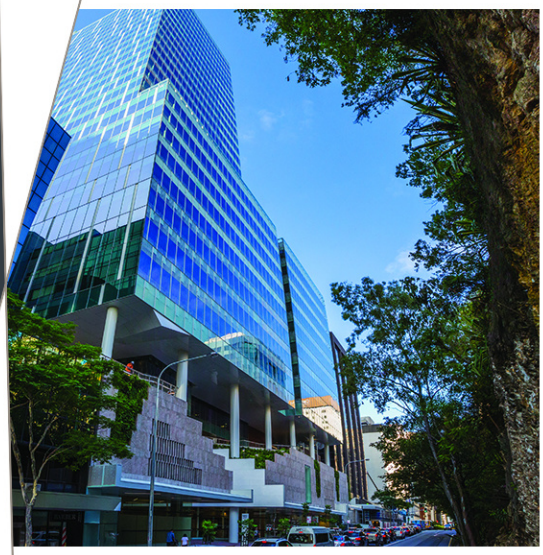
Integrated Stormwater Management Plan

1-2 Murray Rose Avenue, Sydney Olympic Park

80818416



Prepared for

Austino Property Group

23 October 2018

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1 Background Information

This document presents the Integrated Stormwater Management Plan for submission to Sydney Olympic Park Authority (SOPA) to support the Development Application for the proposed multistorey residential development at 1-2 Murray Rose Avenue, Sydney Olympic Park (SOP).

This Integrated Stormwater Management Plan has been prepared in accordance with the requirements of Sydney Olympic Park Authority Policies – Stormwater Management and Water Sensitive Urban Design.

2 Site Context

The proposed 1-2 Murray Rose Avenue, Sydney Olympic Park development is to be situated on Lot 1 DP1185060 (herein referred to as "site 1") with a site area of approximately 3931m², and on Lot 2 DP1185060 (herein referred to as "site 2") with a site area of approximately 2522m².

Site 1 is an undeveloped area with a bituminous path across a portion of the site. The development site is bound to the:

- North by the concrete path built as part of the Brickpit Park development,
- East by Bennelong Parkway and adjacent landscaping,
- South by Murray Rose Avenue, and
- West by a multistorey office building on 3 Murray Rose Avenue.

Gabion retaining walls are present along the north and the east perimeter, and which have presumably been constructed as part of the adjacent road works. Cut embankments are present along the west and north boundary, presumably as a result of previous construction on the adjacent sites.

Bennelong Parkway grades down to the south at approximately 0.3% grade over the section adjoining site 1. Murray Rose Avenue grades relatively steeply towards Bennelong Parkway (at a gradient of up to 11%) over the site 1 frontage.

Site 2 is currently occupied by temporary site offices and associated bitumen car park set up for construction work on 4 Murray Rose Avenue. Buildings and improvements currently located on the site will be demolished as part of the proposed works. The development site is bound to the:

- North by Murray Rose Avenue,
- East by Bennelong Parkway and adjacent landscaping,
- South by Parkview Drive, and
- West by development on 4 Murray Rose Avenue which is currently under construction.

In the past, site 2 has been subjected to some earthworks in order to construct the bitumen carpark.

Gabion retaining walls are present along the south and the east perimeter, and which have presumably been constructed as part of the adjacent road works.

Bennelong Parkway grades down to the south at approximately 0.3% grade over the section adjoining site 2. Murray Rose Avenue grades relatively steeply towards Bennelong Parkway (at a gradient of up to 11%) over the site 2 frontage. Parkview Drive grades down to the east at approximately 9%.

Aerial photography of the existing sites is presented in Figure 2-1.

According to Sydney Olympic Park Authority Policies – Stormwater Management and Water Sensitive Urban Design - Map 1 Town Centre Stormwater Drainage Areas, both sites are situated in the Bennelong Pond Catchment, which is categorised as non-stormwater harvesting catchment. Stormwater collected from the two sites drains to the Bennelong Pond.

Both sites are serviced by stormwater, potable water, sewer, electrical and communication services. Adjustments to a selection of these services may be required as part of the proposed development. Such works will be ascertained once Development consent is granted and prior to issuance of a Construction Certificate.

Based upon geological conditions encountered as part of the geotechnical investigations carried out, it is expected that rock will be encountered as part of the proposed bulk earthworks excavations.

According to Auburn Local Environmental Plan 2010, Flood Planning Map, Sheet FLD_006 (reproduced in Figure 2-2), the site is not flood prone.

In July 2018 a flood study for the proposed development was undertaken by GRC Hydro Pty Ltd. The Flood Assessment (herein referred to as "the Flood Report") presents the maximum flood depths & levels map (reproduced in Figure 2-3). These levels and recommendations were used in determining the appropriate habitable area floor levels, allowing for a freeboard of 500mm. Where this freeboard could not be achieved, appropriate protection measures (walls and/or embankments) have been proposed.

The Brickpit concrete pathway to the north of Site 1 acts as an overland flow conduit for the runoff from Brickpit Park and other areas to the north. It discharges towards Bennelong Parkway stormwater system via a stone-paved open drain. It also acts as a ‘cut-off’ drain that protects Site 1 from any runoff arising to the north.

In general, the proposed developments on both sites are set at levels at which they would not be affected by runoff from the adjacent sites and/or roads.

Figure 2-1 Existing Site (Source – Nearmap 2018)

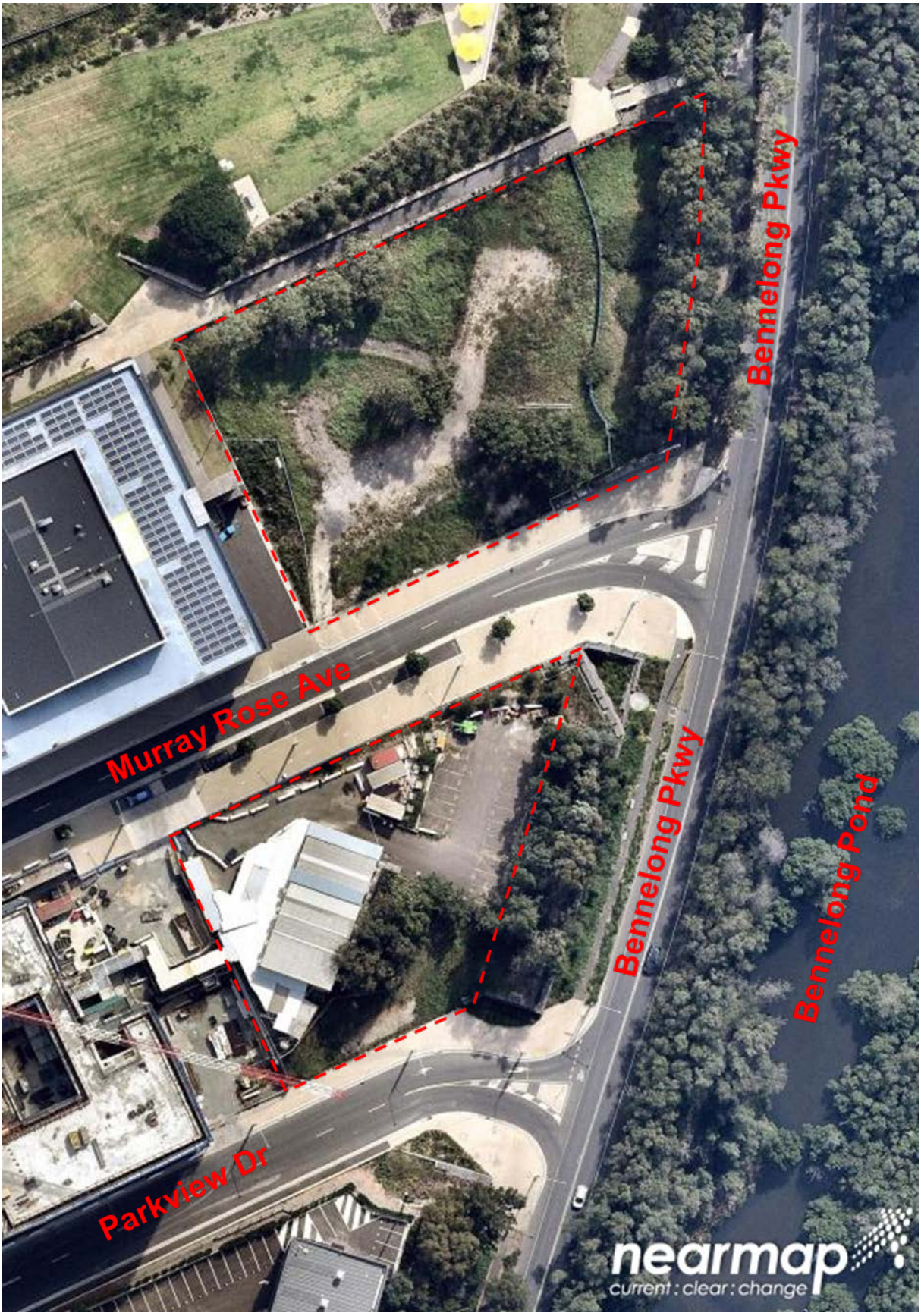
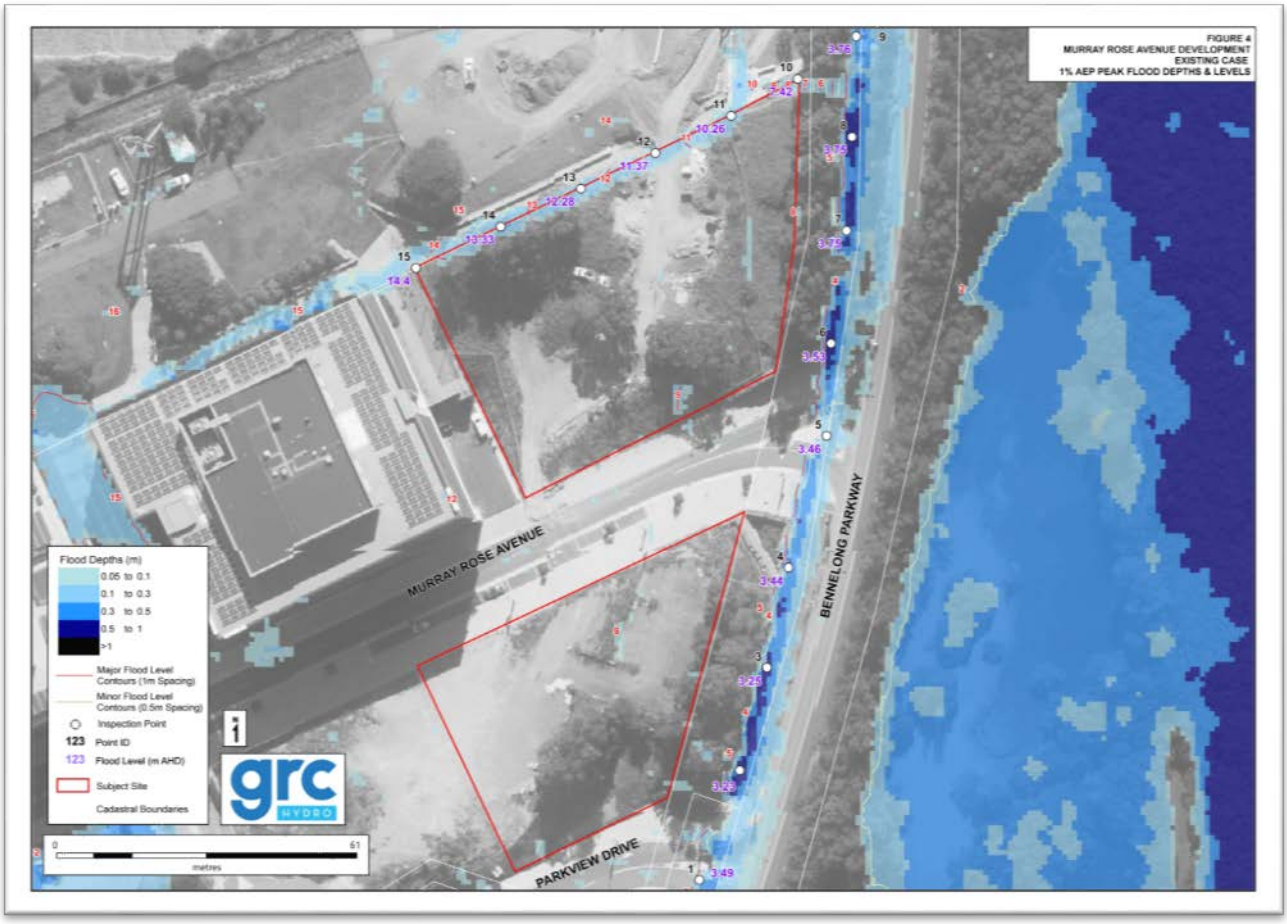


Figure 2-2 Flood Planning Map (Source – Auburn Local Environmental Plan 2010)

Figure 2-3 1% AEP Peak Flood Depths & Levels (Source – The Flood Report)



3 Proposed Development

The proposed development will consist of 2 residential buildings over multi storey basements. The construction works include:

- Demolition works;
- Shoring works;
- Bulk earthworks;
- Construction of two multi storey basement car parks;
- Construction of water quality treatment;
- Construction of entry/exit off Murray Rose Avenue and Parkview Drive;
- Construction of 2 multistorey buildings.

4 Summary of Water Sensitive Urban Design Objectives and Performance Criteria

Water sensitive urban design (WSUD) objectives and performance criteria are specified in Sydney Olympic Park Authority Policy – Stormwater Management and Water Sensitive Urban Design.

Under the policy, the location of the proposed buildings and associated works is situated in Sydney Olympic Park non-stormwater harvesting catchment as per Map 1 Town Centre Stormwater Drainage Areas displays. Thus the WSUD of the development must strive to the maximum extent practicable.

Objectives and performance criteria specified in Attachment 1 of the policy are summarised in Tables 4-1 to 4-3 below.

Performance Criteria for Potable Water Consumption

Table 4-1 Performance Criteria for Potable Water Consumption

Component	Performance Criteria
Re-use water consumption	Refer to BASIX Report (prepared by Cardno)

Table 4-2 Treatment Targets for Stormwater Quality

Component	Retention Criteria
Total Nitrogen	65% reduction in the mean annual load
Total Phosphorus	85% reduction in the mean annual load
Total Suspended Solids	90% reduction in the mean annual load
Hydrocarbons	90% reduction in the mean annual load
Gross Pollutants	95% reduction in the mean annual load
Runoff volume	10% reduction in the mean annual runoff volume

Table 4-3 Performance Criteria for Stormwater Quality

Component	Performance Criteria
ARI design event for internal piped drainage system	1 in 20 years
ARI design event for roof drainage	1 in 100 years
ARI design event for surface runoff	1 in 100 years
Depth x velocity for overland flow paths	0.4 m2/s max.

5 Description of the Proposed Stormwater System

The proposed stormwater system for 1 Murray Rose Avenue can be described as follows:

- All roof water, including stormwater from the communal areas, is to be collected and piped directly into the splitter pit located at the basement B1 level. The stormwater from the splitter pit is then directed to the Jellyfish model JF -3250-28-5 by Stormwater 360, comprising 28 high flow cartridges (5l/s per cartridge) and 5 Drain down cartridges (2.5l/s per cartridge). Once the capacity of the Jellyfish filtration system (152.5 l/s) has been reached, the stormwater will be diverted via Diversion splitter pit to the stormwater collection pit SWP-1/ B1-8.
- Stormwater from the open ramp area is collected by GPT located in the stormwater pit SWP-1/B1-6, which is connected to Grated Drain GD -1/B1-1 on Level B1. One Enviropod unit by Stormwater 360 is proposed as a GPT structure.
- Flows from this GPT, as well as all basement driveway surface drainage areas, are then directed to an oil separator located on Level B3, installed to separate oil/ grease from the stormwater before it is discharged to the stormwater system (basement pump out pit).
- The Subsoil drainage will also be connected to the pump out pit at level B3. The pump out system is designed in accordance with the requirements of AS3500 and include holding well capable of storing 100 year ARI storm event of 2-hour duration and two pumps connected in parallel. Pipe from the pump out pit will be connected to the Jellyfish filtration system via the Splitter pit.
- The Jellyfish filtration unit is connected to a 70 kl Rainwater tank (RWT), details of which are given in Section 5 above. The harvested rainwater will be utilised for irrigation as per BASIX requirements.
- Overflow from the rainwater tank system comprises 375 dia. pipe which is connected to the stormwater collection pit SWP-1/ B1-8 via SWP-1/B1-5.
- Pits from the deep soil zone at level B1 are connected directly to the stormwater collection pit via pit SWP-1/ B1-5
- Stormwater collection pit is connected to the existing stormwater kerb inlet pit SWP-1/B1-9 as per drawing no. 80818416-CI-1003 Rev.2

The proposed stormwater system for 2 Murray Rose Avenue can be described as follows:

- All roof water, including stormwater from the communal areas, is to be collected and piped directly into the SWP-2 / B1-6 pit located on level B1. The stormwater from the pit is then directed to the Jellyfish model JF -3250-28-5 by Stormwater 360, comprising 28 high flow cartridges (5l/s per cartridge) and 5 Drain down cartridges (2.5l/s per cartridge).
- Stormwater from open ramp area is collected by GPT located in the stormwater pit SWP-2/B1-5, which is connected to Grated Drain GD -2/B1-1 on Level B1. One Enviropod unit by Stormwater 360 is proposed as a GPT structure. Flows from the GPT are directed to SWP- 2/B1-6.
- Flows from this GPT, as well as all basement driveway surface drainage areas, are then directed to an oil separator located on Level B3, installed to separate oil/ grease from the stormwater before it is discharged to the stormwater system (basement pump out pit).
- The Subsoil drainage will also be connected to the pump out pit at level B3. The pump out system is designed in accordance with the requirements of AS3500 and include holding well capable of storing 100 year ARI storm event of 2-hour duration and two pumps connected in parallel. Pipe from the pump out pit will be connected to the Jellyfish filtration system via pit SWP-2/B1-6.
- The Jellyfish filtration unit is connected to a 50 kl Rainwater tank (RWT), details of which are given in Section 5 above. The harvested rainwater will be utilised for irrigation as per BASIX requirements.
- Overflow from the rainwater tank system comprises 375 dia. pipe which is connected to the stormwater collection pit SWP-2/B1-4.
- The Stormwater collection pit is connected to the existing stormwater kerb inlet pit SWP-2/B1-7 as per drawing no. 80818416-CI-2003 Rev.2

6 Rainwater Harvesting

Locally harvested rainwater is the primary source primary source of non-potable water for proposed developments to minimise the impact of stormwater quality on sensitive receiving waters and conserve potable water supplies.

- At least 90% of roof will be connected to the rainwater storages for each site which will supply non-potable water re-use from this source.
- Rainwater supply scheme will be supplemented with the recycled water as a back-up to rainwater supply connected to the park's Water Reclamation and Management Scheme (WRAMS) recycled water supply
- A minimum of 0.25 kL rainwater storage is supplied per apartment/ dwelling and an additional 1kL of rainwater storage per 100m²of non-residential net floor area.

Non potable water demands at Sydney Olympic Park are defined as approved uses of the re-use water include irrigation, car washing, toilet flushing, water features, washing machines and cooling towers.

Rainwater Storage Calculations

Table 6-1 Rainwater Storage Calculations

Site	Total Site Area (m^2)	Residential Floor Area (m^2)	Non-Residential Floor Area (m^2)	No. of Dwellings	Calculated Storage (kL)	Provided Storage (kL)
1	3931	1137	2794	167	69.69	70
2	2522	897	1625	126	47.75	60

Calculations are based on SOPA Stormwater Management and Water Sensitive Urban Design Policy [POL13/4]

Reuse rates are determined by the BASIX Certification. Approved re-use includes irrigation, car washing, toilet flushing, water features, washing machines and cooling towers.

The rainwater tanks will be located at B1 level of both buildings. They will be constructed of reinforced walls and slabs as an integral part of the Basement B1 and ground floor structures.

Maintenance access will be provided at Ground floor level.

7 Stormwater Quality

In order to assess water quality and potable water demand, a MUSIC computer model was developed to demonstrate compliance with Sydney Olympic Park Authority Policy.

Performance criteria for stormwater quality is specified in Sydney Olympic Park Authority – Stormwater Management & Water Sensitive Urban Design Policy October 2016 and discussed in Section 4 of this report.

7.1 Base Information

The MUSIC model was prepared in computer model Version 6.2 in accordance with the Sydney Olympic Park Music Modelling Guideline October 2016.

Historical pluviography data was taken from Meteorology Station Number 66037 at the Sydney Airport Station as per Sydney Olympic Park Music Guidelines, October 2016.

Over 10 years of historical rainfall data for the period from 1 January 1988 to 31 December 1998 was analysed in 6-minutes time steps. The average annual rainfall over this period was 1,084mm.

7.2 Source Nodes

Pollutant loads for source nodes were adopted from Table 3 and 4 of the Sydney Olympic Park Music Modelling Guideline.

Stochastic pollutant generation was selected.

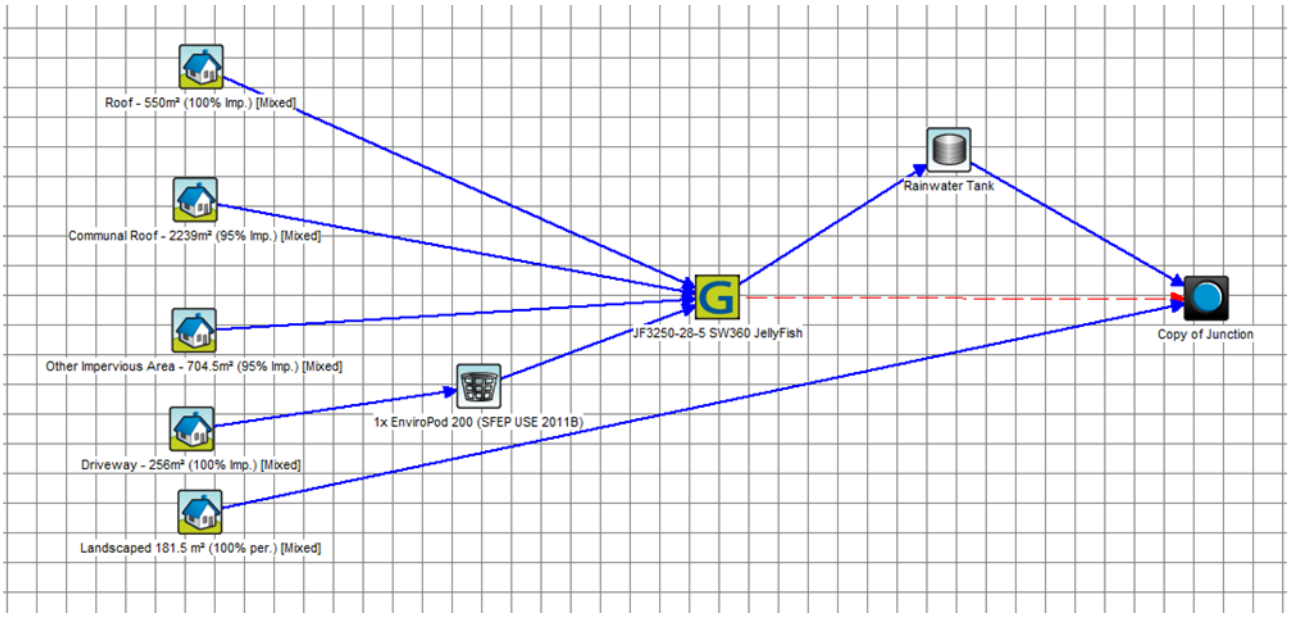
7.3 Treatment Nodes (Building 1)

Two treatments nodes are proposed as part of the water cycle treatment train:

- Stormwater 360 1x EnviroPod 200 (SFEP Use 2011B)
- Jellyfish Filter JF 3250 -28-5 by Stormwater 360

A 1 x EnviroPod is located in the stormwater pit near grated drain in basement B1. Jellyfish filer is located in the Basement B2.

Figure 7-1 Music Source Nodes (Building 1)



7.3.1 EnviroPod

EnviroPod treatment devices are proposed as a pre-treatment device in treatment train for the development to target suspended solids and hydrocarbons/oil. EnviroPod is easily maintained catch pit insert that captures and retains litter, debris and other pollutants as runoff enters the storm drain system.

Sizing of the device has been undertaken by Stormwater 360 with 200micron 300mm deep Enviro Pod in 450 SQ pit is proposed.

7.3.2 Stormwater 360 Jellyfish Filter JF 3250-28-5

A Stormwater 360 'Jellyfish' stormwater treatment device is proposed to treat stormwater runoff following discharge from the site Roof, Impervious area and Communal roof areas. The Jellyfish product is relatively new to stormwater 360 and provides effective treatment over a very small footprint.

The Jellyfish is available in a number of configurations. The Jellyfish treatment node within the Music model was provided by Stormwater 360. A Jellyfish model JF 3250-28-5 was selected to provide suitable treatment of Stormwater Runoff from the site.

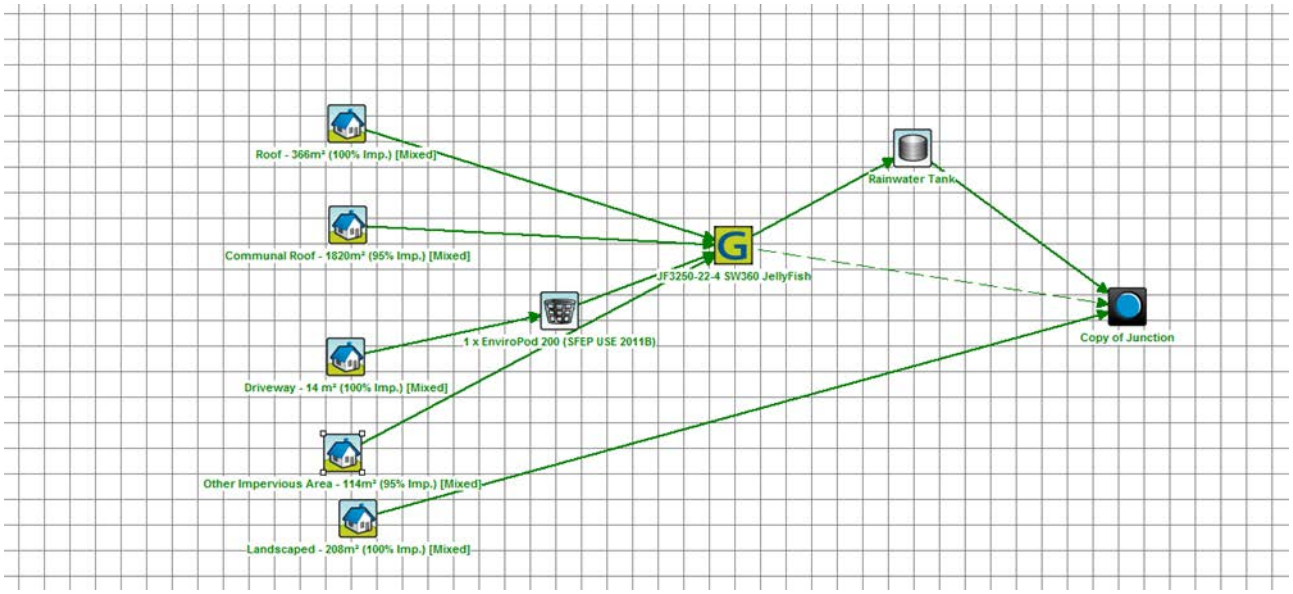
7.4 Treatment Nodes (Building 2)

Two treatments nodes are proposed as part of the water cycle treatment train:

- Stormwater 360 1x EnviroPod 200 (SFEP Use 2011B)
- Jellyfish Filter JF 3250 -28-5 by Stormwater 360

A 1 x EnviroPod is located in the stormwater pit near grated drain in basement B1. Jellyfish filer is located in the Basement B2.

Figure 7-2 Music Source Nodes (Building 2)



7.4.1 EnviroPod

EnviroPod treatment devices are proposed as a pre-treatment device in treatment train for the development to target suspended solids and hydrocarbons/oil. EnviroPod is easily maintained catch pit insert that captures and retains litter, debris and other pollutants as runoff enters the storm drain system.

Sizing of the device has been undertaken by Stormwater 360 with 200micron 300mm deep Enviro Pod in 450 SQ pit is proposed.

7.4.2 Stormwater 360 Jellyfish Filter JF 3250-28-5

A Stormwater 360 'Jellyfish' stormwater treatment device is proposed to treat stormwater runoff following discharge from the site Roof, Impervious area and Communal roof areas. The Jellyfish product is relatively new to stormwater 360 and provides effective treatment over a very small footprint.

The Jellyfish is available in a number of configurations. The Jellyfish treatment node within the Music model was provided by Stormwater 360. A Jellyfish model JF 3250-28-5 was selected to provide suitable treatment of Stormwater Runoff from the site.

7.5 Results

Results of the MUSIC model show the performance of the nominated treatment trains exceed the pollutant removal targets outlined in Sydney Olympic Park Authority- Stormwater management & Water Sensitive Urban Design Policy October 2016- Attachment 1 Part 2. Table 6-1 and Table 6-2 present a summary of the MUSIC model results on both buildings.

Table 7-1 Summary of MUSIC Model Results – Building 1

Element	Minimum Reduction	Achieved Reduction	Comments
Total Suspended Solids (TSS)	90%	96 %	Treatment exceeds minimum
Total Phosphorus (TP)	85%	85.2 %	Treatment exceeds minimum
Total Nitrogen (TN)	65%	82.8 %	Treatment exceeds minimum
Total Hydrocarbons (TPH)	90%	99 %	Treatment exceeds minimum
Gross Pollutants	95%	100 %	Treatment exceeds minimum

Table 7-2 Summary of MUSIC Model Results – Building 2

Element	Minimum Reduction	Achieved Reduction	Comments
Total Suspended Solids (TSS)	90%	94.5 %	Treatment exceeds minimum
Total Phosphorus (TP)	85%	86.9 %	Treatment exceeds minimum
Total Nitrogen (TN)	65%	85.7 %	Treatment exceeds minimum
Total Hydrocarbons (TPH)	90%	98.7 %	Treatment exceeds minimum
Gross Pollutants	95%	100 %	Treatment exceeds minimum

8 Stormwater Quantity

SOPA Stormwater Management & Water Sensitive Urban Design Policy requires that On-Site Detention system (OSD) be provided in a suitable drainage design to attenuate the peak flows from the development.

Both sites are located in the immediate vicinity of the receiving Bennelong Pond. In Cardno's opinion, it would be beneficial if the stormwater discharge from the proposed development was released as early as possible, i.e. without detention, so as not to combine with the upstream flows.

This was communicated to SOPA, and their advice was that On-Site Detention could be waived, subject to the WSUD design compliance with the extended water quality targets specified in SOPA's Stormwater Management and Water Sensitive Urban Design Policy.

As demonstrated in Section 7 above, the proposed WSUD system achieves the targets. Therefore, no OSD has been proposed for both sites.

9 Tailored Ecological Protection Measures

There are no known or identified ecological habitats or species of particular significance in the vicinity of the site. The proposed development incorporates devices to improve water quality and restrict flows from the site to predevelopment levels thus protecting the downstream, receiving network.

10 Responsibility

Austino Property Group will be responsible for the supervision, construction, establishment and commissioning of the proposed water sensitive urban design measures. The works will be undertaken by suitably qualified and experienced contractors with ultimate responsibility lying with the owner of the property. Contractors that will work under the supervision of the owner will be determined following the issuance of the Development Application.

11 Maintenance

Regular inspection and maintenance of water sensitive urban design measures is a critical factor in ensuring the proper ongoing operation of the devices.

A brief summary of inspection and maintenance activities is listed in Table 11-1.

Table 11-1 Summary of Inspection and Maintenance Activities

Element	Activity and Interval
Stormwater grates, rainwater inlets from roof gutters, podium slab, grated drains etc.	Remove any accumulated debris. Note that debris may be on both sides of the grate for pits associated with the on-site detention storage.
Stormwater pits	Remove any accumulated debris. Note that debris may be in the pit invert or impacting inlet or outlet pipes.
Enviropod	Inspections and subsequent minor maintenances on a regular basis for 12 times per year, and immediately after major storms. Major maintenance 2-6 times per year. Maintenance and clearing of the device should be conducted in accordance with the manufacturer's recommendations.
Stormwater 360 Jellyfish Filter	A minimum of two inspections during the first year of operation to assess the sediment and floatable pollutant accumulation, and to ensure proper functioning of the system. Inspection frequency in subsequent years is based on the inspection and maintenance plan developed in the first year of operation. Minimum frequency should be once per year. Inspection is recommended after each major storm event. Inspection is recommended immediately after an upstream oil, fuel or other chemical spill. Maintenance and clearing of the device should be conducted in accordance with the manufacturer's recommendations.

Note that the above intervals are indicative only. Maintenance frequencies and requirements are site specific and vary depending on pollutant loading. Maintenance activities may be required in the event of an upstream chemical spill or due to excessive sediment loading from site erosion or extreme runoff events. It is a good practice to inspect the system after major storm events.

12 References

Auburn Local Environmental Plan 2010, July 2010

BASIX Certificate prepared by Cardno, October 2018

BMT WBM Pty Ltd, Draft New South Wales MUSIC Modelling Guidelines, August 2010

Proposed Development Murray Rose Avenue Flood Assessment, by GRC Hydro Pty Ltd, July 2018

Sydney Olympic Park Authority – Stormwater Management & Water Sensitive Urban Design Policy, October 2016

Stormwater360, Jellyfish Filter Owner's Manual

Stormwater360, Operations and Maintenance: EnviroPod

APPENDIX

A

CONCEPT CIVIL ENGINEERING DRAWING LIST FOR DEVELOPMENT APPLICATION APPROVAL

No.	Drawing Title	Drawing No.	Revision
1	COVER SHEET	80818416-CI-0001	A
2	GENERAL NOTES	80818416-CI-0002	A
3	LEVEL B3 STORMWATER PLAN BUILDING 1	80818416-CI-1001	A
4	LEVEL B2 STORMWATER PLAN BUILDING 1	80818416-CI-1002	A
5	LEVEL B1 STORMWATER PLAN BUILDING 1	80818416-CI-1003	A
6	LEVEL L00 STORMWATER PLAN BUILDING 1	80818416-CI-1004	A
7	LEVEL L08 STORMWATER PLAN BUILDING 1	80818416-CI-1010	A
8	LEVEL L12 STORMWATER PLAN BUILDING 1	80818416-CI-1014	A
9	BULK EXCAVATION & SEDIMENTATION AND EROSION CONTROL PLAN BUILDING 1	80818416-CI-1020	A
10	JELLYFISH JF3250 BUILDING 1	80818416-CI-1031	A
11	SPLITTER DDIVERSION PIT BUILDING 1	80818416-CI-1032	A
12	TRENCH GRATE WITH ENVIROPOD IN GULLY PIT CONFIGURATION BUILDING 1	80818416-CI-1033	A
13	LEVEL B3 STORMWATER PLAN BUILDING 2	80818416-CI-2001	A
14	LEVEL B2 STORMWATER PLAN BUILDING 2	80818416-CI-2002	A
15	LEVEL B1 STORMWATER PLAN BUILDING 2	80818416-CI-2003	A
16	LEVEL L00 STORMWATER PLAN BUILDING 2	80818416-CI-2004	A
17	LEVEL L01 STORMWATER PLAN BUILDING 2	80818416-CI-2005	A
18	LEVEL L08 STORMWATER PLAN BUILDING 2	80818416-CI-2010	A
19	LEVEL L15 STORMWATER PLAN BUILDING 2	80818416-CI-2017	A
20	BULK EXCAVATION & SEDIMENTATION AND EROSION CONTROL PLAN BUILDING 2	80818416-CI-2020	A
21	JELLYFISH JF3250 BUILDING 2	80818416-CI-2031	A
22	TRENCH GRATE WITH ENVIROPOD IN GULLY PIT BUILDING 2	80818416-CI-2033	A
23	STORMWATER DETAILS BUILDING 1 & 2	80818416-CI-3001	A

24	SEDIMENTATION END EROSION CONTROL DETAILS BUILDING 1 & 2	80818416-CI-3002	A