JHA

Water Cycle Management Plan

2 Figtree Drive,

Sydney Olympic Park (Site 53)

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Document Control Sheet

Title	Water Cycle Management Plan
Project	2 Figtree Drive, Sydney Olympic Park
Description	Residential Development
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Contents

1. INTRODUCTION

The site is located at 2 Figtree Drive, Sydney Olympic Park (SOPA Site 53) & currently consists of an existing two level commercial building with external car parking and landscaped areas which is proposed to be completely demolished and replaced with a new residential precinct consisting of 705 residential units across four residential towers, approximately 1500m^2 of retail space with underground car parking.

The proposed site is located within the Sydney Olympic Park Authority (SOPA) Masterplan 2030 Town Centre Central Precinct. The site is bounded by Figtree Drive to the north, Australia Avenue to the east, the Olympic Sprint Lidcombe Shuffle railway corridor to the south and a Fujitsu Data Centre to the west at 4 Figtree Drive.

The development site is located within the Auburn City Council Local Government Area (LGA), however the SOPA Stormwater Management and Water Sensitive Urban Design Policy[1] (The Stormwater Policy) provides the framework for the proposed design.

The SOPA Water Reclamation and Management Scheme[2] (WRAMS) system provides a recycled water service for developments within the Park and its surrounding areas.

Figure 1 - Site location at 2 Figtree Drive, Sydney Olympic Park

[1] http://www.sopa.nsw.gov.au/__data/assets/pdf_file/0008/950480/Stormwater_Management_Policy.pdf

[2] http://www.sopa.nsw.gov.au/__data/assets/pdf_file/0019/344620/urban_water_reuse_brochure_2006.pdf

2. SOPA POLICY & COMPLIANCE

2.1 POLICY INTENT

The "SOPA Stormwater Management and Water Sensitive Urban Design Policy" (version 1, dated January 2015) states the following:

- Locally harvested rainwater shall be the primary source of non- potable water for developments located within a Sydney Olympic Park non- potable stormwater harvesting catchment.
- Where practical, at least 90% of non- potable demand shall be met from this source, which may be supplemented by recycled water, as a back-up of harvested rainwater is insufficient to meet demand,

2.2 COMPLIANCE

Locally harvested rainwater is proposed to be used as the primary source of non- potable water uses, for the 2 Figtree Drive, residential development.

Non – potable water uses are to include:

- Fixture flushing (water closets & urinals),
- Washing machine connection points
- Fire hose reels
- Wash down hose taps
- Landscape irrigation
- Seepage Water Dilution

Due to the limited roof catchment area, in comparison to the high non- potable water demands, preliminary water balancing analysis has indicated that it is impractical to meet 90% of the proposed developments non-potable water demands. A rainwater tank model analysis has indicated that the optimal rainwater harvesting tank size to be in the order of 150 kilolitres, which satisfies 11% of the sites overall non –potable water demands. Refer to section 3.4 RAINWATER TANK MODELLING for rainwater tank sizing analysis.

3. RAINWATER HARVESTING

3.1 STRATEGY

The residential development at 2 Figtree Drive is proposed to adopt the following rainwater harvesting and re-use strategy:

1. All building roof runoff is proposed to be collected and discharged to a centralised rainwater harvesting tank
2. A first flush diverter is proposed to pre-treat collected roof water, prior to discharging to the centralised rainwater harvesting tank.
3. Captured rainwater is proposed to be treated via a 3 stage filtration system, consisting of automatic back wash filters (100 micron), bag wash filters (25 - 5 micron) and UV disinfection.
4. The treated rainwater will be stored in a separate "filtered water tank"
5. Booster pumps will supply treated rainwater from the filtered water tank to all re-use applications, including:
    a. Fixture flushing (water closets & urinals),
    b. Washing machine connection points
    c. Fire hose reels
    d. Wash down hose taps
    e. Landscape irrigation
    f. Seepage Water Dilution
6. The SOPA WRAMS system will top-up the filtered water tank, should it fall below 10% capacity

3.2 ROOF CATCHMENT AREAS

The available roof catchment areas have been summarised below:

Building 1 –	620m^2
Building 2 –	1,263m^2
Building 3 –	761m^2
Building 4 –	1,272m^2
Total roof area for collection =	**3,916m^2**

3.3 NON-POTABLE WATER DEMANDS

3.3.1 Assumptions

Non potable water demands have been based on the following assumptions:

- The residential buildings will consume an average of 48 litres, per bedroom, per day, as recommended within SOPA's Rainwater Tank Guideline, 2016
- A yearly allowance of 0.84 kilolitres per square metre has been made for the future supermarket tenancy, as recommended within SOPA's Rainwater Tank Guideline, 2016
- Lawn areas are expected to require a daily non- potable water demand of 2.28 litres per square metre. The demands have been provided by an independent irrigation contractor.
- Garden areas are expected to require a daily non- potable water demand of 1.73 litres per square metre. The demands have been provided by an independent irrigation contractor.
- The average daily seepage inflow has been estimated to be 1000 litres per day. In order to discharge to the stormwater drainage system, the collected seepage water must be diluted at a ratio of 10:1. This equate to an average daily demand of 10 kilolitres.

3.3.2 Estimated Non- Potable Water Demands

The table below provides a summary of the estimated non- potable water demands for the proposed development:

Table 2 – Non- Potable Water Demands

Type	Unit	Allowance Per Unit (litres per day)	Unit Quantity	Sub Total (kL)
1 Bed Apartment	Beds	48.00	279	13.39
2 Bed Apartment	Beds	48.00	334	32.06
3 Bed Apartment	Beds	48.00	91	13.10
4 Bed Apartment	Beds	48.00	1	0.19
Supermarket	m²	2.30	1,500	3.45
Landscape Irrigation- Lawn Areas	m²	2.28	540	2.28
Landscape Irrigation- Garden Areas	m²	1.73	2,335	1.73
Seepage Water Dilution	1	10,000	1	10.0
Total Daily Average Non- Potable Demand- Kilolitres				77.47

3.4 RAINWATER TANK MODELLING

3.4.1 Assumptions

Rainwater Tank Modelling results have been based on the following assumptions:

- Rainwater tank model has been based on weather data collected for Ryde Pumping Station Gauge (066057), weather station, as downloaded from Bureau of Meteorology.
- The analysis was undertaken for a period of 50 years, commencing 1st January 1925
- A runoff co-efficient of 95% was adopted.
- The first flush diverters have been sized to divert the first 15 litres of water for every 100m² of roof area.

3.4.2 Results of Analysis

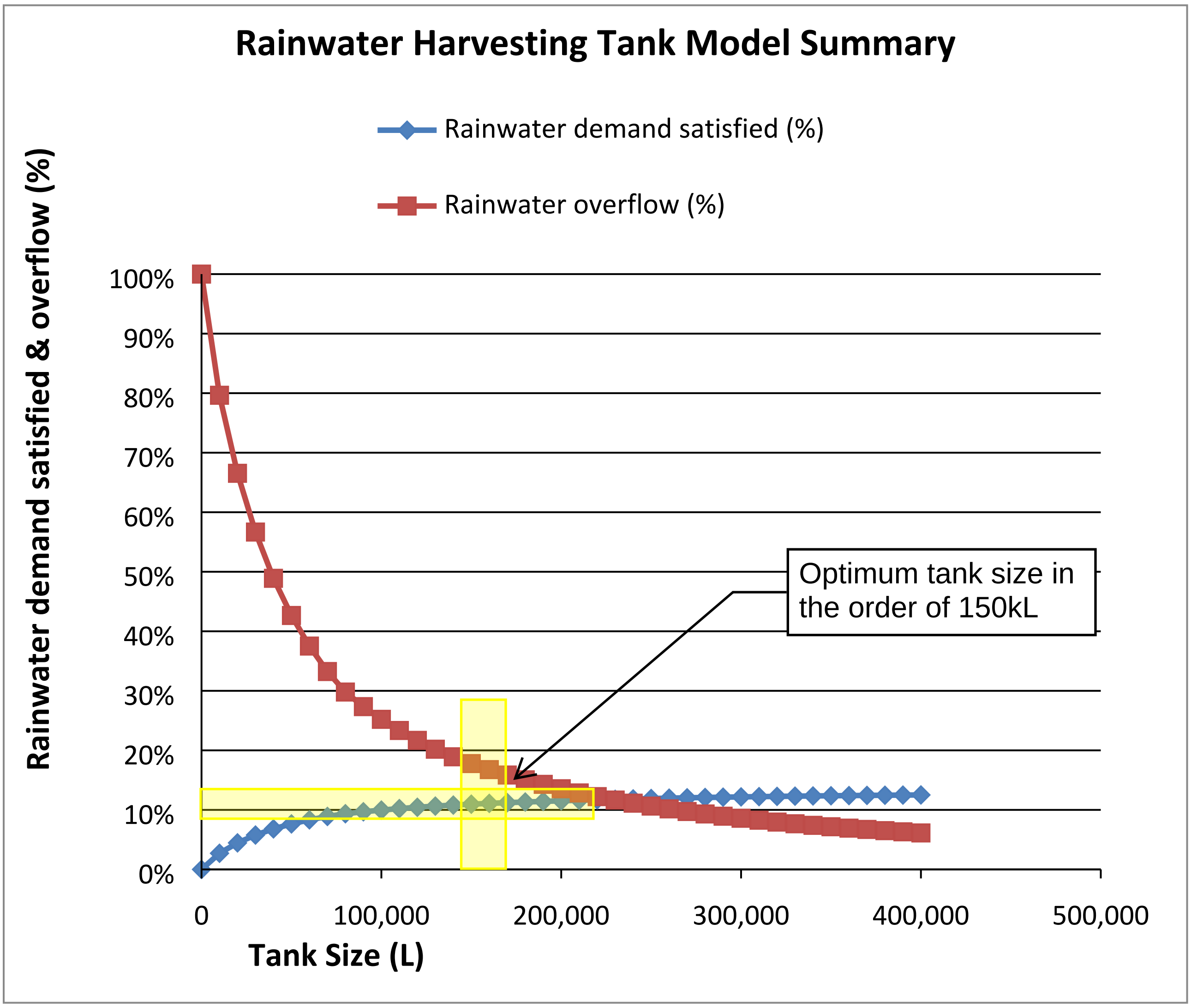

Figure 3 – Rainwater Tank Sizing Analysis

3.4.3 Optimum Rainwater Tank Size

Based on the results of the rainwater tank sizing analysis, the optimum tank size has been calculated to be in the order of 150 kilolitres, which achieves the following:

- Satisfies an average of 11% of the sites proposed non- potable water demands
- Captures an average of 82% of the available roof water run-off

3.5 RAINWATER HARVESTING & RE-USE CONCEPT

The figure below provides an overview of the proposed rainwater harvesting and re-use concept.

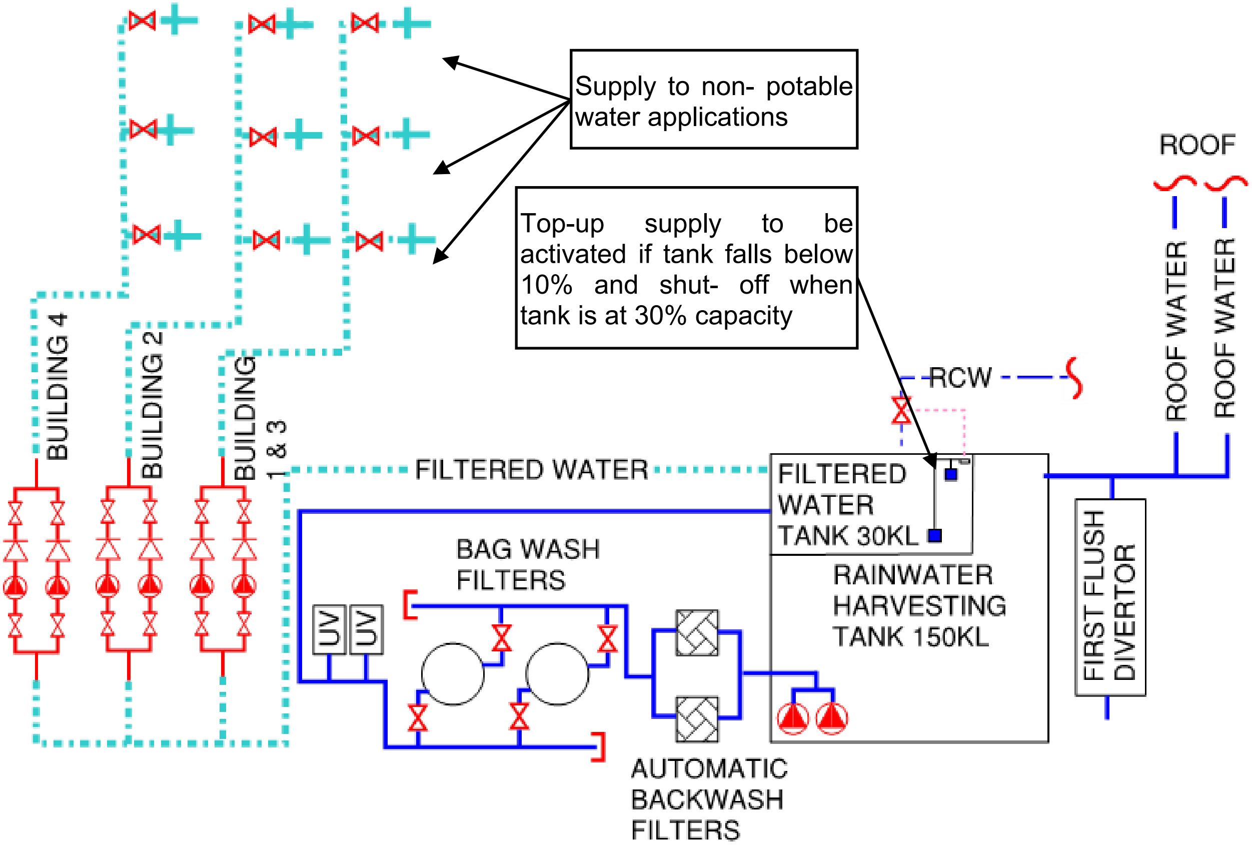

Figure 4 – Schematic layout of rainwater harvesting and re-use strategy

4. SEEPAGE WATER

4.1 GROUND WATER INVESTIGATIONS

The report prepared by JBS&G, 4th November 2016 provides a summary of the additional ground water investigations undertaken for the site. The report identifies the following key issues:

- Seepage rates for the basement are expected to be in the order of 1.0 kilolitre per day
- The concentrations of ammonia reported for all groundwater wells exceeds the criteria relevant for discharge to stormwater. The concentration of ammonia are indicated to be 10 times the allowable limit

The report recommends that the high ammonia concentration could potentially be accommodated for by:

1. Treatment prior to disposal to stormwater. This is however indicated as being relatively expensive in both capital and ongoing costs and is therefore not seem as being viable
2. Dilution of seepage water, with non- potable water prior to disposal
3. Discharge directly to Sydney Water's sewer system, under an industrial trade waste agreement. Discussion with Sydney Water have indicated that this would incur a cost of approximately $29,000, per annum. Due to the significant ongoing costs, which the future owners would incur, this option is seen as being not viable.

4.2 SEEPAGE WATER STRATEGY

Based on the ground water investigation report, the preferred option for dealing with the high concentration of ammonia is to dilute the collected water, with non- potable water prior to discharging to the stormwater drainage system.

The proposed seepage water strategy, can be summarised as follows:

1. Seepage water entering the basement perimeter walls and slabs is proposed to be captured by a common pump out pit, located below the basement 4 slab.
2. Collection of seepage water is proposed to be via sub- soil drainage pipe, perimeter spoon drains and drainage cells.
3. A gross pollutant trap/ oil separator shall be located directly upstream of the common pump-out pit to remove all sediments and oils from entering the pit
4. Float switches located in the pump out pit will be set to:
5. Open a solenoid valve to fill the pit with non- potable water, upon the volume of the pit reaching 1,000 litres
6. Close the solenoid valve, upon the volume of the pit reaching 11,000 litres
7. Activate the pump out pit, when the volume of the pit reaches 11,000 litres

The pump out will be designed to ensure that the seepage water is diluted, with non- potable water, at a ratio of 10:1. The dilution ratio will allow the collected, diluted water to discharge to the stormwater drainage system.

4.2.1 Diagrammatic Layout of Seepage Water Pump- Out Pit

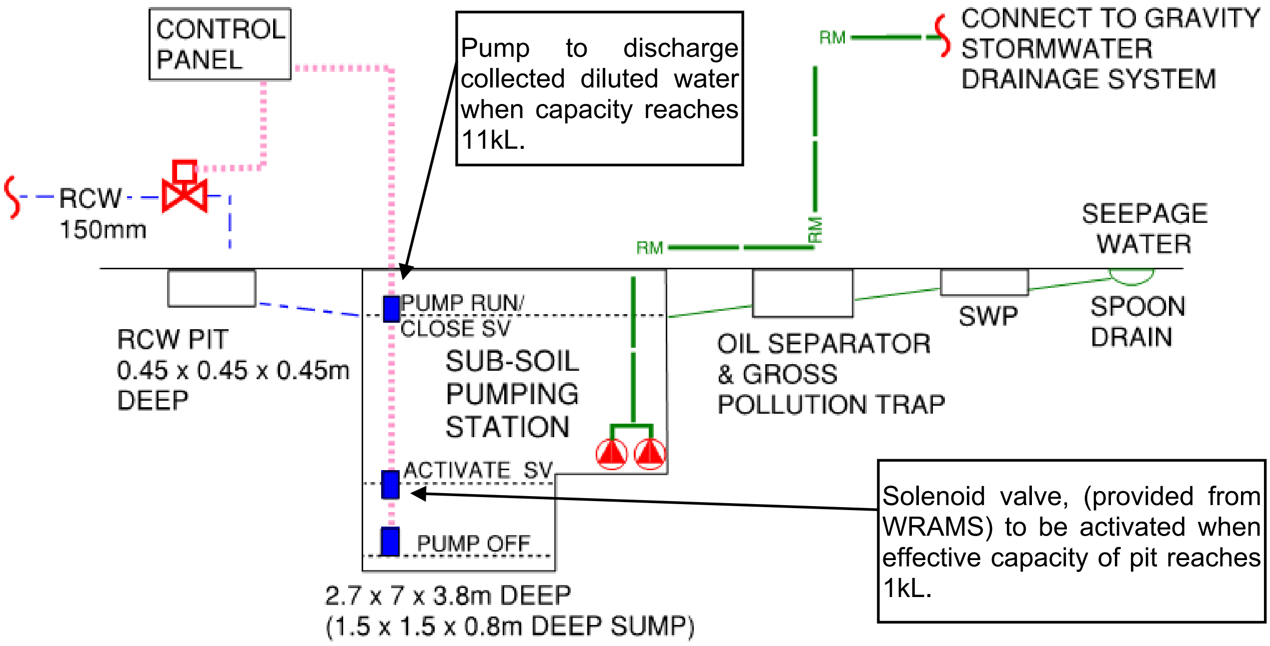

Figure 5 – Seepage Water Pump- Out Pit

5. BASIX

In accordance with all developments in NSW the BASIX[3] calculator will be used to implement energy analysis and minimum targets to be approved via local government.

The minimum water conservation targets our proposal will achieve are as follows:

- High efficiency tapware
- Low flow dual flush toilets
- Energy efficient hot water centralised systems

[3] https://www.basix.nsw.gov.au

6. CONCLUSION

This Water Cycle Management Plan has provided an overall philosophy for the collection, treatment and re-use of collected roof water for all non- potable water applications, and the use of the SOPA WRAMS recycled water mains for supplementing the harvested rainwater.

A dedicated 150kL capacity rainwater harvesting tank will capture all run-off from the roof of the 4 buildings. The captured roof water will be treated to a Class 'A' water standard (as per Australian Drinking Water design guidelines), via a 3 stage post filtration system, and will be supplied to all of the proposed site non-potable water applications including:

- Fixture flushing (water closets & urinals),
- Washing machine connection points
- Fire hose reels
- Wash down hose taps
- Landscape irrigation
- Seepage Water Dilution

The Water Cycled Management Plan also identifies how the high ammonia concentrations are proposed to be diluted, prior to discharging to the stormwater drainage system.

For on-site detention and stormwater discharge pollution control measures refer to Stormwater Management Strategy Report, prepared by BG&E.