** shows the existing site catchment plan.
- Can Council please advise if we are to maintain this existing flow regime – in particular will there be any constraints in draining to Bancroft Avenue?
- Alternatively, is there any known limitations to drain the whole of the proposed development to Recreation Avenue, now that we are providing OSD and attenuating peak flows? We note that the drainage network in Recreation Avenue eventually drains into an existing Sydney Water 1500x1000 box culvert,
  The only constraint with draining to Bancroft Avenue is Councils requirement that the total discharge from a single development lot to the street gutter or table drain must not exceed 25 litres per second.
  I do not see any problem with draining all the site to the stormwater network in Recreation Avenue. However, you suggest that the box culvert at the end of Recreation Avenue is ownership of Sydney Water. If the ownership of this culvert is Sydney water then you will need their approval to connect the site to it.

4. Water Quality and Stream Flow Controls

- Stormwater quality improvement will be provided to meet pollutant reduction targets (24C.6). However, is there now a requirement to drain the impervious non-trafficable roof area to raingardens or vegetated areas to satisfy the 50% reduction in runoff days described in 24C.3 Stream Flow Control?
- We note that there is limited space within the soft landscaping fronting Bancroft Avenue to achieve effective infiltration to reduce runoff days. In addition, the presence of the basement shoring wall would limit effectiveness of on-site infiltration.
- Based on the above, will Council accept that runoff from the non-trafficable roof area be treated through a SQID and attenuated through an OSD system?
  Water treatment measures to meet Councils pollutant reduction targets may be applied in the OSD tank.

5. Bancroft Ave Stormwater Network

- Can Council please advise if there is any available information of the existing 600mm diameter stormwater pipeline along the opposite side of Bancroft Ave? In particular, confirmation of any pipe grades and hydraulic constraints.
  According to Councils records the 600mm diameter stormwater pipe on the northern side of Bancroft Avenue has a gradient of 5.44%, however this data is not to be relied on. You shall survey the upstream and downstream inverts to establish the level of this pipe.

We look forward to your response with the above information. If there are any queries please feel free to give me a call. Alternatively, I am happy to attend Council's offices to discuss in person if you wish to run through any of the plans or concepts in further detail.

Regards,

Matthew Buttarelli | **Associate Senior Civil Engineer**

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