

Integrated Water Management Plan

Kambala Sport, Wellbeing and Senior Learning Precinct (KSWSLP)

Revision 03

20th July 2020

MELBOURNE

Level 2, 616 St Kilda Rd
Melbourne, VIC 3004
P (03) 9230 5600

SYDNEY

Level 4, 73 Walker St
North Sydney, NSW 2060
P (02) 9157 0570

BRISBANE

L10/490 Upper Edward St
Spring Hill, QLD 4000
P (07) 3831 3300

CANBERRA

Ground Floor, Block E,
34 Thynne St
Bruce ACT 2617

PERTH

72 St Georges Terrace
Perth WA 6000
P (08) 9242 5857

Revision Information

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Prepared By	LCI Consultants Sydney Office Level 4 73 Walker Street North Sydney 2060
Author	Kres Mail/Deepak Naicker/Shi-En Lim/Stella Moh

Revision Schedule

Revision	Date	Issue Name	Author	Authorised
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1 Executive Summary

This report addresses key infrastructure design considerations and parameters for the proposed redevelopment of the sports precinct of Kambala School at 794 – 796 New South Head Road, Rose Bay.

This Integrated Water Management Plan seeks to address the requirements of the Planning Secretary's Environmental Assessment Requirements (SEARs) as follows:

- Prepare an integrated Water Management Plan detailing any proposed alternative water supplies, proposed end uses of potable and non-potable water, and water sensitive urban design

This report should be read in conjunction with the current set of AJ+C architectural drawings and other consultant reports sent through this application.

2 Introduction

This report supports a State Significant Development Application (SSDA) submitted to the Department of Planning, Infrastructure and Environment (DPIE) pursuant to Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act), for the proposed redevelopment of the sports precinct of Kambala School at 794 -796 New South Head Road, Rose Bay.

This application is SSD by way of clause 8 and schedule 1 under *State Environmental Planning Policy (State and Regional Development) 2011* on the basis that the development is for the purpose of an existing school and has a Capital Investment Value of more than \$20 million.

This report has been prepared having regard to the Secretary's Environmental Assessment Requirements issued for the project by DPIE, ref no SSD-10385 issued on 24 November 2019.

Pursuant to item 14 – Utilities:

- Prepare an integrated Water Management Plan detailing any proposed alternative water supplies, proposed end uses of potable and non-potable water, and water sensitive urban design

3 Background

Kambala is an independent day and boarding school for girls up to 18 years. Kambala also has an early learning centre catering for approximately 70 girls and boys aged between 6 months and 5 years. The school was established in the late 1800s and moved to the current campus in 1913. The campus has evolved in an organic and ad-hoc manner over the last 100 years as the school and its demands have grown.

A new campus-wide planning approach offers the opportunity to strategically plan for the future in a sustainable and effective manner and to preserve the unique aesthetic and heritage qualities of the campus. The preparation of a campus-wide planning approach is also consistent with the School's 2019 - 2023 Strategic Plan which identified the need for a broader strategic plan to coordinate renewal and development in a feasible and staged manner.

4 Site Description

Kambala is located at 794 -796 New South Head Road, Rose Bay and is within the Woollahra Council local government area (LGA). Situated in the eastern suburbs of Sydney, the School is approximately 8km east of the Sydney CBD. The School is located on New South Head Road which is a classified road connecting the City with the eastern beaches. The School is surrounded by predominantly residential uses.

The campus is bound by New South Head (to the east), Bayview Hill Road (to the north) and Tivoli Avenue (to the west). Fernbank Boarding House is located at 1A -3 Bayview Hill Road opposite the Kambala School grounds. No works are proposed to this part of the campus in this DA. The locational context of the School is illustrated at **Figure 1**. **Figure 2** provides an aerial map of the School and its immediate surrounds.

The School campus slopes down from New South Head Road in the east to the west and comprises a series of existing buildings in the western part of the campus that range in height and age. The south western and north western part of the campus accommodates much of the school's existing built form, while the eastern part has the school's sporting fields and courts.

The Kambala School building known as Tivoli House is in the heart of the campus. The house, its interiors, gateposts, gates and flanking walls with railing facing Tivoli Avenue, as well as 2 Norfolk Island Pines are listed as a heritage item in Woollahra Local Environmental Plan 2014 (WLEP 2014).

Within the School campus, the site of this SSDA is illustrated in **Figure 3**. The site proposed for new buildings is on top of the existing sports field and music building, as shown in green. The site proposed for demolition works and associated façade redevelopment and landscaping works is shown in red and is limited to a portion of the existing Hawthorne Building and the Arts building. The site of new landscape works is shown in yellow and includes all external spaces connecting these works. It is anticipated that the construction works will be staged, so the construction site for any given stage will be smaller than the overall site identified in **Figure 3**. The four key main buildings proposed are identified in **Figure 4**.

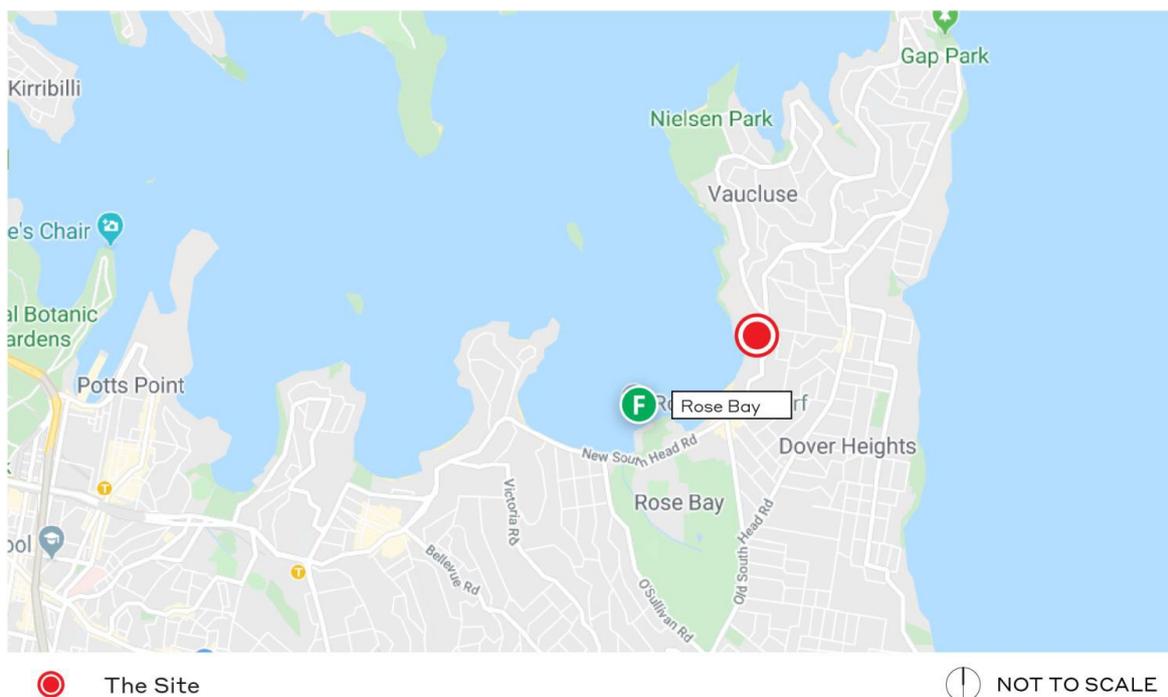


Figure 1: Kambala School Location Plan



The Site

NOT TO SCALE

Figure 2: Aerial Map of Kambala Campus

Source: Near Map

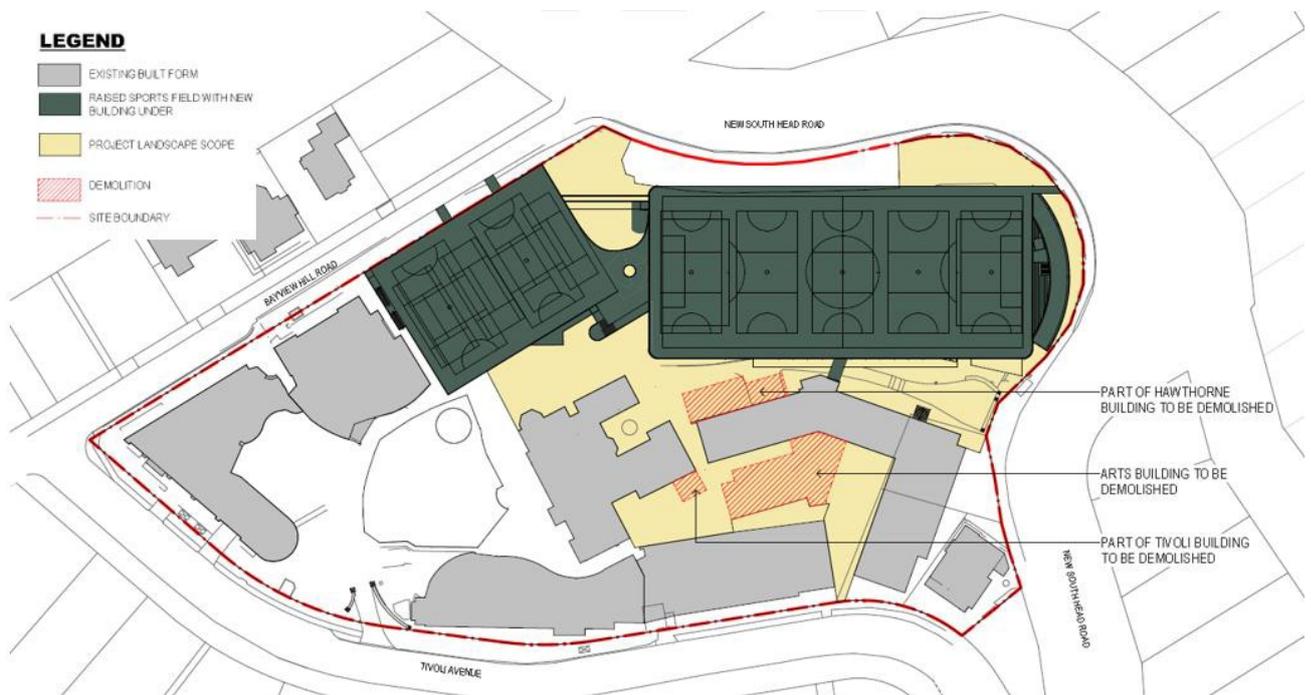


Figure 3: Project Scope

Source: AJ+C



Figure 4: Key Plan

Source: AJ+C

5 Overview of Proposed Development

This SSDA includes detailed plans for a new sport, wellbeing and senior learning precinct. Accordingly, consent is sought for the following:

- The excavation of part of the existing sports field to facilitate the construction of the following:
 - > sports facilities including weights room and dance rooms;
 - > indoor multipurpose sports courts for use by up to 1500 people;
 - > innovative and flexible teaching and learning spaces;
 - > amenities, store rooms, plant, circulation and ancillary spaces
 - > reinstatement of the sports field surface on the roof (sports field and perimeter fencing)
 - > spectator seating / bleachers;
- The removal of the tennis courts (currently on the roof of the music building), and the construction of the following:
 - > a wellbeing centre, called the SHINE centre, to accommodate the Kambala SHINE program
 - > a new staff centre, called the KITE centre, to accommodate staff workstations, meeting areas, staff development workshop rooms and amenities
 - > reinstatement of the tennis courts, lighting and perimeter fencing on the new roof
- a new eastern forecourt for the school, new external landscaped areas and new courtyards;
- minor works to the existing music building to facilitate a new connection to the new courtyard;
- the partial demolition of the Hawthorne building and the construction of a new façade, roof and landscaping; and
- the demolition of the Arts building and the construction of new facades to adjacent affected buildings, and new landscaping to the footprint of the demolished building

6 Development Water Usage

6.1 Water (Potable and Fire) Connection

Sydney Water DBYD shows an existing 150ømm main (Figure 5) reticulating on the Western side of Tivoli Avenue.

The School precinct is currently connected to this Sydney Water Infrastructure for its domestic water supply/reticulation.

The mains connection is also connected to the Fire Hydrant Booster which services a series of external Fire Hydrant. As part of the project, the mains connection will be retained and extended to the new building, and the Fire Hydrant Booster will be relocated (along with a couple of external Fire Hydrants).

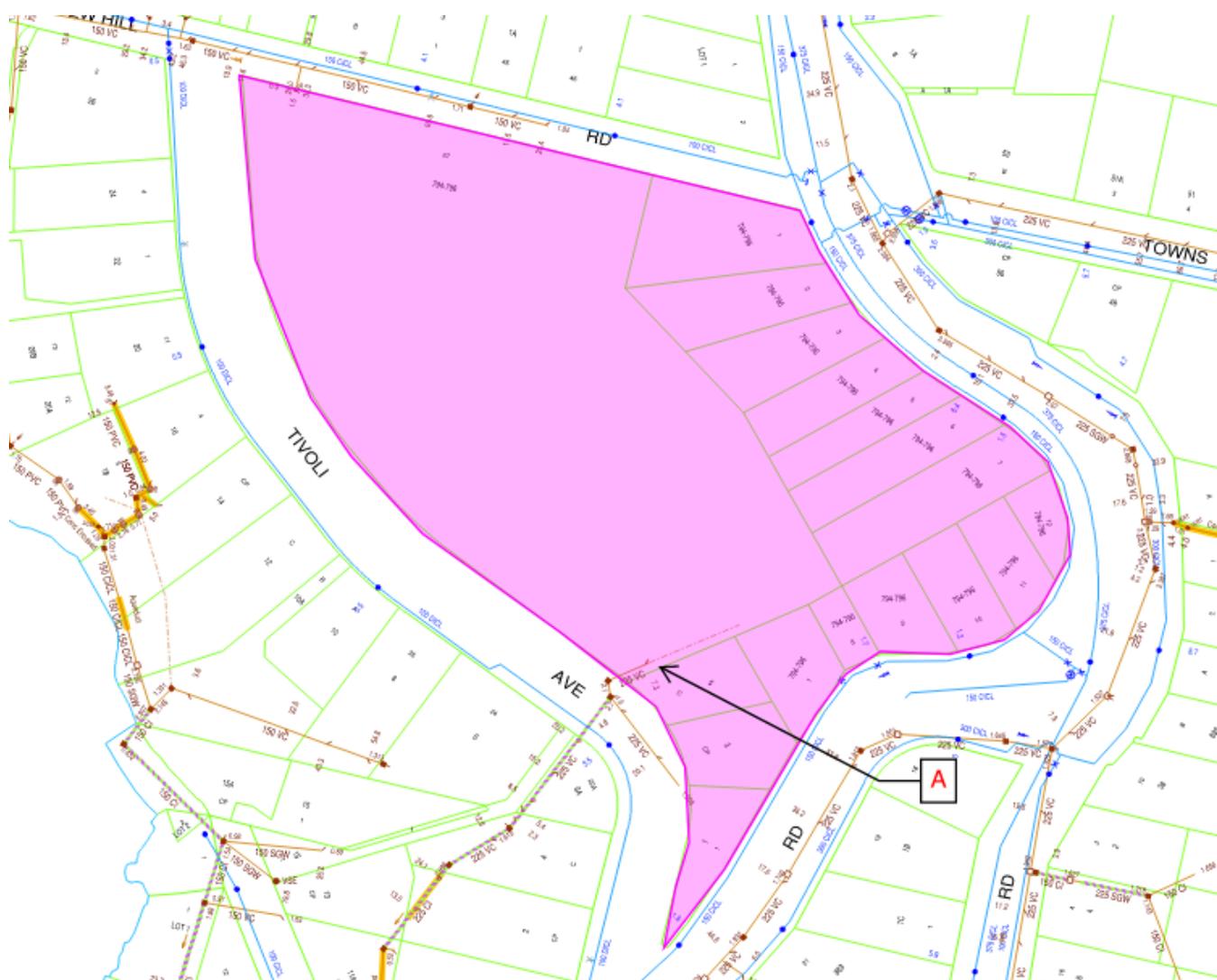


Figure 6: Sydney Water – Water & Sewer Connections

Source: DBYD, Sydney Water

6.2 Water Usage Demand

The estimated Water Usage for the project can be summarised as follow:

Location	Occupancy
Building B, C and D	<ul style="list-style-type: none"> > 18 no. Hand Basins > 13 no. Showers
Building A	<ul style="list-style-type: none"> > 9 no Hand Basins > 1 no. Showers
External	In accordance with the requirement of the BCA NCC 2019

6.3 Alternative Water Supply – Rainwater Recapture & Reuse

As part of the Hydraulic ESD Initiative, a rainwater recapture & reuse system is proposed.

The system will comprise of:

- > Rainwater will be captured on catchment on the entire sports field to maximise yield (Figure 7)

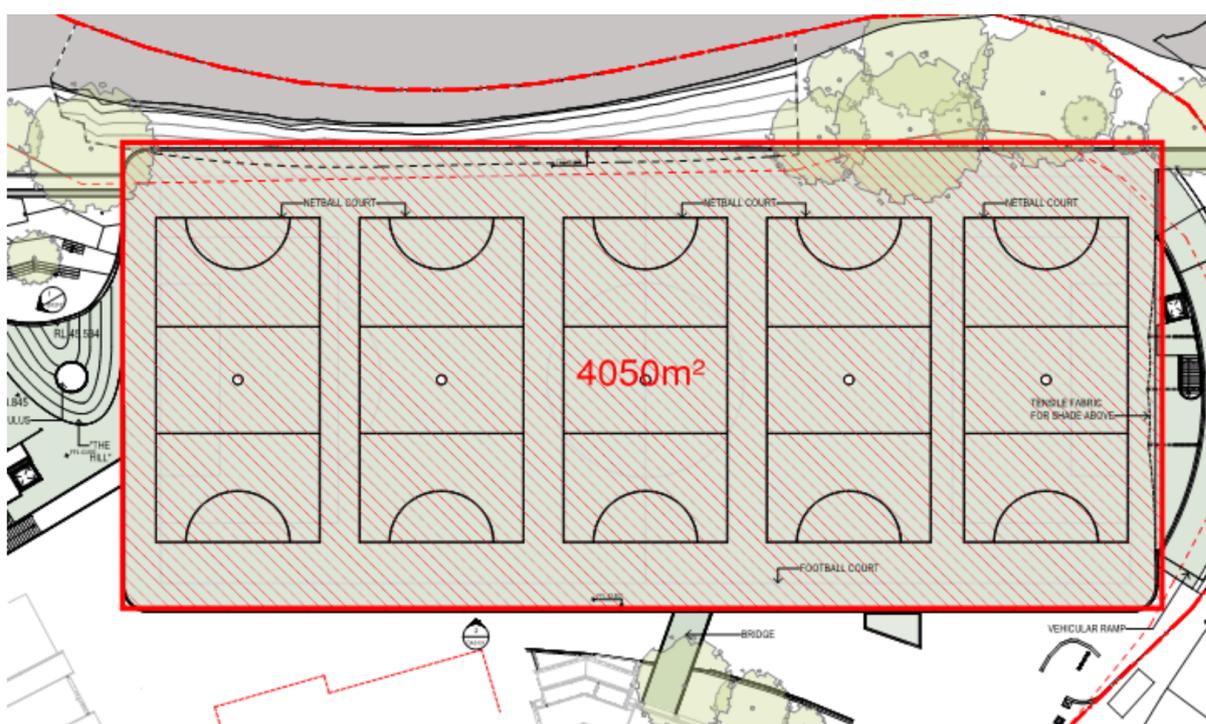


Figure 7: Rainwater Catchment

7 Rainwater Harvesting Requirements

7.1 General

Water collected from the roof will reticulate towards the rainwater harvesting tank which will then overflow towards the OSD tank on the south-east of the proposed school development and further towards the Authorities Stormwater main on Tivoli Avenue.

The tank will cater for the:

- Rainwater reuse for irrigation of approximately 500m² (requiring 2.5 litres per m² per day) – resulting in a daily demand of **1250 litres**.
- Rainwater reuse for toilet flushing with a daily demand of approximately **3.5kL** for both Sport hall and Music Building.

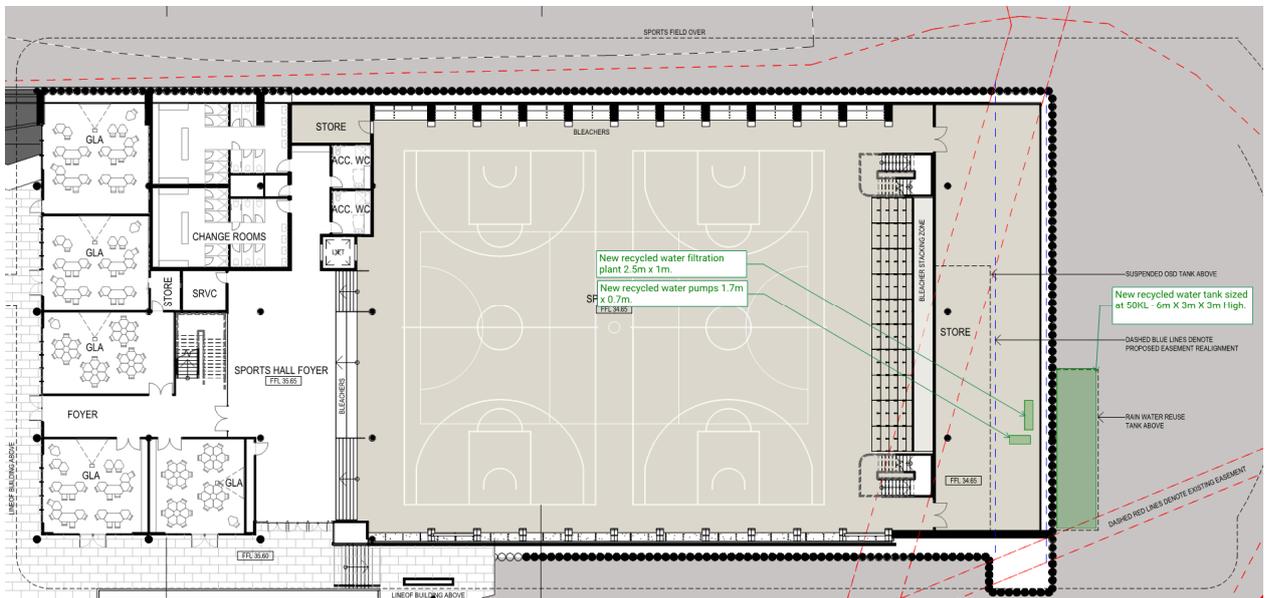


Figure 8 – Rainwater Harvesting Tank Location

7.2 Rainwater Tank Size

Option 1 – Irrigation

Tank sizing calculation and selection takes into consideration:

- The total amount of rainfall received in a 1 in 100 year storm event for a peak duration of 5 minutes – 274mm/hr
- The irrigation demands per day: 1250 Litres.
- Number of operation days a year: 300

From the above parameters, a tank design was modelled with the following results:

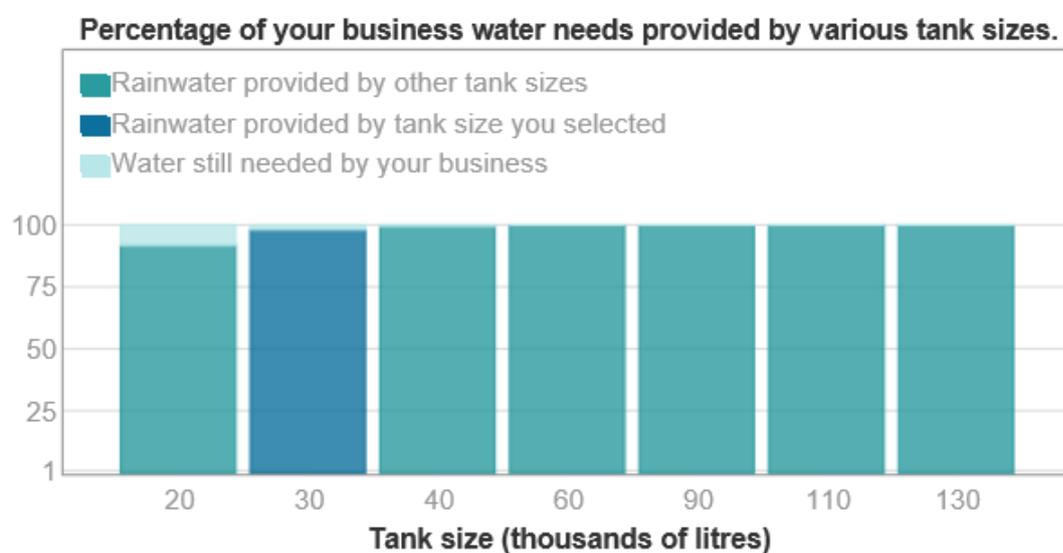


Figure 9 - Total Amount of Rainwater provided by a 30kL tank.

An 30,000 Litre tank could provide up to 98% of the rainwater needed each day during the year.

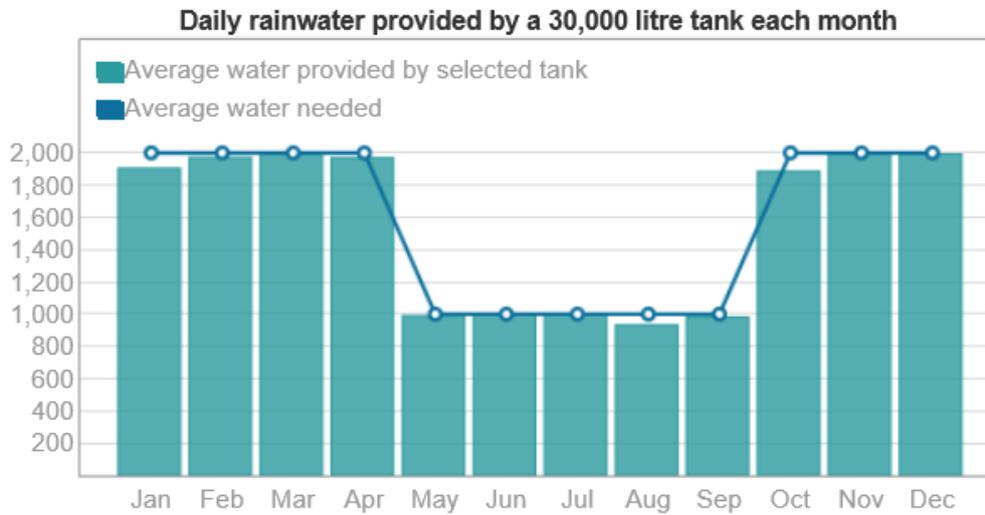


Figure 10 - Daily Rainwater provided by a 30kL tank.

The benefits of rainwater collection reduce when a certain tank size and capacity is reached. From the above two figures, it shows that an increase of tank size from 30kL to 90kL only changes the average daily capacity by 2%.

Based off this volume, the footprint of the proposed tank can be 4m x 4m x 2m.

Option 2 –Toilets

Tank sizing calculation for irrigation and toilet flushing reuse takes into consideration:

- The total amount of rainfall received in a 1 in 100 year storm event for a peak duration of 5 minutes – 274mm/hr
- Rainwater reuse for toilet flushing with a daily demand of approximately 3.5kL.
- Number of operation days a year: 300

From the above parameters, a tank design was modelled with the following results:

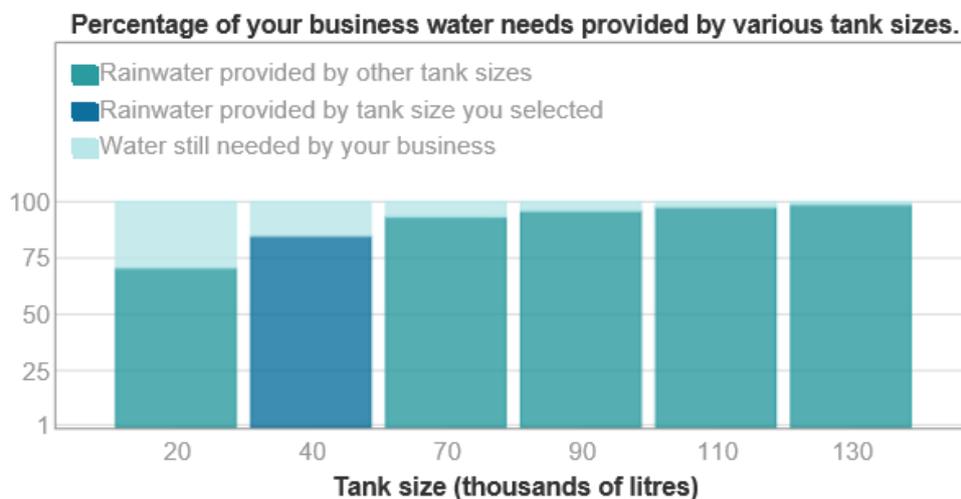


Figure 9 - Total Amount of Rainwater provided by a 40kL tank.

An 40,000 Litre tank could provide up to 85% of the rainwater needed each day during the year.

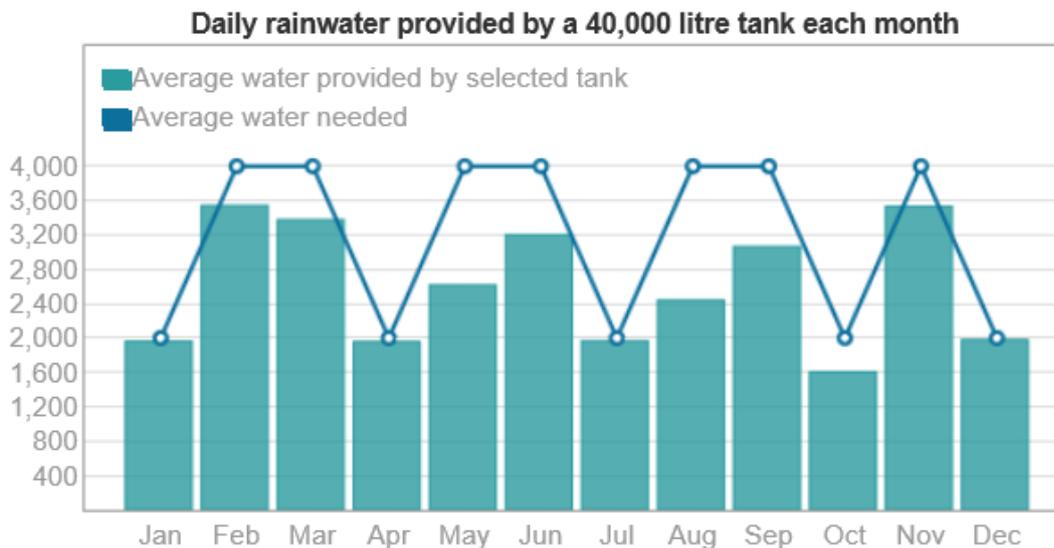


Figure 10 - Daily Rainwater provided by a 40kL tank.

The benefits of rainwater collection reduce when a certain tank size and capacity is reached. From the above two figures, it shows that an increase of tank size from 40kL to 70kL only changes the average daily capacity by 8%.

Based off this volume, the footprint of the proposed tank can be 4m x 4m x 2.5m.

Option 3 – Irrigation and Toilets

Tank sizing calculation for irrigation and toilet flushing reuse takes into consideration:

- The total amount of rainfall received in a 1 in 100 year storm event for a peak duration of 5 minutes – 274mm/hr
- The irrigation demands per day: 1250 Litres.
- Rainwater reuse for toilet flushing with a daily demand of approximately 3.5kL.
- Number of operation days a year: 300

From the above parameters, a tank design was modelled with the following results:

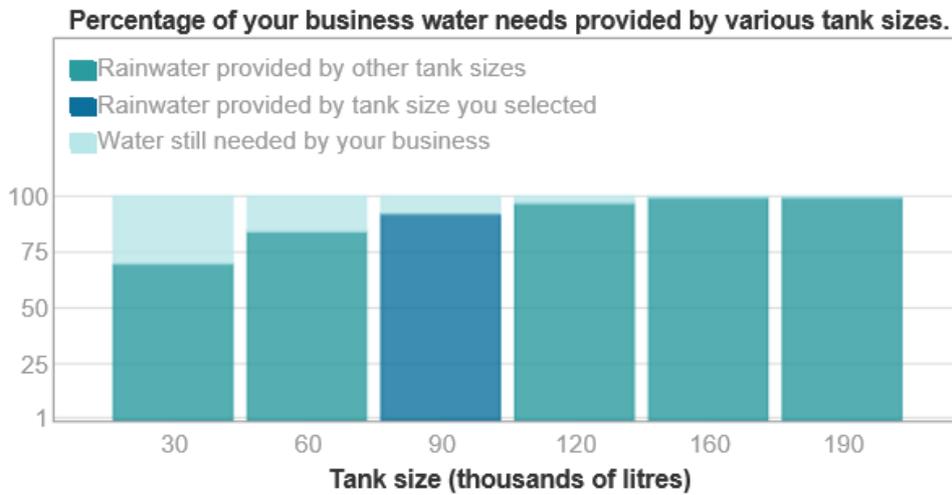


Figure 11 - Total Amount of Rainwater provided by a 90kL tank.

An 90,000 Litre tank could provide up to 92% of the rainwater needed each day during the year.

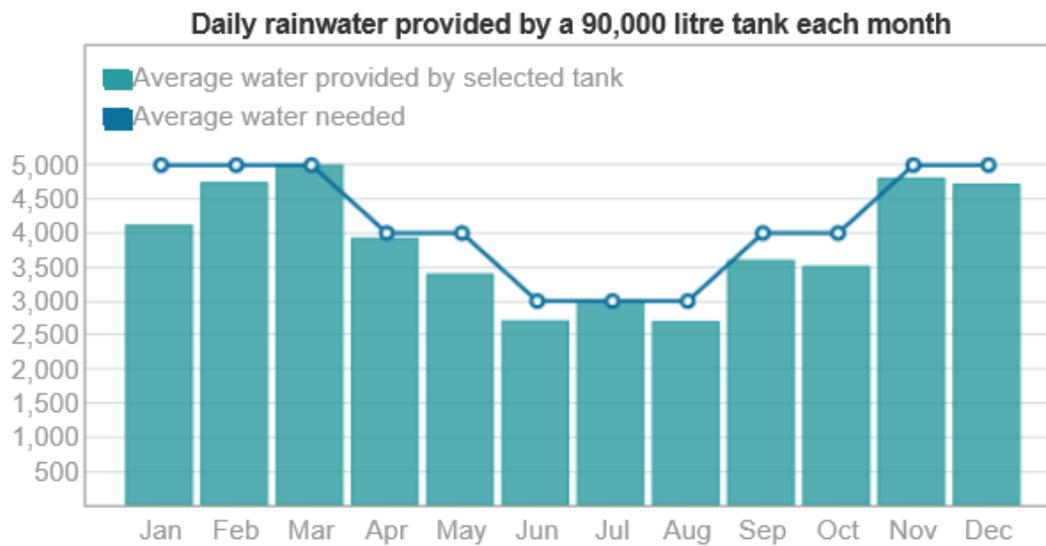


Figure 12 - Daily Rainwater provided by a 90kL tank.

The benefits of rainwater collection reduce when a certain tank size and capacity is reached. From the above two figures, it shows that an increase of tank size from 90kL to 120kL only changes the average daily capacity by 5%.

Based off this volume, the footprint of the proposed tank can be 6m x 6m x 2.5m.

7.3 Recommendation – Water Harvesting

The use of the rainwater harvesting system for the proposed building would have beneficial effects to the sustainability of the new development whilst having a positive impact on the clients running cost and overall water usage.

The proposed KSWSLP poses an approx. water demand of 5kL per day for combined irrigation and toilet flushing usage. Options for rainwater harvesting tank have been provided based on these demand and are summarised below:

Option 1 - Irrigation

- A 30,000 Litre tank is recommended as it can provide 98% of the daily water needs for the irrigation of 500m².
- Sized at 4m x 4m x 2m.

Option 2 - Toilets

- A 40,000 Litre tank is recommended as it can provide 85% of the daily water needs equating to 3.5kL peak usage.
- Sized at 4m x 4m x 2.5m.

Option 3 – Irrigation and Toilets

- A 90,000 Litre tank is recommended as it can provide 92% of the daily water needs for the irrigation of 500m² and 3.5kL of water for toilets.
- Sized at 6m x 6m x 2.5m.

Option 3 provides a more efficient and optimal solution based off the roof area and is a subject of further investigation to maximise the harvesting and storage capability beyond the 90,000 Litre.

It should also be noted that an in-site filtration system is also being investigated to treat the roof area run-off as the roof area is a fully trafficable area and is subject to debris and dirt from shoes, waste, animals etc.

The final arrangement of the Water Harvesting System will be developed as the detailed design is progressed.

7.4 Water Sensitive Urban Design

7.4.1 Fittings & Fixture Selection

The Design will consider the selection and application of 5-star WELS rated fittings/fixtures:

- > Toilets with 3L/half-flush and 4.5L/full flush
- > Indoor Taps with 4.5L/min (as opposed to typical 9L/min)
- > Shower Heads at 7.5L/min
- > Urinals at 1L/flush



